

**Guideline**

# **Signing and Line Marking for Heavy Vehicle Interception Sites**

**September 2022**

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## 1 Background

Transport and Main Roads' transport inspectors and compliance staff of other agencies, such as Queensland Police Service, use designated heavy vehicle interception sites (HVISs) to check vehicles and their drivers for compliance against various statutory requirements.

Transport and Main Roads provides and maintains HVISs as a designated workplace and has a duty of care to ensure they are built and maintained to provide a safe work environment. These sites should conform to the appropriate legislation and relevant codes of practice. The design requirements of HVISs are provided in Transport and Main Roads [Heavy Vehicle Interception Site Design Manual](#).

There is currently no specific national or state code of practice for the provision, maintenance, and operation of HVISs. This *Signing and Line Marking for Heavy Vehicle Interception Sites Guideline* relies on the requirements outlined in the Queensland [Manual of Uniform Traffic Control Devices](#) (MUTCD) and [Queensland Guide to Temporary Traffic Management](#) (QGTMM) for the protection of employees undertaking activities within the road reserve.

This Guideline replaces [Technical Note](#) TN115 *Signing and Line Marking for Heavy Vehicle Interception Sites* which has been withdrawn.

## 2 Purpose

This *Guideline* provides direction on the installation of signs and line marking, including symbols, which are required to provide a safe environment for the interaction between passing vehicles, transport inspectors and occupants of any vehicles entering, parking at, or leaving a HVIS.

## 3 Scope

The scope of this *Guideline* includes the signing and line marking of officially-designated, permanent HVISs used by transport inspectors.

The following processes for developing and maintaining support activities are out of scope for this *Guideline*:

- the design of the HVIS (refer to *Heavy Vehicle Interception Site Design Manual*)
- random locations / activity of intercepting vehicles
- programmed inspection sites not designed as HVISs
- development and implementation of site-specific operating instructions, and/or
- methodology associated with road safety audits.

## 4 References

The following documents are referenced and should be read in conjunction with this *Guideline*:

- [Heavy Vehicle Interception Site Design Manual](#)
- Queensland [Manual of Uniform Traffic Control Devices](#) (MUTCD)
- [Queensland Guide to Temporary Traffic Management](#) (QGTMM)
- [MUTCD Q-series and Traffic Control \(TC\) signs database](#), and
- the [Road Planning and Design Manual](#) (RPDM).

## 5 Terms and definitions

Table 5 lists terms used in this *Guideline* and their definitions.

**Table 5 – Terms and definitions**

Term	Definition
AADT	Annual average daily traffic, given as vehicles per day and is an indication of the number of vehicles travelling on the road (in both directions) at that location
ANPR	Automatic number plate recognition
CMS	Changeable message sign
Government compliance staff	Enforcement staff employed by government departments and agencies to enforce relevant legislation
hinged sign	A traffic control sign that features hinges for the purpose of showing, hiding, or altering the displayed message; the signs are manually changed by workers
HVIS	Heavy vehicle interception site
ITS	Intelligent transport system: the use of electrical, electronic, or mechanical systems to control or regulate a traffic function
M994	Departmental form for the installation and/or removal of regulatory traffic signs / devices
merge	The converging of separate streams of traffic into a single stream
multilane road	Dual carriageway with median or four or more lanes of traffic with no physical separation (refer Queensland MUTCD Part 3)
MUTCD	Queensland <i>Manual of Uniform Traffic Control Devices</i>
OHS	Occupational health and safety
operational separation	A physical separation, such as grass verge, concrete median, or a barrier system (concrete, guardrail, or wire rope), that separates the interception site of the main roadworks site from the adjacent traffic lane
physical separation	A site that has the work area on the site separated from the through traffic lane by either a barrier system, concrete median, or a grassed verge – a 1.2 m flush painted median is not considered physical separation
QGTTM	<i>Queensland Guide to Temporary Traffic Management</i>
QPS	Queensland Police Service
RPDM	<i>Road Planning and Design Manual</i>
TC sign	A sign used for the purpose of traffic control that has been formally authorised for use as an official traffic sign
TMC	Traffic Management Centre
<a href="#">traffic controller</a>	A person authorised to control traffic on a declared road
<a href="#">transport inspector</a>	Transport and Main Roads staff authorised to undertake compliance (enforcement) activities
Two-way road	Roadway having running lanes allotted for use by traffic in opposing directions without either physical separation or a painted median between them
vpd	Vehicles per day
VMS	Variable message sign

Term	Definition
VSLS	Variable speed limit sign
weave	The movement of a vehicle from one through lane to another, sometimes referred to as changing lanes (see definition of <i>merge</i> previously)

## 6 Assumptions

Example sign layouts included within this *Guideline* have been developed based on the following assumptions.

- There is no national or industry code of practice for the signing of HVISs.
- Transport inspectors will develop site-specific operating instructions that incorporate the layouts and operational recommendations in this *Guideline*.
- A HVIS that is located on only one side of the road is not used for traffic approaching in the opposite direction (that is, vehicles shall not have to cross the dividing (centre) line to enter the site).
- Record keeping (such as via Form M994) will be undertaken in accordance with current departmental requirements for any changes to signing layouts or sign face changes, including operation of hinged signs.
- Each time static signs are opened or closed will be recorded in an appropriate place. This is necessary for QPS enforcement, as well as any future legal action involving Transport and Main Roads. It is the responsibility of the transport inspectors to ensure the records are discoverable.

## 7 Signing

### 7.1 Signing philosophy

#### 7.1.1 General

The signing of HVISs is driven by two obligations: the first is worker safety and the second deals with traffic safety – for example, weaving between lanes, merging, or exiting the traffic lane or the safe interaction of traffic within the one lane (as the intercepted vehicle is slowing).

Signing requirements are drawn from Part 2 of the Queensland MUTCD to cover the safe operation of vehicles, and from Part 3 of the Queensland MUTCD and Parts 3 and 7 of QGTTM to cover the safety of the transport inspectors.

The following points were considered in the development of this *Guideline*.

- Intelligent transport system (ITS) signing solutions are the preferred method over static options requiring manual roadside operation of hinged signs by transport inspectors.
- The use of advance ITS signing with the 'when flashing' activation message negates the need for trucks to merge to the left lane when the HVIS is not open. This should be considered on multilane motorways where truck weaving poses an increased risk to the travelling public.
- Static signs requiring manual operation (for example, a hinged sign) that display messages relating to the HVIS should not remain open when the HVIS is not being used.

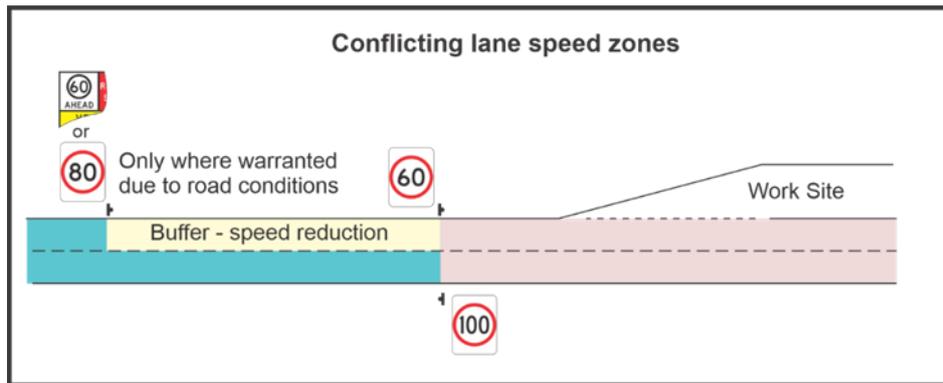
- Technical guidance provides for the minimum requirements; however, designers should be open to the need for an occupational health and safety (OHS) and/or [road safety audit](#) as a means of identifying any additional site-specific signing required.
- Drivers must be given sufficient warning of any activity currently being conducted at an upcoming HVIS. Drivers need to be able to understand what action is required (reduce speed, change lanes, and so on), and respond to the traffic control requirements in place.
- There is a general understanding with reduced speed limits that, if the driver is restricted for too long a distance without perceiving there is activity or a reason to reduce speed, then the driver will start to increase speed again. For this reason, any speed reduction needs to be as close to the HVIS as possible. Speed reductions need to comply with sound traffic engineering practices, the Queensland MUTCD and the QGTTM.
- The transport inspector directs vehicles into the HVIS from anywhere along the site rather than from a fixed point as the transport inspector could be engaged with another vehicle while observing an approaching vehicle of interest. The transport inspector may temporarily cease the current activity and move closer to the traffic lane to direct another driver to enter the HVIS. The transport inspector would then continue with the original activity. For this reason, all dimensions for the location of signs on the approach to the site are taken from the start of the taper used to enter the HVIS.
- The blank side of a hinged sign should be used to display a road safety message when the HVIS is not operational. The relevant Transport and Main Roads District is to decide the road safety message to be displayed, considering the amount and context of signing in proximity to the HVIS.

### **7.1.2 Speed buffer zones on approach to the heavy vehicle interception site**

The following points relating to speed limit signing were considered in the development of this guideline and are illustrated in Figure 7.1.2.

- The regular posted speed sign that follows the temporary work area speed zone (shown as 100 km/h in Figure 7.1.2) should be located as close to the end of the HVIS exit lane as practical, but it must also be in line with the 60 km/h speed sign provided for vehicles approaching the HVIS.
- Offset speeds in a speed zone are not allowed, except as per QGTTM Part 3, which allows offset speeds in the buffer zone. The purpose of the buffer zone is to slow drivers to 60 km/h through the active work site zone. On approach to a HVIS, there is no specific purpose for vehicles to be travelling at 80 km/h in the buffer zone other than to reduce speed for the upcoming 60 km/h zone (shown in Figure 7.1.2), which is why the use of a '60 AHEAD' sign is generally more appropriate than posting a speed limit as a buffer.
- If there was a warrant for an 80 km/h zone (such as a side entrance or similar hazard), then the 100 km/h sign would need to be opposite the 80 km/h sign, and an 80 km/h speed sign would need to be installed opposite the 60 km/h sign, because the 80 km/h limit is no longer a buffer but an actual speed zone.

**Figure 7.1.2 – Conflicting speed zones (offset speed zones)**



### 7.1.3 Worker safety

The following points were considered in relation to worker safety.

- HVISs that do not have physical separation from the traffic lane (such as a grass verge or concrete median greater than 3.0 m wide, or a concrete, guardrail, or wire rope barrier system) must have a minimum 1.2 m-wide, painted operational separation zone. Transport inspectors are not permitted to enter this zone. The adjacent traffic lanes must have a temporary speed limit of 60 km/h applied while transport inspectors are present (refer to QGTTM Part 3). Where adequate physical separation is provided, a temporary speed limit of 80 km/h for the adjacent traffic lanes is permissible.
- This *Guideline* is based on the premise the transport inspector performs two different functions:

1. The transport inspector has statutory power to direct vehicles into the HVIS. Where the HVIS does not have a barrier system or physical separation, such as a median or grassed verge that is 1.2 m to 3.0 m wide, this *Guideline* has adopted the safety process relating to the function of a traffic controller at a roadworks site. This permits the use of a 60 km/h speed zone in accordance with QGTTM Part 3.

