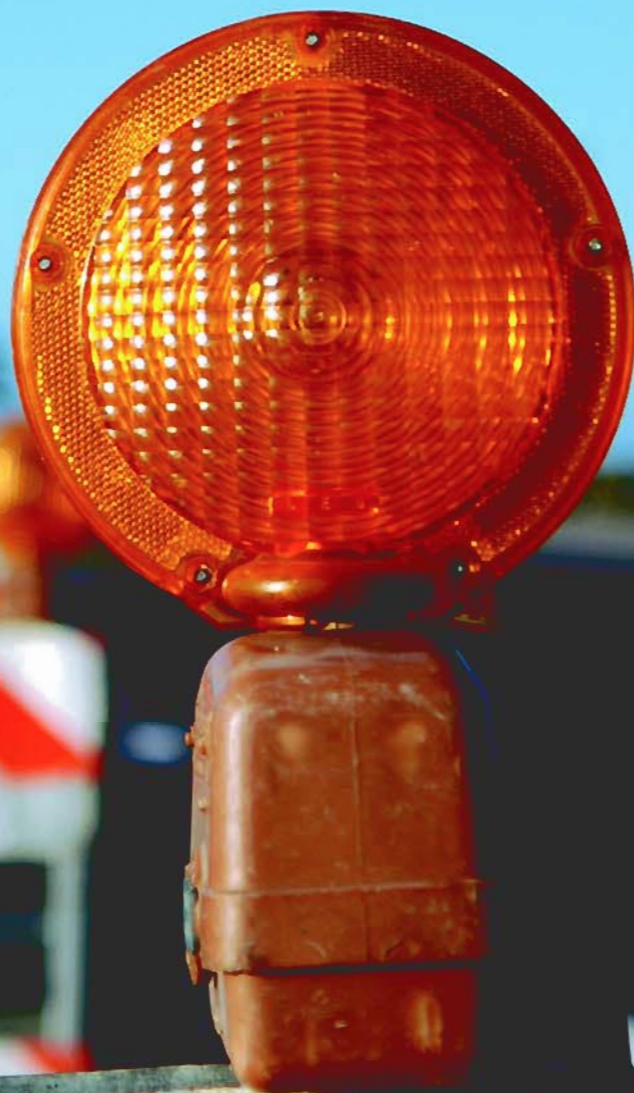


Guidance for the Control and Management of Traffic at Road Works

A design guidance document for temporary traffic management at road works on single carriageway roads

SECOND EDITION
2010



Department of Transport
An Roinn Iompair



HEALTH AND SAFETY
AUTHORITY

NRA
An tUdarás um Bóithre Náisiónta
National Roads Authority



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1. Introduction

1.1 Foreword

This publication is a revised edition of the 'Guidance for the Control and Management of Traffic at Roadworks' and it replaces the original version issued in October 2007. The revision was undertaken by representatives from Local Authorities, the National Roads Authority, the Department of Transport, the Health and Safety Authority and the Local Government Management Services Board.

Revisions were carried out in consultation with a wide range of stakeholders including Local Authorities, utility companies, the Construction Industry Federation, An Garda Síochána, the Road Safety Authority, the National Disability Authority and engineering bodies. The revision has considered Chapter 8 of the Traffic Signs Manual issued by the Department of Transport in December 2008 and other relevant developments since October 2007 including:

- the Safety, Health and Welfare at Work (Construction) (Amendment) Regulations 2008 (S.I. No. 130 of 2008);
- the publication of 'Guidelines for Working on Roads' issued by the Health and Safety Authority in December 2008;
- requests for further guidance on the application of temporary traffic management arrangements in urban areas;
- feedback received from key stakeholders during the consultation process;
- case law in relation to temporary traffic management; and
- research on road surfacing materials.

This publication is intended to provide guidance to Local Authorities and other organisations involved in designing temporary traffic management arrangements. It has been endorsed by the National Roads Authority, the Department of Transport and the Local Government Management Services Board. The Local Government Management Services Board wishes to acknowledge the significant contributions of those who participated directly in this revision and the consultation process.

1.2 Objectives for Guidance Document

The objectives of this document are as follows:

- to facilitate the safe planning and design of temporary traffic management activities undertaken by or on behalf of Local Authorities or other statutory bodies;
- to provide guidance based on current national and international best practice;
- to provide guidance that is concise and easily understood;
- to provide guidance suitable for incorporation into a Road Works Safety Management System that addresses the requirements of the Safety, Health and Welfare at Work Act 2005 and the Safety, Health and Welfare at Work (Construction) Regulations 2006 (as amended);
- to provide guidance consistent with the road user's duty of care as set out under Road and Road Traffic Legislation; and
- to provide guidance on the use of signage at road works consistent with the Road and Road Traffic Acts, and the Traffic Signs Manual.

1.3 Scope of Document

This document includes information on various inter-related topics. Different aspects of a particular issue may be addressed in different sections. Therefore, sections should not be read in isolation.

This document provides guidance for those responsible for planning and designing Temporary Traffic Management Plans for road works undertaken by or on behalf of Local Authorities. It should also prove to be a useful reference document for those responsible for the implementation of Temporary Traffic Management Plans. The goal of the guidance is to provide a safe working environment for road workers and to enable the safe and efficient passage of traffic and other road users through the road works site.

This document should be used in conjunction with Chapter 8 of the Traffic Signs Manual and guideline documents issued by the Health and Safety Authority. Where appropriate, references to more detailed or prescriptive information are given throughout the document.

This is not a prescriptive specification and it is recognised that the guidance cannot cover all situations. It shall be the Designer's responsibility to adapt or develop the traffic management required to suit site conditions. **This document was largely prepared for road works on single carriageway roads.** It does not attempt to address more complicated temporary traffic arrangements required for multi-lane works, mobile lane road closures, crossovers and contra-flow or tidal flow operations; please refer to Chapter 8 of the Traffic Sign Manual for guidance pertaining to these arrangements and to the multi-lane environment.

Typical flowcharts, forms and documents are attached as appendices in order to assist users. It is open to the designer of the temporary traffic management arrangements to amend or customise these forms or to develop alternative forms suitable for particular operations.

Important Note: Having considered the traffic management options available within this guidance document, and where particular site conditions preclude the application of any of the recommended options, reference should be made to Section 8.3.2.2 of Chapter 8 of the Traffic Signs Manual. In such circumstances, it may be necessary to develop and undertake further risk management measures relevant to the requirements of the particular site. These may include controls ranging from redesigning to rescheduling the works and/or the implementation of identified control measures. All controls should be risk assessed through the design, planning and implementation stages of the works. All procedures and risk assessments should be documented and recorded.

The successful implementation of this document is dependent on the provision of appropriate training to all those involved in the design and operation of traffic management arrangements at road works.

1.3.1 Low Exposure Activities

All work activity on roads, including both construction and non-construction work, must be properly managed at all times. Examples of non-construction work on roads include both litter picking and the manual or semi-manual sweeping of footways. As they are work activities, the hazards they involve must be identified and a detailed risk assessment carried out so that adequate and appropriate controls can be implemented to protect the safety and health of workers and road users. The outcome of a specific risk assessment will determine whether the selection of appropriate control measures for non-construction works activities on roads will include similar or identical controls to those involved in construction work. Where the risk assessment of identified hazards requires the use of road works signs, the signs shall be used in accordance with Chapter 8 of the Traffic Signs Manual.

With regard to traffic management requirements, a low exposure activity is considered to be an activity where:

- the risk to the worker posed by live traffic has been assessed and no control measures are deemed necessary; and
- the carrying out of the activity has a minimal impact, if any, on the movement or direction of road users (the term 'road user' is understood to include all road users, including pedestrians and other vulnerable road users).

Low exposure activities do not require the worker to work on foot from or on the roadway; however, the worker may have to cross the roadway as a pedestrian from time to time. Such activities may include picking litter from the footpath, verge or edge of roadway; watering/maintaining planted areas adjacent to the roadway; and window cleaning where pedestrian movement is not impeded. Please refer to the glossary of terms in Section 1.6 for a precise definition of the terms 'road' and 'roadway'. Low exposure activities do not require traffic management and are not subject to the requirements of this document.

1.4 Reference Documents

- Chapter 8 of the Traffic Signs Manual issued by the Department of Transport (Ireland)
- Chapter 8 of the Traffic Signs Manual issued by UK Department for Transport
- Guidance for Safer Temporary Traffic Management issued in 2002 by the UK Highways Agency
- Code of Practice for Traffic Management at Road Works issued by Nottinghamshire County Council (2003)
- Safety at Street Works and Road Works. A Code of Practice published by the UK Department of the Environment, Transport and the Regions (1992)
- Guideline Document and Summary of Key Duties under the Procurement, Design and Site Management Requirements of the SHWW (Construction) Regulations 2006 issued by the Health and Safety Authority
- Roads Act 1993
- Road Traffic Act 2004
- Safety, Health and Welfare at Work Act 2005
- Safety, Health and Welfare at Work (Construction) Regulations 2006 (as amended)
- Guidelines for Working on Roads – Guide to the SHWW (Construction) (Amendment) (No. 2) Regulations 2008 (S.I. No. 423 of 2008) published by the HSA

1.5 Use of Figures

Figures throughout this document are designed to illustrate elements of the traffic management arrangements under discussion in any given section; they are not intended to be used as templates for site specific applications.

1.6 Glossary of Terms

General:

May	indicates an option
Shall or Must	indicates that a particular requirement is mandatory
Should	indicates a recommended practice

Organisations:

DoT	Department of Transport	www.transport.ie
HSA	Health and Safety Authority	www.hsa.ie
NRA	National Roads Authority	www.nra.ie

Abbreviations:

AADT	annual average daily traffic
ADT	average daily traffic
CSCS	Construction Skills Certification Scheme
DBM	dense bitumen macadam
HGV	heavy goods vehicle
HRA	hot rolled asphalt
km/h	kilometres per hour
LMCC	lorry mounted crash cushion
m	metre(s)
mm	millimetre(s)
NTS	not to scale
PSCS	Project Supervisor Construction Stage
PSDP	Project Supervisor Design Process
RUS	regulatory upright sign
SHWW	Safety Health and Welfare at Work
SLG	Signing Lighting and Guarding
SSLC	semi-static lane closure
veh/h	vehicles per hour
VMS	variable message sign
vpd	vehicles per day

Safety and Health:

Competent Person	for the purpose of the relevant statutory provision, a person is deemed to be a competent person where, having regard to the task he or she is required to perform and taking account of the size or hazards (or both of them) of the undertaking or establishment in which he or she undertakes work, the person possesses sufficient training, experience and knowledge appropriate to the nature of the work to be undertaken
Construction Regulations	the Safety, Health and Welfare at Work (Construction) Regulations 2006 (as amended)
Construction Site	any site at which construction work in relation to a project is carried out
Construction Stage	the preparation of a site, temporary works and construction
Contractor	an undertaking, including a Local Authority with direct labour teams or individuals, or other organisation whose Employees carry out or manage road works

Safety and Health Continued

Design	the preparation of drawings, particulars, specifications, calculations, bills of quantities in so far as they contain specifications or other expressions of purpose, according to which a project, or any component of a project, is to be executed
Design Process	the process for preparing and designing a project, including alterations to the design and the design of temporary works to facilitate construction of the project
Designer	a person engaged in work related to the design of a project, including the design of Temporary Traffic Management Plans at road works
Health and Safety Co-ordinator	a competent person appointed in writing to assist in the undertaking of the duties of the Project Supervisor
Project	any development which includes or is intended to include construction work
Project Supervisor	an individual or a corporate body appointed under Regulation 6(1) of the Construction Regulations 2006
Reasonably Practicable	for the purpose of the relevant statutory provisions, 'reasonably practicable', in relation to the duties of the Employer, means that an Employer has exercised all due care by putting in place the necessary protective and preventative measures, having identified the hazards and assessed the risks to safety and health likely to result in accidents or injury to health at the place of work concerned and where the putting in place of any further measures would be grossly disproportionate having regard to the unusual, unforeseeable and exceptional nature of any circumstance or occurrence that may result in an accident at work or injury to health at that place of work
Safety and Health Plan	a written plan prepared and developed in accordance with Part 2 of the Construction Regulations
Safety File	a file prepared and completed in accordance with Regulations 13 and 21 of the Construction Regulations 2006
The 2005 Act	the Safety, Health and Welfare at Work Act 2005
The 2006 Regulations	the Safety, Health and Welfare at Work (Construction) Regulations 2006 (as amended)

Road Works:

Cautionary Speed Plate	information sign plates (plate P011 in Chapter 8 of the Traffic Signs Manual) that may be displayed at a road works site; they indicate the speed which traffic is recommended not to exceed (a Cautionary Speed Plate is not a regulatory speed limit)
Chapter 8	Chapter 8 of the Traffic Signs Manual
Designer (TTM)	the person or party preparing or modifying the Temporary Traffic Management Plan
Emergency Road Works	road works the carrying out of which is immediately required in order to prevent, or reduce the risk of, loss, injury or damage to persons or property

Road Works Continued

Road	<p>a) any street, lane, footpath, square, court, alley or passage;</p> <p>b) any bridge, viaduct, underpass, subway, tunnel, overpass, overbridge, flyover, carriageway (whether single or multiple), pavement or footway;</p> <p>c) any weighbridge or other facility for the weighing or inspection of vehicles, toll plaza or other facility for the collection of tolls, service area, emergency telephone, first aid post, culvert, arch, gully, railing, fence, wall, barrier, guardrail, margin, kerb, lay-by, hard shoulder, island, pedestrian refuge, median, central reserve, channelliser, roundabout, gantry, pole, ramp, bollard, pipe, wire, cable, sign, signal or lighting forming part of the road; and</p> <p>d) any other structure or thing forming part of the road and (i) necessary for the safety, convenience or amenity of road users or for the construction, maintenance, operation or management of the road or for the protection of the environment; or (ii) prescribed by the Minister;</p>
Road Works	road works (also written as 'roadworks') means repairs, maintenance, alterations, improvements or installations or any other works to, above or under, a public road
Road Works Speed Limit	a regulatory speed limit applied at a road works site for a duration and at a location specified in a Manager's Order made under Section 10 of the Road Traffic Act 2004
Roadway	that portion of a road which is provided primarily for the use of vehicles
Temporary Traffic Operations Supervisor	the person on site with direct responsibility for implementation, maintenance and removal of temporary traffic arrangements
Temporary Traffic Management Plan	the Temporary Traffic Management Plan prepared by the Designer (TTM) for inclusion in the Safety and Health Plan and for use during road works
Works Area	the works area (also referred to as the 'working area') is the actual area required by the Contractor to carry out the works

2. Roads and Road Traffic Legal Background

2.1 Roads Acts 1993 – 2007 and Road Traffic Acts 1961 – 2007

The statutory basis for the construction, improvement and maintenance of the public road network is contained in the Roads Acts 1993 to 2007.

In the case of national roads, Local Authorities operate under the general supervision of the National Roads Authority (NRA), which has overall responsibility for the planning and supervision of works involving the construction and maintenance (including resurfacing) of such roads. In accordance with Section 13 of the Roads Act, 1993, responsibility for the maintenance and construction of public roads is vested in Local Authorities as Road Authorities.

The Road Traffic Acts 1961 to 2007 contain the statutory basis for the regulation of road traffic, including the provision of road traffic signs and the setting of speed limits.

2.2 Road Traffic Signs

Road Authorities are empowered to provide road traffic signs, if they consider them to be necessary, under Section 95 of the Road Traffic Act, 1961 (amended by the Road Traffic Act 1994). Signs are defined as any sign, device, notice or road marking, or any instrument for giving signals by mechanical means which does one or more of the following in relation to a public road or public roads:

- a) gives information (this type of sign is referred to herein as 'an information sign');
- b) warns persons of danger or advises persons of the precautions to be taken against such danger, or both (this type of sign is referred to herein as 'a warning sign'); or
- c) indicates the existence of a road regulation or implements such a regulation, or both, or indicates the existence of a provision in an enactment relating to road traffic (this type of sign is referred to herein as 'a regulatory sign').

The Road Traffic (Signs) Regulations 1997 to 2006, made under the Road Traffic Acts, specify the type of signs which must be used by Road Authorities if they are providing road traffic regulatory signs.

The Department of Transport's Traffic Signs Manual provides a comprehensive guide to the format of non-regulatory traffic signs (i.e. information and warning signs). The Manual sets out all of the types of road signs and markings used in this country and the technical standards to be followed by Road Authorities in the provision of the various types of road signs and markings, including temporary signs for use in connection with road works.

The Manual has a statutory basis – it constitutes a directive from the Minister for Transport to Road Authorities under Section 95(16) of the Road Traffic Act 1961. Road Authorities are obliged under Section 95(16) to comply with any directive given by the Minister.

Road traffic signs need to be clear, concise and effective. They indicate the application of road traffic regulations and are essential for the efficient operation of the road network, the safety of both road users and road workers, and the enforcement of road traffic regulations.

Road traffic signs, including those used at road works, may be divided into three broad types.

- **Regulatory** – signs which give instructions or apply prohibitions or restrictions which road users must obey
- **Warning** – signs which warn of hazards/danger on the road ahead or advise persons of the precautions to be taken against such danger, or both
- **Information** – signs which give directions and distances to destinations on the road ahead or on intersecting roads, or which provide other information

Regulatory signs used at road works are the same as those used in non-road works situations (e.g., the blue and white mandatory regulatory sign used to indicate the direction that traffic must proceed in can be used at road works and in non-road works situations). Only those regulatory signs depicted in the relevant Road Traffic (Signs) Regulations 1997 to 2006 may be provided at road works; no other format of sign should be used.

A special type of warning sign is used at road works; most are diamond shaped with black legend on an orange background. Yellow warning signs must not be used at road works and conversely, the orange road works signs must not be used in any non-road works situation.

The orange warning signs for use at road works are depicted in the Traffic Signs Manual. The Manual has been authorised by a direction from the Minister for Transport; therefore, Road Authorities or other organisations must use the signs depicted in the Manual, unless permitted to do otherwise by a subsequent direction.

In general, where existing information signs continue to be applicable at road works sites, they may be kept in position or relocated or amended as necessary. Supplementary plates of the type shown in Chapter 8 should display black text on a white background. Information signs necessitated by the road works (such as signs for detours or diverted traffic) should have black text on an orange background. Similarly, direction information signs (i.e., place name signs) which are erected as part of a road works operation and which relate to temporary traffic management arrangements should have black text on an orange background.

Other types of signs, including chevron and barrier boards and the regulatory Stop and Go batters, are also used frequently at road works. The use of these signs is set out in Chapter 8 of the Traffic Signs Manual.

When speed controls are applied at a location where road works are being carried out, the following options are permitted:

Road Works Speed Limit (under the Roads Act 2004 and associated regulatory speed limit traffic signs): As these limits and signs have regulatory effect a specified process under the 2004 Act must be followed. This includes formal notification and consultation as well as a statutory Local Authority Manager's Order giving effect to the Road Works Speed Limit. The Manager's Order specifies the speed limit, the location where the Road Works Speed Limit applies and the period of time (which must not exceed 12 months) during which that speed limit applies. Regulatory speed limit signs must be posted at the location specified in the Manager's Order to indicate the speed limit that is in force. In the case of a location on a national road, the prior written consent of the National Roads Authority must be obtained before any Order is made. It is an offence to drive at a speed that exceeds a Road Works Speed Limit.

Special Speed Limit (under the Roads Act 2004 and associated regulatory speed limit traffic signs): As these limits and signs have regulatory effect a specified process has to be followed. This includes formal notification and consultation as well as the making of Special Speed Limit bye-laws by the relevant City Council or County Council. The prior written consent of the National Roads Authority must be obtained in relation to any proposal to apply or revise a Special Speed Limit on a national road. The bye-laws specify the speed limit value and the location where that Special Speed Limit applies. Regulatory speed limit signs must be posted at the location specified in the bye-laws to indicate the speed limit that is in force. It is an offence to drive at a speed that exceeds a Special Speed Limit.

Cautionary Speed Plates (under Chapter 8 of the Traffic Signs Manual): These are information sign plates (P011) that may be provided under Chapter 8 of the Traffic Signs Manual to indicate the speed which traffic is recommended not to exceed. These sign plates may be used in conjunction with other road works signs, such as the 'Roadworks Ahead' sign, the 'Slippery Road' sign or the 'Loose Chippings' sign. These information signs can be used to give the driver a clear message that will encourage careful and safe driving behaviour. In this instance, no process of consultation is required with the Gardaí. However, where Local Authorities propose to provide such signs, it is recommended that the Gardaí be advised or notified in advance. The Cautionary Speed rectangular sign plate (details of which are set out in Chapter 8) must only display a value of 25, 35, 45, 55, 65 or 75 km/h. It is a non-regulatory sign so it is not an offence to drive at a speed that exceeds the value depicted on such a sign. The enforceable speed limit that applies at that location is the posted regulatory speed limit.

Appropriate signage and traffic management measures should be provided in order to give drivers passing through road works a clear and unambiguous message. The role of managing traffic behaviour lies with the Gardaí. Organisations that carry out road works should notify the Gardaí in advance as to the nature, duration and extent of such works. Organisations should also liaise regarding the design, signage, setup, and operation of such traffic measures. Additionally, they should liaise with the Gardaí regarding any issues, such as road user behaviour, that may be a matter for concern in the execution of road works.

2.3 Speed Limits

Speed limit signs show the maximum speed at which vehicles, which are not otherwise restricted, are legally permitted to travel on the section of road/carrage-way/lane between such signs. They do not indicate the speed at which all vehicles may travel at all times and in all conditions.

Article 7 of the Road Traffic (Traffic and Parking) Regulations 1997 (S.I. No. 182 of 1997) sets out a general obligation on drivers regarding speed and states that 'A vehicle shall not be driven at a speed exceeding that which will enable its driver to bring it to a halt within the distance which the driver can see to be clear.'

The driver must always drive at an appropriate speed and failure to comply with this obligation is considered to be an offence. Judgement of the appropriate speed at all times is part of the skill of driving. The appropriate speed must take account of all possible factors (e.g., driver, vehicle and environment) and particularly all possible hazards (e.g., what can/cannot be seen, what can be reasonably expected to happen and what could happen in certain instants).

2.4 Road User Behaviour

The Roads Acts 1993 to 2007 and the Road Traffic Acts 1961 to 2007 and associated statutory instruments require all road users to take care for their own safety and the safety of others. The Acts also impose other specific obligations on road users. In particular, Section 67 of the Roads Act, 1993 states the following:

Road users' duty of care: -

67(1) It shall be the duty of a person using a public road to take reasonable care for his own safety and for that of any other person using the public road.

67(2) It shall be the duty of a person using a public road to take all reasonable measures to avoid:

- a) injury to himself or to any other person using the public road,
- b) damage to property owned or used by him or by any other person using the public road.

In addition to drink or drug driving offences the main road traffic driving offences are contained in Part V of the Road Traffic Act 1961. Such driving offences include:

- the offence of driving without reasonable consideration (Section 51A);
- careless driving (Section 52);
- dangerous driving (Section 53); and
- parking a vehicle in a dangerous position (Section 55).

A range of further road traffic offences are set out in the Road Traffic (Traffic and Parking) Regulations 1997-2006.

2.5 Role of the Gardaí

Two key factors in traffic control are traffic management and enforcement of the law. Traffic management is a responsibility shared between the Gardaí and other agencies, whereas traffic law enforcement is almost entirely a Garda function – traffic wardens and authorised persons, such as immobilisation services (clampers), have a role in relation to certain illegal parking offences. The Garda Traffic Corps is dedicated to the enforcement of road traffic legislation and also to aiding the free flow of traffic generally.

Important Note: If an organisation or individual carrying out road works in accordance with Chapter 8 of the Traffic Signs Manual or this guidance document have concerns regarding traffic behaviour at or in the vicinity of road works, the Gardaí should be notified immediately.

The terms ‘roadworks’ and ‘emergency roadworks’ have the meaning assigned to them in section 101D of the Road Traffic Act 1961 (as inserted by Section 9 of the Dublin Transport Authority (Dissolution) Act 1987):

- ‘roadworks’ means repairs, maintenance, alterations, improvements or installations or any other works to, above or under, a public road; and
- ‘emergency roadworks’ means road works, the carrying out of which is immediately required in order to prevent, or reduce the risk of, loss, injury or damage to persons or property.

2.6 Road Authority Powers

The control of road works is governed by a number of Acts. Which Act is applicable depends upon whether works are being carried out by a Local Authority or Road Authority, a Statutory Undertaker or a private organisation. The extent of powers made available to a Road Authority varies accordingly.

Road works must be licensed in accordance with the relevant legislation. A person who carries out unlicensed road works is guilty of an offence. More specifically, under Section 13(10)(a) of the Roads Act 1993, it is an offence to deface, damage, excavate or place/deposit any material or thing on a public road without the lawful consent of the Road Authority.

2.6.1 Road Opening Licence (Roads Act 1993)

In order to carry out road works on a public road, a person or body must have the consent of the Road Authority or must be acting under other specific enabling legislation such as applies to Statutory Undertakers. In accordance with the Roads Act 1993, a Local Authority can issue directions in writing to persons carrying out road works in its functional area.

- Section 13(10)(b) of the Roads Act, 1993 provides powers whereby a Road Authority may consent to allow works to be carried out on a road; such permission constitutes a 'Road Opening Licence'. The Road Authority may attach restrictions and/or conditions to a Road Opening License as it deems appropriate. Failure to comply with such restrictions and/or conditions constitutes an offence.
- Section 13(10)(c) states that where a person does anything in contravention of Section 13(10)(a), a Road Authority may remove any defacement, repair any damage, fill in any excavation, remove any material, thing, dung or urine or remove or reduce any hazard, potential hazard, obstruction or interference, and may recover any costs reasonably incurred carrying out such works.

2.6.2 Statutory Undertakers

A large number of road opening operations are carried out by Statutory Bodies which have powers to open, dig or excavate a public road. These include:

- Road Authorities;
- Water Services Authorities;
- Licensed Undertakers in the electricity sector such as the Electricity Supply Board;
- Bord Gáis Éireann; and
- Licensed Undertakers in the telecommunications sector such as Eircom.

The operations of these bodies are controlled by separate enabling legislation which sets out limitations on the actions of Statutory Undertakers in certain areas. As part of the deregulation of the telecommunications and electricity sectors, other private sector agencies operating under Ministerial sanction have also been licensed to carry out road opening activities.

The term Statutory Undertaker is generally used to describe a body or person who is permitted to carry out work on a road, particularly road opening work, in performance of its or his/her duty or functions under any Act of the Oireachtas. The term is defined in the Planning and Development Act 2000 as follows:

"Statutory Undertaker" means a person, for the time being, authorised by or under any enactment or instrument under an enactment to:

- a) construct or operate a railway, canal, inland navigation, dock, harbour or airport;
- b) provide, or carry out works for the provision of, gas, electricity or telecommunications services; or
- c) provide services connected with, or carry out works for the purposes of the carrying on of the activities of, any public undertaking.

For licensed organisations in the telecommunications sector, the opening of a public road requires a license from the relevant Road Authority. In this case, the relevant Road Authority for National Roads is the National Roads Authority (NRA) and for Regional and Local Roads is the Local Road Authority.

For water services works, the opening of a public road is subject to the consent of the relevant Road Authority where the Water Services Authority is not the Road Authority. In this case, the relevant Road Authority for National Roads is the National Roads Authority (NRA) and for Regional and Local Roads is the Local Road Authority.

Bodies such as the Defense Forces, the Office of Public Works (OPW) have limited powers to work on roads, but these powers are rarely invoked. Irish Rail has the power to lay tracks on the public road and construct level crossings under the Railway Clauses Consolidation Acts of 1845, the Railway Clauses Act of 1863 and Section 9 of the Transport Act 1958. Under these circumstances, Irish Rail becomes responsible for the section of road and the same is not then part of the 'public road'.

2.6.3 Designated Road Authorities

Under Section 101D of the Road Traffic Act, 1961, as inserted by Section 9 of the Dublin Transportation Authority (Dissolution) Act, 1987, designated Authorities are empowered to issue binding directions on a range of matters to any person, including Statutory Undertakers, carrying out road works in a designated Authority's functional area.

The Road Traffic (Coordination of Roadworks) Regulations 1992 (S.I. No. 323 of 1992) designate **Dublin City Council, Cork City Council, Limerick City Council, Waterford City Council, Galway City Council, Fingal County Council, South Dublin County Council and Dun Laoghaire – Rathdown County Council** as Local Authorities for the purpose of section 101D of the Road Traffic Act, 1961. This enables these Local Authorities to exercise functions under section 101D and, in particular, to issue directions to persons undertaking road works on public roads in their functional areas in relation to such matters as timing of road works and the manner in which road works are carried out.

Under this legislation a designated Local Authority has the power to stipulate requirements for road opening works in relation to but not limited to the following:

- the period during which and the times at which road works shall or shall not be carried out;
- the manner in which road works shall or shall not be carried out;
- standards pertaining to construction works;
- traffic control arrangements in the vicinity of road works; and
- financial security arrangements to ensure the satisfactory execution and reinstatement of road works.

Directions may be issued to any organisation that carries out road works within the administrative area of a designated Local Authority.

2.6.4 Road Closures

If a member of the public, without written permission from the Road Authority, uses a public road while it is temporarily closed, he/she is guilty of an offence under Section 75(2)(a) of the Roads Act 1993.

Where a road is closed, local access may be catered for in the following ways:

- the order closing the road may make a specific provision that allows local road users to use the road during the closure; or
- under Section 75(2)(a) of the Roads Act 1993, local road users may be given written authority to use the road during the closure.

3. Safety and Health Responsibilities

This section provides a summary of the key issues that duty holders should consider in order to ensure compliance with safety and health legislation. It concentrates on the key safety and health issues; however, it is essential that all aspects of safety and health are considered during the design and preparation of a Temporary Traffic Management Plan.

Working on live roads carries a potential for high risk. Drivers on these roads may not expect to encounter standing or slow moving vehicles, pedestrians or people at work. In addition, the workers involved may have limited protection from oncoming traffic. Hence, the work must be managed to ensure that the risks are as low as is reasonably practicable.

From a safety and health perspective, road works can present a high risk unless adequate precautions are taken to ensure that the travelling public is adequately warned and informed. While the potential consequences of an accident on heavily trafficked high speed roads are more severe, the risks involved in working on other roads must not be ignored. Such roads will frequently fail to meet current sight distance requirements and design standards and in many cases the available carriageway width will be limited.

3.1 Legal Background

3.1.1 The Safety, Health and Welfare at Work Act 2005

The Safety, Health and Welfare at Work Act 2005 (the 2005 Act), and all other statutory provisions made under the Act, sets out the legal framework for occupational safety and health and is aimed at securing the safety, health and welfare of persons at work.

The 2005 Act and associated Regulations place a duty on Employers to make an assessment of the risks to the safety and health of those they employ as well as others who may be affected by the work being undertaken. The assessment should identify the control measures to be taken in order to comply with all relevant safety and health legislation. Systems should be implemented to ensure the effective planning, organising, controlling, monitoring and reviewing of measures put in place to secure safety and health.

When putting control measures in place, organisations need to have regard to the term 'reasonably practicable', which, in relation to the duties of an Employer, is defined in Section 2(6) of the 2005 Act to mean that an Employer has exercised all due care by putting in place the necessary protective and preventive measures, having identified the hazards and assessed the risks to safety and health likely to result in accidents or injury to health at the place of work concerned and where the putting in place of any further measures is grossly disproportionate having regard to the unusual, unforeseeable and exceptional nature of any circumstance or occurrence that may result in an accident at work or injury to health at that place of work.

Section 2 of the 2005 Act defines a 'place of work' to include any, or any part of any, place (whether or not within or forming part of a building or structure), land or other location at, in, upon or near which, work is carried on whether occasionally or otherwise.

Section 8 of the 2005 Act imposes General Duties on Employers which are set out, in so far as is relevant, as follows:

- (1) Every Employer shall ensure, so far as is reasonably practicable, the safety, health and welfare at work of his or her Employees.
- (2) The Employer's duty extends, in particular, to the following:
 - (a) managing and conducting road work activities in such a way as to ensure, so far as is reasonably practicable, the safety, health and welfare at work of his or her Employees;
 - (b) managing and conducting work activities in such a way as to prevent, so far as is reasonably practicable, any improper conduct or behaviour likely to put the safety, health or welfare at work of his or her Employees at risk;
 - (c) as regards the place of work concerned, ensuring, so far as is reasonably practicable:
 - (i) The design, provision and maintenance of the road works site in a condition that is safe and without risk to health; e.g., the design and implementation of Temporary Traffic Management Plans;
 - (ii) The design, provision and maintenance of safe means of access to and egress from the works;
 - (iii) The design, provision and maintenance of plant and machinery or any other articles that are safe and without risk to health;
 - (d) providing systems of work that are planned, organised, performed, maintained and revised, as appropriate, so as to be, so far as is reasonably practicable, safe and without risk to health; e.g., the development and implementation of a Temporary Traffic Management Plan;
 - (e) providing and maintaining facilities and arrangements for the welfare of his or her Employees at work;
 - (f) providing the information, instruction, training and supervision necessary to ensure, so far as is reasonably practicable, the safety, health, and welfare at work of his or her Employees; e.g., tool box talks, site inductions, CSCS training, as required; and
 - (g) determining and implementing the safety, health and welfare measures necessary for the protection of the safety, health and welfare of his or her Employees.

Section 12 of the 2005 Act outlines general duties of Employers to persons other than their Employees in that every Employer shall manage and conduct his or her undertaking in such a way as to ensure, so far as is reasonably practicable, that in the course of the work being carried on, individuals at the place of work (not being his or her Employees) are not exposed to risks to their safety, health or welfare; e.g., where a footway is obstructed because of road works activity, there is an alternative, appropriate safe route for the user.

Section 17(3) of the 2005 Act and Regulations 17 and 24 of the 2006 Construction Regulations (S.I. 504 of 2006) require that the General Principles of Prevention, as laid down in Schedule 3 of the 2005 Act, are used in the evaluation of safety and health issues.

Sections 32-76 of the 2005 Act set out the role and functions of the Health and Safety Authority (HSA), including its enforcement powers.

3.1.2 The Construction Regulations (S.I. 504 of 2006 and S.I. 423 of 2008)

The Safety, Health and Welfare at Work (Construction) Regulations 2006 (as amended), S.I. 504 of 2006, impose legal obligations on the various duty holders on construction projects, including road works projects. These roles and responsibilities will be explored in Section 3.3.

Both the 2005 Act and the 2006 Construction Regulations clearly place the onus on Employers to manage safety and health in the prevention of occupational accidents and ill health.

Regulation 97 of the 2006 Regulations has been amended by the Safety, Health and Welfare at Work (Construction) (Amendment) (No.2) Regulations 2008. The revision of Regulation 97 of the 2006 Regulations is intended to clarify the provisions applicable to ensure that, in respect of construction work on roads, adequate signing, lighting and guarding is provided, and traffic signs are placed and maintained, and where necessary operated, as reasonably required for the safe guidance or direction of persons, having regard, in particular, to the needs of people with disabilities.

- (a) There must be on site, at all times when the works are in progress and workers are on site, at least one person who has been issued with a valid construction skills registration card relating to either 'Health and Safety at Roadworks' or 'Signing, Lighting and Guarding'. Furthermore the works must be supervised by a competent person who has been issued with a valid construction skills registration card relating to signing, lighting and guarding on roads.
- (b) Where any construction work which obstructs the roadway or where pedestrians, people with disabilities or cyclists on a cycle track that forms part of a footway are diverted onto the roadway because of construction work, there must be on that site at all times when road signing, lighting and guarding is being installed, modified or removed, at least one person who has been issued with a valid construction skills registration card relating to signing, lighting and guarding on roads. This person must also regularly check that the temporary traffic arrangements (layout configuration) identified in the Safety and Health Plan remain in place for the duration of the works.

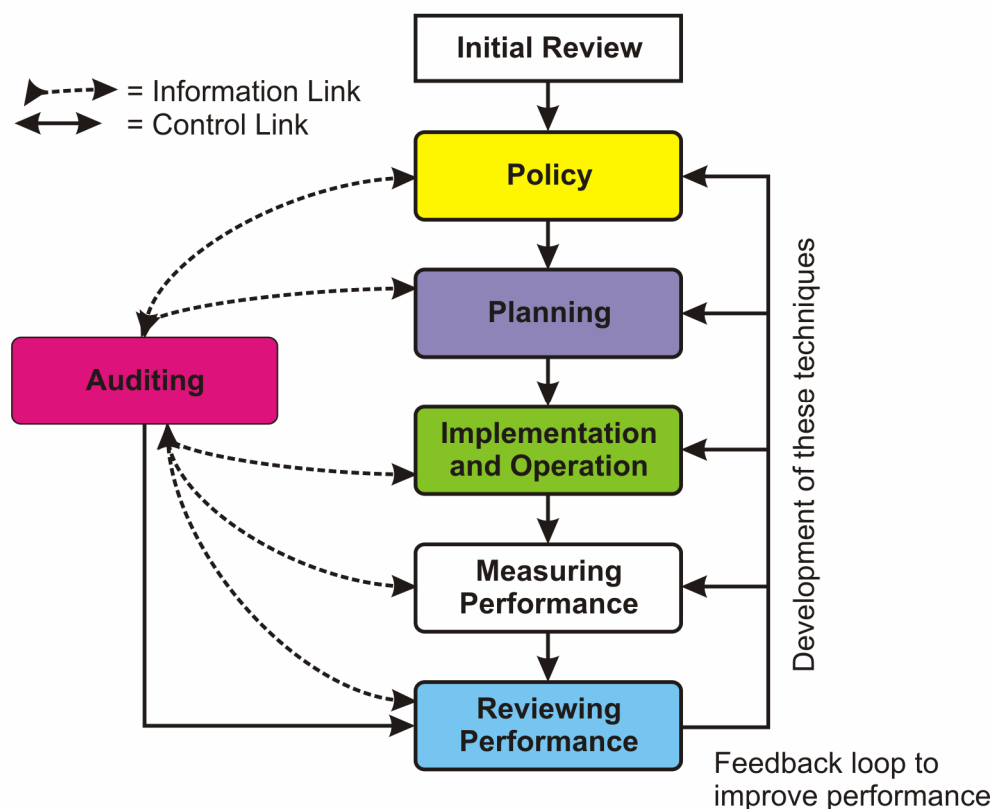
For further information on the Safety, Health and Welfare at Work Act 2005 and other legislation, go to the HSA website, <http://www.hsa.ie/eng/Legislation/>

3.2 Risk Management

3.2.1 Introduction to Risk Management

Work related accidents and injuries are caused by hazards which are either not controlled or are inadequately controlled. The management of risk is the key component in any organisation's safety management system.

