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Observation in relation to Planning Appeal PL06F.248970 - Fingal County Council Ref F16A/0412 at Stapolin, Baldoyle

A chairde

I made an observation to Fingal County Council in relation to the above planning application focussing on the Grange Road junction and other pedestrian/cyclist design issues. The issues raised in my observation were not analysed in the text of the planner's report but the following condition in the decision requires details, to include measures to prioritise cyclists, to be resolved between the applicant and the Council at a later stage:

> "Prior to the commencement of construction, the developer shall submit the following for the written agreement of the Planning Authority;
>
> - "The final details of the revised road design and junction layout along Stapolin Avenue and accessing Block 01
> - "The locations and detailed design of traffic calming throughout the development. Traffic calming measures shall also be reviewed prior to taking-in-charge.
> - "The details of the revised Grange Road signalized junction to include measures to prioritise cyclists. The junction shall be constructed at the developer's expense.
> - "The final details of the surfacing proposed to the bus ramp in the north-western corner of the site and any associated pedestrian crossing measures/design features."

Given that, as pointed out in the observation, the proposed design is in conflict with guidance and standards, it is not acceptable to approve the proposed design of the Grange Road junction subject to a condition that it be redesigned with no opportunity for public input to the design and with no reference to the guidance and standards.

Grange Road junction

The design as proposed is unsafe and hostile to cyclists. I urge the Board to require the submission of a design for the junction which would provide for full segregation of cyclists.

Grange Road is identified in the **GDA Cycle Network** as a Secondary Route, with the importance of Baldoyle Industrial Estate as an employment centre emphasised.
(https://www.nationaltransport.ie/publications/transport-planning/gda-cycle-network-plan/)

The **National Cycle Policy Framework** sets out a vision to "make Irish towns and villages safe and attractive for cyclists of all ages and abilities" and accordingly provides for a "new approach to the design of urban roads".
(http://www.smartertravel.ie/content/national-cycle-policy)

The proposed redesign of the junction will not provide a quality environment suited to cyclists of all ages and abilities. To comply with the County Development Plan and national policy, the design must provide full cyclist segregation and traffic light phasing at this junction, providing separate cycle facilities on all arms of the junction.

The **Dutch Design Manual for Bicycle Traffic** (CROW, 2016, ISBN 978 90 6628 659 7) contains this guidance (p.102) from which is quite clear that a major distributor road such as this should have a segregated cycle path:

motorized traffic (distributor roads). In principle, no cycle facilities are necessary on road sections with a residential function (exclusively or otherwise) for motorized traffic, for road safety reasons; in such cases mixed traffic is acceptable.

Nonetheless, nuances are possible and often desirable within the compass of this general point of departure. For instance, a road section forming part of the main cycle network must provide a greater degree of quality and comfort than a road section only being used by a single cyclist. For that reason, the designer will always have to look at what will constitute the best solution in a given situation, taking the actual circumstances into consideration.

V3, 8, 12, 13, 14, 15

For each road section the question is what traffic facilities are required to ensure that the situation cyclists find themselves in is safe and pleasant. Table 5-2 presents a selection plan for cycle facilities on road sections in built-up areas. This plan provides initial guidance for the decisions to be made for each road section. The plan (table 5-2) enables both functional road categories and traffic planning factors (speed, volume of traffic) to be selected as a starting point. Although a connection may be assumed between the two, in practice it emerges that this is not always the case. The speed of motorized traffic in particular is frequently an unreliable factor; it is common for limits to be exceeded en masse [6]. Consequently, highway authorities should either ensure that actual speed is in line with the speed limit or take actual speed as their point of departure, separately from the road's function. It is important for the designer to always focus on the actual or expected situation and not just on the functional category for motorized traffic.

Table 5-2. Selection plan for cycle facilities in the case of road sections in built-up areas

Road category	Speed limit motorized traffic (km/h)		Volume of motorized traffic (PCU/24-hour period)	Cycle network category: Basic structure ($I_{bicycle}$ < 750/ 24-hour period)	Main cycle network ($I_{bicycle}$ 500-2,500/ 24-hour period)	Bicycle highway ($I_{bicycle}$ > 2,000/ 24-hour period)
Residential road	walking pace or 30		< 2,500	mixed traffic	mixed traffic or bicycle street	bicycle street (with right of way)
			2,000-5,000	mixed traffic	mixed traffic or cycle lane	[illegible]path or [illegible]lane (wi[illegible] of way)
			> 4,000	cycle lane or cycle path	cycle lane or cycle path	[illegible]path or [illegible]lane (wi[illegible] of way)
Distributor road	50	2×1 lane	not relevant	cycle lane or cycle path	cycle path	cycle path
		2×2 traffic lanes		cycle path	cycle path	cycle path
	70			cycle/moped path	cycle/moped path	cycle/moped path

The selection plan presented in table 5-2 is based on three fundamental principles:

1 The most desirable situation for cyclists occupies centre stage.
2 It is not just the specific cycle facility that is important for a cycle-friendly infrastructure, but also the entire traffic situation. For that reason, the scope of the plan goes beyond the cycle facility in itself.
3 It is often the case that various solutions, with various characteristics, are possible in a given situation. This fact finds expression in threshold values that overlap one another.

The three fundamental principles just mentioned are explained below.