If the work area is more than 3.0 m from the traffic lane (known as physical separation), these criteria are no longer applicable, as the level of interaction and proximity to the traffic changes the primary activity to enacting the legislated power to direct a vehicle from the traffic lane rather than the type of interaction performed by a traffic controller. In this instance, item 2 following applies.

2. The second is as a worker performing the function of checking vehicles for compliance with statutory requirements. The statutory power the transport inspector possesses to perform certain activities does not mitigate the requirement for the transport inspector or Transport and Main Roads from undertaking these activities in a safe manner.

- The location of a hinged sign must consider the OHS issues associated with the opening and closing of the sign during both day and night work. Typical issues are:
  - parking of inspector's vehicle when opening and closing the signs
  - crossing the road to open or close signs, or to access signs located in the median
  - work environment around the sign – for example, avoiding signs located in proximity to headwalls / culverts, and/or
  - height of the lock and the type of hinge mechanism to allow for ease of activation.

It is for these reasons that ITS solutions are preferred to minimise the workplace risk for transport inspectors at HVISs.

- For HVIS sign layouts, the transport inspector (symbolic) sign is used to provide clarity to drivers about what to expect on the road ahead.

#### **7.1.4 Traffic safety**

The following points were considered in relation to traffic safety.

- If there is a merge or an exit ramp that is not associated with the HVIS but is close to or within the extent of the signing layout, a road safety audit shall be undertaken by a Transport and Main Roads-registered [road safety auditor](#) to ensure the safety of the travelling public is not compromised by signage associated with the HVIS.
- HVIS signing must consider the interaction of the through traffic with the vehicles that are either entering or exiting the site, as well as the deceleration and acceleration characteristics of these vehicles.
- Signing must take into consideration the deceleration and weaving of heavy vehicles into the left lane on dual carriageways in advance of HVISs.
- The location of the signing must take into consideration the required sight distance and the number of existing signs and similar distractions in the area.

## **7.2 Intelligent transport system signing**

ITS signs include changeable signs such as a variable speed limit sign (VSLS), variable message sign (VMS), changeable message sign (CMS), or static signs featuring magenta flashing lights. Table 7.2 illustrates these options. A combination of two or more different types, all of which are remotely activated, may be included. Integration with an advance weigh-in-motion site that can flag potentially non-compliant vehicles may also be considered.

Further applications of ITS solutions may include the use of automatic number plate recognition (ANPR) cameras to scan the registration plates of vehicles approaching a HVIS, and a VMS sign to display the registration of the vehicle that must exit for inspection.

The use of ITS-based signing is recommended on divided roads with annual average daily traffic (AADT) greater than 10,000 vehicles per day (vpd) and needs to be discussed with the relevant stakeholders.

Some HVISs will require the use of ITS to achieve the required level of worker and traffic safety. High-speed roads with an AADT greater than 5000 vpd should be investigated for the use of ITS technologies, such as VSLS, to avoid the need for manually operating hinged signs on the

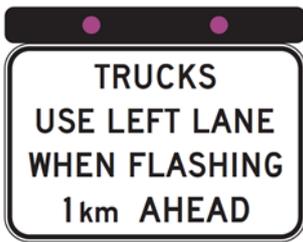
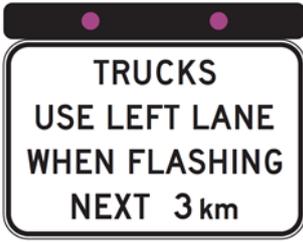
roadside. Where ITS solutions such as VSLS are adopted in lieu of hinged signs, HVISs on both sides of the road should feature the same treatment to ensure consistency for the travelling public.

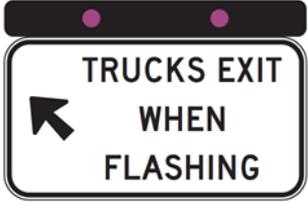
The need for and the type of ITS is most appropriately determined in conjunction with the users of the HVIS (transport inspectors, QPS) with consideration of the cost and availability of the supporting network.

The sign layout will need to be tailored to each site and stakeholders engaged at an early stage to resolve operational issues. The existing communication protocols between Transport and Main Roads' Customer Services Branch and the applicable Traffic Management Centre(s) (TMC(s)) may need to be altered to reflect the requirements of the individual HVIS.

It is recommended that specialists within Transport and Main Roads (for example, ITS Asset Services and ITS Technologies units), the local District Operations team, and the relevant TMC are consulted.

**Table 7.2 – Intelligent transport system signing solution options**

Sign / ITS solution	Application notes
 <p>TC2364_3</p>	<p>TC2364 contains active signs that may be used as part of an advanced ITS signing layout.</p> <p>These signs allow for the condition requiring trucks to use the left lane to be activated only when required (that is, when the HVIS is open), increasing the safety and efficiency of the adjacent through road.</p> <p>Transport inspectors shall retain the ability to activate the signs via a suitable ITS solution.</p>
 <p>TC2364_2</p>	
 <p>TC2364_1</p>	

Sign / ITS solution	Application notes
 <p data-bbox="325 465 453 495">TC2364_4</p>  <p data-bbox="325 689 453 719">TC2364_6</p>	<p data-bbox="603 248 1366 367">The use of TC2364_4 or TC2364_6 is an ITS solution that may be used by transport inspectors to direct trucks to exit at a HVIS without the need for transport inspectors to approach the traffic lane.</p> <p data-bbox="603 378 1356 439">The process of selecting trucks to exit can either be random, or via the use of ANPR technologies, as required.</p> <p data-bbox="603 450 1355 510">Transport inspectors shall retain the ability to activate the signs via a suitable ITS solution.</p>
	<p data-bbox="603 741 1342 801">Overhead VMS may be used to direct vehicles into a HVIS, or show messages relating to the operation of the HVIS.</p> <p data-bbox="603 813 1361 842">VMS can be remotely activated by transport inspectors or TMC.</p> <p data-bbox="603 853 1385 936">When not in use for inspection activities, a VMS may direct trucks to continue, or display road and community safety messages in accordance with relevant Transport and Main Roads policies.</p>
<p data-bbox="244 958 539 1019"><b>Variable message sign (VMS)</b></p>	
  <p data-bbox="220 1529 560 1585"><b>Changeable message sign (CMS)</b></p>	<p data-bbox="603 1037 1321 1097">CMS applications are limited to up to three pre-programmed messages (including a blank sign face).</p> <p data-bbox="603 1108 1358 1169">In some instances, CMS may be a lower-cost option than VMS, depending on the HVIS location and roadside environment.</p> <p data-bbox="603 1180 1358 1263">The use of CMS at HVISs removes the need for transport inspectors to approach the traffic lane to direct vehicles into the HVIS or alter speed limits.</p> <p data-bbox="603 1274 1289 1335">CMS may be used in advance of a HVIS to advise drivers whether the site is open or closed.</p>
 <p data-bbox="228 1921 552 1982"><b>Variable speed limit sign (VLS)</b></p>	<p data-bbox="603 1603 1334 1664">VLS may be used in lieu of hinged signs for the reduction of through-road speed limits past the HVIS, where required.</p>

Sign / ITS solution	Application notes
 <p data-bbox="204 465 576 533"><b>Automatic number plate recognition (ANPR) cameras</b></p>	<p data-bbox="603 248 1385 309">ANPR cameras may be used to screen vehicles on approach to a HVIS. For multilane roads, these should be applied for each lane.</p> <p data-bbox="603 315 1369 439">ANPR cameras may be used in conjunction with a downstream VMS prior to the HVIS that displays the registration number of specific vehicles required to exit for inspection at the HVIS.</p> <p data-bbox="603 450 1385 562">ANPR may also be combined with upstream weigh-in-motion technology to identify and target potentially non-compliant vehicles. These vehicles may then be directed into a HVIS via the use of VMS.</p>

### 7.3 *Static signing*

#### 7.3.1 **Two-way road**

Example layouts for HVISs located on a two-way road are given in Figures A.1 to A.4 in Appendix A, including variations for where HVISs are located on both sides of a two-way road. The signing layouts assume that the adjacent two-way road is signposted at 100 km/h.

The logic behind the example layouts for HVISs, both with and without physical separation, are detailed in Table 7.3.1. A HVIS with adequate physical separation is one where a grass verge or concrete median is greater than 3.0 m wide, or a concrete, guardrail or wire rope barrier system is provided between the HVIS work zone and the edge of the closest through-lane.

Note: Where the transport inspector is more than 3.0 m from the traffic lane, the use of ITS may be required to direct vehicles into the HVIS. Refer to Section 7.2 for an explanation of the use of ITS in this application.

**Table 7.3.1 – Example layouts for single-sided heavy vehicle interception sites on a two-way road**

Sign		Application notes
HVIS without physical separation	HVIS with physical separation	
<p>Located 300 m prior to the 60 km/h speed sign</p>  <p><b>TC1937_1 (LHS)</b></p> <p>Duplicated on RHS of the road</p>  <p><b>TC1937_3 (RHS)</b></p>	<p>Located 300 m prior to the 80 km/h speed sign</p>  <p><b>TC1937_1 (LHS)</b></p> <p>Duplicated on RHS of the road</p>  <p><b>TC1937_3 (RHS)</b></p>	<p>Section 5.5.1 of QGTTM Part 3 requires a temporary speed zone of 60 km/h where workers on foot are located between 1.2 m and 3.0 m of traffic with no physical barrier. Where a physical barrier or &gt;3.0 m of physical separation is provided, an 80 km/h temporary speed zone may be applied.</p> <p>Section 5.5.1 of QGTTM Part 3 requires the Speed Limit AHEAD signs to be placed a distance double the speed limit in advance of the speed limit reduction.</p> <p>In most cases, the speed limit in advance of the HVIS will be 100 km/h, which requires a sign spacing of 200 m; however, the decision to use 300 m is based on:</p> <ul style="list-style-type: none"> <li>the signs are permanent signs that are displayed at various times and do not have advance worker signs or any indications of there being activity ahead as would be the case with temporary work sites</li> <li>heavy vehicles will take time to slow down as they approach the HVIS, and</li> <li>the minimum distance for an 80 km/h speed buffer zone between the 100 km/h zone and the 60 km/h zone would be 300 m.</li> </ul>

