



# Scramble Pedestrian Crossings

Operational Instruction

14.1



# TRAFFIC MANAGEMENT Operational Instructions

## Scramble Pedestrian Crossings - 14.1

### AMENDMENT RECORD

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## 1. Scope

The purpose of this Instruction is to provide a uniform approach for the installation and operation of Scramble Pedestrian Crossings. This guideline applies to all such traffic signal operations on public roads under the responsibility of TSA or Local Government.

## 2. Background

The City of Holdfast Bay, in June 1998, requested that it be permitted to alter the traffic signals at the Jetty Road, Gordon Street, Partridge Street intersection to provide an exclusive pedestrian phase which allows unrestricted pedestrian movements both parallel and diagonally across the intersection.

There appears to be an expectation that this form of signal phasing provides more flexibility and less delay for pedestrians.

Advice from the Legislation and Policy Development Section has established that scramble pedestrian crossing operation is permitted within the Road Traffic Act.

The constraints detailed below have been prepared with pedestrian safety in mind but also to allow a reasonable degree of operating flexibility for efficient operation. However, at the time of preparation no such crossings were operating in the state. Therefore, as experience grows, changes to these guidelines could be expected.

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## 3. General Constraints

Sites being considered for scramble operation should satisfy the following:

**traffic** - there must be a high vehicle and pedestrian flows with sufficient demand for the diagonal crossing movement.

**geometric** - intersection or junction geometry must be simple to allow scramble pedestrian crossing operation without causing undue confusion or excessive delay.

**operational** - the efficiency of the intersection or junction must not be unduly compromised.

### 3.1 Traffic Constraints

Scramble pedestrian crossings should only be used where very high pedestrian and vehicle flows are experienced such that turning vehicles have insufficient gaps to filter through the pedestrian movements or pedestrian safety is compromised. As a guide, the following figures are recommended as a minimum before a scramble pedestrian crossing should be considered:

- pedestrian flows should be **very** high. High may be considered to be a minimum of 10 per cycle. For example, if pedestrians are uniformly distributed and the cycle time is 150 seconds, the minimum pedestrian flow would need to be 240 per hour

- there should be a minimum of 10% of the pedestrian demand for the diagonal crossing. This can be predicted by conducting an origin and destination survey of pedestrian movements through the intersection

The following must also be considered:

- both vehicle and pedestrian delays usually increase with a scramble pedestrian crossing operation compared to standard phasing which allows pedestrian movements to flow within the vehicle phases. This is likely to lead to greater frustration and a stronger tendency for pedestrians to cross illegally against a don't walk display. Therefore, the vehicle flows should be high enough to discourage pedestrians from undertaking the unsafe practice of crossing on the don't walk and leaving a call demand for the scramble phase unnecessarily
- if these constraints are only satisfied during some times of the day or days of the week then part-time introduction of the scramble crossing may be considered
- public transport should not be disadvantaged by additional delays. Agreement of the Passenger Transport Board should be obtained prior to introducing a scramble pedestrian crossing

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### 3.2 Geometric Constraints

Generally scramble pedestrian crossings must only be provided within "standard" cross road or tee intersections with simple and minimal phasing arrangements. They should **not** be installed at sites with:

- corner islands
- seagull/butterfly type islands
- more than four intersection approaches
- severely angled approaches
- diagonal crossings greater than 36 metres
- special phasing for emergency vehicles, bus or tram priority, railway signals etc.
- staggered or paired intersection/junctions
- signals with overlap phasing or early/late cut-offs etc (see clause 5)
- freeway/expressway intersections
- major arterial roads, including those with "linking" either masterlink or flexilink

### 3.3 Operational Constraints

Sites suggested for scramble pedestrian crossing operation must be in heavily trafficked urban shopping and/or tourist precincts. They shall not be used on major arterial routes.

Scramble pedestrian crossings should not be installed if the practical degree of saturation that would result would be greater than 0.9.

Furthermore, the operation of a scramble crossing shall operate such that it does not interfere with the operation of nearby traffic signals or adversely affect vehicle movements on major arterial roads.

## 4. Installation Requirements

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If a site satisfies the constraints in Section 3 and a scramble pedestrian crossing is proposed:

