

# **An evaluation of pedestrian countdown timers in the Sydney CBD**

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## **Abstract**

Pedestrians are a vulnerable road user group, and represent a substantial proportion of relatively severe road trauma. Pedestrian countdown timers are a display next to the pedestrian lanterns that provide pedestrians with additional information at signalised crossings, with the aim of encouraging them to finish crossing within the allotted time, and ultimately improve pedestrian safety.

In order to quantify the safety benefits of pedestrian countdown timers operating during the FLASHING DON'T WALK pedestrian signal phase, a trial was undertaken in the Sydney CBD to determine the impact of pedestrian countdown timers on pedestrian crossing behaviour and attitudes toward the use of this technology. The trial observed the changes in pedestrian behaviour before and after installation of PCT at two locations in the CBD. Observations were made of the number of pedestrians that start and finish during each interval (WALK, FLASHING DON'T WALK, STEADY DON'T WALK). An assessment was also made of community perception through an intercept survey.

This paper will provide an overview of the RTA trial including the background, method employed and outcomes of the trial in terms of the effectiveness of PCT in improving pedestrian safety.

**Key Words:** Pedestrian, road safety, pedestrian countdown timers, evaluation

## **Introduction**

Pedestrians are a vulnerable road user group, and represent a substantial proportion of relatively severe road trauma. Between 2005 and 2009 there were 345 pedestrians killed on NSW roads, comprising 15% of the NSW road toll. Pedestrian injury numbers are also high, with over 2,000 pedestrians injured throughout NSW per year.

Pedestrian countdown timers (PCT) provide pedestrians with additional information at signalised crossings, with the aim of encouraging the pedestrians to finish crossing

within the allotted time. The time remaining until the start or end of a pedestrian walk phase is typically displayed (in seconds) by a numeric countdown display device mounted on the traffic signal post, in order to improve road safety. They can display the time remaining before a pedestrian WALK signal is shown, or the time remaining for the pedestrian to cross before a STEADY DON'T WALK signal is given.

While PCT operate in various modes in a number of countries, evaluation findings regarding their benefits to pedestrians have been mixed. Thus, evaluation of PCT can provide clearer evidence regarding the usefulness of this technology in effectively improving pedestrian safety.

## **Background to the Trial**

A report by the NSW Office of Transport Safety Investigations (OTSI) into a bus accident resulting in serious injury to a pedestrian on 27th June 2007 in the Sydney CBD<sup>3</sup> recommended the RTA, in conjunction with the City of Sydney Council, conduct a trial of PCT at selected locations in the Sydney CBD to determine whether such equipment should be used more widely within the City. The report suggested that the provision of PCT may help a pedestrian to better identify crossing opportunities.

In response to this recommendation, a preliminary review into the road safety benefits of pedestrian countdown timers indicated that current research appears to be inconclusive in regard to the safety benefits gained from PCT. Thus, the RTA initially advised against a trial of PCT, but commissioned an independent research group to undertake a comprehensive literature review of PCT applications throughout Australia and internationally, in order to comprehensively assess the road safety benefits of PCT. An assessment of PCT types that could be used in the Sydney Coordinated Adaptive Traffic System (SCATS) was also examined. Research findings from this detailed literature review indicated that PCT could increase the number of pedestrians that complete their crossing within the allotted time (i.e. resulting in greater efficiency of the pedestrian clearance phase) (Levasseur & McTiernan, 2010).

The review of international practices identified the following four scenarios for implementing PCT, also depicted in Figure 1.

1. Scenario 1: Countdown during the FLASHING DON'T WALK interval
2. Scenario 2: Countdown during the STEADY DON'T WALK interval
3. Scenario 3: Countdown during the WALK and FLASHING DON'T WALK intervals
4. Scenario 4: Countdown during all intervals (i.e. two countdown periods corresponding to those used for Scenarios 2 and 3).

