PERMISSION TO CROSS:
AN ALTERNATIVE WAY OF PRIORITISING REQUESTS FOR PEDESTRIAN CROSSINGS

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1. INTRODUCTION

For local authority highways and transport planning staff, dealing with requests for changes to roads and streets is a constant source of work. Requests for pedestrian crossings are no exception and can be particularly emotive, and indeed politically charged matters. The level of investment available is often outstripped by demand and a system to triage requests is needed to manage this.

This paper explores some of the history around how pedestrian crossings have been assessed as a precursor to being taken forward to the design stage, and how this has generally put the convenience of drivers and driving first. It then proposes an alternative methodology for assessment which can be developed by local authorities and their advisors to suit local conditions, but in an objective way so that decision-makers can make informed and transparent choices. Finally, this paper looks beyond pedestrian crossings as pedestrian infrastructure and offers some conclusions and recommendations.

Where the terms *walking* and *pedestrian* are used in this paper, the reader should consider them in their widest sense to include people on foot and people using wheelchairs and other wheeled mobility aids.

2. THE HISTORICAL MOTOR TRAFFIC CONTEXT

Although local experience will vary, the UK has a long track record of being accommodating to motor traffic with the convenience and time of those driving being given a higher priority than those travelling under their own power.

2.1 Planning, thinking and culture

The Transport Planning Society[1] argues that compared with drivers and especially those travelling at peak hours or for business, other road users are undervalued. They state, *"the resource cost values (2010 prices) in the appraisal guidance are £16.61 per hour for car drivers and £9.41/hour for pedestrians, cyclists and bus passengers"*.

This thinking has permeated government, professional practice, and culture to the point where walking (in its widest sense) has been seen as having low value when investment decisions are being made, and a problem to be worked around where

design decisions have been made. Indeed, despite the recent update the Highway Code which introduced a '*hierarchy of road users'* which places pedestrians first, Alexander[2] reported that according to the AA, three-fifths of its members had not read the updated document.

2.2 Traffic engineering

The traditional role of the traffic engineer is to facilitate the smooth and efficient movement of goods and people by road and therefore anything which detracts from this is deemed as reducing efficiency. Pedestrian crossings by their nature have the potential to disrupt motor traffic flow and so the form of crossing provided can be influenced by the overarching aim of keeping drivers moving.

Figure 1 – A118 Main Road, Romford. An uncontrolled pedestrian refuge where pedestrians must find gaps in multiple lanes of moving motor traffic, but which doesn't disrupt those flows.

Crossings which don't require drivers to stop (uncontrolled crossings) are often favoured where few people are crossing, and in some cases pedestrian refuges are added where some help is required to cross the road in parts. Such arrangements can be useful for walking where gaps in one direction of traffic can be found at a time but are less helpful on busy roads and where there are multiple traffic lanes such as the situation shown in *Figure 1*.

Figure 2 – Zebra crossing, Abbey Road, City of Westminster. Made famous by the cover of The Beatles' 1969 Abbey Road album and which was designated as a Grade II Listed Building in 2010.

Crossings where pedestrians gain priority over drivers (controlled crossings), either zebra crossings (*Figure 2*) or controlled by traffic signals (*Figure 3*), have traditionally required higher flows of people walking to be warranted.

Figure 3 – Pedex, Hampstead Road, City of Westminster.

The term '*warranted*' is interesting in its own right because it is used by traffic engineers when considering pedestrian crossings and it immediately shows the power imbalance where providing for people walking must reach some kind of threshold before impacts on driver convenience is justified. The use of the term appears in 20th century traffic engineering time and again as '*pedestrian crossing warrants*' which are guidelines around which type of crossing should be provided under a range of motor traffic and pedestrian flow conditions at the point of interest. Warrants are especially prevalent in the United States for a range of traffic control methods and devices.

In considering whether pedestrian crossings are warranted, a numerical relationship between motor traffic and pedestrian flows probably emerged in the late 1960s or early 1970s, although it is hard to pinpoint the exact origins and thought process behind it. In the UK, a relationship had been established and placed into formal design guidance by 1980. This has parallels with the *'predict and provide'* approach to road traffic planning which seeks to minimise driver delay and which in turn makes it harder to justify crossings under a warranted approach.

2.3 The rise and fall of PV^2

In the UK, TA10/80 used a '*vehicle/ pedestrian conflict assessment*' for a proposed crossing site. The approach required traffic and pedestrian counts over a 100-metre section of road extending 50 metres either side of the proposed crossing point for a typical working day between 06:00 and 22:00.