Using the following Health and Safety Authority's model of safety management, it becomes clear that risk assessment and management are the most critical tools available to enable an organisation to create a safe and healthy workplace.



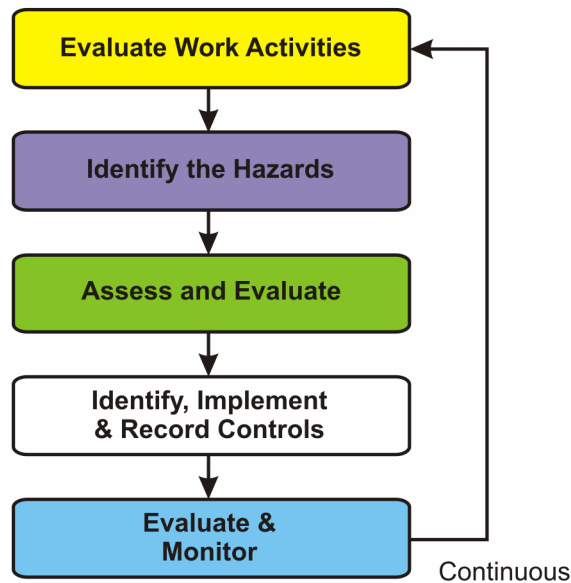
Success in a safety management system requires the development of supportive organisational cultures. All management systems need the active involvement of Employees in the process; it is crucial that there is also visible leadership by managers.

What is essential to using a safety management system is an understanding of the difference between **hazards, hazardous situations, risk, harm and loss**.

- A **hazard** is anything that has the potential to cause harm or loss or damage to human health, property or the environment.
- A **hazardous situation** occurs when a person comes into contact with a hazard.
- **Risk** is the likelihood that the hazard will cause harm or loss, together with the severity of that harm or loss.
- **Harm** is the adverse effect on an individual that may result from the exposure to the hazard.
- **Loss** is the damage to equipment, property or the environment that may result from the exposure to the hazard.

3.2.2 The Risk Management Process

There are five main stages in the risk management process:



A place of work is a dynamic environment and there is always the potential for new hazards to be introduced. This dynamic aspect of the workplace must be reflected in the risk assessment. Based on the risk assessment of the workplace, appropriate controls must be put in place to eliminate the hazard or mitigate the risk to an accepted level. Risk should be managed in accordance with the General Principles of Prevention (see Section 3.2.3 below).

A systematic monitoring and review system must be implemented to assess the effectiveness of the controls. Where the risk is adequately controlled, the controls should be maintained and the hazard should be monitored. Where the risk is not adequately controlled, appropriate action, with further monitoring and review, must be taken.

Further to the above requirements, Chapter 8 of the Traffic Signs Manual and Section 4 of this guidance document detail the identification of hazards and the assessment of risks for activities associated with road works and the design and application of control measures (i.e., traffic management arrangements) that adequately address said hazards and risks. The application of this safety management model to the traffic management design process is developed in Section 3.5.

3.2.3 General Principles of Prevention Schedule 3 (SHWW Act 2005)

1. **The avoidance of risks:** Select a Temporary Traffic Management Plan that will remove the hazards that exist during the project; e.g., the use of a patching machine instead of a patching crew where this is appropriate.
2. **The evaluation of unavoidable risks:** Selecting a Temporary Traffic Management Plan that removes all the hazards during the project will not always be possible; therefore, the unavoidable risk must be assessed so that control measures may be implemented to reduce the risk to an acceptable level; e.g., carrying out road works on a narrow road where no suitable detour is available.
3. **The combating of risks at source:** It is better to design out or minimise risks where practicable rather than leave them to be dealt with on site.

4. **The adaptation of work to the individual:** This principle considers the ergonomic needs of the individual and is especially relevant to the design of a place of work, the choice of work equipment and systems of work selected; e.g., the Temporary Traffic Management Plan should take manual handling into consideration when specifying the number, size and type of signs/cones that will be used for the traffic management arrangements.
5. **The adaptation of the place of work to technical progress:** As technology progresses safety will improve; e.g., the use of vehicle actuated temporary traffic lights, the use of two-way radios with a STOP/GO system, VMS signs, data loggers, etc.
6. **The replacement of dangerous articles, substances or systems of work:** The replacement of these with safe or less dangerous articles, substances or systems of work; e.g., the introduction of a safe system of work such as using a convoy system to control vehicle speed where the required lateral safety zone cannot be provided.
7. **The giving of priority to collective protective measures over individual protective measures;** e.g., the provision of both lateral and longitudinal safety zones to collectively protect the entire workforce.
8. **The development of an adequate prevention policy in relation to safety, health and welfare at work:**
9. **The giving of appropriate training and instructions to Employees:** Employers must discharge their duties under Regulation 97 of the Construction Regulations 2006 (as amended); e.g., CSCS for Signing Lighting and Guarding, and CSCS for Health and Safety at Roadworks.

3.2.4 Risk Management of Non-Construction Related Activities

Where an activity does not fall under the definition of 'construction' work as per the Construction Regulations, the requirements of the Construction Regulations will not apply. However, the Safety Health and Welfare at Work Act 2005 and subsequent Regulations shall apply. Any works on a roadway must be carried out in accordance with Chapter 8 of the Traffic Sign Manual.

The *Guidelines for Working on Roads* published by the HSA explains that all work activities on roads, including both construction and non-construction work must be properly managed at all times. For example, the following work activities on roads would not normally be considered to be construction work.

- Litter picking
- Road sweeping
- Hedge cutting
- Meter reading
- Surveying
- Inspection

Nonetheless, as the above are work activities, the hazards must be identified and risk assessments carried out, so that adequate and appropriate controls can be implemented to protect the safety and health of workers and road users. The outcome of a specific risk assessment should determine whether the selection of appropriate control measures for non-construction work activities on roads will include similar or identical controls to those involved in construction work.

While it is a requirement to carry out site specific risk assessments for all types of work carried out on roads, it is important to note that the scope of the assessment should be commensurate with the scale of works, the risk involved, the type of activity being carried out and the nature of the location of the works.

In order to ensure that site assessments are effectively carried out, organisations carrying out work on roads, including routine works, should have systems in place for managing safety. These systems form part of an overall safety management system and should include safe operating procedures and traffic control measures. As appropriate, standard measures can be modified to suit site conditions. The safety management system should also address efficient management of records and documentation as well as the provision of suitably trained and competent personnel.

For more information on hazard identification and risk assessments, refer to the Health and Safety Authority website, www.hsa.ie.

3.3 Duties and Responsibilities

The Construction Regulations apply to all construction work. In general, the Regulations require the appointment of various duty holders on road works projects. The roles and responsibilities of these duty holders are outlined in this section.

Under certain circumstances, the requirement to appoint Project Supervisors (PSDP and PSCS) does not apply. More specifically, Project Supervisors do not have to be appointed for works where **all** of the following conditions apply (routine maintenance works may satisfy these conditions):

- (i) the work does not involve a particular risk;
- (ii) there is only one contractor; and
- (iii) the work is not likely to last more than 30 days or take more than 500 person days.

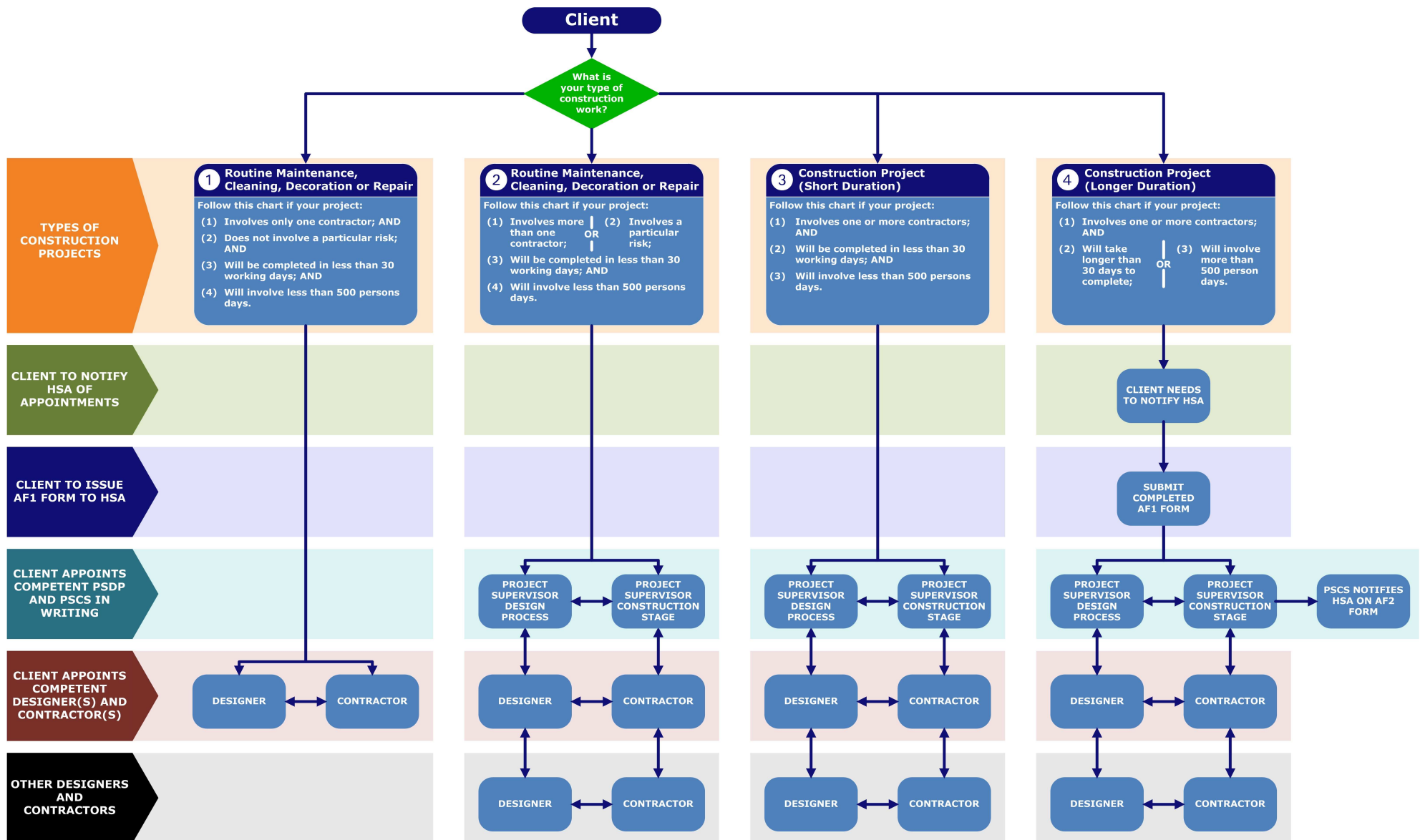
The manner in which the roles and responsibilities of the various duty holders relate to the specific elements of the traffic management design process is outlined in Section 3.5.

3.3.1 The Client

The Client is the person (including a company) for whom construction work is being carried out for the purpose of a trade or business or other undertaking. The following duties must be carried out by the Client for every project:

- appoint, in writing at the start of the Design Process, a project supervisor for the design process (PSDP) who has adequate training, knowledge, experience and resources; such an appointment can be changed, renewed or terminated as necessary;
- appoint, in writing before construction begins, a project supervisor for the construction stage (PSCS) who has adequate training, knowledge, experience and resources; such an appointment can be changed, renewed or terminated as necessary;
- be satisfied that each designer and contractor appointed has adequate training, knowledge, experience and resources for the work to be performed;
- cooperate with the project supervisor and supply necessary information;
- retain and make available the Safety File for the completed road works: the Safety File contains information on the completed road works that may be required for future maintenance works;
- provide a copy of the Preliminary Safety and Health Plan prepared by the PSDP to every person tendering for the project; and
- notify the HSA of the appointment of the PSDP where construction is likely to take more than 500 person days or 30 working days.

The following flowchart provides a useful overview of the Client's duties and responsibilities.



Management flowchart from "Clients in Construction; Best Practice Guidelines" published by the Health and Safety Authority

For further information on Client duties, refer to HSA publication *Clients in Construction – Best Practice Guidance* at www.hsa.ie.

3.3.2 The Project Supervisor Design Process (PSDP)

A competent PSDP must be appointed, in writing, by the Client for each project. The PSDP may or may not carry out the design works but must have extensive knowledge of the design process and possess the necessary competence to fulfil the role of PSDP.

A PSDP may appoint, in writing, a named individual as Health and Safety Co-ordinator to assist the PSDP in carrying out the duties of the PSDP as outlined in the Construction Regulations 2006; however, responsibility for carrying out these duties cannot be delegated to a Health and Safety Co-ordinator.

The primary role of the PSDP is to coordinate the work of the Designers throughout the project. The following is a summary of the key duties of the PSDP:

- identify hazards arising from the design or from the technical, organisational, planning, or time related aspects of the project; e.g., working near a school;
- eliminate, where possible, the hazards and reduce the risk; e.g., consider carrying out the works near the school during the holidays or outside of school hours;
- communicate necessary control measures, design assumptions, or remaining risks to the PSCS so they can be dealt with in the developed Safety and Health Plan;
- ensure that the work of designers, including the Designer (TTM) and other Designers, is coordinated to ensure safety;
- organise cooperation between Designers;
- prepare a written Preliminary Safety and Health Plan for any project where constructions works is likely to take more than 500 person days or 30 working days or where there is a Particular Risk and deliver the plan to the Client prior to tender;
- ensure that a Temporary Traffic Management Plan prepared by a Designer (TTM) is available to the PSCS prior to construction works;
- coordinate any revisions made to the Temporary Traffic Management Plan during the project;
- prepare a Safety File for the completed project and give it the Client; and
- notify the HSA and Client of non-compliance with any written directions issued (the PSDP may issue directions to Designers, Contractors or others).

3.3.3 The Designer

Designers are organisations or individuals who undertake design for a project, including the design of temporary works. By applying the 'general principles of prevention' in their designs they can proactively reduce the risks to safety and health during the construction stage, subsequent use and maintenance.

The Designer may be engaged in the preparation of drawings, particulars, specifications, calculations, and bills of quantities in relation to a project. This includes the design/specification of temporary traffic management.

The following is a summary of the key duties of the Designer:

- take account of the 'general principles of prevention';
- identify any hazards that the design may present during construction and subsequent maintenance;
- eliminate, where possible, the hazards or reduce the risk, by completing design risk assessments;

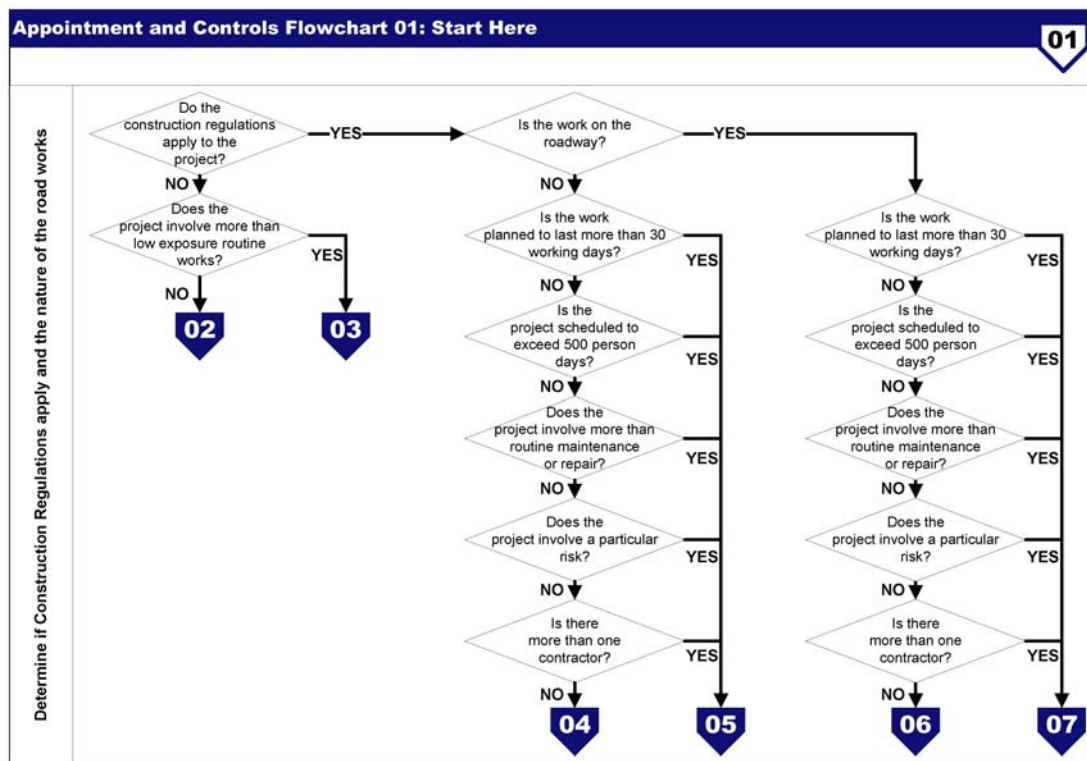
- Communicate necessary control measures, design assumptions or remaining risks to the PSDP so they can be dealt with in the Safety and Health Plan
- Co-operate with other Designers and the PSDP or PSCS
- Take account of any existing Safety and Health Plan or Safety File
- Comply with directions issued by the PSDP and PSCS
- Where no PSDP has been appointed, inform the Client that a PSDP must be appointed

Designers are to ensure that the project is capable of being constructed in such a manner that it will be safe, can be maintained safely and complies with all relevant safety and health legislation.

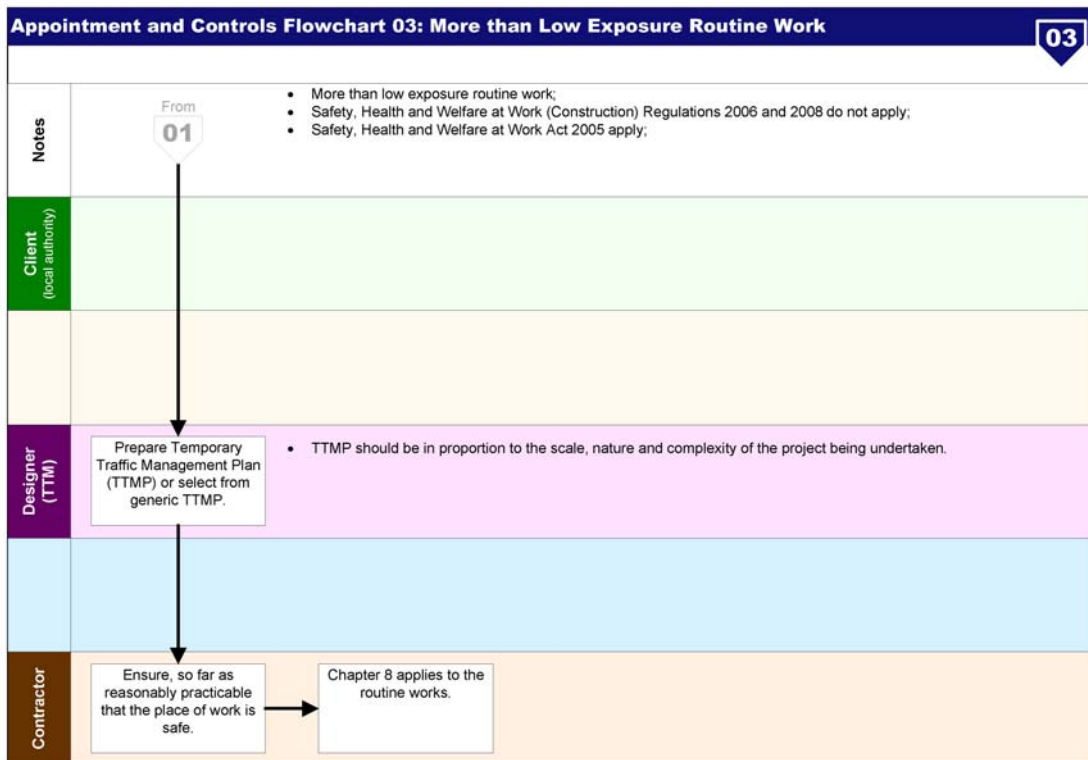
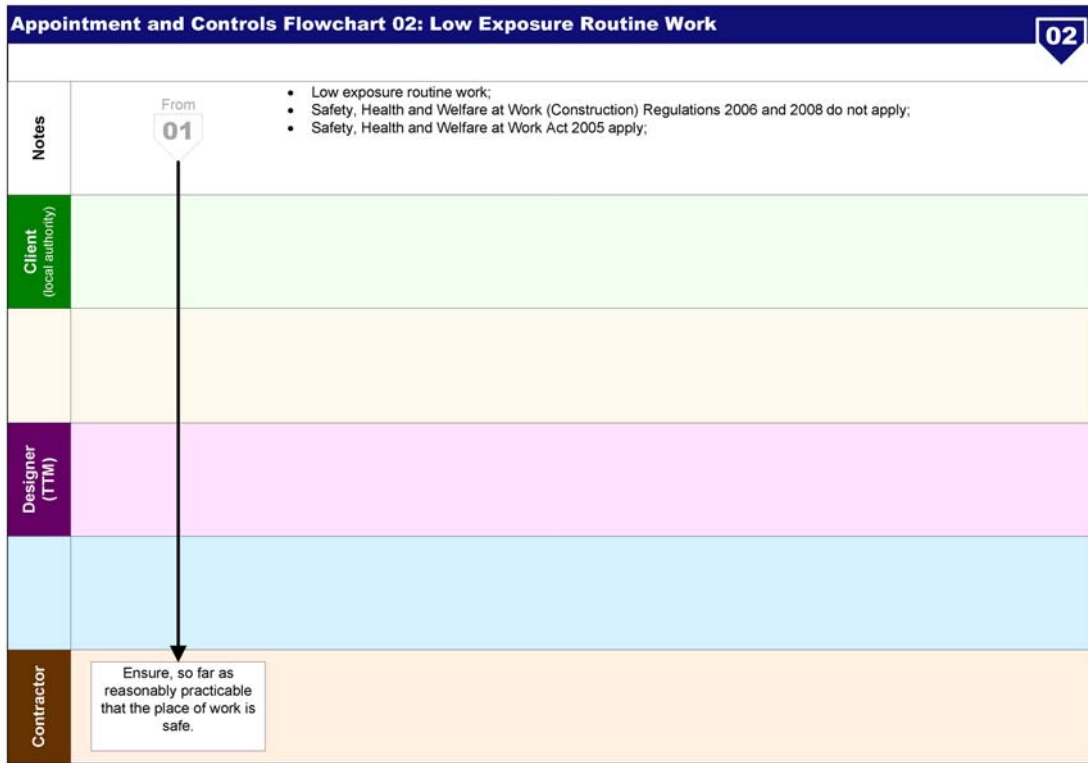
The Designer (TTM) is responsible for the design of the temporary traffic management arrangements and the preparation of the Temporary Traffic Management Plan. The Temporary Traffic Management Plan should be provided to the PSDP for inclusion in the Preliminary Safety and Health Plan. The Temporary Traffic Management Plan may need further development to deal with specific operations during the construction stage. On smaller projects, a single Designer may design all or a number of project design elements, including the Temporary Traffic Management Plan.

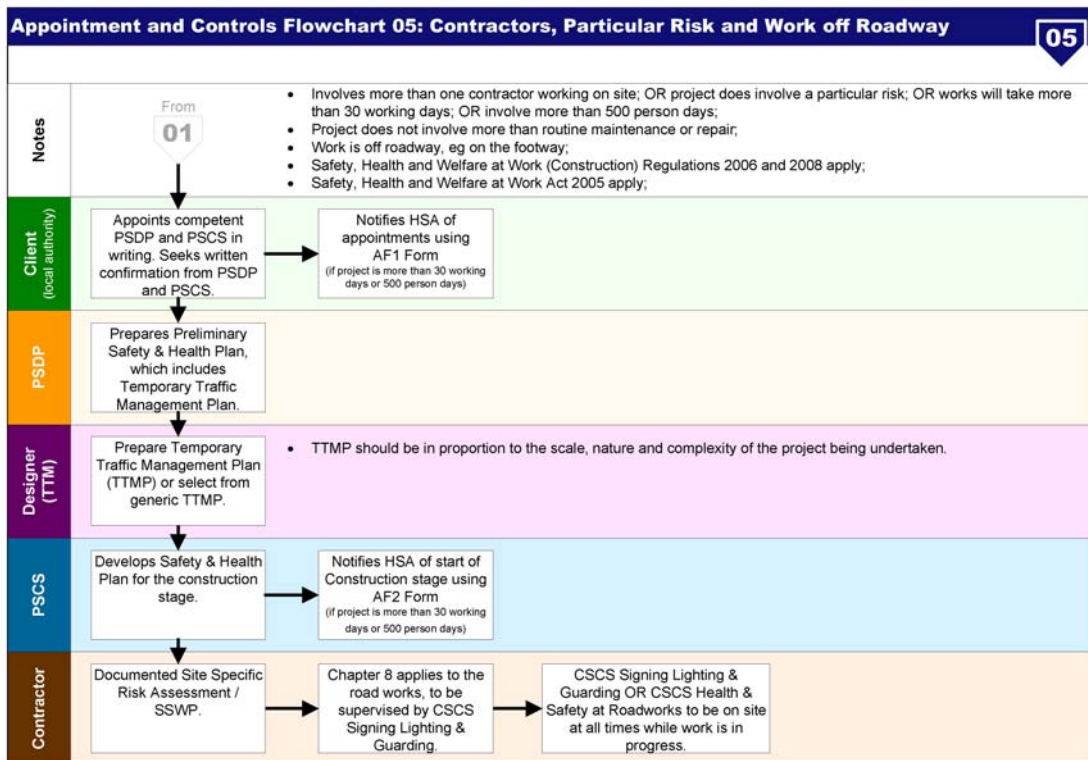
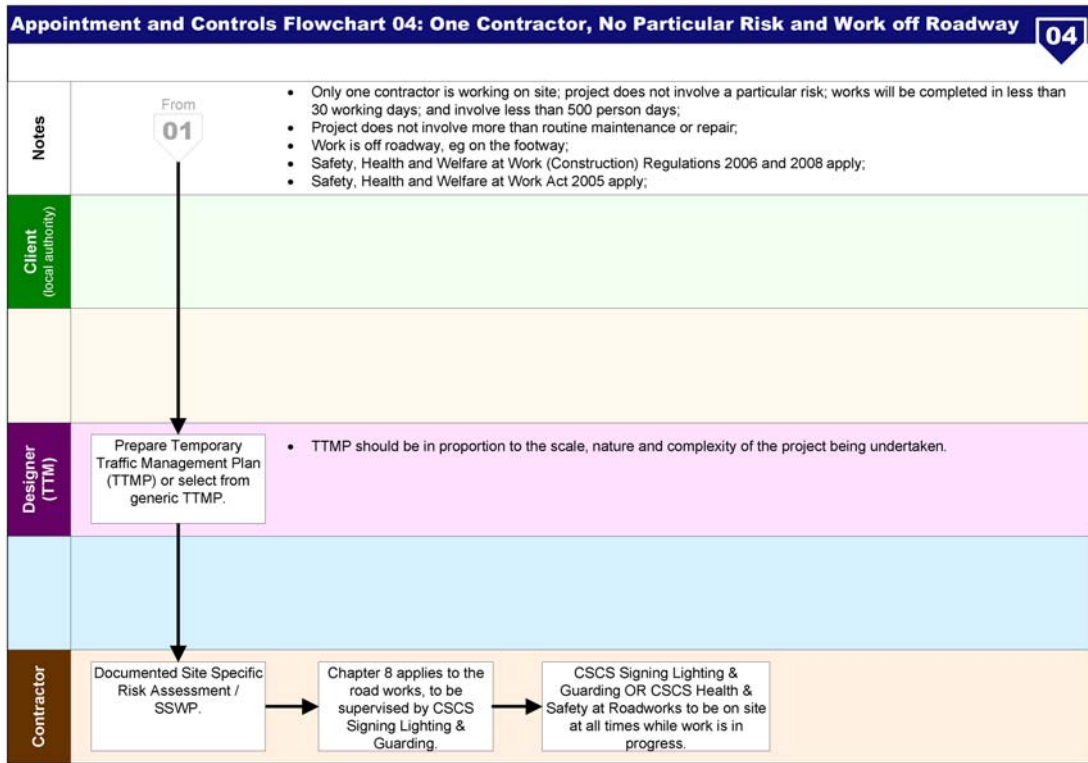
In some cases there may be no Designer (TTM), for example for routine activities where approved generic designs are available and implemented. With respect to the design of the temporary traffic management arrangements, the duties of the Designer (TTM) shall be the same as the duties of the Designer. Where the Temporary Traffic Management Plan is operationally deficient, it will be necessary for the Designer (TTM) to update the plan based on a revised risk assessment for the site.

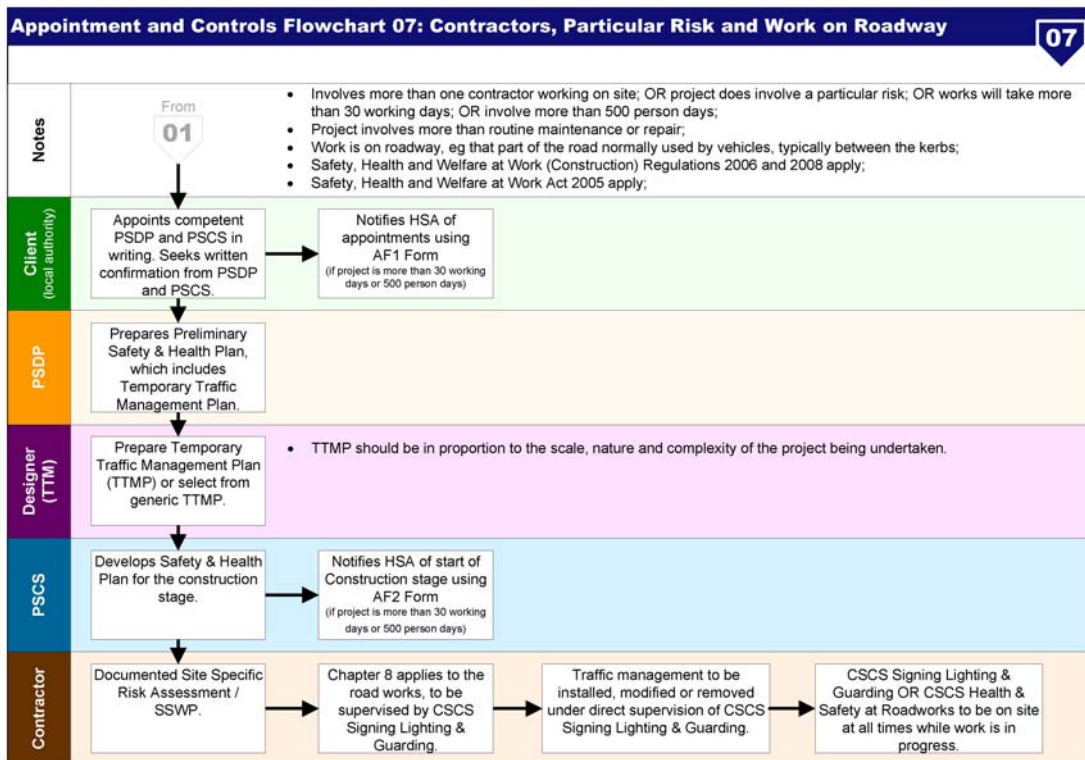
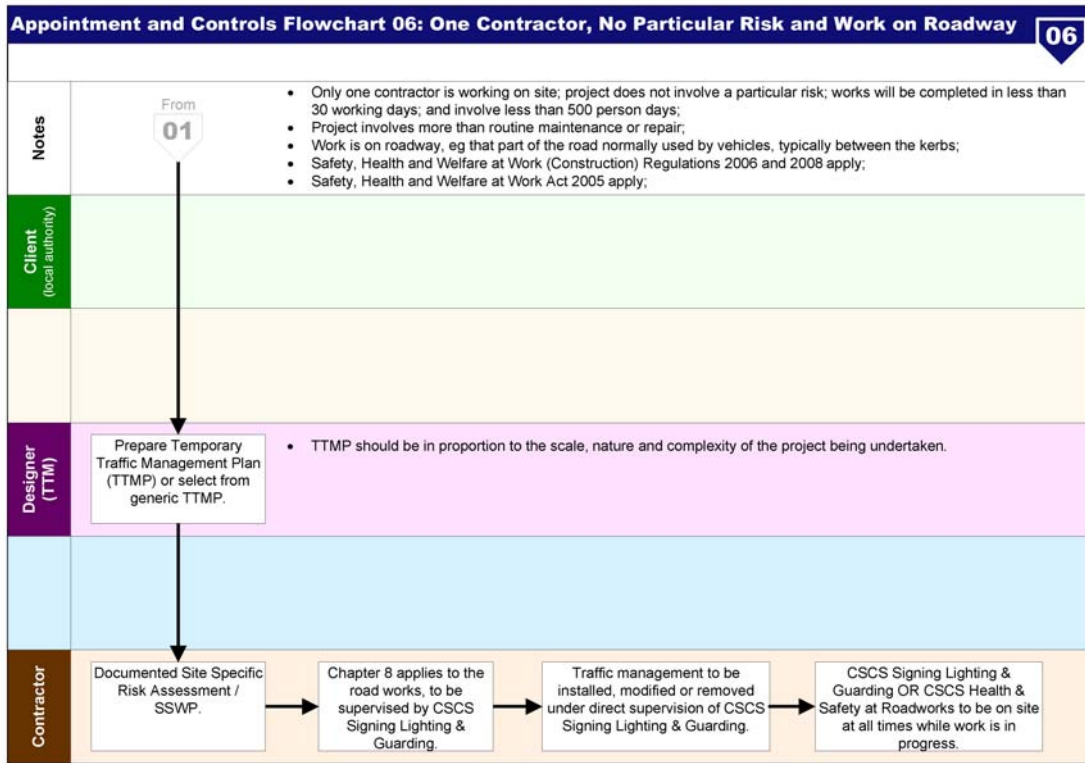
Based on the nature of the works, Flowchart 01 (below) identifies which of the subsequent flowcharts (numbered 02 to 07) should be used to determine the appointments and controls necessary for compliance with the relevant requirements of the Construction Regulations.



Note: The term “low exposure routine work or works” is understood to be a collective term for “low exposure activities” as defined in Section 1.3.1.







3.3.4 The Project Supervisor Construction Stage (PSCS)

A competent PSCS must be appointed, in writing, by the Client for each project. The PSCS may or may not carry out the construction works but must have extensive knowledge of the construction operation and possess the necessary competence to fulfil the role of PSCS.

A PSCS may appoint, in writing, a named individual as Health and Safety Co-ordinator to assist the PSCS in carrying out the duties of the PSCS as outlined in the Construction Regulations 2006; however, responsibility for carrying out these duties cannot be delegated to a Health and Safety Co-ordinator.

The primary role of the PSCS is the coordination of the safety and health aspects of the project. The following is a summary of the key duties of the PSCS:

- coordinate the identification of hazards, the elimination of the hazards or the reduction of risks to an acceptable level during construction; e.g., coordinate safe systems of work to install the temporary traffic management arrangements;
- further develop the Preliminary Safety and Health Plan (prepared by the PSDP) before construction commences; where further development of the Temporary Traffic Management Plan has been identified, the PSCS may consult with a Designer (TTM) to ensure that the works operations and the Temporary Traffic Management Plan are compatible;
- coordinate the implementation of the Construction Regulations by contractors;
- organise co-operation and the provision of information between contractors; e.g., ensure that contractors are aware if shift work is in operation to ensure a safe handover of works;
- coordinate the reporting of accidents to the HSA;
- notify the HSA before construction commences if construction is likely to take more than 500 person days or 30 working days;
- provide information to site safety representatives;
- coordinate the checking of safe working procedures; e.g., copies of audit reports/inspections;
- coordinate measures to restrict entry on to the site; e.g., plant and machinery must not enter longitudinal safety zones;
- coordinate the provision and maintenance of welfare facilities;
- coordinate the arrangements to ensure that workers have valid CSCS cards, including the CSCS Signing, Lighting and Guarding at Roadworks and the CSCS Health and Safety at Roadworks;
- coordinate the appointment of a site safety representative if there are more than 20 persons on site;
- coordinate the implementation and operation of the Temporary Traffic Management Plan;
- appoint a safety adviser if there are more than 100 workers on site;
- provide all necessary Safety File information to the PSDP;
- monitor the compliance of contractors and others and take corrective action where necessary; and
- notify the HSA and the Client of any instances of non-compliance with any written directions issued (the PSCS may issue directions to designers or contractors).

3.3.5 The Contractor

A Contractor is an Employer whose Employees carry out or manage construction work. Under the Construction Regulations, Local Authorities, manufacturers and self employed persons may also be Contractors.

The Contractor has significant duties relating to a wide range of issues. The following is a summary of the key duties of the Contractor:

- cooperate with the PSCS and where required the PSDP to ensure works are coordinated; e.g., the signing, lighting and guarding aspects of the project;
- provide a copy of their safety statement and relevant information to the PSCS – the names of the relevant CSCS card holders should be contained in the Safety Statement including the names of CSCS Signing, Lighting and Guarding and CSCS Health and Safety at Roadworks cardholders;
- promptly provide the PSCS with information required for the Safety File;
- comply with directions from the PSDP and PSCS;
- report accidents to the HSA and to the PSCS if an Employee cannot perform his/her normal work for more than 3 days;
- comply, and ensure Employees comply, with site rules and the Safety and Health Plan including the Temporary Traffic Management Plan; e.g., keep safety zones clear of personnel, plant and material;
- identify hazards, eliminate the hazards, or reduce risks during construction;
- facilitate the site safety representative;
- ensure that relevant workers have a safety awareness card and a construction skills card where required, including the CSCS Signing, Lighting and Guarding Card and CSCS Health and Safety at Roadworks Card;
- appoint a safety officer if there are more than 20 persons on site or 30 persons employed;
- consult workers and safety representatives; and
- monitor compliance and take appropriate corrective action.

3.3.6 The Temporary Traffic Operations Supervisor

The Temporary Traffic Operations Supervisor must hold a valid SLG CSCS card. He/she should also be given the necessary site authority to direct other site operatives in the safe use of the traffic management arrangements.

A Temporary Traffic Operations Supervisor will be required to:

- supervise traffic management road works and be available at short notice to deal with issues at particular site locations;
- be on site when temporary traffic management signs and devices are being installed, modified or removed; e.g., a SLG CSCS cardholder is required on site when switching between traffic lights and STOP/GO operations; be on site to install traffic management arrangements diverting pedestrians or cyclists onto the roadway; perform inspections of the traffic management and record same; report issues or incidents relating to the temporary traffic management to the PSCS; and liaise directly with the Designer (TTM) where required.

