



# Part

# 2

## Level 2 Roads Rural Single Carriageway Roads



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## 2 Operations in Rural Areas

### 2.1 Introduction

Operations on rural single carriageway roads (Level 2 roads) are covered in this part of the guidance documents. The relevant sub-levels, carriageway type and speed limit / speed are outlined in the following table.

Level		Carriageway Type	Speed Limit / Speed (km/h)
Main	Sub		
Level 2	i	Single	80
	ii	Single	100

**Table 2.1.1:** Level 2 Sub-levels, Carriageway Types and Speed Limit / Speed

The approach is to give a simple step by step guide complimented with visuals where required. This gives a quick and easy reference on how to install, operate, amend and remove TTM operations in rural areas. Methods for assessing and applying TTM requirements that are appropriate for rural areas and the nature of the works being undertaken are covered.

This part of the guidance document must be read in parallel with Part 0 so that all concepts and methodologies are fully understood.

The following items are covered in this part of the guidance documents:

- Vehicles and Equipment;
- Methodologies;
- Static Operations;
- Traffic Control Methods;
- Semi-static Operations;
- Wide Single Carriageways, Climbing Lanes and Overtaking Lanes; and
- Specific Operations.

## 2.2 Vehicles and Equipment

Vehicles and equipment are covered in this section under the headings of Semi-Static operations and static operations.

### 2.2.1 Vehicles and Equipment for Static Operations

Vehicles and equipment for static operations on rural roads are included in Part 0 of these guidance documents.

### 2.2.2 Vehicles and Equipment for Semi-Static Operations (SSO)

#### Static Signs for SSO

Sign WK 001 Roadworks Ahead with supplementary plate P 002, stating the distance over which the works may be encountered is required as the first sign. The second sign is another WK 001 sign with a supplementary plate P 082, stating the type of operation in progress.



Figure 2.2.2.1: SSO Static Signs

#### Vehicle Mounted Signs

Vehicle mounted signs may be used as an alternative to static signs. The vehicle and the vehicle mounted signs shall comply the requirements in Part 0 of these guidance documents.

When using SSO for road marking and sign maintenance operations, the signs shown below may be mounted on advance vehicles and works vehicles in accordance with the TII Dashboard Manuals.

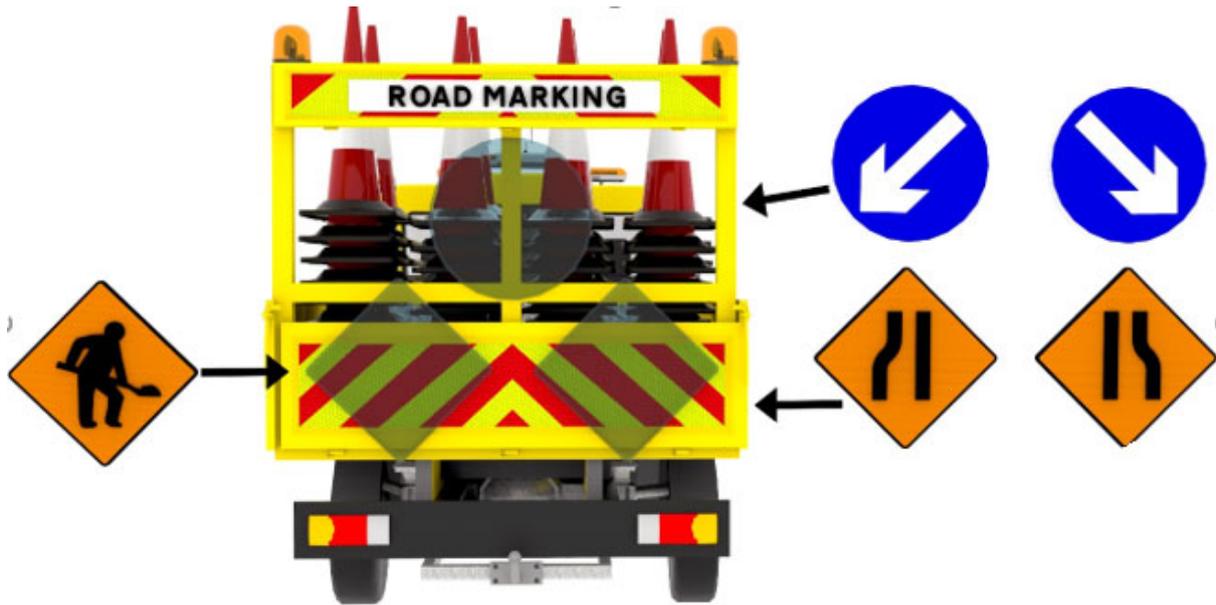


Figure 2.2.2.2: Vehicle Mounted Signs

### SSO for Resurfacing and Surfacing Works

The advance warning signs for SSO works such as road resurfacing are as follows:



Figure 2.2.2.3: SSO Advance Warning Signs

The following signs should be repeated every 400m throughout the length of the works. WK 073 Loose Chippings and supplementary plate, RUS 014 No Overtaking and WK 061 Flagman Ahead and supplementary plate should be used. Existing permanent signs that contradict temporary signs should be covered in accordance with guidance contained in Part 0 of these guidance documents.



Figure 2.2.2.4: SSO Repeater Signs

## **2.3 Methodologies**

### **2.3.1 Context**

The alignment and characteristics of Level 2 roads may give rise to particular hazards in relation to the installation of advance warning signs. Many rural roads do not have a hard shoulder and may have limited or no margin. In addition, the road alignment may give rise to poor forward visibility. Where possible, advance warning signs should be placed on the margin or hard shoulder but may be placed on the carriageway if these are not available.

### **2.3.2 Traffic Management Process**

#### **2.3.2.1 Overview**

If a TTM Plan (TTMP) for the site and work has been prepared by a TTM Designer, then that plan and associated safe operating procedure should be used. If an organisation has layouts and operating procedures for the work at the site, then those layouts and procedures should be used.

If there is no site-specific layout and operating procedure, or if they are not appropriate, then the site should be assessed in accordance with the following steps. This process requires standard layouts, drawings and procedures that can be used to implement site specific controls. The process is summarised in Figure 2.3.2.1.

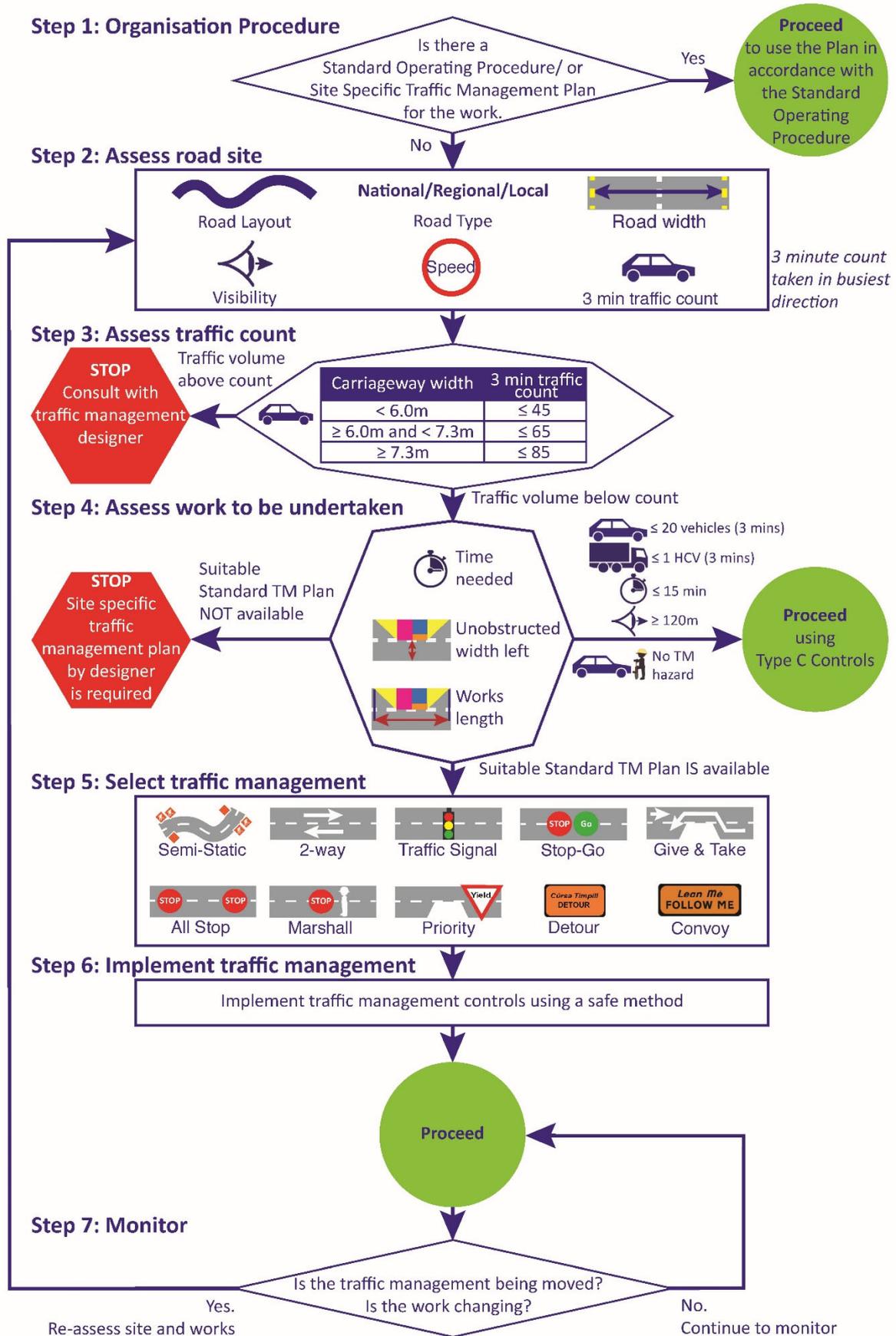


Figure 2.3.2.1: Traffic Management Process Summary

### **2.3.2.2 Assess the Site**

If there are no organisational procedures in place, the next step in the process is to assess the site, considering the number of junctions involved, visibility, speed and volume of traffic. This is followed by assessing the impact of placing a worksite within the road, including the length of time that the works will be present and the amount of road that the site will take up. As described earlier, if the works are of low impact in terms of time, good visibility, and low volumes of traffic, then the works can proceed as Type C roadworks, provided workers are not exposed to live traffic and works vehicles are properly liveried with warning beacons in operation. If the works are going to take longer than 15 minutes, and less than 12 hours, then it is Type B roadworks, and longer than 12 hours is Type A roadworks.

### **2.3.2.3 Planning the Site**

When assessing the area required for the works, adequate provision needs to be provided for the following:

- The actual area needed to carry out the works, including manoeuvring vehicles and swing radii of any plant to be used;
- Area needed to park plant;
- Area needed to store materials; and
- Area where operatives will be present.

Safety zones are then applied around this work area. The safety zones are buffer areas, both longitudinally and laterally, that are exclusion areas where:

- No plant is allowed;
- No personnel are allowed, except designated personnel; and
- No material can be stored.

Finally, tapers are applied. These are going to be either at 45° for shuttle working or at a taper rate for 2-way traffic.

When the works area, safety zones and tapers are determined, this will leave an unobstructed width for road users, and final length of the works. Centreline coning (typically 20m length in rural areas) may be placed for shuttle working where it can be tapered across the centreline of the road while maintaining 3.3m lane width at the narrow end. This line of cones is generally placed 20m in advance of the entry and exit tapers to allow for HGV movement. Distances for advance warning signs are determined from the outermost points of these arrangements.

Once the unobstructed width, time and length of works and traffic volumes are known, the most appropriate traffic management method should be selected in accordance with this document.

#### **2.3.2.4 Setting up the Site**

TTM operatives involved in setting up the TTM should be briefed before works begin so they understand the layouts and methodologies that are going to be used. When at the depot and where possible, signs should be loaded so that they can be removed in an order that generally matches the setting up sequence. On site, ensure that the TTM vehicle has warning beacons in operation. The first signs to be erected are the WK 001 Roadworks Ahead signs, at the required positions, even if planning the site. These can be adjusted once the site is planned in accordance with the above advice. Sign RUS 001 Keep Left or RUS 002 RUS Right should be used on the TTM vehicle at this stage if it is parked on the carriageway.

Once the layout of the site and advance warning signs are known, advance warning signs are placed while facing oncoming traffic starting with the outermost WK 001 signs and working back towards the site on either side. At all times operatives should work from a point of safety within the margins, edge of carriageway or any available footways.

If required, centreline cones should then be installed. An All Stop, along with sign WK 061 Flagman Ahead, may be used at any stage to provide a safe method of work. Prior to implementing an All Stop, signs and devices should be placed on the margins at the required locations for efficiency. When placing centreline coning, the outside Keep Left should be placed first and cones are then installed working back towards the site, finishing up with the inside Keep Left for the other direction.

The work site is set up by placing sign RUS 002 at the start of the approach taper first and then the cones and signs for the entry taper and longitudinal cone run are placed moving back towards the end of the work site. The works area can then be established inside these devices. Permanent contradictory signage should be removed or covered at this stage.

#### **2.3.2.5 Reviewing the Installed Layout**

Once the advance warning signs and site have been set up, the site should be reviewed from the site works and road user point of view and any required adjustments made. Finally, when assessing the installed TTM, the following points should be considered:

- The workforce, plant or materials and live traffic should not be mixing.
- Someone approaching the site should understand what is happening and what is expected from them.

Site installation records should then be completed.

### **2.3.2.6 Removal**

The TTM is removed in reverse order:

- Beginning with the works area;
- Then, the longitudinal cone run working from the end of the site towards the front;
- Removing the centreline coning (if used), using an All Stop if required;
- Removing advance warning signs beginning at the site and working towards the sign WK 001 Roadworks Ahead in both directions.
- Reinststate all permanent signage that was removed/covered.

If the TTM vehicle is parked on the carriageway, sign RUS 001 Keep Left / RUS 002 Keep Right should be used. These signs should remain in place until all other signs and devices have been removed from site and the TTM vehicle is ready to leave.

### **2.3.3 Sign Installation and Accommodating Cyclists**

In addition to the principles outlined in Part 0 of these guidance documents, the following items which may be unique to Level 2 roads, should be considered:

- Avoidance of pinch points;
- Ensuring advance visibility requirements for signs are achieved; and
- Forward and rear visibility of vehicles and operatives installing signage.

#### **Pinch Points**

Where signs are placed on the carriageway, the installation should ensure that signs on opposite sides of the road do not create pinch points and are staggered by at least 50m. Entrances should be used to place signs off the carriageway, provided the visibility of the sign is not affected and the entrance is not impeded.

#### **Sign Visibility**

If visibility requirements cannot be achieved at the required advance sign distance, then the signs should be moved or additional signs placed at appropriate intervals. A tolerance of 10% on signage location is generally acceptable however this may vary depending on site characteristics.

Care should be taken to ensure road side vegetation or overgrown verges do not obscure warning signage. For Type A works which may be in place for an extended duration, the roadside verge and hedges should be cut prior to signage installation. Where hedges are not cut, vegetation should be cleared around the immediate location of the sign to achieve the required visibility or alternatively the sign should be placed on the carriageway.

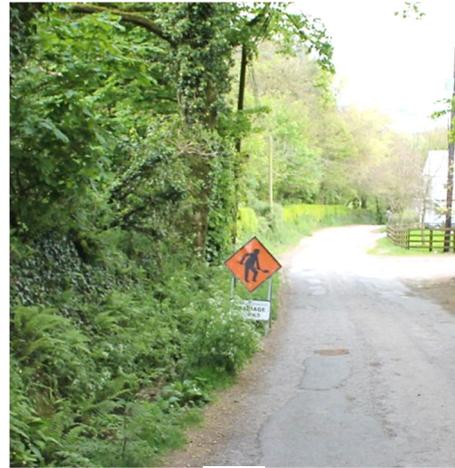


Figure 2.3.3.1: Sign Visibility on Level 2 Roads (cut vegetation around signage)



Figure 2.3.3.2: Sign Visibility on Level 2 Roads (locate signage before bend)

### Vehicle and Operative Visibility

During signage installation, a works vehicle may need to stop on the carriageway if a suitable margin or pull-in area cannot be identified close to the required sign location. In such circumstances, the vehicle should be parked legally and there must be adequate forward and rear visibility of at least 90m for 80km/h and 120m for 100km/h roads.

On non-minor roads, a TTM vehicle may be used to the rear of the signage installation vehicle to give advance warning of the signage setup. The TTM vehicle should remain a minimum of 50m from the operatives installing the signs.

### Accommodating Cyclists

Where an existing cycle facility is being closed, an alternative facility should be provided, or the minimum required lane width should be increased by 1m and vehicles and cyclists allowed to share the running lane. Where there are a significant number of cyclists and the length of works is greater than 80m, the minimum required lane width should be increased by 1m if practicable.

## **2.4 Static Operations**

### **2.4.1 Context**

Static operations on Level 2 roads include specific risks that may not be encountered on Level 1 and Level 3 roads. The following static operations are covered in this section:

- Working at Junctions;
- Working at Roundabouts;
- Operations on Narrow Roads;
- Switching Between Phases; and
- Railway Crossings.

Typical static traffic control methods are included in Section 2.5.

### **2.4.2 Working at Junctions**

When carrying out a risk assessment, the TTOS should ensure that all approaches are considered when determining what hazards are present. Consideration should be given to installing either a Stop and Go or Temporary Traffic Signals operation. Appropriate safety zones should be maintained. If the full length of the longitudinal safety zone cannot be achieved between the works and the junction then the required action is to extend it past the junction and incorporate the full length of the safety zone prior to the junction.

Although there may be more traffic on the mainline the safety of traffic on the side road is equally as important. As the works cross the junction, where possible, the junction should be kept open with works on half the road and switching. An All Stop should be used to move across the junction where this cannot be achieved.

In a rural situation, there may be a higher probability of equestrian users on the road therefore the control of the junction is paramount to provide for these road users to negotiate the works.

### Typical Junction Layouts

#### Works at a Junction (Main Road)

A typical TTM junction layout with works on the main road at a junction and showing a 3-way Stop and Go operation is shown below.

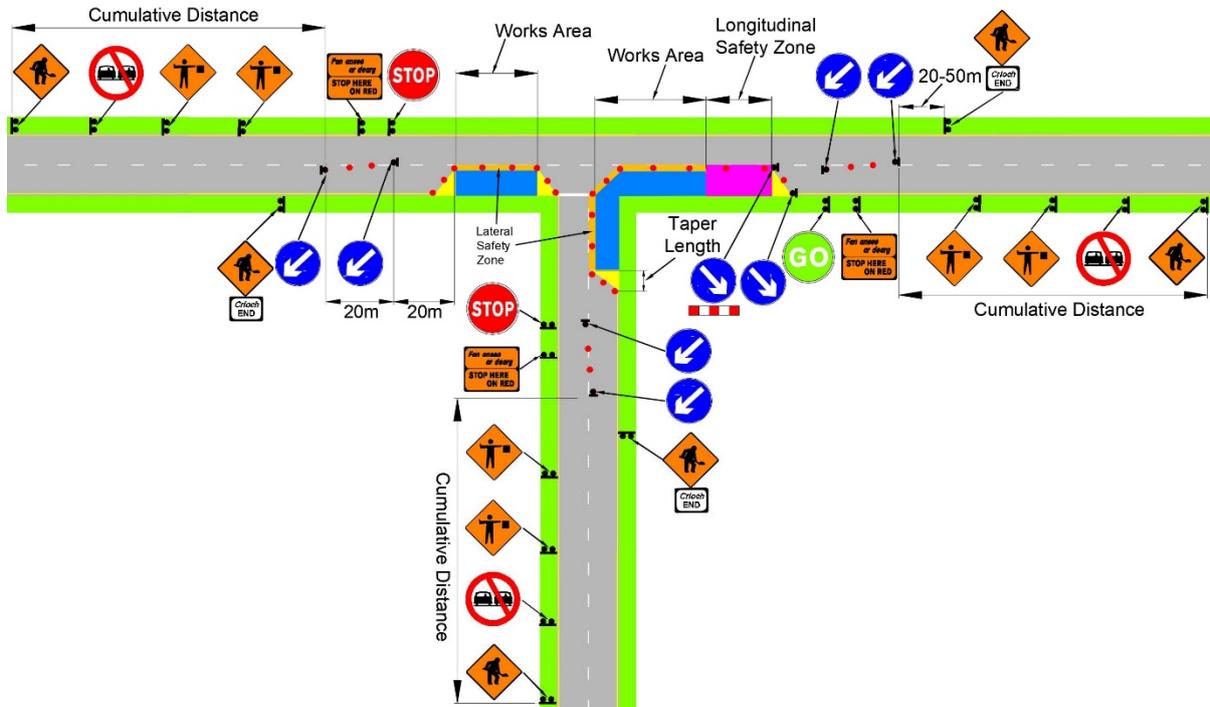
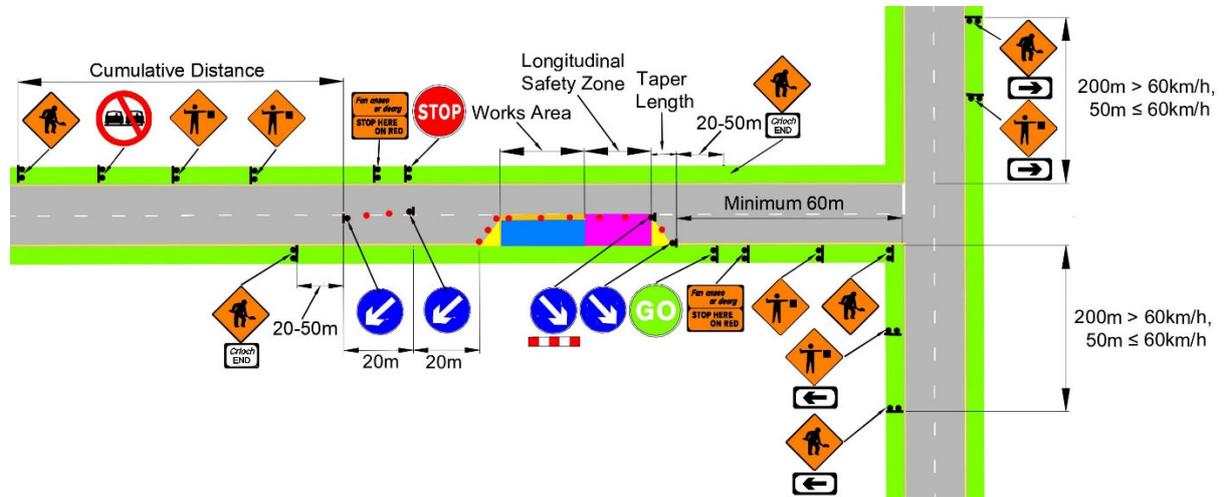


Figure 2.4.2.1: Works at a Junction (Main Road)

Works at a Junction (Side Road)

A typical TTM junction layout with works on the side road at a junction and showing a 2-way Stop and Go operation is shown below.