- there must be a standard pedestrian cross-walk on every approach
- diagonal cross-walks must be marked in accordance with details shown in Figure 1
- the area bounded by the cross-walks must be free of traffic control devices, such as islands, raised pavement markers or other physical devices or obstructions which could be hazardous to pedestrians, particularly those with physical impairments
- the pedestrian clearance times must cater for the additional diagonal crossing distance
- standard walk/don't walk pedestrian lanterns must be provided on a post on each corner such that the best line of sight is provided to pedestrians on the diagonally opposite corner
- pedestrian lanterns facing the parallel cross-walks must be louvered such that only the diagonally facing lanterns are seen from the diagonally opposite corner
- diagonally facing push buttons should not be provided (except under the special operating option discussed in clause 5.2)
- pedestrian audio-tactile units should respond only the corresponding parallel cross-walk
- gully pits and drainage inlets should not be installed on any of the corners within the pedestrian cross-walk areas
- the Mobility Instructors, Guide Dogs Association should be consulted to discuss the special access issues presented to the disabled. Diagonally facing kerb ramps, tactile surface indicators, and the lack of certainty of the angle of the diagonal cross-walk may be confusing to the visually impaired.
- a sign (G9-SA106) advising pedestrians of the scramble crossing operation must be installed on the post immediately above each pedestrian push button as shown in Figure 3
- turn lines for right turning vehicles should not be marked.

## 5. Operation

For optimum pedestrian safety it is recommended that scramble pedestrian crossings operate on a full-time basis. However, part-time operation is an option. Both full time and part time operation is discussed below.

When the scramble phase is introduced, all pedestrian signal groups must operate at the same time, ie. the walk display shall be introduced concurrently on every pedestrian lantern and the duration of the walk and clearance intervals must be identical and be timed to cater for movements across the longest pedestrian (diagonal) cross-walk distance.

*Note: As well as part-time operation, it would of-course also be possible to provide full flexibility by allowing both the standard vehicle/pedestrian phasing and the scramble phase in the same cycle throughout the day, perhaps even allowing the pedestrian movements to overlap to other phases. With this type of operation the scramble phase would need to be introduced automatically in each cycle or by demand with additional push buttons assemblies on each corner. While such operating options may minimise delays, it is thought that the phasing is too complex to be readily and safely comprehended by pedestrians, particularly as there is limited opportunity for pedestrians to experience scramble crossing operation in South Australia (or in fact, in Australia).*

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### 5.1 Full-time Operation

Vehicle and pedestrian movements should not be allowed in the same phases. There shall be no vehicle-pedestrian conflicts. Also there must be no walk or clearance overlap from the scramble phase to any other phase. Under this operation pedestrian confusion is minimised and there is no unnecessary extension of vehicle phases to suit pedestrian requirements when vehicle flows are low, hence minimising delays.

However, it must be realised that pedestrian and vehicle delays are longer when vehicle flows are heavy and pedestrians are much more likely to disobey the don't walk display during the vehicle phases when vehicle flows are light.

A typical phasing arrangement is shown in Figure 2.

### 5.2 Part-time Operation (by Time of Day)

Pedestrian safety must be taken into consideration before part-time operation is introduced. Part-time operation may not be appropriate at this early stage of scramble crossing use in SA.

A disadvantage with part-time operation may be that there is an expectation of a scramble pedestrian phase in the parallel pedestrian phase operating times which may lead to pedestrians mistakenly trying to cross diagonally during the vehicle phase. That is why the full view of the diagonal pedestrian lanterns and a louvered view of the parallel crossing lanterns is very important.

Notwithstanding the potential pedestrian hazard, part-time operation does provide the advantage of allowing the standard combined vehicle and parallel pedestrian movement phasing at low pedestrian movement times of the day thus minimising pedestrian disobedience and driver frustration.