3.3.7 The CSCS Health and Safety at Roadworks Cardholder

A Health and Safety at Roadworks CSCS cardholder is required to be present on site if a SLG CSCS cardholder is not present and construction works are taking place on the road. The Health and Safety at Roadworks CSCS cardholder is responsible for:

- making minor alterations to the temporary traffic arrangements as necessary, such as cleaning/correcting of devices and replacing devices that may have been moved or dislodged; and
- reporting incidents that affect the safety, health and welfare of operatives on site to his/her supervisor.

The Health and Safety at Roadworks CSCS cardholder's duties do not extend to modifying the traffic management arrangements at a road works site.

3.3.8 The Employee

The full cooperation of the road worker is necessary in order for duty holders to comply with relevant statutory provisions. Duties of the road worker include:

- taking reasonable care of his/her own safety and the safety of others;
- not engaging in improper conduct or interfering with or misusing any article used for securing safety, health and welfare on the site;
- not working under the influence of an intoxicant or substance that would affect his/her ability to work in a safe manner;
- cooperating with the Employer with regard to carrying out the requirements of the Construction Regulations ;(this includes complying with site rules and rules applicable to the road worker in the Safety and Health Plan);
- reporting to his/her Employer, PSCS or any responsible Contractor, without unreasonable delay, any dangerous plant or machinery, or any defect in the place of work which might endanger safety, health or welfare;
- using any personal protective clothing or equipment provided in the manner for which it was intended;
- not misrepresenting himself/herself with regard to training; and
- possessing a valid Safe Pass card and where applicable, a CSCS card; relevant cards should be available for inspection at all times on site.

Note: The Construction Regulations 2008 (Amendment) (No.2) do not prohibit Employees at road works from correcting a fallen sign, cleaning signs/cones or replacing a dislodged cone, nor do they prohibit Employees from assisting the cardholders in carrying out their roles.

General: Road workers should receive the appropriate training in order to take reasonable care of their own safety and the safety of others. They should be conscious of their unique working environment and never place themselves or others at risk by their actions or inactions. Road workers should be informed of any significant changes that may occur to the site layout and/or traffic management arrangements. Whether installing, modifying or removing traffic management arrangements or whether working within a works area protected by safety zones, the road worker must be aware of:

- the potential hazards associated with road works; and
- the importance of reasonable and practicable control measures required to mitigate the risk associated with such hazards.

Fitness for Task: Operatives assigned to traffic management duties should be suitable for the work they are assigned to carry out.

Working Hours: Fatigue reduces awareness and therefore increases the potential for accidents to occur, especially in a potentially hazardous working environment such as a road works site. In the interest of Employees' safety, Employers shall not allow excessive hours to be worked.

Personal Protective Equipment: Personal Protective Equipment worn by operatives working on roads must be based on risk assessment; however, the following equipment is normally used:

- class 3 safety jacket/top;
- safety boots;
- gloves;
- hard hats; and
- reflective leggings/trousers, where required.

3.4 Safety Documentation

3.4.1 Safety Statement

A Safety Statement is required under Section 20 of the Safety, Health and Welfare at Work Act 2005. A Safety Statement is an organisation's written programme to safeguard their Employees' safety and health while at the workplace and that of other people who might be at the workplace, including customers, visitors and members of the public.

It states how an organisation will ensure the safety and health of Employees, customers etc., and sets out the resources necessary to do so. The Safety Statement should influence all work activities, including:

- the selection of competent people, equipment and materials;
- the way work is done; and
- the manner in which goods and services are designed and provided.

It is essential to have a written Safety Statement and put in place the arrangements needed to implement and monitor the objectives identified in the Safety Statement. The Safety Statement must show that hazards have been identified, risks have been assessed, and risks have been eliminated or controlled. The Safety Statement must be brought to the attention of all Employees and others who may be exposed to a specific risk to which the Safety Statement applies.

3.4.2 Preliminary Safety and Health Plan

A Preliminary Safety and Health Plan is prepared by the PSDP in accordance with the requirements of the 2006 Construction Regulations. This plan provides the focus for development of the Safety and Health Plan for the construction stage. The Temporary Traffic Management Plan forms part of the Preliminary Safety and Health Plan.

The purpose of the Preliminary Safety and Health Plan is to identify, at a relatively early stage, any residual safety and health issues inherent in the project. The PSDP should ensure that the Preliminary Safety and Health Plan is prepared in sufficient time for the Client to provide the plan to any persons being considered or tendering for the role of PSCS.

Where applicable, the Preliminary Safety and Health Plan should include:

- **A description of the project**, including:
 - the nature of the works and programme details, e.g., describe the main phases and/or work elements in the project;
 - details of the Client, Designers, project supervisor and other consultants;
 - The extent and location of existing records and plans; e.g., location of underground services, etc.; and
 - arrangements for communicating with designers and others; e.g., pre-start meeting, weekly safety meetings, project contact details, etc.

- **Client considerations and management requirements**, including:
 - structure and organisation; e.g., organisational contact details to aid the communication process during the project;
 - safety objectives for the project and the arrangement for monitoring and review; e.g., informing the Contractor/PSCS of the required safety standard;
 - permits and authorisation requirements; e.g., road opening licences and hoarding licences must be obtained prior to commencement of construction works;
 - emergency procedures; e.g. in the event of a serious incident the PSCS must be informed and be familiar with the emergency procedures;
 - site rules, restrictions on contractors, suppliers and others;
 - activities on or adjacent to the site during the works; e.g., informing the PSCS that a utility company will be carrying out remedial works 300 meters from the project site;
 - arrangements for liaison between parties; e.g., in the event that the Temporary Traffic Management Plan needs to be revised, the responsible individuals should be named and their contact information made available; and
 - security arrangements; e.g., the site may need to be manned during the night.

- **Environmental restrictions and existing on site risks**, including:
 - safety hazards, such as:
 - live Traffic;
 - boundaries and access, including temporary access, arrangements for loading/unloading, hard standing, etc.;
 - adjacent land uses; e.g. a quarry could have heavy plant regularly passing the construction site that may cause additional problems if there is a deep excavation;
 - existing storage of hazardous materials;
 - location of existing services;
 - ground conditions;
 - existing structures;
 - health hazards, such as:
 - asbestos, including results of surveys;
 - existing storage of hazardous materials;
 - contaminated land, including results of surveys;
 - existing structures and hazardous materials;
 - health risks arising from Client's activities; and
 - significant design and construction hazards, such as:
 - design assumptions and control measures;
 - arrangements for the coordination of ongoing design work and handling design changes throughout the project;
 - information on significant safety and health risks identified during design; and
 - materials requiring particular precautions.

For more information on the content of a Safety and Health Plan, refer to HSA publication entitled *Guidelines on the Procurement, Design and Management Requirements of the Safety, Health and Welfare at Work (Construction) Regulations 2006*.

3.4.3 Construction Stage Safety and Health Plan

The Construction Stage Safety and Health Plan must be developed by the PSCS prior to the commencement of construction works. The plan should explain how the key safety and health issues will be coordinated on site. It must be relevant to the project and should be developed from the Preliminary Safety and Health Plan provided by the Client.

The developed Safety and Health Plan prepared by the PSCS is the foundation on which the management of safety and health of the works is based. Where applicable, it should include:

- the approach to be adopted for managing safety and health during the construction stage;
- the relevant sections of the safety statements prepared by different contractors;
- the specific control measures based on risk assessments for dealing with particular risks;
- other work activities taking place on site; e.g. maintenance works by a statutory undertaker;
- common arrangements; e.g., emergency procedures;
- arrangements for ensuring effective cooperation and coordination; e.g. weekly meetings scheduled with the supervisors of each contractor employed;
- measures to monitor compliance with the plan and with safe working procedures; e.g., regular safety inspections;
- arrangements for checking that persons on site have received appropriate safety and health information and training; e.g., CSCS card holder must be identified;
- arrangements for ensuring effective communications between all parties and arrangements for appointing a site safety representative;
- information and arrangements for the welfare of workers; and
- information on any changes that occur as work progresses.

The Safety and Health Plan must be kept up to date. As construction works progress, it should be modified and altered to reflect changing circumstances and requirements.

3.4.4 Safety File

Under the 2006 Construction Regulations, the PSDP must prepare a Safety File for the project and present it to the Client when the project is complete. The Safety File is developed by gathering information relating to safety and health from the main duty holders involved in the project.

The Safety File is a record of information for the Client/end user with emphasis on safety and health issues. The information it contains may assist those who are responsible for the road network with regard to any major safety and health risks that may need to be addressed during subsequent maintenance, repair and other construction works.

The Safety File would normally include:

- construction drawings, specification and bills of quantities, used and produced throughout the project;
- the design criteria implemented and details of any equipment and maintenance facilities provided;
- where applicable, documents produced by Contractors outlining operating and maintenance procedures and schedules for plant and equipment installed as part of any incorporated structure; and
- where appropriate, details of the locations of utilities and services, including emergency services.

Depending on the size and nature of the project, it may be advisable to compile the Safety File in two parts: one part for day to day use and the other for long term use. Liaising with the Client, Designers and the PSCS is paramount to ensure that the Safety File is handed back to the Client at the agreed time. The Safety File should be retained by the Client.

3.5 The Traffic Management Process

The Temporary Traffic Management Plan is developed using the same risk management process as outlined in Section 3.2. Duty holders with responsibility for design and implementation of the Temporary Traffic Management Plan as well as the provision of information to the Safety and Health Plan are established in accordance with Section 3.3 and 3.4.

A Temporary Traffic Management Plan shall be completed where road works require temporary traffic management. Temporary Traffic Management Plans provide a means of planning and implementing the traffic management arrangements that ensure the safety of road workers and determine the manner in which all likely road users are safely and efficiently conveyed through a road works site. Temporary Traffic Management Plans are strategic and normally form part of a project's Preliminary Safety and Health Plan. The Temporary Traffic Management Plan should be in proportion to the scale and complexity of the project being undertaken. Temporary Traffic Management Plans can therefore vary from readily recognised layouts to extremely complex designs.

While a formal project design brief may not always be required for minor works and routine maintenance operations, an appropriate risk assessment should always be carried out. For small-scale maintenance works, a set of standard traffic measures plus an indicative design may be provided to the Temporary Traffic Operations Supervisor.

For larger works and planned operations, site specific Temporary Traffic Management Plans may be required. These plans may include designed layouts which have been prepared under the co-ordination of the PSDP. On site the PSCS can adjust the plan to take account of the progress of the works. Should any such adjustments require design input, the PSCS may, as necessary, require the Designer (TTM) to review and/or modify the plan; the Designer (TTM) shall work under the co-ordination of the PSDP.

Construction sites are dynamic by nature and the Temporary Traffic Management Plan should be developed to take account of the sequence of works and type of project. Where changes to a project or to the sequence of works impacts on the temporary traffic management arrangements, these changes should be incorporated into the Temporary Traffic Management Plan and communicated to all relevant parties. The appropriate mechanism for communicating the Temporary Traffic Management Plan and any changes required should be specified in the Safety and Health Plan.

3.5.1 Traffic Management Design Process

Temporary Traffic Management Plans shall be prepared by a competent Designer (TTM) with experience in traffic management and road construction or civil engineering works, and having regard to the nature and complexity of the works.

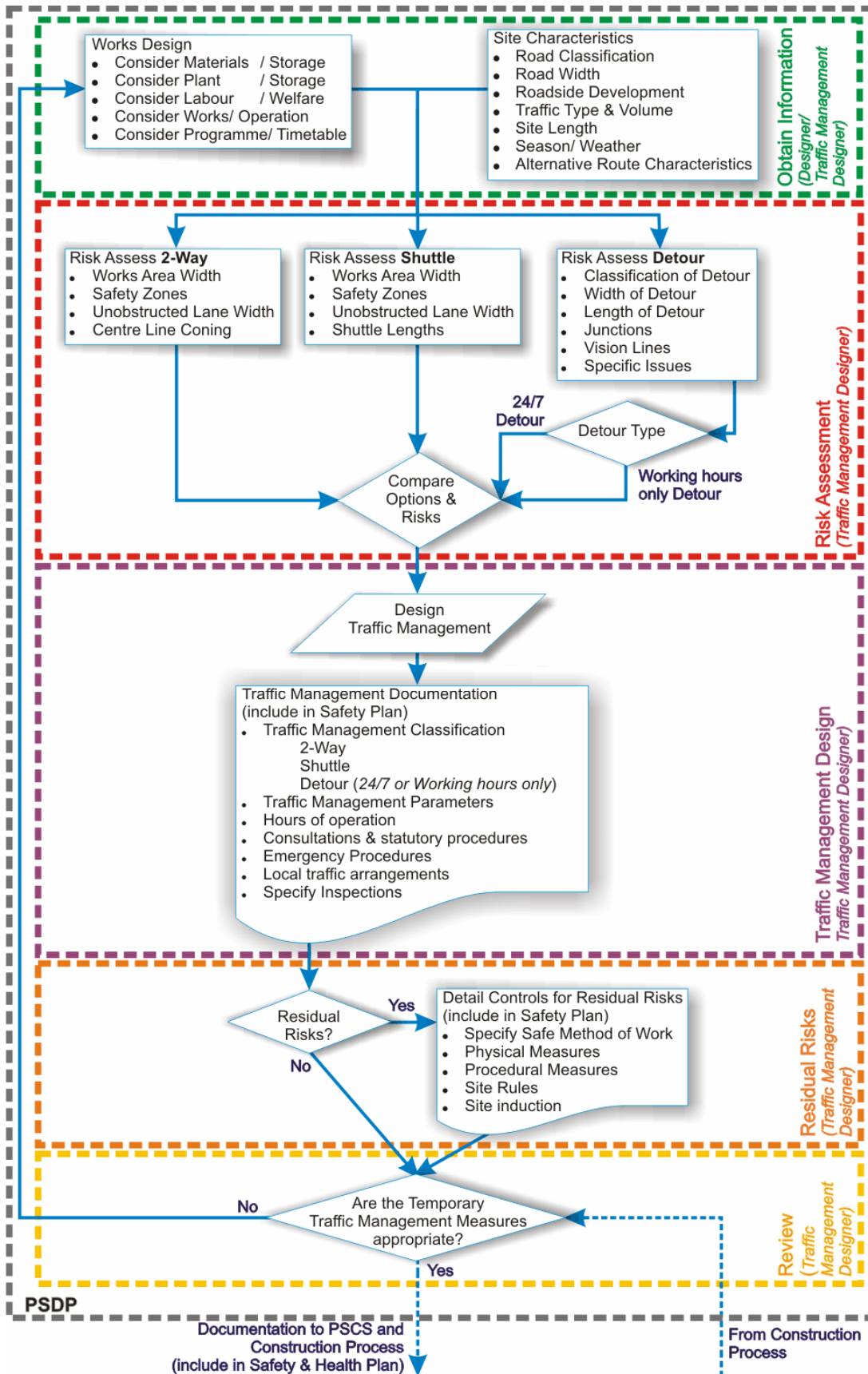
The following should be considered with a view to reducing risks particularly relevant to the design of a Temporary Traffic Management Plan:

- the possibility of workers carrying equipment across the live carriageway;
- the possibility of traffic management vehicles stopping in live traffic lanes;
- the use of technology or equipment to help avoid or mitigate risks;
- the provision of safe access/egress for personnel on site;
- the manoeuvres likely to be made by works vehicles;
- the specification of materials or equipment for use during the work;
- the establishment of safe working areas;
- the establishment of safety zones;
- the adoption of safe working practices;
- the provision of safe access to and through the road works site for vehicles and pedestrians;
- the implementation of a traffic control system aimed at keeping traffic delays to a minimum and also ensuring the safety of road workers on site;
- the preparation, in good time, of any requirements under road traffic legislation; and
- the needs of motorists, cyclists and pedestrians and especially any vulnerable road users.

Sufficient information regarding any risks identified during the preparation of the hazard identification and risk assessment process must be included as part of the safety documentation. The information provided should be explicit and, depending on the complexity of the project, may include:

- environment and location;
- road classification;
- road widths;
- length of works;
- roadside development;
- traffic volumes and types of road vehicles;
- speed limits;
- details of areas where sight lines are restricted;
- details of areas where safe working space is restricted;
- types of road surfaces;
- the weight of equipment and materials;
- sequencing of work;
- surrounding topography;
- services likely to be encountered; e.g., gas pipeline or electrical lines/ducts; and
- reference to relevant design standards and codes.

Traffic Management Design Process
(for symbol legend see Appendix A)



3.5.2 Construction Process

The implementation of the Temporary Traffic Management Plan is coordinated by the PSCS. In particular cases, e.g., where works are contracted out, the PSDP may specify that a Designer (TTM) will be required to develop the Temporary Traffic Management Plan. This Designer may be appointed during the construction stage. In this instance, the Designer (TTM) is still a designer and is therefore *coordinated* by the PSDP. The Designer (TTM) will *liaise* as necessary with the PSCS and Temporary Traffic Operations Supervisor to ensure that the Temporary Traffic Management Plan can be implemented.

Implementing the Temporary Traffic Management Plan: On receiving the Temporary Traffic Management Plan provided in the Preliminary Safety and Health Plan, the PSCS should:

- as necessary, further develop the plan (taking account of the Contractor's work activities); and
- adjust the plan to take account of the programming/progress of the works.

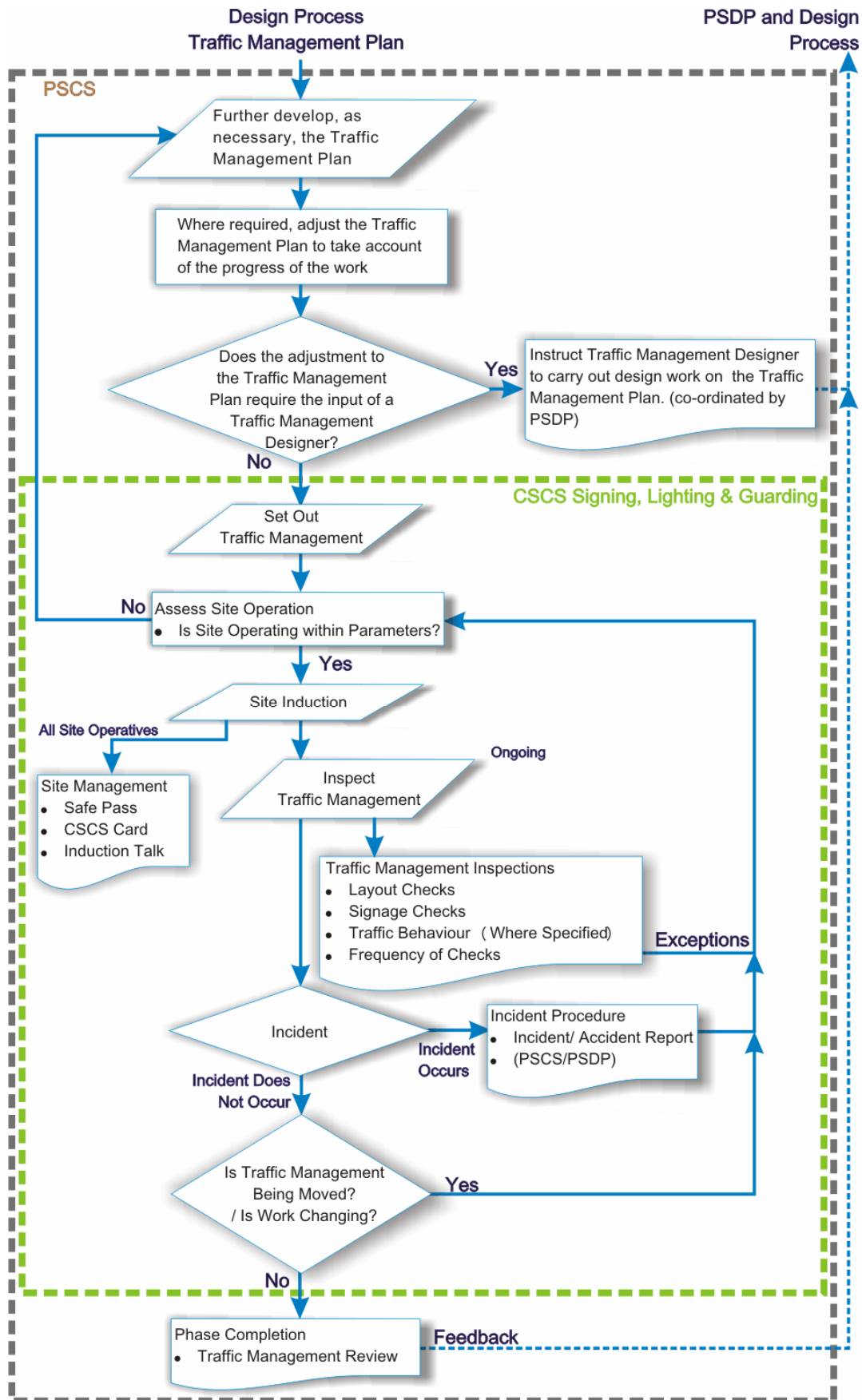
Note: Both these functions are compatible with a tendering procedure where a prospective PSCS develops a Temporary Traffic Management Plan based on the Temporary Traffic Management Plan provided with the Preliminary Safety and Health Plan prepared for the project and the tendering contractor's work proposals and programme. The developed plan is included and priced in the tender proposal.

The Temporary Traffic Management Plan is implemented at site level. This should be done by a competent contractor, taking the requirements of Regulation 97 of the Construction Regulations 2006 (as amended) into account. The Temporary Traffic Management Plan is part of the Safety and Health Plan and should include the safe systems of work necessary to implement the plan. If there is more than one contractor on site, the PSCS must coordinate the implementation of the Temporary Traffic Management Plan.

As the works progress and as required, it may be necessary for the PSCS to continue to develop the Temporary Traffic Management Plan; however, the PSCS should limit the development of the Temporary Traffic Management Plan to the parameters allowed for in the Temporary Traffic Management Plan provided in the Preliminary Safety and Health Plan. For example, if the Temporary Traffic Management Plan provided in the Preliminary Safety and Health Plan specifies a particular traffic management arrangement (e.g., shuttle working using temporary traffic signals), the PSCS should develop the plan in accordance with the specified arrangement. Should conditions deem it necessary to change arrangements or parameters specified in the Temporary Traffic Management Plan provided in the Preliminary Safety and Health Plan (e.g., replace shuttle working with a temporary road closure), the PSCS may require the Designer (TTM) to modify the plan to allow for said conditions; any such design work is coordinated by the PSDP.

The Temporary Traffic Operations Supervisor should carry out routine inspection of the traffic management arrangements and assess whether or not the site is operating within the traffic management parameters specified in the plan. Inspections should be documented. Where a site is not operating within these parameters the Temporary Traffic Management Supervisor should report any issues to his/her Employer or directly to the PSCS, depending on the type of site and/or project reporting structure concerned. If an incident occurs, relating to traffic management (ranging from traffic accidents to dangerous occurrences caused by speed to long traffic delays), the Temporary Traffic Operations Supervisor should report the incident to the PSCS and take corrective action, where necessary. If the temporary traffic management layout is moved or changed, the Temporary Traffic Operations Supervisor must check to ensure that design parameters and other requirements (such as; vision lines, safety zones and lane widths etc.) specified in the Temporary Traffic Management Plan are maintained.

Traffic Management Construction Process
(for symbol legend see Appendix A)



4. Planning and Design

4.1 Planning the Works

This section highlights issues that should be considered by the Designer (TTM) during the planning phase of the works. In many cases, decisions that ultimately determine how safely the temporary traffic management arrangements can be designed and/or implemented are made when the works are being planned.

4.1.1 General Principles of Temporary Traffic Management Design

In the operation and maintenance of road networks, it is necessary to install temporary traffic management measures to facilitate road works, routine maintenance works and, on occasion, emergency works.

The primary objective in the planning and design of all road works activities is always:

- to maximise the safety of the workforce and the travelling public.

The main secondary objective is:

- to keep traffic flowing as freely as possible and reduce the impact of the road works to a minimum.

Local Authorities, PSDPs and Designers (TTM) must be conscious of these objectives during all stages of the design process and particularly when considering the traffic management requirements of the design brief.

Safe and efficient traffic management is founded upon the following principles:

- development of traffic management proposals in accordance with the principles of prevention (see Section 3.2.3) and by following the hierarchy of risk prevention and protection;
- provision of clear and early warning of obstructions in the roadway;
- optimisation of road space and the provision of an adequate safety zone and work space at work locations;
- provision of clear directions relating to decisions/actions required from road users;
- consideration for the needs of vulnerable road users;
- minimisation of potential conflict between road users;
- provision of credible traffic signs and temporary requirements; and
- provision of appropriate speed limits and restrictions.

Safe System of Work: The live carriageway of any roadway is a dangerous working environment. In particular, operatives may need to work on the live carriageway without the protection afforded by the fully installed layouts when traffic management arrangements are being set up, changed, maintained or removed. It is therefore essential that the temporary traffic management operations are planned, designed and implemented in accordance with a safe system of work.

Safety Zones: Longitudinal and lateral safety zones are provided around a defined works area in order to provide a safe system of working at road works. The appropriate length and width of the safety zones are determined by the applicable speed limit or, where appropriate, the

observed speed. Site characteristics may also need to be taken into consideration. The only activity permitted in a safety zone is the maintenance of traffic management arrangements. All other activities, including storage of materials and construction vehicles, are prohibited. The demarcation of safety zones needs to be clear.

Traffic Signs and Site Characteristics: Traffic signs and other apparatus for the control of traffic must conform to the requirements of Chapter 8 of the Traffic Signs Manual (hereafter referred to as Chapter 8). The signing layout should take the individual features of the site into consideration. This includes proximity to junctions and facilities such as schools, churches, retirement communities, sports grounds, factory entrances etc. Additional signs may also be required where sight lines are restricted by poor existing alignment.

Notwithstanding the above, it should be noted that too many signs can be confusing for the driver. The signing should always convey accurately to road users, including pedestrians, exactly what is happening and what is expected of them. These objectives are encapsulated in the W-I-D-E approach to signing at road works:

Warn	the road user of the forthcoming works
Inform	the road user of the characteristics (e.g., roadway narrows, traffic control ahead etc.)
Direct	the road user safely through the site by means of arrows, cones, etc.
End	clearly sign the end of the road works site

Lane Delineation: Obstruction of part of a roadway may require drivers to carry out unusual manoeuvres, so drivers must be given a clear indication of the path they should take. Temporary delineation in the form of traffic cones, cylinders, barriers etc. should be used for this purpose. Existing roadway markings and studs in conflict with any temporary lane alignment should be removed or masked, unless traffic is to be confined to a single lane delineated by cones or other suitable devices on each side.

Lane Width and Traffic Control: Available roadway width, applicable speed limit and traffic volume are used to determine the most appropriate method of traffic control. Site length, project duration and site characteristics may also need to be considered. The use of established optimum lane widths for single and two-way traffic layouts will assist in ensuring the safe and efficient flow of traffic past the works.

Note: Refer to Chapter 8 for guidance on traffic management design for more advanced types of road works (multi-lane works, mobile lane road closures, crossovers, contra-flow or tidal flow operations).

4.1.2 Design Brief

The first decisions about the safe management of the site are made during the preparation of the project design brief. In particular, the project design brief should allow sufficient time for the subsequent design and implementation phases of the project. While a formal project design brief may not always be required for minor works and routine maintenance operations, a risk assessment must be carried out for all stages of the project, bearing in mind the potential hazards to the workforce and the public. The preparation of the traffic management element of the design brief should include the following:

- liaison with adjacent Local Authorities with a view to avoiding conflicting concurrent works and/or diversions in close proximity;
- consideration of other necessary or desirable works that could be carried out as part of the primary, planned works;
- programming of the works, where feasible, to avoid higher than normal or sensitive traffic flows (seasonal festivals, bank holidays, national exams, funerals etc.);
- informing of public transport operators using the affected route;
- liaison with the Gardaí and other emergency services where appropriate; and
- consideration of requirements under the Roads Act.

4.1.3 Local Authority Requirements

Local Authorities may impose specific requirements and be aware of constraints that will have a bearing on the management of the site and may influence the traffic management design. These may include the following:

- minimum carriageway/lane availability requirements;
- capacity and congestion issues;
- working hours and constraints;
- speed limits;
- road closures and diversion route requirements;
- co-ordination with other planned road works;
- emergency services access requirements;
- legal agreements and land restraint requirements, including public access to frontages etc.;
- incident management arrangements and provisions for vehicle recovery;
- winter maintenance arrangements;
- publicity requirements (e.g., press release, radio announcements etc.);
- abnormal load movement requirements; and
- vulnerable road users and special needs groups' requirements.

Where works have an impact on road networks under the control of an adjoining Local Authority, agreement should be reached between the Authorities with regard to access, signing, diversion routes, scheduling of adjacent concurrent works etc. and any relevant items listed above.

4.1.4 Emergency Services

In certain circumstances, the Gardaí, ambulances services and other specialist services (e.g., coastguard, lifeboat crews, mountain rescue etc.) may need to be consulted in relation to the timing and layout of the works and the emergency routes through the site. However, given their limited scale and duration, this is not likely to be a routine requirement for typical annual minor works or routine maintenance operations.

Where appropriate, the Local Authority should liaise with the Gardaí with regard to the implementation of traffic management and enforcement issues. Other points to be considered that may influence the traffic management design include:

- Garda enforcement of speed limits at road works and the use of speed cameras;
- arrangements for routing emergency vehicles;
- incident management procedures; and
- speed control measures.

4.1.5 Statutory Undertakers

On some schemes it will be necessary for Local Authorities and statutory undertakers to coordinate their works. This could include programming of temporary traffic management and arrangements for the statutory undertaker or its Contractor.

Short duration emergencies (lasting only a few hours) dealt with by utility companies will normally be signposted and guarded by them, possibly in conjunction with the Gardaí. Where emergency and remedial works are expected to be of longer duration, the relevant Local Authority should be consulted as soon as possible in order to agree an appropriate signing

layout for the work. The responsibility for the signing layout and traffic management arrangements remains with the utility company.

4.1.6 Site Information (Design Process)

Any special features that may impact on the operational safety of the works will need to be taken into account during the design. Existing Local Authority information pertaining to the site should be made available to those responsible for the traffic management design and the traffic management operation. Relevant information could include:

- information on traffic flows and patterns, peak periods, etc.;
- existing speed limits and observed speeds;
- information on frequency of pedestrian usage and usage by other vulnerable road users;
- availability and suitability of alternative routes for diverted traffic;
- availability and suitability of alternative routes for pedestrians and vulnerable road users;
- details of traffic sensitive roads or sites with specific engineering difficulties;
- location and nature of permanent signs and roadway markings;
- information about existing safety barriers;
- accident records;
- presence of underground and/or overhead services;
- presence of railway crossings or railway signalling equipment;
- local weather conditions, e.g., susceptibility to flooding, fog etc.;
- availability of safe refuge for vehicles used in association with temporary traffic management; and
- needs of local residences and businesses.

4.1.7 Programming

The detailed programme is usually developed during the planning of the construction works. However, the PSDP and Designer (TTM) should consider the need for a realistic programme when establishing contract length and considering financial, time, resource and other constraints (e.g., closedown during builders' holidays, weather conditions etc.) as well as the impact of any traffic control measures on the road user.

4.1.8 Traffic Disruption

The primary objective of temporary traffic management is to maximise the safety of the workforce and the travelling public. However, the Designer (TTM) also has a responsibility to minimise traffic delays and disruption. Road works schemes involve a compromise between getting the work done quickly and safely and keeping the traffic flowing freely and safely. It is important to plan activities (including placement and removal of traffic management arrangements) to optimise work efficiency and safety, and to minimise traffic delay, congestion and general inconvenience to the road user.

Maintenance works should be undertaken in the minimum time, taking up the minimum road space, but without compromising safety. Lane closures should be avoided where possible during peak traffic flow time, especially on busy commuter routes. Where practicable, additional resources or time-reducing techniques should be employed.

Traffic management arrangements should not be left in place for longer than necessary. They should be installed only when the works are about to commence and they should be removed in a timely manner once the works are completed.

4.1.9 Basic Space Considerations

Space at road works sites is often at a premium. Available space should be apportioned with a view to ensuring that the works and traffic management scheme can be carried out in a safe manner while minimising disruption to traffic. In particular, the PSDP and Designer (TTM) should consider the following:

- number and width of temporary traffic lanes, including use of hard shoulder;
- safety zone and working space requirements;
- adequacy of work-space for the proposed operations, and storage of materials and equipment, including consideration of the selection of suitable plant and machinery to do the work planned;
- arrangement for access to and from the site;
- option of using static or semi-static traffic management;
- option of using convoy working where lateral safety clearance is restricted;
- lane restrictions and use of temporary speed restrictions; and
- spacing of temporary road works signs and installation of signals and barriers.

Note: In many cases, the PSDP and the Designer (TTM) will be one and the same, especially for small-scale projects.

4.1.10 Detailed Traffic Management Design

The objective of the detailed traffic management layout is to demonstrate a practical solution to facilitate safe passage of traffic, including pedestrians and vulnerable road users, past the works and to ensure that the safety of the workforce is not compromised. A detailed and objective overview of all factors outlined heretofore (e.g., design brief, consultation, site constraints, etc.) is required to ensure production of a composite solution. In addition to familiarity with the appropriate design standards and advice notes, knowledge of the site and the ability to visualise the traffic flow are most important.

The Designer (TTM) carries responsibility for the safety and health implications of the Temporary Traffic Management Plan (see Section 3 of this document) and must always consider the implications of installation, modification, maintenance and removal of the traffic management arrangements. As part of the design, the Designer (TTM) should advise on the minimum standard of maintenance and inspection required to maintain the safety and integrity of the design. The level of inspection required will vary with location and type of works.

For small-scale works (e.g. routine works/ semi-static works), a set of standard traffic measures plus an indicative design can be provided to the Temporary Traffic Operations Supervisor. The Temporary Traffic Operations Supervisor will then carry out a site risk assessment and modify the standard traffic measures, as required, to suit actual site conditions.

Important Note: The Temporary Traffic Operations Supervisor is the person on site with direct responsibility for implementation, maintenance and removal of temporary traffic arrangements.

4.1.11 Post Design Review

On completion of the Temporary Traffic Management Plan, the proposals, as a whole, should be reviewed by the PSDP and formal risk assessments undertaken and coordinated by the PSDP. At this stage, the programme for the works should be finalised and the traffic management requirements confirmed. The Temporary Traffic Management Plan should be clearly set out in scheme-specific documentation, drawings and specifications, as appropriate. The documentation should not include any standard drawings which do not apply to the

scheme. For complex schemes, the post design review may include an independent road safety audit.

For small-scale works the Temporary Traffic Operations Supervisor should carry out a site risk assessment and use a set of standard traffic measures, modified as required, to suit actual site conditions.

The post design review also provides an opportunity to check that the traffic restrictions required by the Temporary Traffic Management Plan are appropriately covered by Manager's Order and that any approvals for equipment or other special authorisations are in place.

4.2 Lane Closure Design

This section provides guidance on site layout design and how traffic flow is directed through or around the works site. Parts of the following guidance may not necessarily apply to all situations but, where appropriate, the criteria should be followed. **Refer to Section 4.4 – Lane Closure Options for site layout design parameters.**

4.2.1 Sight Lines, Taper Requirements and Positioning

Sight lines need to be considered from both the traditional road design perspective where the road users' needs are considered, and also from the operatives' point of view (e.g., design of works, site access and egress). The PSDP should ensure that layouts consider the sight lines from both points of view and endeavour to ensure that provision of forward visibility and signing does not compromise the operatives' safety.

A taper is the required length for the reduction in width of a single lane or hard shoulder. The required taper is calculated using the specified rate of taper multiplied by the reduction width. The rate of taper is dependent on the applicable speed limit. The taper area should be treated the same as a safety zone with regard to restriction of use and access. Where shuttle working is required to facilitate works on a single carriageway road, a 45 degree taper shall be used on both approaches in conjunction with a suitable method of traffic control (refer to Section 4.5 – Traffic Movement Options).

Site characteristics, such as alignment and forward visibility, need to be taken into consideration when determining the appropriate taper length and position. Tapers should be situated where sight lines in both the vertical and horizontal planes are favourable. The location of the taper should not be decided without the benefit of a risk assessment and a full appreciation of the site.

Safety issues pertaining to placing, erecting and removing advanced warning signs and cones in the taper, and the availability of safe parking for traffic management vehicles may also be factors in deciding the taper position. On roads without hard shoulders, the traffic management should be designed so that taper positions are identified which facilitate the provision of advanced signing without the need for stationary or slow moving vehicles to encroach into live lanes when pre-placing, installing or removing traffic management equipment.

Where road works are situated near a bend in the road, and especially a left hand bend, it is essential that adequate advanced warning is given to the approaching drivers because of the reduced visibility. An early indication should be given of the path that must be followed to avoid any obstruction in the carriageway.

Where applicable, the hard shoulder should always be closed as part of any near-side lane closure. It is recommended that the length of the closure of the hard shoulder be kept to a minimum as it is an area for traffic to use in an emergency. To deter traffic from using the hard

shoulder in advance of the works, angled lines of cones (3 or 4 cones across the hard shoulder) may be used 25 m to 50 m in advance of the start of the taper.

4.2.2 Safety Zones

Safety zones are established around the works area for the protection of the workers and to ensure a safe system of working can be provided. The lateral safety zone is measured from the front (traffic edge) of the cone to the edge of the works area. This measurement also applies to barriers where barriers are used instead of cones but are not required to function as a safety barrier (lateral safety zone requirements for safety barriers are specified in Section 4.2.7). The required width of the lateral safety zone is dependent on the applicable speed limit. In so far as possible, it is recommended that lateral clearance be provided in accordance with the requirements of the road's permanent speed limit. For continuously progressing operations, such as road strengthening and resurfacing operations, the boundary between the safety zone and the works area may be marked using temporary lining or an additional row of cones (traffic tape may also be used). For operations at a fixed location, the boundary between the safety zone and the works area should be marked by a barrier or fence.

The longitudinal safety zone is measured from the end of the taper to the start of the works area. The required length of the longitudinal safety zone is also dependent on the applicable speed limit. It is recommended that longitudinal clearance be provided in accordance with the road's permanent speed limit regardless of the imposition of any Road Works Speed Limit.

In general, the practice of introducing a Road Works Speed Limit for the express purpose of reducing the required lateral clearance is not encouraged. Where this exceptional provision is invoked (e.g., where roadway width is restricted by bridges, tunnels and other structures), provision must be made in the Temporary Traffic Management Plan to ensure that the Road Works Speed Limit is observed.

