



Review of Blackfriars Bridge

ETSC project – Voice

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Note

European Transport Safety Council (ETSC) has asked Søren Underlien Jensen, Trafitec, to review the current layout of Blackfriars Bridge and a preferred option by Transport for London (TfL) of 04.03.2005 of the same bridge. The preferred option is enclosed.

About 30,000 cars and 2,000 cyclists cross the Thames on Blackfriars Bridge on an average day. About 300 buses stop at each bus stop located on the south side of the bridge. Pedestrian counts indicate about 20,000 pedestrians on an average day.

Prime cyclist safety problems on the bridge seems to be improper lane changing / overtaking behaviour and major differences in motorists and cyclists speeds that cause rear-end collisions.

Site visit

A site visit was made on the 2nd September 2005. It focused on Blackfriars Road and Bridge from (including) the junction at Stamford Street in the south and to (including) the junction at Queen Victoria Street in the north. This section of Blackfriars Road is about 500 metres long. Two other junctions are located on this section at the Embankment and Upper Ground.

General knowledge about cycle facilities

A cycle facility needs to be at least 1.7 meter wide in order to be able to include a cyclist overtaking another cyclist. At this width, the overtaking cyclist is actually hampered due to too narrow safety distances. With natural safety distances, the facility needs to be 1.85 meter.

Cycle facilities that are narrower than 1.7 meter will result in often dangerous “dart outs” on the driving lane, footway or other areas. In cases of “wide cyclists” (up to 1.0 meter) e.g. due to cycle trailers, the cycle facility needs to be 2.2 meter wide in order for an ordinary cyclist to overtake properly. Less than a quarter of cyclists do look backwards when making dart-outs, merging, right-turns etc.

Implementing cycle facilities like segregated cycle paths, cycle paths along roads (cycle tracks) and cycle lane in urban areas do in general not change the number of accidents to any greater extent. **This means:** Cycle paths, tracks and lanes should not be implemented due to safety considerations in urban areas – but be implemented primarily to improve the level of service (LOS) that cyclists experience and secondly to increase the number of cyclists. A normal 2.0 meter wide cycle track with kerb to driving lane improve LOS about 70 percent more than a normal 1.5 meter wide cycle lane with only white markings to the driving lane (Jensen, 2005).

Cycle paths and tracks result in no change in safety (Elvik et al., 1997; Jensen et al., 2000). Cycle lanes result in 10 percent increase of bicycle accidents (Smith & Walsh, 1988; Nielsen et al., 1996; Coates, 1999). Too narrow cycle lanes increase the number of bicycle accidents much more (Wegman & Dijkstra, 1988; Herrstedt et al., 1994). **This means:** Cycle lanes less than 1.2 meter wide should not at all be implemented.

In general, cycle facilities reduce the number of accidents on links, but more accidents occur at junctions. A reason to cycle lanes lack of safety efficiency is that cyclists right turns at junctions still are as dangerous as in mixed traffic. Other reasons are cyclist dart-outs and motorists parking on the cycle lane. In general, there are major differences in the effect of applying cycle facilities primarily due to junction design elements and topography / hilliness (speed of cyclists). There is evidence which indicate that cycle facilities provide safer conditions on trafficked roads (over 12,000 vehicles per day) and unsafer conditions on less trafficked roads (Keller et al, 1979).

Review of current layout of Blackfriars Bridge

In the following are comments to the current layout of the 500 meter section of Blackfriars Road that was included in the site visit. Two questions should always be answered when reviewing a layout:

- Is the infrastructure for cyclists visible, used and logical to all road users?
- Are road user conflicts visible and clear to involved users?

In addition there are several questions about speed, parking, junction design, etc. The following are comments.

The junction Stamford Street / Blackfriars Road is compact and heavily used. It lacks one pedestrian crossing (west side). The advanced cycle box on the north side is not used by cyclists but rather by motorists. If the dangerous manoeuvre of right-turning cyclists that make the right turn in one stage (in stead of two: straight forward – turn at corner – straight forward on next green signal) is to be maintained then motorists behaviour at stop lines should be enforced. Another possibility is to use wider stop lines (white) e.g. 0.5 meter. This junction is otherwise good due to the compact and easy-to-understand layout.



The dual-way cycle facility in the middle of Blackfriars Road between Upper Ground and Stamford Street is not used by most cyclists. This facility should be closed and the space should be used for other purposes.



