



# Protected Junctions for Cyclists

**CYCLOPS – CYCLeOptimisedProtectedSignals**

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# CYCLe Optimised Protected Signals



# Pre-2010

## Advanced Stop Line



On carriageway

## Toucan



Off carriageway

Cycle Gate



Early Release



# Cycle Stage



# Hold-the-Left



# Assessing Existing Junction Protection Measures

		Forms of Protection for Cyclists at Signal Junctions			
		Early Release	Cycle Gate	Cycle Only Stages	Hold-the-Left with 2-Stage Right-Turn
Evaluation Criteria	Conflict	Poor	Moderate	Good	Moderate *
	Capacity	Poor	Poor	Poor	Good
	Delay	Good	Poor	Poor	Moderate
	Spatial Efficiency	Good	Moderate	Good	Moderate
		*Good for cyclists travelling ahead/left, uncertain for 2-stage right-turners			

UK lacks 'give way on turning' and 'presumed liability' rules meaning that we cannot display green to pedestrians and cyclists at the same time as displaying green to general traffic that may turn left or right through the pedestrian or cycle phase.

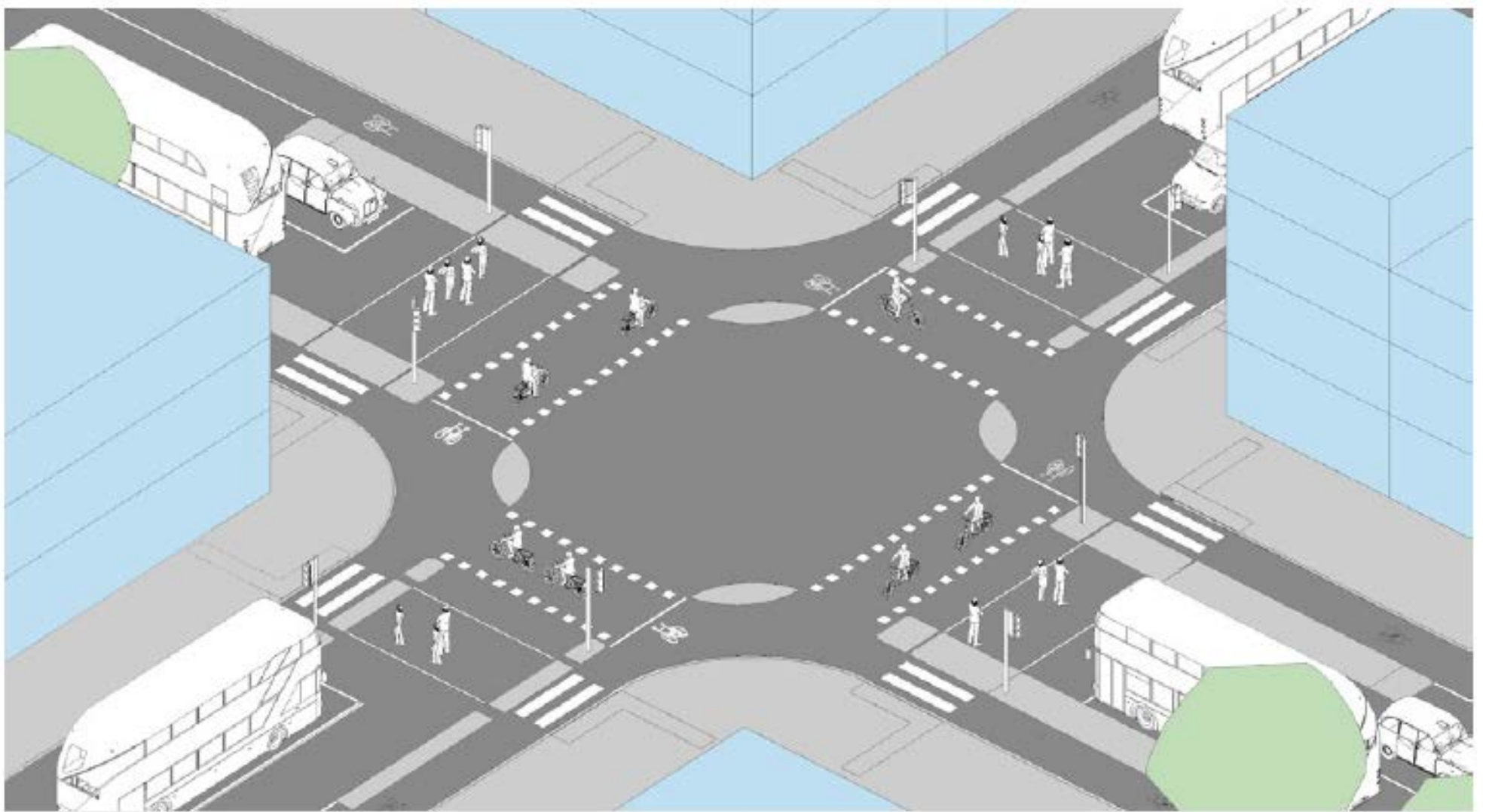
Dutch / Danish designs don't easily convert into the UK context