For each hour counted, the *'degree of conflict'* is calculated as PV^2 where P is the number of pedestrians crossing and V is the vehicle flow. The four highest values for PV^2 are identified and the average pedestrian and traffic flows are calculated to give a site PV^2 value. TA10/80 includes a table which takes PV^2 values, pedestrian and vehicle flows and assigns a crossing type recommendation depending on the site which is reproduced in *Table 1*.

PV^2	P	V	Preliminary recommendation
Over 10^8	50 to 1100	300 to 500	Zebra
Over 2×10^8	50 to 1100	400 to 750	Divided Zebra
Over 10^8	50 to 1100	Over 500	Pelican
Over 10^8	over 1100	Over 300	Pelican
Over 2×10^8	50 to 1100	Over 750	Divided Pelican
Over 2×10^8	Over 1100	Over 400	Divided Pelican

Table 1 – Degree of conflict and assigned crossing type.

TA10/80 also presents the crossing type recommendation in two diagrams which are reproduced in *Figure 4* and *Figure 5*.

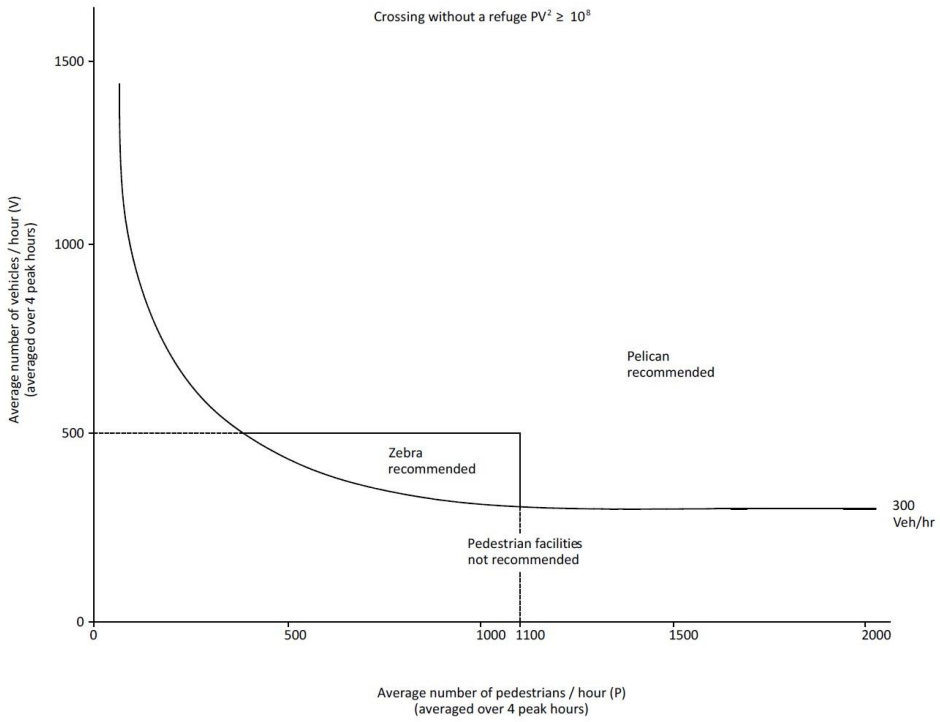

Figure 4 – PV^2 graph for crossings without a refuge.