Sign		Application notes
HVIS without physical separation	HVIS with physical separation	
<p>Located 200 m from the start of the HVIS</p>  <p><b>TC1938_1 (LHS)</b></p>	<p>Located 200 m from the start of the HVIS</p>  <p><b>TC1938_1 (LHS)</b></p>	<p>The transport inspector flagging a vehicle for entry into the HVIS is a similar operation to that of a traffic controller on a roadworks site. For traffic control operations (assuming no traffic queue), the primary PREPARE TO STOP sign (per Section 4.8 of QGTTM Part 3) is located in accordance with the sight distance table in Section 2.5.4 of QGTTM Part 3 in advance of the end of queue.</p> <p>In most cases, the HVIS will be located in a 100 km/h speed zone and a distance of two times the speed limit will equate to a 200 m spacing between the sign and the entry to the HVIS – the rationale being that the transport inspector performs a similar role to a traffic controller and QGTTM provides this distance as an allowable length to facilitate a slow / stop traffic control condition, which is similar to that which may be required for a heavy vehicle entering safely into a HVIS.</p> <p>This sign shall only be displayed when transport inspectors are present at the HVIS.</p>
<p>Duplicated on RHS of the road</p>  <p><b>TC1938_3 (RHS)</b></p>	<p>Duplicated on RHS of the road</p>  <p><b>TC1938_3 (RHS)</b></p>	

Sign		Application notes
HVIS without physical separation	HVIS with physical separation	
<p>Located 100 m past the end of the HVIS and duplicated on RHS of the road</p>  <p>R4-1</p>  <p>TC1911_3</p>	<p>Located 100 m past the end of the HVIS and duplicated on RHS of the road</p>  <p>R4-1</p>  <p>TC1911_3</p>	<p>The '100' sign is permanent and the '60' is temporary and is mounted with a target board as highlight on the reverse side of the '100' sign.</p> <p>For locations with two-way traffic flow, the '100' sign shall be in line with the applicable speed reduction sign for the opposing direction of traffic (refer to Section 5.5.1 of QGTTM Part 3).</p> <p>Section 5.12 of QGTTM Part 3 includes a table for the spacing of termination signs; however, termination sign spacing also requires consideration of driver behaviour, compliance, and the risk of differential speeds.</p> <p>A distance as per the table would equate to 45 m for a 60 km/h speed zone, or 80 m for an 80 km/h zone. This distance may not be sufficient to manage differential speeds of heavy vehicles exiting the HVIS and traffic in the through lane, with heavy vehicles taking some time to accelerate up to 100 km/h: therefore, in this instance, a spacing of 100 m has been chosen to provide some additional distance for heavy vehicles to increase speed prior to the speed limit reinstatement.</p> <p>It is important to note that the location at which this sign is placed must consider site-specific conditions such as available acceleration distance for vehicles exiting the HVIS.</p>
<p>Located 300 m prior to the 60 km/h speed sign</p>  <p>TC1937_1 (LHS)</p>	<p>Located 300 m prior to the 80 km/h speed sign</p>  <p>TC1937_1 (LHS)</p>	<p>This sign is set to face traffic entering the site area from the reverse direction (see <i>Application notes</i> for TC1937 previously regarding spacing).</p>
<p>Duplicated on RHS of the road</p>  <p>TC1937_3 (RHS)</p>	<p>Duplicated on RHS of the road</p>  <p>TC1937_3 (RHS)</p>	

### 7.3.2 Divided multilane road

Example layouts for HVIS located on a multilane road are given in Figures A.5 and A.6 in Appendix A. The signing layouts assume that the adjacent multilane road is signposted at 100 km/h and is not of motorway standard (refer to Section 7.3.3 for signing of motorway-standard roads).

The logic behind the example layouts for HVISs, both with and without physical separation, is detailed in Table 7.3.2. A HVIS with adequate physical separation is one where a grass verge or concrete median is greater than 3.0 m wide, or a concrete, guardrail or wire rope barrier system is provided between the HVIS work zone and the edge of the closest through-lane. All HVISs are to provide a minimum 1.2 m of operational separation between the work zone and adjacent traffic lane.

Because of the high AADT associated with this type of road, the use of ITS may be required to safely control the entry and exit of vehicles from this site, as well as where the transport inspector is more than 3.0 m from the traffic lane (refer to Section 7.2 for an explanation of the use of ITS in this application and Section 7.3.3 for an example layout of an ITS solution).

**Table 7.3.2 – Example layouts for single-sided heavy vehicle interception sites on a divided multilane road**

Sign		Application notes
HVIS without physical separation	HVIS with physical separation	
Located 3 km prior to the HVIS and duplicated in the centre median R6-28  R9-7-1 		On multilane roads, appropriate warning shall be given to move trucks into the left lane so that any vehicle given the direction to enter the HVIS can do so in a manner that does not adversely affect the safety of other road users or the transport inspectors. The location of the first sign should be approximately 3 km prior to the HVIS. Experience at the Burpengary HVIS has shown that 3 km is an acceptable operational compromise between too long a distance for moving all trucks into the slow lane, and too short a distance for them to respond.
 R6-28		The instruction to move into the left lane is generally reinforced at intervals of 1–2 km following the signing of the initial instruction. This sign shall be duplicated in the median.

Sign		Application notes
HVIS without physical separation	HVIS with physical separation	
<p>Located 300 m prior to the 60 km/h speed sign</p>  <p>TC1937_1 (LHS)</p>	<p>Located 300 m prior to the 80 km/h speed sign</p>  <p>TC1937_1 (LHS)</p>	<p>Section 5.5.1 of QGTTM Part 3 requires a temporary speed zone of 60 km/h where workers on foot are located between 1.2 m and 3.0 m of traffic with no physical barrier. Where a physical barrier or &gt;3.0 m of physical separation is provided, an 80 km/h temporary speed zone may be applied.</p> <p>Section 5.5.1 of QGTTM Part 3 requires the Speed Limit AHEAD signs to be placed a distance double the speed limit in advance of the speed limit reduction.</p> <p>In most cases, the speed limit in advance of the HVIS will be 100 km/h which requires a sign spacing of 200 m; however, the decision to use 300 m is based on:</p> <ul style="list-style-type: none"> <li>the signs are permanent signs that are displayed at various times and do not have advance worker signs or any indications of there being activity ahead as would be the case with temporary roadworks sites</li> <li>heavy vehicles will take time to slow down as they approach the HVIS, and</li> <li>the minimum distance for an 80 km/h speed buffer zone between the 100 km/h zone and the 60 km/h zone would be 300 m.</li> </ul> <p>The transport inspector flagging a vehicle for entry into the HVIS is a similar operation to that of a traffic controller on a roadworks site. For traffic control operations (assuming no traffic queue), the primary PREPARE TO STOP sign (per Section 4.8 of QGTTM Part 3) is located in accordance with the sight distance table in Section 2.5.4 of QGTTM Part 3 in advance of the end of queue.</p> <p>In most cases, the HVIS will be located in a 100 km/h speed zone and a distance of two times the speed limit will equate to a 200 m spacing between the sign and the entry to the HVIS: the rationale being that the transport inspector performs a similar role to a traffic controller and QGTTM provides this distance as an allowable length to facilitate a slow / stop traffic control condition, which is similar to that which may be required for a heavy vehicle entering safely into a HVIS.</p> <p>This sign shall only be displayed when transport inspectors are present at the HVIS.</p>
<p>Duplicated in the centre median</p>  <p>TC1937_3 (RHS)</p>	<p>Duplicated in the centre median</p>  <p>TC1937_3 (RHS)</p>	
<p>Located 200 m from the start of the HVIS</p>  <p>TC1938_1 (LHS)</p>	<p>Located 200 m from the start of the HVIS</p>  <p>TC1938_1 (LHS)</p>	
<p>Duplicated in the centre median</p>  <p>TC1938_3 (RHS)</p>	<p>Duplicated in the centre median</p>  <p>TC1938_3 (RHS)</p>	

Sign		Application notes
HVIS without physical separation	HVIS with physical separation	
No sign required	<p>The sign is located within the work zone and shall be duplicated in the centre median.</p> <p style="text-align: center;"><b>R6-28</b></p> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div> <p style="text-align: center;"><b>R7-4</b></p>	<p>The R7-4 and R6-28 should be located as close to the HVIS as practical and be visible to through traffic. It is preferable to have the signs located prior to the exit lane from the HVIS so that trucks that are passing the site are permitted to move out of the left lane to allow trucks that are exiting the HVIS to merge and accelerate up to speed.</p> <p>This sign may not need to be installed if trucks are required to continue using the left lane beyond the HVIS.</p>
	<p>The sign shall be located after the work zone and may be duplicated in the centre median.</p> <p style="text-align: center;"><b>R6-28</b></p> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div> <p style="text-align: center;"><b>R7-4</b></p>	<p>This installation shall be provided after the HVIS for the benefit of drivers exiting the HVIS.</p> <p>This sign may not need to be installed if trucks are required to continue using the left lane beyond the HVIS.</p>
	<p>Located 100 m past the end of the HVIS and duplicated in the centre median.</p> <div style="text-align: center;">  </div> <p style="text-align: center;"><b>R4-1</b></p>	<p>For locations with one-way traffic flow (including divided roads), Section 5.12 of QGTTM Part 3 includes a table for the spacing of termination signs; however, this also requires consideration of driver behaviour, compliance, and the risk of differential speeds. A distance as per the table would equate to 45 m for a 60 km/h speed zone, or 80 m for an 80 km/h zone.</p> <p>This distance may not be sufficient to manage differential speeds of heavy vehicles exiting the HVIS and traffic in the through lane, with heavy vehicles taking some time to accelerate up to 100 km/h; therefore, in this instance, a spacing of 100 m has been chosen to provide some additional distance for heavy vehicles to increase speed prior to the speed limit reinstatement.</p> <p>It is important to note that the location at which this sign is placed must consider site-specific conditions such as available acceleration distance for vehicles exiting the HVIS.</p>

### 7.3.3 Motorway-standard road

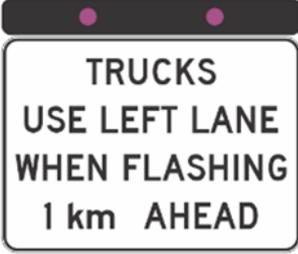
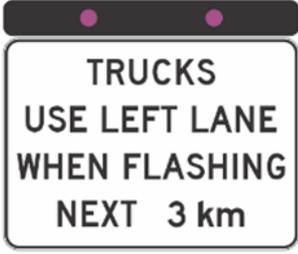
The motorway-standard application shall be adopted when there are two or more traffic lanes in one direction and the AADT of the slow lane is more than 10,000 vpd, or the slow lane peak hourly flow is more than 1000 vehicles. Example layouts for motorway-standard HVISs are given in Figures A.7 and A.8 in Appendix A. The logic behind the example layout is detailed in Table 7.3.3.

HVISs located adjacent to motorways shall have more than 6.0 m of physical separation from the adjacent traffic lane or an appropriate physical barrier system. The speed zone adjacent to the HVIS will remain unchanged unless a road safety audit reveals there is a traffic safety issue.