Fundamental principle 1: The most desirable situation for cyclists occupies centre stage.
The selection plan shows what situations are favourable for cyclists; in practice this boils down to 'as safe and comfortable as possible'. The recommendations from the plan will not always be feasible, however, even if it is often the case that various solutions are possible. The upshot of this is that in such cases the designer will prepare a design that is less desirable from the perspective of cyclists' interests. Here, the designer will endeavour to identify a better solution by searching for alternative routes or speeds, as a result of which there will be 'room for manoeuvre' within the plan. After all, the plan incorporates three variables that can be influenced: bicycle traffic volume, motorized traffic volume and motorized traffic speed. If one of these factors is changed, then it may be possible to continue working 'from the perspective of a cell' where the relevant facility is feasible in a cycle-friendly way.

If both a cycle path and a cycle lane are feasible options, then creating a cycle path will always be preferable. After all, from the perspective of road safety, exposure to exhaust fumes and comfort, a cycle path has clear advantages over a cycle lane.

Fundamental principle 2: The entire traffic situation is important
Cycle policy is not synonymous with creating specific cycle facilities. Whether or not traffic situations are safe and pleasant for cyclists is not something that depends solely on the presence and quality of facilities made for cyclists; to this end, the *entire* traffic situation is important. Furthermore, it is not always possible to fall back on general points of departure. It is too easy to state that mixing bicycle traffic with motorized traffic is always possible where the speed of the latter is low. Perhaps from a safety perspective it is, but cyclists' comfort might necessitate more. Which is why in the selection plan the general points of departure of segregation and mixing are nuanced in terms of components.

Fundamental principle 3: More solutions, overlapping boundaries
Various good solutions are possible for a given situation; hard and fast limits for such things as volumes of traffic cannot be offered. Hence the overlap between various solution options in the selection plan (table 5-2). As a result, various forms of solution are possible for various areas of application. Incidentally, the plan is merely a tool; the designer will have to produce a customized solution based on the actual situation.

Road categorization and influencing factors
Two types of criteria are used in the selection plan to distinguish traffic situations. First of all, these are the influencing factors for which it is known that they determine the bicycle-friendliness of a traffic situation to a significant extent: the speed and the volume of motorized traffic. Secondly, there are the functional categories. Fundamental to the plan is the distinction between residential road and distributor road for motorized traffic and basic structure, main cycle network and bicycle highway for bicycles.

According to publication Basiskenmerken Wegontwerp ('Dutch Guidelines for Basic Road Design') [7] mixing traffic types is the starting point on residential roads (in the case of minor differences in speed, direction and mass) and segregating traffic types is the starting point on distributor roads (in the case of major differences in speed and mass). As already touched on, this is somewhat nuanced, and also chimes with the observation that in the Netherlands there are provisionally a lot of intermediate forms in practice. These so-called *grey roads* have characteristics of distributor roads when it comes to their function in the network and use by motorized traffic, and yet at the same time they also have characteristics of residential roads due to the adjacent buildings and facilities.

In the case of these types of road with mixed traffic or light forms of segregation, a lower, safer speed is suggested [8].

V12, 13, 14

On residential roads with low car traffic volumes and high bicycle traffic volumes, bicycle streets are suggested on the main cycle network and on bicycle highways. Bicycle streets have right of way at junctions with residential streets. To this end, a decision has been made to safeguard traffic flow and comfort on the main cycle route, thereby serving the flow function for bicycle traffic.

5.4.2 Mixed traffic

V8

A residential road, which often takes the form of a traditional residential street or a road with a limited collection function in a residential area, has a speed limit of 30 km/h. In the case of a limited number of cyclists, motorized traffic volumes of up to around 5,000 PCU/24-hour period, block paving, and in particular also a speed pattern appropriate to the road's function, specific cycle facilities are not required. In the case of low volumes of motorized traffic and bicycle traffic, a tight profile is the starting point. This contributes to the intended low speed, but is not sufficient by definition; even in the case of a tight profile additional speed-reducing measures can be necessary.

A tight profile means that a car has to stay behind a bicycle when faced with oncoming traffic (see also the text box 'Dimensional segments and indicative use'). The higher the volumes, the more irritation will be caused by motorists on such a tight profile, ultimately resulting in irresponsible overtaking manoeu-

The Manual further discusses the options for junctions of distributor roads (pp.146 on). You will note that the sort of weaving between cyclists and motor vehicles required to negotiate the proposed junction is "strongly discouraged" (p.153) at busy junctions like this one.

traffic is (much) lower, leaving the cyclist in a better position to anticipate the traffic flow to be intersected.

- *Create a grade-separated cycle crossing*. This will reduce the waiting time to zero, though this solution is expensive, often difficult to integrate spatially, and depending on the design it is possible that cyclists will have to take a bit of a detour in order to use it.

6.3.3 Junction distributor road – distributor road

From a functional perspective, two intersecting distributor roads are equal. If this fact is contrasted with the general point of departure of right of way, then apart from the well-known priority junction there are three possible solutions:

- roundabout (6.3.3.1);
- traffic light control system (6.3.3.2);
- grade-separated solution (6.3.3.3).

In many situations a variety of types of junction will be possible from the perspective of adequate traffic flow capacity. The type of junction will then be selected on the basis of a combination of other criteria, including:

- the traffic flow;
- the extent to which crossing is possible;
- the road safety;
- the desired priorities (e.g. for public transport or emergency services);
- the amount of space taken up and available;
- the connection to other junctions in a route;
- the effect on the surrounding road network;
- environmental aspects;
- the costs (in terms of implementation, management and maintenance).

