

Advanced Green Cycle Filters:

Design and Implementation

Experienced gained in Cambridge and Norwich

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Synopsis:

In August 2013 Cambridgeshire County Council was granted Department for Transport authorisation to use a green cycle filter at the Catholic Church Junction in Cambridge. At this time the use of an advanced green filter for cyclists was the first DfT approved for the country and is now being implemented elsewhere in the country.

Since 2013 the use of advanced green cycle filters has now been approved for further trials, installed and is operational at other locations throughout the country, including another site in Cambridge and one in Norwich. Details of other approved locations can be found at <http://www.dft.gov.uk/traffic-auths/>

Introduction:

Britain's top cycling city is Cambridge where one in three journeys is on two wheels, and where there are more cycle lanes and bike parks than anywhere in Britain. Research has also identified that 30% of commuters travel by bicycle and over half of the city's population travel by bicycle at least once a week.

Consequently Cambridgeshire County Council has been at the forefront of providing cycle related infrastructure to cope with the demands of cyclists, including the introduction of Advanced Stop Lines (ASLs) in the late 1980s and being one of the first authorities to trial nearside Toucan crossings as well as rolling out traffic signal controlled junctions with separately signalled cycle only stages. The growth of cycle use in the city has been such that junctions that already incorporate cycle facilities are having to be re-designed to accommodate the additional cycle traffic, such as the junctions on Hills Road Bridge.

With the increase of cycling journeys, safety concerns are being realised at certain junctions within the City. As a result consideration is now being given as to other types of cycle facilities that could be introduced that would provide a benefit to cyclists without unreasonably affecting other road users. One such measure is the introduction of Advanced Green Cycle Filters.

Advanced Green Cycle Filter:

So what is an 'advanced green cycle filter?'

An advanced green cycle filter is a green cycle aspect fitted below the associated green on a traffic signal head. Its position on a traffic signal head is at the normal height for a bottom optic.

Its appearance is configured in the same way as a left turn filter arrow, appearing before the full green to traffic and terminating when the associated full green appears. See Figure 1 - Advanced Green Cycle Filter.

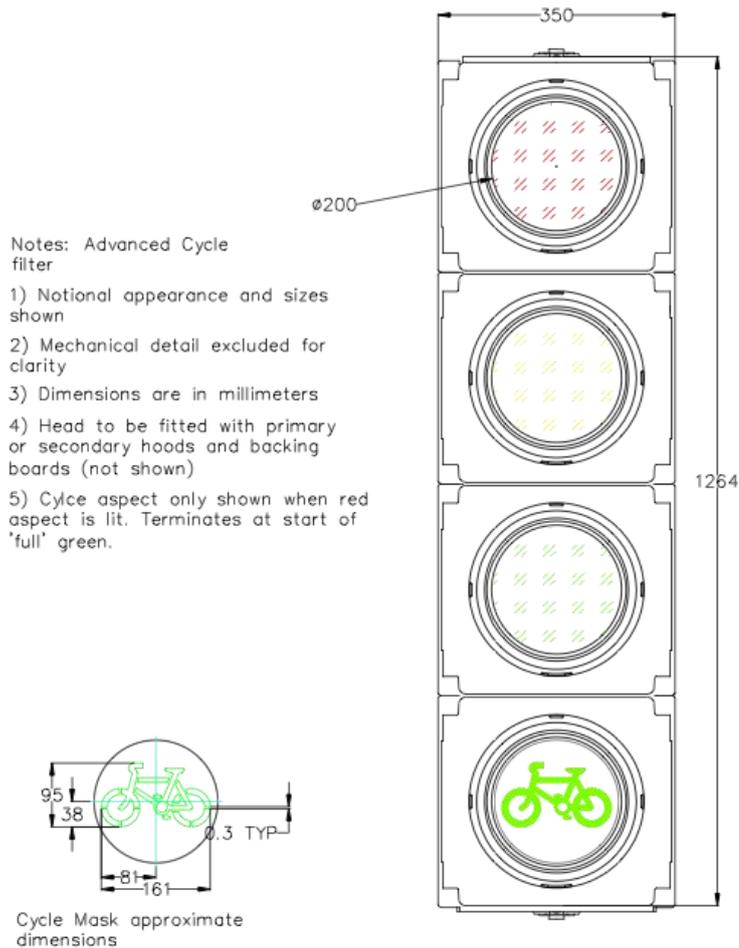


Figure 1 - Advanced Green Cycle Filter

The appearance of the advanced green cycle filter is not a full sequence and has to be followed by the normal green. See Figure 2 - Advanced Green Cycle Filter - Appearance & Termination overleaf)

The appearance of the advanced green cycle filter is not fixed in the stage sequence and is demanded only by cyclists in the ASL. The length of time of the green cycle aspect appears can also be extended.