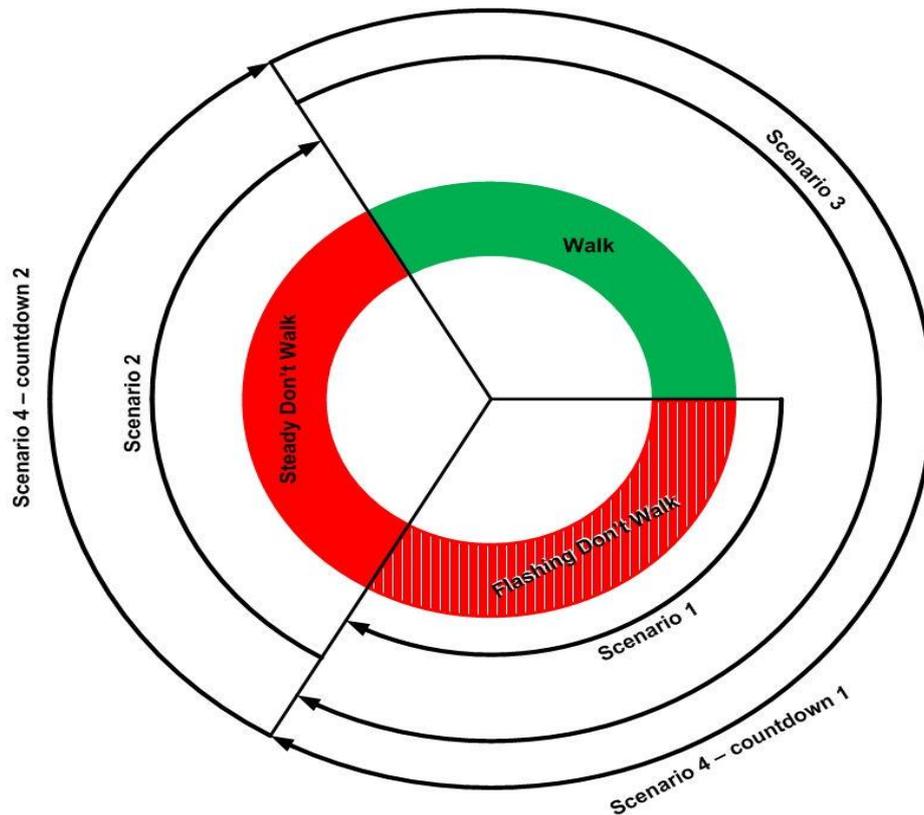


Figure 1: Pedestrian countdown timer scenarios

While PCT may operate in any one of these modes, the review also indicated that, for adaptively managed traffic signal environments such as SCATS (as in NSW), FLASHING DON'T WALK is the only fixed period suitable for PCT to operate. Adaptive traffic signal control responds to real time traffic conditions to change signal phases and coordinate traffic flows over the network being managed.

Therefore, PCT operating during the FLASHING DON'T WALK phase was identified as the only practical option for a trial in the Sydney CBD. This recommendation led to a decision to trial PCT specifically under these conditions (see Figure 2 below). A steering committee with representation from RTA and City of Sydney was established to oversee the trial.