The junction that best suits a specific situation will depend on the characteristics of the location. The junction type assessment process, described in CROW publication 315A [6], can assist the designer in making the right decision. In practice, it will usually be a choice of either roundabout or a junction with traffic light control system. These two solutions will be discussed in detail below. Grade-separated crossings will then be touched on briefly.

The various solutions have rather different consequences in terms of safety. For example, a relatively high number of accidents happen at full (four-way) junctions. From the perspective of safety, therefore, they must be avoided. Single-lane roundabouts are (if volumes do not exceed the roundabout's capacity) always the safest type of junction. At higher volumes, turbo roundabouts constitute a relatively safe solution, provided that the bicycle traffic is grade-separated.

6.3.3.1 Roundabout

V31, 32, 33, 34

Roundabouts are now a solution being used on a large scale. Which is unsurprising, given that roundabouts present various benefits. The most important of these are:

- preventing encounters between oncoming traffic;
- simplifying conflict situations;
- reducing speed at points of conflict.

Furthermore, roundabouts are a safe solution. Due to their sizeable capacity and relatively fluent traffic flow, roundabouts are a highly suitable solution for intersecting distributor roads.

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Single-lane roundabouts are the safest type of junction. Such roundabouts have a capacity of up to c. 25,000 PCU/24-hour period (sum of the incoming arms; in the case of asymmetrical traffic volume the capacity will be up to 20% lower). A turbo roundabout is capable of accommodating many more vehicles, with the larger varieties taking up to c. 50,000 PCU/24-hour period. Nevertheless, they are considerably less safe than single-lane roundabouts and for that reason they will only be considered if this is unavoidable for reasons of capacity.

From the perspective of road safety, it is desirable to have cyclists cross other traffic by means of a grade-separated solution. If this is not possible, then cyclists will have to give way at turbo roundabouts both in and outside of built-up areas. Only if there are already more roundabouts in the local area at which cyclists have right of way will it be possible to consider to give cyclists right of way at the turbo roundabout too. Additional layout requirement will apply to this end, however [10].

Facilities for bicycle traffic

In principle, specific facilities for cyclists are unnecessary on relatively quiet roundabouts up to around 6,000 PCU/24-hour period. However, they could be wanted if they would make the design of the roundabout fit in better with the connecting roads. If the latter have segregated cycle paths (for instance), then preference will be given to creating a segregated cycle path on the roundabout as well.

A segregated cycle path is at any rate recommended on busier roundabouts. Cycle lanes on roundabouts are discouraged. Due to their blind spot, drivers of turning lorries in particular have an inadequate view of cyclists and moped riders riding next to them on the right-hand side. Furthermore, the following points for attention apply [11]:

- The design of the cycle path must encourage caution on the part of cyclists.
- The point at which cyclists cross the carriageway must be sufficiently clear and noticeable.

- Cyclists must be readily visible in the vicinity of the point at which they will be crossing the carriageway.
- Turning cyclists must be able to leave the roundabout as swiftly as possible.

In built-up areas the guideline is that cyclists on a segregated cycle path going round a roundabout have right of way [12]. This is most in keeping with a cycle-friendly policy. The design of cycle paths around the roundabout must be fine-tuned to the priority control: the cycle path is circular and is ridden in a single direction. Outward bends and 'square' cycle paths are dangerous and uncomfortable, and for that reason they are discouraged.

No less important is the design of the main carriageway. This must adequately reduce the speed of motorized traffic.
This can be done by (for example) making the central traffic island sufficiently large (to stop cars being able to drive by them at relatively high speeds), by raising the central traffic island, and by using sufficiently tight curve radii for motorized traffic.

Outside of built-up areas the guideline is that cyclists on a segregated cycle path going round a roundabout have right of way [12]. The corresponding design is a cycle path bent outwards. Here, too, there is a need to adequately reduce the speed of motorized traffic. To this end, sufficiently tight curve radii are required.

As far as possible, bidirectional cycle paths around roundabouts are avoided, as motorists are not expecting any oncoming cyclists riding clockwise as well as anticlockwise. If a bidirectional cycle path is used round a roundabout anyway, then it is strongly recommended that the cycle path be raised over the approaches and exits, with the design, markings and signage optimally drawing road users' attention to the possibility of cyclists coming from more than one direction.

If the volume of traffic on the arms of a roundabout is sufficient to necessitate a turbo roundabout, then the design of cycle facilities will require extra attention. The best solution would be a grade-separated one, preferably entailing a lowered cycle path combined with a raised carriageway. If need be, a tunnel can be used, though only on the main cycle route. This will enable at-grade crossing on the part of cyclists, depending on volumes. However, this will only apply if it is a single-lane exit, in which case the cycle path should preferably be constructed on a table. At-grade crossing of two-lane exits is extremely dangerous due to the obstructed visibility. Designs in which this is necessary are strongly advised against.

6.3.3.2 Traffic lights

Traffic lights are usually installed to ensure smooth, safe motorized traffic flow. In the case of distributor roads, this will pertain to junctions accommodating between 10,000 and 30,000

PCU/24-hour period. Traffic lights are a less (sustainably) safe solution than roundabouts or grade-separated crossings, which is why from that aspect they must be considered to be second best.

Motorized traffic is usually dominant at junctions regulated by traffic lights. Consequently, attention was primarily given in the design of the traffic light control system to the flow of motorized traffic. This entails the capacity for motorized traffic being used as a benchmark and the available time for slow-moving traffic often being limited. The combination of short green times for bicycle and pedestrian traffic and the long time required to process motorized traffic creates long waiting times for slow-moving traffic. Nevertheless, an acceptable probability of having to stop and a limited waiting time are just as important for slow-moving traffic as they are for motorized traffic. There are possibilities in terms of addressing this (or addressing this better).