**Figure 2.4.2.2:** Works at a Junction (Side Road)

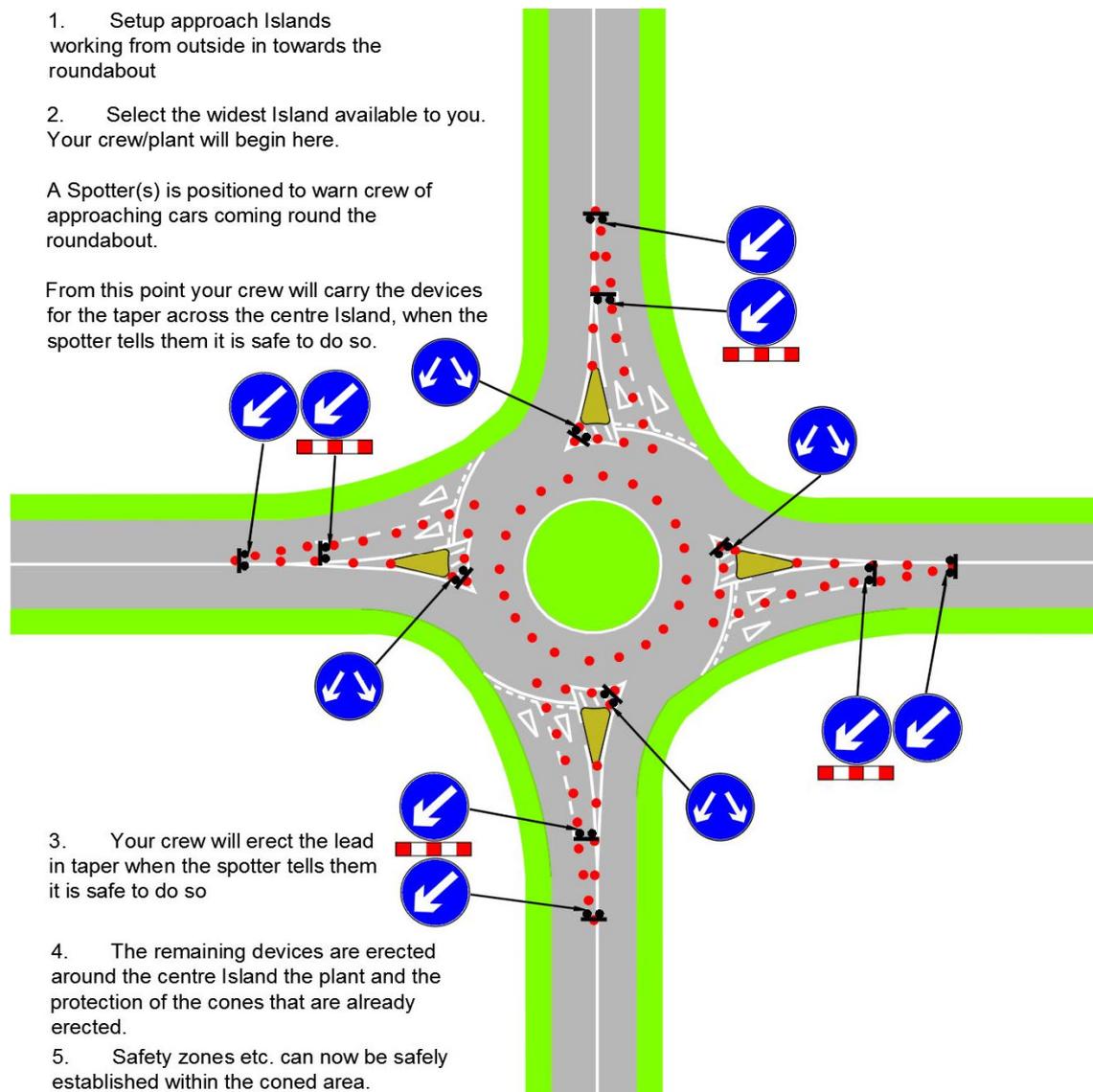
### 2.4.3 Working at Roundabouts

The TTOS should ensure that all approaches are considered when determining what hazards are present. Required advance warning signage and lane closures must be put in place prior to works taking place on the roundabout. Cones within circulatory area of the roundabout should be spaced at:

- ≤ 60km/h: maximum 2m; and
- > 60km/h: maximum 3m.

#### Typical Roundabout Set-up Sequence

The sequence for setting out TTM equipment on roundabouts on Level 2 roads is shown in Figure 2.4.3.1.



**Figure 2.4.3.1:** Sequence for Setting out TTM Equipment at Roundabouts (advance warning signage excluded for clarity)

## **Roundabout with Two or More Lanes**

Where there are works required on a roundabout with two or more lanes around the whole roundabout, then lane 2 (or the lane nearest to the central island) should be closed giving a 1.2m lateral safety zone.

### Installation:

TTM operatives should carry enough cones to the roundabout to be able to install a short taper. When there is a suitable gap in traffic, TTM operatives set out the taper in lane 2 (or the lane nearest to the roundabout), after which, the TTM vehicle can pull in behind it. The TTM vehicle is then driven around the roundabout whilst TTM operatives drop out cones to close the rest of the lane. When the TTM vehicle reaches the taper TTM operatives use those cones to complete the circle. The closed lane now provides a lateral safety zone for works on the roundabout.

### Removal of Lane 2 Closure:

TTM operatives pull back enough cones to create a short taper in front of the TTM vehicle. Once this is set up the TTM vehicle reverses whilst TTM operatives remove the cones and load them onto the vehicle. When they reach the taper the TTM vehicle exits from the roundabout to a safe place nearby. The TTM crew then remove the taper and when safe carry the cones from the roundabout to the TTM vehicle where they can now be loaded.

### Typical Roundabout Layout

A typical TTM roundabout layout is shown in Figure 2.4.3.2.

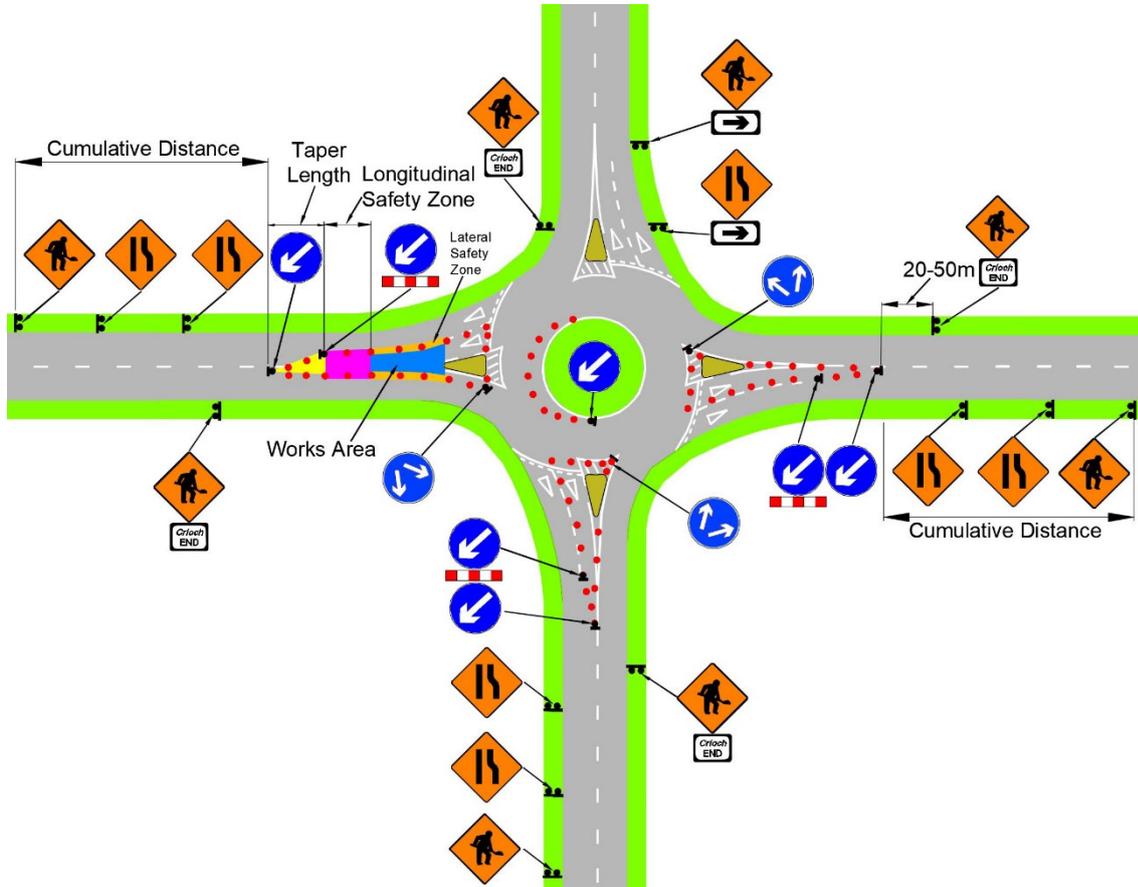


Figure 2.4.3.2: Typical Works on Entry Splitter Island

## 2.4.4 Operations on Narrow Roads

### Context

This section deals with Level 2 roads where the unobstructed road width < 2.5m. These are virtually an everyday event for stakeholders which include a significant length of local secondary and tertiary roads. Contractors and utility providers may also encounter these scenarios on a regular basis. RUS 014 No Overtaking signs are not required on narrow roads. Operations are divided into the following sections:

- Where works cannot be suspended; and
- Where works can be suspended.



**Figure 2.4.4.1:** Typical example of Semi-Static Works on a Narrow Road with Unobstructed Road Width < 2.5m. (Semi-Static warning signage has been erected outside of the camera frame)

### Where Works Cannot Be Suspended

For operations such as an extensive road excavation or road strengthening, then a road closure or a road block is the only option. Works under this heading may include long and deep excavations. This means that there is local access only on the road in question.

### Where Works Can Be Suspended

For operations such as a road crossing for drainage or utility provisions, then an All Stop should be used. This means that the road can remain open and when a road user is required to pass, then the works are temporarily suspended. Where required, a steel plate should be secured over the excavation, works vehicle and plant should be moved to the nearest gap, entrance or junction to facilitate vehicles to pass the works.

### **2.4.5 Switching Between Phases**

The following procedure should be followed to carry out a switch between phases on rural roads:

- Ensure workforce and TTM crew are aware that a switch is planned;
- Implement an All Stop;
- Workforce moves plant to the opposite carriageway;
- TTM crew adjust tapers for the opposite side of the carriageway;
- TTM crew adjust longitudinal cone run where necessary;
- TTOS checks that the carriageway is clear on the side of the road to be opened; and
- The All Stop is removed.

A similar principle applies to switching to the aftercare. The point at which the hard shoulder is closed should be consistent throughout phases.

Prior to removing the works, the TTM crew should install a line of cones along the hard shoulder on the side of the works. Under an All Stop the tapers should be removed and cones used for the longitudinal cone run and the works area repositioned along the centre of the road where the centreline had been. The hard shoulder closure on the opposite side of the road can now be extended for the length of the works area requiring aftercare. As this operation will be in place overnight, lamps must be placed on the cones unless the area is well lit.

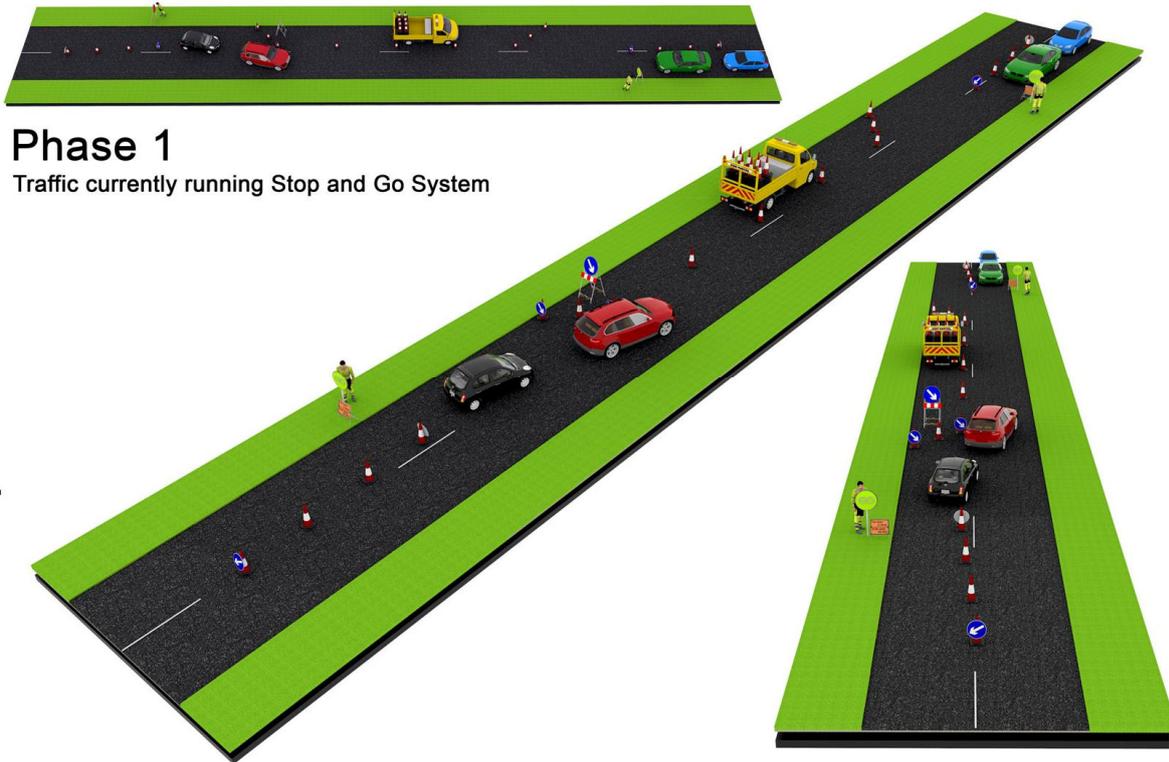


Figure 2.4.5.1: Switch – Phase 1

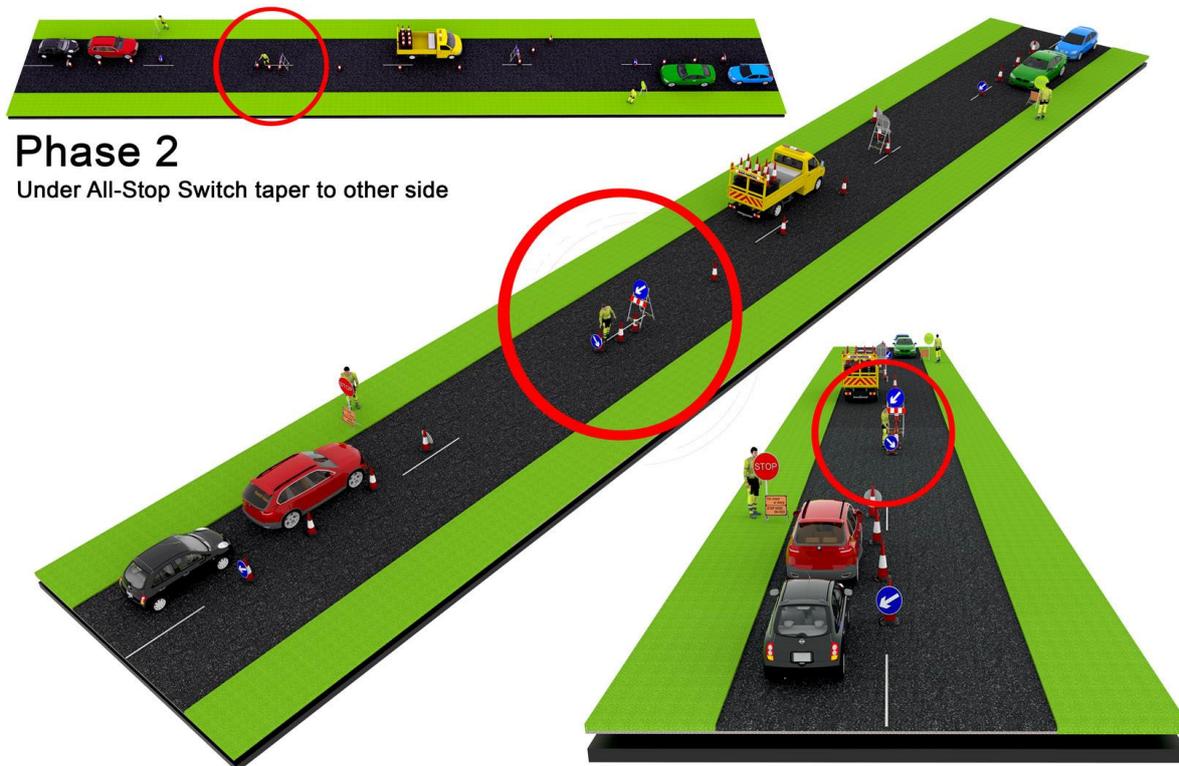
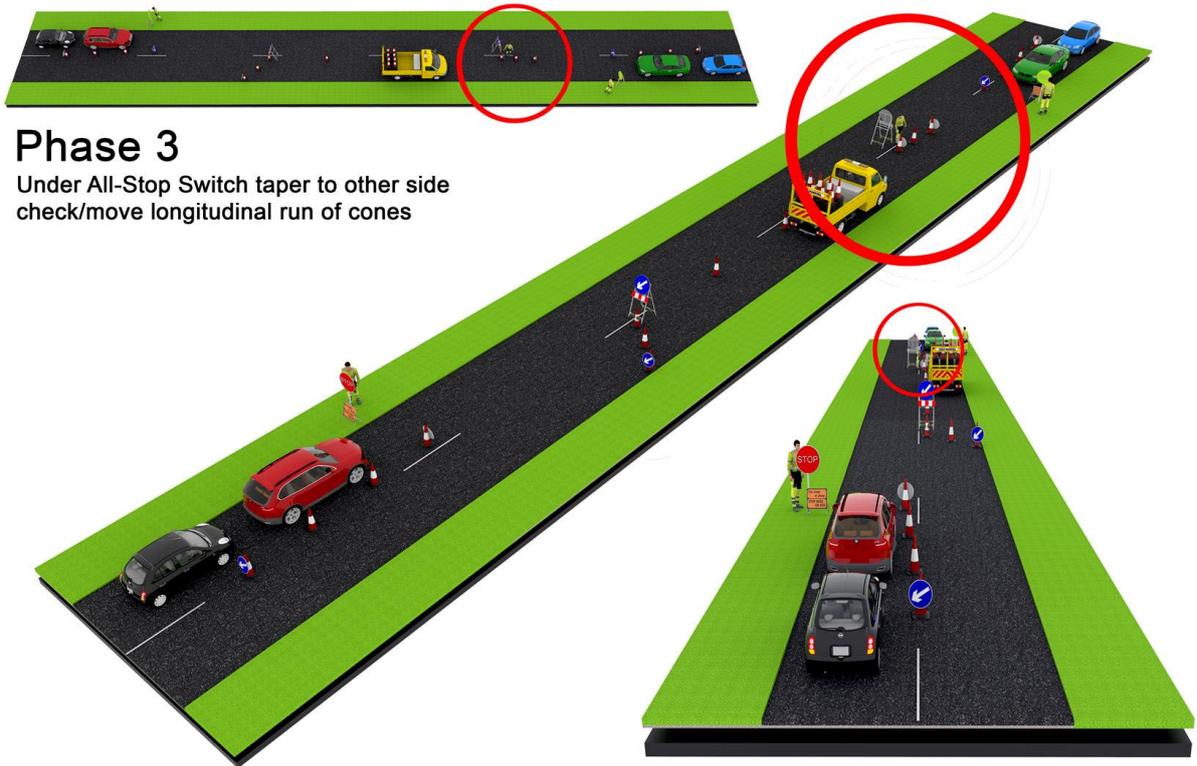


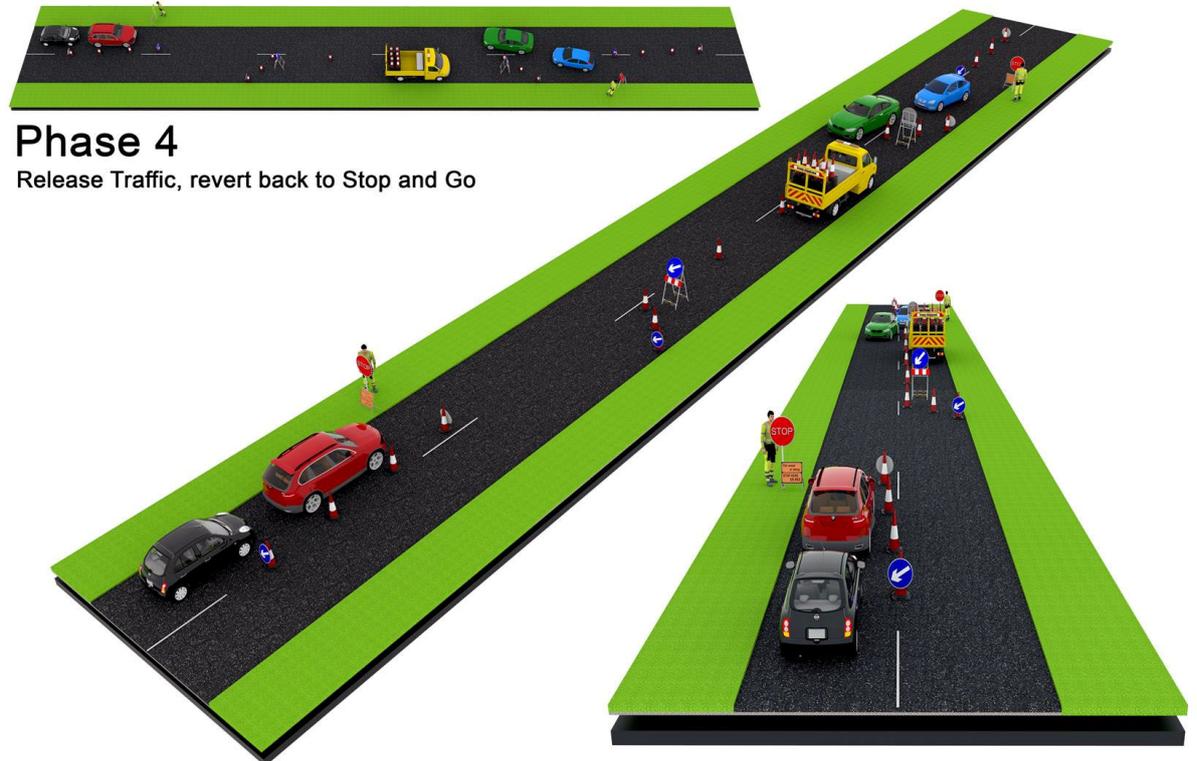
Figure 2.4.5.2: Switch – Phase 2



### Phase 3

Under All-Stop Switch taper to other side  
check/move longitudinal run of cones

Figure 2.4.5.3: Switch – Phase 3



### Phase 4

Release Traffic, revert back to Stop and Go

Figure 2.4.5.4: Switch – Phase 4

## **2.4.6 Railway Crossings**

When works are to be carried out across a railway line, the TTOS, when carrying out a risk assessment, should ensure that TTM crew are inducted to the Rail Operator's Safe Working Practice. A timetable of works must be agreed with the rail operator. At no time should plant or vehicles be allowed to stop on the tracks unless all services have been suspended and a permit to work has been obtained from the rail operator.