The signs can be either one of or a combination of a VMS, CMS or a fixed sign with magenta flashing lights, remotely activated. The sign layout will need to be tailored to each site and the relevant stakeholders engaged at an early stage to resolve operational issues. The existing communication protocols between Transport and Main Roads' Customer Services Branch and the TMC may need to be altered to reflect the requirements of the site (see Section 7.2 for more details on the installation and use of ITS solutions).

It is recommended that Transport and Main Roads' [ITS Technology Unit](#) be consulted on the technical and operational specifications for a given sign layout.

**Table 7.3.3 – Example layout for single-sided site on a motorway**

Sign		Application notes
ITS solution	Static solution	
<p>Located approximately 3 km prior to the start of the HVIS and shall be duplicated in the centre median.</p>  <p>TC2364_3</p>	<p>Located approximately 3 km prior to the start of the HVIS and shall be duplicated in the centre median.</p> <p>R6-28</p>  <p>R7-12</p>	<p>On multilane roads, appropriate warning must be given to move trucks into the left lane so that any vehicle given the direction to enter the HVIS can do so in a manner that does not affect the safety of other road users or the transport inspectors.</p> <p>The location of these signs shall be determined following a road safety audit by staff experienced in traffic management. Some existing sites have the complication of exit and merge ramps being located within 3 km of the site, causing problems during peak traffic flows.</p> <p>The location of the first sign should be approximately 3 km prior to the HVIS. Experience at the Burpengary HVIS has shown that 3 km is an acceptable operational compromise between too long a distance for moving all trucks into the slow lane, and too short a distance for them to respond. The TRUCKS USE LEFT LANE instruction legally requires all trucks to comply. On motorway environments where three or more lanes are generally present, this process may introduce safety hazards and congestion associated with the required merging and positioning of trucks in the left lane. This is particularly relevant with high volumes of trucks, or where motorway interchanges are present in proximity to the HVIS.</p> <p>The use of an ITS solution inclusive of TC2364 with the words WHEN FLASHING eliminates the need for trucks to merge unnecessarily when the HVIS is not operational.</p> <p>Note: The flashing lights shown on the R6-28 / R9-7-1 combination for the static solution only raises awareness of the sign. The sign will always require trucks to use the left lane, regardless of whether lights are flashing or not.</p>
 <p>TC2364_2</p>	<p>R6-28</p>  <p>R9-7-1</p>	

Sign		Application notes
ITS solution	Static solution	
<p>Located at intervals of approximately 1–2 km following the initial instruction. Shall be duplicated in median.</p>  <p>TC2361_1</p>	<p>Located at intervals of 1–2 km following the initial instruction. Shall be duplicated in median.</p>  <p>R6-28</p>	<p>The instruction to move into the left lane is generally reinforced at intervals of 1–2 km following the signing of the initial instruction (see previous). Refer Queensland MUTCD Part 2.</p>
<p>The sign should be located approximately 500 m prior to the HVIS.</p>  <p>TC2364_5</p>		<p>This sign provides advanced warning for drivers, reinforcing the need to be aware of the potential requirement to exit. The transport inspectors will use an ITS solution or manually instruct drivers to enter the HVIS – see following.</p>
 <p>TC2364_4</p>  <p>TC2364_6</p>		<p>These sign options provide an instruction to drivers to exit into the HVIS. An ITS solution should be implemented that allows transport inspectors to operate the sign and control the number of vehicles present within the HVIS, thus eliminating the need for workers to approach the travel lanes for manual intervention.</p>
<p>The signs shall be located within the work zone, 30 m after the site, and be duplicated in the centre median.</p>  <p>R6-28</p>  <p>R7-4</p>		<p>The R7-4 and R6-28 should be located as close to the HVIS as practical and be visible to through traffic. It is preferable to have the signs located prior to the exit lane from the HVIS so that trucks that are passing the site are permitted to move into the right-hand lane to allow the slower trucks that are exiting the HVIS to merge and accelerate up to speed. An additional installation should be provided after the HVIS for the benefit of drivers exiting the HVIS (refer Queensland MUTCD Part 2). This sign may not need to be installed if trucks are required to continue using the left lane post-HVIS.</p>

### 7.4 Offset sites

There are occasions when an existing sealed area is used as a HVIS. These have been referred to as 'offset' sites as a simplified method of describing them. They are generally constructed well clear of the through traffic lane or have been bypassed as a result of an upgrade.

**Figure 7.4 – Typical offset site**



The tapers are often not to the same standard as purpose-built interception sites and the speed zone on the through traffic lanes will be determined by the existing traffic management guidelines in the *Road Planning and Design Manual* (RPDM) and Queensland MUTCD. Districts and regions may have signed offset sites in the same manner as rest areas and pull-over sites.

The operational signing for each offset site will need to be determined by a site inspection and be included in the site-specific operating procedure developed by the transport inspectors.

A road safety audit will need to consider the potential hazards created through:

- vehicles entering the site through drivers' own volition, without understanding of the compliance function underway, and/or
- vehicles entering the site without the knowledge of the transport inspectors.

### 7.5 Miscellaneous signing

Table 7.5 presents miscellaneous signing applicable to HVISs for the management of vehicular parking and abandonment onsite.

**Table 7.5 – Miscellaneous signing**

Sign	Application notes
 <p style="text-align: center;"><b>TC9677</b></p>	<p>Each HVIS shall display sign TC9677 that informs the public they may be asked to vacate the site when it is being used for compliance activities.</p> <p>The TC9677 sign should be located outside the edge of the seal, towards the middle of the site, clear of the transport inspectors' vehicle and work area. The sign face being parallel to the centreline of the adjacent traffic lane.</p>

Sign	Application notes
	<p>Some HVISs have a problem with trailers being parked on the site, including in locations that prevent the site being used for interceptions. If this is the case, then sign TC1387 should be erected in an appropriate location and consideration should be given to adding additional length to the HVIS.</p>
<p><b>TC1387</b></p>	

## 8 Line marking and symbolising

### 8.1 Philosophy

It is important that the road user sees consistency in the pavement marking and is not confronted with something unexpected that induces indecision.

### 8.2 Layout options

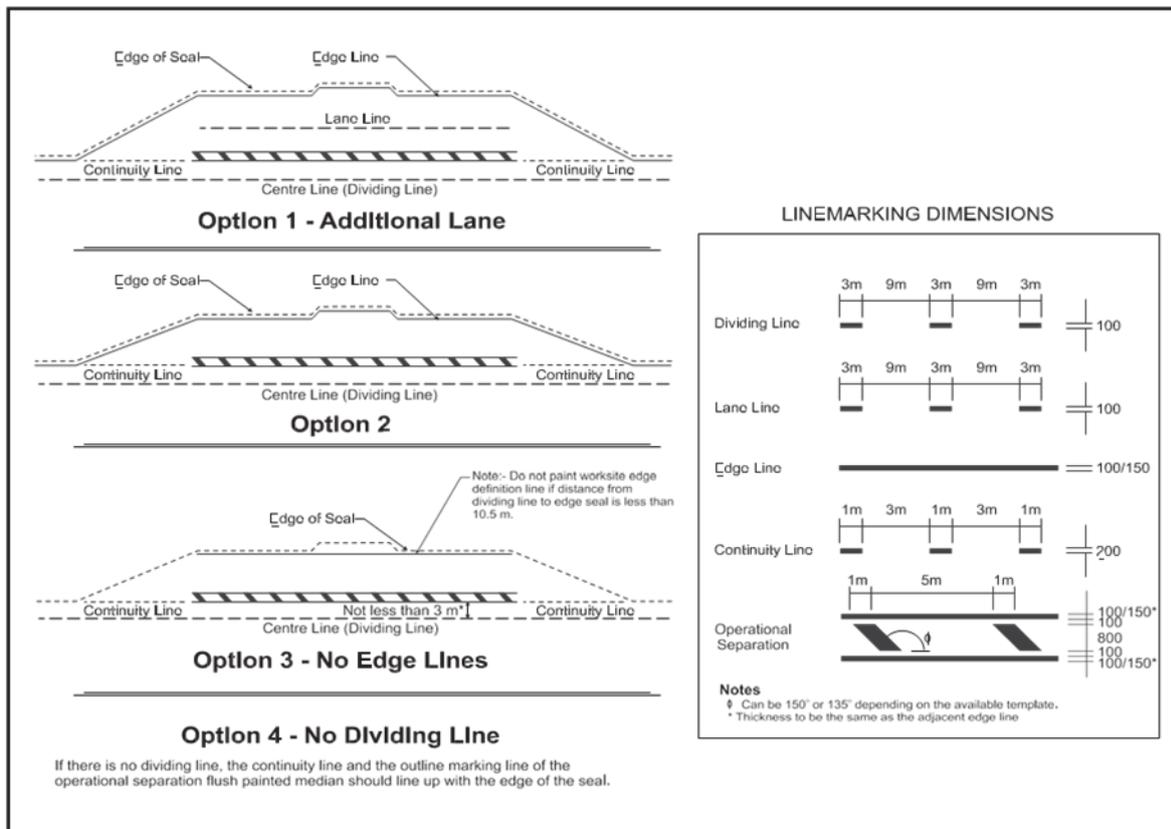
#### 8.2.1 General

There are five options for the pavement marking of HVISs:

- Option 1: HVIS has edge lining on adjacent pavement and has an additional lane for clearing vehicles
- Option 2: HVIS has edge lining on adjacent pavement
- Option 3: HVIS has no edge lining on adjacent pavement
- Option 4: HVIS has no edge lining or dividing line on adjacent pavement, or
- Option 5: HVIS is separated by a median – the line marking will be in accordance with the [RPDM](#), [Queensland MUTCD Part 2](#), and the [Heavy Vehicle Interception Site Design Manual](#).

Layouts for Options 1, 2, 3 and 4 are shown in Figure 8.2.1.

**Figure 8.2.1 – Options for pavement marking (no physical barrier or median)**



## 8.2.2 Line marking

### Dividing line

HVISs would generally be located where the dividing line is marked as broken. If there is no dividing line, the continuity and edge of the operational separation is positioned as described in the following section titled *Operational separation*.

### Edge line

If the approaches to the HVIS have edge line marking, the edge line is continued to delineate the outer edge of the interception site. The edge line is used to define the work area. Vehicles moving off the sealed area and onto softer ground could cause damage to the vehicle or to the pavement in the HVIS – that is, deep depressions can lead to water ponding adjacent to the pavement. There is also the issue of possible vehicle instability if the vehicle moves off the edge of the HVIS that has a steep batter slope. If the approaches do not have edge lines (refer Option 3), then the site will be marked as follows:

- the entrance and exit portion of the HVIS will not have an 'edge line', as this could cause uncertainty for motorists if the rest of the road has no edge lines – an edge line may be mistaken as an entrance to a passing lane or exit ramp to the local road network, and
- the straight portion of the HVIS will have an edge line to define the work area.