Various *criteria and design requirements* for traffic lights are discussed below. Afterwards attention will be devoted to *fundamental principles for policy and management* which are important within the compass of cycle-friendly traffic control. Finally, a brief look will be taken at *possibilities in terms of control technology* to improve the position of bicycle traffic in a traffic light control system.

Criteria and design requirements

Siting criteria for traffic lights, flow capacity, waiting time (average and maximum) and probability of having to stop/probability of being able to continue, cycle time and preconditions vis-à-vis partial conflicts and a combined flow are some of the important factors.

Siting criteria traffic lights

A detailed account of the siting criteria for traffic lights is beyond the scope of the present Design Manual. Only those considerations that pertain to bicycles will be treated. From the perspective of the interests of cyclists, traffic lights can be considered with safety and bicycle traffic flow in mind. Safety is particularly important at junctions and crossings: if the scale and/or speed of the traffic flow to be crossed is sufficiently considerable that this will put cyclists in jeopardy, then traffic lights can be considered. Incidentally, this is only if other measures (including creating a roundabout or a central traffic island at crossings) has proved to be infeasible.

Flow capacity

The flow capacity of cycle paths is high: around 5,200 cyclists per hour at a width of 2.00 m. Nevertheless, high volumes and/or long red times for cyclists give rise to significant time loss and discomfort as a result of questions and saturation. Options in terms of preventing this include (locally) widening the stacking space, widening the flow space and extending the green time.

Bottlenecks and solutions where bicycle traffic volumes are high

If a junction is required to accommodate large numbers of cyclists, then the following bottlenecks could occur (for example):

- Too little space for the high volume of cyclists to wait and manoeuvre at a red light. This will cause jams and will inconvenience cyclists and put them at risk.
- It will also inconvenience pedestrians and put them at risk if cyclists have to veer onto the pavement or crossing.
- A considerable amount of time will be lost by cyclists, who will be unable to proceed during the next green phase because of how busy it is.
- Time will be lost if the bicycle traffic flow is blocked by waiting cyclists.
- Motorized traffic flow will be limited, particularly where there is a large volume of motorized traffic turning and a large volume of cyclists riding straight on.

In order to remedy the bottlenecks outlined, the following measures are possible (combined, if need be):

- Increasing the size of the stacking space for cyclists by making it wider and/or longer.
- Increasing the space for bicycles by:
  - using ample curve radii for cyclists;
  - reducing the size of speed bumps or remove them;
  - making edges of speed bumps on cyclists' side flush with the road surface;
  - widening the cycle crossing;
  - not applying block markings to but rather adjacent to the vehicle path (after all, cyclists prefer not to ride over blocks in marking paint as this is bumpy).
- Situating the stacking space for cyclists as far ahead as possible, e.g. by using an advanced stop line (which can also be connected up to a segregated cycle path, past the pedestrian crossing).
- Keeping the space for cyclists in motion separate from the space for waiting cyclists by:
  - introducing box junction markings where segregated cycle paths intersect;
  - providing traffic lanes and stacking spaces with arrows for different cycle directions;
  - introducing specific markings at particular places where cyclists 'amass', such as at ferry landings (e.g. red and green boxes, like at the ferries in Amsterdam).
- Selecting a different type of junction, such as:
  - a junction with right of way for the most important cycle direction;
  - an unregulated junction with ample central reservation, preferably over 2×1 traffic lane;
  - a roundabout at which cyclists have right of way (to prevent large numbers of cyclists amassing, as they do at traffic lights);
  - a grade-separated crossing (in the case of heavy motorized traffic flows).
- Adjusting traffic light settings, with:
  - cyclists being given a green aspect as frequently as possible, thereby reducing waiting times and the number of cyclists that will amass due to a red light. More green aspects can be achieved for cyclists by (for example):
    - giving cyclists a green aspect at the same time as other modalities;
    - giving cyclists a green aspect twice per cycle.
  - extending the green phase for cyclists, with the extended green phase coming into effect when the volume of cyclists exceeds the volume that can pass through during a regular green phase;
  - ensuring a subsequent green aspect where cyclists have to turn left through two sets of lights, thereby preventing delay, as without such a link (much) more stacking space will be required at the second set of lights.

Waiting time and probability of having to stop
For the purposes of ascertaining the bicycle-friendliness of traffic light control systems, the terms probability of having to stop/probability of being able to continue and waiting time (for cyclists, of course) are extremely important. Waiting for traffic lights turns out to be a significant source of delay, particularly in major cities. Stopping means not only lost time, but also energy loss and discomfort.

The *probability of having to stop* (and by extension the probability of being able to continue) is determined by the number of times that a cyclist will have to stop at a traffic light control system. In the case of a fixed system, the probability of having to stop is easy to establish: it will be the red time divided by the cycle time. In the case of a pre-emptive (non-fixed) system, the probability of having to stop can be calculated by dividing the overall red time in a (representative) period of observation by the overall time that this period of observation comprises.

If a cyclist has to stop, the *waiting time* will be an important measure of bicycle-friendliness. Both the average and the maximum waiting time are significant. If a cyclist has to stop at a red light, then the waiting time is determined by the red time and the point during the red phase at which the cyclist arrives. The average of this (across all arrivals) is the average waiting time when stopping. In a fixed system, this will simply be half the red time. Perhaps contrary to expectations, the average waiting time will be a little higher for a pre-emptive (vehicle-dependent) system. The calculation is more complicated - see above [16].