Cyclists should be instructed to cross at right angles to the tracks or else dismount to avoid getting the wheels caught in the groove. Consideration in the risk assessment should be given to asking both cyclists and equestrians to dismount.

### **Works at Unmanned Level Crossings**

In many rural areas level crossings are unmanned and may have a gate system. These unattended level crossings are found on minor roads. The railway is typically guarded by iron gates which must be kept shut as there is no other protection. The user has the responsibility to open and shut the gates.

Where the works are near an unmanned crossing and it is necessary to cross to works on the other side of the track, the following procedure should be adhered to:

- Read and understand the instructions at the crossing;
- Stop at 2m back from the railway line;
- Look left and right while also watching for the lights of approaching trains;
- Listen for a train horn or whistle;
- Give way to oncoming trains;
- Always expect a train;
- Open all gates before driving across; and
- Shut and fasten the gates after you.

### **Works at Manned Level Crossings**

These level crossings are usually attended by railway staff and have a gate or barrier system. The railway staff will always have control of the level crossing and no works, or rail crossings, can take place unless instructed to do so by the railway staff.

### **Works at Automated Level Crossings**

These level crossings have barriers which automatically lower when a train is approaching and raise after the train has passed. The amber light is the same as an amber traffic light; stop safely when the amber light shows. Flashing red lights have the same meaning as a steady red traffic light; stop safely when they show.

## 2.5 Traffic Control Methods

### 2.5.1 General

Traffic control methods on Level 2 roads are covered in this section. The approach is to give a simple step by step guide complemented with visuals included in Appendix B. This gives a quick and easy reference on how to install and remove different traffic control methods.

The following traffic control methods are covered:

- All Stop;
- Two-Way Traffic Operation;
- Priority;
- Stop and Go;
- Temporary Traffic Signals;
- Marshalling;
- Convoy Operation; and
- Road Closures and Detours.

The text on each of the above methods is intended to give a brief introduction and highlight some key unique points. Refer to Appendix B for Information Sheets.

### 2.5.2 All Stop

An All Stop is used to temporarily halt traffic where a TTM operation is in place. An All Stop is suitable for short duration works that can be quickly and easily suspended. The maximum duration should be 10 minutes, however a shorter time of 2 to 3 minutes is advisable. The maximum traffic flow should be 300 vehicles / hour. Where used for installation of TTM, the maximum traffic flow is the carriageway capacity.

Typically, an All Stop is used:

- To allow for an emergency vehicle to pass through the site;
- Where plant must cross the running lane;
- When deliveries must be made to site; or
- When there is a requirement to use marshalling.

A Stop and Go procedure can lead to an All Stop. An All Stop may also be likely within a road closure. This method does not require a Road Closure Order but should not be used where there is a suitable or obvious alternative route available on which to divert traffic. It is often more practicable to have traffic wait on an All Stop for a few minutes than send them on a diversion route. Persons involved in an All Stop must have a reliable means of communication between each other.

Where an All Stop is proposed and there are not already WK 061 Flagman Ahead signs, then these should be installed prior to TTM operatives taking control of traffic. TTM vehicles may be used to stop traffic using an All Stop.

### **2.5.3 Two-Way Traffic Operation**

#### **General Information**

Two-Way Traffic control is suitable for Level 2 roads. A Two-Way traffic operation is where drivers from opposite directions do not have priority over another. Drivers from both directions must have clear stopping sight distances.

#### **TTM Installation**

Installation shall take note of the principles and methodologies outlined in Part 0 of these guidance documents.

#### **Advance Warning Signage**

Install the WK 001 Roadworks Ahead signs. Then install the RUS 014 No Overtaking and Road Narrows signs. WK 001 with End plate P 010 is set out approximately 20 to 50m after the works, on the opposite side facing traffic approaching from the opposite direction.

When the advance warning signs have been installed from approach A on the side of the works then this set up should be repeated for approach B from the opposite direction. After the advance warning signs have been installed, the cones and signs are installed for the lead-in taper and around the works area.

### **2.5.4 Priority Operation**

#### **General**

A Priority operation is suitable for Level 2 roads. It requires drivers to make their own decision when it is safe to pass the works. Therefore, drivers from both directions must have clear visibility through the works.

#### **TTM Installation**

The following hazards should be taken into consideration:

- The presence of high speed traffic;
- Roads without a verge, footway or hard shoulder; and
- Extensive lengths of carriageway where solid white lines prohibit overtaking manoeuvres.

Variable Message Signs may be used as part of a Priority operation on Level 2 roads. An All Stop is required for installing the lead-in taper and works area.

Where there is a solid white line in the centre of the road, this indicates that they must drive to the left of the line. However, when installing TTM, the use of a RUS 002 Keep Right arrow directing traffic across the line overrides the no overtaking of the white line.

## **2.5.5 Stop and Go Operation**

### **General Information**

A Stop and Go operation is suitable for Level 2 roads. The TTOS should ensure that the Gardaí have been notified in advance of the operation. It is regulated by TTM operatives. The work site should be a maximum length of 500m. Drivers are not required to have clear visibility through the works. A single TTM operator can be used for works up to 200m provided the operator is within 100m of each sign. Automated Stop and Go discs are useful for works where only a single TTM operator is available. Additional operators may be required to regulate traffic emerging from any junctions.

### **TTM Installation**

The following hazards should be taken into consideration:

- The presence of high speed traffic;
- Roads without a verge, footway or hard shoulder; and
- Extensive lengths of carriageway where solid white lines prohibit overtaking.

Sign RUS 014 No Overtaking sign should be erected after sign WK 001 Roadworks Ahead. When all signs have been erected, this effectively creates a no overtaking zone. When installing TTM, the use of sign RUS 002 Keep Right, which is a regulatory sign, directing traffic across the line overrides the white line.

### **Stop and Go Discs and Operatives**

Care must be taken when setting out the Stop and Go positions to ensure that TTM operatives are in a safe a location. They should be located where they are visible to road users. Where a single operator is being used, they should have an unobstructed view of both ends of the site. Preferably both operators should be inter-visible but this may not always be possible.

Where this is not possible they must be in radio communication. The radio communication should include identifying the last car through direction 1, so that direction 2 knows when to release their traffic through. Operatives should stay alert and use a common language when using radio communication where two operators are required. A suitable communication system should be used when conveying information regarding letters and numbers, such as, vehicle registrations. There should be clear predefined radio instructions for dealing with emergencies.

Priority is given to the clear lane operator in the overall control of traffic. Care should be taken to make sure the traffic being asked to stop cannot see the Go panel of the far operator, as this may cause confusion. A blocker board may be used to prevent oncoming traffic from seeing the second disc. Stop is always shown until approaching traffic has come to a halt. If there are traffic queues on both approaches, traffic on the clear lane is shuttled first. Operators should give clear directions to road users and avoid verbal communication.

Rest periods must comply with the Working Time Directive. This may require rotation for operatives that are working long periods. This may also require additional staff so this should be considered by the TTOS.

## **2.5.6 Temporary Traffic Signals**

### **General**

A Temporary Traffic Signal operation is suitable for Level 2 roads. The TTOS should ensure that the Gardaí have been notified in advance of the operation and that permission has been given by the Road Authority. It does not require drivers to have clear visibility through the works. TTM operatives either manually operate, pre-programme or set the traffic signals to vehicle actuated mode. Temporary traffic signals should be vehicle actuated.

### **TTM Installation**

The following hazards should be taken into consideration;

- The presence of high speed traffic;
- Roads without a verge, footway or hard shoulder; and
- Extensive lengths of carriageway where solid white lines prohibit overtaking manoeuvres.

Note that when installing TTM, the use of a RUS 002 Keep Right arrow, which is a regulatory sign, directing traffic across the line overrides the white line.

### **Temporary Signals**

Temporary traffic signals should be positioned so that they can be set up for the required operation. They should be placed a sufficient distance apart to allow traffic from the one-way section to cross over to the correct side of the road before encountering the traffic queuing in the opposite direction. The traffic signals should be unloaded from the TTM vehicle. Initially, face both sets of signals towards each other and away from the view of live traffic. The parameters are then set based on the design and the works area length. Start the sequence on an all red phase. Under the all red phase, turn the signals to face the live traffic. When the above is complete and the signals are operating correctly, set the sequence running.

It should be observed for three cycles and monitored from there onwards. If queues develop, the green settings are too short and may need to be increased. A copy of the signals operating manual should be kept on site.

Refer to Appendix D for information on vehicle actuated modes and configuration tables.

### **2.5.7 Marshalling**

A marshall is responsible for adjusting the longitudinal cone run to allow the passage of HGV traffic on roads with narrow lane widths between 2.5 and 3m. This operation allows the remaining roadway width to be reduced to 2.5m while facilitating HGV traffic. The works operation should be suspended while there is no lateral safety zone and should only recommence when the lateral safety zone is reinstated. This traffic control method is done in conjunction with another control method such as Stop and Go or traffic signals.

### **2.5.8 Convoy Operation**

#### **General**

Convoy vehicles may be used for protecting surface dressing works and for works on roads with reduced widths, or when there are too many variables to use a standard TTM layout. A Convoy operation uses both a convoy vehicle to guide traffic past the works as well as a Stop and Go or a Temporary Traffic Signal operation and is regulated by TTM operatives.

Two-way traffic flows for a single vehicle convoy operation should be less than 45 - 50 veh / 3 minutes. The maximum queue to convoy should be 30 vehicles or less. If volumes exceed these values, a 3-convoy vehicle system should be deployed. Where possible, the period between convoys should be kept below 5 minutes.

When there is little or no available safety zone, traffic speeds past the works must be reduced to 20km/h and an agreed safe method of working imposed on the site. Convoy may also be used to protect surface dressing. Refer to Section 2.8.2.

#### **Convoy Vehicles**

It is possible to operate a Convoy operation with one vehicle but there may be occasions where more vehicles are required. Convoy vehicle drivers should maintain the required speed throughout the Convoy operation and ensure that the last vehicle in the convoy is kept under control until it passes the works area.

A multi vehicle Convoy operation may be one solution to ensure that there is a control vehicle at the head of each queue but this will add to other operational considerations, such as driver rotation and rest periods. It may also be necessary to have a standby vehicle on hand.

Rest periods must comply with the Working Time Directive. This may require rotation for operatives that are working long periods. This may also require additional staff, so this must be considered by the TTOS.

### **Communication System**

Prior to commencing a Convoy operation, a radio check should be carried out to ensure that there is a reliable and appropriate means of communication between drivers, Stop and Go operatives and the TTOS. It is essential that instructions are clear and concise and that no unnecessary talk is carried out over the communication system.

The language used when conveying information regarding letters and numbers, such as, vehicle registrations, should be understood by operatives using the communication system. There should be clear predefined radio instructions for dealing with emergencies.

Operatives should have received training and familiarisation with any communication system used during the Convoy operation. A Convoy operation may be suspended during peak hours or to relieve traffic congestion through the works.

### **Considerations**

The termination or suspension of bus stops should also be considered along with access and egress from adjoining properties. The TTOS should ensure that provisions for vulnerable road users have been made and control measures are implemented prior to commencement of the convoy operation.

Junctions should be avoided when using a Convoy operation where possible. Where this is unavoidable, a Stop and Go operative must be stationed at this point to hold traffic until the convoy vehicle passes. The Stop and Go operative will then only allow traffic to join the convoy procession in the direction of its travel. Vehicles wishing to travel in the opposite direction must be held until the convoy returns in the opposite direction.

## **2.5.9 Road Closures and Detours**

### **General**

There is an established road closure process set out in Section 75 of the Roads Act (1993) which must be followed before a road closure can be granted by a Local Authority. Road closures require a site specific plan to detail the closure points and the diversion routes to be followed.

It is common to install a major road closure overnight during low traffic volumes. Once on site, it would be difficult to close a road whilst traffic volumes are heavy as this may cause long delays and frustrate road users. This in turn may lead to an accident.

### Diversion Route Installation

Prior to installing the closure points, detour routes should be signposted to direct road users around the closure point to their destination. VMS may be used to provide information on road closures and detours. These can be placed before the Roadworks Ahead sign.

The diversion route should be capable of accommodating the types and volumes of traffic diverted from the primary route. If a temporary road is to be constructed; weight, height and width restrictions should be clearly signed.

The first advance warning sign must be sign WK 001 Roadworks Ahead. This should be followed by sign WK 090 Detour.

For short uncomplicated detour routes, a simple detour sign can be used to direct traffic, but for longer more complicated detours, a destination or route number may be shown in addition to the text and arrow.



On the approach to the point where the traffic is to be diverted, a detour sign should be installed with a distance to the start of the detour. A directional arrow can also be added to this sign.

Signs should be erected on frames and stands where possible. However, the restricted space available in urban areas may mean that signs are erected on street furniture.

Sign WK 091 Diverted Traffic should be used to indicate straight ahead, left or right at every decision point. The arrow direction may be varied to suit.



On diversions with long distances between decision points, the straight-ahead variant should be repeated at intervals to reassure road users that they are still on the correct route.

Sign WK 092 End Detour should be used at the end of the diversion to notify road users that they are back on their original route. The diversion route should be driven to ensure it is properly signed.



## **2.6 Semi-Static Operations (SSO)**

### **2.6.1 General**

Semi-Static operations (SSO) are used where the workforce and plant move continuously, or make frequent short duration stops. All approaches are considered when determining traffic flow and what hazards are present together with the type of Semi-Static works that are being carried out.

The TTOS should be aware of the traffic flow in respect of the TTM operation to be adopted for the Semi-Static works prior to commencing work.

The following is a non-exhaustive list of Semi-Static works:

- Longitudinal road marking and road studs;
- Testing public lighting or replacing bulbs;
- Road edge hedge cutting;
- Road edge vegetation management (mowing, weeding etc.);
- Pavement sweeping;
- Cleaning road signs;
- Cleaning drains, gullies and manholes;
- Maintaining surface water road drainage cuts;
- Installing road closures or other temporary traffic measures;
- Litter and debris collection;
- Road pavement inspection and testing;
- Surface dressing on minor roads;
- Pavement maintenance (such as scheduled pothole repairs, surface retexturing, etc.);
- Surveying; and
- Sporting, cultural or community events held on the public road.

## 2.6.2 General Layout and Procedures

The first sign to be installed is a WK 001 Roadworks Ahead with supplementary plate P 002, stating the distance over which the works may be encountered. Works may start from the installation of the sign. These signs should be within 1km of the works, but never more than 2km. Additional signs may be placed on the verge at 500m intervals.

The second sign is a WK 001 with supplementary plate P 082, stating the type of operation in progress. Additional signs may be placed on the verge at intervals between the first set of signs and the roadworks. By using several sets, the rear most signs can be moved forward at intervals, leap frogging the other signs so that the warning signs are always at the appropriate distance from the works. The supplementary plates that may be used in conjunction with the WK 001 sign at the start of roadworks should be as per Chapter 8 of the TSM.

The distance in the first WK 001 sign is a countdown to the works from the start of the advance warning signs. Sign RUS 014 No Overtaking is only required where there is a possibility of overtaking.

When using vehicle mounted signs, the TTM vehicle should park clear of the traffic lane, on the verge or in another safe location, moving forward to the next suitable location as necessary. When moving from one location to the next, the vehicle should travel at normal road speed. The drivers should be wary of the verge condition and roadside obstructions as the site may not be suitable to run vehicle mounted signage.

Depending on traffic volumes and subject to a SSRA, it may be necessary to control traffic past the works using manually operated Stop and Go discs. Where this may be required, TTM operatives should use two-way radios and WK 061 Flagman Ahead signs. These should be placed on all approaches.

### 2.6.3 SSO with Unobstructed Road Width $\geq$ 2.5m

#### Context

Roads where an unobstructed road width  $\geq$  2.5m is available are generally regional or local primary roads. Examples of these are shown below.



**Figure 2.6.3.1:** Typical regional / local primary road where unobstructed road width  $\geq$  2.5m



**Figure 2.6.3.2:** Typical regional / local primary road where unobstructed road width  $\geq$  2.5m

When considering the use of Semi-Static operations on Level 2 roads with an unobstructed road width  $\geq 2.5\text{m}$ , visibilities and traffic count data should be taken into account. The criteria for these items is included in the table below.

Speed (km/h)	Advance Signage Visibility (m)	Hard Shoulder Works	Semi-Static Give and Take <sup>2</sup>		Stop and Go <sup>1</sup>		
		Max 3 Minute Count	Max 3 Minute Count	Advance Visibility to Works (m)	Max 3 Minute Count	Stop and Go Operator Distance from Works (m)	Advance Visibility to Stop and Go (m)
80	90	130	20	160	50	45	90
100	120			215		60	120

**Table 2.6.3.1:** Semi-Static Operation criteria for unobstructed road width  $\geq 2.5\text{m}$

**Notes**

1. Two Operator Stop and Go maximum works length is 300m for a traffic count of 50 vehicles / 3 minutes.
2. Give and Take maximum works length is 50m.
3. Traffic counts in both directions.

**Working Through Junctions and Hard Shoulders**

SSO that are continually moving can pass through a junction briskly in which case the traffic may be held while the works vehicles proceed uninhibited. Alternative arrangements such as Stop and Go may be needed if the junction is temporarily inhibited.

At junctions and roundabouts, the approaching traffic from other arms should be warned of the operation in progress. Additional warning signs should be placed on the approaching arms, as appropriate. SSO are usually appropriate where operations are carried out from within a vehicle or where TTM operatives work along the nearside edge of the carriageway.

When using the TII Dashboard Manuals, visibility requirements should be adhered to. If the visibility is reduced, additional signage and/or traffic control may be required.

### **General Hard Shoulder Works**

These works require the hard shoulder to fully incorporate the works vehicle and the lateral safety zone of 1.2m. Overhangs from works vehicles should be taken into account when loader cranes are used or the working arm of a hedge cutter swings around.

An IPV may be used for works on Level 2 roads depending on the SSRA however it should only be used in conjunction with Stop and Go traffic control and the light arrow sign on the IPV shall not be used on two-way, single carriageway roads.

Works where a hard shoulder narrows or ends require a different TTM set up. This would typically occur in and around junctions. Where works are suspended due to a narrow or termination of a hard shoulder then this can only be carried out at a later stage using a static TTM operation.

The works vehicle driver should check mirrors and blind spots in readiness for driving the vehicle on the mainline at normal driving speed. After checking mirrors and blind spots, the works vehicle may move out into the carriageway and proceed across the junction pulling in at the next location to continue the works.

If there is more than one works vehicle, then they should cross the junction one at a time. Only when the previous vehicle has crossed the junction and re-established itself on the other side of the junction should the next vehicle carry out the manoeuvre. Where workers are on foot they should adhere to the guidance contained in Part 0 of these guidance documents.

### 2.6.4 SSO on Minor Roads with Unobstructed Road Width < 2.5m

Roads where an unobstructed road width < 2.5m is available are generally local roads. An example is shown below.



**Figure 2.6.4.1:** Typical Local Road where unobstructed road width < 2.5m

On rural roads with unobstructed road width of < 2.5m in width, the traffic volumes tend to be lower and traffic speeds also tend to be lower. Semi-Static operations, with stops lasting  $\leq 15$  minutes, on such roads generally involve the use of a works vehicle that can block the road and prevent traffic passing the operation. This means that shuttle working and convoys cannot be implemented. It is still important to ensure that adequate visibility of the operation is given to approaching traffic. This means the visibility for the signage and the operation set out within Chapter 8 of the TSM is required. Where adequate visibility of the operation by approaching traffic is achieved, then the operation may be conducted under Semi-Static signage. Alternatively, where it is appropriate to block the road temporarily to undertake the works, then a No Access signage arrangement may be used.