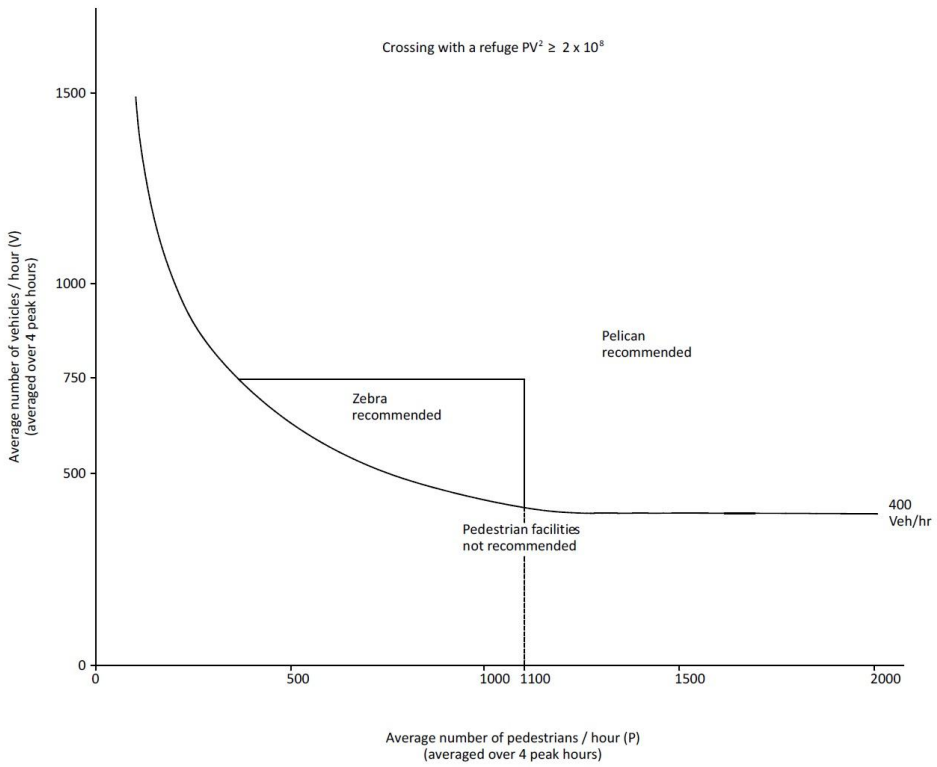

Figure 5 – PV² graph for crossings with a refuge.

What is clear from the diagrams in TA10/80 is that situations where there are high pedestrian flows and low motor traffic flows, controlled crossings are not required, and which implies that pedestrians are able to dominate the space.

Conversely, where there are low pedestrian flows and high motor traffic flows, the recommendation will also be that controlled crossings are not required. This implies that the amount of pedestrian use doesn't justify the interference with motor traffic flows and by extension, the cost of providing controlled crossings. Because the PV^2 approach also tends to concentrate on the highest motor traffic flows in the calculation, it assumes that the peak motor traffic flows coincide with the peak pedestrian flows which isn't a given.

This is an issue because it ignores the local contextual conditions of the road or street where the crossing assessment is being undertaken, it also ignores who the local users might be and, in some circumstances, any local peak crossing times, including weekends. TA10/80 recognises these limitations and draws attention to the need to consider '*special situations*' as follows:

- Where a road divides a substantial community.
- Adjacent to community centres and homes for the elderly, infirm or blind.
- Adjacent to hospitals or clinics.
- Busy shopping areas.

- Outside school entrances.
- Where the number of heavy vehicles exceeds 300 per hour during the 4 busy hours.

TA10/80 suggests that some users find pelican crossings more reassuring to use than zebra crossings and that straight roads can lead to higher driver speeds where a pelican might be more appropriate. It also suggests that pelicans may be better where pedestrian flow is intermittently heavy such as outside railway stations. This is because zebras enable continuous pedestrian flows and by implication, motor traffic will be held up.

Figure 6 – A12 Colchester Road, London Borough of Havering. A woman with three small children crosses a 50mph road between two parks also forming local routes to schools and where the road has severed the community since it was dualled in the mid-1980s.

There is also commentary on how *'the pedestrian accident level'* might require an investigation. Further study arising from a collision report isn't inherently problematic, but in a low pedestrian flow / high motor traffic flow situation, the PV^2 method is unlikely to recommend a controlled crossing, especially if the road in question is considered important for motor traffic flow such as the example shown in *Figure 6*.

This is especially problematic because where a high-speed roads are concerned (50mph and higher), the design response is grade separation in a mid-block situation which is going to be even more challenging to justify on cost grounds where the number of people crossing now might be very low or non-existent because of severance.

PV^2 is to some extent a mechanism for rationing pedestrian crossings, and this will be considered in more detail in Section 2.4. TA10/80 was replaced by TA52/87 which considers the prevailing conditions in far more detail but retains PV^2 as a key determination of whether a controlled crossing is justified. In 1995 it was withdrawn along with the use of PV^2 by Local Transport Note 1/95 (LTN1/95).