The green cycle filters at the sites in Cambridge and Norwich have been designed not to be directional enabling cyclists to turn in any direction.



Figure 2 - Advanced Green Cycle Filter - Appearance & Termination

Cambridge Schemes:

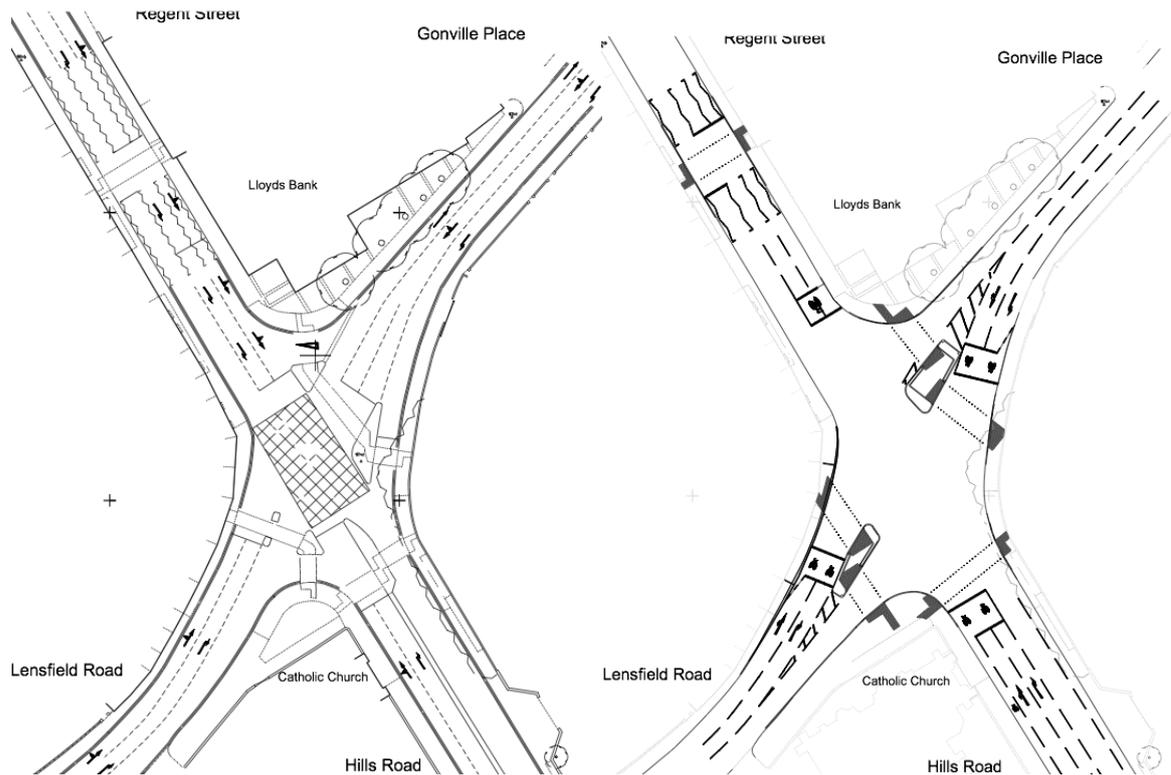
Catholic Church Junction: Hills Road, Lensfield Road, Regent Street, Gonville Place, Cambridge.

The first location selected in Cambridge to trial advanced green cycle filters was at the Catholic Church junction in Cambridge.

In the previous 5 years up to May 2013 there had been a total of 16 injury accidents of which 11 had involved cyclists. In addition, feedback from cyclists was that the junction was unsafe. Also due to the high volume of cyclists, drivers of other vehicles were being held up when the traffic signals went to green, leading to aggressive behaviour from both drivers and cyclists.

As part of the project the layout and operation of the junction was completely reassessed. The work undertaken at the junction also included refurbishing the traffic signals. Street clutter was reduced by combining the street lighting and traffic signal equipment.

One of the major issues of the previous layout was the geometry of the junction, the location of the existing islands and the overrunning of footways. The resulting design process looked at the existing pinch points and the number of existing centre islands. The resulting design removed all of the five existing centre islands, replacing them with two larger centre islands. As a result ASL waiting areas could be provided on all of the approaches to the junction and a cycle lead in on the Hills Road approach. Trixi mirrors were also installed on all approaches to help drivers see waiting cyclists.