Where visibility requirements are not met, cones, barrier boards, or flagmen should be used to protect the operation from approaching traffic. When this is done, advance warning of such devices is given to the approaching traffic in the form of a WK 061 Flagman Ahead sign.

If using a No Access signage arrangement, a block line of cones may be used to prevent traffic using the road. Care should be taken to place the block line of cones at a distance from a junction that would not create a hazard for traffic who inadvertently use the junction. Dependant on the junction size, this may range from 2.1m back to allow traffic to pull in sideways and re-join the mainline road, or up to 6m to allow traffic to drive in and stop.

If traffic is allowed to drive in and stop, adequate space and visibility must be available to allow such traffic to turn and re-join the mainline road.

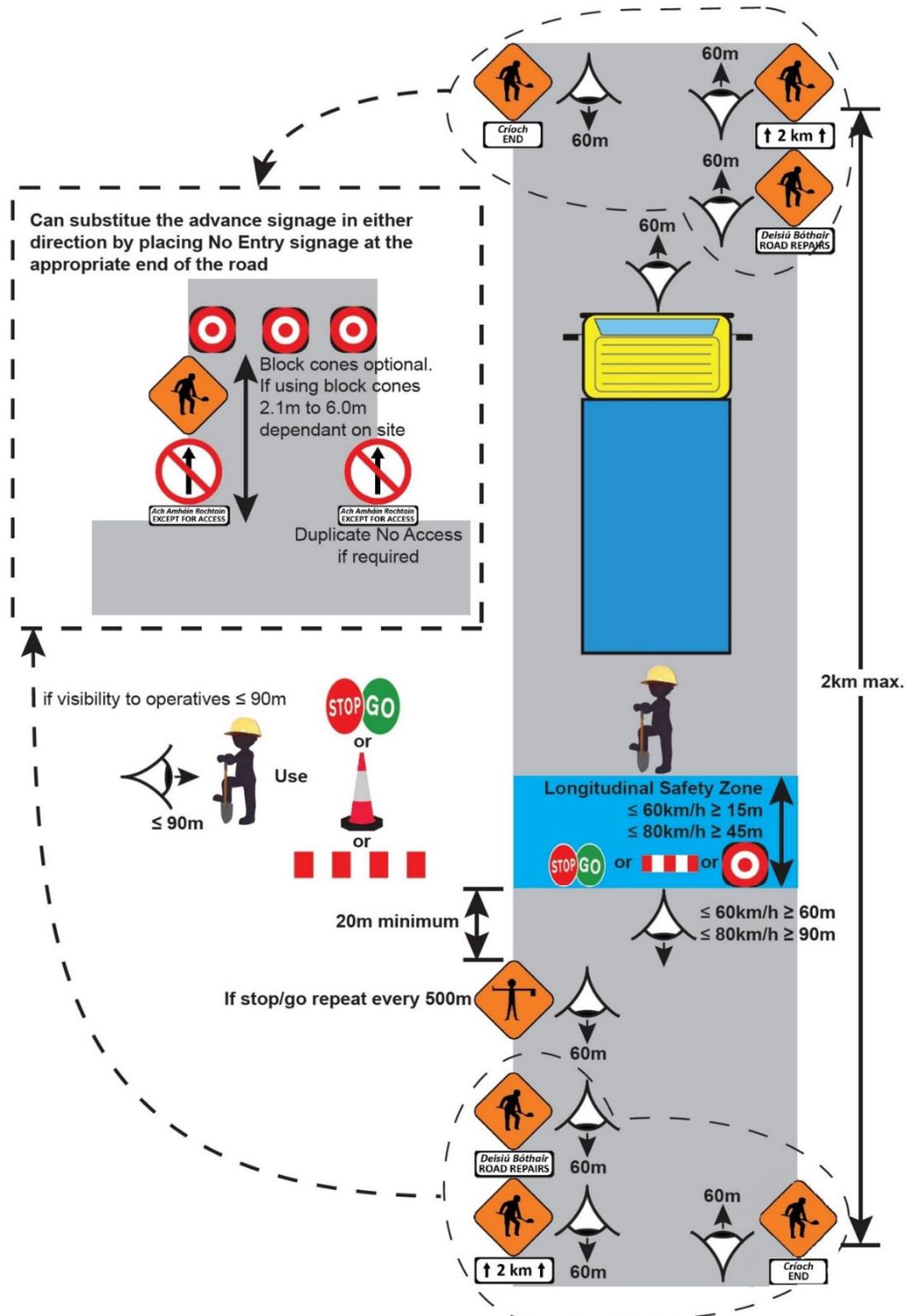


Figure 2.6.4.2: Semi-Static Layout with Unobstructed Road Width < 2.5m

## **2.6.5 SSO with Give and Take Traffic Control**

### **General**

A Give and Take operation may be used outside of a 50km/h zone within a SSO. There are greater visibility requirements for drivers approaching from both directions. The Give and Take operation must not be used near roundabouts or pedestrian crossings.

## **2.6.6 SSO using an IPV**

Subject to a risk assessment, the use of an impact protection vehicle (IPV) may be used. However, this may only be done where they have been provided with a site specific TTMP including method statements. Items to be considered when using an IPV during an SSO include:

- Buffer zone;
- Risk assess running lane width;
- Risk assess overhead hazards; and
- IPV driver to be suitably trained.

## 2.7 Wide Single Carriageways and Climbing / Overtaking Lanes

### 2.7.1 Context

Wide single carriageways and climbing / overtaking lanes present specific hazards that should be risk assessed before any works are carried out. Where there are no organisational procedures in place, the following guidance should be adhered to.

### 2.7.2 Wide Single Carriageways (Lane widths > 3.65m)



**Figure 2.7.2.1:** Typical example of Wide Single Carriageway with lane width > 3.65m and h/s > 2.5m. Care is required when considering the use of Semi-Static traffic control for works contained within a hard shoulder where lane widths are >3.65m. Wide lane widths result in an increased risk of traffic using the hard shoulder as a running lane. If there is a standard operating procedure for the works, then this should be followed. In the absence of a standard operating procedure, a standard Semi-Static signage layout should not be used, and the following traffic control methods should be considered as an alternative:

- **Static Hard Shoulder Closure:** This is done by the installation of a hard shoulder taper and longitudinal cone run with cones at 24m centres maximum. Cones should be dropped along the road verge from a TTM vehicle and then moved out by operatives to close the hard shoulder.
- **Semi-Static operation with vehicle mounted signs on traffic control vehicles.** The advance signs should be mounted on a yellow backing board with flashing amber beacons. Required visibility to vehicle mounted signs must be as per Table 2.6.3.1 for Semi-Static operations. The TTM vehicles must maintain a minimum clear distance of 50m to the works vehicle.

### 2.7.3 Climbing and Overtaking Lanes

#### Context

Placing TTM within overtaking lanes requires a specific method statement due to the potential for additional vehicle manoeuvres that occur at these locations. As these are distinct sections of road, the entire overtaking section requires TTM devices.

#### Installation

##### Lane 2 Closure (Overtaking Lane)

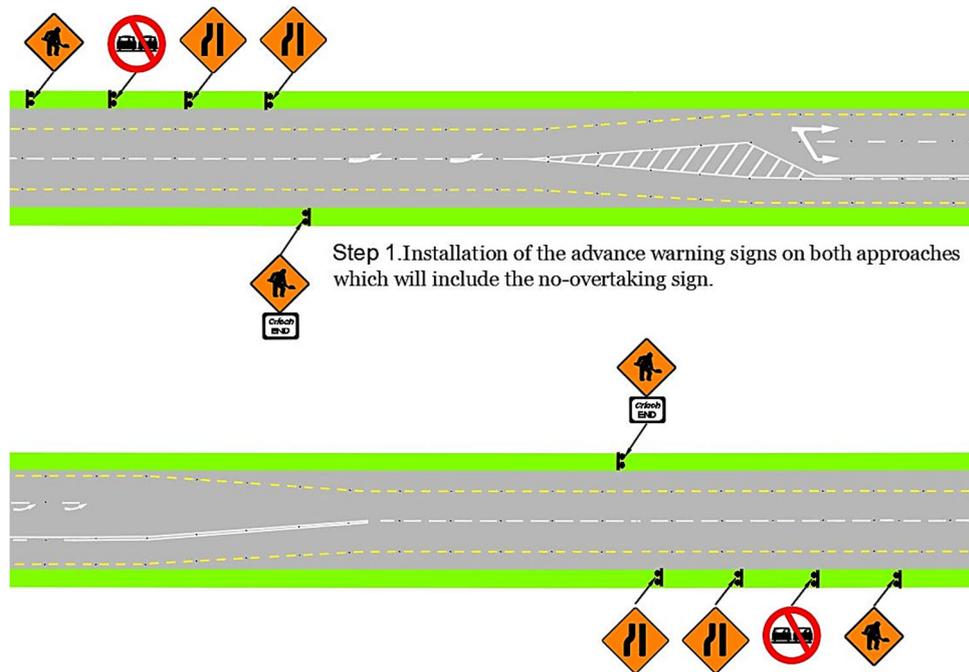
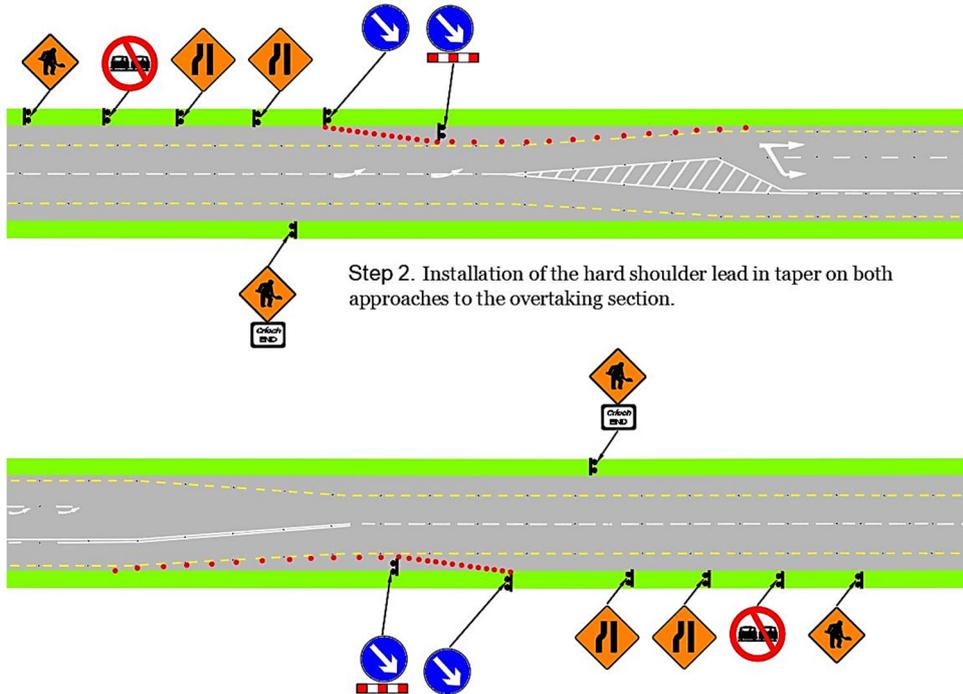


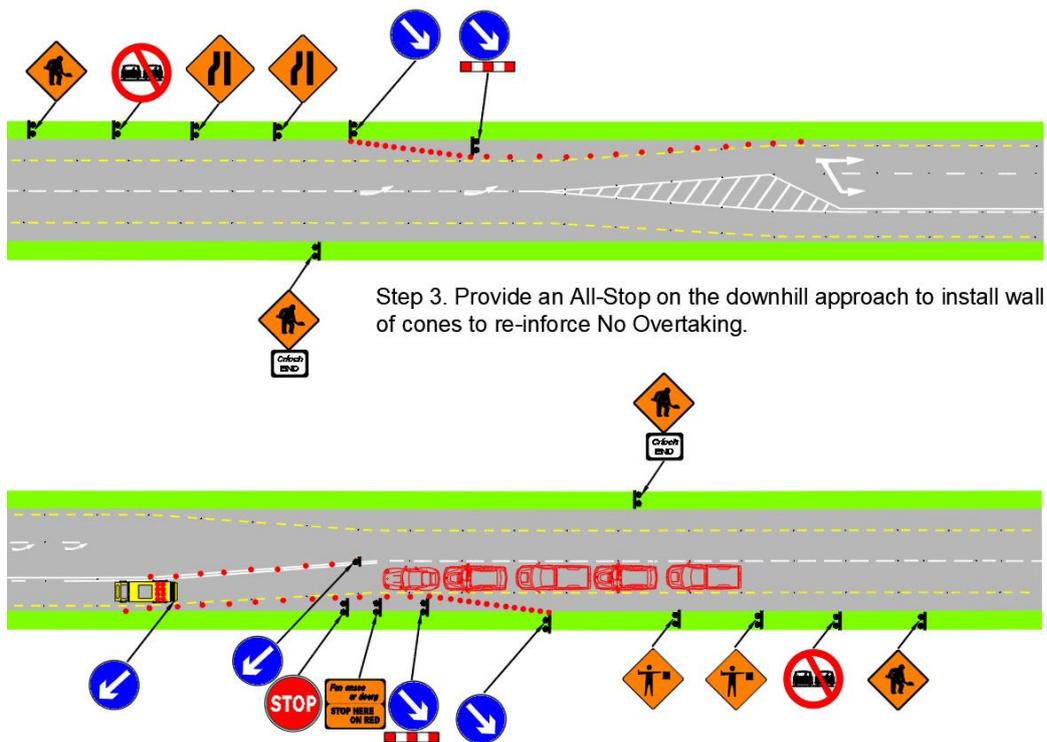
Figure 2.7.3.1: Lane 2 Closure (Overtaking Lane) - Installation of the Advance Warning Signs

Temporary Traffic Management Operations Guidance  
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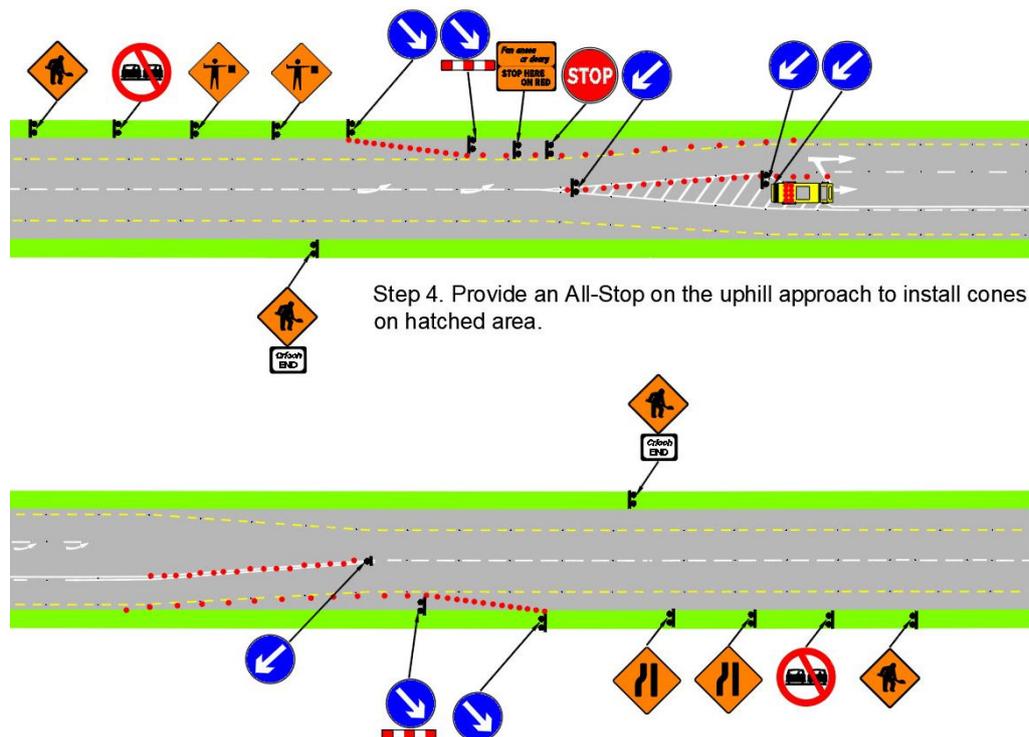
**Figure 2.7.3.2:** Lane 2 Closure (Overtaking Lane) - Installation of h/s lead-in taper and island

A Stop and Go board, along with associated advance warning signage, should be used to stop traffic on the approach to the uphill side of the overtaking section. The centreline along the transition section at the uphill end of the overtaking lane should be coned at 6m centres using a TTM vehicle driving downhill. Once the centreline of this transition section is coned, uphill end traffic should be released.



**Figure 2.7.3.3:** Lane 2 Closure (Overtaking Lane) - Install wall of cones

A Stop and Go board, along with associated advance warning signage, should be used to stop traffic on the approach to the downhill side of the overtaking section. The centre hatched area, on the approach to the downhill side of the overtaking section is coned off. A TTM vehicle should be used to place cones at 6m centres inside the uphill lane bounding white line, until the overtaking lane is reached. This line of cones is extended for a further 6m between lanes 1 and 2 of the overtaking section. The TTM vehicle should then reverse into the newly established lane 2 closure. Downhill end traffic should now be released. Operatives should then place cones along the downhill bounding white line of the centre hatched area.



**Figure 2.7.3.4:** Lane 2 Closure (Overtaking Lane) – Install Cones on Hatched Area

The TTM vehicle should proceed uphill establishing a lane 2 closure along the entire overtaking section by placing cones at both lane edges, until the centreline cones at the uphill end are reached. Operatives should continue to place cones to close out the end of this transition section from a point of safety within the closed lane.

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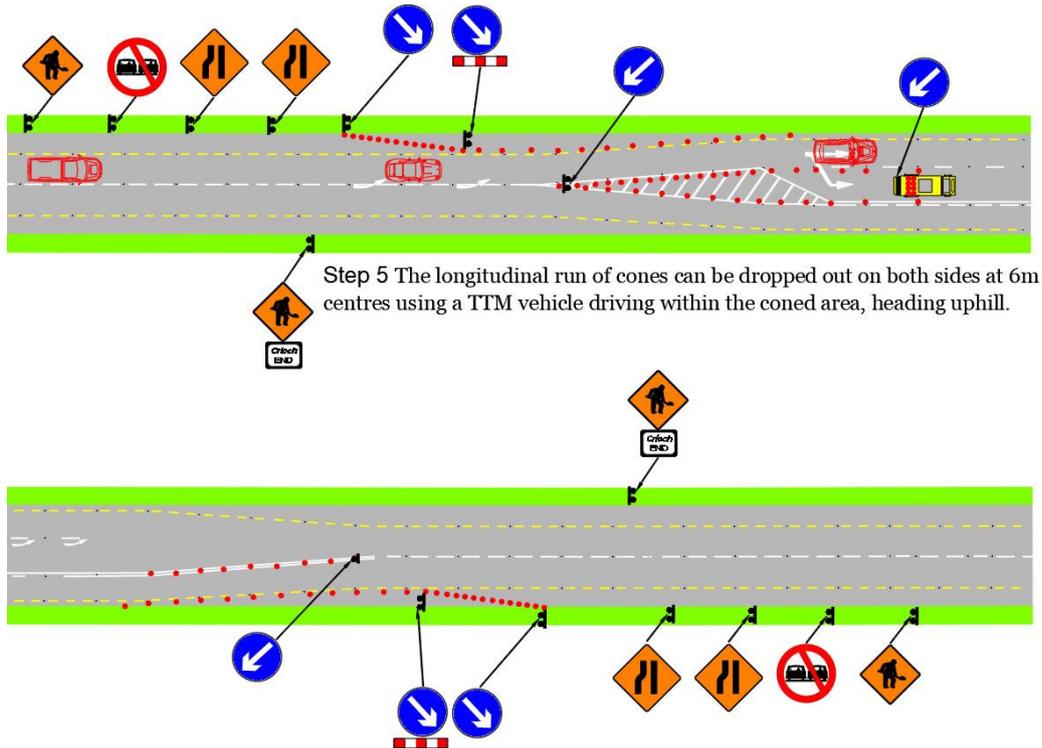