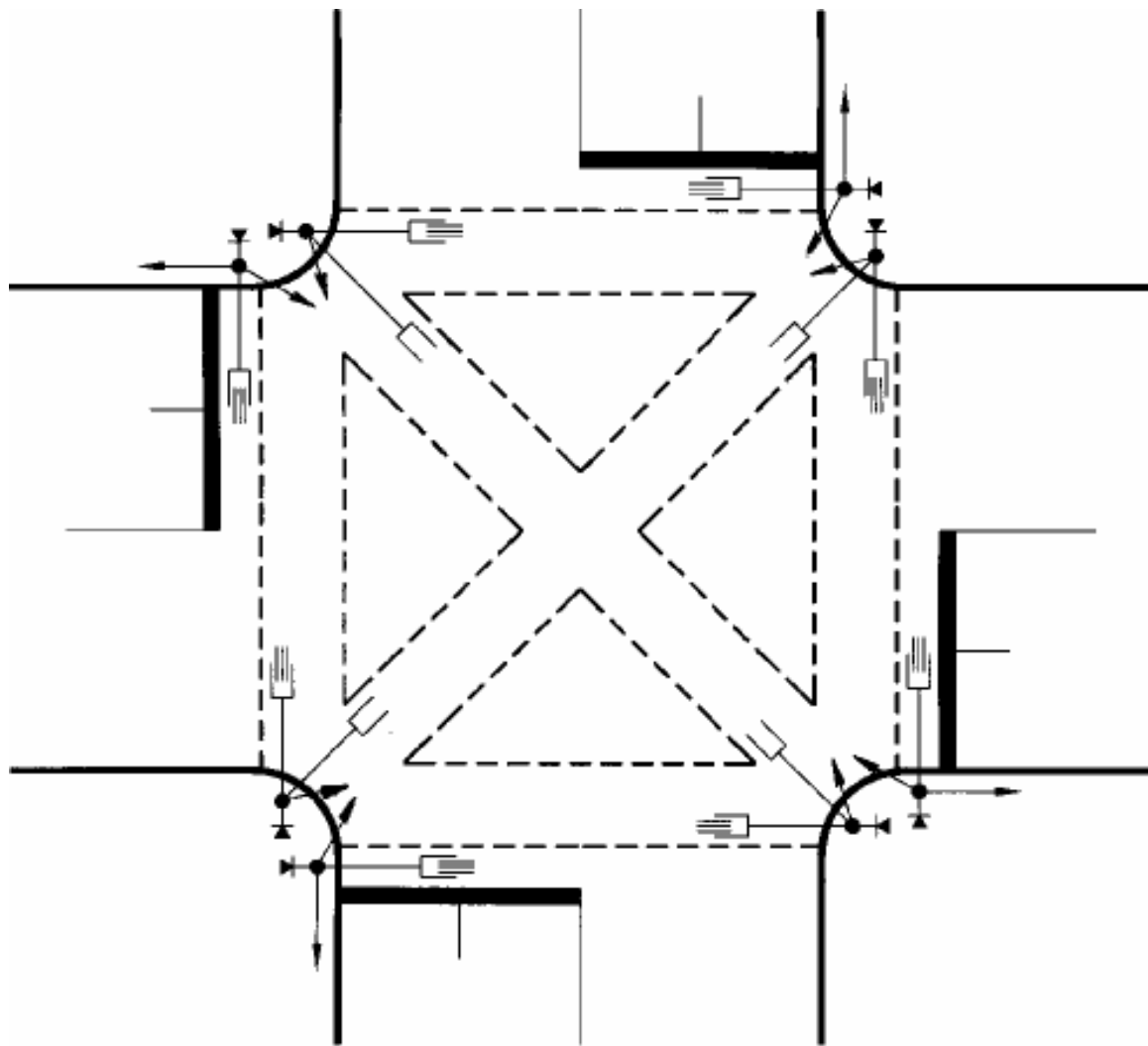
If the decision is made to allow the signals to operate part-time it is recommended that the times of operation be selected by time of day and day of the week in accordance with measured pedestrian and vehicle demand. Once selected it is further recommended that the times be applied consistently such that regular road users become accustomed to the operational characteristics. This may reduce (but not eliminate) the potential for confusion to road users, particularly pedestrians.

## 6. Reference Documents

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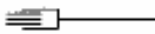


- Draft document on Scramble Crossings, Roads and Traffic Authority, NSW.
- AS1742.14-1996, Manual of Uniform Traffic Control Devices, Part 14: Traffic Signals.