The average waiting time is proportional to the square of the cycle time for cyclists. Shortening the cycle time will therefore make a significant contribution towards limiting the average waiting time.

The above means that the average waiting time can be improved by reducing the probability of having to stop and/or by lowering the average waiting time when stopping (the red time). An average waiting time of less than 15 s can be deemed good, and one exceeding 20 s can be deemed bad. Between these times can be considered moderate. The corresponding values for probability of having to stop and waiting time are given in figure 6-2.

In pretty much all cases the aforementioned waiting times at traffic light control systems are higher than the waiting times when crossing priority roads without traffic light control systems. Hence from the perspective of the cyclist (or directness for the cyclist), introducing a traffic light control system is seldom a good idea. However, one advantage of such a system is that the maximum waiting time is limited. This is not so when crossing priority roads without traffic light control systems, where there is a chance that those wishing to cross will have to wait four times longer than the average waiting time when it is particularly busy. For that reason, cyclists accept slightly longer (average) waiting times at traffic lights.

There is, however, a limit to that acceptance: maximum waiting times exceeding 90 to 100 s are not credible. This limit can be lower if junctions with traffic lights are close to one another, or if a large number of cyclists are turning left and this requires them to stop twice. For that reason, the following limits are recommended for the maximum waiting time, irrespective of the type of control system (such as those pre-empted by traffic or public transport):

- outside of built-up areas: maximum waiting time < 90 s;
- in built-up areas: maximum waiting time < 100 s.

Cycle time

The waiting time for cyclists is also dependent on the cycle time of a traffic light control system. A short cycle time will not only improve bicycle

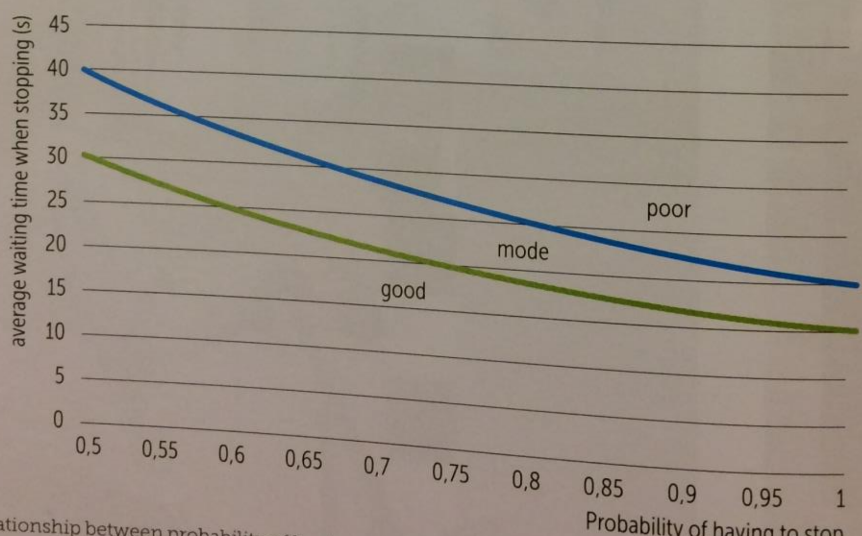


Figure 6-2. Relationship between probability of having to stop and average waiting time when stopping for traffic lights

traffic flow but will usually also improve flow for other types of vehicle as well. For a cycle-friendly control system it holds that the shorter the cycle time the better, though preferably not longer than 90 s. Having the green aspect for cyclists feature twice during the cycle can considerably improve waiting time for cyclists.

Partial conflicts between car and bicycle

A large number of highway authorities do not allow any partial conflicts in their systems from the point of view of road safety. However, for various reasons it could be desirable to permit partial conflicts between car and bicycle in a system, e.g. to shorten waiting times or due to lack of space. Such partial conflicts may only be permitted between cyclists travelling straight on and cars from the parallel traffic flow turning (or vice versa). In this regard, having a proper view of the cyclists is crucial. Furthermore, giving cyclists a head start in this case is recommended to ensure that the presence of this flow is emphasized.

Partial conflicts between car and bicycle are strongly discouraged if:

- the volume of the motorized traffic turning exceeds 150 PCU/hour;
- a bidirectional cycle path is involved, because a proportion of the cyclists will be coming from an unexpected direction;
- it pertains to a situation outside of built-up areas in which the speeds are higher and cyclists are a less dominant force in the streetscape (as a result of which they are more likely to be missed);
- a large number of lorries are turning right (due to the probability of a blind spot-related accident);
- motorized traffic turning left has to cross a large junction (because motorists are no longer expecting any cyclists after the significant distance).

Combined flow of cyclists and other traffic or not?

Three manoeuvres can be distinguished for cyclists at a junction: turning right, riding

straight on or turning left. The choice of type of cycle facility at a regulated junction will depend on the cycle facilities present on the approach roads, the presence of partial conflicts and the volumes of car traffic.

- *Cyclists turning right*

At a junction with traffic lights, delay for cyclists turning right can be limited by leading these cyclists around the provision ('free right turn through red') or if need be permitting 'right turn for cyclists free'. Points for attention in such a case include the fact that the cyclists turning right must not experience any nuisance from cyclists riding straight on (and vice versa) and from pedestrians walking straight on. Attention must also be given to cyclists joining traffic (use cover behind them, if need be).