Figure 2.7.3.5: Lane 2 Closure (Overtaking Lane) – Longitudinal Cone Run

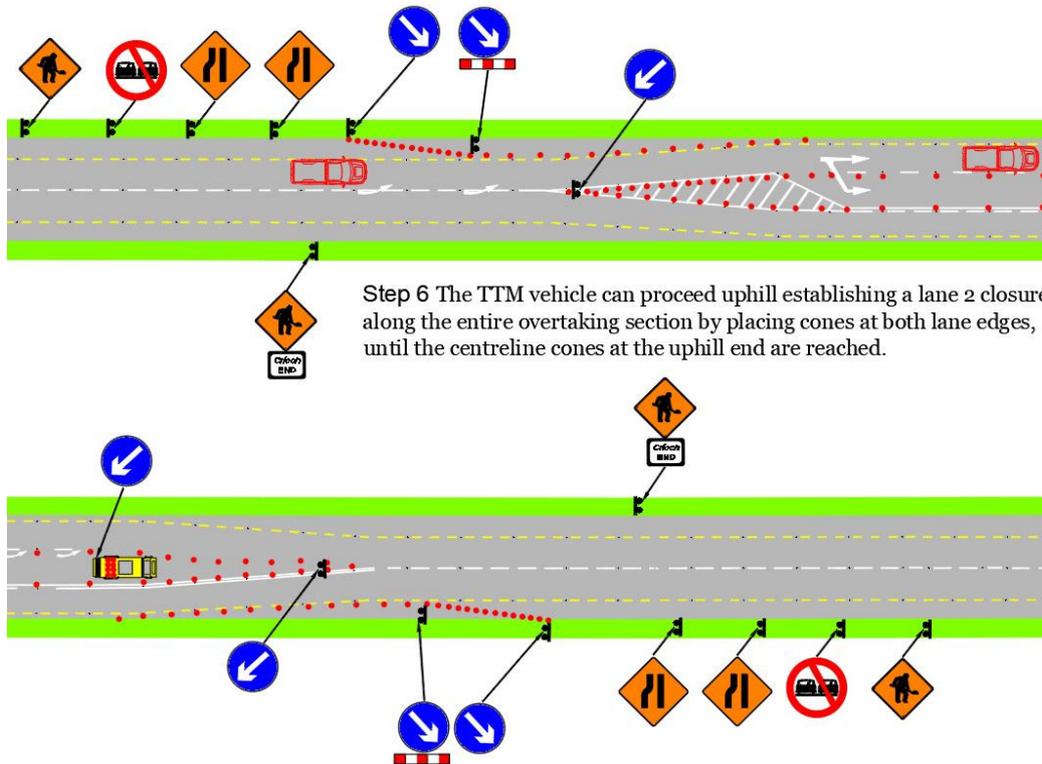


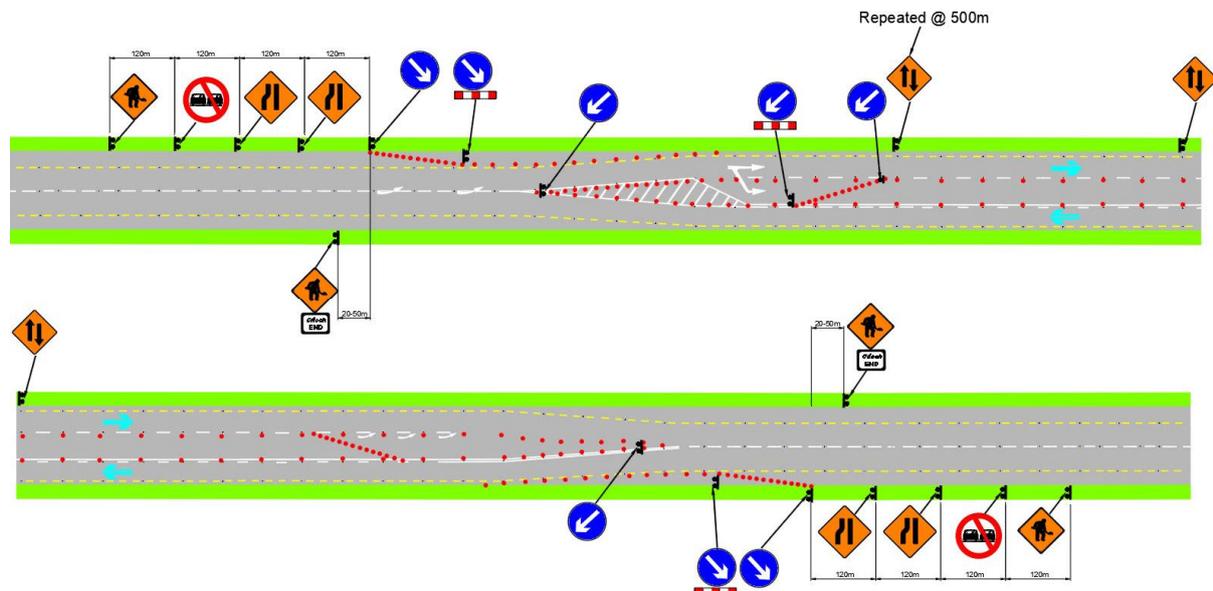
Figure 2.7.3.6: Lane 2 Closure (Overtaking Lane) – Finishing the Closure

### Lane 1 Closure

To install a lane 1 closure on an overtaking section, a lane 2 closure should be established first without closing out the transition section at the uphill end. A back wall, with cones at 3m centres, should be constructed at the beginning of the overtaking section while the lane 2 closure is still in place. A lead-in taper should be built by removing cones from lane 1 / lane 2 line and placing cones at 3m centres parallel to the back wall. This is done while using a Stop and Go board, along with associated advance warning signage, to provide a working window by stopping traffic approaching the downhill end.

### Downhill Lane Closure

To install a downhill lane closure on an overtaking section, a lane 2 closure should be established first including closing out the transition section at the uphill end. The back wall and facing wall, with cones at 3m centres, are both constructed within the lane 2 closure.



**Figure 2.7.3.7:** Downhill Lane Closure

A lead-in taper should be built by removing cones from the lane 2 / downhill lane line and placing cones at 3m centres parallel to the back wall. (For clarity, this is on the uphill side of the closure). Cones along the facing wall section in lane / downhill should be pulled into the downhill back wall. This is done while using a Stop and Go board (along with associated advance warning signage) to provide a working window by stopping traffic approaching the uphill end. This downhill back wall should be filled up after traffic has been released from within a point of safety.



## Layouts

### Overtaking Lane (Lane 1 Closure)

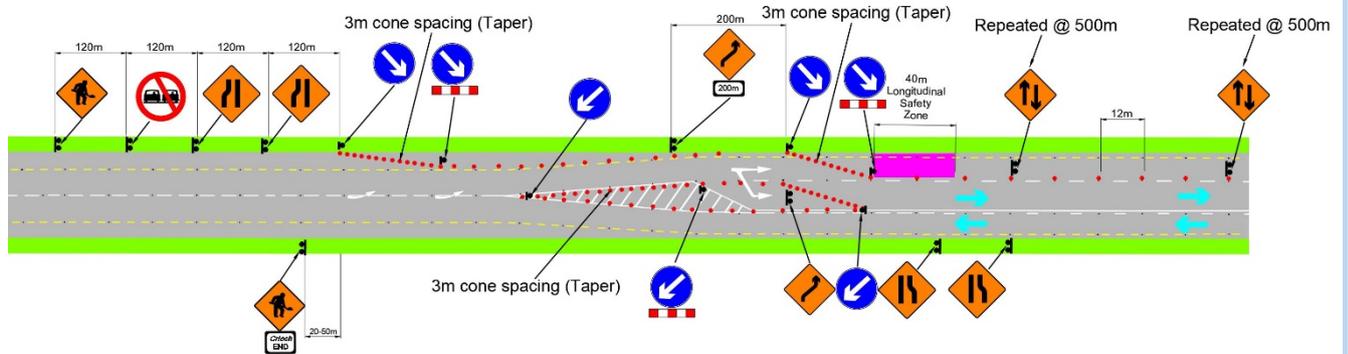


Figure 2.7.3.9: Typical Overtaking Lane Layout (Lane 1 Closure) with works at start

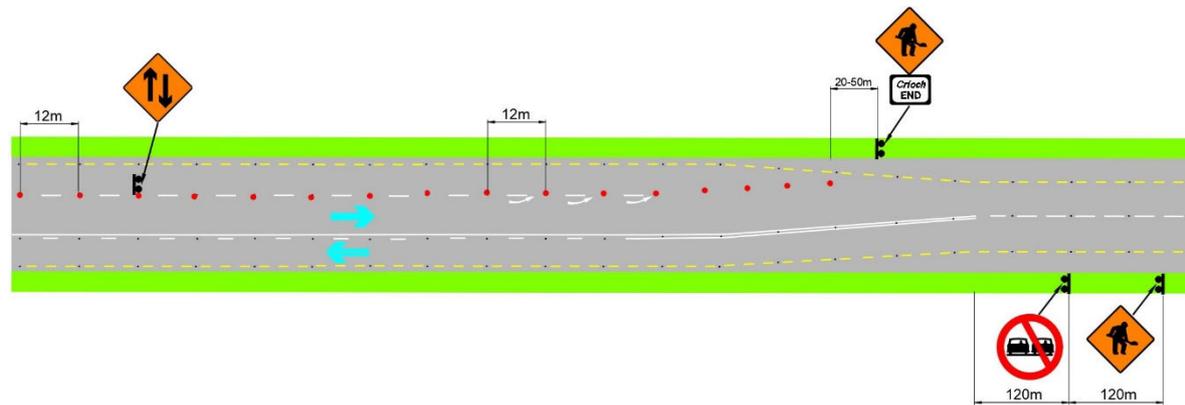


Figure 2.7.3.10: Typical Overtaking Lane Layout (Lane 1 Closure) with works at end

### Overtaking Lane (Lane 2 Closure)

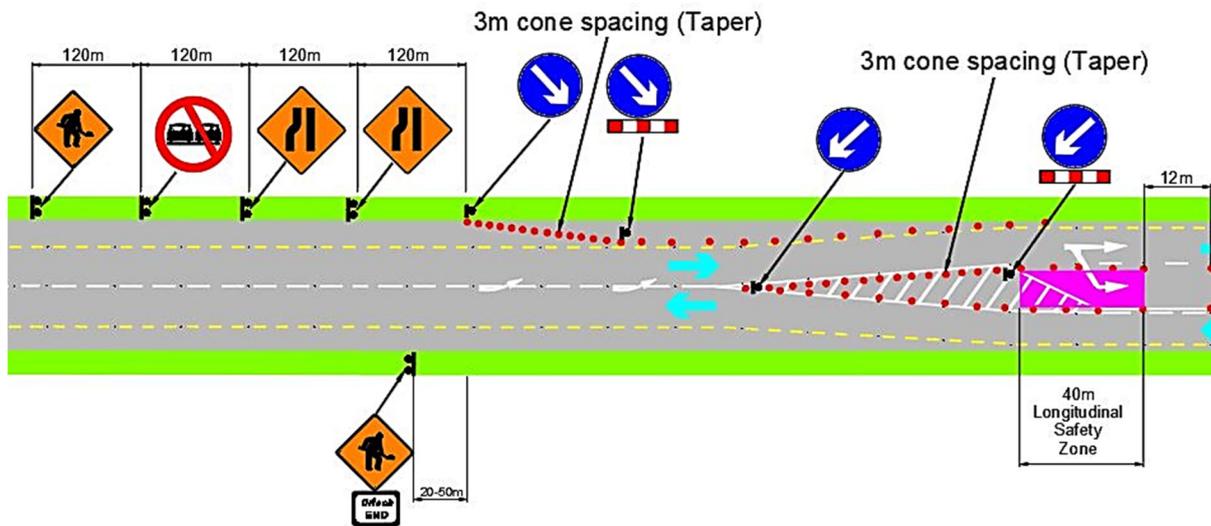


Figure 2.7.3.11: Typical Overtaking Lane Layout (Lane 2 Closure) - start of Overtaking Lane

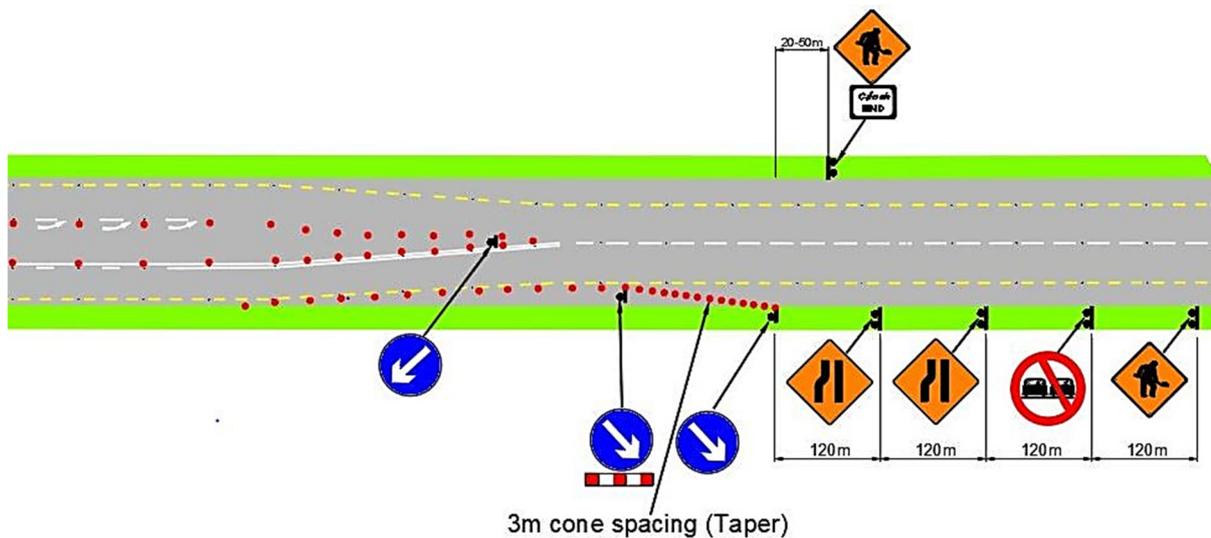


Figure 2.7.3.12: Typical Overtaking Lane Layout (Lane 2 Closure) - start of Overtaking Lane

Overtaking Lane – Opposite Lane Shift

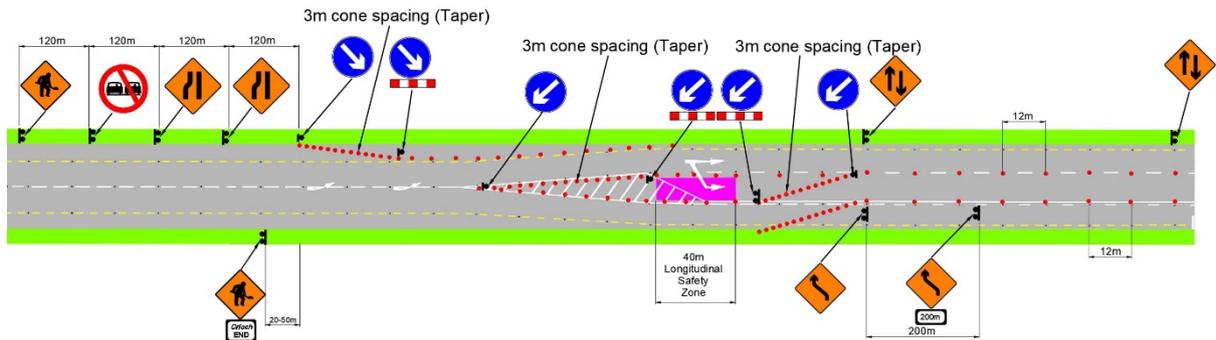


Figure 2.7.3.13: Typical Layout of Overtaking Lane opposite Lane Shift – start of Overtaking Lane

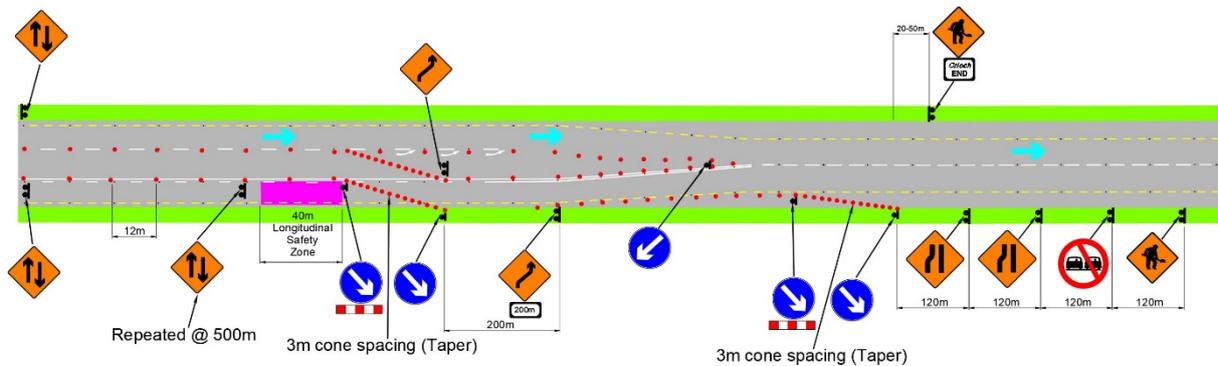


Figure 2.7.3.14: Typical Layout of Overtaking Lane Opposite Lane Shift – end of Overtaking Lane

## **2.8 Specific Operations**

### **2.8.1 Context**

Some operations may be carried by using either a Static or Semi-Static layout depending on the type of works to be undertaken. These include:

- Surface Dressing;
- Road Marking Works;
- Traffic Sign Works; and
- Road Maintenance Works.

These operations have specific characteristics and therefore are included in a separate standalone section with each being described below.

### **2.8.2 Surface Dressing**

#### **General**

Surface dressing operations may be carried out with static or semi-static traffic control or under a road closure. The type of traffic control being determined by the road width, traffic volume and availability of suitable diversion routes. The TTOS should be aware that early trafficking assists in ensuring the success of the surface dressing operation but that the speed of this trafficking needs to be monitored and controlled. Surface dressing requires both an Operational TTMP during the construction phase and an Aftercare TTMP for post works protection of the work.

#### **Signage Installation**

Due to the number of signs required and road lengths involved during surface dressing, they are usually installed on stakes and installation takes place on the day prior to the works so that works can commence promptly each day. WK 061 Flagman Ahead signs should only be installed on the day works commence and should be removed as soon as possible on completion of each section of road.

As tipping operations are likely throughout the works, overhead cable crossings should be signed with a W 111 Overhead Electrical Cables sign on both approaches and a dedicated lines observer used during tipping operations.

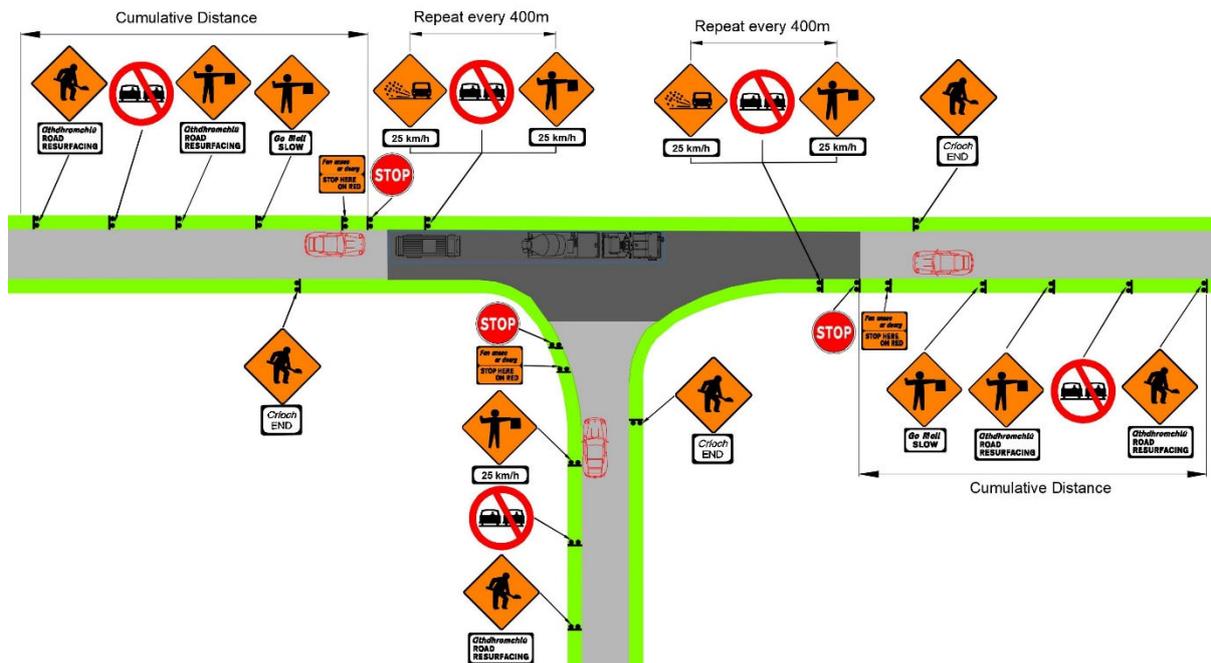
#### **Road Closure**

Where a suitable diversion route is available, a full road closure may be put in place for surface dressing works. Where roads have been closed during the construction phase they should be re-opened to live traffic as soon as practicable to achieve the best quality outcome.

**SSO on Minor Roads (< 5.5m Wide or < 2.5m Unobstructed Road Width)**

Surface dressing may be carried out as an SSO on minor roads. A combination of All Stop, Stop and Go and Convoy working is usually required. In this scenario, the surface dressing train should move continuously along the road, albeit, at a very slow speed with regular stops. Traffic travelling behind the train follows at the same speed as the chipping vehicles and are controlled by the use of Stop and Go discs. Traffic travelling towards the surface dressing train should be held at a convenient passing point such as a layby or a junction. On reaching this point, the surface dressing vehicles should be manoeuvred in order to allow the following traffic to pass and the opposing traffic to clear. A 3m lane width is required at passing points (2.5m for passenger car and light vehicle traffic only). This arrangement should operate along the whole length of the works.

Advisory boards or VMS signs indicating likely delays should be displayed at each end of the works and alternative routes signed if required. As the closure is unofficial, traffic should be allowed to pass if the issue is forced and contingency plans put in place to allow quick removal of the obstruction, particularly if emergency vehicles need to pass.



**Figure 2.8.2.1:** Semi-Static Surface Dressing Operation on road with unobstructed road width < 2.5m

**Static Operation (Unobstructed Road Width >2.5m)**

Where surface dressing operations are carried out with a static lane closure, minimum lane widths for shuttle working of 2.5m for cars and 3m for HGVs as per Part 0 of these guidance documents must be maintained together with a lateral clearance of 1.2m. A Stop and Go operation should be used as the surface dressing train will be longer than 50m.

On many roads, it may not be possible to obtain the required lateral clearance for a static lane closure, and in such cases, convoy traffic control with a convoy speed of 20km/h may be used as a safe method of carrying out the works.

### Surface Dressing Aftercare

Where newly laid surface dressing is exposed to live traffic, a Cautionary Speed plate of 25km/h should apply to protect the quality of the work and ensure loose chips do not present a hazard to road users. Aftercare signage must be installed to replace the works signage. This should include sign WK 073 Loose Chippings with a 25km/h precautionary speed plate and RUS 014 No Overtaking signs or sign WK 072 Slippery Road.

For roads, wider than 5m or where higher speed and traffic volumes are expected, a convoy system may be used to control traffic speed and protect the works following completion. A convoy speed of 25km/h is appropriate, and the flagman and convoy drivers must be in contact with each other by a reliable means of communication. The convoy should continue to operate for a number of hours and in particular until traffic volumes have subsided.