Dutch style Protected junctions?



Not compliant with UK rules





Concept sketch for a junction redesign involving island protection

# London Cycling Design Standards

# Lea Bridge Road



1. Pedestrian routes and areas should be clear and intuitive (including for the visually impaired) and not compromised in order to accommodate cycle facilities
2. Cyclists should ideally be treated as a separate mode independent of vehicular traffic
3. Cyclists, pedestrians and vehicular traffic modes should be separated in space or time
4. Identify and manage inter/intra-modal user conflicts eliminate, minimise, simplify, signalise?
5. Cycle / traffic conflicts will typically require signal control
6. Cycle / pedestrian interaction should be simple and intuitive with points of conflict preferably not managed by signal control
7. Cycle / cycle only conflicts should be simple and intuitive and preferably not managed by signal control
8. Cycle movements should not be subject to unnecessarily tight turning radii
9. Aim to minimise divergence from pedestrian desire lines and shorten crossing distances
10. Aim to minimise cycle movements subject to signal control by eliminating conflict or simplifying interaction with vehicular traffic
11. Aim to allow cyclists to bypass or be exempted from traffic regulation orders prohibiting movements that apply to general traffic
12. Aim to provide sufficient space such that cyclists waiting to make a movement do not block cyclists with an alternative destination
13. Minimise any potential negative impact of new facilities on all junction users and the road network