On roads where width restrictions prevent the provision of the appropriate lateral clearance and traffic diversion would be impractical or equally hazardous, traffic speed must be reduced to 20 km/h and an agreed safe method of working imposed on the site (see Section 4.5.6 on Convoy Working).

4.2.3 Signing

The Designer (TTM) should refer to Chapter 8 for a comprehensive list of available signs; guidance on correct use and placement of signs; and required standards and specifications for signs (colours, chromaticity, luminance, retro-reflectivity, size, material, text etc.). All signs used at temporary road works shall be in accordance with the Traffic Signs Manual.

The Designer (TTM) must consider all aspects of signing, including:

- temporary diversion signs;
- driver information signs (including those placed in advance of the works);
- traffic management signs;
- directional signs;
- regulatory signs;
- warning/cautionary signs;
- variable message signs (VMS), where appropriate.

It should be a requirement (included in the contract) that signing equipment must comply with the relevant Irish or European Standard (refer to the Traffic Signs Manual for relevant standards).

The number of temporary diversion signs may be extensive and the location of each sign may need to be specified. It is important to ensure that temporary signs are consistent with permanent signs.

The choice and location of signs should take account of existing services and sight lines and should accord with actual site conditions. Methods used to secure temporary traffic signs should be sufficient to prevent them from falling or being blown into live traffic lanes.

Driver information signs may be required by Local Authorities to inform road users of the reason for the works and to explain delays. Variable message signs may be of particular use in informing drivers about exceptional delays. A variable message sign should be carefully located so as not to cause a road hazard. The sign should be set back from the edge of the running carriageway by a distance greater than or equal to the width of the lateral safety zone applicable to the works. When a variable message sign is located in the hard shoulder, an angled line of cones (3 or 4 cones across the hard shoulder) should be placed 25 m in advance of the sign and immediately in front of the sign.

Access to and egress from the works area requires signing both for the purpose of directing works traffic and of alerting other road users of the likelihood of works vehicles making unexpected manoeuvres. All temporary traffic signs should be placed such that they:

- do not obstruct sight lines;
- do not obstruct other signs; and
- are themselves not obstructed by other signs.

4.2.4 Edge Strengthening and Temporary Widening

The Designer (TTM) may include for preparatory roadway widening works in order to provide the required lateral clearance for the main works. When this strategy is adopted:

- the extended surface should be capable of accommodating the expected traffic load;
- existing services should be located and protection measures discussed with utility companies, as necessary; and
- environmental concerns and reinstatement requirements should be reviewed.

4.2.5 Lane Widths

Two-way operation of traffic should be maintained on single carriageway roads, where possible (see Table 4.2.1 below).

When this cannot be achieved, the through passage should be further restricted by the use of cones to a single traffic lane not less than 3.0 m but not exceeding 3.7 m, and alternate one-way traffic (shuttle working) should be introduced using the most appropriate method of traffic control.

When the traffic volume is low and expected to consist only of cars and other light vehicles, a desirable minimum of 2.75 m and an absolute minimum of 2.5 m may be used. Whenever this situation arises, advanced warning of the narrow lanes should be given, using appropriate signs.

Table 4.2.1 – Minimum carriageway widths for two-way and shuttle working with traffic control

	Normal traffic including buses and HGVs	Cars and light vehicles only
Two-way working	6.75 m desirable minimum 6.0 m absolute minimum	5.5 m desirable minimum 5.0 m absolute minimum
Shuttle working	3.7 m maximum 3.25 m desirable minimum 3.0 m absolute minimum	3.7 m maximum 2.75 m desirable minimum 2.5 m absolute minimum

Note: Lane widths between 2.75 m and 3.25 m should be avoided where cyclists are likely to pass through the site on a regular basis. Refer to Chapter 8, Section 8.3.11 for further guidance on provisions for cyclists and pedestrians.

4.2.6 Temporary Lane Delineation

Obstruction of part of a roadway may require drivers to carry out unusual manoeuvres, so drivers must be given a clear indication of the path they should take. Temporary delineation in the form of traffic cones, cylinders or barriers etc. should be used for this purpose. Existing roadway markings and studs in conflict with any temporary lane alignment should be removed or masked, unless traffic is to be confined to a single lane delineated by cones on each side. Temporary traffic management signs and cones shall be sized in accordance with Table 4.2.2 below.

Table 4.2.2: Sign and cone sizes for temporary traffic management arrangements

Permanent Speed Limit	Sign Size (diamond or circular)	Cone height
30, 50 or 60 km/h (Level 1 or 2)	600 mm	750 mm
80 or 100 km/h (Level 3)	600 or 750 mm	
80 or 100 km/h (Level 4)	750 or 900 mm	

Note: 450 mm cones are permitted for works such as roadway marking and surveying on single carriageway roads.

A row of cones at 6 or 12 m centres (see Tables 4.4.4 through 4.4.6 for cone spacing requirements) should be used to delineate the centreline of unmarked surfaces on roadways wider than 7.3 m. This applies to temporary surfaces as well as newly completed permanent surfaces (e.g., DBM, HRA and surfaced dressed surfaces). Depending on the length, duration and complexity of the works, temporary carriageway markings and/or temporary reflecting roadway studs may also be used to indicate the edge of the route to be followed.

Temporary roadway studs may facilitate the installation of a temporary layout in poor weather conditions; however, they are not recommended for periods longer than three months and must not be utilised for more than one application.

Note: Steady state lamps should be used in unlit areas (blinking/flashing lamps should only be used at an isolated hazard location). Maximum longitudinal lamp spacing is 12 m and maximum lamp spacing at taper is 6m.

4.2.7 Temporary Safety Barriers

Obstructions and excavations should be adequately guarded at all times. Barriers may be used to protect all persons from roadside hazards, obstructions and excavations, and/or for the protection of the workforce from errant vehicles.

Where it is evident at the design stage that temporary safety barriers will be necessary to protect the workforce or road users, their use should be specified as part of the design. The Designer (TTM) should take account of the need to flare approach lengths of barriers away from oncoming traffic. When specifying the use of barriers, the implications for emergency service access and passage of wide load vehicles should be considered. The duration of the works relative to the risk associated with the installation of the barriers should also be assessed.

Designers (TTM) also need to take into account speed limits and the degree of deflection which may occur in the event of an impact. In determining whether to include safety barriers, the PSDP needs to undertake a risk assessment of the situation.

The performance parameters of the safety barrier (containment level, impact severity level and working width) should be selected to suit the particular requirements of the site. The barriers must conform to EN 1317. The containment level shall be normal, higher or very high as appropriate to the circumstances. Refer to NRA TD 19 and IS EN 1317.

The position of the barrier should allow for the required lateral safety zone. The width of the lateral safety zone should be per the design parameters set out in Tables 4.4.4 through 4.4.6 of this document or the deflection width for the safety barrier as specified by the manufacturer, whichever is greater.

The design and layout should adhere to the manufacturer's requirements to ensure the temporary safety barrier acts as intended on impact. Once in position, site staff shall not move safety barriers without prior agreement from the Designer (TTM).

The carriageway still in use alongside temporary safety barriers should be clearly defined by temporary roadway markings, studs or other appropriate means (e.g., row of cones between barrier and live traffic). Where the length of temporary barrier exceeds 50 m, reflective strips or steady state lamps should be placed at 12 m intervals along the line of the barrier.

4.2.8 Use of Temporary Surfaces

The primary methods of ensuring the safe passage of road traffic through the site should be by the use of appropriate signage and lane delineation. All temporary road works signs shall be used in accordance with the requirements of Chapter 8.

The Temporary Traffic Management Plan should include for specific arrangements to Warn and Inform the road user of the condition of the temporary surface and the need, where necessary, to reduce speed accordingly. Temporary lane delineation should be provided (see Section 4.2.5 and 4.2.6 above) to Direct the road user over the temporary surface.

Live traffic may be exposed to temporary surfaces during road works where traffic is required to travel on construction layers (e.g. road base and binder course surfaces) or where traffic is directed over areas of the carriageway not normally used to convey traffic. Depending on technical properties, including skid resistance, the appropriate travel speed over a temporary surface may be lower than the prevailing speed limit.

Where traffic is exposed to a temporary surface and the appropriate travel speed over the temporary surface is lower than the prevailing speed limit, Cautionary Speed Plates or a Road Works Speed Limit should also be used. In the majority of cases, a Cautionary Speed Plate will be used to communicate the appropriate speed to the road user; however, in certain circumstances a Road Works Speed Limit may be used (see Section 4.3.1).

Where a temporary surface is isolated (e.g., road crossing, patch repair or manhole reinstatement works), an assessment of the risk posed to live traffic by the isolated temporary surface may conclude that the use of a Cautionary Speed Plate or Road Works Speed Limit is not appropriate.

The appropriate travel speed through the site may also be less than the permanent speed limit if the temporary traffic management arrangements result in reduced geometric or surface condition standards. Where areas of the carriageway that are not normally used to convey traffic are brought into operation, the adequacy of such temporary surfaces should also be considered with respect to the following:

- cross fall/roadway camber;
- location of gullies, channels, manhole covers and other ironwork;
- clearances where traffic runs on edge strengthening or hard shoulder (e.g., proximity to safety barrier, light standards etc.);
- surface condition (e.g., need to sweep the surface, skid resistance, planed out sections, etc.);
- length and duration of exposure to temporary surface; and
- impact of expected temporary traffic loads (e.g., hard shoulders may need strengthening, manhole covers may need to be upgraded, etc.).

Appropriate travel speeds for temporary surfaces should be based on guidance issued or authorised by the DoT and the NRA. Traffic management geometry should be in accordance with the design parameters prescribed in Chapter 8.

Some examples of appropriate use of signage and Cautionary Speed Plates are outlined below:

The 'Slippery Road' sign (WK 072) should be considered for use in conjunction with the 'Unfinished Road Surface' plate (P 085) and/or Cautionary Speed Plate signage to indicate that final surfacing has not yet been laid. Particular attention should be given to the programming and contractual arrangements for planing, pavement strengthening and resurfacing work so as to minimise the periods that elapse between these operations. All reasonable steps should be taken to reduce the hazards in the periods when temporary running surfaces are in use. Longitudinal steps should be avoided. If this is not possible, longitudinal steps of more than 50 mm should always be marked with a line of cones. The 'Slippery Road' sign may also be required where mud, clay etc. is deposited on the roadway; however, the provision of the sign does not absolve the Contractor of its obligations under the Roads Act. The Contractor must also make every reasonable effort to reduce the hazard to a minimum by carrying out regular roadway washing and/or brushing.

The 'Hump or Ramp' sign (WK 070) should be used to warn the approaching driver of the presence of a hump in roadway alignment due to road works or traffic calming measures. When used as a traffic calming measure, the gradient and length of the ramp will be dictated by the speed at which vehicles are expected to traverse it and, where possible, the ramp should be constructed at right angles to the vehicle path.



Where traffic is exposed to different layers of overlay material, the 'Uneven Surface' sign (WK 071) should be used to indicate that there is an uneven surface for vehicles. Where newly laid unbound material is exposed to live traffic, the 'Uneven Surface' sign should be used in conjunction with a Cautionary Speed Plate of 25 km/h. It may also be accompanied by Plate P

080 (Slow). Short duration exposure may be unavoidable due to the nature and sequence of the works; however, works should be scheduled to minimise any such exposure.

The 'Loose Chippings' sign (WK 073) should be used during surface dressing operations to warn of the likelihood of loose chippings on the carriageway. It should be retained in position along with Cautionary Speed Plate signage during the period that the chippings are being embedded by the traffic and until sweeping is completed (see Section 4.6.2 for further guidance on surface dressing). It may also be accompanied by Plate P 080 (Slow). Where it is considered necessary to warn drivers of soft verges, the 'Soft Verges' sign (WK 074) may be used.

4.2.9 Transition Sections

The road layout at the transition between single and dual carriageway roads, and vice versa, can vary considerably. Therefore, particular care is required when designing traffic management for works in the vicinity of such locations. In general, signing should be based on the speed and nature of the approach road. This document does not address dual carriageway or motorway working. Refer to Chapter 8 and other relevant documents for guidance on dual carriageway, motorway and 2 plus 1 road works.

4.3 Traffic Movement Design

This section provides guidance on traffic movement and how traffic flow, including construction traffic and emergency services, is controlled through or around the works site. Parts of the following guidance may not necessarily apply to all situations but, where appropriate, the criteria should be followed.

4.3.1 Speed Limits at Road Works

Works should be designed to minimise the risks to road users and the workforce. Safe systems of work at road works are achieved by the provision of safety zones around the works area using appropriate signage and delineation methods. In certain circumstances, it may also be beneficial to introduce a temporary speed restriction to further reduce the risks.

In particular, the use of a Road Works Speed Limit Order may be appropriate where works of a significant nature and duration are undertaken on a high-speed carriageway (greater than 60 km/h). For works of a significant nature and duration, a Road Works Speed Limit should be applied while a hazard exists that reduces the appropriate travel speed through the site below that of the permanent speed limit.

Under the Road Traffic Act 2004, City and County Managers have powers to make a Road Works Speed Limit Order for the purpose of applying a speed limit to a part of a road where road works are being carried out. This process requires consultation with the Gardaí and public notification. Consequently, it is important that the need for a Road Works Speed Limit Order be considered well in advance. The design programme for the works should make provision for the time required to obtain necessary Manager's Orders. Only speed limits set out in the Road Traffic Act 2004 (30, 50, 60, 80 or 100 km/h) can be selected as a Road Works Speed Limit. On national roads, the consent of the National Roads Authority is required for a Road Works Speed Limit Order.

In general, it is recommended that any mandatory speed reduction introduced at road works on high-speed roads should not exceed two steps below the permanent speed limit (e.g., a permanent limit of 100 km/h would be reduced to a Road Works Speed Limit of 80 or 60 km/h). A Road Works Speed Limit should not normally be less than 50 km/h on single carriageway

roads; however, in certain circumstances, the temporary design parameters of the road may necessitate the application of a greater speed reduction.

Important Note: A Road Works Speed Limit Order requires a predefined extent and duration (not exceeding 12 months). It is in force for the specified duration, irrespective of whether road works are active. Due to these precise requirements, there may be circumstances where the use of such an Order is not appropriate. In particular, where the benefits of a Road Works Speed Limit Order are outweighed by a corresponding adverse effect on traffic flow, driver confidence and credibility of temporary traffic management arrangements, the use of a Cautionary Speed Plate should be considered. A suitable Cautionary Speed Plate can be applied at the required location and for the required duration without any unnecessary adverse impacts on traffic flow beyond the active location or outside of working hours.

Speed restrictions should extend throughout the works area on single carriageway roads to a point 45 m beyond the end of the temporary traffic management arrangement. Sign WK 001 shall be positioned before the sign displaying the Road Works Speed Limit and shall have a supplementary plate stating the distance to the start of the road works taper. Similarly, sign WK 001 with a supplementary END plate shall be positioned before the permanent speed limit.

For single carriageway roads, a temporary speed restriction should not be introduced where the length of the restriction would be less than 400 m. At sites where the length of road affected is 800 m or longer, repeater signs should be placed at regular intervals to encourage compliance. Temporary speed restriction signs must be erected in accordance with the requirements of Chapter 8. Any existing signs that are not applicable during the course of the works must be removed or covered with opaque material.

Where it is impractical to apply a Road Works Speed Limit (e.g., for unpredictable maintenance works, short duration works etc.) or where the desired speed limit is below any enforceable limit, consideration should be given to the application of a Cautionary Speed Plate. Cautionary Speed Plates shall be selected from the following list: 25, 35, 45, 55, 65 or 75 km/h. These speeds are deliberately different from regulatory speed limits. Very slow speeds should not be used unless absolutely necessary (e.g., surface dressing operations or convoy working).

Sign WK 001 shall be positioned before the sign displaying the Cautionary Speed Plate and may have a supplementary plate stating the distance to the start of the road works taper.

Where the use of a Road Works Speed Limit is included in the Temporary Traffic Management Plan, the Designer (TTM) should involve the Gardaí early in the design stage to secure agreement on enforcement issues and the placement of speed cameras and signs. Road Works Speed Limits can only be enforced where they are correctly applied in accordance with the Road Traffic Act 2004 (see Appendix D). The limits of any temporary speed restriction must correspond to those specified in the Manager's Order. Under road traffic legislation, the road user has a responsibility to observe Road Works Speed Limits and Cautionary Speed Plates.

4.3.2 Design Speed for Traffic Management Arrangements

It is important that the limitations of temporary speed restrictions as a protection, both of persons working on the site and the travelling public, are realised. Primary means of protection should always be provided by means of signing and delineation (including safety zones) rather than a temporary speed restriction.

In general, traffic management arrangements should be designed on the basis of the permanent speed limit prevailing. The practice of introducing a Road Works Speed Limit for the express purpose of reducing the required lateral clearance (or other design criteria) is not encouraged. Where this exceptional provision is invoked (e.g., where roadway width is restricted by bridges, tunnels and other structures), provision must be made in the Temporary Traffic Management Plan to encourage compliance with the Road Works Speed Limit. Provisions to encourage compliance may include the following measures:

- use of narrow lanes;
- reduced cone spacing and/or coning both sides of the temporary lane;
- introducing chicanes (only suitable for low HGV traffic volumes);
- publicity (national and local advertising campaigns);
- additional traffic signs and roadway markings to promote traffic calming (e.g., VMS);
- Garda patrols and enforcement through use of speed cameras;
- convoy working; and
- detours.

Where it is considered that the approach speed of traffic is significantly different from the signed speed limit, the temporary traffic management design criteria may be based on observed speeds.

Direct risks to the safety of the workforce or the public (e.g., bridge deck replacement operation) should be countered by the presence of appropriate restraint barriers or changes in the work methods that reduce the risks. Temporary speed restrictions should not be solely relied upon to protect the workforce.

4.3.3 Diversions and Road Closures

When weighing up the various traffic management options (e.g., shuttle working, convoy working, ALL STOP procedures, and road closures) the Designer (TTM) should consider the overall road safety impact of the Temporary Traffic Management Plan, including any impact beyond the confines of the road works site.

The Designer (TTM) should discuss road closure options for any planned works with the Gardaí and the relevant Local Authority early in the planning stage. For works on national routes, it is usually preferable to maintain the existing route. However, where there is an agreed diversion route, or it is likely that a suitable diversion route can be found and agreed, the diversion option should be included in the Designer's (TTM) risk assessment. In other cases, a road closure with diversion may be the only suitable option (see Table 4.2.1 for minimum carriageway widths for two-way and shuttle working with traffic control).

The following should be taken into account when planning a road closure with diversion:

- suitability of the diversionary route with respect to expected traffic type, flow, etc;
- suitability of the diversionary route with respect to capacity, roadway width and surface condition;
- need for Manager's Order;
- ensuring that the location of access for works vehicles does not adversely affect the diversion route (e.g., by introducing right turn movements);
- information strategy including general public announcements (local/national radio stations and AA Road Watch), and letter drops to residences and business premises affected by the diversion route;
- establishing contractual responsibility relating to the signing of the diversion routes;
- advanced signing detailing the nature, duration and necessity for the works and requirements for detailed directional signing throughout the diversion (per Chapter 8);
- priority junctions (existing priorities may need to be altered to maintain diverted traffic flow);
- introducing one-way traffic flow;
- prohibiting turning movements;
- changing priority and restricting movements according to vehicle size/weight;
- presence of railway crossings, narrow bridges or other restrictive features on the diversionary route;
- other works on the diversion route;
- providing for winter maintenance on the diversion route;
- effect on the environment and safety; and
- requirements for pedestrians, cyclists and other vulnerable road users.

Traffic should be diverted onto roads with an adequate capacity. When this is not possible, a one-way diversion should be considered for diverted traffic.

Note: When road closures are required on minor roads (see Section 4.6.7 for definition of a minor road) and traffic is deemed to be local, signed diversion routes may not be required.

Important Reminder:

Managers' Orders and public notices are required when either (i) Road Works Speed Limits or (ii) road closures become part of the traffic management proposals. The length of time required to secure such orders should be considered early in the design process (see Appendix D).

4.3.4 Works Access and Egress

Where possible, access/egress to/from the works area should be considered at the design stage in conjunction with the following:

- conflict with other movements;
- location;
- width;
- sight lines;
- signing;
- vehicle sweep path;
- decelerating/accelerating space;
- segregation of decelerating/accelerating space from the work area; and
- cleanliness (mud and other debris on the roadway).

4.3.5 Routes for Site Vehicles

Routes for vehicles to the site and through the works can create significant problems. Access is required for works vehicles and plant, and delivery vehicles and private vehicles used by site staff. How these vehicles access the site can have a significant impact on how normal traffic flows through the site. Site access/egress is a fundamental element to be considered during the design process and should include the following:

- matters arising from the consultation process;
- determination of permitted/prohibited routes and design of signing;
- provision of adequate signing;
- imposition of site speed limits;
- access to the works from the adjoining road network;
- parking procedures and arrangements for site staff;
- conflict with local land use patterns and timing of the works (e.g., seasonal agricultural traffic movements);
- provisions to minimise mud and debris deposited on roadway surfaces;
- consultation with adjoining Local Authorities;
- consideration of whether light and heavy/wide/high construction vehicles need different routes/arrangements;
- provision for the safety of pedestrian workers working in the vicinity of mobile plant and machinery (refer to Section 87(2)b of the Construction Regulations);
- the impact on the environment, local businesses and residences; and
- special traffic control arrangements at locations where heavy plant needs to move across a public roadway on a frequent basis.

4.3.6 Pedestrians, Cyclists and Other Vulnerable Road Users

Where pedestrians, cyclists, equestrians and other vulnerable road users are affected by road works, the Designer (TTM) should give detailed consideration, including, where appropriate, consultation with those affected, to minimising the impact on them and to ensuring that suitable alternatives exist. This consideration should include the following:

- review of advance signing and the length of diversion routes;
- safety and accessibility implications of temporary surfaces, obstructions, ramps, diversions etc.;
- impact on frontage of lands adjacent to the roadway (domestic, agricultural and other entrances, in particular);
- standard of surface, gradient and lighting;
- adequacy of lane widths for cyclists past the works and/or on the diversion route (see Chapter 8, Section 8.3.11);
- adequacy of crossing facilities for pedestrians;
- needs of children, particularly near schools, shops, playing fields and other facilities;
- impact on bus stop locations and access to bus stops;
- closing off of unsafe access across works; and
- arrangements for vulnerable road users, including people with disabilities.

4.3.7 Emergency Traffic Management

Consideration should be given to emergency access to all parts of the works area and roadway which are subject to temporary traffic management, should a carriageway become blocked and queuing occur. In most cases, an ALL STOP intervention procedure can be used to provide a suitable means of emergency access.

In an emergency, it may not always be possible to provide temporary traffic management in strict accordance with the principles included in this document. In such circumstances, it may be necessary for those dealing with the incident to deploy emergency traffic management (ETM) using limited traffic management resources as are available to them upon arrival at the incident.

4.3.8 Vehicle Recovery

The Designer (TTM) should determine the need for and extent of a vehicle recovery operation. Issues which may need to be considered include:

- number and position of recovery vehicles;
- communication systems;
- location of drop-off points;
- facilities at drop-off points, including the needs of vulnerable vehicle occupants;
- system of identifying vehicles in need of recovery (CCTV/patrols);
- regime to ensure compliance with contractual obligations and requirements; and
- the role of the Gardaí with regard to communication details, particularly with regard to procedures for dealing with abandoned vehicles.

4.3.9 Incident Management

Under the SHWW Act there is a statutory requirement to record and report incidents causing injury. In order to comply with this requirement, each project must include the provision of an

incident management system to record all site incidents, including, and in particular, those that are related to traffic management. The incident management system adopted must be capable of identifying and highlighting unexpected levels or categories of incidents. This capability will facilitate early implementation of remedial measures to counter the impact of any unsafe features in the project and help avoid the creation of similar, undesirable features on future projects.

The incident management system should be a part of the Temporary Traffic Management Plan, which is a major element of the overall project safety plan for road works projects (i.e., the requirement of the incident management plan is established early in the design process). On large projects, the appointment of a dedicated Temporary Traffic Operations Supervisor under the terms of the contract provides a first line of reporting to assist in this procedure. For smaller projects, the role of the Temporary Traffic Operations Supervisor may be assigned to the project safety personnel, supervisor or foreman, as appropriate. Any individual assigned to the role of Temporary Traffic Operations Supervisor must have suitable training and be present on site while the temporary traffic management arrangements are being installed, removed or significantly altered.

The incident management system should include:

- an operational structure with a formal reporting system and review meetings;
- the name of the person with responsibility for record keeping;
- an outline contingency plan.

During the works, consideration should be given to the possibility of altering or removing the traffic management measures in order to deal with exceptional circumstances such as:

- high traffic volumes;
- adverse weather conditions;
- emergency access; and
- periods when the work is not in progress.

4.4 Lane Closure Options

The basic components of a Temporary Traffic Management Plan are (i) lane closure design and (ii) method of controlling traffic movement past the works site. This section provides guidance on lane closure design.

4.4.1 General Issues

Two-way traffic should be maintained wherever possible, but where this is not possible, single-file traffic (shuttle working) should be considered. The period during which traffic is subjected to shuttle working should be kept to an absolute minimum.

On roads with higher flows, traffic control measures associated with shuttle working may result in exceptional delays. Where this is likely to occur, the Designer (TTM) should consider the implications and possible alternative options, such as the use of diversions or the restriction of site working hours.

4.4.2 Lane Closure Options

Depending on the nature of the works, a lane closure can be static or semi-static.

A static lane closure is appropriate for works that are confined to a fixed site location. The appropriate level of signing and temporary traffic measures required for a static lane closure depends on the road classification and the type of road works.

A semi-static lane closure is appropriate for mobile operations or very short duration static operations that continuously progress. A reduced level of signage and temporary traffic measures (relative to static lane closures) are used to warn road users of upcoming works. Signs should be placed in the verge and moved forward as the work progresses. Semi-static lane closures are only suitable in off-peak traffic flows, during daylight hours and in good visibility conditions.

4.4.3 Road Classifications and Types of Static Road Works

The type of road, applicable speed limit and ADT are used to classify roads in accordance with Table 4.4.1 below.

Table 4.4.1: Road Classifications

Road Classification	Type of Road	Speed Limit	Traffic Volume
Level 1	Single Carriageway	30 km/h	All traffic volumes
Level 2		50 or 60 km/h	All traffic volumes
Level 3		80 or 100 km/h	ADT ≤ 5,000 vpd
Level 4		80 or 100 km/h	ADT > 5,000 vpd
Level 5	Dual Carriageway	50, 60 or 80 km/h	All traffic volumes
Level 6		100 or 120 km/h	

Note 1 ADT = Average Daily Traffic – the total two-way traffic flow on a specific day (vpd = vehicles per day).

Note 2 Dual carriageway and motorway roads (Level 5 and Level 6) are not addressed in this document – refer to Chapter 8 for guidance on dual carriageway and motorway working.

Important Note: In order to allow appropriate relaxations to be considered in the case of certain road works activities, roads classified from Level 1 through to Level 4 can be further classified as minor roads and non-minor roads (see Section 4.6.7 for definition of minor roads).

The duration of the works and the prevailing traffic flow are used to define three types of static road works (see Table 4.4.2 below).

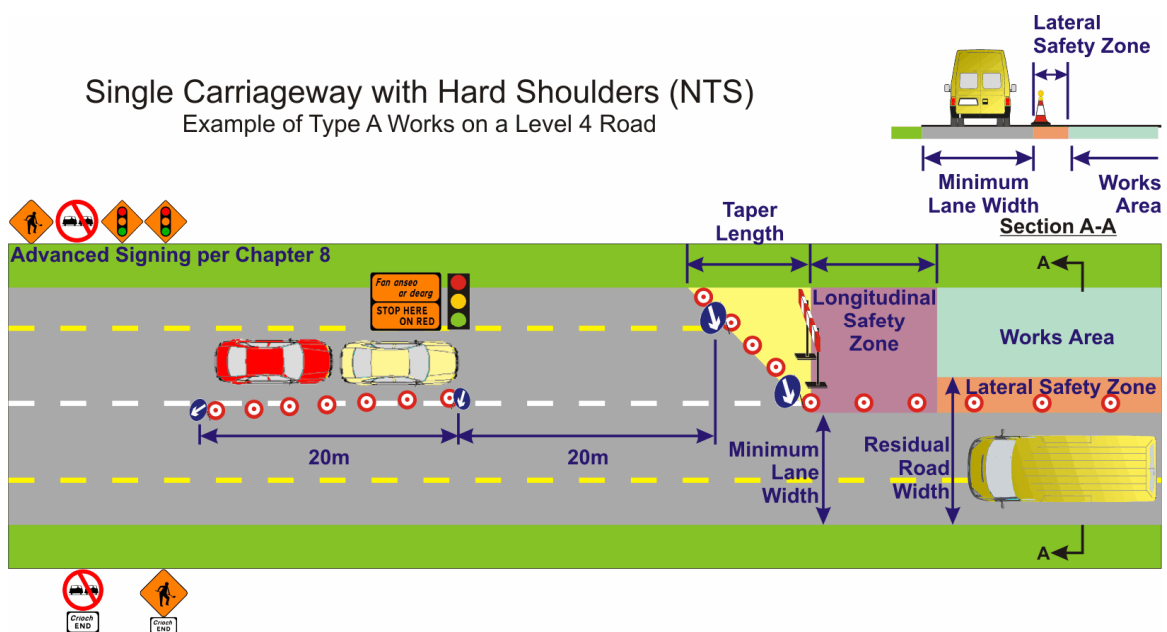
Table 4.4.2: Types of Static Road Works

Type A	Full-time road works that remain in operation in all traffic flows and all visibility conditions. This type of works typically includes temporary traffic measures that will remain in position for a duration in excess of 24 hours.
Type B	Part-time road works that remain in operation when the expected traffic flow is less than the available carriageway capacity. This type of works typically includes temporary traffic measures at off-peak times. With this type of works, the road works are such that they can be removed, if necessary, to minimise potential traffic delays.
Type C	Short duration works that involve the use of one or two works vehicles, typically maintenance to utilities or street furniture, in all visibility conditions, when the expected traffic flow is less than the available carriageway capacity or the works do not reduce the carriageway width significantly.

4.4.4 Temporary Traffic Measures Required for Static Lane Closures

The appropriate level of signing and temporary traffic measures required for different single carriageway road classifications and different types of works are detailed in Tables 4.4.4 through to 4.4.6. In essence, design parameters specified for Type A and B are the same for all single carriageway roads (Levels 1 to 4). See Figures 4.4.1 and 4.4.2 for diagrammatic representation of design parameters.

Figure 4.4.1 Diagrammatic Representation of Static Lane Closure Design Parameters



The design parameters specified in the tables should be applied when designing temporary traffic measures for all road works no matter how short or minor the impact on the road user. Terms used in the tables are defined in Table 4.4.3 below:

Table 4.4.3: Explanation of Design Parameters

Parameter	Explanation
Speed Limit	The permanent speed limit prior to temporary traffic management measures being implemented.
Sign Visibility	The uninterrupted sight distance of an approaching vehicle to the first sign (Road Works Ahead)
Number of Signs	This is the number of signs required in advance of the start of the taper. The first sign is the Road Works Ahead sign. The number of signs specified is for the left hand side only (single carriageway road).
Cumulative Distance	Spacing of signs is measured by placing the first sign (Road Works Ahead) at the cumulative distance of the spacing of all signs from the start of the taper. Where centre line cones are used in advance of the taper (for example, shuttle working using STOP/GO batters as per Figure 4.5.3 or shuttle working using temporary traffic signals as per figure 4.5.4), the cumulative distance may be measured from the start of the centre line coning.
Distance between advance signs	The distance between signs is measured from the first (Road Works Ahead) sign at the specified distance.
Taper	The required length for the reduction in width of a single lane or hard shoulder. The taper length is calculated using the specified rate of taper multiplied by the hazard width, including the lateral safety zone, and rounded up to the nearest cone spacing.
Safety Zone	Longitudinal and lateral safety zones are areas between the works and the cones or barriers adjacent to the running traffic lane. They are required for the safety of the worker. The lateral safety zone is measured from the front (traffic edge) of the cone or barrier to the edge of the works. The longitudinal safety zone is measured from the end of the taper to the start of the works.
Cone Spacing	The recommended maximum spacing of cones required at tapers and longitudinally. Closer spacing may be needed at some locations, e.g., at short lengths of road works in urban areas.
Minimum Lane Width	The minimum width of traffic lane to be maintained at all times for use by the road user (refer to Table 4.2.1)

Table 4.4.4: Design Parameters for Level 1

Design Parameters	Road Works Type A & B (Full-Time & Part-Time)	Road Works Type C (Short duration)
Single Carriageway with Speed Limit of 30 km/hr		
Temporary Signs		
Sign Visibility (m)	50	50
Number of Signs	2	2
Cumulative Distance (m)	50	50
Dist. between advance signs (m)	25	25
Minimum Rate of Taper		
Taper at Lane (m)	1 in 10	1 in 5
Taper at Hard Shoulder (m)	1 in 5	1 in 5
Safety Zone		
Longitudinal (m)	5	5
Lateral (m)	0.5	0.5
Maximum Cone Spacing		
At Tapers (m)	3	3
Longitudinal (m)	6	6
Maximum Lamp Spacing		
At Tapers (m)	6	6
Longitudinal (m)	12	12

- Note 1 A 45 degree taper with cones on 1m centres is required for shuttle working
- Note 2 Cone spacing shown is the maximum permitted. Where geometry or any other site specific reason dictates, the spacing should be reduced accordingly.
- Note 3 See Table 4.2.1 for minimum carriageway widths for two-way and shuttle working with traffic control.
- Note 4 See Table 4.2.2 for sign and cone sizes for temporary traffic management arrangements.
- Note 5 Flashing lamps should only be used at isolated hazards (the location of the first cone and/or the location of an abrupt change in cone alignment could also constitute an isolated hazard).

Table 4.4.5: Design Parameters for Level 2

Design Parameters	Road Works Type A & B (Full-Time & Part-Time)	Road Works Type C (Short duration)
Single Carriageway with Speed Limit of 50 or 60 km/hr		
Temporary Signs		
Sign Visibility (m)	50	50
Number of Signs	3	2
Cumulative Distance (m)	75	50
Dist. between advance signs (m)	25	25
Minimum Rate of Taper		
Taper at Lane (m)	1 in 15	1 in 5
Taper at Hard Shoulder (m)	1 in 10	1 in 5
Safety Zone		
Longitudinal (m)	25	5
Lateral (m)	0.5	0.5
Maximum Cone Spacing		
At Tapers (m)	3	3
Longitudinal (m)	6	6
Maximum Lamp Spacing		
At Tapers (m)	6	6
Longitudinal (m)	12	12

- Note 1 A 45 degree taper with cones on 1m centres is required for shuttle working
- Note 2 Cone spacing shown is the maximum permitted. Where geometry or any other site specific reason dictates, the spacing should be reduced accordingly.
- Note 3 See Table 4.2.1 for minimum carriageway widths for two-way and shuttle working with traffic control.
- Note 4 See Table 4.2.2 for sign and cone sizes for temporary traffic management arrangements.
- Note 5 Flashing lamps should only be used at isolated hazards (the location of the first cone and/or the location of an abrupt change in cone alignment could also constitute an isolated hazard).

Table 4.4.6: Design Parameters Level 3 and 4

Design Parameters	Road Works Type A & B (Full-Time & Part-Time)	Road Works Type C (Short duration)
Single Carriageway with Speed Limit of 80 or 100 km/hr		
Temporary Signs		
Sign Visibility (m)	120	120
Number of Signs	4	3
Cumulative Distance (m)	800	600
Dist. between advance signs (m)	200	200
Minimum Rate of Taper		
Taper at Lane (m)	1 in 55	1 in 40
Taper at Hard Shoulder (m)	1 in 30	1 in 20
Safety Zone		
Longitudinal (m)	60	45
Lateral (m)	1.2	1.2
Maximum Cone Spacing		
At Tapers (m)	3	3
Longitudinal (m)	12	12
Maximum Lamp Spacing		
At Tapers (m)	6	6
Longitudinal (m)	12	12

- Note 1 A 45 degree taper with cones on 1m centres is required for shuttle working
- Note 2 Cone spacing shown is the maximum permitted. Where geometry or any other site specific reason dictates, the spacing should be reduced accordingly.
- Note 3 See Table 4.2.1 for minimum carriageway widths for two-way and shuttle working with traffic control.
- Note 4 See Table 4.2.2 for sign and cone sizes for temporary traffic management arrangements.
- Note 5 Flashing lamps should only be used at isolated hazards (the location of the first cone and/or the location of an abrupt change in cone alignment could also constitute an isolated hazard).

Where congestion is not likely to occur, the normal method of traffic management past the works vehicle is the passive GIVE and TAKE system. Priority control may also be used where traffic flow patterns justify its use.

In certain circumstances, depending on traffic volume and subject to a risk assessment, it may be necessary to control traffic past the works vehicle by means of manually operated STOP and GO battens. Where STOP and GO traffic control is used, operatives should be equipped with two-way radios and the 'Flagman Ahead' sign should be placed on both approaches.

4.4.6 Semi-Static Lane Closures

Some road works operations require the work force and plant to either move continuously along a road or make frequent short duration stops to carry out maintenance works. For works of this type, it is often impractical to provide the signs and cones required for Type C (single vehicle) road works. Instead, warning signs are placed at intervals on the verge and are moved forward as the works progress. Such works are referred to as Semi-Static Lane Closures (SSLC). SSLC are normally only suitable for single carriageway working, during daylight hours and in good visibility conditions. The following is a non-exhaustive list of operations where SSLC may be appropriate:

- longitudinal roadway marking;
- 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 pick-up/collection;
- roadway pavement inspection and testing;
- surface dressing on minor roads (see Section 4.6.2 and 4.6.7);
- pavement maintenance (e.g., scheduled pothole repairs, surface retexturing, etc.);
- surveying; and
- sporting, cultural or community events held on the public road.

It is recommended that a set of standard traffic measures be prepared where small-scale maintenance works are routinely carried out as SSLC operations. However, a site risk assessment should be carried out and any standard traffic measures modified accordingly to suit actual site conditions.

SSLC is implemented by erecting warning signs on the verge in advance of the works. General layout and procedure is as follows.

- The first sign is a "Road Works Ahead" signs (WK001) with Supplementary Plate P002, stating the distance over which the works may be encountered.
- The second closely spaced sign is a "Road Works Ahead" sign (WK 001) with Supplementary Plate P082, stating the type of operation in progress.
- Preferably, these signs should be within 1 km of the works but never more than 2 km.
- Additional signs may be placed on the verge at intervals between the first set of signs and the road works. By using several sets, the rearmost signs can be moved forward at intervals, leapfrogging the other signs, so that the warning signs are always at the appropriate distance from the works.

