



## **Right turns at signalised intersections: Can they be standardised?**

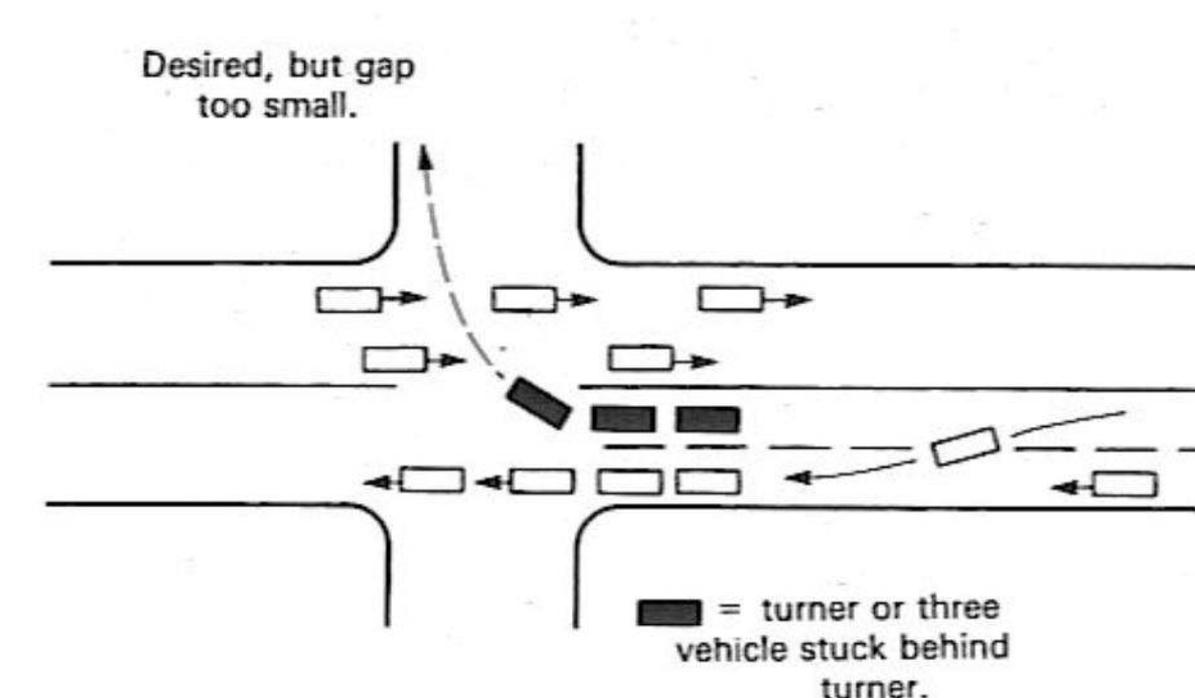
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- Why standardise right turning movements at signalised intersections?
- Are there any benefits to standardising right turns?



- The most dangerous movement at signalised intersections is the right turn.
- This is due to right turning vehicle having to wait for gaps from the oncoming traffic (Yan and Radwan 2008).





Increasing traffic volumes mean that more intersections must incorporate a protected right turn phase by adding the leading or lagging green (protected - permitted) or even the protected only phase.

- Leading green phase

Right turning vehicles proceed before straight through vehicles.

- Lagging green phase

Right turning vehicles proceed after straight through and left turning vehicles



- This results in different requirements for right turning vehicles at individual signalised intersections.
- Where drivers are unfamiliar with that intersections time is lost as drivers may not anticipate the right turn phase for that intersection.
- This decreases the capacity and safety of the intersection and increases driver aggression.



Safety and capacity are the main reasons why the standardisation of right turn movements must be considered.

With these two factors in mind, both leading and lagging green phases must be considered.



## Leading green

Studies done by various scholars revealed the following;

- Leading green phase works well in increasing the capacity of the intersection without requiring an additional turning lane(Sampson 2011).
- Leading green phase also works best where the right turning volume is high only from one direction(Sampson 2011).

Leading green does however have disadvantages that render it dangerous to use on some intersections, these disadvantages include;



## Leading green

- Non conformity to existing right of way laws, which causes false starts for oncoming traffic(Sampson 2011).
- Delays of right turning vehicles as they may not anticipate having right of way first(Sampson 2011).
- May be confusing to pedestrians(Sampson 2011).
- Right turning vehicles may assume it is safe to proceed even after the arrow stops flashing(Sampson 2011).



## Leading green as the standardised right turning phase

- No need for the construction of designated turning lanes in most cases.
- Queue lengths for right turning vehicles at intersections would decrease and fewer through traffic will be blocked as a result of this phase.
- Is not feasible for all intersections as it does not work well if vehicles are turning from more than one direction.



## Lagging green

- The lagging green signal can be used with relative ease in bigger intersections(Sampson 2011).
- It also works better on intersections where there are dual dedicated right turning lanes(Sampson 2011).

This kind of protected permitted right turn has its own disadvantages which include;

- Designated right turning lane is necessary for maximum benefit.
- Obstruction of through vehicles where there is a long queue of right turning vehicles.
- Can not be used where the right turning volume is high only from one direction.



## Lagging green as a standardised right turning phase

- Easier to implement at large intersections with high volumes of right turning vehicles (better capacity).
- Can cater for right turning movements from more than one direction (back to back).
- Less confusing to pedestrians.
- Requires dedicated right turn lane for maximum benefit (more expensive).
- Straight through traffic may be blocked.
- Can not be used for single right turns.



## Possible benefits of standardising right turns

- Decrease in loss of start up time, as vehicle would be sure of the requirements at each traffic signals.
- Increased capacity at signalised intersections
- Increased safety , as motorists not confident to take gaps have the option of waiting for the protected phase.
- Better coordination of traffic signals as they would all have the same right turn phase.
- Less pedestrian confusion.



## Factors to consider before standardisation;

- Possible negative implications on intersections currently functioning well in their current state.
- Effects of traffic growth in the future if leading green is used.
- Possible over catering for right turning movements at the expense of through traffic (possible if lagging green is used).
- Logistics of changing motorists driving behaviour.



## Conclusion

Standardising right turning movements at signalised intersections is possible and is already happening in a smaller scales, where in certain areas use more leading green, and others use more lagging green. Traffic volumes are only going to increase therefore most if not all intersections may require protected right turning phases. Analysing intersections in isolation will only increase start up time loses, a more holistic approach to traffic signal design must be adopted going in to the future with higher traffic volumes.

Standardising right turning movements would restore the simplicity of the traffic signal.

More extensive studies would have to be done to ensure that the standardisation of right turning movements is safe and increases capacity.