### Continuity line

This line is used to indicate the edge of the roadway at the start and finish of the HVIS. Where there is no edge line on the approach, the continuity line commences at the start of the taper. This line is

positioned not less than 3 m from the separation line. If there is no separation line, this line is positioned to line up with the edge of the seal on the approach. The Queensland MUTCD Part 2 refers to continuity lines as being used to indicate where traffic is entering or leaving an added lane. The continuity line was chosen over the edge line for the following reasons:

- the public understands the continuity line directs them in the direction of the default path of travel – in this case, the normal traffic lane
- the entry into the HVIS needs to be controlled: vehicles are required to enter at the location indicated by the continuity lane, otherwise operational efficiency will be adversely affected while vehicles entering further along the HVIS will need to reverse to align with the screening pad (parking areas do not require such vehicle control), and
- the site more closely conforms to the characteristic of an auxiliary lane than it does a parking lane. The vehicles are controlled and moving through the HVIS rather than entering as a matter of choice and stopping in an independent and uncontrolled manner.

### **Operational separation**

A combination of edge lines and diagonal markings is considered suitable marking. This combination is similar to the diagonal markings in medians (Queensland MUTCD Part 2) and uses 1 m-wide bars with 5 m spacing. The operational separation does not have a nose taper, to differentiate it from a median. The dimensions shown are the minimum to achieve the safe workplace clearance to traffic of 1.2 m. The site-specific operation guidelines will require transport inspectors to work outside of this separation. The width of the outline markings should be either 100 mm or 150 mm wide to match the adjacent edge lines for efficiency when re-marking.

### **Lane line**

This line is used only where width is available and clearing of vehicles is necessary (see Figure 8.2.1, Option 1).

### **Roadworks site edge definition line**

The line is only used to define the outer edge of the roadworks site on roads that have no edge lines. The roadworks site edge definition line is not marked if the HVIS is less than 7.0 m wide. This requires the transport inspectors to walk on an unsealed shoulder that could have an irregular surface profile, constituting an occupational health and safety hazard. If a HVIS does not have an edge line (as shown in Figure 8.2.1, Options 1 and 2) or a roadworks site edge definition line (as shown in Option 3), then the site-specific OHS instructions shall require the transport inspector to examine the conditions of the unsealed shoulder to determine if a hazard exists.

**Figure 8.2.2 – Roadworks site edge definition line**



### **8.2.3 Retroreflective raised pavement markers**

Retroreflective raised pavement markers (RRPMs) are not recommended at HVISs for the following reasons:

- the RRPM may create a workplace safety issue, such as a trip hazard, and
- the RRPM may cause confusion with motorists if the rest of the road has no RRPMs.

If the designer believes there is a need (refer Queensland MUTCD Part 2) because the environment surrounding the site constitutes a special hazard, then red unidirectional RRPMs can be used. It would be preferable to only have the RRPMs in the first 20 m of the operational separation. RRPMs shall not be provided in the middle third of the length of the operational separation as transport inspectors may move into the operational separation in this area to direct traffic into the HVIS and RRPMs may pose as a trip hazard, particularly at night.

## **9 Road safety audit**

A road safety audit shall be undertaken where:

- there is concern about the interaction of traffic streams
- there is a merge or exit lane within two kilometres of the HVIS
- there is sight distance of less than one kilometre to the start of the HVIS, and/or
- the HVIS is located on a four-lane (divided or undivided) carriageway or where vehicles are required to weave into the left lane to enter the site.

The audit team shall be made up of both a departmental-accredited [road safety auditor](#) and a senior [transport inspector](#) who is familiar with the HVIS. The respective requirements of vehicle safety, worker safety and operational effectiveness can sometimes be in conflict and should be resolved on site with input from both parties.

## 10 Audit program

The sign layout and line marking for each HVIS should be audited on a regular basis for compliance with these guidelines and the Queensland MUTCD. This should occur every two years, or sooner if there is a change in AADT, functionality, or any changes to the infrastructure – for example, the actual site itself, addition of lanes, widening of lanes or shoulders, or the construction of an exit or entrance to private properties or other roads.

## 11 Operational recommendations

It is recommended the following operational procedures are incorporated into the site-specific operating procedures for interception sites that are signed using this *Guideline*.

- Inspectors must not work in the operating separation zone, that is the 1.2 m-wide flush, painted median unless to signal an approaching vehicle to enter the HVIS.
- Use cones with a reflective band to define the extent of the operational separation so that the transport inspectors are aware of where the edges of the zone are. This should be done if intercepting more than a single vehicle.
- Where there is a 3 m physical separation, such as grass verge or a barrier system (concrete, guardrail or wire rope) and the work zone is in an 80 km/h speed zone, then the HVIS shall have site-specific operating instructions as to how a vehicle is to be intercepted. The general rule is a traffic controller must not work in an 80 km/h zone. Transport inspectors have the power to intercept and direct traffic, but they must do this in a manner that is safe.
- Each opening and closing of the signs are to be recorded in an appropriate place. This is necessary for QPS enforcement, as well as any future legal action against the department.

## Appendices

### Appendix A – Typical layouts

Figure A.1 – Example layout for one-sided site on two-way road with no physical separation

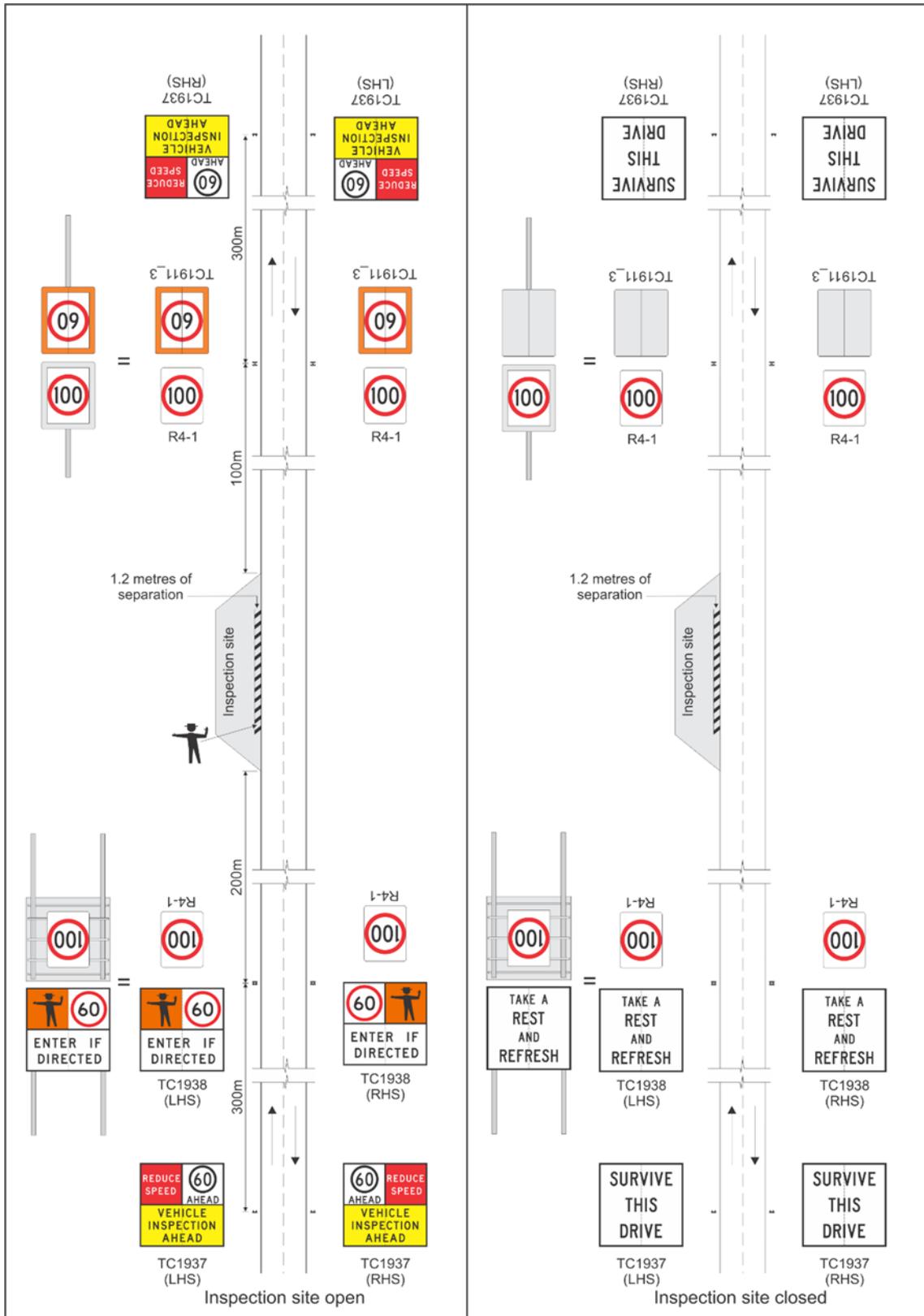
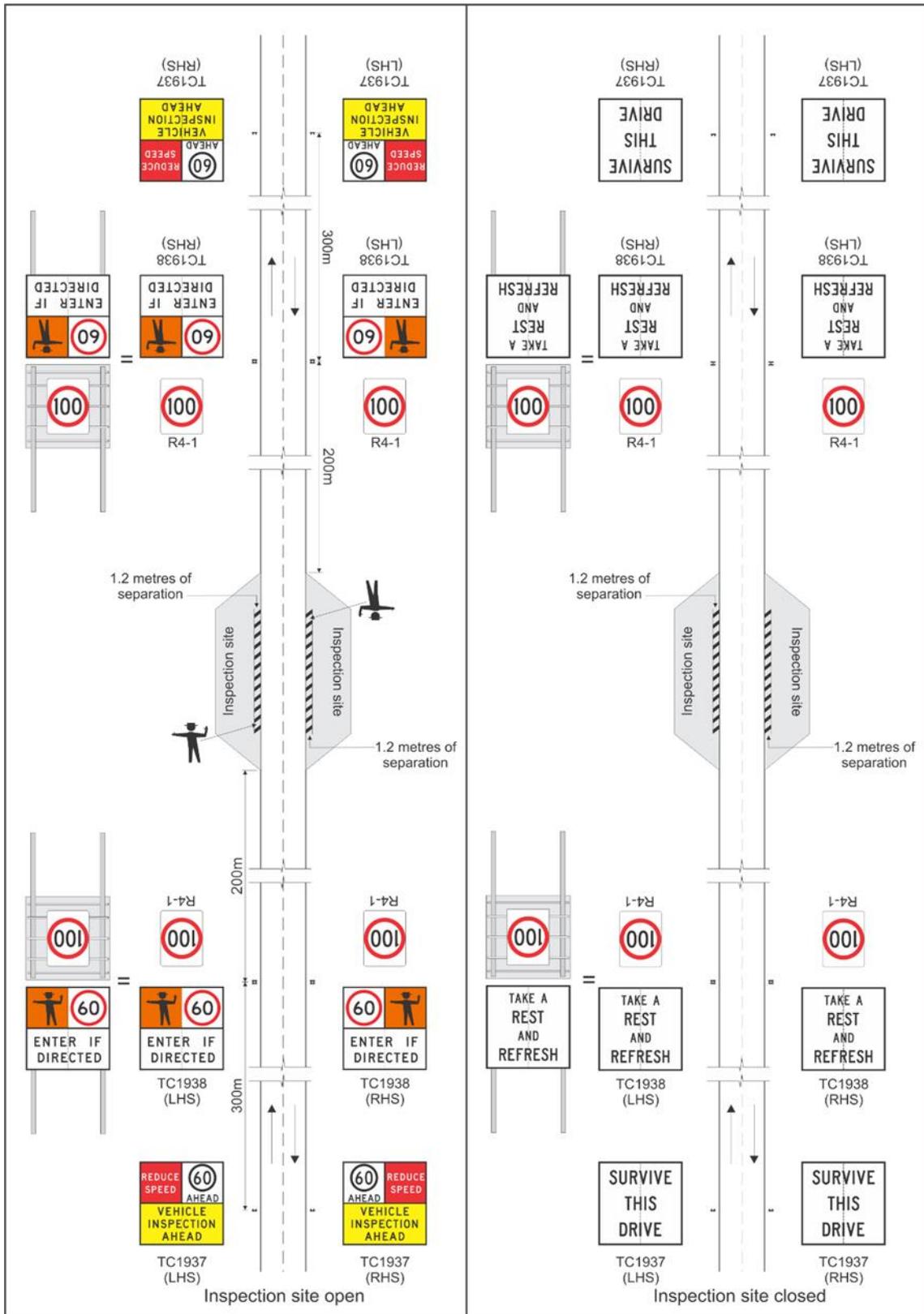