Vehicle mounted signs may be used as an alternative to static signs. The vehicle and the vehicle-mounted signs shall comply with the recommendations for mobile lane closures detailed in Chapter 8, Section 8.5. Thus, the signs should be mounted on a yellow backing board with flashing amber beacons. The vehicle should park clear of the traffic lane, on the verge or in an

entranceway, 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.

Where congestion is unlikely to occur, the normal method of traffic management past the works is the passive GIVE and TAKE system. Priority control may also be used where traffic flow patterns justify its use.

In certain circumstances, depending on traffic volume and subject to a risk assessment, it may be necessary to control traffic past the works by means of manually operated STOP and GO batters. Where STOP and GO traffic control is used, operatives should be equipped with two-way radios and the 'Flagman Ahead' sign should be placed on both approaches.

Subject to a risk assessment, the use of a lorry-mounted crash cushion (LMCC) fitted to an escort vehicle and/or the works vehicle may be recommended on roadways wider than 5.5 m with a speed limit of 60 km/h or greater. A LMCC shall only be used in conjunction with STOP and GO traffic control and the light arrow sign on the LMCC shall not be used on two-way, single carriageway roads. It should also be noted that a LMCC may not be suitable for use on roads with poor alignment or roadways less than 5.5 m wide.

Single carriageway roads can have high volumes of low speed traffic in urban situations and low volumes of high-speed traffic in rural areas; both scenarios can pose problems for a SSLC operation. The design of a SSLC should take the following matters into account.

- **Maximum Allowable Traffic Flow:** This is the maximum traffic flow that can be accommodated during a SSLC. The traffic flow should allow a vehicle to overtake the operation in a single manoeuvre and the traffic flow should be able to operate in the remaining available traffic lane(s) without causing major delays. Where appropriate, short (3 minute) traffic counts should be carried out prior to the implementation of the SSLC to ensure the actual demand does not outweigh the reduced capacity that would be available during the SSLC operation. The operation should only proceed once the Temporary Traffic Operations Supervisor is satisfied that traffic flows are in accordance with agreed proposals.

Traffic flows should be monitored as appropriate during the works, to ensure that volumes are not too high. It may be necessary to repeat traffic counts at intervals. Alternatively, queues could be monitored to trigger pre-determined, corrective actions, up to and including temporary withdrawal or termination of SSLC operations.

- **Stopping Sight Distance:** This is the distance at which approaching traffic can see the works area. Appropriate stopping sight distances for different speeds are given in NRA DMRB TD 9.
- **Road Geometry:** Consideration needs to be given to the geometry of the road to ensure visibility requirements are met. Poor horizontal and/or vertical alignment may reduce the sight distance available to approaching drivers. Substandard road geometry may require additional signage and/or traffic control.
- **Weather Conditions:** Heavy rain, fog, dazzling sunlight or sunlight low on the horizon will reduce visibility for approaching traffic and should be considered before implementing a SSLC.
- **Working through Junctions and Roundabouts:** At junctions and roundabouts the approaching traffic from other arms will need to be warned of the operation in progress. Additional warning signs should be placed on the approaching arms, as appropriate.

SSLC are usually appropriate where operations are carried out from within a vehicle or where operatives work along the nearside edge of the carriageway. SSLC may not be appropriate if operatives are required to work extensively in the live carriageway. In such cases, the use of a LMCC could be considered or a fully static method of working may be required.

4.4.7 Night-time Working Considerations

Traffic flows and other factors dictate that some traffic management activities are conducted during the hours of darkness. Such operations require additional pre-planning, resources and procedures to those needed for daytime activities.

Although the risk of encountering high traffic flows are reduced by working during the night, other factors, such as poor driver behaviour, higher speeds, fatigue, difficulty in judging distances and limited vision, increase the risk of working during the night.

The following checks should be conducted during daylight hours prior to works being conducted during the hours of darkness, as necessary:

- stopping points for vehicles should be predetermined and identified;
- proposed location for temporary signs, the start and end of tapers and longitudinal coning should be positively identified;
- relevant verges should be inspected for hazards and to ensure there is adequate width to place temporary signs safely;
- consideration should be given to pre-placing the signs in the verge during daylight hours;
- carriageway crossing points should be checked to ensure there are adequate sight lines to see oncoming traffic;
- the position of any overhead lines likely to impinge on traffic management activity should be positively identified;
- the correct retro-reflective material should be used and kept clean to ensure proper visibility of signs, cones, etc. at night and during poor visibility; and
- the provision of additional temporary lighting in urban/lit areas should be considered.

4.5 Traffic Movement Options

The basic components of a Temporary Traffic Management Plan are (i) lane closure design and (ii) method of controlling traffic movement past the works site. This section provides guidance on controlling traffic movement.

In addition to static layout design requirements, passive/active traffic control is required to regulate the flow and speed of traffic through or around the site.

The main factors affecting the selection of the most appropriate type of control are:

- visibility through the works area;
- length of the controlled area;
- volume of traffic flow;
- duration of the works; and
- proximity of junctions, pedestrian crossings or railway level crossings.

Two-way Traffic: Whenever possible, two-way traffic should be maintained using normal delineated traffic management arrangements as referenced in this document and as specified in Chapter 8. When the minimum width for two-way working cannot be safely maintained, a lane closure and shuttle working must be considered (refer to table 4.2.1 for minimum lane widths for two-way traffic and shuttle working).

Typical traffic management methods to implement shuttle working and regulate traffic movement through the static works site are as follows:

- GIVE and TAKE;
- Priority (Yield Sign);
- STOP and GO battens;

- temporary traffic signals;
- ALL STOP; and
- convoy working.

The factors affecting the choice of traffic control method are summarised in Table 4.5.1

Table 4.5.1: Factors affecting the choice of traffic control method

Method	Maximum speed limit	Coned area length	Maximum traffic flow
GIVE and TAKE	50 km/h	50 m maximum	400 veh/hr and 20 HGV/hr
Priority (Yield Sign)	100 km/h	80 m maximum	850 veh/hr
STOP and GO batters	100 km/h	100 m 200 m 300 m 400 m 500 m	1400 veh/hr 1250 veh/hr 1050 veh/hr 950 veh/hr 850 veh/hr
Temporary traffic signals	100 km/h	500 m maximum	Not applicable
ALL STOP	100 km/h	Not applicable	Not applicable

Note 1 Maximum speed limit for GIVE and TAKE does not apply where the method is used in conjunction with single vehicle working or SSLC operations.

Note 2 Where shuttle working is required, a 45 degree taper shall be used on both approaches in conjunction with a suitable method of traffic control.

Additional care must be taken when designing temporary traffic measures in the vicinity of railway level crossings. In particular, Designers (TTM) should ensure that traffic cannot block back and stop on the crossing.

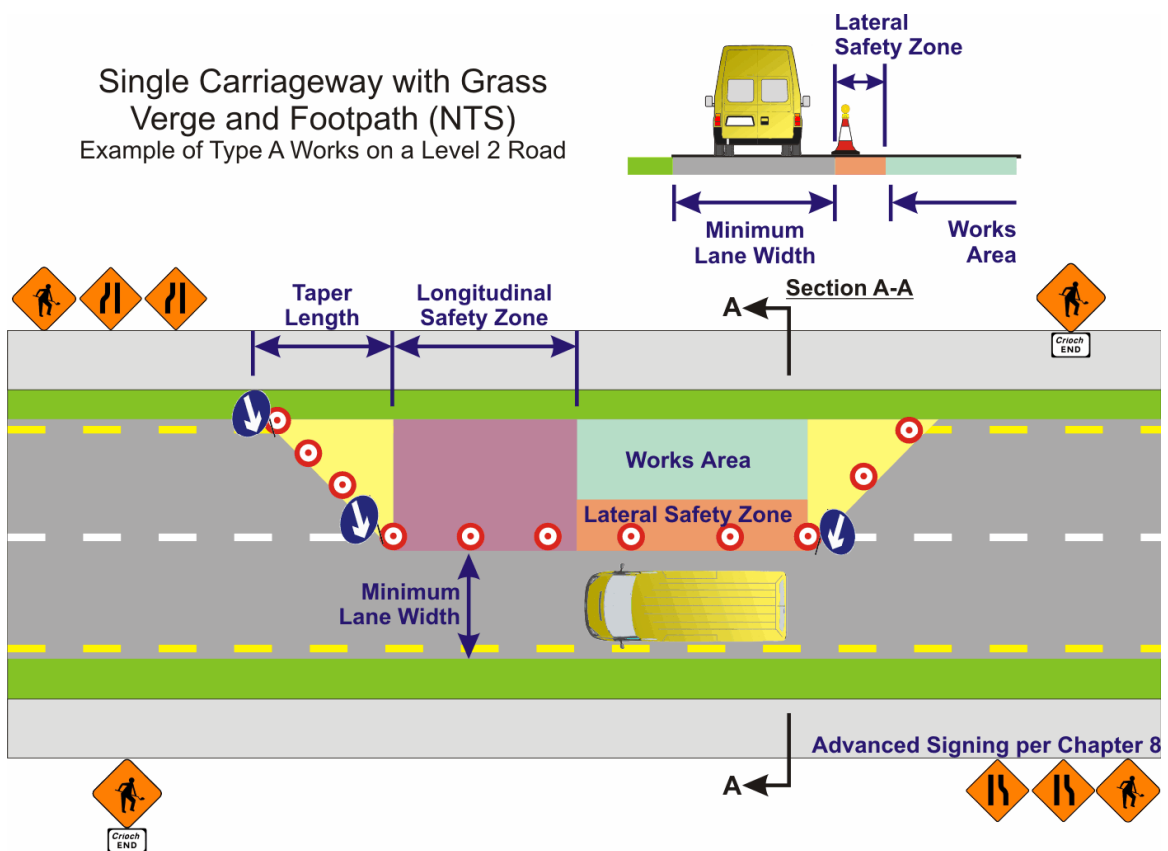
4.5.1 GIVE and TAKE

The passive/self regulating GIVE and TAKE system may be used for shuttle working during day light hours provided that:

- there is clear visibility of and through the site for drivers approaching from either direction;
- the speed limit is 50 km/h or less (this limitation does not apply where the method is used in conjunction with single vehicle working or SSLC operations);
- the total two-way traffic flow is less than 400 veh/hr;
- the total HGV traffic is less than 20 veh/hr; and
- the length of shuttle lane past the works does not exceed 50 m between ends of tapers.

Signing and coning for the GIVE and TAKE method should be in accordance with Figure 4.5.1. Where the above criteria cannot be met, one of the positive control systems should be adopted. This system of shuttle working should not be operated at night or during periods of poor visibility. Shuttle working after darkness should normally be controlled by temporary traffic lights.

Figure 4.5.1 Shuttle System at Static Works with GIVE and TAKE Traffic Control



4.5.2 Priority (Yield Sign)

Priority is established on one approach to the works site by placing a Yield sign on the opposing approach. Priority control may be applied where all of the following conditions are met:

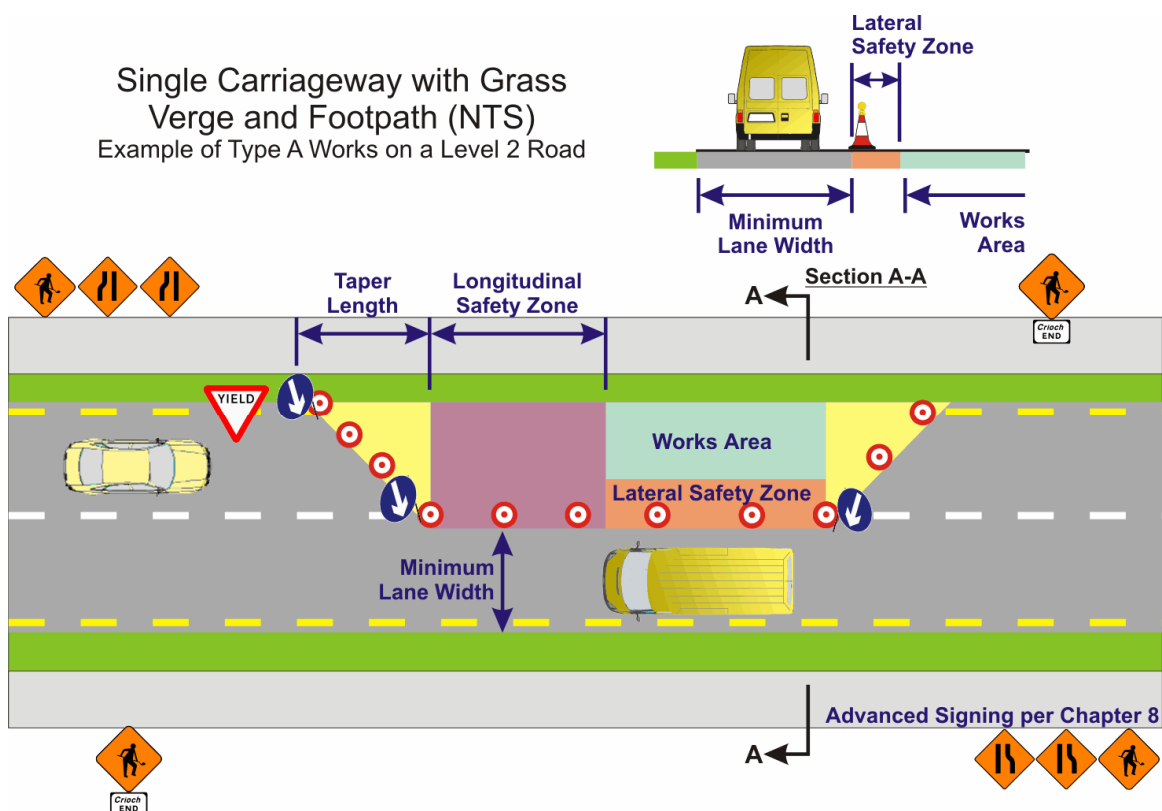
- the clear visibility requirements either side of the coned area specified in Table 4.5.2 below are satisfied;
- two-way traffic flow is less than 850 veh/h; and
- the site length (measured from the first cone of the entry taper to the last cone of the exit taper) is not more than 80 m.

Table 4.5.2: Clear visibility requirements for use of priority signs

Maximum permitted speed limit	Clear visibility distance (before and after the coned area)
50 km/h	60 m
60 km/h	70 m
80 km/h	80 m
100 km/h	100 m

Priority sign method should only be used during periods of good visibility. It should not be used where fog is frequently encountered nor should it be used at night unless the site is located in a well-lit area. Signing and coning for the priority sign method should be in accordance with Figure 4.5.2.

Figure 4.5.2 Shuttle System at Static Works with Priority YIELD Traffic Control



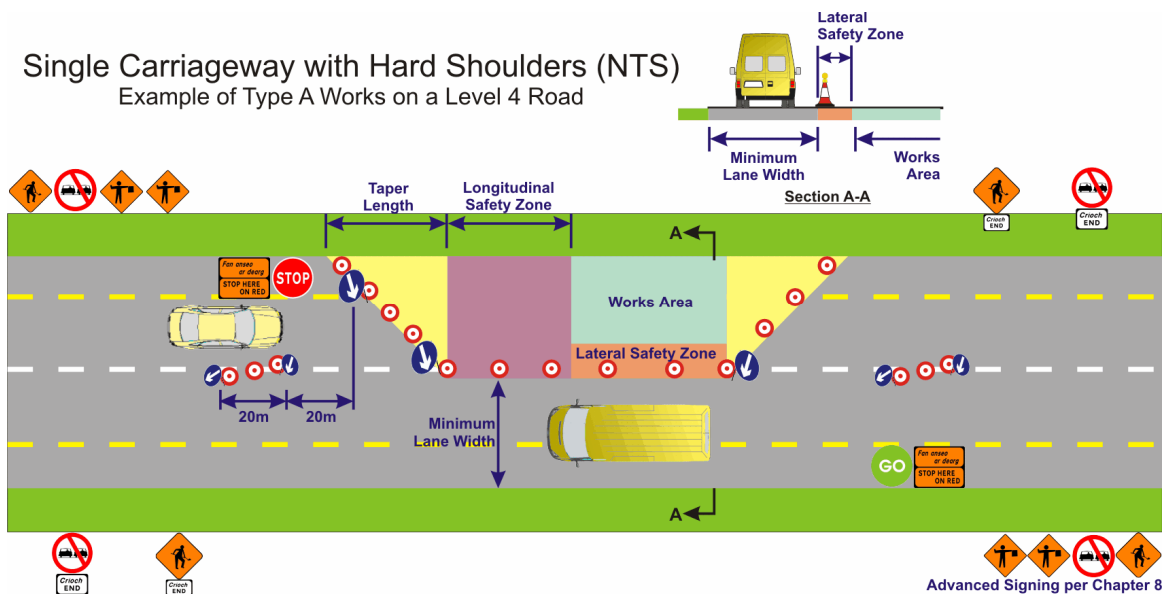
4.5.3 STOP and GO Battens

The Road Authority or the Contractor must consult with the Gardaí prior to the implementation of STOP and GO battens (Appendix D). Battens used shall be in accordance with sign numbers RUS060 and RUS061 as detailed in Chapter 8, Table 8.2.4. Temporary signage in advance of the manually controlled stopping point shall include the use of sign WK 061.

Using manual or mechanically operated methods, STOP and GO battens can be used at plant crossing points, site entrances/exits or on single carriageway roads where traffic is reduced to shuttle working. This method allows traffic flows to move according to the actual demand, thereby reducing congestion, delay and driver frustration. STOP and GO battens are often specified and/or required during peak traffic flow periods on sites where remote control methods, such as temporary traffic signals, are used during the off-peak periods.

Manually operated signs should be operated in accordance with safe operating procedures. This operation should be undertaken by trained personnel using STOP and GO battens and wearing high visibility garments.

Figure 4.5.3 Shuttle System at Static Works with Manual or Mechanical STOP/GO Traffic Control



For short works (20 m or less) manual control at one end or in the middle may be sufficient. For short works at site crossing points or exits, a single operator may use a double-sided STOP batten to control traffic.

For works longer than 20 m, but less than 200 m, remotely operated STOP and GO battens may be used provided the operator has an unobstructed view of both ends of the site and is not more than 100 m from either end.

For works longer than 200 m, two operators will be required – one at either end of the controlled section. Additional operators may be required to regulate traffic emerging from any junctions within the controlled section. The work site should be limited to 500 m maximum length, including tapers. Preferably, operators should be inter-visible and should be in contact by a suitable and reliable means of communication (e.g., two-way radios).

STOP and GO method should be replaced by temporary traffic signals for night time working. If the night time use of STOP and GO is required for a particular operation, appropriate flood lighting must be provided to illuminate batten and flagmen on all approaches.

Signing and coning for the STOP and GO batten method should be in accordance with Figure 4.5.3. The cross-over and cross-back gaps at the respective leading and trailing tapers should be 20 m (10 m minimum and only where HGVs are not expected). For 20 m in advance of the STOP/GO stop positions, cones should be placed along the centre line where space permits or otherwise along the verge, to highlight the approaching manually controlled stopping point to the driver. If necessary, an additional sign, WK 061, may be positioned 15 to 20 m in advance of the additional centre line/verge cones.

4.5.4 Temporary Traffic Signals

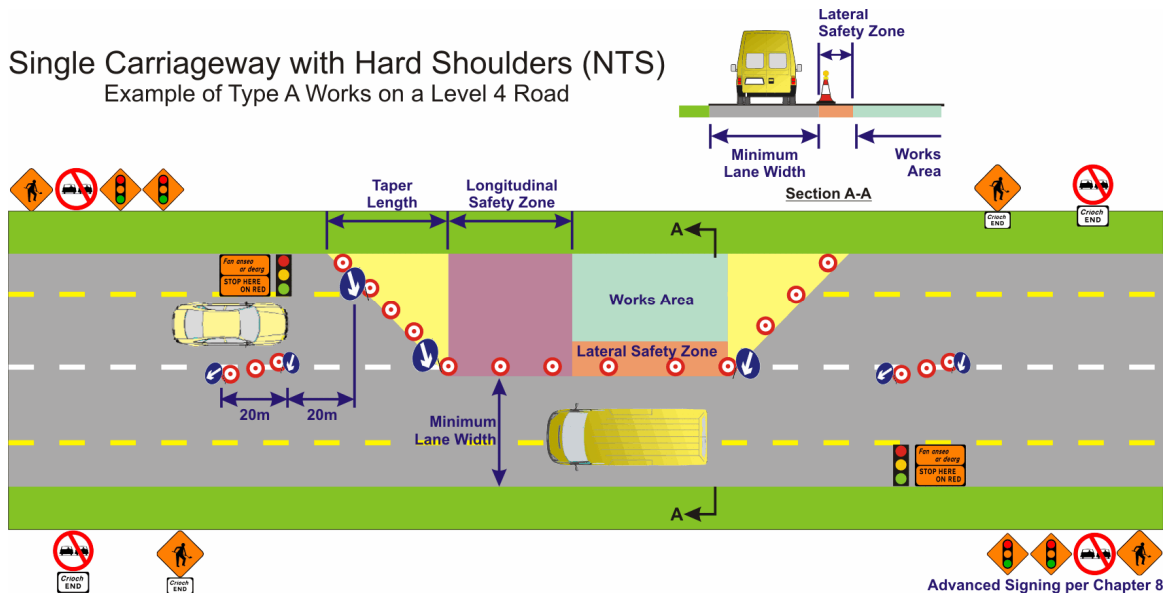
The Road Authority or Contractor must consult with the Gardaí prior to the implementation of temporary traffic signals (See Appendix D). Temporary traffic signals may be used at plant crossing points and site entrances/exits. They may also be used on single carriageway roads where traffic is reduced to shuttle working at all times on low traffic volume roads and at off-peak times only on roads with high traffic volume. Temporary traffic signals should have an adequate and reliable power supply and be capable of running a number of different phases. Vehicle actuated temporary traffic signals are desirable, especially where the expected traffic flow pattern would benefit from their use. Temporary signage in advance of the signal controlled stopping point shall include the use of sign WK 060.

Vehicle actuated signals detect motion for a specified speed, distance and direction; consequently, the positioning and orientation of these traffic signals is critical. Traffic actuated signals, as with all traffic signals, should be installed and operated in accordance with manufacturers' instructions.

When their use is appropriate, temporary traffic signals are preferable to manually operated methods since their use does not expose operatives to live traffic. Temporary traffic signals should be placed a sufficient distance away from the end of the one-lane section to allow traffic emerging from the one-way section to cross over to the correct side of the roadway before encountering the stationary traffic queuing at the red signal. Temporary traffic signals should be positioned with adequate forward visibility and, where possible, have inter-visibility. The recommended maximum distance between signals is 500 m.

Figure 4.5.4

Shuttle System at Static Works with Traffic Signals



The design and operation of any temporary traffic signal operations should be undertaken by experienced personnel. The design and calculation of timings and phases should be as for permanent traffic signals. The design should include fixed and variable timings, where applicable, and the length of restriction to be installed. All these factors will influence queue lengths and may affect the surrounding network. Traffic signals should be bagged/covered or removed when they are not operating (not in use) for any significant period of time.

In order to react manually to actual traffic demands, the use of temporary traffic signals may have to be suspended at peak traffic flow periods in favour of a STOP and GO batten system.

Signing and coning for the temporary traffic signal method should be in accordance with Figure 4.5.4. The cross-over and cross-back gaps at the respective leading and trailing tapers should be 20 m (10 m minimum and only where HGVs are not expected). For 20 m in advance of the temporary traffic signal, cones should be placed along the centre line where space permits or otherwise along the verge, to highlight the approaching signal controlled stopping point to the driver. If necessary, an additional sign, WK 060, may be positioned 15 to 20 m in advance of the additional centre line/verge cones.

4.5.5 ALL STOP

Where traffic flows are light and diversion routes are long, it may be quicker for traffic to wait for a significant time at road works rather than embark on a diversion route (e.g., railway crossings operate on this principle). An ALL STOP is generally suitable for short duration works that can be quickly and easily suspended to relieve unacceptable queues and allow for emergency access through the site. The ALL STOP period should not exceed 10 minutes and this method of working is generally not suitable where traffic flows exceed 300 veh/hr. This method does not require a Manager's Order. It should not be used if an obvious alternative route is available.

STOP and GO batters are operated such that both batters remain on STOP whilst works are being carried out. Traffic queues are relieved periodically by opening up one or both lanes, as applicable.

Where traffic flows are in excess of the above, and no other traffic management option is appropriate, the use of an ALL STOP procedure may be considered. Examples of such circumstances include where a suitable detour is not available, and there is insufficient roadway width for a temporary shuttle/convoy lane past the works. In such circumstances engineering judgement should be used to minimise the risks. At no time should the safety of the workforce or the road user be put at risk in order to accommodate traffic past the works.

Where the minimum lane widths cannot be provided and traffic is required to encroach on the works area, traffic should be marshalled through the site and all work activities should be suspended while traffic moves through the site. It may also be necessary to temporarily re-arrange the site to allow for the safe passage of larger vehicles.

The ALL STOP procedure can also be used to interrupt other traffic control methods for the purpose of providing emergency access to or through the site. Manual control of waiting traffic must be used at all times because of the likelihood of driver frustration leading to 'breaking' of red lights.

4.5.6 Convoy Working

Where normal traffic management arrangements are not feasible because of restricted roadway width and diversion is impractical, a method of convoy traffic management may be used. In this method, traffic is brought to a halt in advance of the road works (usually by using STOP and GO batters) and is then led slowly, in single file, through the site and past the works by an appropriately signed works vehicle. A lateral safety zone is not required for convoy working. Convoy lane widths should be in accordance with shuttle working lane width requirements specified in Table 4.2.1 and maximum coned area length for convoy working should not exceed 500 m.

When there is little or no available safety zone, it is essential that traffic speeds past the works must be reliably reduced to 20 km/h and an agreed safe method of working imposed on the site. Under these circumstances, convoy working is recognised as a safe method of working and a reliable method of ensuring compliance with temporary speed restrictions. Convoy working may also be employed on carriageways during surface dressing operations when it is considered necessary to protect newly laid surface dressing.

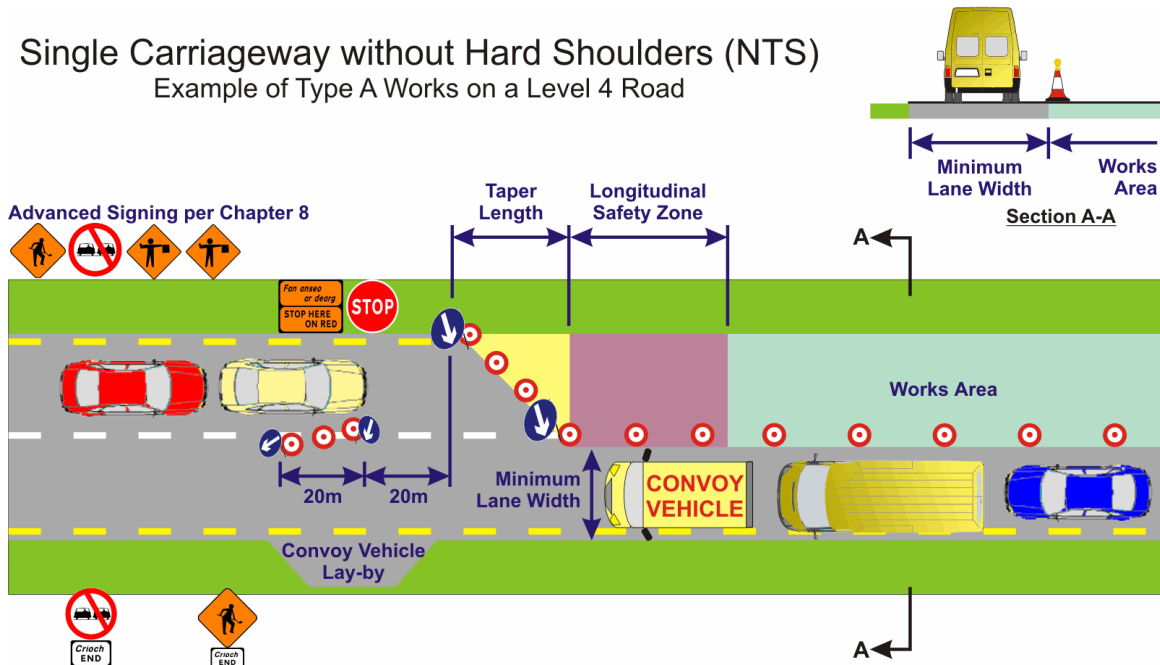
Convoy working should only be used when the reduced capacity of the road (reduced due to convoy working) is capable of accommodating actual traffic demand in accordance with agreed proposals. It may be necessary to restrict peak time working or make provision to suspend all convoy dependent road works and withdraw convoy traffic management in order to disperse queues periodically.

Figure 4.5.6

Static Lane Closure with Convoy Traffic Control System (one convoy vehicle system shown)

Single Carriageway without Hard Shoulders (NTS)

Example of Type A Works on a Level 4 Road



Risk assessment of the actual work activity and the effects of the convoy traffic management on the workforce and the road users must be conducted in order to determine whether this system is appropriate for the particular task and location. The following measures should be taken when planning convoy working:

- plan the works and individual operations to minimise their effect on traffic delay and interference with the convoy system (e.g., consider night-time convoy working);
- arrange the works to avoid junctions within the convoy section; where unavoidable, determine the method to be adopted for the management of side road traffic (e.g., additional STOP and GO batten);
- plan an appropriate convoy system (e.g., number of lead vehicles, etc.);
- determine a queue management strategy, including levels of congestion which trigger special action (e.g., suspension of convoy working);
- determine safe methods of working for the introduction and withdrawal of convoy working;
- allow for driver rotation;
- use suitable convoy vehicles (e.g., a small, reliable, diesel van capable of driving at low speed for a prolonged duration without overheating);
- determine suitable locations for convoy vehicles to pull out of the running lane at the end of the works; and
- determine requirements and placement of additional signage (e.g., Convoy Vehicle No Overtaking, Queues Likely, No Overtaking, etc.).

Signing and coning for the convoy method of working should be in accordance with Figure 4.5.6. Where possible, consideration should be given to the installation of cones or other means to increase worker awareness of the presence of live traffic and to improve delineation between the convoy lane and the works area.

4.6 Application of Guidance to Local Authority Activities

This section discusses the application of the design guidelines presented in this document to typical road works activities undertaken by or on behalf of Local Authorities.

The residual roadway width is considered to be the remaining available roadway width outside the works area. The works area (also referred to as working area) is defined as the actual area required by the Contractor to carry out the works. Carriageway and lane width requirements in the following examples are based on the **absolute minimum** requirements of Table 4.2.1.

4.6.1 Road Strengthening and Resurfacing Operations

In order to achieve acceptable results on wider single carriageway roads, road strengthening and resurfacing materials are generally laid to the roadway centre. Consequently, a working area equal to half the width of the roadway (i.e., a full lane/hard shoulder working area) is required and the works must be carried out in a particular sequence. On narrower roads, where traffic flow through the site cannot be maintained and a road closure is required, road strengthening and resurfacing materials may be laid to the full roadway width. As applicable, the safety zones, as well as the working area and any running lane(s), must be accounted for in the carriageway cross-section. The required work sequence and the available carriageway width will, to a large extent, determine the permissible site layout and traffic control options for a particular site.

The following examples assume that the lateral safety zone requirements pertaining to the permanent applicable speed limit are being applied to the temporary traffic works. Where the lateral safety zone is reduced on the basis of a Road Works Speed Limit or where the permanent speed limit is 60 km/h or less, the required residual roadway widths and/or overall roadway widths specified below may be reduced accordingly. See Section 4.2.2 for further guidance on safety zones and Tables 4.4.4 through 4.4.6 for safety zone requirements.

Two-way Working: Where works are being carried out on one side of a single carriageway road with speed limit greater than 60 km/h, the residual roadway width required for two-way working = (lateral clearance) + (two-way working carriageway width).

Two-way Working Example:

Type of traffic	Lateral clearance	Two-way working (absolute minimum)	Residual roadway width required
Normal including buses and HGVs	1.2 m	6.0 m	7.2 m
Cars and light vehicles only	1.2 m	5.0 m	6.2 m

Important Note: Where materials used in road strengthening and resurfacing works must be laid to roadway centre and lane edge lines, it will not be possible to maintain two-way traffic at all times during the works. Where two-way traffic cannot be accommodated, shuttle working should be considered.

Shuttle Working: The residual roadway width required for shuttle working on a single carriageway road with speed limit greater than 60 km/h = (lateral clearance) + (shuttle working lane width).

Shuttle Working Example:

Type of traffic	Lateral clearance	Shuttle working (absolute minimum)	Residual roadway width required
Normal including buses and HGVs	1.2 m	3.0 m	4.2 m
Cars and light vehicles only	1.2 m	2.5 m	3.7 m

Road Closure: Based on the residual roadway width requirements for shuttle working, road strengthening and resurfacing works on roadways less than 8.4 m wide (7.4 m for cars and light vehicles only) with a speed limit greater than 60 km/h will require a road closure, convoy working **or** an ALL STOP procedure.

Convoy Working: A road closure may be preferable to convoy working from both a safety and economical viewpoint. Nevertheless, where lateral clearances cannot be provided and a road closure is impractical, a convoy system at a controlled speed of 20 km/h through the works site can be used as a safe method of working. The absolute minimum lane width required for convoy working is 3.0 m (2.5 m for cars and light vehicles only). For road strengthening and resurfacing works, the roadway width required for convoy working is twice the absolute minimum lane width requirement or 6.0 m (5.0 m for cars and light vehicles only).

ALL STOP: Where a suitable detour is not available and there is insufficient roadway width for a temporary convoy lane past the works, an ALL STOP procedure may be considered (see Section 4.5.5).

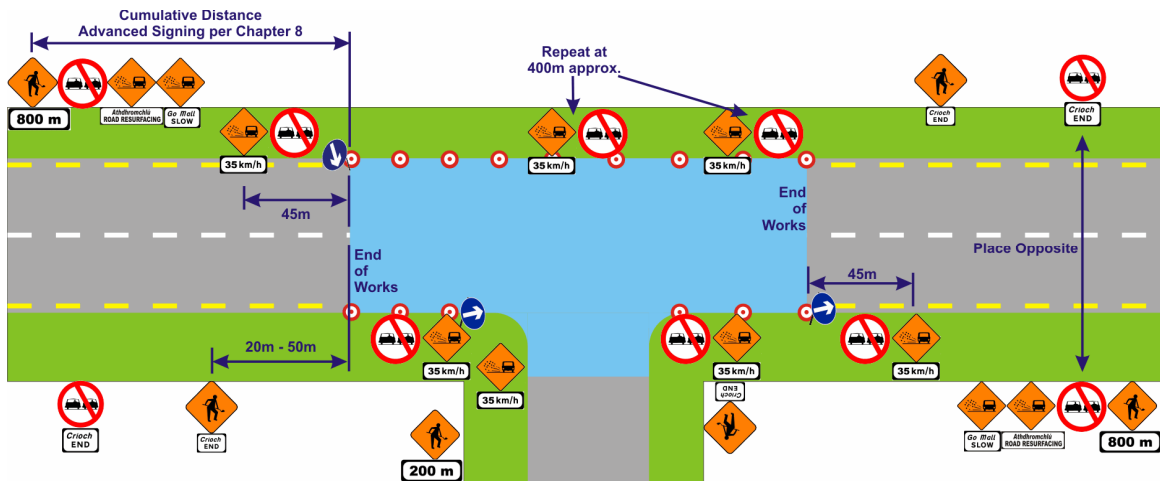
4.6.2 Surface Dressing

Where newly laid surface dressing is exposed to live traffic, a Cautionary Speed Plate of 25 km/h should apply **to protect the quality of the work** until the binder has set. In certain cases, and particularly where there is a danger of traffic damaging the surface dressing, convoy working will be the most appropriate means of protecting the work. The convoy should continue to operate for a number of hours after surface dressing is complete (binder setting times can vary with climatic conditions) and, where applicable, until peak pm traffic flows have subsided. It should be noted that early exposure to properly controlled traffic is beneficial and greatly contributes to the ultimate success of the operation.

Once the surface dressing operation is complete, the site should be signed as required. Signing should include the use of the 'Loose Chippings' sign (WK 073) in conjunction with a Cautionary Speed Plate of 25, 35 or 45 km/h, depending on site conditions. Where appropriate, other signs (e.g., the 'No Overtaking' sign and the 'Slow' sign Plate P 080) or additional cones may be used to encourage motorists to review their speed. Appropriate signage must be retained in position throughout the operation and until sweeping is completed. In general, it is recommended that sweeping take place the morning after the surface dressing operation.

Figure 4.6.2a

Example of Surface Dressing Aftercare Signage



Note 1 The appropriate Cautionary Speed Plate should be selected in accordance with advice contained in Section 4.6.2. Existing permanent signs (none shown) that contradict temporary signs should be covered.

Note 2 On roads wider than 7.4 m, cones should be placed along both road edges and along the road centre (place signs RUS 001 and RUS 002 at the leading cones, as appropriate). The third advanced warning sign should also be replaced with WK 034 (Road Narrows on Both Sides) to indicate that the available carriageway width has been reduced. Longitudinal cone and lamp spacing should be per Tables 4.4.4 to 4.4.6.

Note 3 On roads less than 7.4 m wide, edge coning may be placed on the roadway provided minimum lane widths can be maintained or in the verge, as appropriate (verges may not always be wide enough or level enough to accommodate placement of cones).

Surface Dressing as a Convoy Operation: Speeds for surface dressing works will be determined by the following considerations.