LTN1/95 specifically states that it supersedes TA52, and by implication PV^2, because the method simply doesn't appear in the guidance. LTN1/95 is a full framework for the assessment of pedestrian crossings and *"describes an assessment method to be used when considering the provision and type of 'stand-alone' at-grade pedestrian crossings."*

LTN 1/95 developed the idea of an '*assessment procedure'* which uses a range of site information and data to create a *'site assessment record'* which was used as a basis for an '*assessment framework'* which essentially developed a set of options for the site under consideration. LTN1/95 was a practical approach which was more considerate of pedestrians and local conditions, rather than the numerical approach of TA10/80.

There was useful advice given around how an assessor could consider the difficulty in crossing based on the observed gaps in motor traffic, but there is still some consideration on how crossing options can create delay for motor traffic as well as potential impacts on road capacity. For the first time the idea of *'latent demand'* is noted which considers who might not feature in the site data because of the prevailing conditions.

LTN1/95 was then superseded in 2019 when Chapter 6 of the Traffic Signs Manual (Chapter 6) was published with site assessments covered in Section II of the same. It retains much of the key advice set out in LTN 1/95 with the use of a site assessment leading to an options assessment, and it also develops the idea of latent demand a little further.

"A low number of people crossing the road, particularly vulnerable road users, may not indicate low demand. The low numbers may be due to latent demand as people experience difficulty in crossing"

Chapter 6 also recognises that there are alternatives to providing crossings such as driver speed reduction and motor traffic flow reduction, as well as changing some of the other physical issues which make it harder for people to cross such as carriageway width.

2.4 Rationing and the PV^2 zombie

Despite PV^2 being over 40 years old in the UK and its use being formally withdrawn nearly 30 years ago, the technique remains stubbornly in use by highway authorities and consultants alike. There are probably two linked reasons for this. First, the '*we've always done it this way*' mentality that often pervades professional practice, especially where those deploying a technique don't understand its origins, limitations, and biases.

Second there is rationing, whether it's a local authority trying to find ways of having to deal with far more requests for crossings than it has resources to assess or construct; or consultants trying to help developer clients avoid the cost of having to pay for crossings as part of a proposed development. If the term '*PV^2 crossing assessment*' is entered into an internet search engine, there will be a variety of results which show just how entrenched PV^2 remains in technical and local authority culture and practice.

Local authorities that still reference PV^2 often temper its use with the assessment of local contexts or with a weighting applied, but is using a technique formally withdrawn in 1995 appropriate in 2023? As for consultants using the technique, there must be a concern with the quality of their advice and the knowledge of their staff in specifying its use. If there is one positive outcome from this paper, it will be to draw attention to the continued use of this out-of-date technique which is inherently biased against walking and is exclusionary given that it doesn't count the people not crossing now.

There is also the wider question as to why traffic engineers have tried to distil the assessment of pedestrian crossing need into a mathematical approach which ignored the societal issues created by severance, whether on a local street or a trunk road. Perhaps it is this mathematical approach which has led to some of our current problems.

3. INVITATION TO CROSS

The title of this paper is *"permission to cross – an alternative way of prioritising requests for pedestrian crossings"*. This section will explore this alternative and seeks to move to a position where the heuristic becomes '*invitation to cross'*.

3.1 Crossing rivers

In setting out an alternative way of prioritising pedestrian crossing requests it is worth considering the words of Canadian urban planner Brent Toderian[3] who said:

"it's hard to justify a bridge by the number of people swimming across a raging, crocodile-filled river"

In other words, one cannot gauge demand for crossings based on the people you can see crossing now, especially if it is difficult or dangerous for them to do so. In designing for walking, thought is required around who we want to see and then designing accordingly. In the case of crossings, this means providing layouts that enable as many different types of people as possible to use them.

3.2 Let's ignore who is crossing now

LTN1/95 developed the idea that latent demand could be used in the assessment of pedestrian crossings, but no advice was given on how one could generate a flow per hour of those who were not crossing now. It is therefore difficult to see how this could objectively work in practice.

CH2M Hill[4] suggests that latent demand might be '*identified by local communities'*, although this immediately raises the question around *who* the local community is, how representative they are of local people, and in listening to those with a voice, how that leads us to miss the views of other people without a voice.

The key component in moving towards the invitation to cross concept is the removal of any direct assessment of pedestrians and then concentrating on the prevailing conditions as well as the local population demographic. Of course, if nobody is asking for a crossing, then a local authority won't investigate a site and there must be a role for citizens asking for an assessment. Additionally, local intelligence such as collision data or a new development can also start the process off.