Figure A.2 – Example layout for two-sided site on two-way road with no physical separation



**Figure A.3 – Example layout for one-sided site on two-way road with >3 m separation or barrier system**

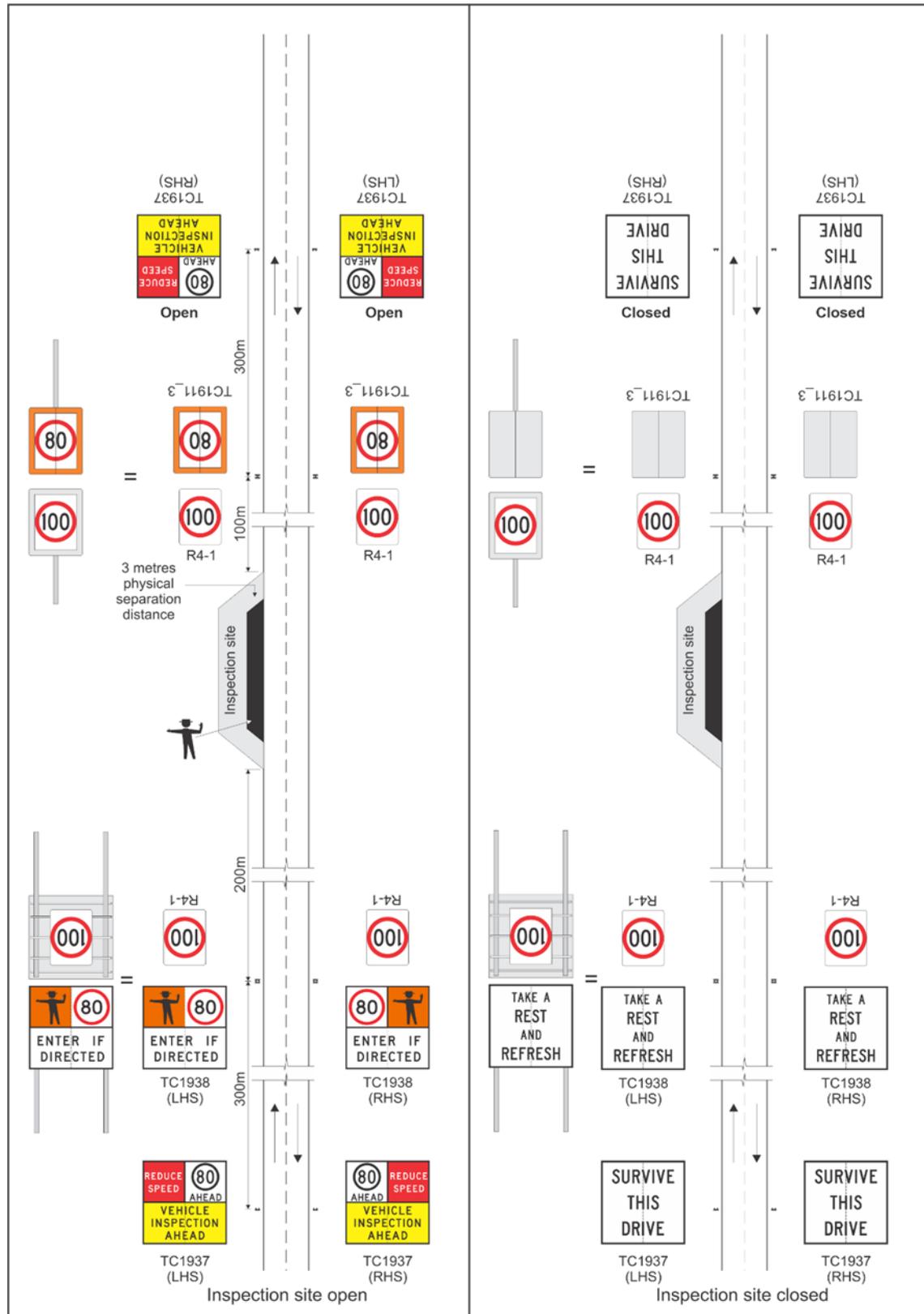


Figure A.4 – Example layout for two-sided site on two-way road with >3 m separation or barrier system