Vulnerable road users suffer disproportionately from bad design

Cyclists are silent

Good stakeholder engagement

Ensure Pedestrian routes are distinct and navigable

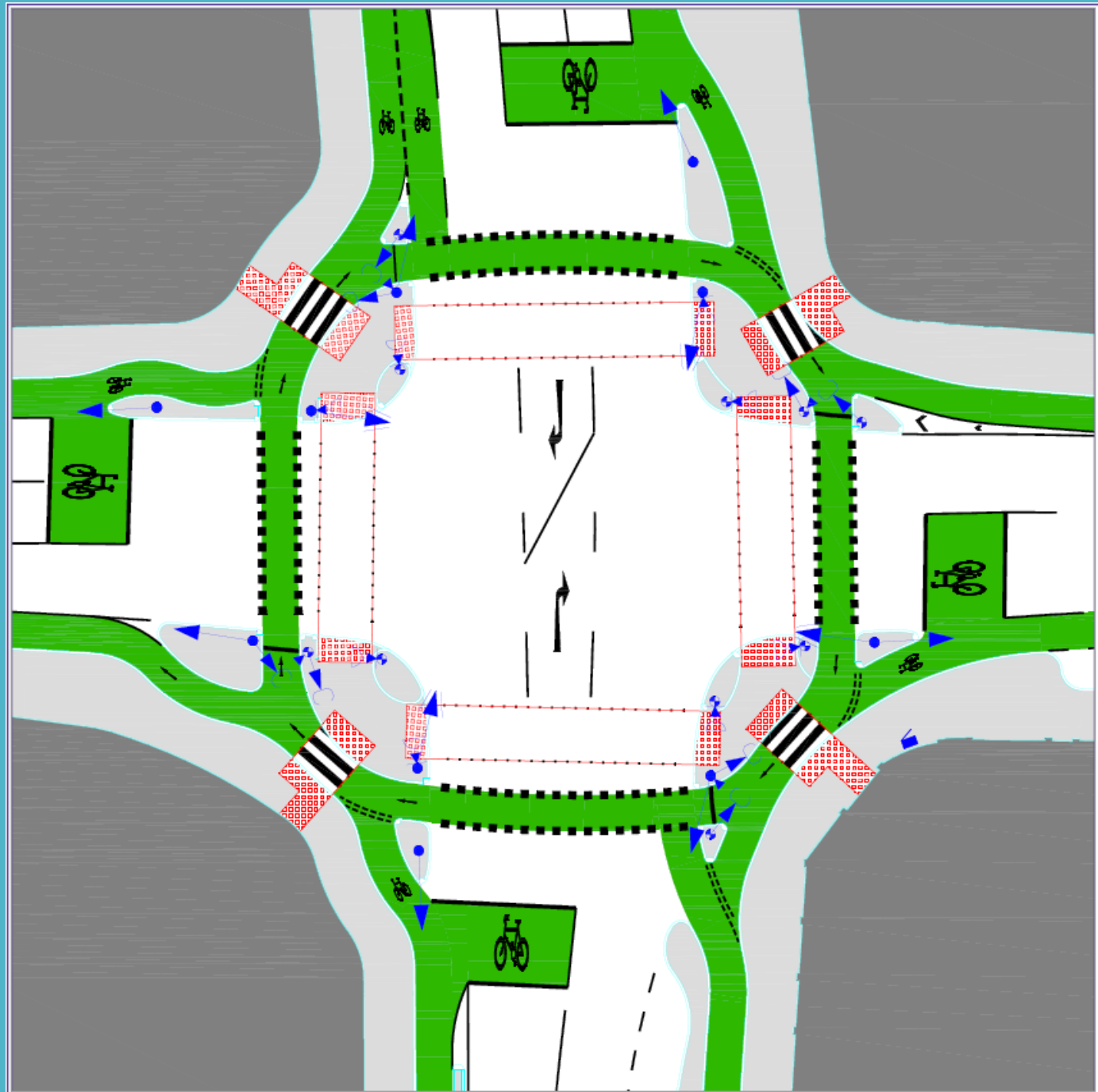


Wilmslow Road Cycleway - Post scheme completion monitoring

# Royce Rd CYCLOPS

Manchester's prototype fully protected junction.

- External cycle track
- Signal controlled pedestrian facilities across carriageways
- Zebra or informal crossings of cycle track
- Cyclists can use the new signalled cycle track *or* the main carriageway





## CYCLOPS: The Benefits of an External Orbital Cycle System

In addition to minimising the number of phases/stages required to accommodate all movements, orbital cycle systems have other important benefits:

1. All cycle-traffic conflicts can be signalised
2. Cycle phases can run simultaneously during an 'all red to traffic' stage
3. Cycle / cycle conflicts are simple, intuitive and need not be signalised
4. Cyclists can make fully protected 2-phase right-turns (subject to signal staging and timings, this may be achieved in one movement or with little delay)
5. Controlled cycle and pedestrian phases need not conflict and can run simultaneously
6. Accommodating multiple origins/destinations is more straightforward

In a conventional highway cross-section, cyclists are positioned between the vehicular traffic and pedestrians. When designing a junction incorporating an orbital cycle track,

it would at first appear logical to maintain this spatial relationship such that cyclists are located within the area bounded by the pedestrian crossings of the junction arms – in essence, an **internal** orbital system.

On further investigation, there were actually numerous advantages with an external orbital system. The following benefits are realised (or can be achieved within a smaller junction footprint) when the cycle track is **external** rather than internal:

1. Larger orbit radius ensures
  - more space for storage at cycle signals
  - more comfortable, longer turning radii
2. Cyclists can filter left onto and off the orbital route without signal control
3. Controlled pedestrian phases are shorter and closer to desire lines
4. Potential for diagonal pedestrian crossings
5. Potential for complex signal staging incorporating walk-with-traffic pedestrian phases