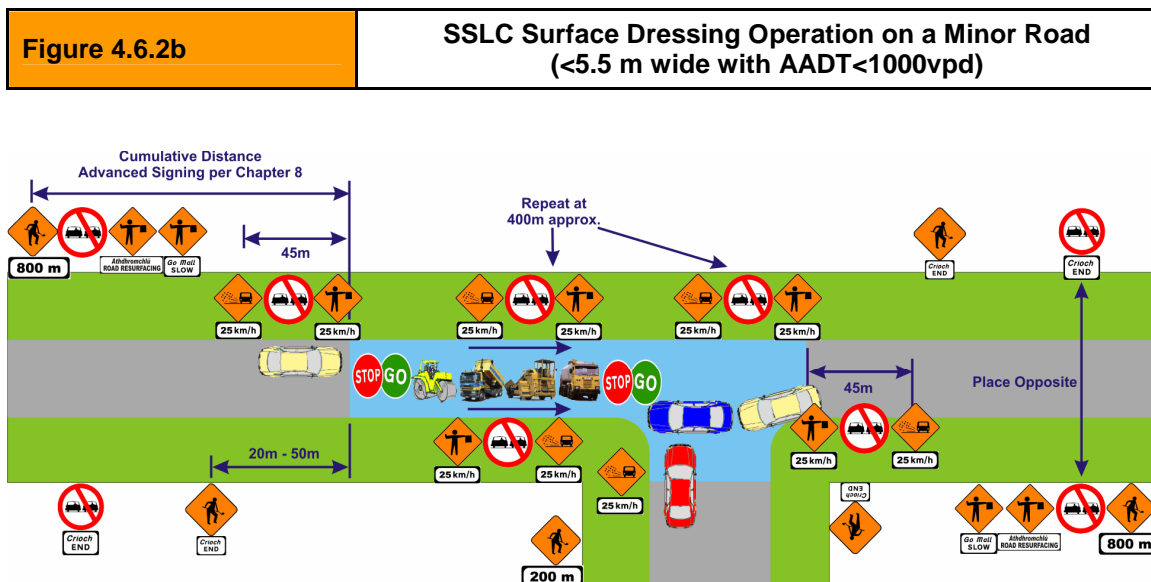
- Where convoy working is used to protect the quality of the work during the surface dressing operation, a convoy speed of 25 km/h through the works site is appropriate.
- Where the lateral safety zone required for a static lane closure operation cannot be provided and convoy working is used as a safe method of working during the surface dressing operation, a convoy speed of 20 km/h through the works site is required while operatives work in the carriageway.
- A convoy system used during surface dressing operations may be withdrawn once the surface dressing activity is complete and the binder has set; however, where convoy working is maintained to regulate traffic behaviour for a period of time after the binder has set, a convoy speed of 25, 35 or 45 km/h should apply depending on site conditions.

In addition to standard signage requirements, the use of variable message signs may be appropriate on high volume roads as a highly visible method of warning road users during and after surface dressing operations (see Section 4.2.3 for placement of variable message signs).

Surface Dressing as a Static Lane Closure Operation: Where surface dressing operations are carried out with a full static lane closure, the roadway width restrictions that apply to road strengthening and resurfacing operations will also apply to surface dressing operations (see Section 4.6.1).

Surface Dressing as a Road Closure Operation: A road closure is also an appropriate method of carrying out surface dressing operations and should be considered, especially where a suitable detour is readily available. Where roads have been closed during construction, they should be re-opened to traffic as soon as the bond between binder and chippings is sufficient in order to achieve the best mosaic possible (early trafficking is especially important with polymer modified binders).

Surface Dressing as a SSLC Operation on Minor Roads: Where surface dressing is carried out as a SSLC operation on minor roads, active traffic management through the works site is required. Due to the width restrictions associated with minor roads, a combination of ALL STOP, STOP and GO batten and convoy working is usually required to control speed through the works site and control traffic movement past the surface dressing operation. It may also be necessary to halt the works at pre-selected passing points (e.g., junctions, lay-bys, etc.) to alleviate traffic queues behind or ahead of the surface dressing operation. A 3 m lane width is required at passing points (2.5 m for passenger car and light vehicle traffic only). Technology and innovation that reduce/eliminate the necessity for operatives to work in the carriageway should be considered in preference to more traditional methods. Surface dressing should not be carried out as a SSLC on non-minor roads.



Note 1 Traffic travelling in the same direction as the surface dressing work train follows behind the moving train. A STOP batten is used to prevent following traffic from attempting to overtake the work train. Following traffic is permitted to overtake the work train at a convenient passing point, such as a junction, provided opposing traffic has been cleared. The work train may need to be repositioned to facilitate this manoeuvre.

- Note 2 Traffic travelling in the opposite direction to the surface dressing work train is held at a convenient passing point using a STOP batten. Once the work train reaches this wider section of the road, the held traffic is permitted to proceed using a GO batten. Per above, once the held traffic is cleared, traffic following the work train is permitted to overtake the momentarily stationary work train.
- Note 3 Existing permanent signs (none shown) that contradict temporary signs should be covered.

4.6.3 Roadway Markings and Roadway Studs

Roadway markings may be divided into two general types: longitudinal work, which is normally done by a special machine operating continuously along the carriageway, and any other works, such as the application of priority junction markings, arrows etc., which for a short time have the characteristics of static road works and should be signed as such.

For longitudinal work, advance warning signs and warning indicators on vehicles (SSLC) may be sufficient, provided there is adequate width for the passage of traffic and the newly-laid lines do not require to be kept clear of traffic. Acceptable technology and innovation that reduce/eliminate the requirement for operatives to work in the carriageway should be considered in preference to more traditional methods.

Fixed signs at the roadside may not be practical where thermoplastic material is applied to the carriageway using a mobile marking machine to produce roadway markings (travel speed is approximately 8 km/h). To overcome this, it is necessary to provide signs mounted on the rear of other vehicles which travel in convoy with the marking machine, or other measures to provide the necessary advanced warning (see SSLC under Section 4.4.6). In any case, advanced warning signs should always be provided when roadway marking operations are being carried out.

Where it is necessary for operatives to work in the carriageway (e.g., installing roadway studs, setting out prior to marking etc.), other methods from single vehicle working to full static lane closure, with or without traffic control, may be required.

A road closure may be required for centreline marking where the roadway width is less than 6 m. However, consideration should also be given to the ALL STOP method of traffic flow management (see Section 4.5.5).

4.6.4 Longitudinal Works at Nearside Roadway Edge and Verge

Many of the routine operation and maintenance works undertaken by Local Authorities would fall under this description of works. Depending on the nature of the works, the works could be carried out as a single vehicle (Type C static operation) or a SSLC operation. In general, single vehicle working is a more appropriate method where operatives are required to work in the carriageway and the SSLC procedure is more suited to slow moving or steadily progressing works carried out from within a works vehicle. Where operatives are required to work extensively in the carriageway, a full static lane closure with traffic control may be more appropriate. Refer to Sections 4.4.5 and 4.4.6 for detailed guidance on the use of single vehicle and SSLC methods of working.

4.6.5 Patching

Scheduled roadway patching maintenance can be carried out as a SSLC 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 in the carriageway, a single vehicle method of working (Type C static operation) may be required.

4.6.6 Emergency Works and Dynamic Risk Management

Due to their nature, emergency road works require an immediate response. Therefore, tasks performed during emergency works should be carried out in accordance with pre-established safe operating procedures.

Where it is not practical to address less predictable and site specific aspects of emergency works by way of pre-established operating procedures, a dynamic risk management procedure should be followed to ensure the safety of workers.

Dynamic risk management is the continuous process of identifying hazards, assessing risks, taking action to eliminate risks, monitoring and reviewing in the rapidly changing circumstances of an emergency. The core principles of dynamic risk management are outlined below:

- avoid working alone, if possible;
- at least one team member attending an emergency should have access to a mobile phone at all times;
- evaluate the situation and identify the hazards;
- consider the risks to personnel, the public and the environment;
- apply judgement to decide the most appropriate course of action;
- **do not proceed with an action unless the benefit derived from the action justifies the risk taken to execute the action;**
- monitor and re-assess the situation as new hazards and risks arise;
- do not become complacent;
- recognise your own limitations and the limitations of your crew/colleagues (fatigue, etc.); and
- conduct a post incident review, as necessary.

Removing Debris from the Carriageway: Debris in the carriageway cannot be predicted. Consequently, its removal can be described as an emergency operation. In principle, all debris should be removed from the carriageway as soon as it is safe to do so. Only trained personnel should remove small/light debris from a live carriageway. For larger/heavier items, the hazards involved should be taken into consideration and, on busy routes, assistance from the Gardaí may be necessary for the protection of the operatives. When an item cannot be moved immediately, it should be marked by cones, flashing beacons or other means, as appropriate. Large items removed from the carriageway and temporarily placed in the verge may still be hazardous and should also be marked, as necessary.

Emergency Pothole Repairs: Emergency pothole repair can be carried out as a single vehicle or SSLC operation. In general, it is desirable to carry out such repairs during off-peak traffic flow or good visibility conditions. However, having regard to the risk posed to the road user by the surface defect, it may be necessary to carry out these works in less than favourable conditions.

Emergency Lane/Road Closure: In these situations, Local Authorities must notify the Gardaí and should assist emergency services as required. Local Authorities should also provide appropriate traffic management (signing of routes etc.).

Where a private utility company is responsible for the emergency situation (e.g., a fallen electrical power line), the emergency reaction should be by the utility company with the Local Authority providing additional assistance as requested by the Gardaí and emergency services.

Emergencies involving vehicular accidents, chemicals and other spillages should be treated with urgency and extreme caution. In general, emergencies of this nature should be dealt with by the Gardaí and emergency services. Where road works personnel come upon an incident, the

Gardaí should be notified of the location immediately and an agreed set of emergency response procedures put into operation.

4.6.7 Relaxations for Works on Minor Roads

Important Note: In the context of this guidance document, a minor road is defined as a local roadway less than 5.5 m wide with an AADT of less than 1000 vehicles per day. All other public roads shall be considered to be non-minor roads.

Road Strengthening and Resurfacing Operations: Because of roadway width restrictions associated with minor roads, a road closure or an ALL STOP procedure will be the only suitable traffic management option for most road strengthening and resurfacing operations. Traffic on minor roads is deemed to be local and fully signed detour routes are not considered necessary unless a site risk assessment suggests otherwise.

Surface Dressing: Surface dressing may be carried out as a SSLC operation on minor roads (see Section 4.6.2 above).

Routine Maintenance Works: It is recommended that a set of standard traffic measures be prepared where maintenance works are routinely carried out on minor roads. However, a site risk assessment will be required and any standard traffic measures modified accordingly to suit actual site conditions.

Detours onto Minor Roads from Non-Minor Roads: Where minor roads are used as detour routes for works on non-minor roads, careful consideration should be given to the suitability of the minor road with respect to traffic volumes, turning and passing manoeuvres, movement and volume of HGV traffic, etc. (see Section 4.3.3).

4.6.8 Provision for Local Access during the Works

The nature of and necessity for the works should be communicated to residents, businesses and other premises with frontage onto or access through the works site. A suitable access/egress procedure should be agreed with the relevant parties and coordinated through the Temporary Traffic Operations Supervisor.

Similarly, a suitable procedure for directing school buses and emergency services in need of local access should be agreed with the relevant operators/organisations. In some cases, a suspension of working will be required at agreed times to accommodate local access.

An appropriate Cautionary Speed Plate should be applied to all local and construction traffic within a road closure site.

4.6.9 Winter Maintenance Operations

Winter maintenance (salting/gritting and/or ploughing) is a mobile operation carried out close to normal traffic speed. Traffic management is not required for this operation. Work vehicles should be fit for purpose, suitably conspicuous and fitted with flashing beacons.

4.6.10 Inspection Stops and Surveys

Site inspections are carried out without a hard shoulder/lane closure or associated temporary static traffic measures (i.e., construction works are not carried out during an inspection).

Nonetheless, inspections are an integral and necessary part of most road works projects. They are usually short in duration and may include the following types of activities:

- risk assessment prior to works;
- risk assessment during the planning/design process;
- post works measure-up or quality assurance inspection;
- road condition inspection; and
- carrying out of minor surveys, taking measurements, etc.

The following guidelines should be adhered to when carrying out such inspections:

- where possible, plan the inspection in periods of light traffic flow;
- avoid inspections if visibility is poor or during adverse weather conditions;
- wear high visibility clothing;
- look out for approaching traffic before opening the door and alighting;
- if it is essential to cross the carriageway, wait for a sufficient gap in traffic to walk across briskly – do not run, and continue to keep a look out for oncoming vehicles;
- remain alert at all times and face oncoming traffic as much as possible;
- complete the inspection as quickly as possible;
- when leaving the site, wait for a suitable gap in the traffic to merge safely;
- use a roof mounted, amber warning beacon throughout, if provided (required for motorway inspection); and
- when a hard shoulder/lane closure is required for inspection, the operation shall be carried out as a normal static operation.

Survey works that progress along the roadway edge may be carried out as a SSLC operation. Survey works requiring a partial or full closure of a running lane or hard shoulder should be carried out as a normal static closure operation.

5. Pedestrians, Vulnerable Road Users, Junctions and Urban Roads

5.1 Pedestrians and Vulnerable Road Users

This section addresses issues associated with the application of traffic management design in urban areas with particular emphasis on the impact road works can have on pedestrians and other vulnerable road users. For the purpose of this document, the term 'pedestrians and other vulnerable road users' is understood to be a collective term for pedestrians, cyclists, wheelchair users, people who are unsteady on their feet or who use walking aids, people who walk at low speeds or who need to take frequent pauses, people with impaired hearing or impaired vision, pedestrians with push buggies or luggage and other non-motorised road users.

The likelihood of encountering alternate modes of transport (buses, light rail, etc.) and the level of vehicular, cycle and pedestrian movements is significantly higher in urban areas. Therefore, the impact of road works on these road users is also likely to be significantly higher in urban areas by comparison with non-urban and rural areas.

There is also a greater possibility that an urban road will include separate or designated facilities for pedestrians and other vulnerable road users (e.g., designated footpaths, cycle tracks, crossing points, etc.). Where these facilities exist, the Designer (TTM) should endeavour to maintain existing facilities or provide suitable alternatives.

In so far as is reasonably practicable, the Temporary Traffic Management Plan should minimise the direct impact of road works on the desired routes normally taken by pedestrians and other vulnerable road users.

5.1.1 Temporary Pedestrian Routes

Where existing footways are within the works area or are affected by road works, a safe temporary pedestrian route should preferably be provided through the site. It is also preferable to keep the temporary route off the roadway; however, in many cases, it may not be possible to achieve this for any or all of the temporary route.

The temporary route should be clearly delineated using appropriate barriers. The type of appropriate barrier to be used will depend on the function of the barrier. For example, pedestrian barriers designed to simply delineate the temporary pedestrian route from the works area or the roadway cannot be used where a containment barrier is required to protect the pedestrian from certain traffic or construction hazards. Where containment barriers are used to delineate pedestrian routes, they should be brightly coloured and highly visible to facilitate people with vision impairments. Similarly, scaffolding or hoarding should be highlighted in a contrasting colour to aid detection by people with vision impairments.

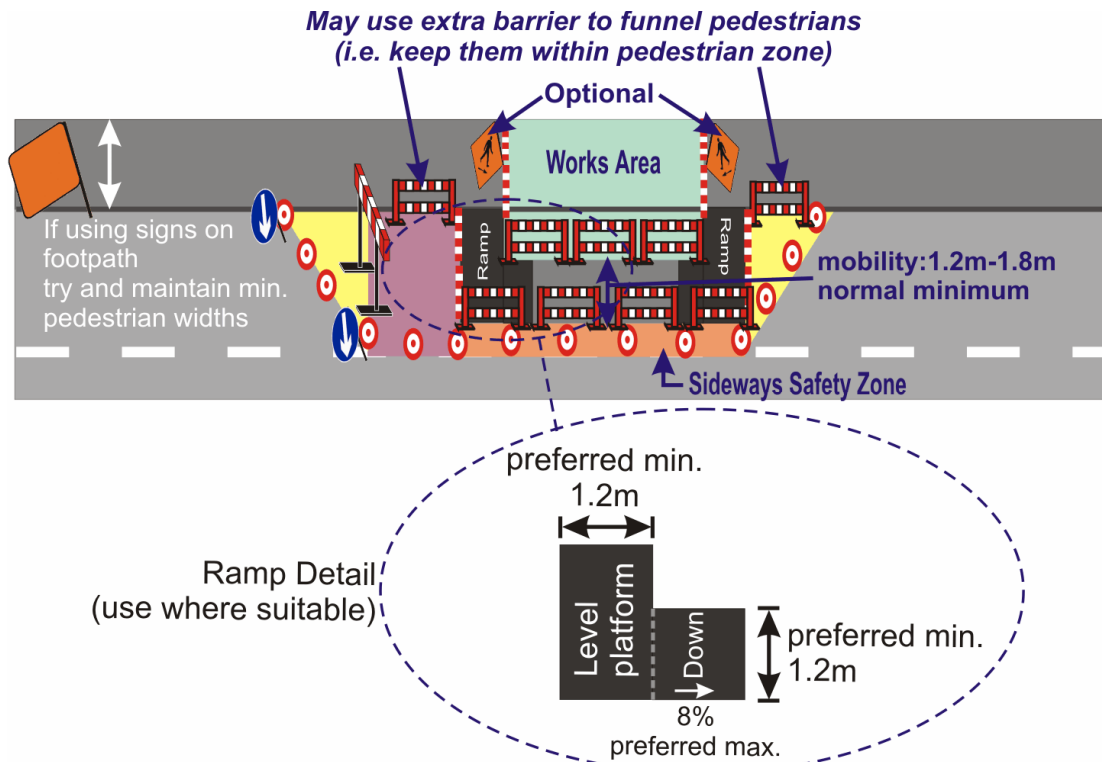
Pedestrian routes are not part of the works area; therefore, no construction activity should take place within a designated route. The route should be kept clear of obstacles, trip hazards and overhanging objects, and the surface should be suitable for all pedestrians, including people with disabilities. Similarly, temporary road works signs, barriers, etc. should be positioned and stored on site so as not to cause an obstruction.

Where a footway is diverted onto a roadway, the longitudinal and lateral safety zones should be located between the footway and live traffic. The inner or pedestrian side of the safety zones should be delineated from the pedestrian route by a continuous pedestrian barrier. The outer or

live traffic side of the safety zones should be delineated from live traffic by a row of traffic cones. Where pedestrians and/or vehicles are directly exposed to construction hazards, it may be necessary to use containment barriers instead of or in addition to the above referenced pedestrian barriers and traffic cones. A lateral safety zone is not required where a continuous containment barrier is provided between the pedestrian route and live traffic.

Figure 5.1.1

Pedestrian Management in Urban Areas



Roadway Crossings: Where a roadway crossing is out of use due to construction works, existing signs and crossing controls should be removed or covered, as appropriate. Signage and barriers should be erected to indicate that the crossing is not in use and pedestrians should be directed to the nearest suitable alternative. The temporary traffic management arrangements should be designed to minimise the impact of the works on these critical points.

Pedestrians should be discouraged from attempting to cross at a location where the crossing cannot be completed due to the presence of road works. Pedestrian barriers may also be used to prevent pedestrian access onto the roadway at such locations.

The traffic management design should consider 'pedestrian desire lines' such as informal crossing points that are commonly used by pedestrians, e.g., from a school to a shop. The design should either cater for such crossing movements or take positive steps to discourage them. Where the Temporary Traffic Management Plan directs pedestrians to cross the roadway at a location where motorists would not normally expect to encounter pedestrian movements, the 'Pedestrians' sign, WK 140, may be used.

**WK 140 Pedestrians**

Where the pedestrian/cyclist demand is high, it may be necessary to maintain existing signalised crossings or provide alternative, temporary crossing points. Where a temporary crossing point is provided in a busy urban area, it may be necessary to accommodate pedestrian crossing movements using temporary traffic signals or STOP/GO battens.

Ramps: Where the temporary route around the works area diverts pedestrians onto the roadway, kerb ramps or raised footways should be provided to maintain access for wheelchair and buggy users. Ramps should have a slip resistant surface and should slope gently enough to enable users to negotiate the change in level without difficulty (maximum gradient of 1:12). When possible, the layout should include a platform at kerb level, which would allow wheelchair users to turn through 90 degrees before descending the ramp (i.e., ramp is parallel to the kerb line as shown in Figure 5.1.1). Ramps, raised footways or boards that are provided should be fit for purpose. The use of handrails should also be considered, especially at ramps.

Designing for Everyone: In order to maintain overall pedestrian mobility and reduce hazards particular attention should be paid to the needs of people with disabilities. All organisations that are either responsible for or carry out road works shall have regard to the requirements of the Disability Act 2005.

Facilities, such as hospitals, that may increase the level of vulnerable road user activity in an area should be identified at the planning stage. Where temporary or alternate pedestrian routes are provided at road works, the safety and accessibility implications of uneven/unsuitable surfaces, excessive gradients and obstructions on the temporary/alternate route as well as the length of the temporary/alternate route must be considered.

To the extent possible, the design of the temporary route should allow pedestrians and other vulnerable road users to proceed in a normal manner and without the intervention of a second party. More specifically, pedestrians and vulnerable road users who do not normally require assistance should not be required to rely on assistance to negotiate the temporary route. It is acknowledged that this may not always be possible or reasonably practicable; in such circumstances the Temporary Traffic Management Plan should advise the Contractor that the provision of special assistance may be necessary. This is especially relevant where permanent arrangements that assist the movement of vulnerable road users, such as tactile pavement with colour/tonal contrast and signalised crossings with audible warning, cannot be incorporated into the temporary route. Measures may include the use of a pedestrian controller (a site operative with responsibility for assisting/escorting pedestrians and other vulnerable road users through the site).

Restricted Sites: In particular cases, such as older housing estates, it may not be feasible to install a delineated pedestrian route through the road works site. In such cases, satisfactory alternative arrangements should be identified at the planning stage or prior to the commencement of the works.

5.1.2 Barriers and Equipment

In urban areas, where a footway exists, continuous pedestrian barriers should be provided along the temporary pedestrian route through the site. In other cases, pedestrian barriers should be provided on the basis of need.

Barriers can serve a number of functions; they may be required to delineate a temporary pedestrian route from live traffic, the general works area or a specific hazard, such as an open trench, within the works area.

Pedestrian Barriers: Where the temporary pedestrian route cannot be provided off the roadway, pedestrians may need to occupy part of the roadway. Pedestrian barriers should be used to separate a temporary pedestrian route from live traffic. The required lateral safety zone between the pedestrian route and the near side traffic lane should be established by placing a row of cones on the traffic side of the pedestrian barrier.

When covers from underground access chambers, manholes, etc. are temporarily removed, pedestrians should be protected from the exposed opening by pedestrian barriers of sufficient size to enclose both the chamber opening and its cover. Covers should only be removed while workers are present on site and should be replaced as soon as the inspection/activity is complete.

Pedestrian barriers provide visual guidance for pedestrians through the road works site. They also indicate the designated route for pedestrians to road workers thus ensuring that materials and equipment do not infringe upon this allocated space. Basic criteria for pedestrian barriers are outlined hereafter and in Figure 5.1.2. In general, pedestrian barriers:

- should have a highly visible bar/board and a tapping rail;
- be reasonably rigid, be erected in a continuous manner and be placed so that they cannot be easily knocked over; and
- be continuous between supports and fixed so that they cannot be accidentally dislodged.

If there is any risk to pedestrians or cyclists from works activity, a site specific containment/protection type barrier or suitable hoarding may be required.

Containment Barriers: Pedestrian barriers may also be used to delineate a temporary pedestrian route from the general works; however, if the pedestrian route is in close proximity to a specific hazard within the works area, the specific hazard should be isolated from the works area and adjacent pedestrian route using suitable protection/containment barriers. Pedestrian routes adjacent to excavations should be subject to a risk assessment. Containment barriers should be used where excavations greater than 300 mm deep are located adjacent to pedestrian routes. Containment barriers should be capable of withstanding the pressure of pedestrians pressing against them and be set back from the excavated edge in accordance with recommended practice. These barriers should also comply with approved standards (IS EN 1317).

Security Barriers: Additional security measures may be required between the pedestrian route and the works area where works are left unattended, unauthorised entry is likely to occur and/or where the duration of the works is considerable.

Signing and Lighting: Works or obstructions on an existing footway should be signed and guarded. Where appropriate, the temporary footway should be lit to allow for the safe passage of pedestrians. Appropriate signs should be provided to indicate that the existing footway is closed and to direct the pedestrian along the temporary route provided. Where the normal pedestrian route is diverted, 'Route for Pedestrians' signs (WK 080 to go left or WK 081 to go right) should be used.

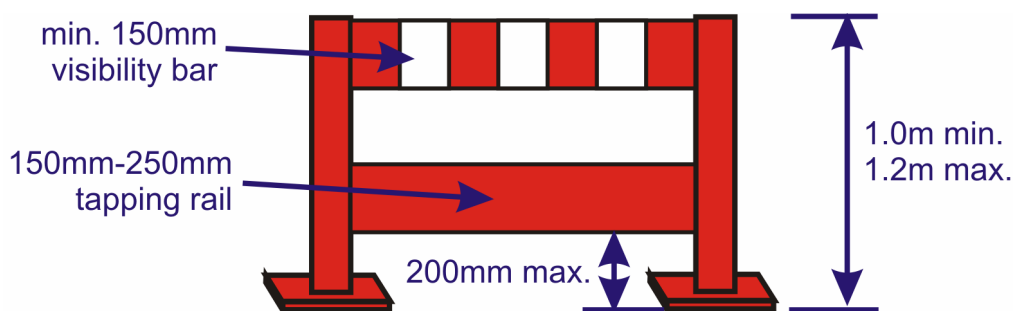


Other issues that need to be considered by the Designer (TTM) when locating barriers in urban areas include:

- the location of entrances and access to property;
- access to bus stop locations for both pedestrians and bus drivers;
- impact on loading/unloading activities;
- preventing unsafe/unauthorised access through the works area; and
- the proximity of facilities that may increase the presence of vulnerable road users (schools, amenity areas, nursing homes, churches, etc.).

Figure 5.1.2

Pedestrian Barrier Dimensions



5.1.3 Cyclists

While cyclists may be encountered on any type of single carriageway road, cycling in urban areas is far more likely to be used as a viable means of transport. Consequently, cyclists are more likely to be present at road works in urban areas. Permanent road space for cyclists can consist of one or more of the following options:

- sharing the running lane with vehicular traffic;
- separate cycle track on the roadway;
- separate cycle track off the roadway; and
- combined pedestrian and cycle track.

To the extent possible, the temporary route provided for cyclists at road works should mirror the permanent arrangements. For example, if a separate cycle track and pedestrian footway exist in advance of the works, it would be desirable to provide separated pedestrian and cycle routes through the road works site.

Cycle routes should be kept open through the works site and access should be maintained in both directions. However, if this cannot be achieved, it may be necessary for cyclists to use the running lane on the roadway, take an alternative diversion route or dismount and use temporary pedestrian facilities provided.



RUS 009 with P010
Cycle Lane Ends or Cycle Lane Suspended

When cycle tracks or shared pedestrian/cycle facilities are affected by the road works, the changes should be clearly signed well in advance of the road works. When a cycle track is suspended, signage should be provided to direct the cyclist in an appropriate manner.

Where lane widths are reduced during construction such that construction lane widths are too narrow to safely accommodate cyclists and vehicular traffic, an alternative route should be provided for cyclists. Alternative routes should be adequately signed and where possible be independent of vehicular traffic. Where roadway diversions are used, the diversion should be as direct as possible (cyclists are not likely to undertake lengthy detours).

Temporary traffic signals should give cyclists sufficient opportunity to pass safely through road works site, particularly where shuttle systems are in operation. This is an important consideration for any active traffic management system in an urban area.

Cyclists are particularly vulnerable on rough or uneven surfaces. Potholes, gullies, metal plates, sloping fillets and cable protectors can be particularly hazardous. The cycle route through the road works site should be kept as level as practicable.

Where cyclists are accommodated on the roadway, the design of temporary traffic measures should ensure that the lane widths are adequate to accommodate cyclists as well as vehicular traffic. Long lengths of narrow lanes can cause difficulties for cyclists and it may be preferable to have lanes that are too narrow for other vehicles to overtake than lanes where passing is possible but unsafe. Widths of between 2.75 m and 3.25 m for near side lanes should be avoided. In situations where vehicles are unable to pass cyclists safely, i.e., where the effective lane width is less than 3.5 m, the use of 'Cycle Warning' sign WK 143 should be considered.



WK 143 Cyclists

5.1.4 Dimensions

Routes for pedestrians and other vulnerable road users should be designed/provided in accordance with clearances specified in Table 5.1.4. While minimum clearances are specified, where possible, the width provided should be capable of accommodating expected volumes.

Available space may not always be sufficient to achieve these dimensions. Further reductions in widths may be considered after assessment of the physical space available on the street, pedestrian demands and the general standard of existing provisions adjacent to the site.

Table 5.1.4 Clearances for use with pedestrians, cyclists and people with disabilities

Description	Clearance	Dimension (m)
Temporary footway	desirable minimum width <i>(allows two wheelchairs to pass)</i>	1.8 m
	absolute minimum width <i>(allows a wheelchair user and a pedestrian to pass)</i>	1.2 m
	desirable min. width at obstacle	1.0 m
	desirable min. width at bus stop	3.0 m
	desirable min. width at shop front	3.5 to 4.5 m
One-way cycle track	desirable minimum width	1.5 m
	absolute minimum width	1.25 m
Shared pedestrian/cycle facility	minimum width	3.0 m
Cycle or shared pedestrian/cycle facility	desirable minimum height	2.5 m
	Temporary footway	absolute minimum height

Figure 5.1.4a Pedestrian Requirements

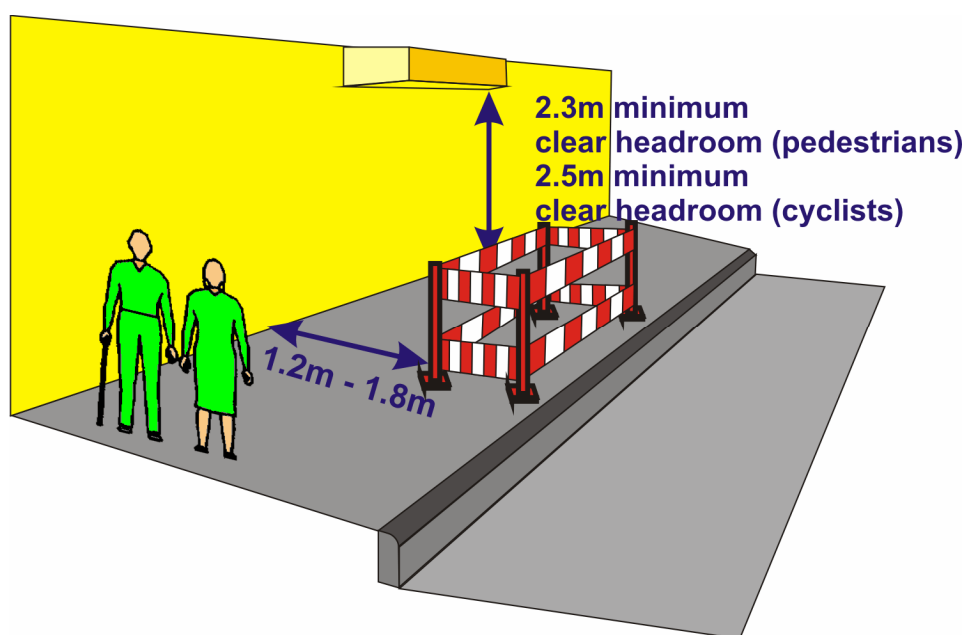
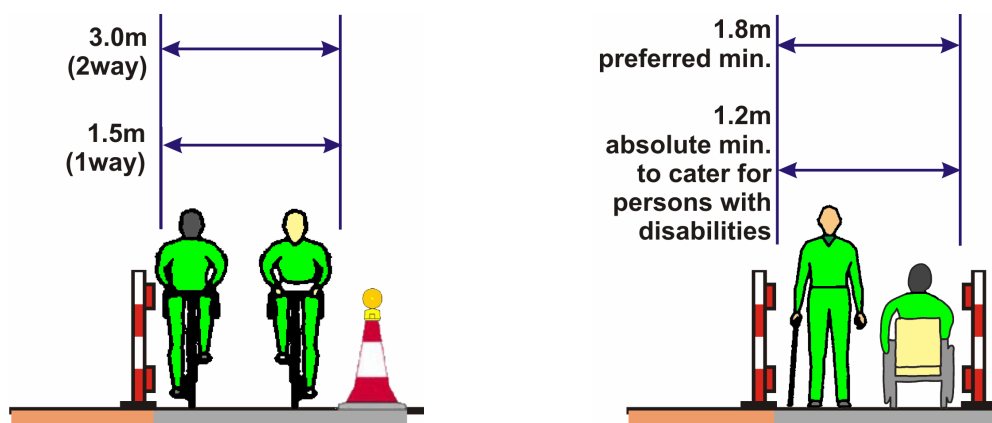


Figure 5.1.4b**Cycle and Pedestrian Lateral Requirements**

5.2. Junctions, Roundabouts and Signals

This section addresses the application of the design guidelines presented in this document to road works activities relating to urban areas, covering activities relating to junctions, roundabouts, traffic signals, etc. In addition, works in urban areas usually have to accommodate more complicated road layouts, higher traffic volumes and a greater range of transport modes.

5.2.1 Junctions

The preferred objective is to maintain two-way traffic past the obstruction when it is safe to do so. This may be achieved by providing temporary road markings and also 'yield' road markings to assist in marshalling traffic. Traffic restrictions such as the prohibition of turning movements may be required, subject to agreement of the Local Road Authority in consultation with the Gardaí. If suitable, convenient alternative roads are available, temporary diversions should be arranged and signed.

If the road width available to traffic has to be reduced to less than 5.0 m, it will be necessary to control traffic by means of 'STOP/GO' battens or temporary traffic signals.

If the width of road available in the side road is sufficient for one-way traffic only, all turns from the major road must be prohibited, subject to agreement of the Local Road Authority in consultation with the Gardaí, so that the side road operates one-way only past the obstruction. A similar effect could be achieved by using the 'No Entry' sign. A diversion should then be signed to permit access to the side road. It may be possible to operate shuttle working past the obstruction under the following circumstances:

- the side road is a cul-de-sac;
- diversion routes are impractical; and/or
- traffic is very light and there is little risk of traffic on the main road being inconvenienced.

Road works signs in accordance with Chapter 8 of the Traffic Signs Manual should be provided (see Figures 5.2.1.A and 5.2.1.B).

Figure 5.2.1.A Works at Junctions (Main Road)

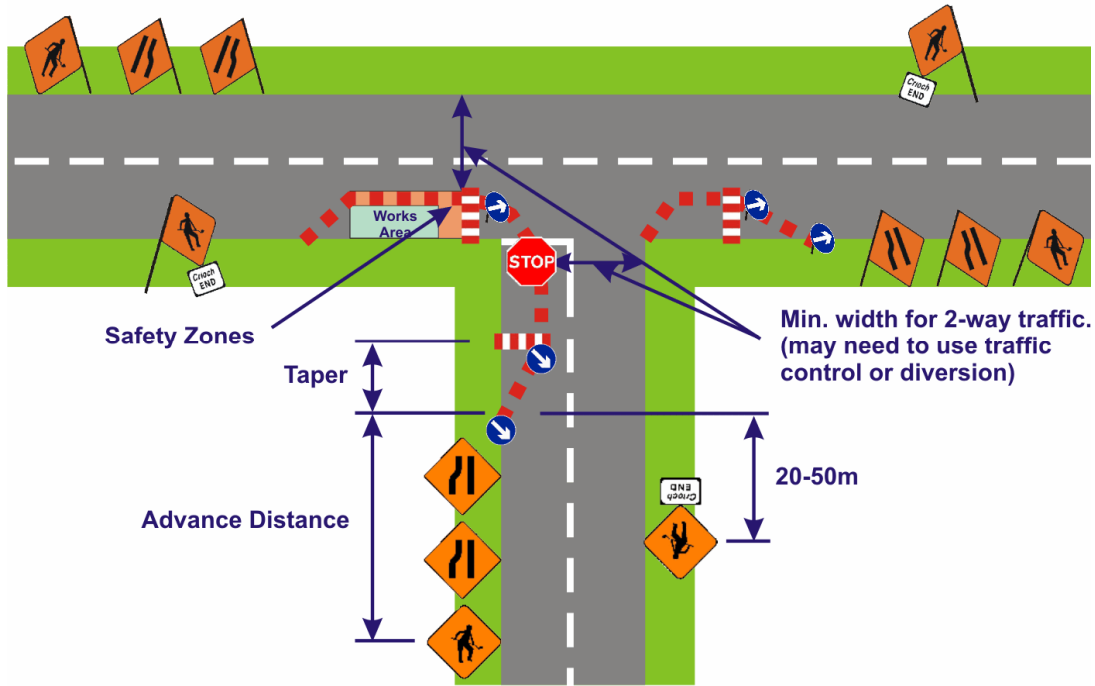
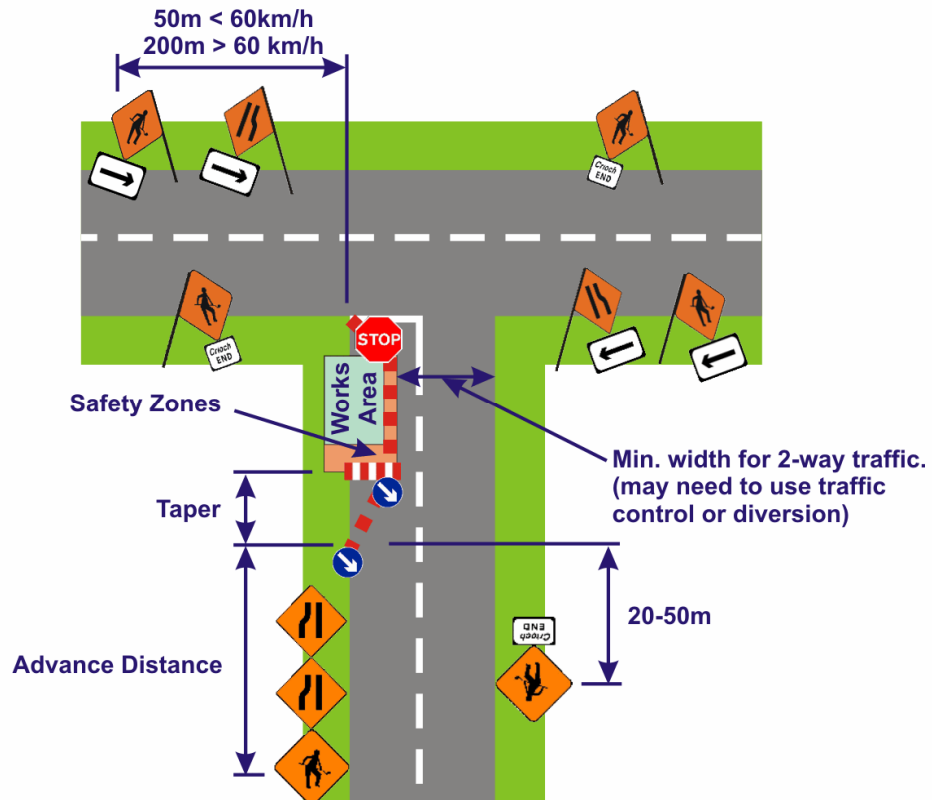


Figure 5.2.1.B Works at Junctions (Side Road)



Where the junction is normally controlled by 'Yield' or 'Stop' signs and traffic or visibility problems require the minor road or access to be controlled by signals, both the junction and the shuttle lane should be controlled by a multiphase portable signal controller. As appropriate, permanent signage and road markings should be temporarily masked or removed.