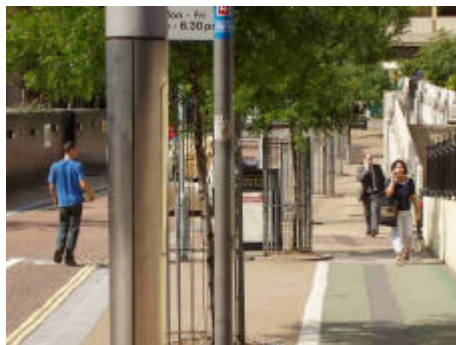
The carriageway of Blackfriars Road on this short section between Upper Ground and Stamford Street is narrow on the west side. This provides poor conditions for the cyclists, and the cyclists actually hamper cars moving forward in the outer drive lane. This is critical here (creates frustrated motorists) because cyclists are slow upwards towards the bridge.



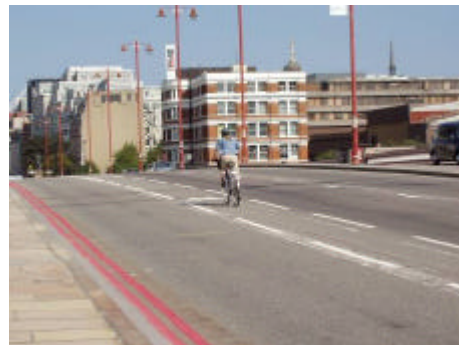
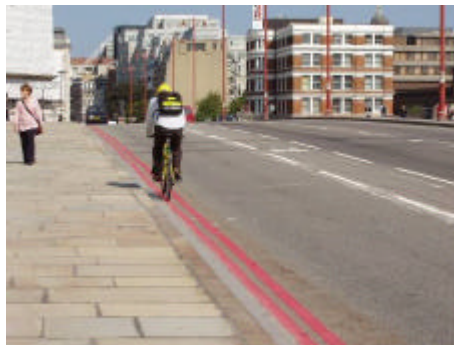
The push-buttons at the signalised pedestrian / cyclist crossing at Upper Ground are only partially used. Cyclists apparently prefer not to wait at the signal when cycling on the southbound cycle lane across the bridge, but merge into the traffic across two driving lanes. The layout with cycle lanes do not prevent the merging manoeuvres.



The cycle facilities on Upper Ground next to Blackfriars Road are not logical. The street Upper Ground and the junction Upper Ground / Blackfriars Road are therefore used in various ways by cyclists, which mean that cyclists in practice are all over the street.



The northbound cycle lane is located between a left-turn lane and a continuing straight forward driving lane. Most cyclists use this lane, but merge into the cycle lane from a location near the kerb at various points across the bridge. This results in many improper lane changes. The reason for this is an unclear start of both the left-turn lane and the cycle lane. The left-turn lane is much too long compared to its traffic volume, and its markings at the start of this lane is “hidden” just after the bus stop. The cycle lane is too narrow in relation to having cars driving 20-35mph in lanes on both sides of the cyclist.



The southbound cycle lane on the bridge is much too narrow at the beginning after Queen Victoria Street. The cycle lane seems to be used both by cyclists and motorists. It creates dangerous situations due to many different manoeuvres. Cyclists merging towards Embankment start the merge at various points. The southbound cycle lane on the bridge seems to work well until the bus stop. However, the bus lane seems rather ridiculous to have on the bridge and not up the junction at Stamford Street, where it actually would provide time savings for bus passengers if bus priority was in place at the signalised junction.



The east side bus stop is dangerous to cyclists because they will be “clipped” trying to cycle around the stopped bus. Cars go fast here if the light is green at the pedestrian crossing. At this place there is only one drive lane, but cars may squeeze towards the left-turn lane and outer through-lane in relation to the junction at Stamford Street.



The west side bus stop may also be critical, but not when the bus is stopped – rather when the bus starts from the bus stop. The problem here is that buses continuing northbound on Blackfriars Road after Embankment will have to merge both with very slow cyclists and fast right-turning and through-going motorists. This mix of slow and fast can create difficult situations for bus drivers.



The pedestrian-free junction Embankment / Queen Victoria Street / Blackfriars Road constitute some problems to cyclists in the current layout. Besides those mentions previously there are four very-easy-to-detect problems:

- The right-turn for cyclists going to Embankment
- The merge with traffic coming from Embankment
- The right-turn for cyclists going to Queen Victoria Street
- The north-west corner

Any type of right-turns for cyclists is difficult at this junction due to the layout. It must be rather difficult to actually place your self as cyclist correctly in this junction. The tight north-west corner is cornered by motorists in a way leaving only half a meter to cyclists.