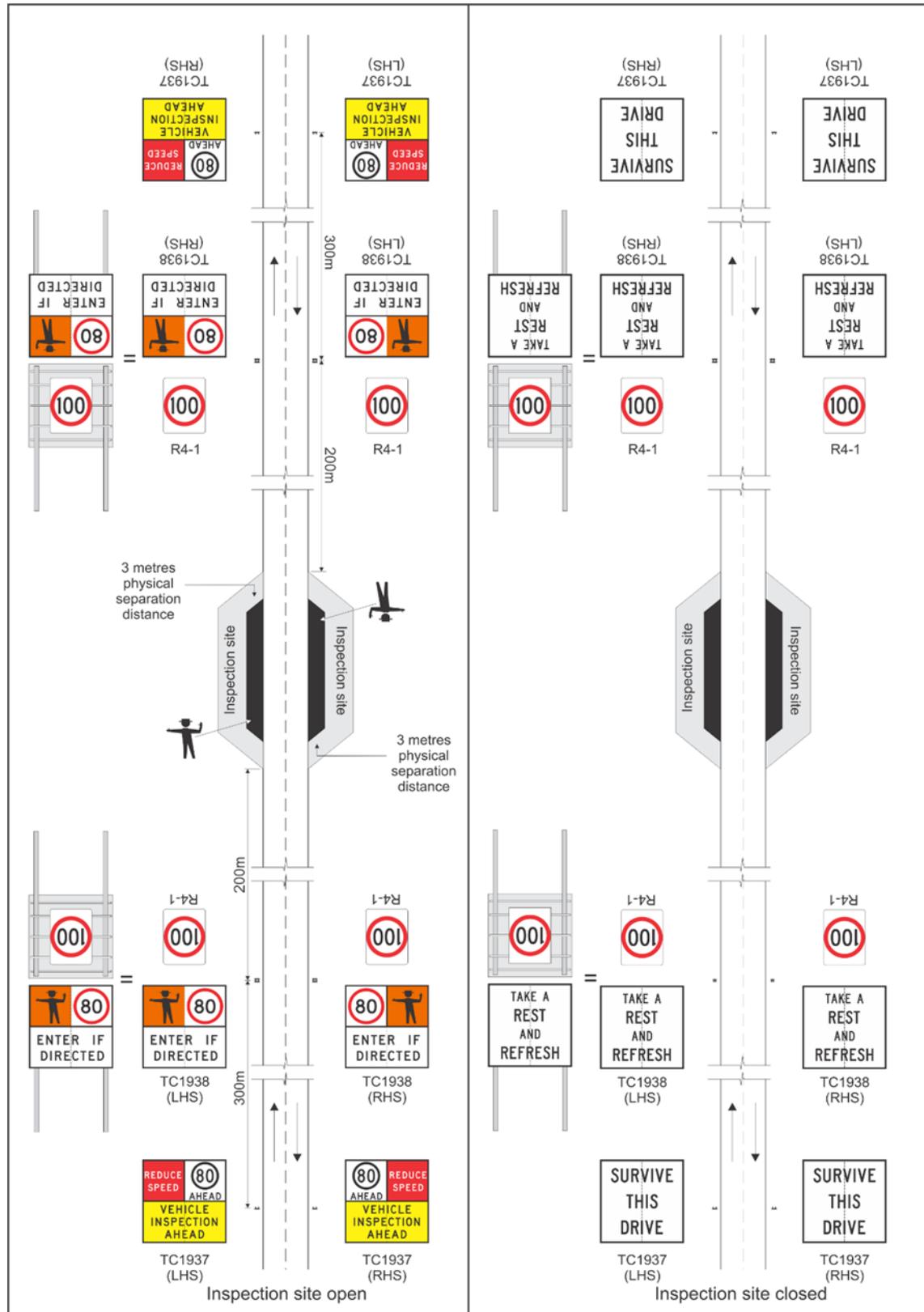
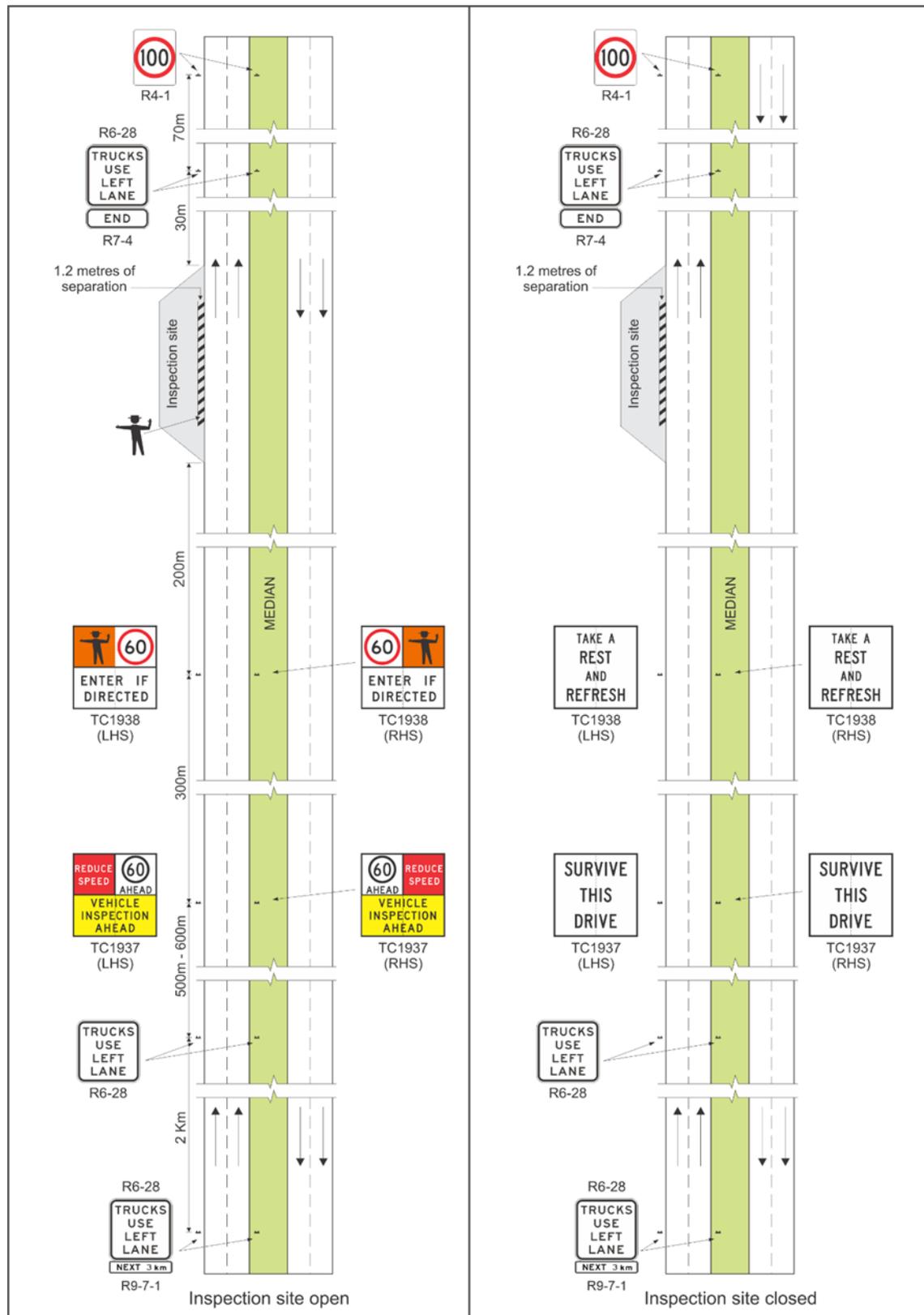
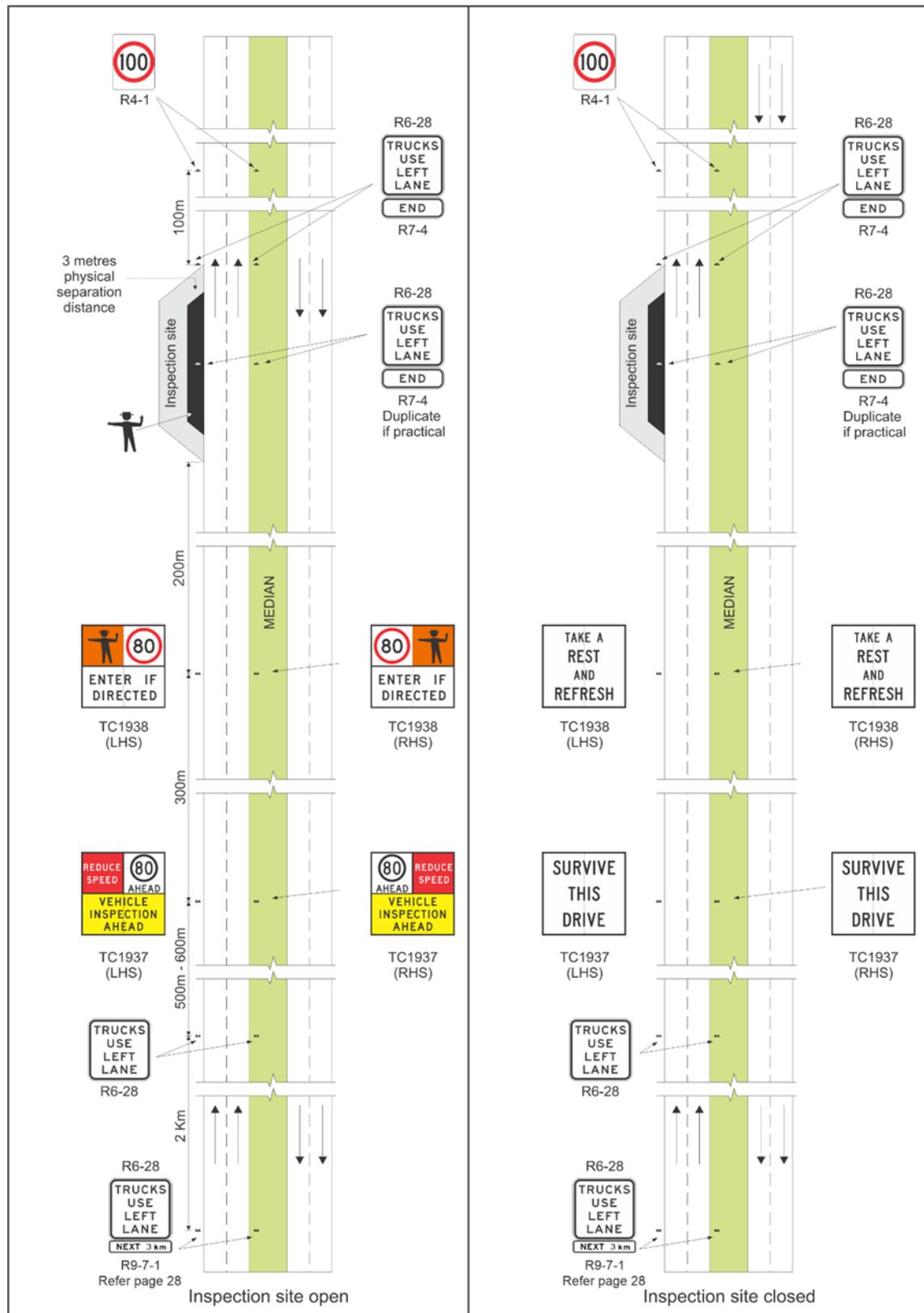


Figure A.5 – Example layout for divided multilane road with no physical separation



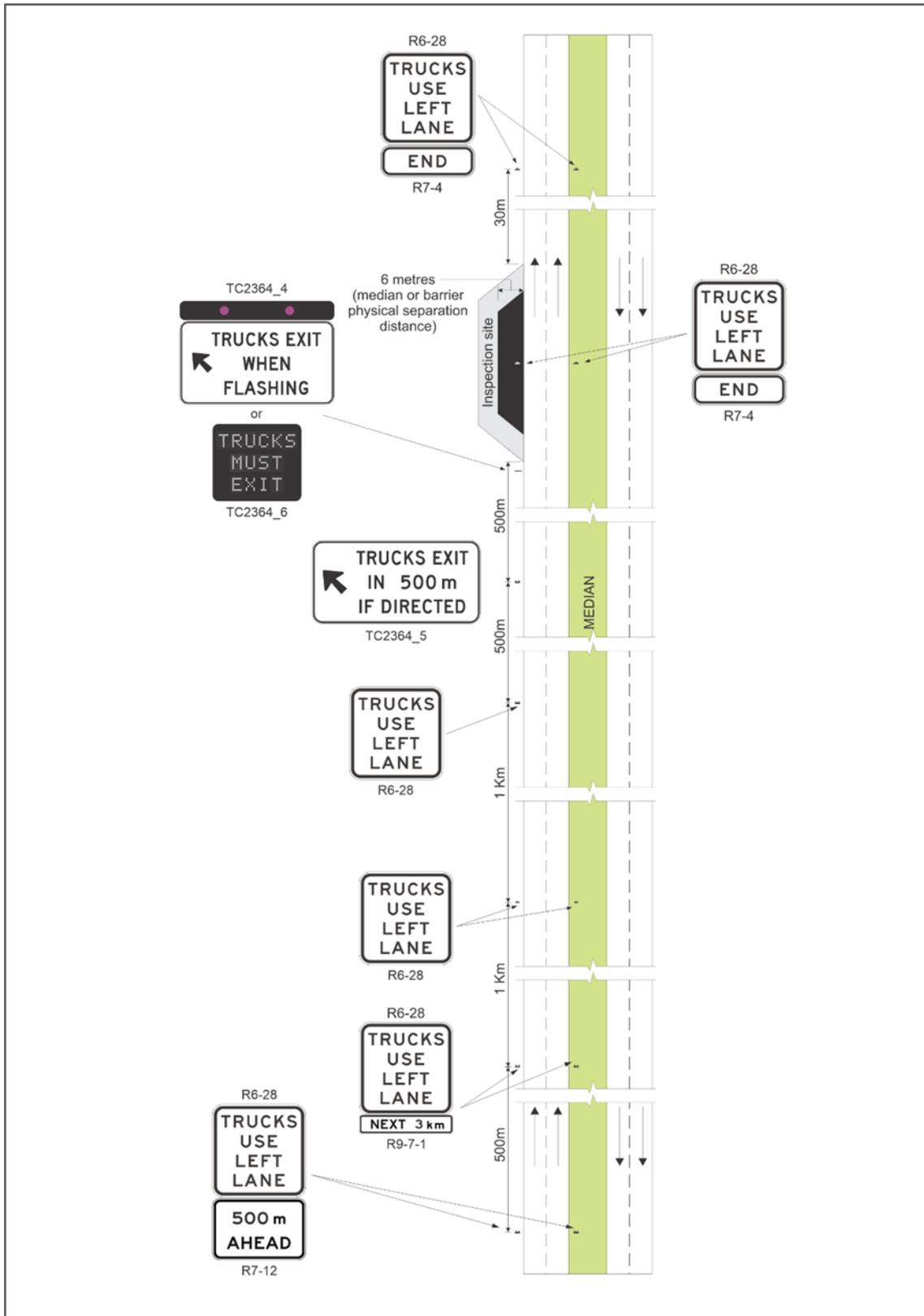
Note: This example depicts the use of hinged signs. The use of VSLs may be adopted instead, should the need arise for worker and/or travelling public safety. This may be as a result of access difficulties and parking locations required to access and operate hinged signs.