5.2.2 Roundabouts

When carrying out road works at a roundabout, Designers should be aware of their nature as low speed environments and that taper lengths may be selected accordingly. Where provided, taper locations and transitions should be designed to tie in where the road widens in the vicinity of the roundabout.

Where the impact of the works area and safety zone make the implementation of temporary traffic management difficult, options such as diversions, partial removal or removal of islands should be considered.

A. Entrance to a Roundabout:

The approach to the obstruction should be signed and guarded as per Chapter 8 of the Traffic Signs Manual. If possible, two-way traffic should be maintained on the arm where the obstruction/works area is located (see Figure 5.2.2.A(i)). For situations similar to Figure 5.2.2.A(ii), part of the roundabout circulatory area should be coned off as shown to restrict traffic to one lane going towards the exit where the works are located; 'Road Narrows' warning signs should be provided in advance. Where two-way traffic cannot be maintained, entering traffic should be prohibited and a suitable diversion route should be arranged. If no suitable diversion routes are available, it may be necessary to adopt shuttle working.

B. Circulatory Area of a Roundabout:

All movements should be maintained, if possible. The obstruction should be signed and guarded with lamps and a 'Road Narrows' sign should be provided (see Figure 5.2.2.B).

Widths on the circulatory area of a roundabout should adhere to general design requirements, having regard for the type of traffic to be expected. When establishing the works area and safety zones on or near a roundabout, the requirements of vehicles (e.g., overhang, sweep paths and width), and HGVs in particular, should be taken into consideration.

C. Completely Obstructing a Roundabout:

The works should be signed and guarded. Diversion routes should be provided where suitable alternative roads are available. The complete obstruction of a roundabout requires the agreement of the Local (Road) Authority in consultation with the Gardaí.

Figure 5.2.2.A(i) Works on Nearside Entry of Roundabout

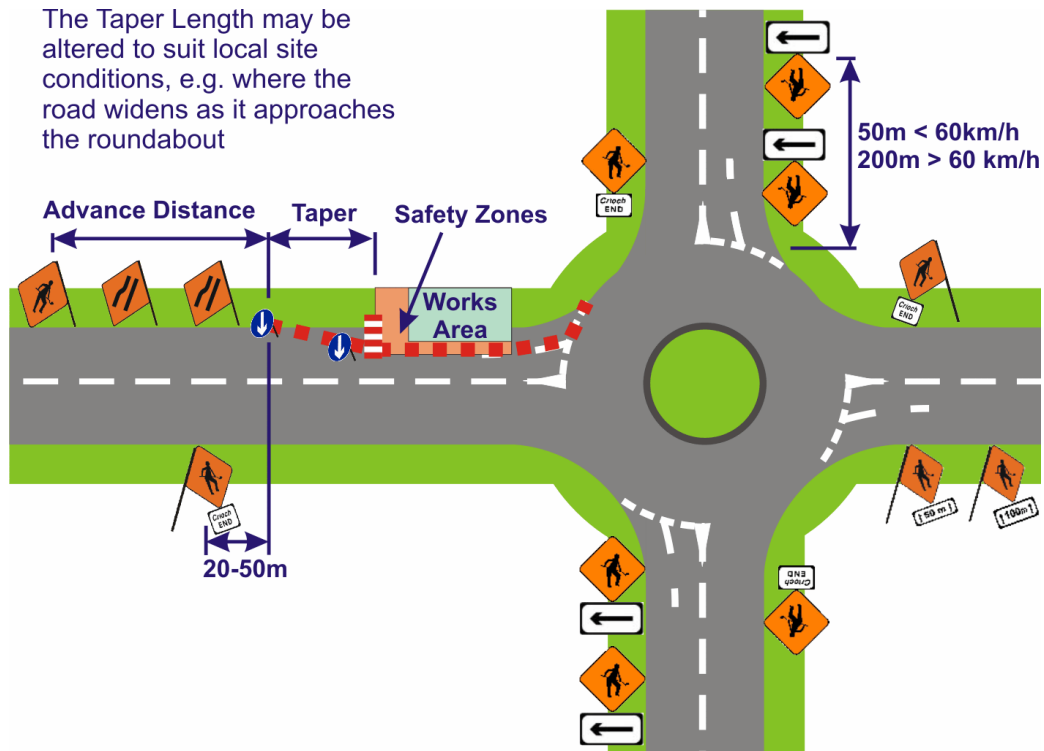


Figure 5.2.2.A(ii) Works on Offside Entry of Roundabout

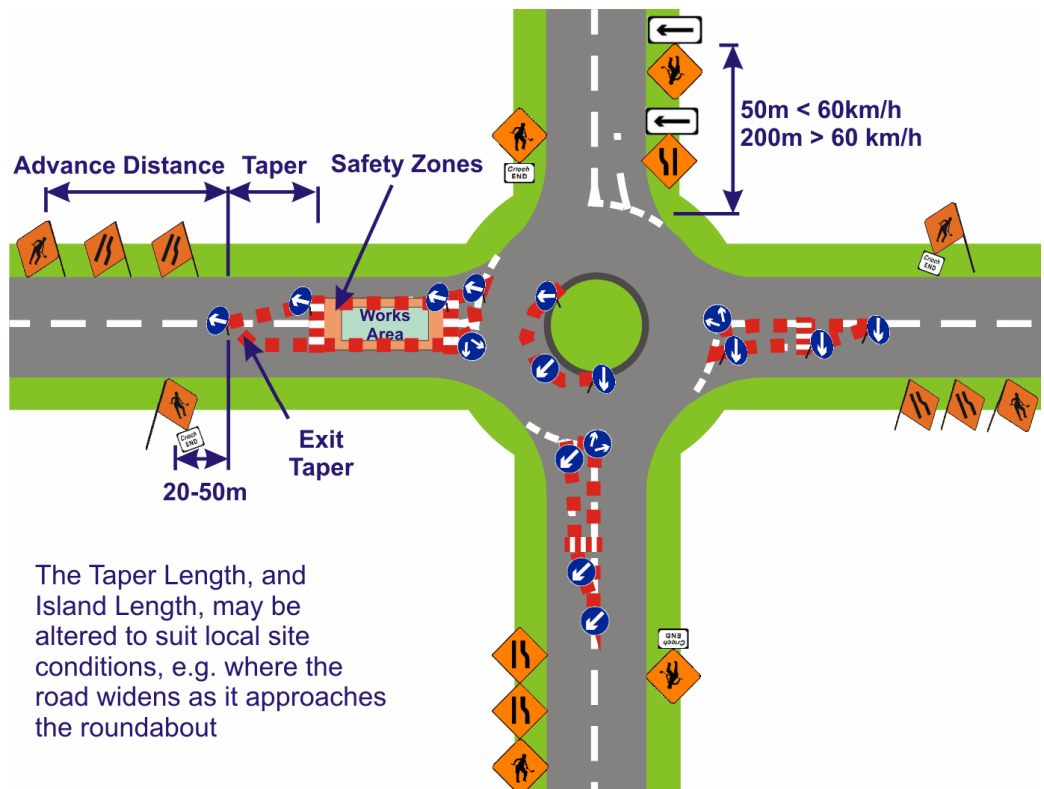
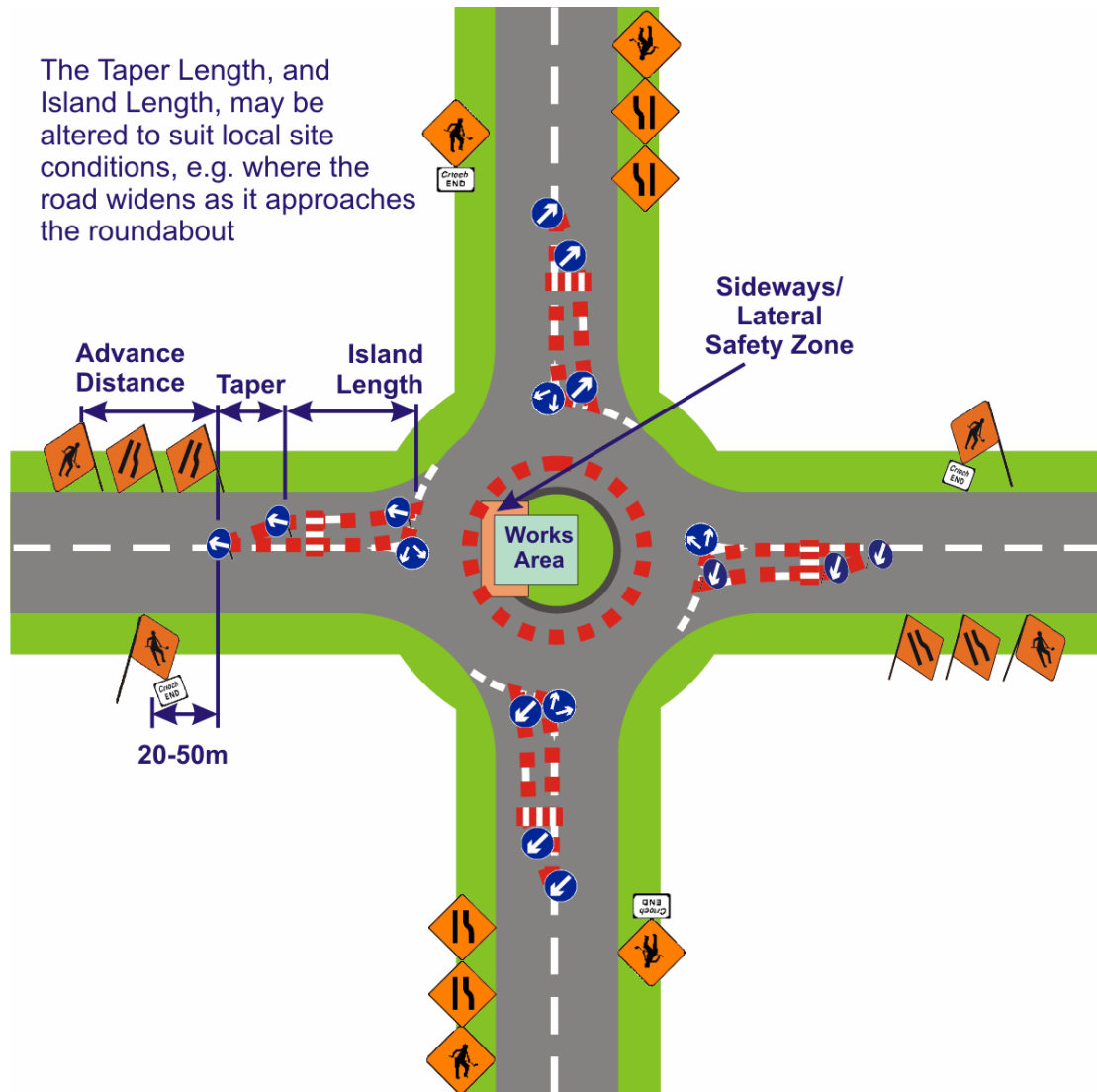


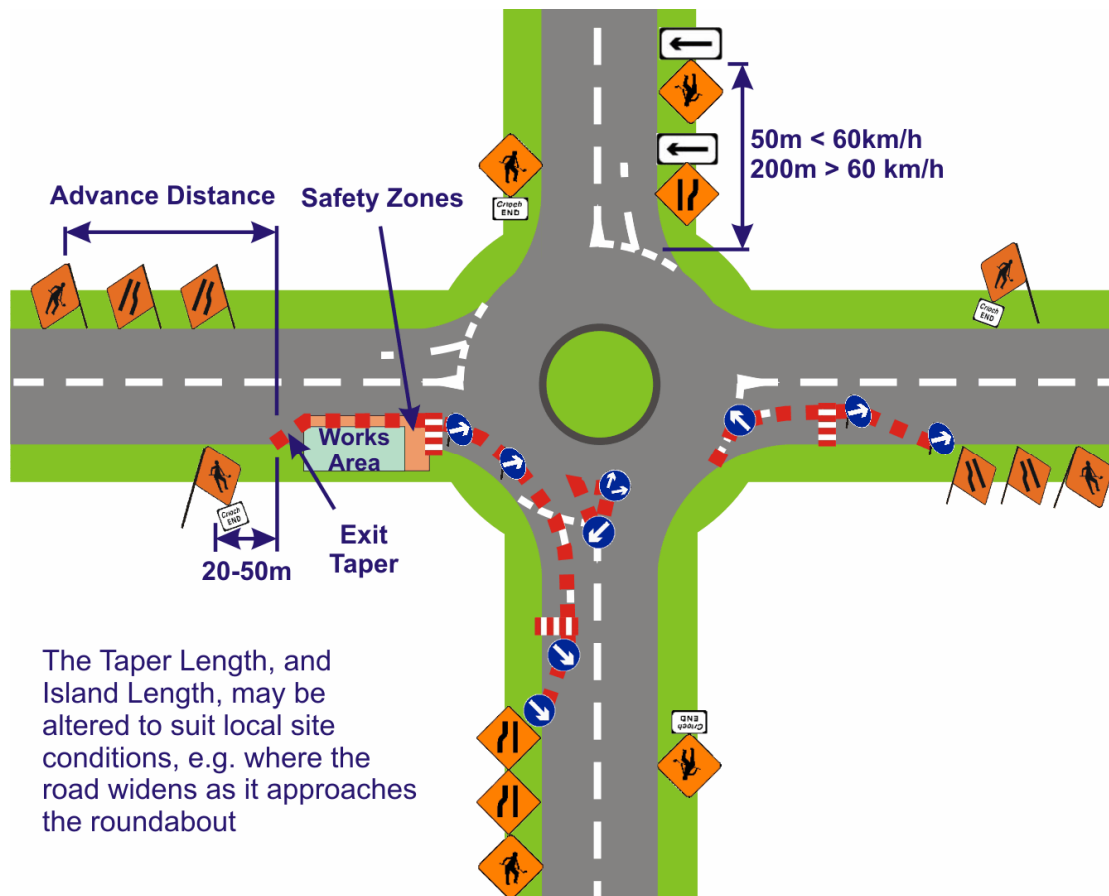
Figure 5.2.2.B Works on Circulatory Area of Roundabout



- D. Exit from a Roundabout:**
Where possible two-way traffic past the works should be maintained. In this case, part of the circulating area should be coned off to restrict traffic to one lane going towards this exit and advance warning provided using the 'Road Narrows' sign. The obstruction should be signed and guarded as per Figure 5.2.2.D. Where two-way traffic cannot be maintained past the works, entering traffic should be prohibited and a suitable diversion route should be arranged.
- E. Works at a Mini-Roundabout:**
Traffic management for works at a mini-roundabout, i.e. a roundabout with the marking instead of a physical central island, should be as for a junction of two roads, i.e., a T-junction or crossroads.

Figure 5.2.2.D

Works on Exit of Roundabout



5.2.3 Traffic Signals

Where a junction is normally controlled by permanent signals, the position of the proposed works will dictate the most appropriate traffic management arrangements.

A temporary change in the road lining and signing may suffice. However, temporary modifications to the signals may be required during road works to ensure satisfactory operation and to avoid unnecessary delays. Other situations may require the permanent signals to be switched off temporarily to allow traffic to be controlled either by a multiphase portable signal set or by STOP and GO batters.

Permanent traffic signal heads should be covered when their operation is suspended. Signs to indicate 'traffic signals not in use ahead' should be erected when they are being replaced on a temporary basis by Stop and GO batters.

Works in the vicinity of stand-alone crossings at roundabouts and signal-controlled roundabouts can cause particular problems and the designer should contact the Road Authority and Gardaí before planning the necessary traffic management. The needs of pedestrians and other non-motorised roads users should be considered when traffic signals are removed from use.

5.3 Management of Road Works in Urban Areas

Because of the nature of urban areas, there is a greater need to minimise congestion and disruption to other road users as well as local residents and businesses. Greater management and control is required to ensure that road works are carried out in a coordinated, orderly and timely manner. Designated Urban Road Authorities may apply further restrictions on the carrying out of road works.

5.3.1 On-Site Documentation

It may be necessary to retain the following documentation for inspection:

- a copy of the individual licence issued for the works and associated conditions;
- a copy of the Temporary Traffic Management Plan, where required;
- a copy of the Works Method Statement, where required; and
- all required health and safety documentation (see chapter 3).

Other documentation requirements may apply.

5.3.2 Restrictions on the Timing of Road Works

In urban areas a Road Authority may specify time or hours of operation requirements on road works. These may relate to:

- night time restrictions in residential areas;
- a general requirement to minimise disruption to traffic such as am/pm restrictions;
- priority route restrictions such as green routes or quality bus corridors;
- moratoria on road works on specified roads to protect residential amenity, preserve scarce road-space or recently renewed or resurfaced roads (this restriction may operate over a number of years, usually five);
- restrictions relating to special events; and
- periodic restrictions that may be applied to assist traffic flow during specific events or at particular times of the year.

It may also be necessary to apply additional restrictions to facilitate emergency road works.

5.3.3 Traffic and Parking Controls

Road works may necessitate the suspension of permanent traffic and parking controls in urban areas affected by the works. The area may include the construction site, the approach roads to the site and any diversion routes. Traffic and parking control measures could include:

- regulatory signage;
- regulatory road markings;
- parking bays/spaces, including paid parking bays/spaces;
- bus bays;
- cycle lanes;
- loading and unloading bays; and
- taxi ranks.

The suspension of traffic and parking controls require the agreement of the Road Authority in consultation with the Gardaí.

5.3.4 Hoardings and Scaffolding

The erection of a hoarding, fence or scaffold on a public road (not being a hoarding, fence or scaffold bounding a public road) shall be subject to a licence in accordance with section 254 of the Planning and Development Act, 2000 as follows.

- A person applying for a licence under this section is required to furnish to the Local Authority such plans and other information concerning the position, design and capacity of the scaffolding or hoarding as may be required.
- The Local Authority may grant licences specifying the period, the location and the design.
- A Local Authority may withdraw a licence if it is considered that a hoarding or scaffolding causes an obstruction or becomes dangerous. The licensee is then required to remove the appliance, apparatus or structure at his or her own expense.

Scaffolding and hoardings should be signed and guarded in accordance with the Traffic Signs Manual, Chapter 8. Additionally, where footpaths are closed, adequate provision should be made to protect pedestrians from traffic as described in Section 5.1.1.

Where scaffolding is erected:

- the public should be excluded from the area around the work during erection, modification and dismantling. This may involve getting permission to close the road, streets or footpaths;
- public access to the scaffold should, so far as is practicable, be made difficult by providing hoardings and by removing or preventing the use of access ladders at a lower level; and
- effective physical protection should be provided to prevent persons being struck by falling tools or materials.

Where members of the public are permitted to walk through the base of the scaffold, precautions should include:

- providing pedestrian clearances in accordance with the *Code of Practice for Access and Working Scaffolds* published by the HSA (enclosing the actual building works with a hoarding is considered to be a safer method of working);
- ensuring there are no projections that may injure people or damage their clothing; and
- providing and maintaining a sound walking surface and adequate lighting.

The risk of damage to scaffolding is high where vehicles are permitted to park adjacent to the scaffolding, particularly where perpendicular (nose-in or tail-in) parking is permitted. Damage should be avoided by preventing such parking or by providing barriers. Where this is not practicable, the scaffold should be inspected frequently so that damage may be quickly detected and remedied.

5.3.5 Use of Construction Skips

Skips may require a licence if a Local Authority has made bye-laws to regulate and control the use of skips on public roads in accordance with the Roads Act 1993. Conditions that relate to the administrative area or areas to which the bye-laws apply may be attached to a skip licence. Conditions may specify the following:

- siting and removal of skips;
- dimensions and other characteristics of skips;
- lighting and marking of skips for the purpose of making them readily visible to road users;
- care and disposal of the contents of skips;
- period of deposit of skips on public roads;
- earliest practicable removal of skips once full;

- clear and indelible marking of skips with the name, address and telephone number of the owner or provider; and
- the provision of a security or an indemnity.

Where the placement of the skip interferes with traffic flow it must be signed, lighted and guarded in accordance with the Traffic Signs Manual, Chapter 8 and guidance as specified elsewhere in this document. Skips must have permanently attached horizontal reflective markings of a type that is clearly visible to all road users, including pedestrians. Due to the tapering profile of most skips, a vision impaired person's cane might not make contact with the base of the skip before the head/face is in danger of colliding with the upper part of the skip. A pedestrian barrier should be placed in front of the skip to provide a suitable guard from this hazard and articles contained in the skip should not protrude (laterally) beyond the confines of the skip.

Skip licences should only be issued where skips are hired from licensed skip operators. The skip operator's licence number must be quoted for all skip applications and the licence must be available for inspection on site at all times.

Appendix A	Temporary Traffic Management Design Process	Page
Flowcharts	Explanatory Note	A-3
Design Forms	Explanatory Note	A-5
	Planned Works Traffic Management Design Sheets	A-7

Traffic Management Plan Flow Charts:

The following table gives the meaning of the symbols used in the flowcharts in section 3.5.



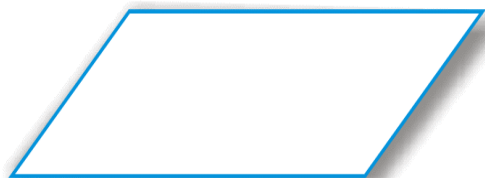
Indicates a measurement or consideration



Indicates a decision or occurrence



Indicates a process where documentation/records should be produced



Indicates an activity



Indicates the progress to the next step



Indicates an information link between the Design Process and Construction Process during the development of the Safety & Health Plan.

Design Forms

Organisation of Forms

The upper corner of each sheet should be numbered, including the total number of sheets in the design, so that someone reading the sheets would be assured that they have all the necessary information. The sheets in each section should also be numbered, with the total number of sheets in the section, so that the reader can go through the design in sequence. This allows for two sets of numbers, catering for the “development” of the traffic management plan. As works progress, or information becomes available, these sheets should be updated.

If further hazards are identified over and above what can be fitted into each sheet, these can be included in the **Traffic Management Design Additional Sheet**, and similarly for any additional signage requirements. These additional sheets should be numbered appropriately to appear correctly in the sequence.

The forms are double sided with a site map at the back, and references made to the hazards/signs, on the maps. The site map can be an autocad drawing, ortho photo, OS map, or sketch, so long as it adequately conveys the hazards and arrangements to the traffic management operative.

Each Sheet should be signed by the Designer.

Traffic Management Design & Risk Assessment Master Sheet (TDRAM)

The first form, TDRAM, is the Risk Assessment Master Sheet. This sheet describes the existing site, existing traffic, works type and programme. Hazards on the site should be identified on this sheet and should be read with all of the follow-on Traffic Management Design Sheets.

The section on development can be completed as follows;

- None: No roadside development at the works site
- Rural: Rural type development at the works site
- Housing Estate: Housing estate at the works site
- Town Centre: Works site in town centre
- Etc.

This information should be considered by the traffic management designer in his control selection of local access issues etc.

Phase Sheets

The Traffic Management arrangements can change as the works develop at the site. The ‘Works/Intermediate Sheets’ largely reflect this, and the designer should note that there can be several stages of each works and each stage may require a different arrangement. Again, these sheets should be numbered so that they appear in sequence.

The **Planned Works Traffic Management Design Sheet** gives a rough guide to the traffic management selection and design parameters. The designer must be familiar with Chapter 8 of the *Traffic Signs Manual* and the *Guidelines for Working on Roads*.

Several Traffic Management Selections can be made, as long as it is clear where each is going to be used. The parameters (e.g. cone height, lane width etc.) for the site at each works phase must also be conveyed to the traffic management operative. The Designer should also determine the level of monitoring required on the site from his/her on the ground assessment/experience of the site in the light of the provisions of the guidance document. Where blanks are left in the signage (e.g. S3) or 'Supplement/Additional Info' plates they should be filled in by the Designer.

Traffic Management Design Civil Works Sheet (TDC)

This sheet covers works such as widening, trenching, off-line construction etc.

Traffic Management Design Surfacing Works Sheet (TDS)

This sheet covers works such as Wetmix overlays, DBM, Asphalts, Surface Dressings etc.

Traffic Management Design Intermediate Site Sheet (TDI)

This sheet covers the control measures on site when no works are on-going. e.g., period between DBM and surface dressing, period between DBM and asphalt etc.

Traffic Management Design Detour Sheet (TDD)

This sheet covers the signage of the detour. Yellow signs are used on the detour to warn drivers of hazards that are not associated with the works.

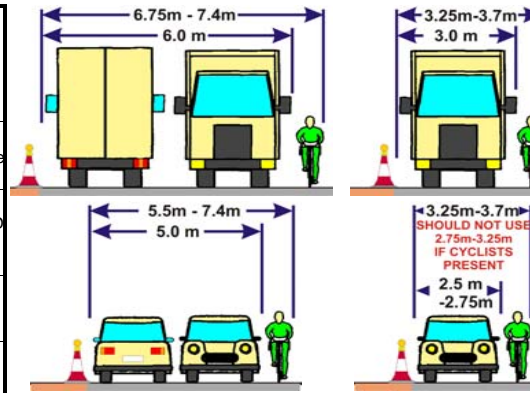
Traffic Management Design Detour Sheet (TDA)

This sheet provides for additional information and signage to be included in the temporary traffic management design.

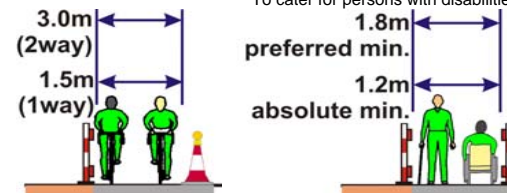
PLANNED WORKS TRAFFIC MANAGEMENT DESIGN SHEETS

TRAFFIC MANAGEMENT LAYOUT PARAMETER DESIGN SHEET

STEP 1: SELECT TRAFFIC MANAGEMENT TYPE	Road Closure	When: 1) Adequate Safety Zone + Lane Width cannot be achieved, or 2) Alternative Safe Method of Work cannot be implemented, or 3) Semi Static Operation for Minor Roads not applicable, or 4) Convoy Working cannot be implemented
	24/7 detour	Where RESIDUAL risks on Road Works Section are greater than on the Detour even when active works are not taking place
	Working hours detour	Where RESIDUAL risks on Road Works Section are greater than on the Detour when works are active AND where the RESIDUAL risks on Road Works Section are less than on the Detour when works are not active
	Two-Way	Abs Min. 5.0m (Cars and light vehicles only) Minimum 6.0m Maximum Combined lane width should not exceed 7.4m
	Lane/ Shuttle	Abs Min. 2.5m Minimum 3.0m Maximum 3.7m Cyclists DO NOT USE lane width between 2.75m and 3.25m
	Marshall	Shuttle with mainly light vehicles and alternatives not suitable
	Convoy	Select Where: 1) Adequate Safety Zone + Lane Width cannot be achieved 2) Alternative Safe Method of Work cannot be implemented 3) Semi Static Operations for Minor Roads not applicable
	Semi-Static Management	> On Minor Roads use for Surface Dressing > For moving single vehicle operations
	Roadworks Speedlimit	Refer to Section 4.3
	Cautionary Speed Plate	See Section 4.3
All Stop	short duration (<10 min typically) and 300 veh/hr or less	



- > Limit Shuttle lengths to 500m generally (+/- at junctions/ specific reasons)
- > Use Vehicle Actuated Traffic Lights
- > Notify Gardai if using Traffic Lights/ Stop-Go boards



To cater for persons with disabilities

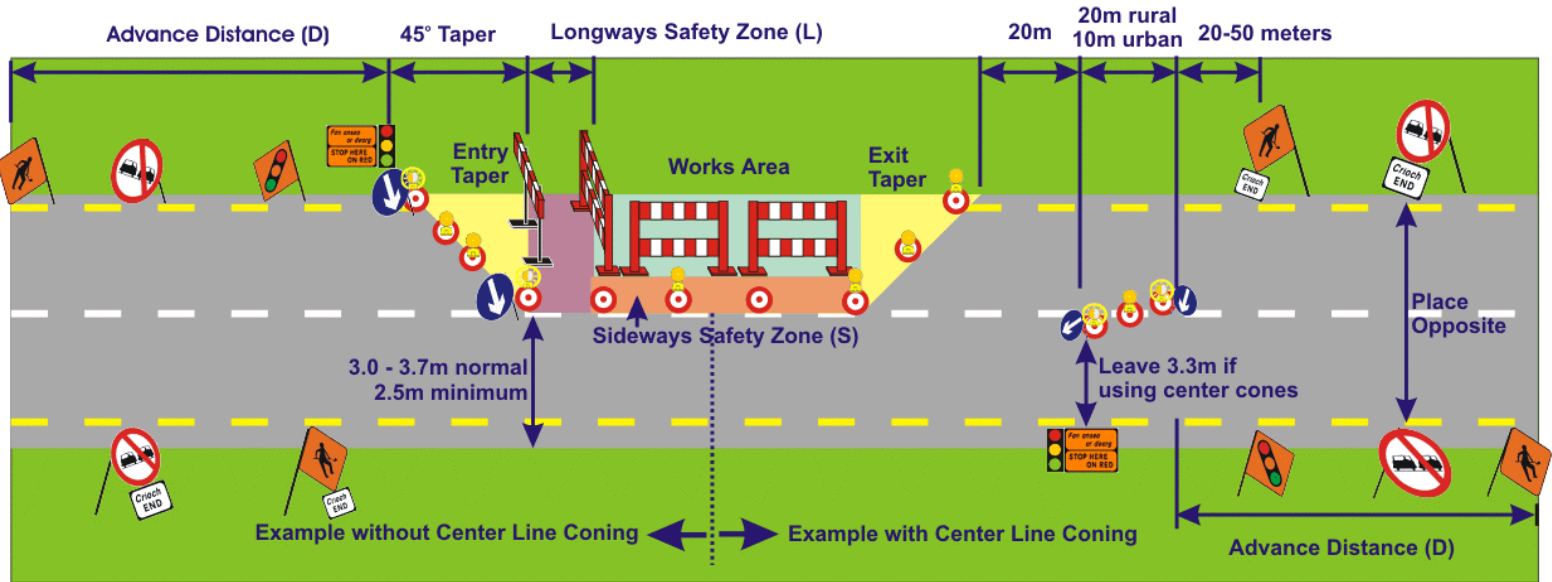
VULNERABLE ROAD USERS

Footway Desirable minimum width	1.8m
Vulnerable users' minimum width	1.2m
Minimum width at obstacle	1.0m
Minimum width at bus stop	3.0m
Minimum width at shop front	3.5m
Cycle track desirable minimum width	1.5m
Cycle track absolute minimum width	1.3m
Combined minimum width	3.0m
Desirable minimum clearance height	2.5m
Absolute minimum clearance height	2.3m

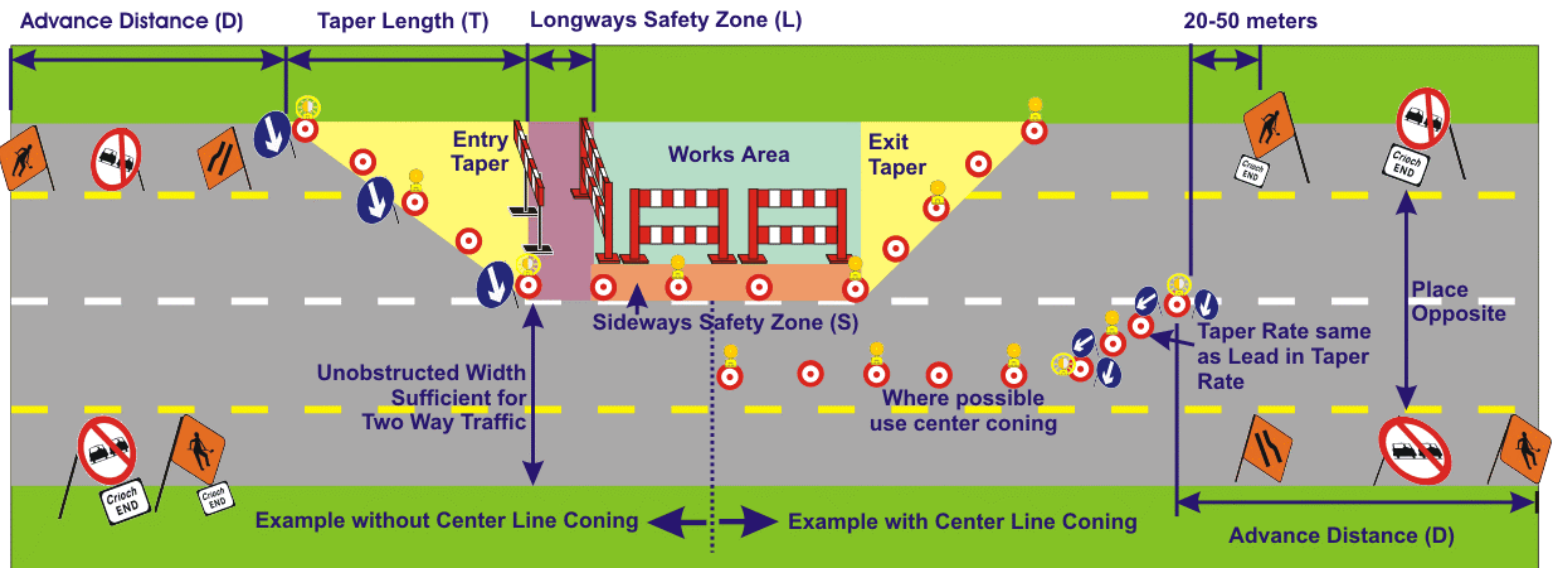
STEP 3: SELECT PARAMETERS	Type of Road	Type of Works	Advance Sign Distance (D) (m)	Min. Number Of Advance Signs	Min. clear visibility of Signs (m)	Min. size of signs (mm)	Min. height of cones (mm)	Long. Safety Zone (L) (m)	Side. Safety Zone (S) (m)	Long. Cone Space	Long. Lamp Space	Hard Shoulder Taper Multiply Factor	2 WAY Lane Taper Multiply Factor	2 WAY Lane Taper Cone Spacing	Lane Taper Lamp Spacing	Lane Lead-in cone tapers Recommended lengths	Width of hazard (including safety zone) NOTE: WHERE TWO TRAFFIC MAINTAINED			
																	1m	2m	3m	4m
Single carriageway road, 30km/h	All works		50	1 (rwa) 1 (tm)	50	600	750	5	0.5	6	12	5	10	3	6	Length of taper (T) in (m)	10	20	30	40
																Minimum no. of Cones	5	8	12	15
	Single Vehicle		25	1 (rwa)	50	600	750	5	0.5	6	12	5	5	3	6	Length of taper (T) in (m)	5	10	15	20
																Minimum no. of Cones	3	5	7	8
Single carriageway, 31km/h to 60km/h	All Works		75	1 (rwa) 2 (tm)	50	600	750	25	0.5	6	12	10	15	3	6	Length of taper (T) in (m)	15	30	45	60
																Minimum no. of Cones	7	12	17	22
	Single Vehicle		50	1 (rwa) 1 (tm)	50	600	750	5	0.5	6	12	5	5	3	6	Length of taper (T) in (m)	5	10	15	20
																Minimum no. of Cones	3	5	7	8
Single Carriageway 61 to 100 km/h	All Works		800	1 (rwa) 1 (no) 2 (tm)	120	600* 750*	750	60	1.2	12	12	30	55	3	6	Length of taper (T) in (m)	55	110	165	220
																Minimum no. of Cones	20	38	57	75
	Single Vehicle		600	1 (rwa) 1 (no) 1 (tm)	120	600* 750*	750	45	1.2	12	12	20	40	3	6	Length of taper (T) in (m)	40	80	120	160
																Minimum no. of Cones	15	28	42	55
															Minimum no. of Lamps	8	15	22	28	

* Use 600mm signs where Vehicles Per Day < 5,000. Use 750mm signs where Vehicles Per Day > 5,000

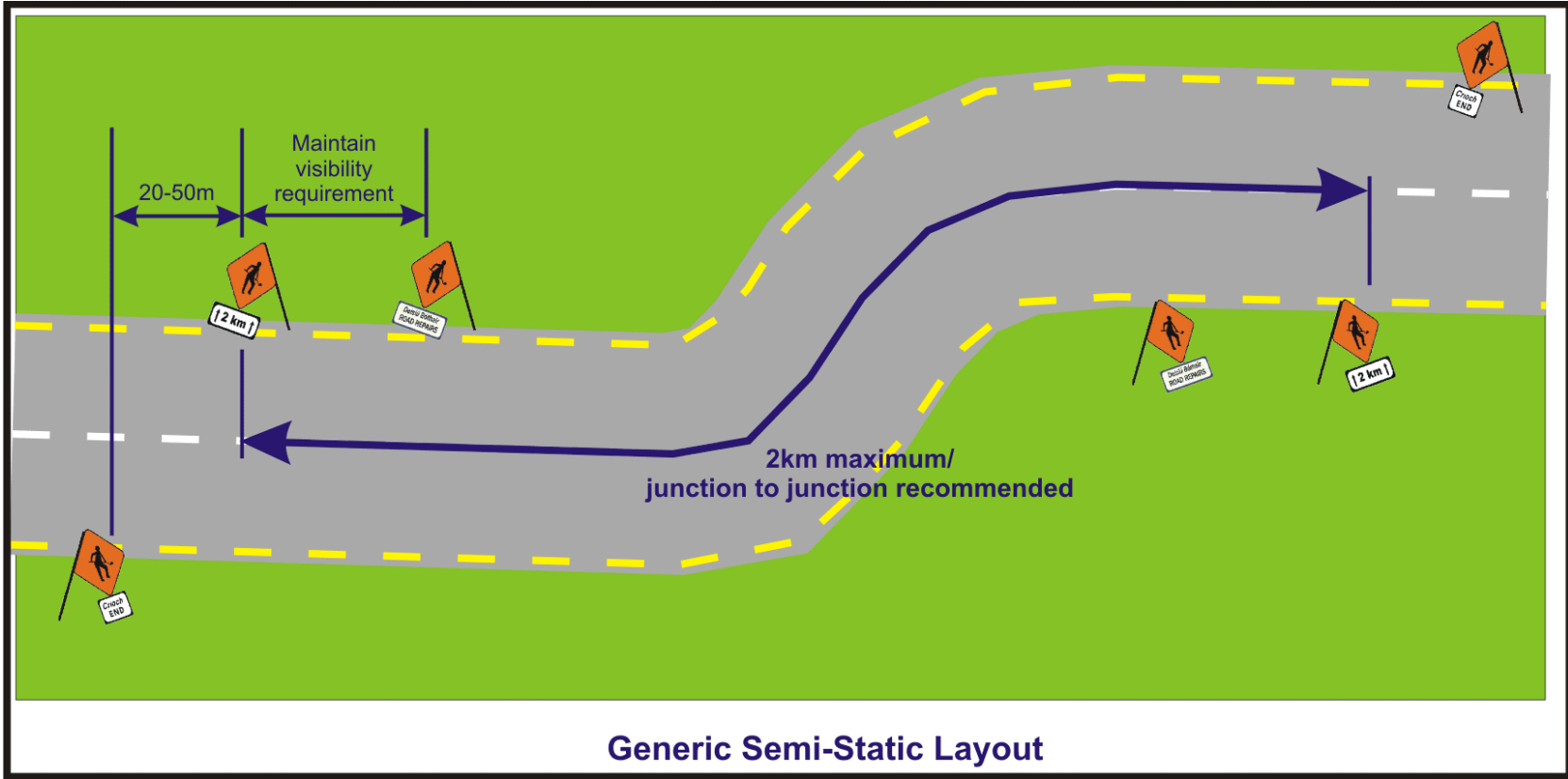
Tapers at Shuttles to be at 45 degrees with 1m cone spacings.



