A wide range of work activities, temporary events or hazards on a road may require the partial or full closure of one or more traffic lanes.

The Manual of Uniform Traffic Control Devices (MUTCD) Part 3 must be used to design static work sites requiring lane closures. Short term lane closures must be delineated with hazard markers, traffic cones or bollards.

The initial delineation area of a closure, called an approach taper, plays a vital role in work site safety. The requirements for approach tapers are sometimes misunderstood and incorrectly applied during the design and implementation of Traffic Guidance Schemes (TGS), which can lead to confusion for road users and increased risks for road workers.

Refer to MUTCD Part 3 Cl 4.8

| Merges are required only on multi-lane roads where one lane is required to merge into another. Merge tapers allow road users in the merging lane to safely change lanes in a gradual and predictable manner at or below the posted speed of the road. Wherever possible, tapers should be located where their full length is visible on approach. Where several lanes need to be closed in one direction, only one lane may be merged at a time and a minimum separation between successive merge tapers of 2D (as per the MUTCD Part 3 Table 4.2) is required. This applies to lane closures on the same side and on the opposite side of the carriageway. |
| Lateral Shifts are applicable where traffic in one lane is required to change alignment without any conflict with another traffic lane. Lateral shifts are used to move traffic: around a work site, to a different carriageway (contraflow), to a side track or a detour, or to provide access to a turn lane. The lateral shift taper lengths in the MUTCD Part 3 allow for drivers to safely shift direction over a single lane width while travelling at the posted speed. Where the lateral distance is greater than 3.5m, longer taper lengths should be considered. Additionally, separation between lateral shifts in different directions is required and it is undesirable to present road users with multiple lateral shift decisions at once. |
| Reversible Flow describes alternating traffic flow in two directions along a single travel lane, also commonly referred to as shuttle flow. This is used where insufficient width is available for two lanes in opposite directions. Vehicle movements may be managed by a traffic controller, portable traffic signals or other control device on both approaches to the one lane section. The maximum length of a reversible flow lane is determined by the two-way traffic volume (refer to MUTCD Part 3 Table 4.9). Refer to MUTCD Part 3 Cl 4.13.1 |

<table>
<thead>
<tr>
<th>Recommended taper length (m)</th>
<th>Merge</th>
<th>Lateral Shift</th>
<th>Reversible Flow</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permanent posted speed (km/h)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40 or less</td>
<td>15</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td>50</td>
<td>30</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>60</td>
<td>60</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Greater than 60</td>
<td>120 - 160</td>
<td>60 - 80</td>
<td>30</td>
</tr>
</tbody>
</table>

Refer to MUTCD Clause 4.8.2 Table 4.6

Reversible Flow describes alternating traffic flow in two directions along a single travel lane, also commonly referred to as shuttle flow. This is used where insufficient width is available for two lanes in opposite directions. Vehicle movements may be managed by a traffic controller, portable traffic signals or other control device on both approaches to the one lane section. The maximum length of a reversible flow lane is determined by the two-way traffic volume (refer to MUTCD Part 3 Table 4.9).

Refer to MUTCD Part 3 Cl 4.13.1
Complex lane closures
The three basic types of tapers can be applied in numerous combinations. While these may seem complex, the fundamental requirements for each basic taper still applies. The permanent road speed must be used to select all taper lengths, even if the taper is located in a section where speed is reduced. It is important that appropriate separation distance is provided between all tapers to give road users sufficient time to understand and react to the changed conditions. Some examples are provided below for the correct and incorrect application of tapers.

Multiple lane merges

Key Tips:
• Always provide a separation distance between merges of 2D (as per MUTCD Part 3 Table 4.2).
• Do not locate a temporary merge near a permanent merge – provide 2D separation between them.
• Place merge tapers where the full length is visible to approaching road users.
• Allow traffic to adjust after a merge point before drivers are required to merge again – drivers should only need to make one decision at a time.

Tapers near curves and crests

Key Tips:
• Provide drivers with adequate sight distance to interpret signage leading up to roadwork sites.
• If the curve or crest restricts the sight distance for road users, consider starting and ending the merge taper before the curve or crest. While this sight distance varies with speed, a suggested method to ensure that adequate sight distance is available is to confirm that the last cone/bollard in the merge taper is visible from:
  - 50m prior to the lane status sign, where the permanent Posted Speed Limit is at or below 60km/h
  - The lane status sign, where the permanent Posted Speed Limit is greater than 60km/h
Lateral shifts

Key Tips:
- Consider the lateral shift distance when determining the length of a multi-lane lateral shift taper. For example, when using a two lane lateral shift, the recommended taper length would be twice the recommended standard lateral shift taper length in MUTCD Part 3 Table 4.6 (i.e. at 60km/h the recommended lateral shift taper length is 30m and so the recommended length would be 60m for a two lane lateral shift).
- Provide appropriate separation (2D) between successive merges and lateral shifts.
- Consider presenting drivers with only one choice at a time e.g. stagger diverge tapers if turn lanes are maintained.
Reversible flow

Key Tips:

- Ensure that four (4) traffic cones are located on the centreline prior to traffic controllers and locate traffic signals or traffic controllers immediately prior to tapers. Greater separation may be required if oversize vehicles are anticipated. The decision not to use these cones must be supported by a risk assessment in accordance with MUTCD Part 3 Clause 2.2.5 and identification of an alternative measure that provides an equivalent level of safety.
- Refer to MUTCD Part 3 Clause 4.13.1 for determining the desirable maximum length of single-lane operation under reversible flow based on traffic volumes.
- Consider the need for additional traffic controllers and signage where driveways or side streets intersect with the two-way reversible flow section. Both directions of traffic should be stopped to allow side street traffic to enter reversible flow sections.
- Sufficient all-red time is needed for portable signals to safely allow vehicles to clear the reversible flow lane before the direction changes. Refer to MUTCD Part 3 Supplement Table 8.2.3 for details.
- Consider using approved TC signs TC9265 or T5-Q02 at the start and end of reversible flow.

Traffic Guidance Schemes must be prepared by a competent person with Traffic Management Design certification.
Other Works on Roads Factsheets related to this topic include:
- Cyclists and road works
- Pedestrians at construction works
- Short Term Low Impact Works
For more in-depth information refer to the MUTCD in the first instance, and then contact:
trafficengineering.support@tmr.qld.gov.au if required.