When the combined lane width of single carriageway roads is greater than 7.4m, cones may be placed in the carriageway edge and centreline at 12m apart. In this case, the third advance warning sign should be WK 034 Road Narrows On Both Sides.

There should be regular maintenance of the site during the aftercare phase to ensure that the signage remains intact and in place. Aftercare signage should be removed once the road has been swept.

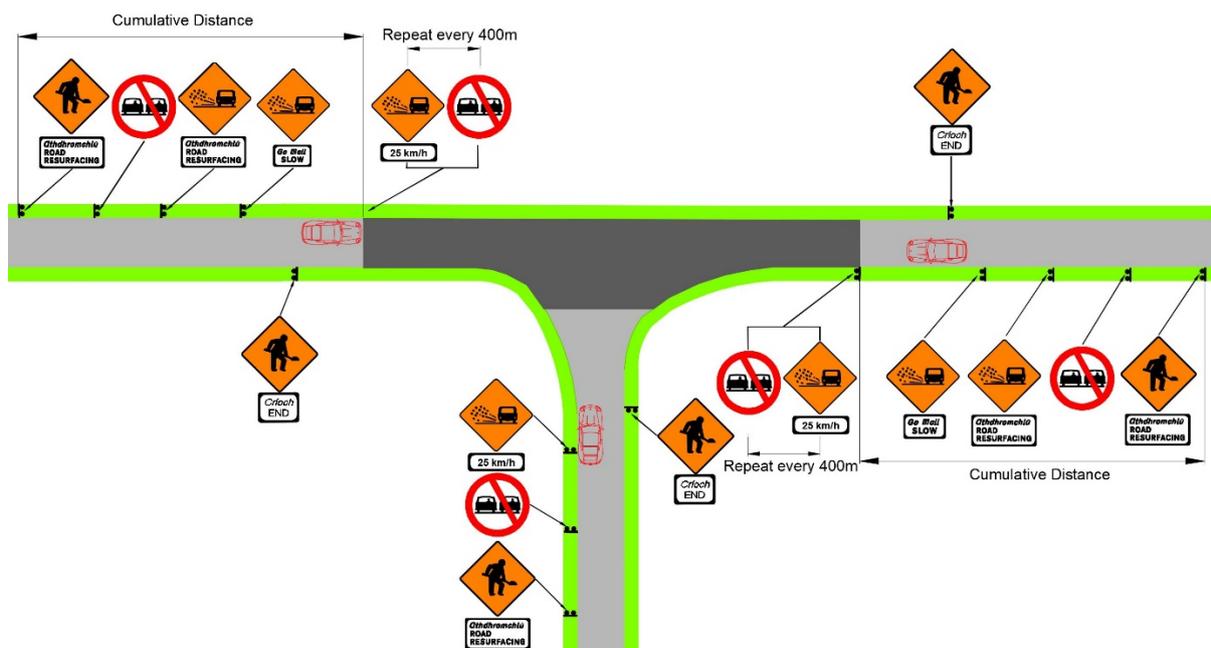


Figure 2.8.2.2: Surface Dressing Aftercare Signage

### 2.8.3 Road Marking Works

#### General

Road marking works are categorised as follows:

Activity	Screed Applied Markings	Stud Fitting / Removal, Longitudinal Markings
<b>Typical Operations</b>	<ul style="list-style-type: none"> <li>- Lane Destination Markings</li> <li>- Arrows</li> <li>- Worded and Diagrammatic Markings</li> <li>- Stop Lines, Yield Lines</li> <li>- Hatched Areas (such as Yellow Boxes, Ghost Islands)</li> </ul>	<ul style="list-style-type: none"> <li>- Installation and Removal of Road Studs</li> <li>- Installation and Removal of Surface Applied Studs</li> <li>- Replacement of Reflective Stud Inserts</li> <li>- Machine Applied Line Marking</li> <li>- Short Duration Screed Operations</li> </ul>

**Table 2.8.3.1:** Road Marking Works Categorisation

Road marking works on Level 2 roads are either Semi-Static (continuously moving) or static.

#### Operations

Sign WK 001 Roadworks Ahead with supplementary plate P 082 showing Road Marking should be erected. When working at junctions, a warning vehicle should be positioned approximately 100m from the junction and should have a WK 001 sign, supplementary plate and a WK 061 Flagman Ahead sign mounted on the rear of the vehicle. Sign RUS 002 Keep Right should be positioned above these signs.

The works vehicle should be positioned in the junction on the approach road, facing oncoming traffic, providing protection for the workers at the junction. Cones should be set out to create a works area around the Stop and Go operatives and workers.

Sign WK 001 with supplementary plate stating Road Marking should be set out on the approach road followed by sign WK 061. When the works have cleared the junction, they can resume a SSO.

When road marking from a hard shoulder, the warning vehicle should have lateral safety zone cantilever boards and on the rear of the vehicle, display sign WK 032 Road Narrows on Left in addition to WK 001 and RUS 002 signs.

A warning vehicle should be used to protect the works vehicle at a junction although this may not be necessary where traffic volumes are low.

The appropriate layout(s) shown in the TII Dashboard Manual may be used by the TTOS.

### Road Marking for Centreline Road Markings and Road Stud Works

There are two options for these works, carried out over a maximum distance of 10km:

1. Semi-Static operation with vehicle mounted signs on traffic control vehicles. The advance signs should be mounted on a yellow backing board with flashing amber beacons. Required visibility to vehicle mounted signs must be as given in Section 2.6.3 for Semi-Static operations. The TTM vehicles must maintain a minimum clear distance of 50m to the works vehicle.
2. If using static signage, then the layout shown in Figure 2.8.3.1 should be used.

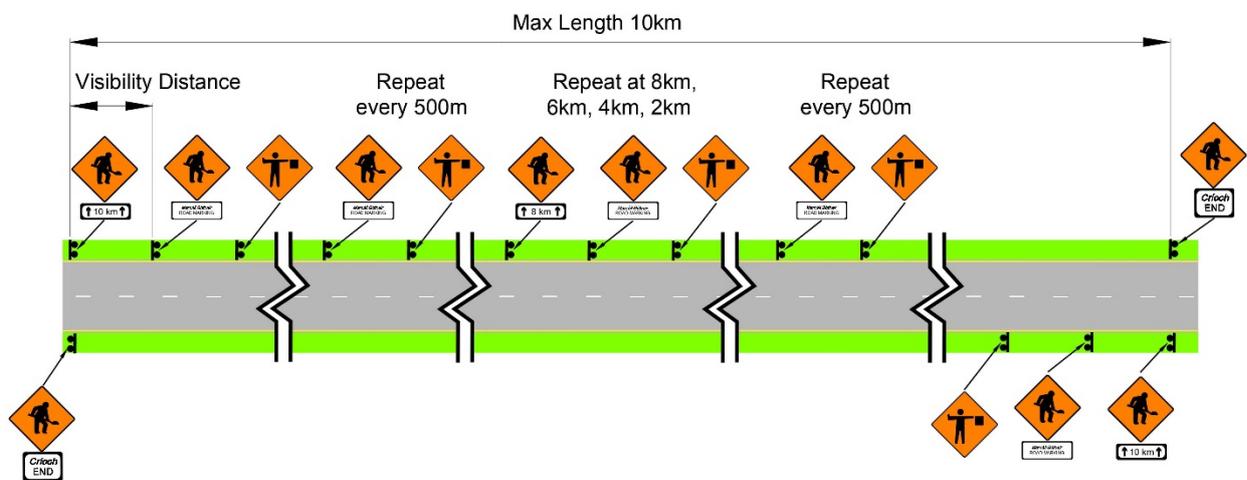


Figure 2.8.3.1: SSO for Road Marking Works for a length of 10km

## 2.8.4 Traffic Sign Works

### General

Traffic sign works are categorised as follows:

Activity	Minor Maintenance (Continuously Moving)	Standard Maintenance / Minor Works	Standard Works
Typical Operations	<ul style="list-style-type: none"> <li>- Pole Caps</li> <li>- Patching</li> <li>- Sign Washing</li> <li>- Hedge Maintenance</li> </ul>	<ul style="list-style-type: none"> <li>- Single Post Installations</li> <li>- Sign Face Replacement</li> <li>- Minor Removals</li> <li>- Hedge Clearance</li> <li>- Landscaping</li> </ul>	<ul style="list-style-type: none"> <li>- Sign Installations</li> <li>- Sign Removals</li> <li>- Tree Clearance</li> </ul>
Duration	< 5 mins	< 30 mins	> 30 mins

Table 2.8.4.1: Traffic Sign Works Categorisation

### Operations

For very short duration (< 5 minutes), a warning vehicle may be positioned at several locations to warn road users and protect the works. Vehicle mounted signs should be used provided visibility requirements are met.

Where the works are likely to take longer than five minutes, advance warning signs should be installed. In addition, three to four cones may be installed at an angle ahead of a hard shoulder closure taper at 25m and 50m. Additional advance warning signs are also required on the approach road. The warning vehicle should be positioned within the hard shoulder closure and should have a WK 001 Roadworks Ahead sign, supplementary plate and a WK 061 Flagman Ahead sign. Sign RUS 002 Keep Right should be positioned above these signs.

On side roads, a flagman is required to control the conflicted movements of traffic. On busy side roads, a 3-way Stop and Go operation may be required to control traffic movements. Where works are being carried out on minor roads with a traffic volume of < 1 veh / 3 min, advance warning signs may be omitted.

A warning vehicle should be used to protect the works vehicle at a junction although this may not be necessary where traffic volumes are low.

The appropriate layout(s) shown in the TII Dashboard Manual may be used by the TTOS.

## 2.8.5 Road Maintenance Works

### Context

Routine maintenance works generally undertaken by Local Authorities include the following:

- Patching; and
- Winter Maintenance.

### Patching

Scheduled roadway patching maintenance can be carried out as an SSO where operatives are not required to work extensively in the carriageway. The use of acceptable technology and innovation that allows patching operations to be carried out from within a works vehicle should be considered and encouraged. Where operatives are required to work extensively in the carriageway or if works at a particular location will be >15 minutes, Static Type B TTM may be required.

### Winter Maintenance

Winter maintenance, such as salting, gritting and ploughing, are mobile operations carried out at close to normal traffic speed. TTM is not required for this operation. Work vehicles should be fit for purpose, suitably conspicuous and fitted with flashing beacons.

## 2.9 Summary

Operations in rural areas (Level 2 roads) have been covered in this part of the guidance documents. This has given a quick and easy reference on how to install, operate, amend and remove the following TTM operations in rural areas:

- Vehicles and Equipment;
- Methodologies;
- Static Operations;
- Traffic Control Methods;
- Semi-Static Operations;
- Wide Single Carriageways, Climbing Lanes and Overtaking Lanes; and
- Specific Operations.

Methods for assessing and applying TTM requirements that are appropriate for rural areas and the nature of the works being undertaken have also been covered.

## **Appendix A – Design Parameter Tables**

**Table 2.1**  
**Minimum Design Parameters for Level 2(i) Roads**  
**(Single Carriageway of 80km/h)**

Design Parameter	Type A > 12 hours	Type B < 12 hours	Type C < 15 mins
<b>Advance Warning Signage</b>			
Sign Size (mm)	600	600	-
Sign Visibility (m)	90	90	90
Number of Signs	4	3	-
Cumulative Distance (m)	480	360	-
Distance between advance warning signs (m)	120	120	-
<b>Taper</b>			
Lane Taper Rate <sup>A</sup>	1 in 40	1 in 40	-
Hard Shoulder Taper Rate <sup>A</sup>			-
<b>Cones</b>			
Cone Height (mm)	750	750	-
Taper Spacing (m) <sup>B</sup>	3	3	-
Longitudinal Spacing (m) <sup>B</sup>	12	12	-
<b>Lamps (unlit areas only)</b>			
Taper Spacing (m)	6	6	-
Longitudinal Spacing (m)	24	24	-
<b>Safety Zones</b>			
Longitudinal (m)	45	45	-
Lateral (m)	1.2	1.2	-
<b>Lanes</b>			
Lane Width (m) <sup>C</sup>	3	3	-

**Notes:**

- A. 45° taper is required at shuttle traffic controlled layouts with cones at 1m centres.
- B. Cone spacing is the maximum permitted. Where geometry or any other site specific reason dictates, the spacing shall be reduced accordingly.
- C. The optimum lane width for all classes of vehicles is 3.3m. This may be reduced to a minimum of 3m. Below this, HGVs and buses must be marshalled past the works. The absolute minimum lane width, if only cars and light vehicles are present, is 2.5m. Refer to Section 0.3.3.2 of Part 0.

**Table 2.2**  
**Minimum Design Parameters for Level 2(ii) Roads**  
**(Single Carriageway of 100km/h)**

Design Parameter	Type A > 12 hours	Type B < 12 hours	Type C < 15 mins
<b>Advance Warning Signage</b>			
Sign Size (mm)	750	750	-
Sign Visibility (m)	120	120	120
Number of Signs	4	3	-
Cumulative Distance (m)	800	600	-
Distance between advance warning signs (m)	200	200	-
<b>Taper</b>			
Lane Taper Rate <sup>A</sup>	1 in 60	1 in 60	-
Hard Shoulder Taper Rate <sup>A</sup>	1 in 30	1 in 30	-
<b>Cones</b>			
Cone Height (mm)	1,000	1,000	-
Taper Spacing (m) <sup>B</sup>	3	3	-
Longitudinal Spacing (m) <sup>B</sup>	12	12	-
<b>Lamps (unlit areas only)</b>			
Taper Spacing (m)	6	6	-
Longitudinal Spacing (m)	24	24	-
<b>Safety Zones</b>			
Longitudinal (m)	60	60	-
Lateral (m)	1.2	1.2	-
<b>Lanes</b>			
Lane Width (m) <sup>C</sup>	3	3	-

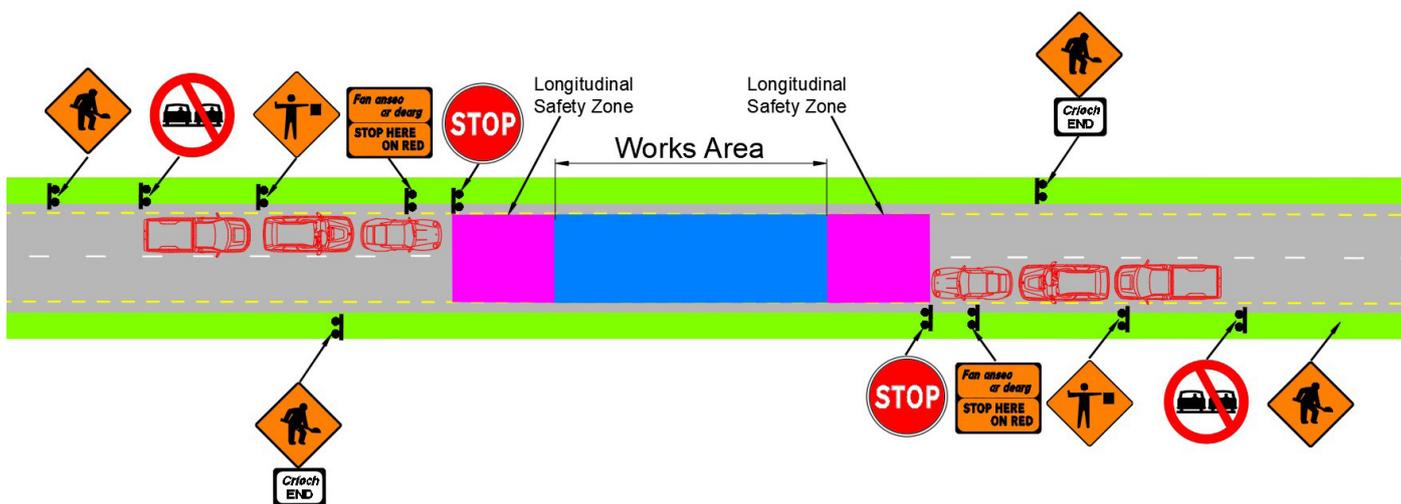
**Notes:**

- A. 45° taper is required at shuttle traffic controlled layouts with cones at 1m centres.
- B. Cone spacing is the maximum permitted. Where geometry or any other site specific reason dictates, the spacing shall be reduced accordingly.
- C. The optimum lane width for all classes of vehicles is 3.3m. This may be reduced to a minimum of 3m. Below this, HGVs and buses must be marshalled past the works. The absolute minimum lane width, if only cars and light vehicles are present, is 2.5m. Refer to Section 0.3.3.2 of Part 0.

## **Appendix B –**

## **Traffic Control Method Information Sheets**

# All Stop



Level	Longitudinal Safety Zone (m)
2(i)	45
2(ii)	60

## General

- This operation is suitable on roads with traffic flows up to 15 vehicles for a 3 minute count.
- Suitable for short duration works that can be quickly and easily suspended.
- In some cases, an All Stop is the only option and is considered to be normal procedure.
- TTM vehicles may be used to stop traffic using an All Stop.
- A Stop and Go procedure can lead to an All Stop.
- An All Stop may also be likely within a road closure.
- Generally an All Stop requires at least two TTM operatives.
- Max site length should be 500m, however, one TTM operative with a double sided Stop board can control a short area of up to 20m in length.

## Installation

1. On arrival on site, park TTM vehicle safely and off the carriageway if possible.
2. The TTOS identifies the works area and carries out a Risk Assessment.
3. Determine safe places to position the Stop and Go Operators.
4. Install the WK 001 Roadworks Ahead signs, which are always the first signs to be installed.
5. The safety zones shall now be measured out after which the position of the advance signs are calculated and TTM equipment laid out on the kerb/verge.
6. The next sign to be installed is the RUS 014 No Overtaking sign.
7. The next signs to be installed are the WK 061 Flagman signs.
8. Install the WK 095 Stop Here on Red sign.
9. Install WK 001 / P 010 Roadworks End Sign 20-50m after the end of the site.
10. Repeat the above sequence of signs for all approaches.
11. TTOS carries out a final check.
12. Inform workforce they may proceed to carry out the works.

## Operation

1. 2-way radios (or other reliable means of communication) must be provided for each of the Stop and Go disc operators and works site supervisor.
2. The lead Stop and Go operator should be assigned to the clear lane.
3. The works site supervisor calls the All Stop. Stop operators only confirm to supervisor that All Stop is in place once Stop is displayed and traffic has come to a halt.
4. Traffic should only be held for 2-3 minutes stop duration. Maximum 10 minutes.
5. The works site supervisor calls-off the All Stop only after ensuring that road is safe to be opened to traffic.

## Removal

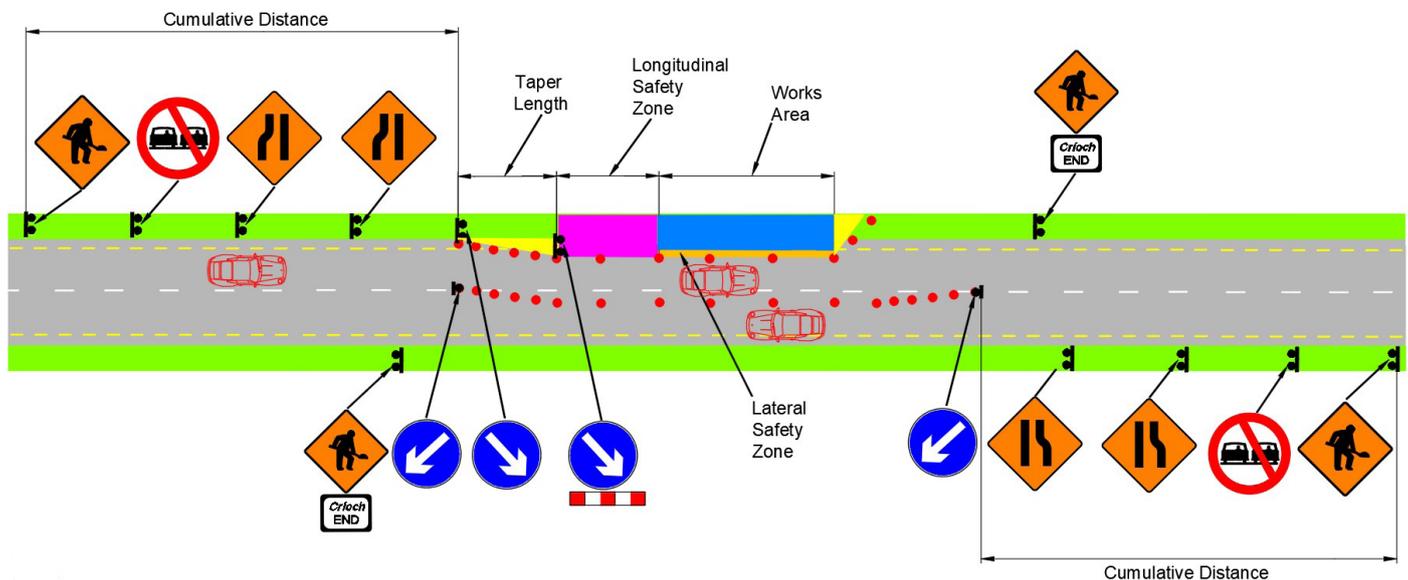
1. Check all works personnel, plant, materials and debris are cleared and site is safe to traffic.
2. Remove and load Advance Warning Signs.
3. The last signs to be removed are the WK 001 Roadworks Ahead signs.
4. Check equipment is loaded securely and safely on TTM vehicle.
5. Make a final check of the site ensuring all items are removed.
6. Do not leave signs in place when no works are being carried out.
7. Leave site.

# Two-Way Traffic Operation



## Introduction

A Two-Way Traffic operation is suitable for **Level 2 roads** with a speed limit up to **100km/h**. Two-way traffic is maintained although their route past the works may be altered. **Drivers** from opposite directions **do not have priority over another. Tapers are as per the table below with cone spacing at 3m**. The 3 minute traffic count prior to proceeding with TTM operations should be **< 45 vehicles**. Traffic volumes are monitored throughout the works.