Because local authorities are having to make decisions on what is funded, policies are often couched in some sort of numerical basis because decision-makers want and need something to support decisions. Prioritisation ultimately comes from a political position and not having a policy or process leaves local authorities open to complaint and challenge, especially around equity. It is therefore helpful that decisions are taken on a rational and defensible basis.

3.3 An alternative approach

In considering an alternative approach, the resources of local authorities were in mind. Metrics which use easily obtainable information are used and can be classified in three ways.

- Physical data which looks at the crossing environment.
- Geographic data which looks at local attractors that people might wish to walk to.
- Demographic data which considers the groups who might need the most help crossing.

For physical data, the following is proposed as being relatively easy or cost-effective to obtain.

- Speed. Data might be already available, otherwise a survey can be undertaken, perhaps with a short off-peak sample covertly obtained with a speed gun. Off-peak is the preference as driver speeds might be higher than at peak times making it harder to cross.

- Traffic flow (two-way). A manual peak time traffic count is simple to undertake. Flows are best expressed as Passenger Car Units (PCU) as this adjusts for larger/ heavier vehicles. The higher the flow, the harder it is for people to find a crossing gap.

- Width of carriageway (including number of lanes to cross). This is easily done with a measuring wheel, a laser distance measurer or from electronic maps and drawings. The width of carriageway is important as the wider it is, the harder it is to cross. Additionally, the more lanes to traverse the harder it is to cross because of the need to find gaps in the traffic that coincide.

Geographic data is concerned with considering the proximity of amenities and any obvious attractors to the site and mapping them accordingly. Schools, parks, care homes, shopping parades, post boxes, medical facilities and other similar attractors are all things that people will want to walk to within their immediate area.

This task needs to be manageable and so thought around what could be within a 5-minute walk of the site would be a simple starting point. Mitchell and Bendixson[5] suggest that 5 minutes is around 400 metres at 3mph.

It can be assumed that the higher number of attractors within the selected radius the higher the need for a crossing. This is rationing, but it is based on what people could get to more easily if a formal crossing were provided to meet latent demand.

Demographic data considers the people in the community who are not crossing now because of some of the physical issues outlined above. This information can be used to gain local insight into age (both children and older people) and those with long term illness or Disabled people; the groups who most need help crossing the road.

Scoring might be challenging, so an assessment in comparison to the borough, district, or national averages would be useful baselines. It's useful to consider deprivation because there is evidence that a higher proportion of road casualties live in areas of high deprivation compared with low deprivation. In England, the Department for Transport[6] Index of Multiple Deprivation for Lower Layer Super Output Areas is easily accessible.

It is *not* suggested that casualty data is considered at this stage because *point* locations are unlikely to have a dataset of a size that allows useful conclusions to be drawn. Data around driver speed, traffic flow and crossing difficulty outlined above will to some extent capture some of the current risk exposure the site presents.

Casualty data might, however, be the catalyst for a site to be reviewed for prioritisation from either calls from the community, or routine analysis by the highway authority through its general road safety promotion activities under S39 of the Road Traffic Act 1998.

This set of data is intended to be a suggestion and local authorities might have other local data which will help tailor the process for a particular area. The key point is it should be reflective of the existing conditions on site and the people living in the area and *not* on who can cross now. If this or a similar methodology is adopted, then a consistent approach to data collection is required if sites are being compared or ranked.

3.4 Manipulating and presenting the data

A scored approach might be the simplest and most transparent way that crossing sites can be assessed and it allows sites with competing demands to be considered against each other and prioritised. With inspiration from the Walking Route Assessment Tool (WRAT)[7] a simple scoring system of 0, 1 or 2 against a list of categories can be used to create an overall site score. Unlike the WRAT, this proposal scores poor conditions highly as it does sites featuring more highly than average in demographic matters.

In a ranking exercise where a decision-maker is being asked to decide what is taken forward, a group of sites can easily be ranked with the highest scoring being the most urgent, or an authority might decide to use a minimum score to decide what is taken forward to a more detailed review. *Table 2* proposes a tabular method of capturing scores against a set of site categories with space for the assessor to record any comments or observations.