Review of TfL's preferred option for Blackfriars Bridge

This option includes a northbound 1.5-2.0 meter wide cycle track on the west footway, i.e. with a kerb to motor traffic, see enclosure. The cycle track begins at Upper Ground and terminates into a separate signal phase for cyclists at the Embankment. One drive lane is replaced by a bus lane on the bridge. At the west bus stop there is a bus platform between the cycle track and the stopped bus.

This option will resolve two current problems at the west side bus stop and the northbound cycle lane.

However, it will also create four new problems:

- Northbound motorists going to the Embankment will have to merge into one drive lane if a bus is stopped at the west side bus stop or stop behind the bus at the bus stop. This will possibly create new merging accidents.
- The layout with a bus platform between a cycle track and a stopped bus is not well-known among road users in England. This will create many conflicts between pedestrians and cyclists, because most of them are not familiar with or take no notice to the actual give-way regulation. Most problems will occur between boarding bus passengers and cyclists in this layout, however, since cyclists are going slowly uphill and there are only 300 buses per day, the problems don't have a great magnitude. It is wise to have all waiting facilities for bus passengers on the platform.
- The cycle track without a kerb to the pedestrians on the bridge will also constitute a problem due to magnitude of both pedestrians and cyclists, because pedestrians will dart-out onto the cycle track from the only 2.7 meter wide footway. The colouring of the cycle track will not fully prevent this.
- Many cyclists will ride on red at the separate cycle phase at the Embankment, because they only have to cross one left-turn lane with "not so much" traffic. It is only wise to use this layout if there are more motorists turning left in two lanes. The left-turn lane needs only to be about 60-70 meters long. Since cyclists are riding fast here, it is best to terminate the cycle track as the left-turn lane starts, i.e. 60-70 meters before the junction and then let left-turners and cyclists merge in the left-turn lane. However, a possibility is to use early cut-off regarding green-time for left-turners so cyclists starting at green from the separate phase can ride through the entire junction without stopping again for red (except those turning right to Queen Victoria Street).

The many other problems mentioned in the review of the current layout are not addressed within the preferred option from TfL.

TfL's strategy is also to introduce 20mph limits on Thames bridges. Realistically this will not be met by motorists on Blackfriars Bridge in many hours of the day outside peak hours.

Empirical studies of changes of speed limits and traffic calming also shows that the decline in casualty (and injury) rate for cyclists is only about one third compared to the decline that pedestrians and motorists experience.

This means: A change in speed limit to 20mph on Blackfriars Bridge must be heavily enforced in order to actually result in better safety – and cyclist safety will not improve considerably anyway.

Suggested redesign

Install the missing pedestrian crossing at the junction with Stamford Street. Remove the advanced cycle box at this junction and force cyclists to do right-turns in two stages – possibly also design junction corners for this.

Start a northbound cycle lane or track right after the incoming left-turn lanes from Stamford Street. Remove the dual-way cycle path in the middle of the street.

Continue the cycle lane or track across Upper Ground. Have a narrow (max. 2.5 meter wide / minimum 1.5 meter wide bus platform between the cycle lane or track and the stopped bus. Let the cycle lane or track be next to the current footway. Terminate the cycle lane or track 60-70 meters before the Embankment and start the left-turn lane to the Embankment here. No northbound bus lane on the bridge, but two normal drive lanes.

On the east side: Remove the bus lane on the bridge. Increase the length of the left-turn lane to Stamford Street with about 20 meters starting with the bus stop. Terminate the cycle lane right before the bus stop, i.e. the cycle lane or track should not be continue all the way down to Stamford Street, because cyclists are riding fast. Redo the combined pedestrian and cycle crossing to Upper Ground so it is easier to understand that cyclists are to use this crossing, i.e. a crossing that cross straight over and isn't bend in the middle.

Northbound and southbound cycle lanes or tracks should be at least 1.85 meter wide.

The complex junction Embankment / Blackfriars Road / Queen Victoria Street should also be redesigned. The south part could be changed into a more compact T-junction with two traditionally right-turn lanes from Blackfriars Road to the Embankment. The length of these right-turn lanes can be up to 30-35 meters i.e. holding 8-10 ordinary passenger cars. The north part of the junction could be changed into a two lane roundabout. Another alternative could be one long oval-shaped roundabout. A third alternative could be two traditional compact signalised junctions.

A possibility is to install bus priority at Stamford Street and at Embankment. Whether this actually is realistic in terms of capacity is unknown to the author of this review.

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