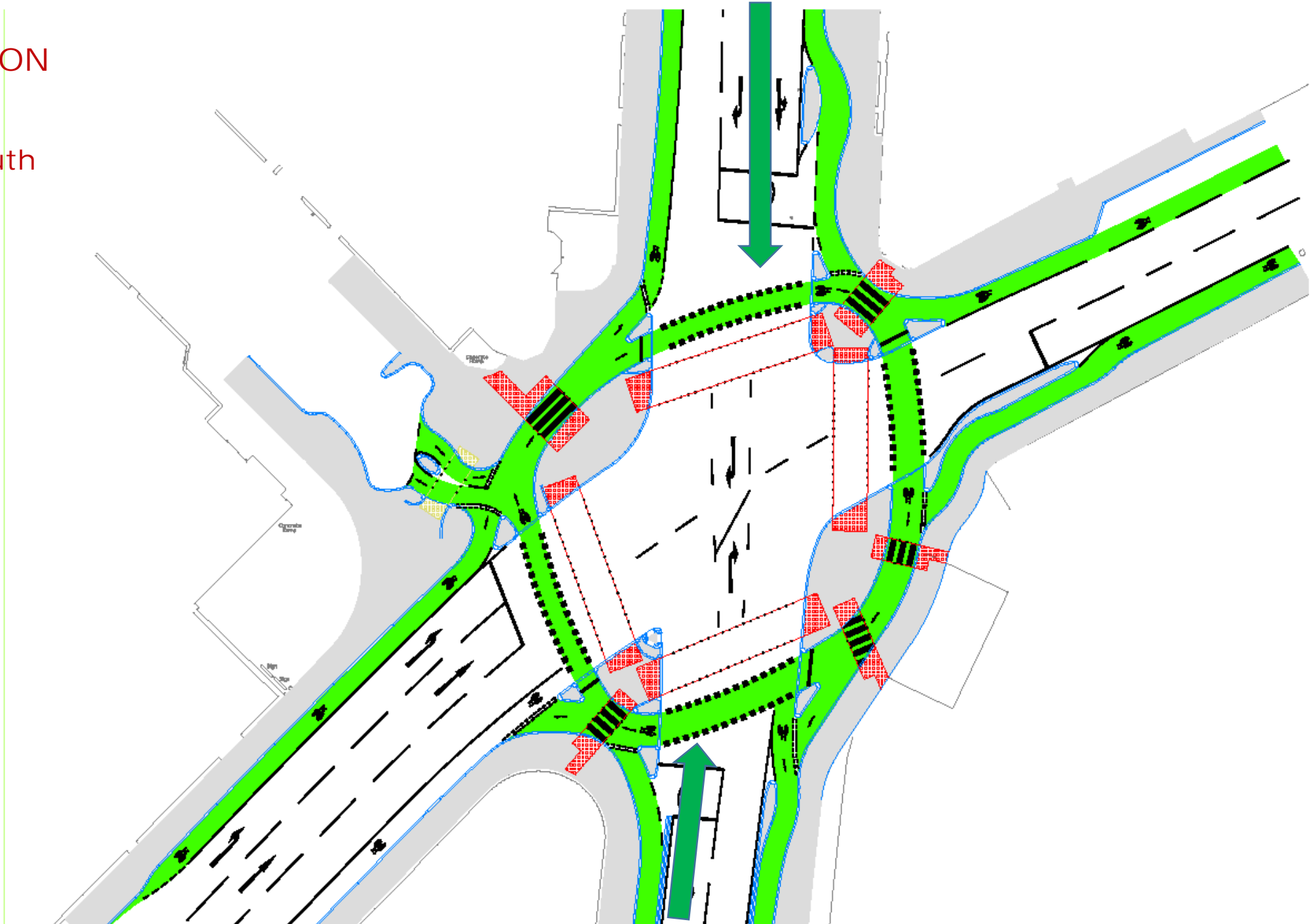


## 3 STAGE JUNCTION

### STAGE 1: Traffic North & South

Pedestrians can access the signal controlled crossings via zebras (or uncontrolled crossings) at any time