V35, 36

If neither 'right turn through red' nor 'right turn for cyclists free' are possible, then the stacking space will be important for cyclists. In order to enhance the flexibility of the provision, it could be desirable for cyclists turning right to be allocated their own signal group. In that case it will be desirable for them to have their own dedicated turning lane.

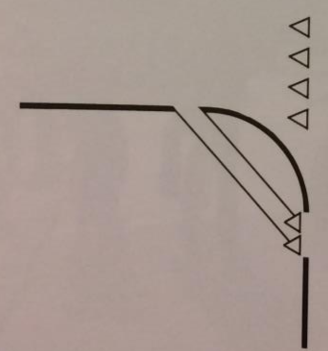


Figure 6-3. Basic principle of 'right turn through red'

- *Cyclists riding straight on*

V35, 37

In the case of a mixed profile and in the presence of cycle lanes on the approach road, cyclists riding straight on will be flowing in parallel with motorized traffic. It could be desirable to create a streamed cycle path or streamed cycle lane to enable cyclists to pass waiting cars. Another possibility is to give cyclists riding straight on their own green phase. In such cases, the recommendation for a mixed profile would be to create a streamed cycle path for cyclists or give them their own dedicated turning lane. In this regard, it is important for cyclists to remain in motorists' field of vision. For that reason, it is *imperative* that the stop line for cyclists is a few metres ahead of the stop line for motorized traffic in the case of a mixed profile, this being due to lorries' blind spots. If bicycle traffic flow is on a cycle path, there are options in terms of cyclists riding straight on being merged with other, non-conflicting signal groups. This will present more opportunities in terms of the bicycle-friendliness of a provision.

- *Cyclists turning left*

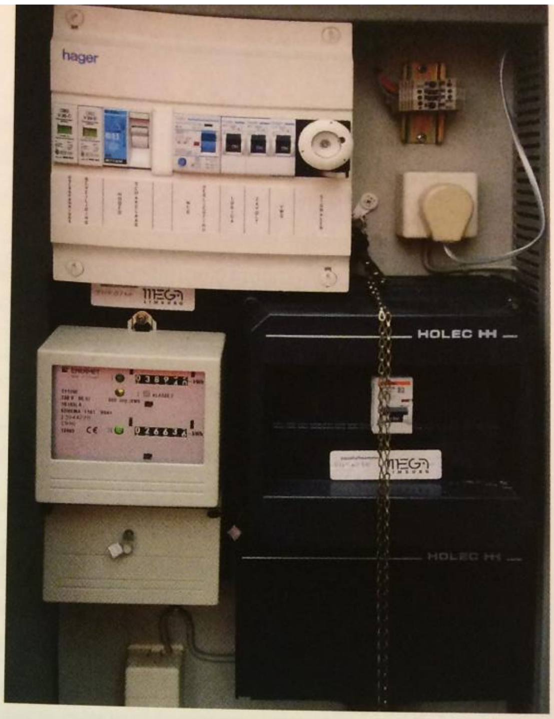
V38, 39, 48

Cyclists turning left often have a raw deal at a traffic light control system. Particularly in the case of segregated cycle paths, turning left is conceived of as two different manoeuvres. Waiting time can be shortened considerably if this manoeuvre is considered a straight-on manoeuvre and the two green phases follow one another in quick succession. If there is a mixed profile (at relatively low volumes of traffic on an approach road), then an advanced stop line can be created. If there are a lot of cyclists turning left, it could also be a good solution to have cyclists travelling in all directions given a green signal at the same time. In situations involving a dominant flow of cyclists turning left, this flow can easily be facilitated by adjusting the order of the green aspect in the so-called block diagram of the traffic light control system. This could have markedly positive effects.

Fundamental principles for policy and management

One of the most important options when it comes to improving the position of bicycle traffic at traffic light control systems is at the level of policy development. Or, to put it in more concrete terms, it consists in formulating clear, cycle-friendly policy principles. Practical experience has shown that a large number of traffic light control systems are made by traffic control engineers with a high degree of independence. Taking into consideration the interests of all road users and on the basis of the engineer's own knowledge and expertise, a traffic light control system is created that to all intents and purposes constitutes a 'compromise' [13]. Such a way of working leads to the control engineer making a significant mark on the highway authority's traffic policy.

In order to prevent this, though also to avoid being overly reliant on the engineer when it comes to resolving dilemmas during the design process, highway authorities responsible for a wide array of traffic light control systems should develop a traffic light provision policy to this end. This will set out what priorities are being assigned to the various categories of road user in the different road situations. For example, one fundamental principle can be that at junctions in built-up areas right of way be given to (sections with) main cycle routes. However, it is also possible to specify maximum values for average waiting times or cycle times, for



instance. If such fundamental principles are recorded in administrative regulations, then the control engineer will have clear objectives, which will also be readily testable.

Another important measure is carrying out periodic maintenance on the provision. Once a traffic light control system is 'up and running', it often receives little in the way of attention. Performing regular maintenance work and checking in situ whether specifications are still satisfactory will prevent a provision from no longer being optimally fine-tuned to the traffic situation as time goes by.