Catholic Church: Junction layout before and after

Implementing the junction layout changes would not necessarily be enough to assist cyclists using the Hills Road approach.

The cyclists travelling on the Hills Road approach mainly travel across the junction into Regent Street, however many drivers are turning left, putting cyclists at greater risk from 'hooking' accidents.

Consequently the use of the Advanced Green Cycle filter was recommended for this location as cyclists could move ahead, gaining control of the lane, without other traffic turning left across them.

The Advanced Green Cycle filter uses standard features and equipment as the cycle aspect is already in use on separately signalled cycle lane approaches at traffic signal junctions. The only difference in this location is that it operates in an unusual combination. Furthermore as the equipment has been seen elsewhere it is not perceived as being new and is easily understood.



Magdalene Street, Northampton Street, Castle Street, Chesterton Lane, Cambridge:

This junction was decided as being suitable for the use of advanced green cycle filters due to the very large volumes of cyclists using the junction on the side roads (Magdalene Street and Castle Street). The junction is located on the north side of the city of Cambridge and is on the main arterial route to the north west of the city. It is also located near to Magdalene College and is well used by students on bicycles.

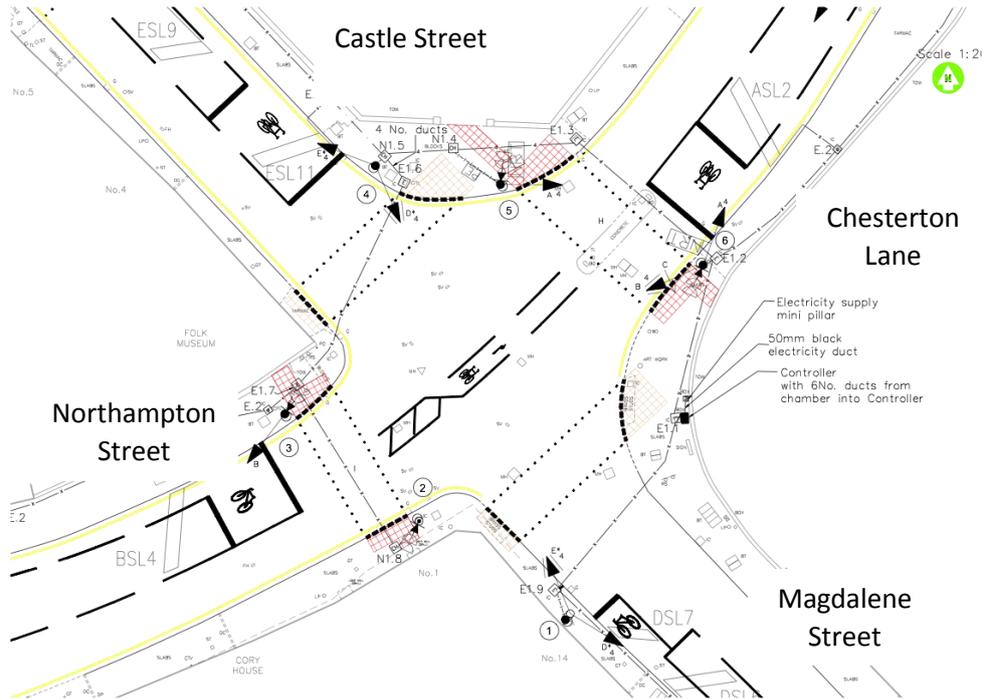
Due to the very high volumes of cyclists using both Magdalene Street and Castle Street throughout the day, it was determined that consideration be given to using advanced green cycle filters on both these approaches.