Cyclists can filter on to the circulatory and left off at any time

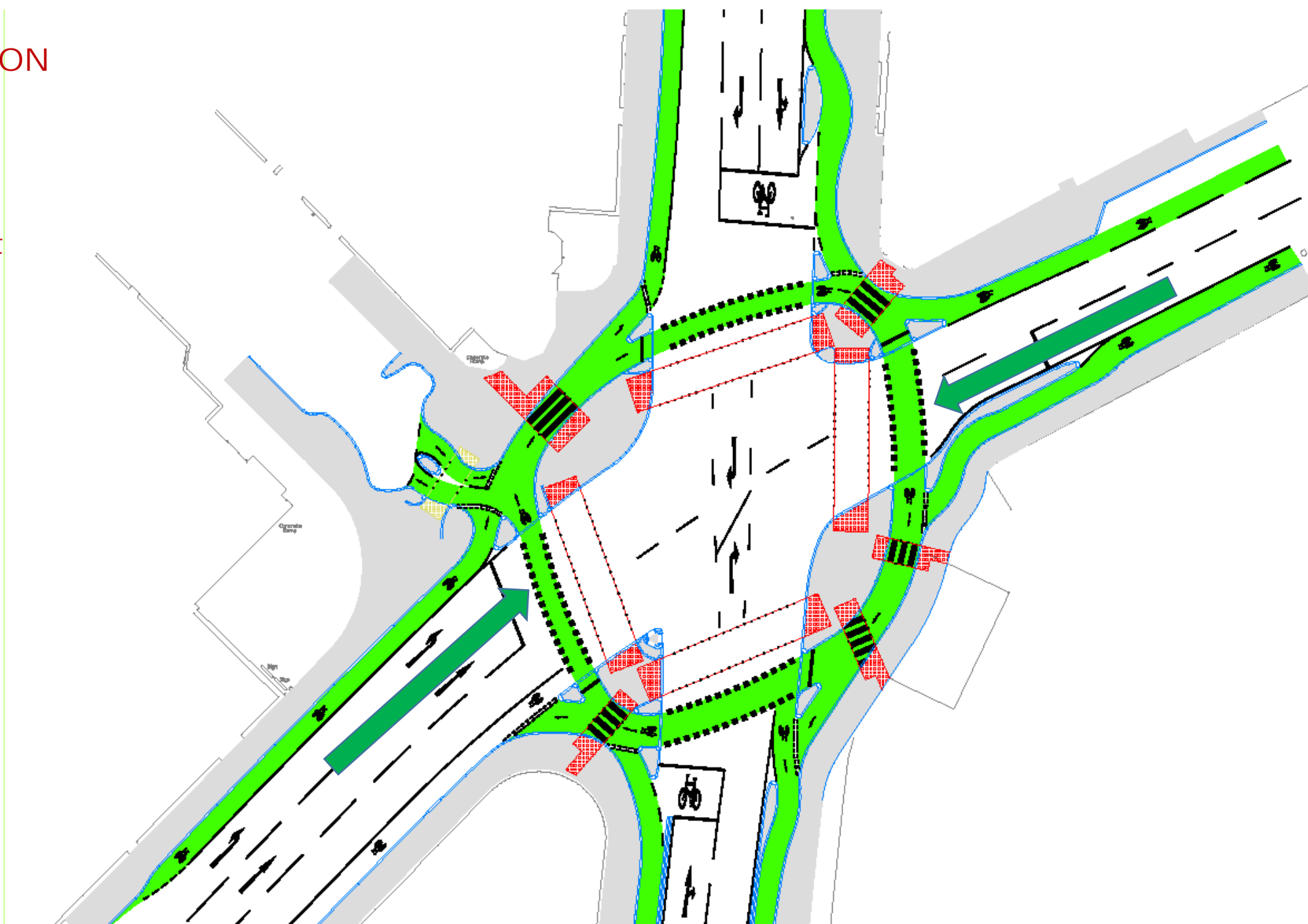


## 3 STAGE JUNCTION

### STAGE 2: Traffic East & West

Pedestrians can access the signal controlled crossings via zebras (or uncontrolled crossings) at any time

