July 2006

Gap Analysis

Special information for MetroCount Vehicle Classifier System and Traffic Executive software v3.1

bulletin

Gap acceptance defined

Using MetroCount for gap analysis

Counting gaps with MCReport's Event Counts

Many traffic manoeuvres require the road user (eg driver, rider or pedestrian) to select a suitable break or gap in a traffic stream to accomplish the manoeuvre safely. This behaviour is known as **"gap acceptance"**. Examples of gap acceptance include:

- Pedestrians crossing a road
- Drivers entering a priority road from a side road

Analytical methods are available to model gap acceptance, based on the assumed distribution of gaps in traffic and assumed human behaviour. They predict the likelihood of delay and probable duration.

These gap acceptance models typically define gaps of various duration for the different manoeuvres. They define the **"critical gap"** (t_a) as the minimum gap required for the road user to make the manoeuvre.

Pedestrians do not usually join a queue to cross a road. As soon as an acceptable gap (or critical gap) occurs, all pedestrians are able to cross together.

Vehicles, on the other hand, have to queue at a stop-line and move up as other vehicles depart from the minor road. This is measured by the parameter **"follow up headway"** (t_f). In practice this means that:

- Gaps less than t_a will not be used.
- Gaps between t_a and $t_a + t_f$ will be used by one minor stream vehicle.
- Gaps between t_a and $t_a + 2t_f$ will be used by two minor stream vehicles, and so on.

Assuming of course, that the queue of minor stream vehicles is not exhausted.

MetroCount for Gap Analysis

Where does MetroCount fit in to all this? Well, with MetroCount you don't need to model the available gaps; you can simply measure them directly!

How? The MetroCount Vehicle Classifier System stores every axle with better than millisecond resolution. These "time-stamped" axle events are the raw data available in every MetroCount dataset. As well as knowing speed and axle position data for every vehicle, you have access to the gaps in the traffic stream, too.

Event Count Reports

Along with its host of speed and class reports, your MetroCount analysis software, MCReport, provides "Event counts" where events are tallied from a single sensor. With MCReport and your time-stamped MetroCount data, you can easily enter typical gap parameters, and count the number of gaps.

Table: Unsignalised intersections critical acceptance gaps and follow-up headways

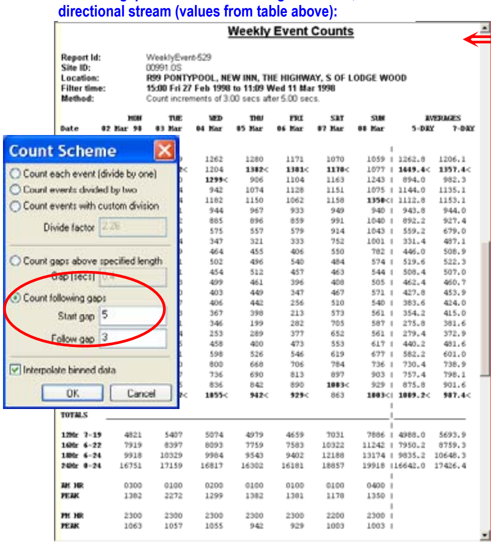
	Critical Acceptance Gap ta	Follow-up Headway tf
Crossing Manoeuvres		
Two-directional stream		
2 lanes	5	3
4 lanes	8	5
One-directional stream		
2 lanes	4	2
3 lanes	6	3
4 lanes	8	4
Turning manoeuvre into the far-side flow (ie Europe, US left turn. Aus, UK right turn)		
Across single lane flow		
Good turning conditions	4	2
Difficult turning conditions	5	3
Across 2 lane flow	5	3
Across 3 lane flow	6	4

Note: The listed values for *ta* and *tf* assume good sight distances and reasonable grades. Allowance should be made for extraordinary conditions.
Values required for turns into the near-side flow become very large if it is assumed that through traffic is not impeded, and most drivers would not wait for such gaps. Judgement needs to be exercised to select appropriate gap criteria for turns into the near-side flow.

Adapted from NAASRA 1988 Guide to Traffic Engineering Practice Part 1 & Part 5.

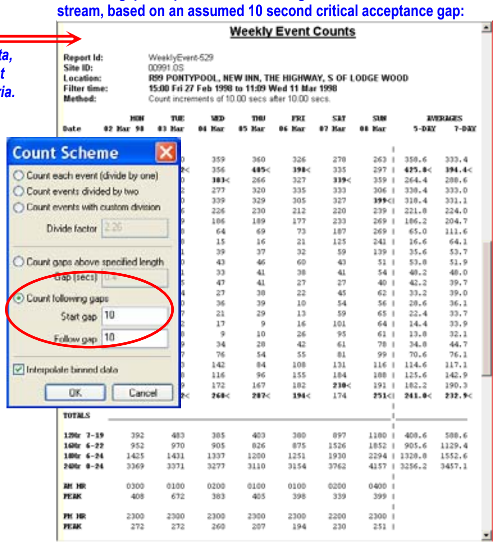
Gap analysis examples:

Available gaps for vehicles crossing a two lane, two directional stream (values from table above):



Same data, different gap criteria.

Available gaps for pedestrians crossing a two lane, two directional stream, based on an assumed 10 second critical acceptance gap:



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