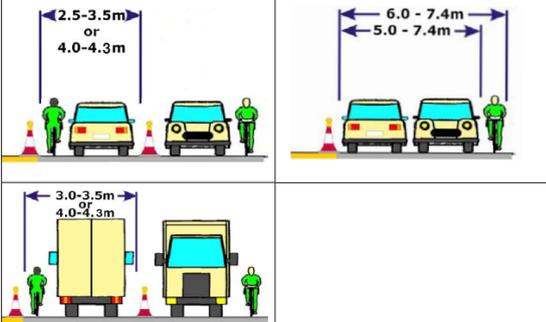


Type	Speed (km/h)	No Adv. Warning Signs	Cumulative Distance (m)	Tapers	Cone Spacing Taper / Cone Runs	Lateral Safety Zone (m)	Longitudinal Safety Zone (m)
Level 2 (i) A	80	4	480	1 in 40	3 / 12	1.2	45
Level 2 (i) B	80	3	360	1 in 40	3 / 12	1.2	45
Level 2 (ii) A	100	4	800	1 in 60 / 1 in 30	3 / 12	1.2	60
Level 2 (ii) B	100	3	600	1 in 60 / 1 in 30	3 / 12	1.2	60



## Lane Widths

	Individual Lane Width (centre-line coning)	2-way (no centre-line coning)
Cars only	≥ 2.5m	
HGVs present	≥ 3.0m	
Preferred width	3.3m	6.0m - 7.4m
Preferred (with cyclists)	4.0 - 4.3m	7.0m - 7.4m

## Installation

1. On arrival on site, park TTM vehicle safely and off the carriageway if possible.
2. The TTOS identifies the works area and carries out a Risk Assessment.
3. Install the WK 001 Roadworks Ahead signs, which are always the first signs to be installed.
4. The safety zones and tapers shall now be measured out after which the position of the advance signs are calculated and TTM equipment laid out on the kerb / verge.
5. The next sign to be installed is the RUS 014 No Overtaking sign.
6. The next signs to be installed are the WK 032 Road Narrows Left / WK 033 Road Narrows Right signs.
7. Install WK 001 / P 010 Roadworks End Sign 20-50m after the end of the site.
8. If a hard shoulder is present, install return to carriageway taper, to move traffic from hard shoulder back onto carriageway, with RUS 002 Keep Right arrow at each end of taper.
9. Install the centreline coning with a RUS 001 Keep Left arrow at each end, only if gap at narrow end >3.0m. Repeat Keep Left arrow at end of facing taper. Use an All Stop if necessary.
10. Repeat the above sequence for all approaches.
11. Place RUS 002 Keep Right arrow on kerb edge or verge at start of the lead in taper, then step out cones and install RUS 002 Keep Right arrow at end of lead in taper.
12. Install cones along safety zone and the length of the required works area.
13. Install exit taper.
14. Install TTM equipment around the works area.
15. TTOS carries out a final check.
16. Inform workforce they may proceed to carry out the works.

## Removal

1. Check all works personnel, plant, materials and debris are cleared and site is safe to traffic.
2. Pull TTM equipment around the works area to the kerb / verge under the protection of the longitudinal cone run and lead in taper.
3. Pull off the exit taper and longitudinal cone run back to the lead in taper.
4. Pull off the lead in taper.
5. Pull off the centreline coning and signs. Use an All Stop if necessary.
6. If a hard shoulder is present, pull off return to carriageway taper.
7. Load TTM equipment onto the TTM vehicle.
8. Remove and load Advance Warning Signs.
9. The last signs to be removed are the WK 001 Roadworks Ahead signs.
10. Check equipment is loaded securely and safely on TTM vehicle.
11. Make a final check of the site ensuring all items are removed.
12. Do not leave signs in place when no works are being carried out.
13. Leave site.

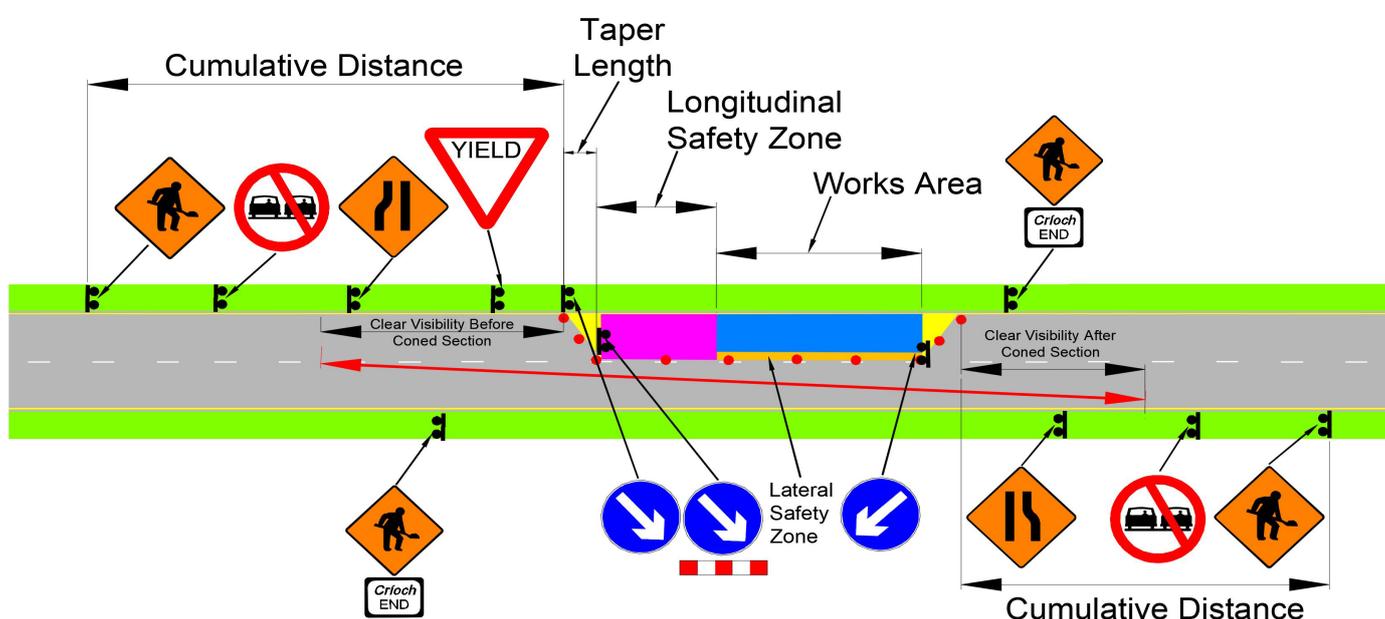


# Priority Static Operation



## Introduction

A priority operation is suitable for **Level 2 roads** with a speed limit up to **100km/h**. It requires drivers to make their own decision when it is safe to pass the works. **Traffic counts** are carried out over **3 minutes** with a maximum of **40 vehicles** permitted in this timeframe including HGVs. Drivers approaching the site should have good visibility of the temporary route through the site. **Tapers are at 45° with cones at 1m centres**. The 3 minute traffic count prior to proceeding with TTM operations should be **< 30 vehicles**.

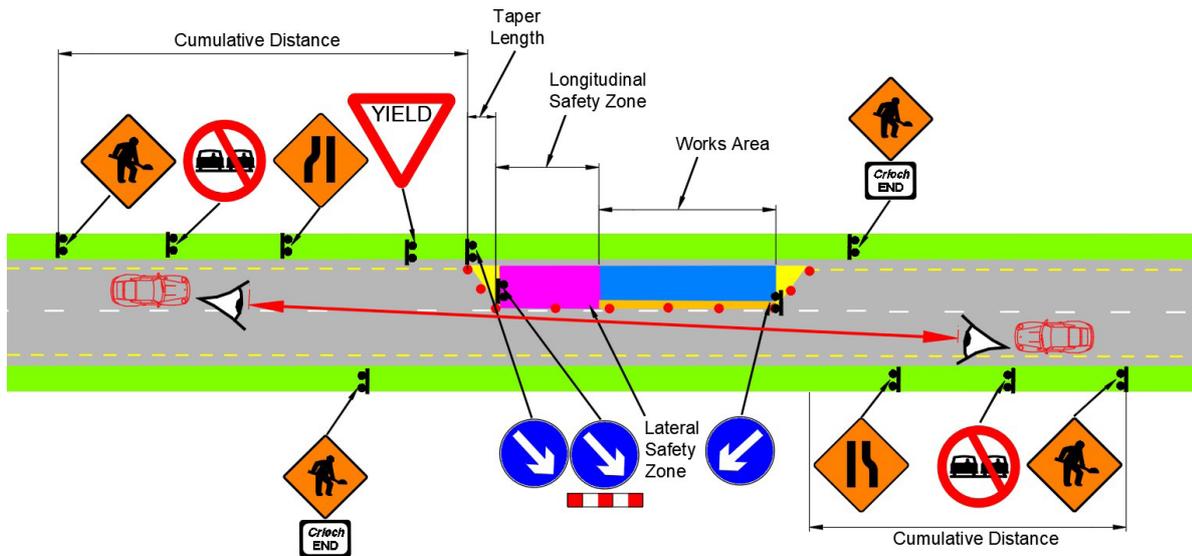


Roadworks Type	Speed (km/h)	No. Adv. Warning Signs	Cumulative Distance (m)	Sign Visibility (m)	Longitudinal Safety Zone (m)	Lateral Safety Zone (m)	Max Cone / Lamp Spacing (m)
Level 2 (i) A	80	4	480	90	45	1.2	12 / 24
Level 2 (i) B	80	3	360	90	45	1.2	12 / 24
Level 2 (ii) A	100	4	800	120	60	1.2	12 / 24
Level 2 (ii) B	100	3	600	120	60	1.2	12 / 24

## Summary Criteria

Speed (km/h)	Coned Area Length	Max Traffic Flow (3 min count)	Clear Visibility Before and After Coned Area (m)
80	80m maximum	40 vehicles	80
100			100

## Priority Visibility



## Lane Widths

Cars only	≥ 2.5m
HGVs present	≥ 3.0m
Preferred width	3.3m
Preferred (with cyclists)	4.0 - 4.3m



## Installation

1. On arrival on site, park TTM vehicle safely and off the carriageway if possible.
2. The TTOS identifies the works area and carries out a Risk Assessment.
3. Install the WK 001 Roadworks Ahead signs, which are always the first signs to be installed.
4. The safety zones and tapers shall now be measured out after which the position of the advance signs are calculated and TTM equipment laid out on the kerb / verge.
5. The next sign to be installed is the RUS 014 No Overtaking signs.
6. The next signs to be installed are the WK 032 Road Narrows Left / WK 033 Road Narrows Right signs.
7. Install the RUS 026 Yield Sign on the approach side where the works are located only.
8. Install WK 001 / P 010 Roadworks End Sign 20-50m after the end of the site.
9. Repeat the above sequence for the opposite direction. Do not repeat the installation of the Yield Sign.
10. Place RUS 002 Keep Right arrow on kerb edge or verge at start of the lead in taper, then step out cones and install RUS 002 Keep Right arrow at end of lead in taper.
11. Install cones along safety zone and the length of the required works area.

12. Install exit taper.
13. Install TTM equipment around the works area.
14. TTOS carries out a final check.
15. Inform workforce they may proceed to carry out the works.

## Removal

1. Check all works personnel, plant, materials and debris are cleared and site is safe to traffic.
2. Pull TTM equipment around the works area to the kerb / verge under the protection of the longitudinal cone run and lead in taper.
3. Pull off the exit taper and longitudinal cone run back to the lead in taper.
4. Pull off the lead in taper and open carriageway to traffic.
5. Load TTM equipment onto the TTM vehicle.
6. Remove and load Advance Warning Signs.
7. The last signs to be removed are the WK 001 Roadworks Ahead signs.
8. Check equipment is loaded securely and safely on TTM vehicle.
9. Make a final check of the site ensuring all items are removed.
10. Do not leave signs in place when no works are being carried out.
11. Leave site.

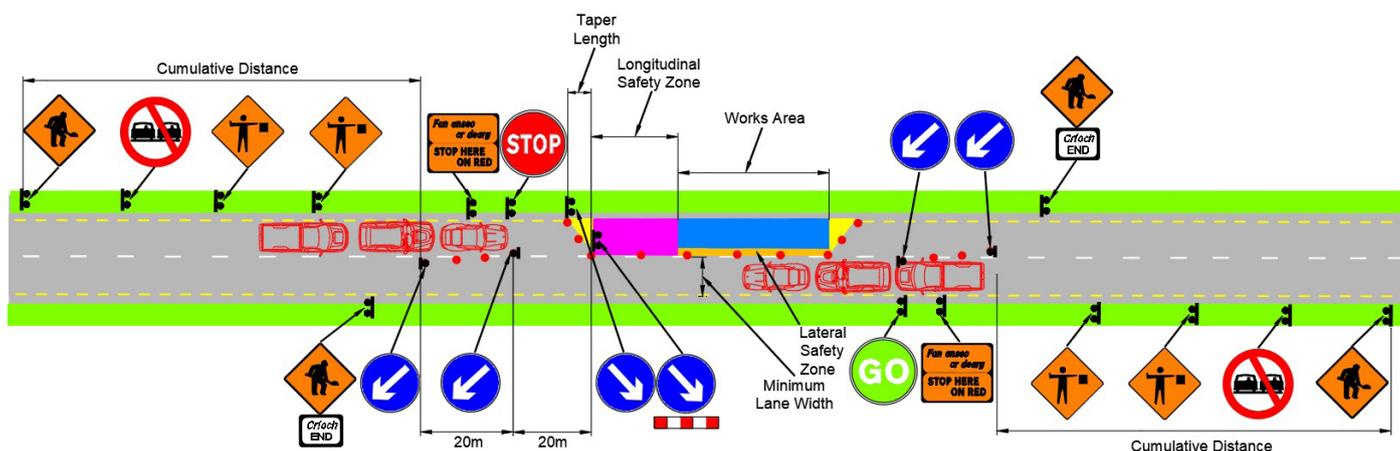


# Stop and Go Operation



## Introduction

A Stop and Go operation is suitable for **Level 2 roads** with a speed limit up to **100km/h**. The maximum site length should be 500m. The TTOS should ensure that the Gardai have been notified in advance of the operation. It is regulated by TTM operatives. The works site should be limited to a maximum length of 500m. A **single TTM operator** can be used for works **up to 200m** provided **two automatic signs** are used for lengths **in excess of 100m**. Automated Stop and Go discs are useful for works where only a single TTM operator is available. **Tapers are at 45° with cones at 1m centres**. The 3 minute traffic count prior to proceeding with TTM operations should be **<30 vehicles**. Traffic volumes are monitored throughout the works.



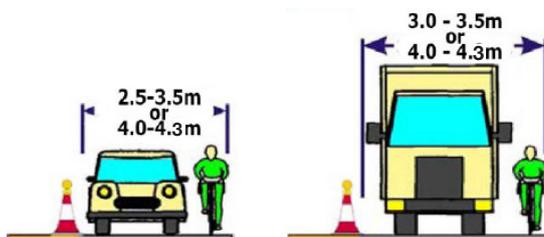
Roadworks Type	Speed (km/h)	No. Signs	Cumulative Distance (m)	Sign Visibility (m)	Longitudinal Safety Zone (m)	Lateral Safety Zone (m)	Max Cone / Lamp Spacing (m)
Level 2 (i) A	80	4	480	90	45	1.2	12 / 24
Level 2 (i) B	80	3	360	90	45	1.2	12 / 24
Level 2 (ii) A	100	4	800	120	60	1.2	12 / 24
Level 2 (ii) B	100	3	600	120	60	1.2	12 / 24

## Summary Criteria

Shuttle Length	Maximum Traffic / 3 mins	Notes
500m	45	Shall be 2 operators, 2 discs when $\geq 200\text{m}$
400m	50	
300m	55	
200m	60	May be 1 operator with remote discs. Operator must be $\leq 100\text{m}$ from each disc and have clear view of each
100m	70	
20m	25	May be 1 operator, 1 disc

## Lane Widths

Cars only	$\geq 2.5\text{m}$
HGVs present	$\geq 3.0\text{m}$
Preferred width	3.3m
Preferred (with cyclists)	4.0 - 4.3m



## Installation

1. On arrival on site, park TTM vehicle safely and off the carriageway if possible.
2. The TTOS identifies the works area and carries out a Risk Assessment.
3. Determine safe places to position the Stop and Go Operators.
4. Install the WK 001 Roadworks Ahead signs, which are always the first signs to be installed.
5. The safety zones and tapers shall now be measured out after which the position of the advance signs are calculated and TTM equipment laid out on the kerb / verge.
6. The next sign to be installed is the RUS 014 No Overtaking sign.
7. The next signs to be installed are the WK 061 Flagman signs.
8. Install the WK 095 Stop Here on Red sign.
9. Install WK 001 / P 010 Roadworks End Sign 20-50m after the end of the site.
10. Install the centre-line coning with a RUS 001 Keep Left arrow at each end, only if gap at narrow end  $>3.0\text{m}$ . Use an All Stop if necessary.
11. Repeat the above sequence for all approaches.
12. Place RUS 002 Keep Right arrow on kerb edge or verge at start of the lead in taper, then step out cones and install RUS 002 Keep Right arrow at end of lead in taper.
13. Install cones along safety zone and the length of the required works area.
14. Install exit taper.
15. Install TTM equipment around the works area.
16. TTOS carries out a final check.
17. Inform workforce they may proceed to carry out the works.

## Operation

1. 2-way radios (or other reliable means of communication) must be provided where there is more than 1 operator.
2. The lead Stop and Go operator should be assigned to the clear lane.
3. Stop is always shown to approaching traffic until it comes to a halt. Once the vehicle stops, it is then allowed through using Go.

## Removal

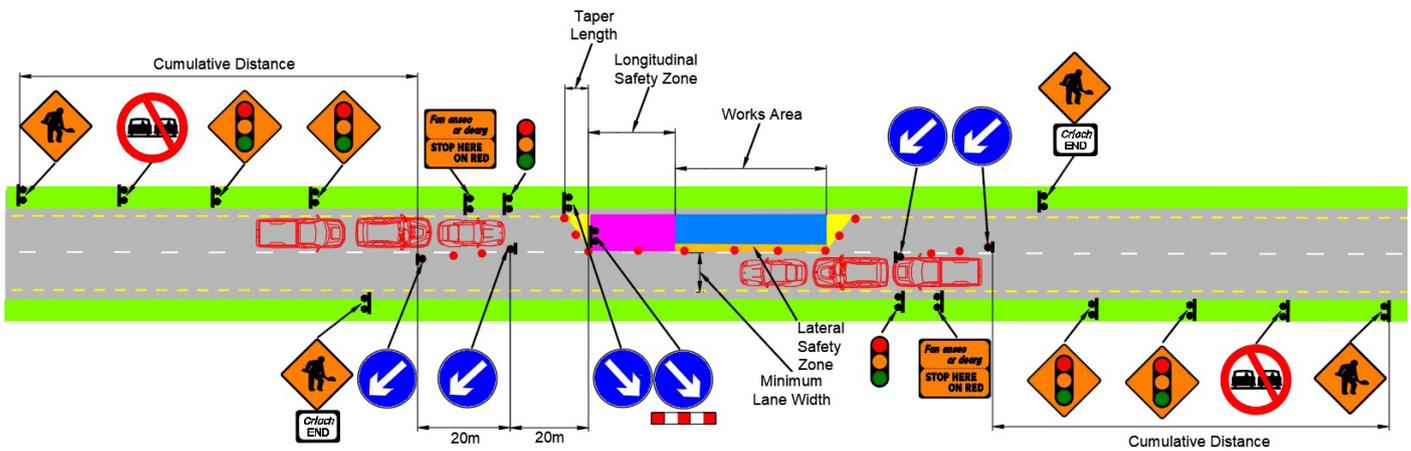
1. Check all works personnel, plant, materials and debris are cleared and site is safe to traffic.
2. Pull TTM equipment around the works area to the kerb / verge under the protection of the longitudinal cone run and lead in taper.
3. Pull off the exit taper and longitudinal cone run back to the lead in taper.
4. Pull off the lead in taper and open carriageway to traffic.
5. Pull off the centre-line coning and signs.
6. Load TTM equipment onto the TTM vehicle.
7. Remove and load Advance Warning Signs.
8. The last signs to be removed are the WK 001 Roadworks Ahead signs.
9. Check equipment is loaded securely and safely on TTM vehicle.
10. Make a final check of the site ensuring all items are removed.
11. Do not leave signs in place when no works are being carried out.
12. Leave site.

# Temporary Traffic Signals Operation



## Introduction

A Temporary Traffic Signals operation is suitable for **Level 2 roads** with a speed limit up to **100km/h**. The TTOS should ensure that the Gardaí have been notified in advance of the operation. TTM operatives either **manually operate, pre-programme** or set the traffic signals to **vehicle actuated** mode. Vehicle activated mode is preferred. **Tapers are at 45° with cones at 1m centres**. The 3 minute traffic count prior to proceeding with TTM operations should be **< 30 vehicles**. Traffic volumes are monitored throughout the works.