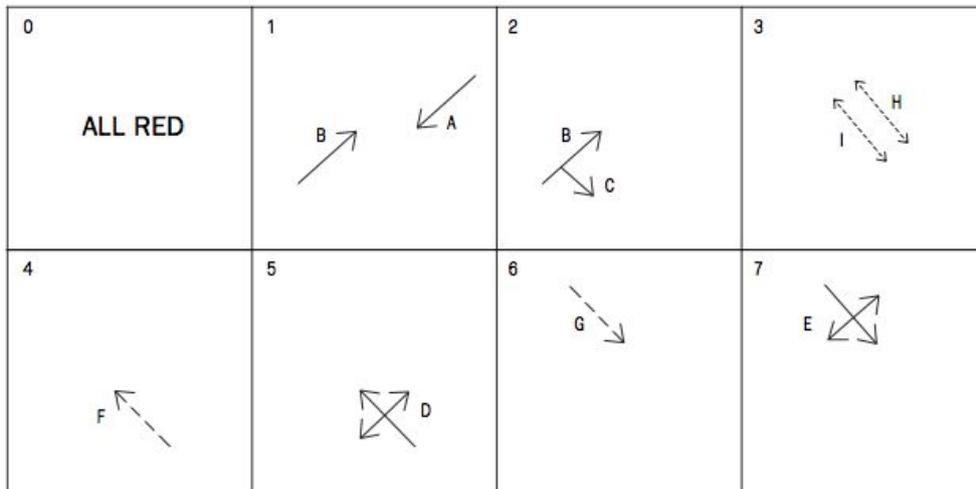
The implementation of this proposal was made easier as the existing stage sequence controlled the side roads in separate stages. Almost all vehicles turned from these side roads, whereas almost all of the cyclists travelled ahead.

The scheme was developed primarily as a refurbishment scheme, which included reviewing the location of existing remote pedestrian crossing points. The design also included extending the ASL on Castle Street to 7.5m and providing new ASLs on Chesterton Lane and Northampton Street. Detection was placed in the cycle lead in lanes as well as within the ASL on both the Magdalene Street and Castle Street approaches.

See following details of the site layout and stage sequence.



PHASING AND STAGING DIAGRAM
Stream 0



Phase F and G are the Advanced Green Cycle Filters for Magdalene Street and Castle Street respectively.

Norwich Scheme:

Colman Road, The Avenues, Norwich.

This junction was decided as being suitable for the use of advanced green cycle filters due to the very high volumes of cyclists using the junction on the side roads (The Avenues). The junction is located on the west side of the city of Norwich on the outer ring road connecting an east-west route from the city to the University of East Anglia. Consequently it is extensively used by students and staff travelling to and from the University by cycle.

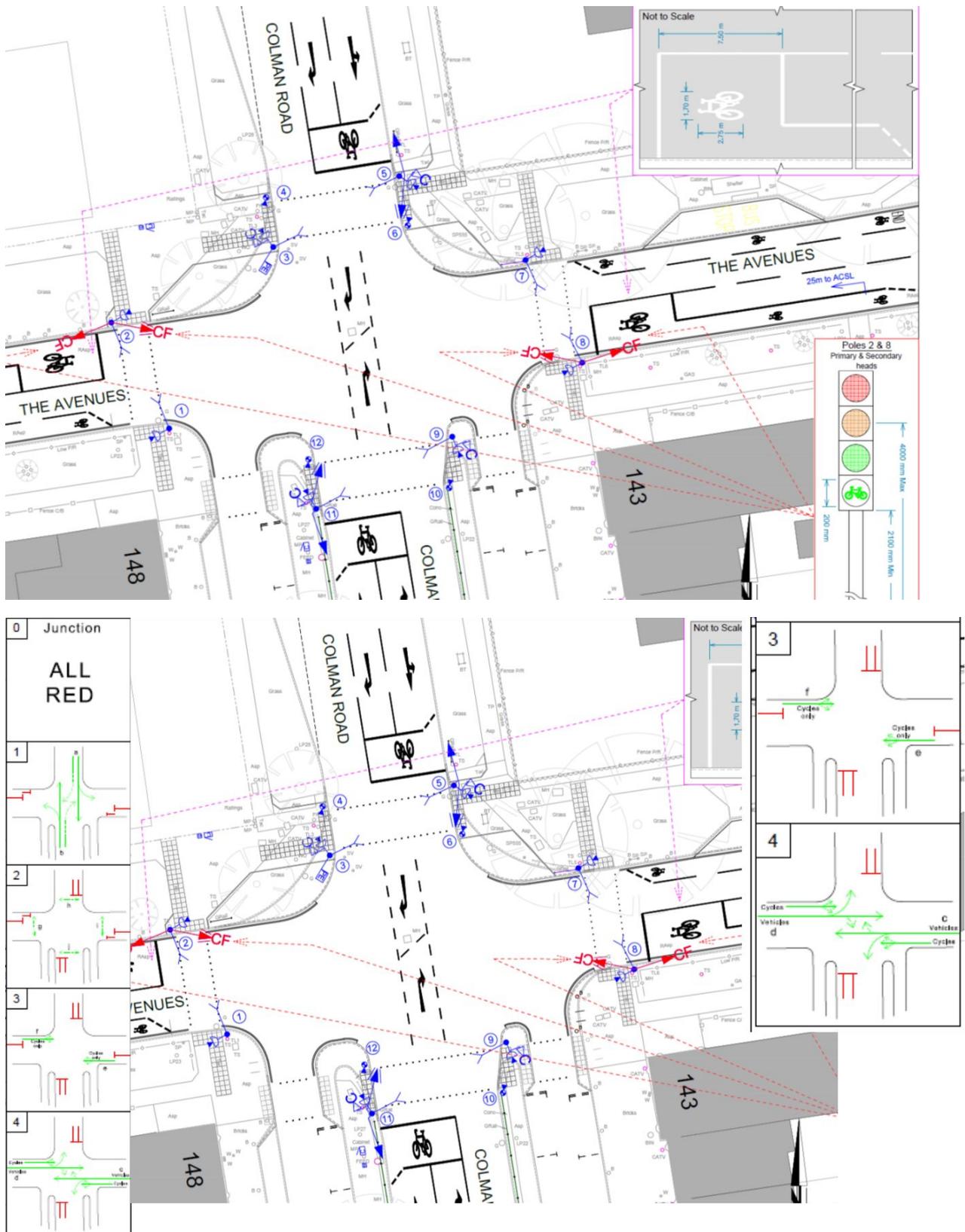
Due to the location of this junction being on the outer ring road priority is given to the main road and the green time given to the side road approaches is restricted. Consequently on site there are times when left turning vehicles have to wait for cyclists to clear the cycle lead in lane and ASL before being able to complete the turn. When this happens additional queuing results on the side roads.