Control engineering options

Various design sheets accompanying this Design Manual include measures to improve the situation for cyclists at junctions with traffic lights. A large number of these centre on shortening waiting time for cyclists. After all, minimizing waiting time is essential for a cycle-friendly provision. The various measures can be

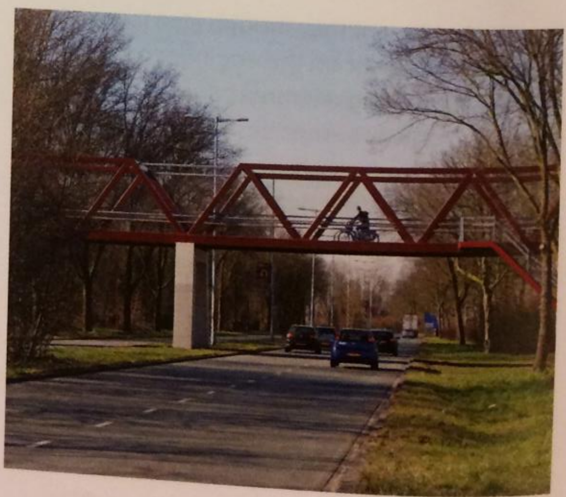
Table 6-4. Possibilities for combining cycle-friendly measures at traffic lights

Number	Measure	Design sheet	Can perhaps be combined with number(s)
1	reducing cycle time	V40	2 to 16
2	including extra green aspects for bicycles	V47	1, 3, 4, 7 to 9, 11 to 16
3	permitting right turn through red		1, 2, 4 to 11, 14 to 16
4	giving all cycle directions a green aspect simultaneously	V48	1 to 3, 10 to 13, 15
5	accepting partial car-bicycle conflicts	V46	1, 3, 7 to 9, 11 to 13
6	setting a favourable idle mode for cyclists	V49	1, 3, 4, 9, 11 to 13, 15, 16
7	increasing cycle directions with right of way for public transport	V41	1 to 3, 5, 8, 9, 11 to 16
8	increasing cycle directions with other directions	V42	1 to 3, 5, 7, 9, 11 to 16
9	setting favourable phase order for cyclists turning left	V43	1 to 3, 5, 7, 8, 10 to 13, 15, 16
10	setting green wave for bicycle traffic	V44	1, 3 to 5, 9, 11 to 16
11	keeping reciprocal conflicts between slow-moving traffic outside of the regulation		all measures
12	implementing right turn through red		all measures, with the exception of 3
13	introducing advance detection/pre-request for bicycle traffic	V45	all measures
14	introducing advanced stop line	V39	all measures, with the exception of 6, 7 and 8
15	increasing flow capacity motorized traffic (to enable cyclists to be given a green aspect sooner)		all measures, with the exception of 5
16	introduce bidirectional crossings		all measures, with the exception of 4, 5 and 14
17	increase size of stacking spaces and exit lanes for cyclists		all measures, at high volumes of bicycle traffic

adopted separately, though often in combination as well (see table 6-4). The effects of the measures could vary for each situation. For that reason, a thorough analysis must be performed for each situation to ascertain the most suitable measures in situ.

6.3.3.3 Grade-separated solution

Grade-separated facilities will be desirable or necessary if other junction solutions do not satisfy the design requirements vis-à-vis directness and safety. This applies not only to main cycle routes but also to the basic network – particularly for those components that intersect busy



The Irish **National Cycle Manual** (www.cyclemanual.ie) similarly recommends the use of a segregated cycle track for roads such as this with high volumes of traffic at high speeds (Guidance Graph 1.7.4, p.19 and note 7 on page 21)

The National Cycle Manual's advice on integrating design for cyclists and pedestrians into the junction design process is particularly relevant given the way Fingal County Council proposes the design of this junction be addressed:

> Cyclists and Pedestrians:
> The needs of cyclists and pedestrians should be considered as a fundamental part of the design process rather that as an afterthought once vehicular traffic has been catered for. (p,.75)

The Manual includes the following advice which this design fails to follow:

> Where there are HGVs, cycle track should be segregated up to the stop line, and separately signalised. See 4.5.5 LeftTurning Large Vehicles: Functionality
> (p.79)
>
> • Streaming cycle lanes can only be used in low traffic speed environments where there is minimal speed differential between cyclists and adjacent traffic
> • Streaming is not suitable along HGV routes
> (p.81)

The guidance in relation to left turning lanes is clear that they are not appropriate for this junction:

> Not suitable where HGVs use left hand pocket. (p.89)

The guidance is strongly against left turning lanes in general, advising in relation to existing junctions:

> "Left hand pockets should be removed wherever possible." (p.97)