Cyclists can filter on to the circulatory and left off at any time

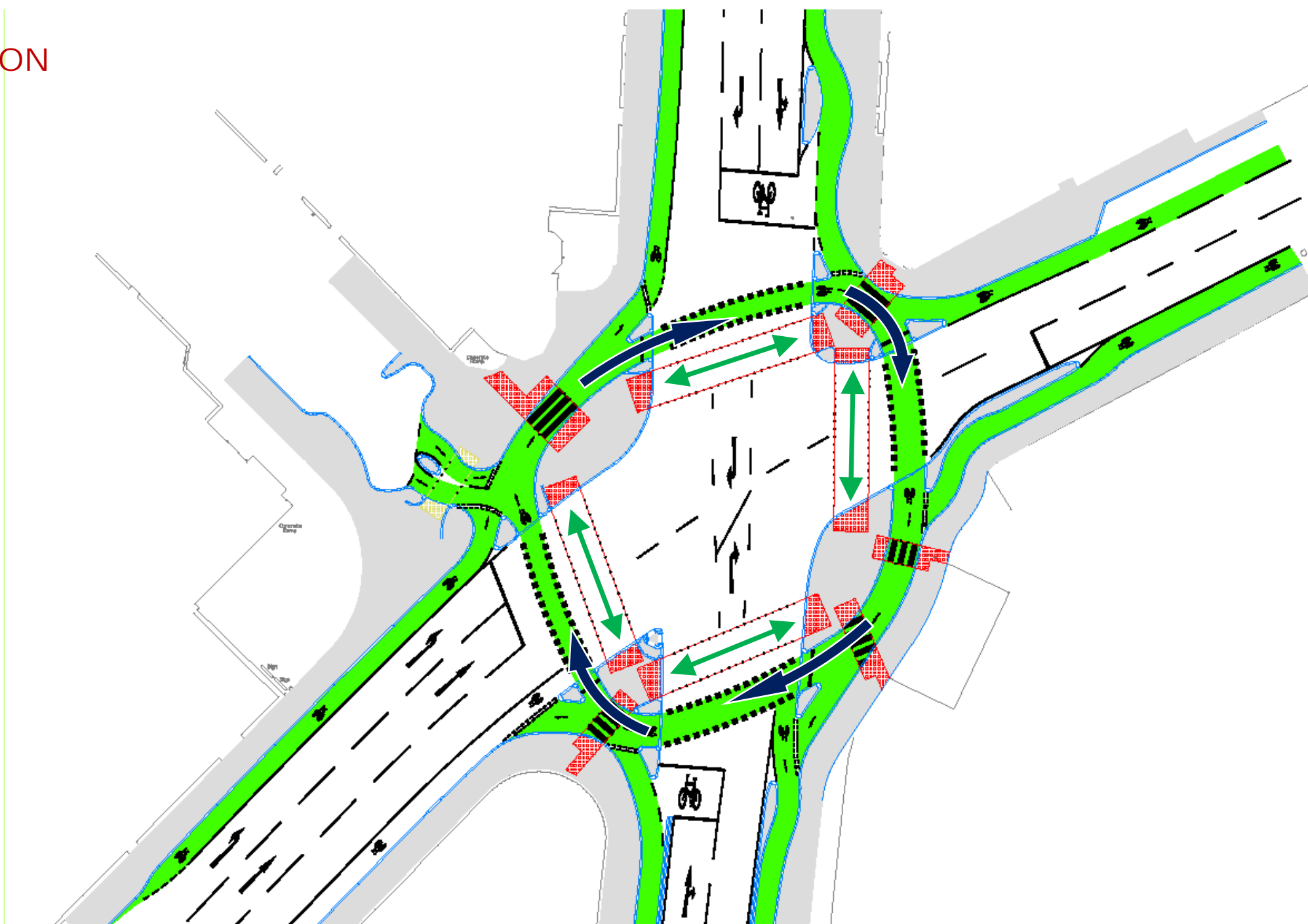


## 3 STAGE JUNCTION

### STAGE 3: Cycles and Peds

Pedestrians can access the signal controlled crossings via zebras (or uncontrolled crossings) at any time

Cyclists can filter on to the circulatory and left off at any time



# Comparison of CYCLOPS with Existing Techniques

		Forms of Protection for Cyclists at Signal Junctions				
		Early Release	Cycle Gate	Cycle Only Stages	Hold-the-Left with 2-Stage Right-Turn	CYCLOPS
Evaluation Criteria	Conflict	Poor	Moderate	Good	Moderate *	Good
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	Delay	Good	Poor	Poor	Moderate	Good*
						Moderate
Spatial Efficiency	Good	Moderate	Good	Moderate	Good	
<p>*CYCLOPS can be categorised as 'Good' for 'Delay' as multiple cycle movements can bypass signal control, and, cycle phases may be able to run in multiple stages running in parallel with traffic phases as well as pedestrian phases. Hold-the-left or similar efficient phasing regimes can be designed within the external circulating cycle track.</p>						

# Diagonal crossings...



Complex internal layout...



# Separate left turn lane...



# Protected junctions for cyclists

## CYCLOPS – **CYCL**e**O**ptimised**P**rotected**S**ignals

More info at: [www.tfgm.com/press-release/new-junction-design](http://www.tfgm.com/press-release/new-junction-design)



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