Categories	Green (0)	Amber (1)	Red (2)	Score	Comments
Speed limit (mph)	20	30	40+		
85th percentile speed (mph)	<20	20 to 30	30+		
% exceeding speed limit	<10%	10% to 20%	>20%		
Peak hour traffic flow (PCU) (v/h) 2-way	<200	200 to 400	>400		
Carriageway width (m)	<6	6 to 8	>8		
Number of lanes to cross	1	2	3+		
Amenities within 5 minutes	<5	5 to 10	>10		
Children in area	<borough average	0 to 5% above borough average	>5% borough average		
Older people in area	<borough average	0 to 5% above borough average	>5% borough average		
Long term illness/ Disabled people	<borough average	0 to 5% above borough average	>5% borough average		
Index of Multiple Deprivation decile	5 to 10	3 or 4	1 or 2		
			Total Score		

Table 2 – Crossing site scoring table

This is not intended to be an exhaustive design assessment, but where a local authority decides to take a crossing forward to the design stage, it at least provides useful base information, including some insight on who might be living in the area which can form a basis for stakeholder engagement work.

4. BEYOND PEDESTRIAN CROSSINGS

Pedestrian crossings are usually framed as pedestrian infrastructure, but this is conceptually false because they are *motoring* infrastructure which is aimed at mitigating the current status quo and hence the starting point and title of this paper where people are seeking permission to cross a motoring environment.

It's a piece of thinking which must then lead to the conclusion that much of the *'stuff'* placed on roads and streets are there because of mass driving and if we are to move beyond this proposition to one which is infrastructure aimed at walking, then every opportunity to reduce the impacts of motor traffic is required.

This is a network issue and when objective network decisions are taken, then many locations will have motor traffic volumes reduced to the point where fewer formal crossings are required, and which then allows local authorities and engineers to concentrate on main roads which will always carry the bulk of the motor traffic flows. In those situations, providing a decent minimum level of service for pedestrians should be a key requirement so that layouts such as the one shown in *Figure 6* become a thing of the past.

There is also the matter of pedestrians taking long diversions off their desire line to avoid unsafe crossing locations (both objectively and subjectively) which in itself degrades the walking experience, and in some cases deny walking as the mode of choice.

5. CONCLUSION

5.1 Discussion

The introduction to this paper notes that local authorities triage and/ or ration pedestrian crossing requests which is developed in Section 2.3 and Section 2.4. The alternative assessment methodology presented in this paper in Section 3.3 is still a form of rationing, but it is based on making an assessment in terms of risk exposure, the places people might visit and local demographics. A local authority might still wish to apply a minimum score needed to take a site forward, or perhaps a year's worth of scores could be used to rank the top five sites or whatever is possible and affordable for a forward programme.

The scoring table uses the speed limit, the recorded 85th percentile speed and the percentage of drivers exceeding the speed limit to provide an overview of the off-peak conditions. There is a potential issue where a wide carriageway *'invites'* drivers to speed leading to poor compliance. Although an assessment might ultimately lead to a site having a high priority for a crossing, there might be other issues that need addressing, including at the network level. For example, 20mph is being more widely deployed on streets without any changes to the carriageway width or alignment. This may end up with poor compliance, even though a 20mph speed limit is desirable in policy and risk exposure terms. There is a risk that such an environment leads to a higher score than the site should receive, especially if the 20mph limit is newly implemented without other changes to the street.

This approach does not specify the type of crossing needed because that is where more engineering thought and judgement is required, although for example, a 40mph dual carriageway is always going to need traffic signals and anything at 50mph and higher really needs grade separation unless a crossing requirement is coincident with a signalised junction. In those cases, there's little value in undertaking an assessment because the solutions are immediately apparent. Further advice on crossing types and their application are proposed by Philpotts[8].

The proposition of rationing remains uncomfortable from a professional engineers' perspective because that is rightly a political decision, but a simple assessment based on how easy it is for the local population to cross is an objectively fairer way of looking at the issue rather than the number of people crossing now, which PV^2 skews against.

5.2 Recommendations

Put simply local authorities should stop using PV^2 in their decision-making processes and consultants should similarly stop using in their advice to clients. The approach is long out of date and it's exclusionary because it does not consider those who are not counted in a meaningful way. It should remain an historic traffic engineering curiosity.

It is recognised that local authorities have to prioritise against a backdrop of finite resources and so it is suggested that the methodology proposed in this paper which considers the prevailing conditions, local attractors and demographics, is fairer and more transparent than PV^2, even if it has been locally augmented.

Finally, it is recommended that local authorities keep in mind that pedestrian crossings are motoring infrastructure and are in part a response to network-level considerations and other network choices can influence the prevailing conditions.

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