Roadworks Type	Speed (km/h)	No. Adv. Warning Signs	Cumulative Distance (m)	Sign Visibility (m)	Longitudinal Safety Zone (m)	Lateral Safety Zone (m)	Max Cone / Lamp Spacing (m)
Level 2 (i) A	80	4	480	90	45	1.2	12 / 24
Level 2 (i) B	80	3	360	90	45	1.2	12 / 24
Level 2 (ii) A	100	4	800	120	60	1.2	12 / 24
Level 2 (ii) B	100	3	600	120	60	1.2	12 / 24

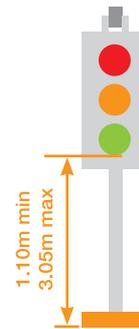
## Signal Checks

- Batteries
- Bulb / LEDs operating
- Signals communicating with each other
- Housing is in good condition

## Signal Sequence

- Red - time is set by Operative
- Green - time is set by Operative
- Amber - 3 seconds

## Signal Heights

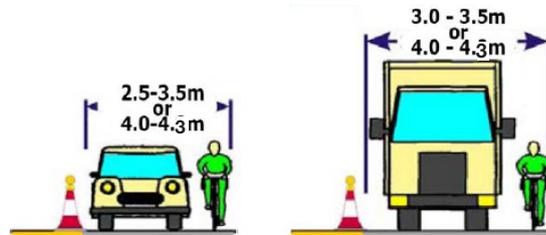


## Summary Criteria

Max Speed Limit (km/h)	Max Coned Area Length (m)	Max Traffic Flow
60	500	No Restrictions

## Lane Widths

Cars only	≥ 2.5m
HGVs present	≥ 3.0m
Preferred width	3.3m
Preferred (with cyclists)	4.0 - 4.3m



## Installation

1. On arrival on site, park TTM vehicle safely and off the carriageway if possible.
2. The TTOS identifies the works area and carries out a Risk Assessment.
3. Install the WK 001 Roadworks Ahead signs, which are always the first signs to be installed.
4. The safety zones and tapers shall now be measured out after which the position of the advance signs are calculated and TTM equipment laid out on the kerb / verge.
5. The next sign to be installed is the RUS 014 No Overtaking sign.
6. The next signs to be installed are the WK 060 Temporary Traffic Signals signs.
7. Install the WK 095 Stop Here on Red sign.
8. Install WK 001/P 010 Roadworks End Sign 20-50m after the end of the site.
9. Install the centre-line coning with a RUS 001 Keep Left arrow at each end, only if gap at narrow end >3.0m. Use an All Stop if necessary.
10. Repeat the above sequence for all approaches.
11. Set all signals to red.
12. Set the sequence running and observe for 3 cycles to ensure operating correctly.
13. Place RUS 002 Keep Right arrow on kerb edge or verge at start of the lead in taper, then step out cones and install RUS 002 Keep Right arrow at end of lead in taper.
14. Install cones along safety zone and the length of the required works area.

15. Install exit taper.
16. Install TTM equipment around the works area.
17. TTOS carries out a final check.
18. Inform workforce they may proceed to carry out the works.

## Removal

1. Check all works personnel, plant, materials and debris are cleared and site is safe to traffic.
2. Pull TTM equipment around the works area to the kerb/verge under the protection of the longitudinal cone run and lead in taper.
3. Pull off the exit taper and longitudinal cone run back to the lead in taper.
4. Pull off the lead in taper.
5. Turn in / off temporary traffic signals and open carriageway to traffic.
6. Pull off the centre-line coning and signs. Use an All Stop if necessary.
7. Load TTM equipment onto the TTM vehicle.
8. Remove and load Advance Warning signs.
9. The last signs to be removed are the WK 001 Roadworks Ahead signs.
10. Check equipment is loaded securely and safely on TTM vehicle.
11. Make a final check of the site ensuring all items are removed.
12. Do not leave signs in place when no works are being carried out.
13. Leave site.

# Rural Single (Level 2 Roads) Convoy Operation

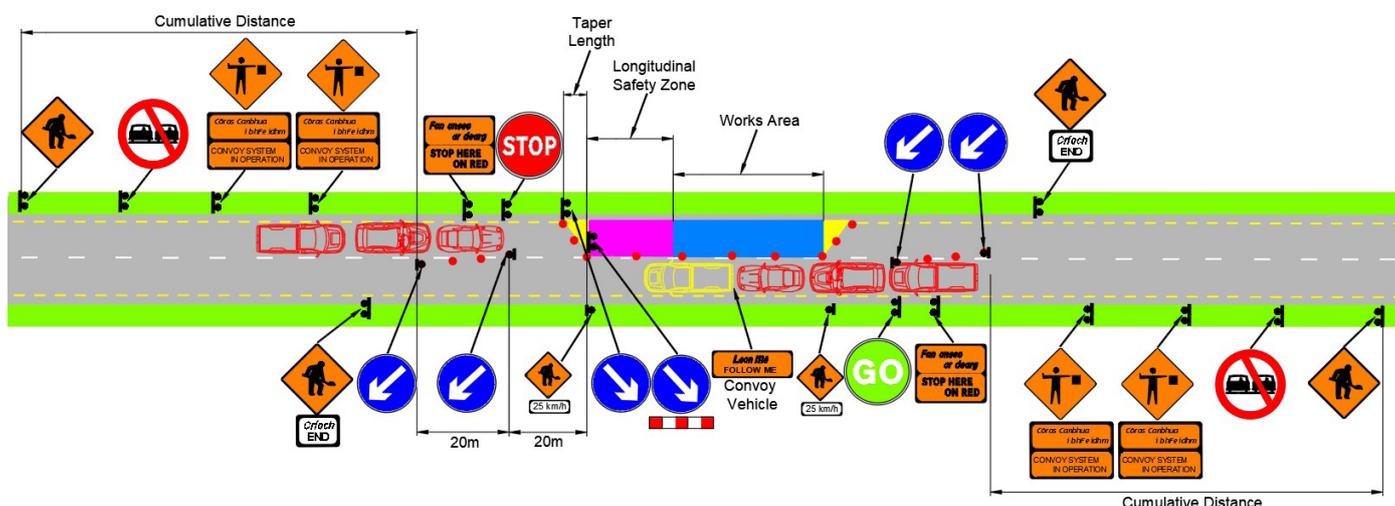


## Introduction

A **Convoy** operation is suitable for **Level 2 roads** with a speed limit of up to **100km/h**. It is operated under either a Stop and Go or a temporary traffic signal system and is **regulated by TTM operatives**. **Guidance** for a Convoy Operation as is **determined by queue length and waiting time**. The **allowable two-way traffic flow** on a single lane carriageway is usually between **45 and 50 vehicles per 3 minutes**. The main **benefit** of using a Convoy operation is that it **removes the requirement for a lateral safety zone**. Where there is little or no available safety zone, traffic speeds past the works must be reduced to **20km/h** and an agreed safe method of working imposed on the site.

Convoy vehicle drivers should maintain the required speed throughout the convoy operation and ensure that the last vehicle in the convoy is kept under control until it passes the works area.

A convoy operation may also be used to protect surface dressing. In this scenario, traffic speeds should be reduced to **25km/h** to protect the quality of work and ensure loose chippings do not present a hazard to road users.



## Installation Considerations

The road user should be informed by the use of a Convoy System In Operation sign and a Follow Me Vehicle sign.

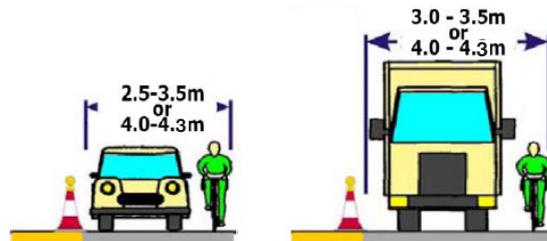


## Summary Criteria

Max Queue Length under Convoy	Max Waiting Time between Convoys	Max Length of Convoy Shuttle
30 vehicles	5 minutes	500m

## Lane Widths

Cars only	≥ 2.5m
HGVs present	≥ 3.0m
Preferred width	3.3m
Preferred (with cyclists)	4.0 - 4.3m



## Convoy Vehicles

1. Vehicles should have four wheels, have a tight turning circle and be capable of driving at up to 20km/h for long periods.
2. Vehicles must have appropriate signage on the rear of the vehicle. Signage must be a WK 090 Follow Me.
3. Vehicles must be roadworthy, have good all round visibility, be of a conspicuous colour, either yellow or white, be fitted with a reflective stripe along the side and rear of the vehicle, be fitted with beacons that can be seen through 360°.
4. Vehicles should be kept clean so that the colour and reflectivity of stripes are not affected.

## Queue Management

1. Queues should only be released when the last vehicle is past the works and the convoy vehicle is at the head of the queue.
2. Adequate space must be provided to facilitate the convoy vehicles turning around and getting to the head of the queue.
3. If the queue length or waiting time goes beyond the limits set out above, then the system should be withdrawn and the lateral safety zone reinstated immediately.
4. Traffic congestion should be relieved using the traffic control system in place without restricting the road user's speed through the site.
5. Removal of the 25km/h cautionary speed during normal traffic hours may be impractical if it is envisaged that the withdrawal will be for a short time only.

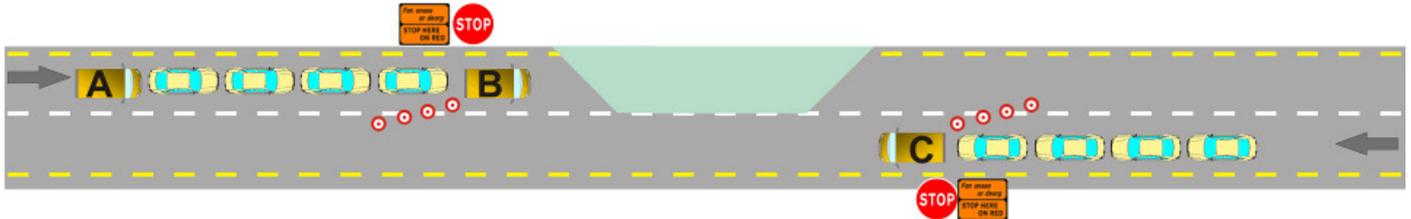
## Installation and Removal of Convoy System

Installation and removal of a Convoy Operation is as per a Stop and Go operation.

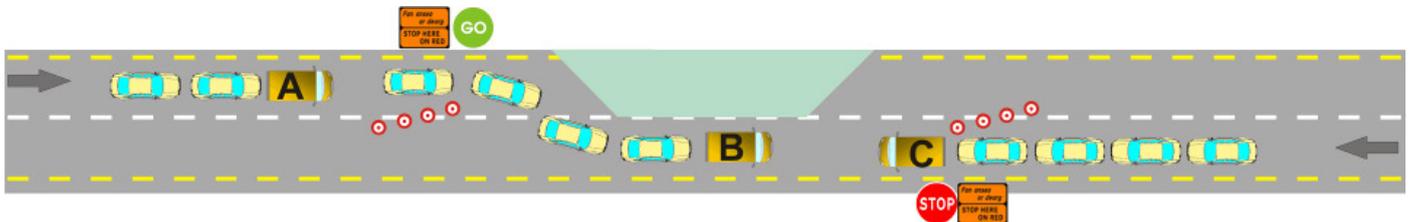
# Sequence for 3 Vehicle Operation



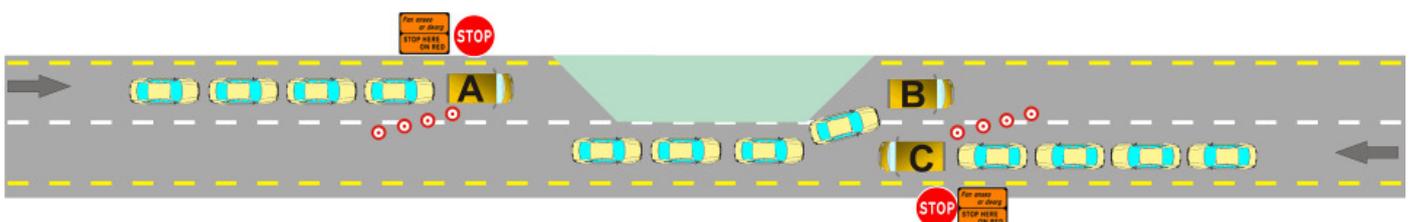
1. Both signs on stop. Convoy vehicles move into position.



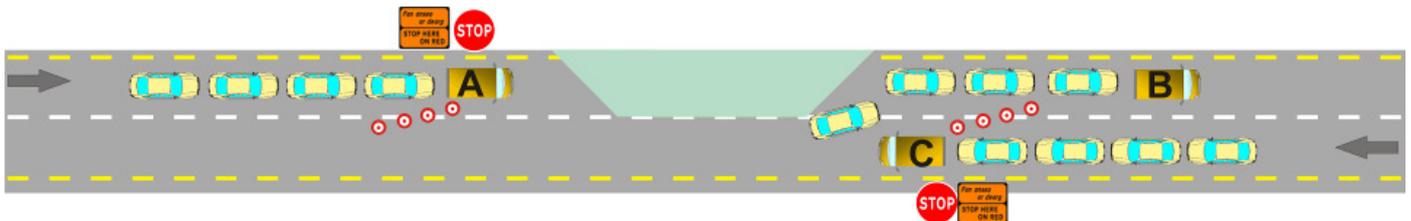
2. Sign turns to Go. Convoy Vehicle B leads traffic past works.



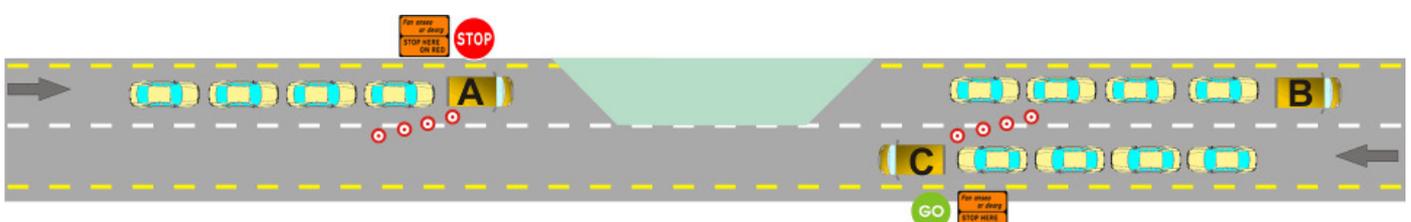
3. Sign turns back to Stop as Convoy Vehicle A reaches it. Convoy Vehicle A Stops.



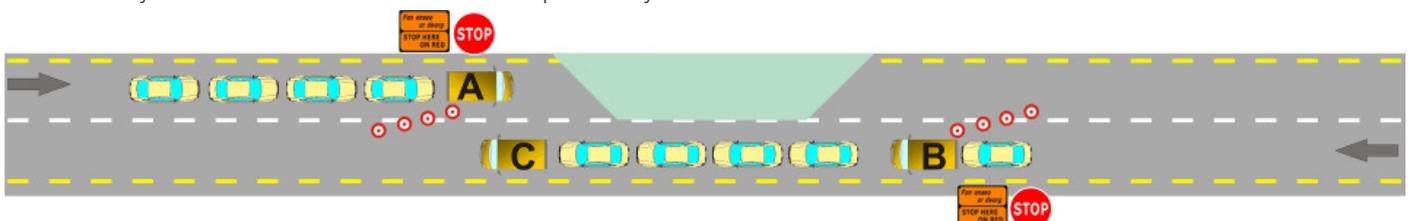
4. Convoy Vehicle B continues to lead until queue fully clear of works area.



5. Once last vehicle through sign turned to Go and Convoy Vehicle C now leads queue through works. Convoy Vehicle B turns around and joins end of queue.



6. Convoy Vehicle C continues to lead until queue fully clear of works area.



Rural Single (Level 2 Roads)

# Marshalling Operation



## Introduction

A marshal is responsible for adjusting the longitudinal cone run to allow the passage of **HGV traffic** on a roadway with narrow lane widths between 2.5 and 3m. This operation **allows the remaining roadway width to be reduced to 2.5m while facilitating HGV traffic**. The works operation should be suspended while there is no lateral safety zone, and should only recommence when the lateral safety zone is reinstated. This traffic control method is done in conjunction with another control method such as Stop and Go or traffic signals.

### Phase 1

Normal Stop and Go, roadway width is reduced to 2.5m while facilitating HGV traffic. Note that there is a third operative.

### Phase 2

A HGV / bus arrives, Stop and Go is put to All-Stop. Note that the longitudinal run of cones is moved only under an All-Stop.

### Phase 3

Third operative relocates the longitudinal run of cones to increase roadway width from 2.5 to 3m. This is to facilitate enough room for the wide vehicle to pass.

### Phase 4

Longitudinal run of cones is fully moved.

### Phase 5

Wide vehicle passes through roadworks site.

### Phase 6

Third operative relocates the longitudinal run of cones to decrease roadway width from 3m to 2.5m.

### Phase 7

Normal Stop and Go, roadway width is reduced to 2.5m while facilitating HGV traffic.

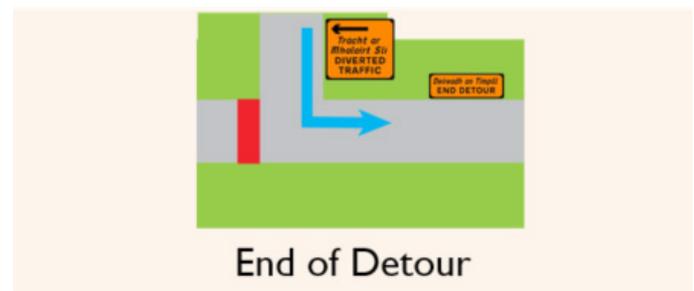
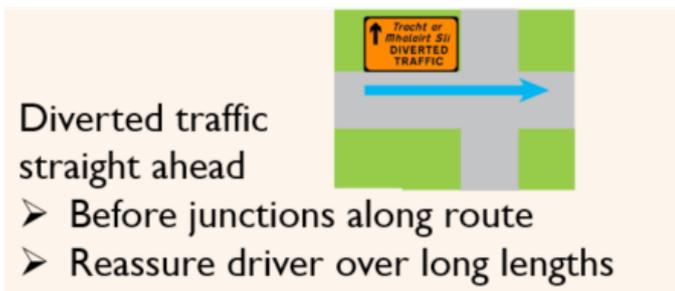
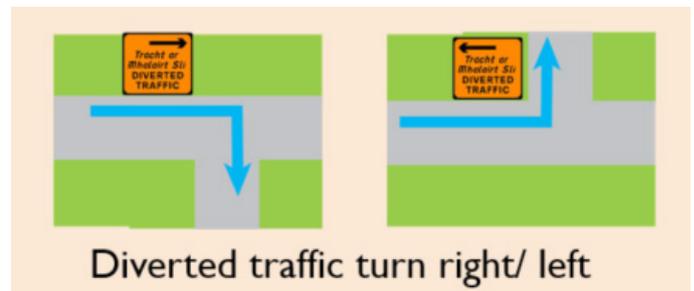
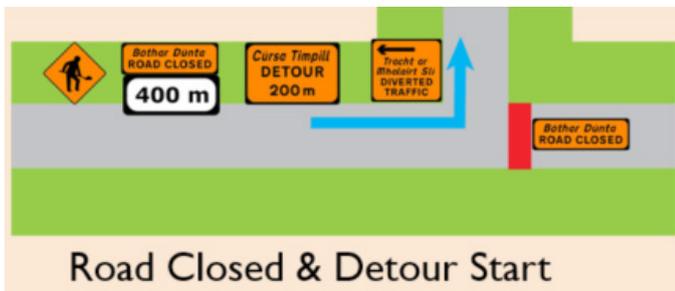


# Road Closures and Detours



## Introduction

The road closure process is set out in **Section 75 of the Roads Act (1993)** which must be followed before a road closure will be granted by a Local Authority. Road closures require a **site specific plan** to detail the closure points and the diversion routes to be followed. It is common to **install** a major road closure **overnight during low traffic volumes**. Diversion routes should be **correctly sign posted** to direct road users around the closure point to their destination. The **diversion route** should be **capable of accommodating the types and volumes of traffic** diverted from the primary route. Prior to implementation, drive the diversion route to ensure it is properly signed.



## Permanent Road Signs

When permanent road signage conflicts with TTM signage, Local Authority approval must be obtained.

There are three ways to deal with a conflicting sign:

- Removal;
- Cover it (tape and typically black bin liners) ensuring not to damage the sign face; and
- Mask it (using masking spray).

Upon removing the TTM, all signs that have been covered or removed should be reinstated immediately ensuring that they are not damaged in the process.

## Road Closure Installation

When all the signs on the diversions have been erected, the TTOS should carry out a Risk Assessment.

He should then instruct TTM operatives to implement the road closure.

This is usually done by placing cones or barriers across the carriageway.

Additional control measures may be required, such as additional signage, speed triggered VMS, buffer zones and narrowing of approach lanes.

A TTM operative may be required at the closure point to enforce the closure, regulate local access and direct road users onto the diversion route.

This is particularly important during the early days of the road closure when road users are not familiar with the set up.

## Long Diversion Routes

WK 091 straight ahead variant should be repeated at intervals to reassure road users that they are still on the correct route.

## End of Diversion Routes

WK 092 End Detour sign should be used to notify road users that they are back on their original route.

## Managing Incursions

An incursion is an unauthorised entry into TTM by a member of the public.

There are four main reasons why an incursion may occur:

- Follow-ins behind authorised vehicles;
- Breaches / violations of carriageway closures;
- Road users who are lost and seeking directions; and
- Emergency vehicles seeking to bypass congestion.

To avoid incursions, the road should be physically blocked by TTM equipment and / or TTM vehicles. These blocks should be maintained for the duration of the works.



## **Appendix C – Site Specific Record for TTMP**



## Appendix D – Temporary Traffic Signals

### a) Vehicle Actuated Modes

- All Red - Holds Traffic;
- Manual - Remote Controlled All Stop;
- Vehicle Actuated - Normal Operation;
- Flashing - Continuous Flashing Amber; and
- Fixed Time - Timed Operation.

### b) Configuration Tables

#### All Red Time

The all red time is the time used to clear the shuttle.

- In basic signal models, this dial may display distances, in which case you select the appropriate distance;
- If the site is on a steep gradient, increase the All Red Time on the uphill direction by 5 seconds; and
- If there is a significant number of slow moving vehicles, increase All Red Time in both directions by 5 seconds.

Length (m)	All Red (s)
50	5
100	10
150	20
200	25
250	30
300	35
350	40
400	50
450	55
500	60

### Maximum Green Time

In basic signals models, this dial may display distances, in which case you select the appropriate distance.

Length (m)	Maximum Green (s)
50	35
100	40
150	40
200	40
250	45
300	45
350	50
400	50
450	55
500	55

### Adjusting Green Time for traffic volumes

- Set up the signals with timings already described;
- For next 3 cycles, separately count the vehicles waiting at each signal when the light changes from red to green; for example:
  - Signal 1:  $7 + 9 + 8 = 24$
  - Signal 2:  $12 + 9 + 13 = 34$
- Use the following chart to set the correct green timing.