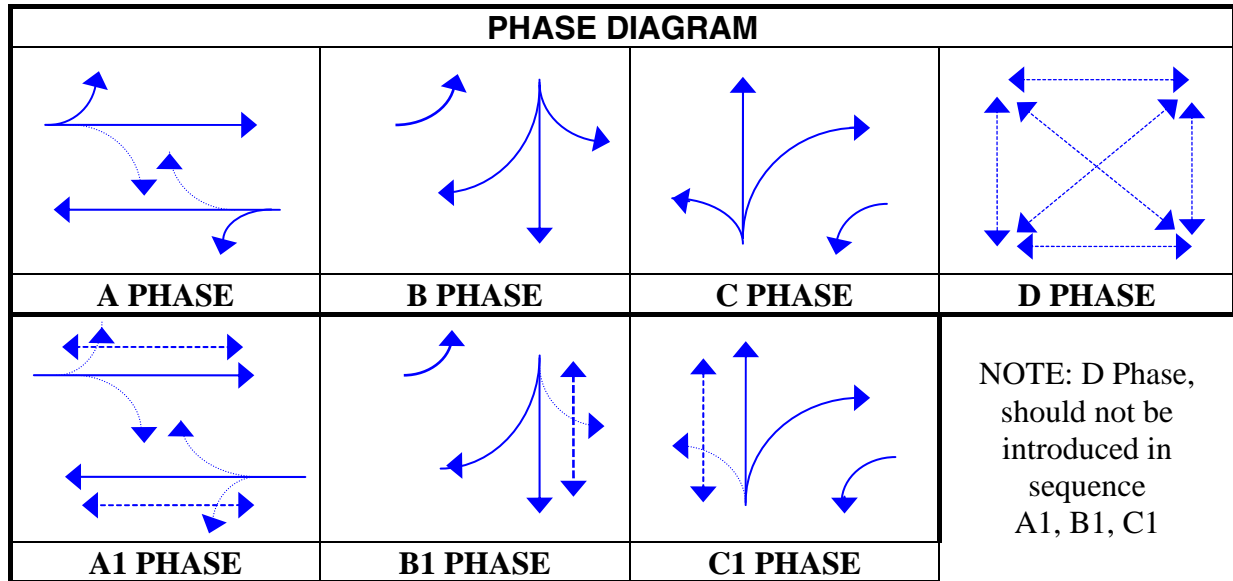


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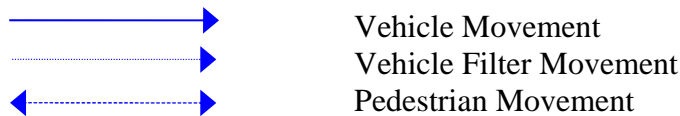
LEGEND:

-  Vehicle Signal
-  Pedestrian Walk / Don't Walk Signal
-  Pedestrian Walk / Don't Walk Signal with cowls and louvres.
-  Pedestrian Push Button
-  Pedestrian crosswalk pavement markings

**Figure 1 - Pedestrian and Vehicle Signals and Cross-walk Markings**



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Example of a scramble pedestrian phase in conjunction with a standard three phase arrangement. The scramble phase could also be introduced in a standard two phase arrangement.

- Full-time:
  - \* scramble pedestrian phasing only allows A, B, C and D phases
- Part-time (take note of concerns expressed in clause 5.2 before considering this operation):
  - \* scramble pedestrian phase allowed - A, B, C, D (only)
  - \* no scramble pedestrian phase allowed - A1, B1, C1 (only)

**Figure 2 - Example of a Scramble Phase Operation**

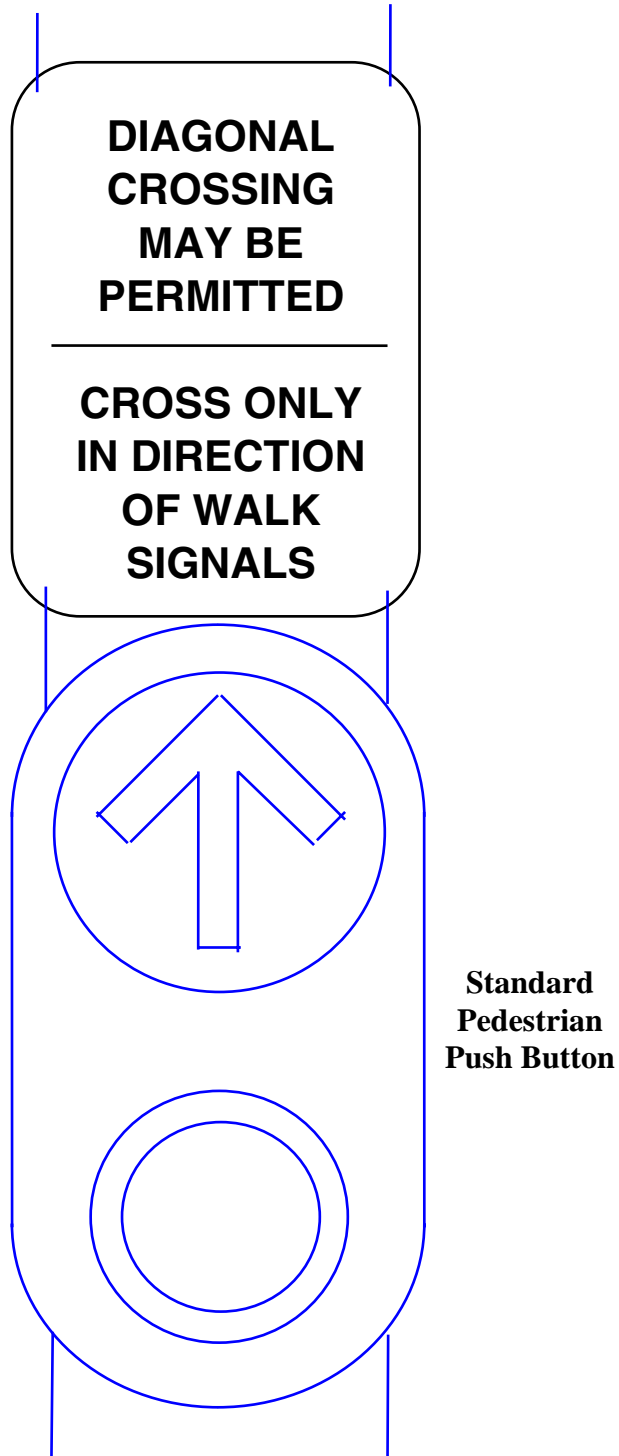


Figure 3 - Pedestrian Push Button Information Sign (G9-SA106)