Figure A.6 – Example layout for divided multilane road with >3 m separation or barrier system



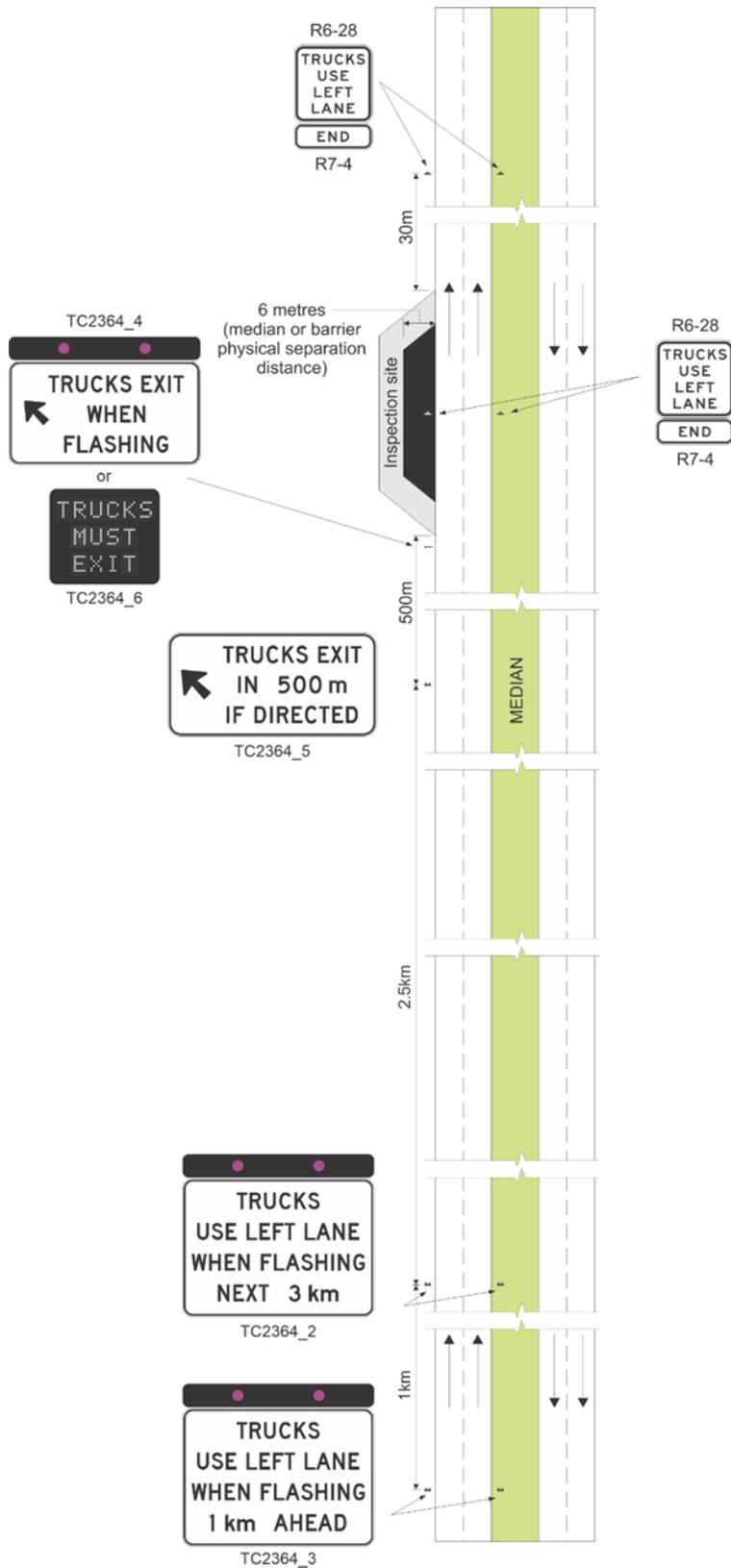
Note: This example depicts the use of hinged signs. The use of VSLs may be adopted instead, should the need arise for worker and/or travelling public safety. This may be as a result of access difficulties and parking locations required to access and operate hinged signs.

**Figure A.7 – Example layout for motorway with basic intelligent transport system capability, 6 m separation and barrier system**



Note: CMSs or VMSs may also be used to direct vehicles into the HVIS. Flashing light bars are used only for awareness of signs.

**Figure A.8 – Example layout for motorway with advanced intelligent transport capability, 6 m separation or barrier system**

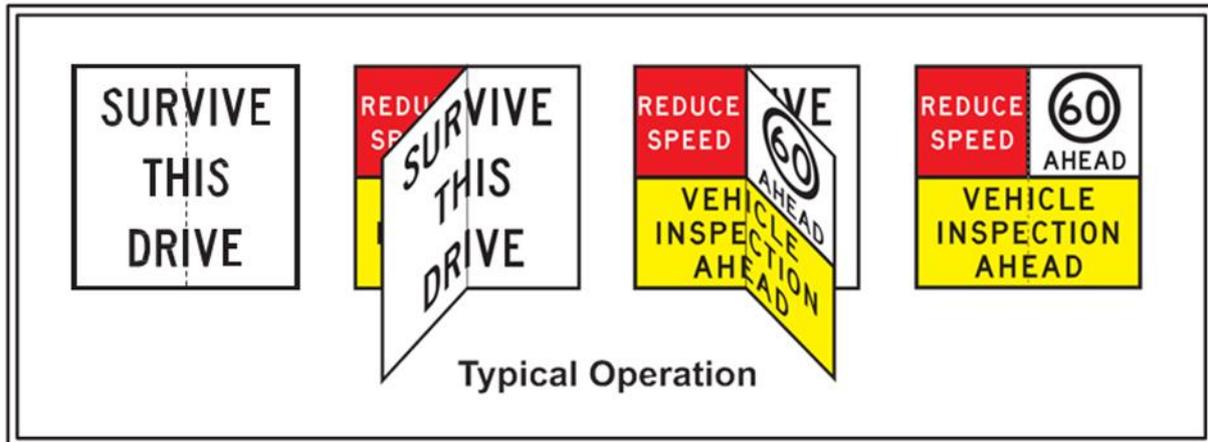


Note: CMSs or VMSs may also be used to direct vehicles into the HVIS. Flashing lights activate the requirements of signs when used in conjunction with the 'when flashing' message.

## Appendix B – Example hinged sign configuration

The signs have a flap hinge mounted to the centre line of the sign.

**Figure B.1 – Sign mechanism**



**Safety message when HVIS is closed vs. when HVIS operating**

The road safety message should be used where there is a history of fatigue-related crashes. The sign can also be used to encourage drivers to use the HVIS as a stopping place. Refer to Section 7 of this *Guideline* for information on the use of these signs.

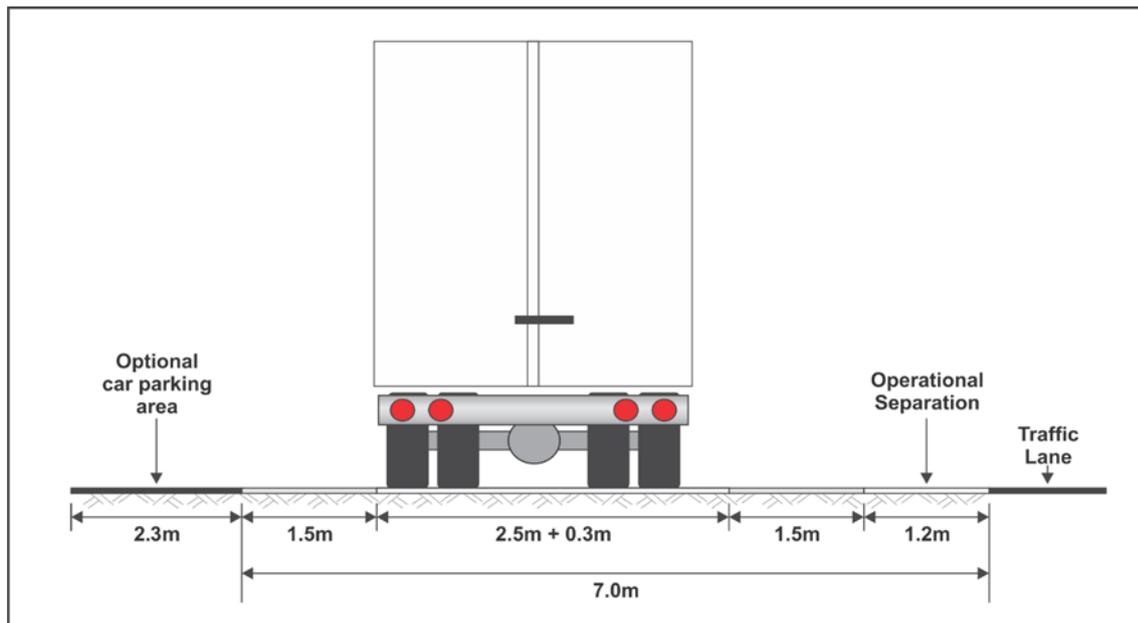
## Appendix C – Philosophy behind the operational separation

The work area is made up of the vehicle, the inspector's normal work area and an operational separation for safety.

The minimum width for an interception site is 7 m, made up of:

- 1.2 m minimum clearance as per QGTTM (noted as *Operational Separation* in Figure C1 following)
- 1.5 m to access the vehicle to weigh the right hand side (the inspector needs 1.5 m to locate and operate the weighing devices)
- 2.5 m for the vehicle
- 0.3 m additional clearance to the right hand side to allow for lateral vehicle movement (driver will not park exactly where instructed or expected)
- 1.5 m to access the vehicle to weigh the left hand side, and
- 2.3 m is sometimes allowed for the inspectors to park their vehicle near the middle of the HVIS.

**Figure C.1 – Minimum site width**



The Standard drawings in Appendix C of the [Heavy Vehicle Interception Site Design Manual](#) show the minimum site width as being 10.5 m from the road centre line. This allows for lower-volume roads that may have a lane width less than 3.5 m and so maintain the total work environment of separation of transport inspectors and passing traffic.

### **Operational separation width of 1.2 m**

The requirements of the QGTTM are the basis for the 1.2 m operational separation width. The transport inspectors are instructed to not work within 1.2 m of the traffic lane. The painted median is used as a physical reminder of this safety requirement.

### ***Line marking of operational separation area***

There are two major issues:

1. The separation must be obvious to the inspector, both at night and during the day. For this reason, the width of the separation is defined by white line marking paint with an application of glass beads. Diagonals are used to make the separation more conspicuous and increase the transport inspector's awareness of the proximity of the separation. The transport inspector works mostly in the middle third of the HVIS and it is from this area that the transport inspector will move to the edge of the operational separation to signal a vehicle to move into the HVIS. If a transport inspector was to move within the separation zone, then they would be looking at the approaching traffic and not at the ground under their feet: therefore, it is important there are no irregularities (for example, RRPM) that could become a tripping hazard.
2. There is no nose on each end of the operational separation area. The ends are open to stop any possibility of an approaching driver thinking they are approaching a median and will need to veer into the HVIS. It may appear obvious it is an HVIS; however, the concern is fatigue in rural areas and its effect on driver perception. The driver needs to see continuity in the definition of the left edge of the traffic lane as indicated in the photographs following.

***Figure C.2 – Line marking of operational separation area***