From reviewing the traffic count, vehicles using The Avenues can turn in all directions whereas the cyclists generally travel ahead.

The junction is also located on the pink pedal way in Norwich and in August 2013 Norwich City Council was awarded a City Cycle Ambition Grant to upgrade and improve cycle facilities along the pink pedal way route.

The revised signal layout introduces Advanced Green Cycle aspects on both The Avenues approaches. It also includes the upgrade of the signal equipment and provision of additional pedestrian facilities, as well as the introduction of ASLs on all approaches. The existing ASLs on both The Avenues approaches have been extended from 4m to 7.5m in order to accommodate the high volume of cyclists.



Phase E and F are the Advanced Green Cycle Filters for The Avenues approaches.

Experienced Gained in the design and implementation of Advanced Green Cycle filters so far:

From the sites implemented so far, experience shows that the Advanced Green Cycle Filters are effective in providing safe progression for cyclists whilst minimising the impact on other road users. Whilst no accident data is yet available there is sufficient confidence in using Advanced Green cycle filters at other sites.

Whilst all of the schemes discussed did also include refurbishment of equipment the introduction of Advanced Green cycle filter are potentially inexpensive. They also seem to be simple, well understood and tolerated.

Their introduction does need to be carefully considered and site layout changes may also be required to ensure the advanced green cycle filter is effective. They can be used as a solution for helping cyclists to turn right safely across oncoming traffic or reducing the chances of accidents associated with left hooking. All of the schemes discussed were carefully considered in this regard and cycle movements assessed early during the design stage.

From the sites implemented in Cambridge it would appear that the advanced green cycle filter has been successful as it appears to be widely accepted by both cyclists and drivers. It also appears to be well understood and used correctly. The major benefit of the use of advanced green cycle filter is that it gets cyclists clear of the conflict points, before cars behind them start. The delay experienced by other road users also appears to be minimal due to the fact that previously vehicle movements would have been restricted by the cycle movements.

To implement advanced green cycle filters it is recommended that some 'rules of engagement' are adhered to:

- As part of the design process analyse the volume and direction of cyclists.
- Carefully consider use with opposing flows as the filter would put right turning cyclists in front of oncoming traffic as it starts. This is not an issue when used with non-opposing flows.
- Single phase for general traffic - cannot be used where turning traffic is controlled with arrows.
- High numbers of cyclists - otherwise it's wasteful, annoying and probably ignored by drivers.
- Good feed in lanes, cyclists must be able to get to ASL either with cycle lanes or wide traffic lanes.
- A large ASL, - get cyclists to the front so they can use it.
- It needs careful design - although the filter light itself 'just bolts on', a lot of thought is required and other changes may be needed, including reconfiguration of the controller.
- As with everything, the design (and therefore designer) is critical for it to be effective. Don't decide to use it without assessing the site properly first.