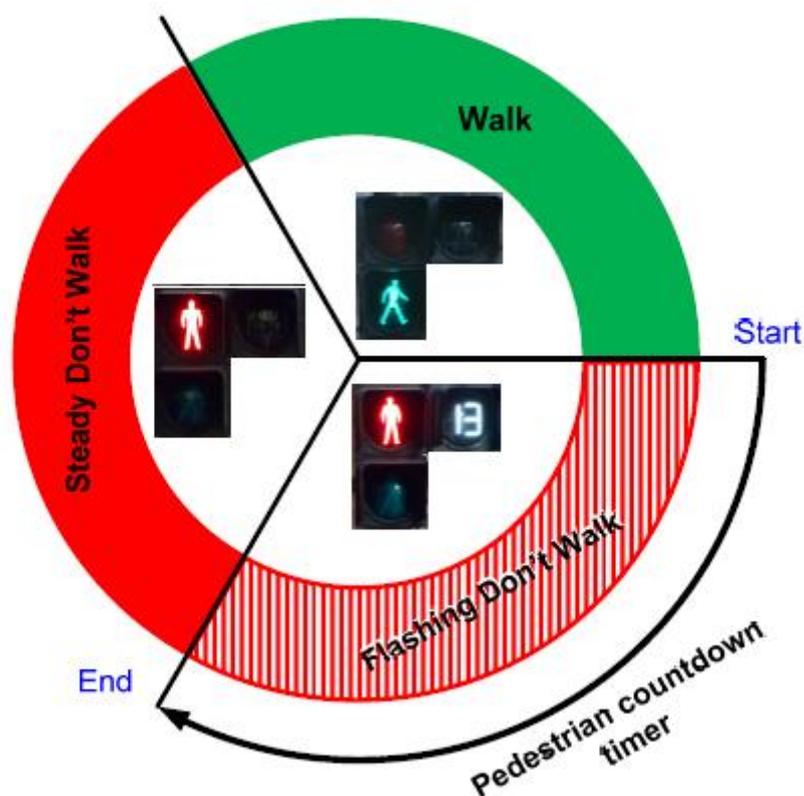


Figure 2: Pedestrian countdown timer scenario used in the Sydney trial

## Research Aims

The aims of the research were to trial and evaluate the effectiveness of PCT at two signalised intersections in the Sydney CBD, which count down during the FLASHING DON'T WALK signal phase only.

In order to evaluate the safety benefits of PCT, the following key potential impacts were identified for assessment:

1. PCT will not increase the proportion of pedestrians who begin to cross during the FLASHING DON'T WALK interval.
2. PCT will reduce the proportion of pedestrians finishing their crossing during the STEADY DON'T WALK interval.
3. PCT will increase the walking speed of pedestrians who start to cross during the FLASHING DON'T WALK.
4. PCT will reduce the number of potential conflicts between pedestrians and vehicles.

Pedestrian intercept surveys were used to assess pedestrian attitudes related to PCT.

## Method

### Trial Locations

Two treatment and two control sites located in the Sydney CBD were selected and matched for conducting the study:

Treatment sites were:

1. Intersection of George Street and Bathurst Street – consists of three north bound and three south bound lanes on George Street and three east bound through lanes on Bathurst Street.
2. Intersection of Park Street and Pitt Street – consists of five east bound or west bound lanes on Park Street and two north bound through lanes on Pitt Street.

Control sites were:

1. Intersection of George and Liverpool Streets – consists of five lanes of traffic on the northern side of the intersection. On the southern side of the intersection there are six lanes of traffic.
2. Intersection of Park and Castlereagh Streets – consists of five west bound lanes on Park Street on the western side of the intersection. Six travel lanes are found on the eastern sides of the intersection.

### Materials

In order to evaluate the safety benefits of PCT, the trial included:

- an observational video survey, conducted before installation of the PCT, to allow analysis of crossing patterns including pedestrian behaviour and times, and traffic patterns
- an observational video survey, conducted after installation of the PCT, to allow analysis of pedestrian crossing patterns and times
- an on-site intercept survey of pedestrians conducted after the installation of the PCT, to identify pedestrian perceptions of the pedestrian countdown timers.

### *Video Data Collection*

Roadside digital video camera equipment (Figure 3) was used to collect pedestrian observation data at the four trial intersections, for three-day video data collection periods (8:00am to 8:00pm on Thursday and Friday, and 10:00am to 10:00pm on Saturday). The time periods were chosen to obtain a representative sample of pedestrian volumes at a crossing over the course of a day.



*Figure 3: Roadside digital video image collection*

Video data collection was focused on the pedestrian crossing area. The pedestrian crossing area for a typical crossing is shown in Figure 4. It includes the area bounded by the edge of the two kerbs and would typically include the area between the pedestrian crossing markings.

However, based on observations of existing pedestrian behaviour, pedestrians may not cross solely between the pedestrian crossing markings. Consequently, the crossing area was extended to include the area between the vehicle hold line and the pedestrian crossing marking closest to the intersection.