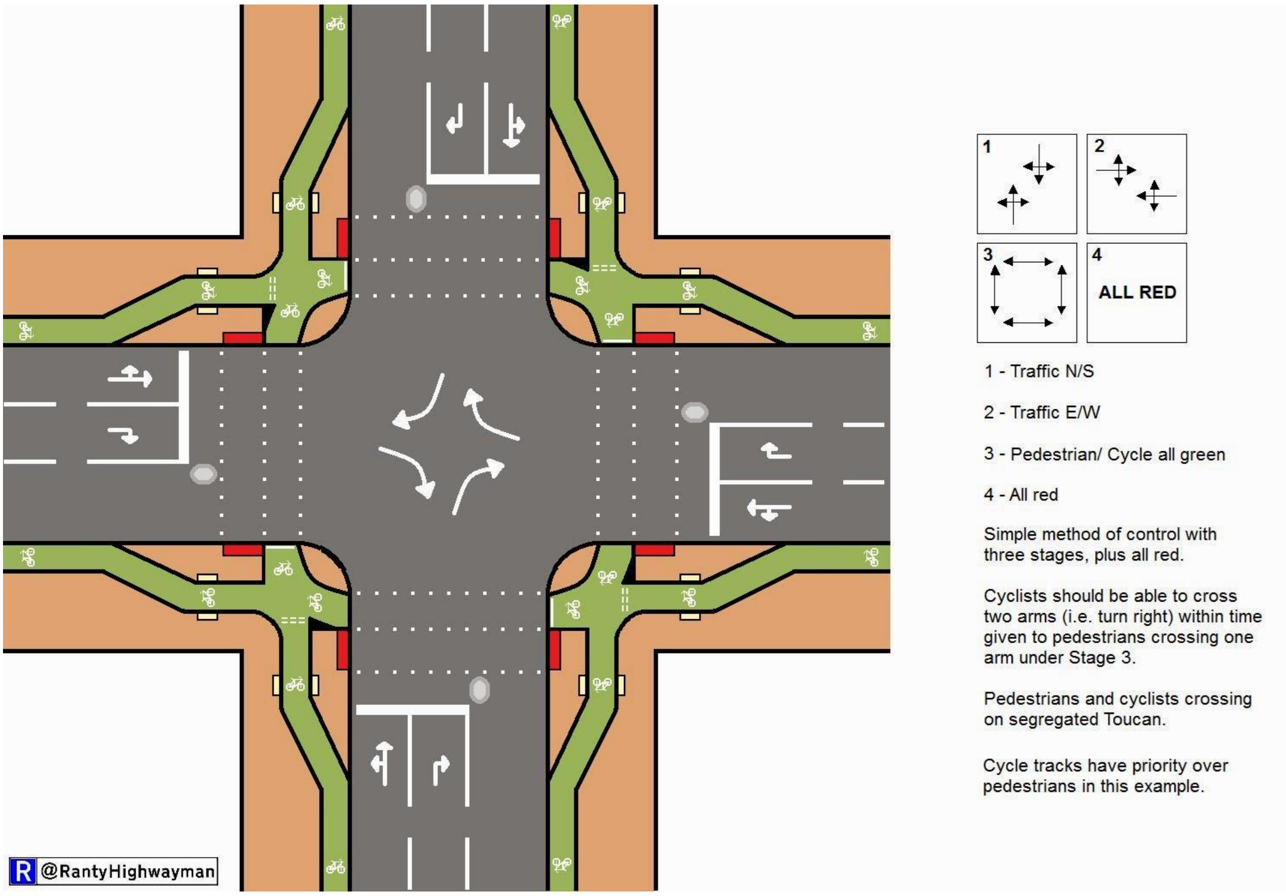
The **Design Manual for Urban Roads and Streets** (http://www.dttas.ie/) contains similar advice.

The **County Development Plan** (CDP) requires "the design of roads, including cycle infrastructure, in line with the Principles of Sustainable Safety in a manner consistent with the National Cycle Manual and the Design Manual for Urban Roads and Streets."

Given that large numbers of HGVs use this junction, it is essential that segregated cycle facilities, with adequate visibility and dedicated cycle and pedestrian phases are provided at this junction.

In these circumstances, the Council should have requested that the applicant produce a design for the junction consistent with the CDP specification that it be "in line with the Principles of Sustainable Safety in a manner consistent with the National Cycle Manual and the Design Manual for Urban Roads and Streets." The Board should now do that.

It is not the Board's role, nor my role as an observer, to design the junction. However, it may be useful to point to an example of the sort of design which would be appropriate at this location, simply to demonstrate the existence of safe alternatives. This diagram, based on Dutch practice but flipped for left-hand street use, gives a very clear explanation of the sort of fully segregated junction which would be appropriate here and would be in line with the design guidance quoted above.



(Source: http://therantyhighwayman.blogspot.ie/2014/07/traffic-signal-pie-third-slice-floating.html Note that it would be easy to give pedestrians priority over cyclists at the relevant points.)

Overall street design principles for the new development

In line with the Design Manual for Urban Roads and Streets, the design speed for all roads in the development should be 30km/h and the area should be brought forward for designation as a 30km/h zone straight away so that the designation will be in place before any new streets/roads are opened to use.

Contra flow cycle facilities

One-way routes in the new development should provide for contra flow cycle traffic, as advised in the National Cycle Manual.

Allocation of street space to planting rather than parking

Given the information in the Additional Information response in relation to the over-provision of parking spaces, the fact that the County Development Plan standards are maxima not minima and the proximity of the development to Clongriffin Station, it is important that available street space is used for planting to provide a high quality environment in line with the Design Manual for Urban Roads and Streets.

Respect for and retention of the historic character of the area

The proposal should better address the historic character of the area as an early Viking settlement, which gave its name to Baldoyle, and a location of habitation at Stapolin House.

Baldoyle – The Town of The Dark Stranger – Baile Dubhghaill

The year 898 and the Vikings made their first recorded sortie to what is now known as Baldoyle. It is, however, unlikely that this was the first incursion here by the Ost-men as some writers note their presence her as early as 852. Their settlement was probably not in the location that we today regard as Baldoyle. The raiders almost certainly sailed their boats up into the Maine River as far as the area around what we know as *Stapolin House*(the name Stapolin is the Norse for the title Steach Poilín, the house of Polin). The Danish (Baldoyle) group settled down and did not live up to their reputation as marauding raiders. Recent study shows that the native Irish were four times more likely to attack Irish settlements than were the Danes.

The ruins/remnants of Stapolin House should be incorporated into the design and the history of the area reflected better in the development.

I attach a copy of the acknowledgement of my original submission.

Best regards,

Cllr. David Healy