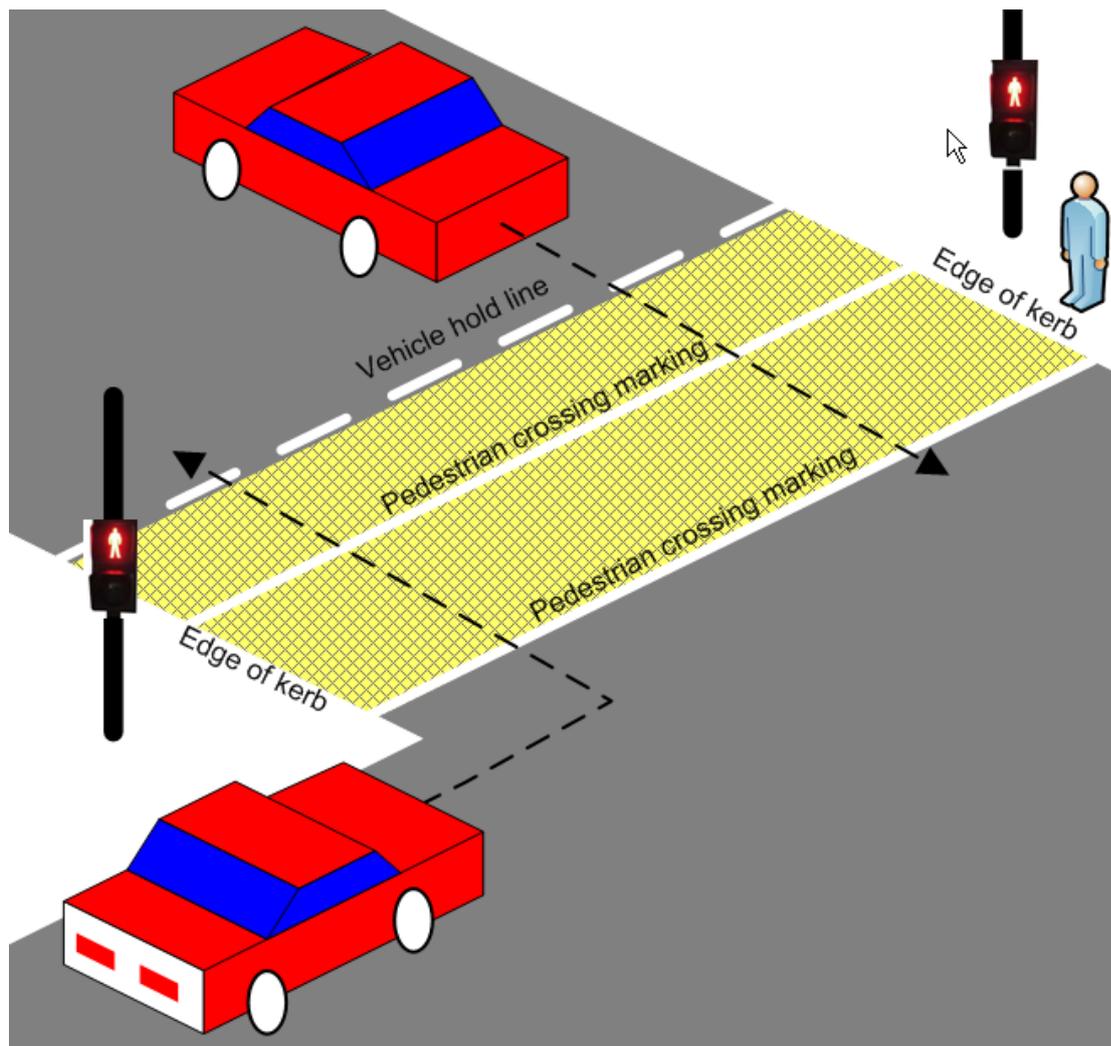


Figure 4: Pedestrian crossing area

Four types of data were collected:

1. Number of pedestrians that started and finished each pedestrian time interval (Walk, FDW, SDW). Starting and finishing a crossing was defined as when a pedestrian steps off or onto the kerb, respectively.
2. The number of vehicles that traversed the pedestrian crossing area during the Walk and FDW intervals.
3. The start and finish times and phase intervals for individual pedestrian movements that began during the FDW interval.
4. Pedestrian vehicle incidents observed.

#### *Behavioural Intercept Survey*

A pedestrian intercept survey was developed which consisted of questions relating to the purpose and usefulness of PCT, their ease of use, the extent to which they improve pedestrian safety, as well as demographic and exposure questions.

The intercept survey was conducted on a total of 195 pedestrians at each of the crossings at the two PCT treatment sites. The survey was conducted during the post-operation period after completion of the post-installation video data collection.

The interviewers were instructed to select an equal number of men and women, and an evenly distributed number of interviewees by age groups. The gender and age of pedestrian respondents were based on an assessment made by the interviewer. The interviewer also observed whether the pedestrian had a physical impairment.

## Summary of Findings

The following key changes were found from the video observation survey:

- minimal change in late finishers (those who finish crossing prior to the STEADY DON'T WALK interval)
- an 11.9% increase in late starters (those starting to cross during the FLASHING DON'T WALK interval which was offset by an 11.3% decrease in pedestrians starting during the Walk interval)
- a 12.3% increase in late starters that were successful
- increase in the walking speed of late starters

Results of the pedestrian intercept survey found that:

- only 37% of pedestrians overall noticed the PCT with nearly half (47%) noticing the PCT at wider crossings and slightly more than a quarter of pedestrians (28%) at the narrower crossings
- 53% of respondents felt that the PCT made crossing 'much safer' and 25% 'a little safer'
- a majority of respondents (63%) felt that the PCT made crossing 'much easier to understand'

## Discussion

The improvement in successful late starters and late starter walking speed was offset by the increase in the number of late starters. PCT resulted in a reduction in pedestrian compliance due to the increase in the number of late starters who started crossing during the FLASHING DON'T WALK interval. This was most dramatically seen at the Park St and Pitt St western crossing where the number of late starters was found to increase by 1606 pedestrians (19.2%).

In terms of safety, it is difficult to determine the effect of more pedestrians starting late on safety. The trial recorded the number of conflicting vehicles present in the crossing area during the Walk and FLASHING DON'T WALK intervals. However, whether a late starting pedestrian would have had a higher level of exposure to vehicles due to starting late was not conclusively determined from the outcomes of the trial. The lack of compliance does not automatically increase safety risk for pedestrians. Crossing during the FLASHING DON'T WALK interval still provides a temporal separation between pedestrians and vehicle movements.

The video observations also identified situations where vehicles were observed committing traffic violations which may have made it more challenging for pedestrians to comply with starting during the WALK interval. Vehicle violations were

not recorded as part of the trial, and it is therefore not possible to determine the extent to which they occurred or any resulting influence upon pedestrian compliance.

Results of the intercept survey suggested that pedestrians felt safer crossing whilst using PCT with 53% responding that PCT made them feel 'more safe' and 18% responding 'a little safer'. However, the results of the video survey suggest did not concur with these findings. For pedestrians, the trial found that PCT provide them with an opportunity to start later in the pedestrian phase and increase the likelihood of a successful crossing. It may be that pedestrians view PCT in this manner, which would account for the difference between user perceptions and the actual outcomes of the observational analysis.

The outcomes of this trial provide little conclusive evidence that the safety of pedestrians was improved as a result of PCT. Further research involving a larger number of treatment and control sites may provide clarity regarding the effectiveness of PCT, and may enable greater understanding of the mechanisms relating to pedestrian behaviour around PCT.

Pedestrian safety is a key priority for the RTA and it continues to investigate ways to improve safety at traffic signals while maintaining traffic flow. Following the signing of a Memorandum of Understanding (MoU) between the NSW Premier and Sydney Lord Mayor in September 2010, the RTA has been working together with Transport NSW, the Transport Management Centre, State Transit Authority and City of Sydney Council to continue to actively develop and deliver projects and campaigns in conjunction with local councils to improve pedestrian safety across Sydney, and more broadly throughout NSW.

## References

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