Generic Shuttle Layout



Generic 2-Way Layout



Generic Semi-Static Layout

PLANNED WORKS TRAFFIC MANAGEMENT DESIGN SHEETS

SITE SPECIFIC SHEET _____ OF _____

HEALTH, SAFETY AND RISK ASSESSMENT MASTER SHEET

Works Name:

TDRAM -

Job Location		Works	Period 1	Period 2	Period 3	Period 4	Period 5	Period 6	Period 7	Period 8	Period 9	Period 10	Period 11	Period 12
PSDP (CMO)														
PSCS (CMO)														
Job Code														
Budget Holder														
Budget														
Total No. Work Days														
Tot. No. Person Days														
Work Days > 30 or Person Days > 500 then Notify HSA														

Physical Data

Brief Description of Works:	
Road Classification	
Road ID (incl. Seg)	
Road Width	
Works Length	
Roadside Development:	

Traffic Data

AADT	
% HCV	
Speed Limit	
Operating Speed	

Traffic Management Items

Accident History	
Pedestrians	
Schools	
Shops	
Cyclists	
Equestrian/Rail Crossing	
Vulnerable Road Users	
Bus Route/School Route	

Particular Risk Items

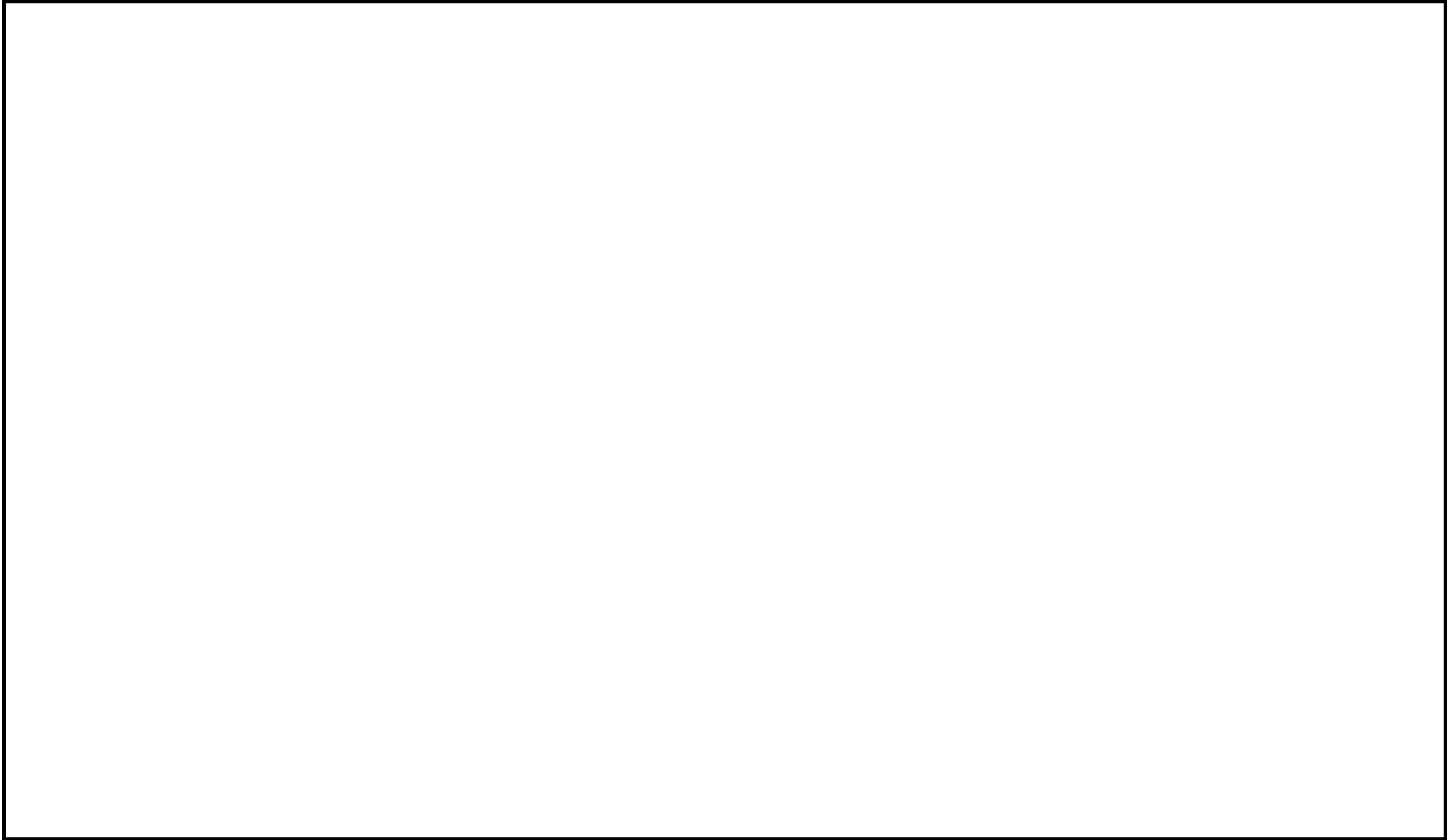
Burial	<input type="checkbox"/>	Underground works	<input type="checkbox"/>
Fall from height	<input type="checkbox"/>	Diving	<input type="checkbox"/>
Chemical/Biological	<input type="checkbox"/>	Compressed air	<input type="checkbox"/>
Radiation	<input type="checkbox"/>	Explosives	<input type="checkbox"/>
HV Power Lines	<input type="checkbox"/>	Heavy components	<input type="checkbox"/>
Drowning	<input type="checkbox"/>	Other	<input type="checkbox"/>

Identified Items (For Map Reference see overleaf)

Map Ref.	Item	Hazard	Risk			Control	Residual Risk		
			Hi	Med	Lw		Hi	Med	Lw

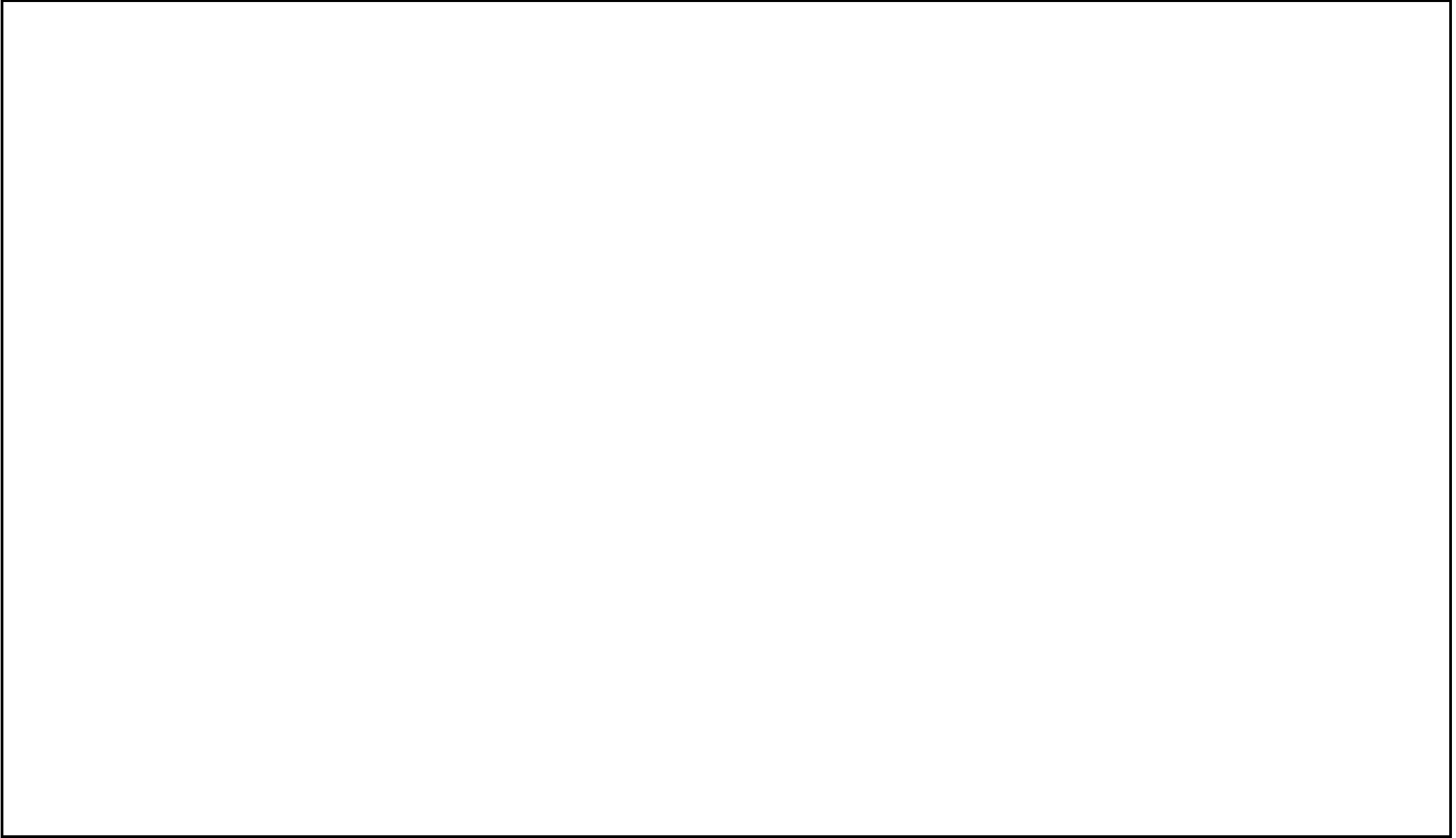
Design Prepared By: _____

Site Map



Design Prepared By: _____

Site Map



Design Prepared By: _____

PLANNED WORKS TRAFFIC MANAGEMENT DESIGN SHEETS

TRAFFIC MANAGEMENT DESIGN SURFACING WORKS SHEET

SITE SPECIFIC SHEET _____ OF _____

Works Name: _____

Layout Parameters

TDS -

Traffic Management Selection

Notes

Road Closure: 24/7 - Working Hours
Detour
Two Way
Shuttle:
Give & Take
Priority
Stop/Go
Traffic Lights
Marshall
Convoy
Semi-Static Roadworks
Roadworks Speedlimit
Cautionary Speed Plate
All Stop

Advance Distance
Number of Advance Signs
Min Advance Sign Visibility
Size of Signs
Height of Cones
Taper Length
Sideways Safety Zone
Longways Safety Zone
Lane Width/ Carriageway Width
Longitudinal Cone/ Lamp Spacing
Taper Cone/ Lamp Spacing
Maximum Length of Shuttle
Repeater Sign Distances

Inspections

Monday	
Tuesday	
Wednesday	
Thursday	
Friday	
Saturday	
Sunday	

Consultation

Buses/School Buses Milk Lorries
 Local Residents Emergency Services
 Gardaí for Roadworks Speedlimit /or Positive TM

Sign Ref	Sign	Quantity	Supplement/ Additional Info	No.
WK 001	Roadworks Ahead		km/h m ROAD RESURFACING	
RUS 014	No Overtaking			
RUS 039-044	Roadworks Speedlimit		Specify Speed Both Sides	
WK 032	Road Narrows Left		m	
WK 033	Road Narrows Right		m	
WK 034	Road Narrows Both		m	
WK 060	Temporary Traffic Signal		m	
WK 061	Flagman Ahead		m	
WK 062	Queues Likely		m	

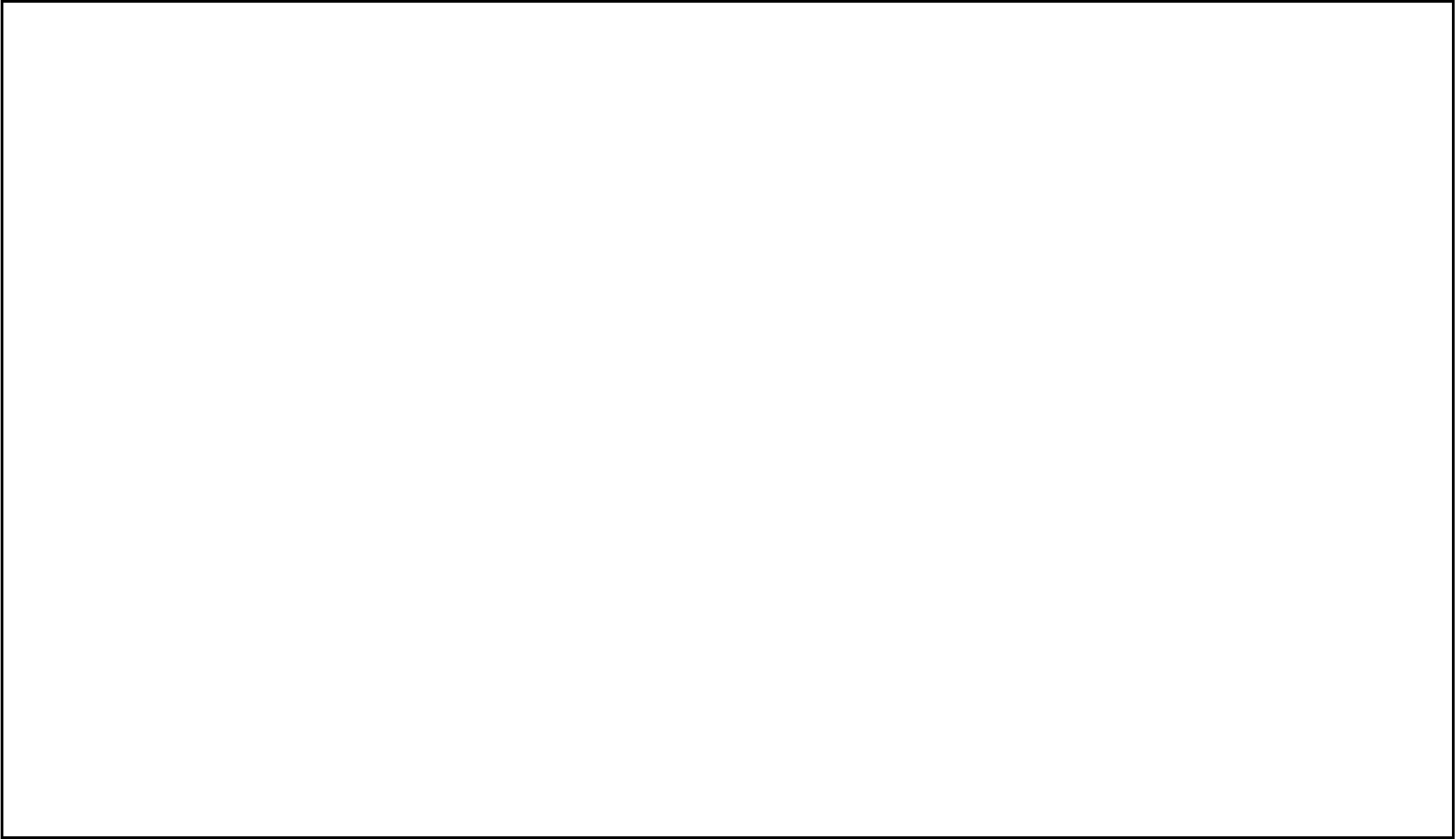
Sign Ref	Sign	Quantity	Supplement/ Additional Info	No.
WK 094	Road Closed			
WK 071	Uneven Surface		Go Slow SLOW km/h	
WK 072	Slippery Road		km/h CRACK END	
WK 073	Loose Chippings		Go Slow SLOW km/h CRACK END	
RUS 001	Keep Left			
RUS 002	Keep Right			
W 062L	Chevron Left			
W 062R	Chevron Right			
W183 W184 W185	Barrier Board			

Sign Ref	Sign	Quantity	Supplement/ Additional Info	No.
RUS 060/061	Stop and Go		SG-M=Manned Stop/Go SG-A=Auto/Controlled Stop/Go delete as appropriate	
TL	Temporary Traffic Signal			
WK 095	Stop Here on Red			
WK 030	Single Lane Shuttle			
WK 070	Hump or Ramp		m	
WK 050	Side Road Left		Oscalt Cheite CONCEALED ENTRANCE	
WK 051	Side Road Right		Oscalt Cheite CONCEALED ENTRANCE	
WK 052	Site Access Left		Oscalt Cheite CONCEALED ENTRANCE	
WK 053	Site Access Right		Oscalt Cheite CONCEALED ENTRANCE	
WK 080	Pedestrians Cross Left			

Sign Ref	Sign	Quantity	Supplement/ Additional Info	No.
WK 081	Pedestrians Cross Right			
PB	Pedestrian Barrier			
PF	Herace Style Fencing			
WK 001 P010	Roadworks End			
RUS 014 P010	No Overtaking Ends			
C	Cone			
WB	Workman Barrier			
LS	Steady State Lamp			
LF	Flashing Warning Lamp			
RR	Rotating Reflector			

Design Prepared By: _____

Site Map



Design Prepared By: _____

PLANNED WORKS TRAFFIC MANAGEMENT DESIGN SHEETS
TRAFFIC MANAGEMENT DESIGN INTERMEDIATE SITE SHEET

Works Name: _____

TDI - _____

Traffic Management Selection

Road Closure: 24/7 - Working Hours	
Detour	
Two Way	
Shuttle:	Give & Take
	Priority
	Traffic Lights
Roadworks Speedlimit	
Cautionary Speed Plate	

Notes

Layout Parameters

Advance Distance	
Number of Advance Signs	
Min Advance Sign Visibility	
Size of Signs	
Height of Cones	
Taper Length	
Sideways Safety Zone	
Longways Safety Zone	
Lane Width/ Carriageway Width	
Longitudinal Cone/ Lamp Spacing	
Edge Cone/ Lamp Spacing	
Taper Cone/ Lamp Spacing	
Maximum Length of Shuttle	
Repeater Sign Distances	

Inspections

Monday	
Tuesday	
Wednesday	
Thursday	
Friday	
Saturday	
Sunday	

Consultation

Buses/School Buses	<input type="checkbox"/>	Milk Lorries	<input type="checkbox"/>
Local Residents	<input type="checkbox"/>	Emergency Services	<input type="checkbox"/>
Gardaí for Roadworks Speedlimit	<input type="checkbox"/>	/or Positive TM	<input type="checkbox"/>

Sign Ref	Sign	Quantity	Supplement/ Additional Info	No.
WK 001	Roadworks Ahead		km/h m Gan Linne Bóthair NO ROAD LINES	
RUS 014	No Overtaking			
RUS 039-044	Roadworks Speedlimit		Specify Speed Both Sides	
WK 032	Road Narrows Left		m	
WK 033	Road Narrows Right		m	
WK 034	Road Narrows Both		m	
WK 060	Temporary Traffic Signal		m	
WK 094	Road Closed			
WK 071	Uneven Surface		Go Slow SLOW km/h	

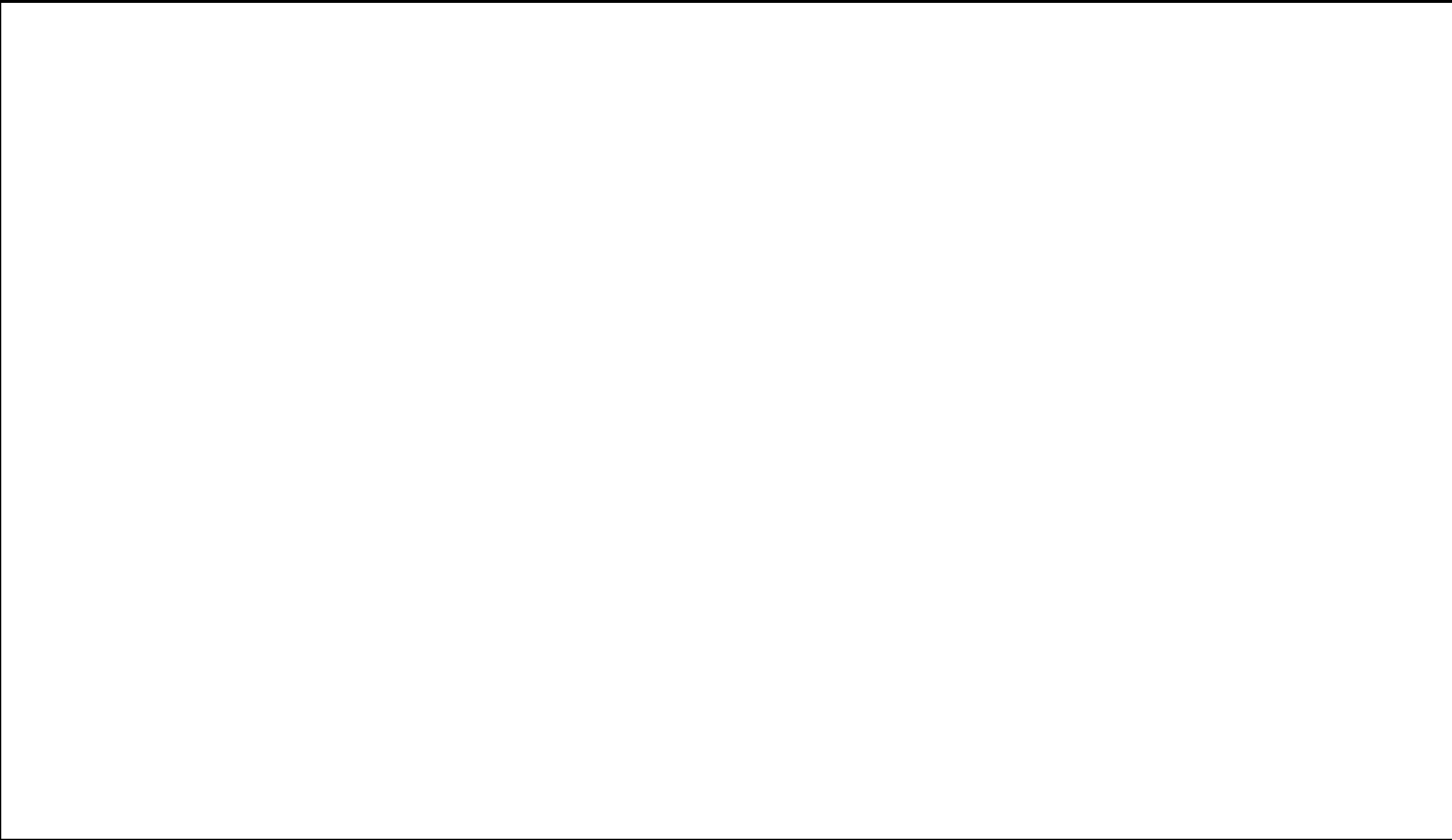
Sign Ref	Sign	Quantity	Supplement/ Additional Info	No.
WK 072	Slippery Road		km/h Creech END Droimúir UNFINISHED ROAD SURFACE	
WK 073	Loose Chippings		Go Slow SLOW km/h Creech END	
RUS 001	Keep Left			
RUS 002	Keep Right			
W 062L	Chevron Left			
W 062R	Chevron Right			
W183 W184 W185	Barrier Board			
TL	Temporary Traffic Signal			
WK 095	Stop Here on Red		Fan arísce or dearg STOP HERE ON RED	

Sign Ref	Sign	Quantity	Supplement/ Additional Info	No.
WK 030	Single Lane Shuttle			
WK 070	Hump or Ramp		m	
WK 050	Side Road Left		Oscailt Cheilte CONCEALED ENTRANCE	
WK 051	Side Road Right		Oscailt Cheilte CONCEALED ENTRANCE	
WK 080	Pedestrians Cross Left			
WK 081	Pedestrians Cross Right			
PB	Pedestrian Barrier			
PF	Herace Style Fencing			
WK 001 P010	Roadworks Ends			
RUS 014 P010	No Overtaking Ends			

Sign Ref	Sign	Quantity	Supplement/ Additional Info	No.
C	Cone			
LS	Steady State Lamp			
LF	Flashing Warning Lamp			
RR	Rotating Reflector			

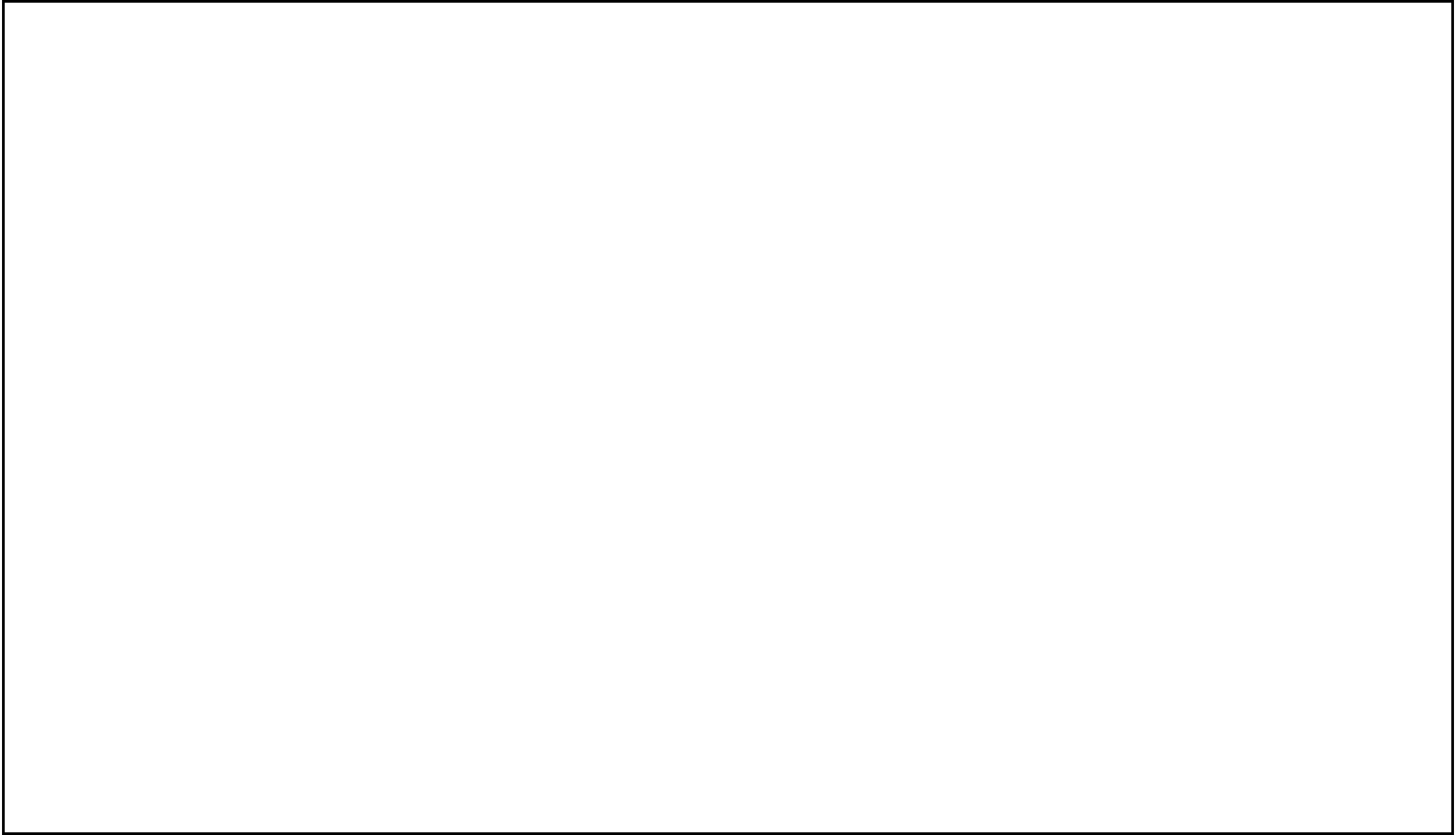
Design Prepared By: _____

Site Map



Design Prepared By: _____

Site Map



Design Prepared By: _____

Appendix B	Planned Works Site Sheets	Page
	Planned Works Site Inspection	B-3

PLANNED WORKS TRAFFIC MANAGEMENT SITE INSPECTION SHEET

PROJECT NAME:		Phase:	
Date:		Time:	1). 2).

1) TRAFFIC MANAGEMENT SET-UP/ MODIFICATION, INSPECTIONS
1-1) Installation Checks

Does the Traffic Management conform to the Design Layout and Parameters?		
Have all hazards been addressed in the Traffic Management Plan?		
Has allowance been made for the delivery and removal of materials?		
Have Gardaí been informed of any Traffic Lights/ Stop-Go Boards in use?		
Have Gardaí been informed of Roadworks Speed Limits being introduced?		

2) TRAFFIC MANAGEMENT OPERATION INSPECTIONS
2-1) Operation Checks

	1	2
Are Safety Zones being kept clear of operatives, plant and materials?		
Are all the signs in good condition/ are all cones in good condition with sleeves?		
Are sign vision lines free from bends, hills/dips in the road, parked vehicles, hedges etc?		
Will the site be safe at night or in wind, fog, snow or rain? (delete as appropriate)		
Are all misleading permanent signs and road markings covered?		
Is the carriageway/footway being kept clear of mud and surplus equipment?		
Are materials/ plant that are left on verges or lay-bys being properly guarded and lit?		

2-2) Traffic Checks

Is there safe access to adjacent premises?		
Does Signing and Guarding meet the (changing) conditions?		
Are traffic control arrangements working at the optimum level to reduce traffic delays?		
If present, are the needs of cyclists or horse riders incorporated into the layout?		

2-3) Pedestrian and Vulnerable Road User Checks

Have the needs of pedestrians and vulnerable road users been addressed in the layout?		
If pedestrian route blocked, has a suitable alternative route been provided?		
Are pedestrian routes clearly evident/ indicated?		
If a footway in the road is to be used, are ramps to the kerb provided?		
Are pedestrian hazards sufficiently GUARDED at night?		

3) TRAFFIC MANAGEMENT CESSATION INSPECTIONS
3-1) Works Complete Checks

Have all signs, cones, barriers, and lamps been removed?	
Have any covered permanent signs been restored?	
Have Gardaí been informed that Speedlimits/ Traffic Signals/ Stop-Go removed?	

4) EXCEPTIONS REPORT
 (Append attachments as necessary)

Check Completed By:	
----------------------------	--

Form Completion Notes – Planned Works Traffic Management Site Inspection Sheet:**Project Data:**

Enter Project Name

Enter Phase (e.g. Civil works, Surfacing, Intermediate, Completion)

Enter Date of inspection

Enter Time of inspection (2 inspections can be performed per sheet. This corresponds to two boxes being provided per question. If 2 inspections are being carried out per sheet, enter both inspection times in the boxes provided)

In the following sections the tick boxes should be filled as follows: ✓

Check carried out and item found to be satisfactory

 X

Check carried out and item found to be unsatisfactory.

 N/A

This check is not appropriate to the Traffic Management at the site and has not been carried out.

Section 1:

This section deals with the initial checks (drive through checks etc.) carried out once the Traffic Management has been set up. **N.B. THESE CHECKS MUST BE FOLLOWED BY THE CHECKS IN SECTION 2 BEFORE THE TRAFFIC MANAGEMENT CAN BE DEEMED TO BE OPERATIONAL.** The checks in section 1 should be repeated at the start of each Phase. The checks in section 1 should be repeated if the traffic management arrangements have been materially changed.

Section 2:

These are the checks that are carried out each time the Traffic Management arrangements are inspected.

Sub-Section 2-1:

This sub-section deals with the operation of the site and the continuing condition of the traffic management arrangements.

Sub-Section 2-2:

This sub-section deals with how traffic is interacting with the site. It allows for highlighting where improvements can be made in the arrangements for reducing traffic delays. If arrangements for cyclists/ horse riders have not been included in the Traffic Management Design, the need for such arrangements should be highlighted here if explicitly required.

Sub-Section 2-3:

This sub-section deals with pedestrians and vulnerable road users. If there is no explicit requirement for traffic management arrangements under this sub-section, and the design does not specify such arrangements, 'N/A' filled into the first question will suffice for the whole sub-section.

Section 3:

This section deals with the removing of the traffic management arrangements. These questions should only be answered once the arrangements have been removed.

Section 4:

If an 'X' has been entered in any of the preceding sections, a note of the issue should be made in this section. Where the Temporary Traffic Operations Supervisor can undertake the necessary remedial action, such action should be taken and a note made in this section. If referral is required, a suggested remedial action should be noted in this section and communicated to the Temporary Traffic Management Designer.

The form should be signed by the checker

Appendix C	Routine Works Temporary Traffic Management Design Sheets	Page
	Routine Works	C-3



HEALTH AND SAFETY AUTHORITY

SAFE SYSTEM OF WORK PLAN (SSWP)

WORKING ON ROADS

Plan No.

PART 1

Job Details	Resources Required	Emergency Details
Employer Name: _____	Worker Skills: _____	Contact Names & Tel No.
Responsible Person/Supervisor: _____	_____	1. _____
Number of Workers: _____	_____	2. _____
Specific Location: _____	Plant/Equipment: _____	3. _____
Description of Works: _____	_____	First Aider: _____
_____	_____	_____
Start Date: _____	Hazardous Materials: _____	Location of First Aid Box: _____
NOTE: A new SSWP must be completed when the task or the environment changes.		WORK PERMITS REQUIRED
		Hot <input type="checkbox"/> Electricity <input type="checkbox"/> Excavation <input type="checkbox"/>
		Confined Space <input type="checkbox"/> Other <input type="checkbox"/>
		Method Statement Yes <input type="checkbox"/> No <input type="checkbox"/>

Before Works Starts the following **MUST** be in place Tick the circle when confirmed

Supervision <input type="checkbox"/>	Safe Pass <input type="checkbox"/>	Plant/Eq. Cert. <input type="checkbox"/>	CSCS <input type="checkbox"/>	Communication/Induction <input type="checkbox"/>	WC & Washing <input type="checkbox"/>	Canteen <input type="checkbox"/>	Drying/Changing <input type="checkbox"/>	Drinking Water <input type="checkbox"/>	First Aid <input type="checkbox"/>	PPE <input type="checkbox"/>
--------------------------------------	------------------------------------	--	-------------------------------	--	---------------------------------------	----------------------------------	--	---	------------------------------------	------------------------------

SELECT HAZARD OR ACTIVITY **SELECT CONTROL** All controls identified below must be in place before work starts

Tick the box to identify controls required; Tick the circle when control is in place.

Live Traffic <input type="checkbox"/>	Liaison/Gardai <input type="checkbox"/>	Diversion <input type="checkbox"/>	Road Signage <input type="checkbox"/>	Flagman/Stop-Go Man <input type="checkbox"/>	Traffic Management Plan <input type="checkbox"/>	Traffic/Speed Control <input type="checkbox"/>	Vehicle Crash Barriers <input type="checkbox"/>	Crash Cushion Lorry <input type="checkbox"/>	Site/Private Parking <input type="checkbox"/>	Erecting Traffic Control Signs <input type="checkbox"/>
Working Close to the Public <input type="checkbox"/>	Liaison <input type="checkbox"/>	Fencing/Hoarding <input type="checkbox"/>	Barriers <input type="checkbox"/>	Pedestrian Routes <input type="checkbox"/>	Security <input type="checkbox"/>	Traffic Control <input type="checkbox"/>	Flagman/Stop-Go Man <input type="checkbox"/>	Vehicle/Plant Controller <input type="checkbox"/>	Surveying <input type="checkbox"/>	Examination & Inspection <input type="checkbox"/>
Lifting Operations <input type="checkbox"/>	Selection/Suitability <input type="checkbox"/>	Plan Lift/SWL <input type="checkbox"/>	Lorry Crane/Sensors/Guards <input type="checkbox"/>	Slinger/Signaller <input type="checkbox"/>	Check Lifting Gear <input type="checkbox"/>	Exclusion Zone <input type="checkbox"/>	Examination & Inspection <input type="checkbox"/>	Lighting <input type="checkbox"/>	Dust/Muck Cleaning/Removal <input type="checkbox"/>	Pedestrian Controller <input type="checkbox"/>
Plant and Equipment <input type="checkbox"/>	Selection/Suitability <input type="checkbox"/>	Vibration Controls/Service/Duration <input type="checkbox"/>	Reverse Warning Devices <input type="checkbox"/>	Locking Attachments <input type="checkbox"/>	Roll Over Protection/No Passengers <input type="checkbox"/>	Seat Belts <input type="checkbox"/>	PTO Guard & Access Steps <input type="checkbox"/>	Hedge Cutting/Guarding/Signage <input type="checkbox"/>	Safe Parking <input type="checkbox"/>	Traffic/Speed Control <input type="checkbox"/>
	Pedestrian Route <input type="checkbox"/>	Road Planer/Pinch: Fall Controls <input type="checkbox"/>	Kerbing Machine/Pinch: Fall Controls <input type="checkbox"/>	Dumper/Auxiliary Visual Devices <input type="checkbox"/>	Rock Breaker/Cab Protection <input type="checkbox"/>	360 Excavator/Check Valves <input type="checkbox"/>	180 Excavator/Visual Aids: Set Up <input type="checkbox"/>	Vehicle Recovery <input type="checkbox"/>	Proximity to Public <input type="checkbox"/>	ATV/Training: PPE <input type="checkbox"/>
	Exclusion Zone <input type="checkbox"/>	No Tipping - OH Lines <input type="checkbox"/>	Strimming <input type="checkbox"/>	Boilers/Burners/Training: Servicing <input type="checkbox"/>	Hot Compressed Air Lance <input type="checkbox"/>	Slinger/Signaller <input type="checkbox"/>	Safe Driving <input type="checkbox"/>	Compound Plant Security <input type="checkbox"/>	Nuclear Density Test/Supervision: Training <input type="checkbox"/>	Examination & Inspection <input type="checkbox"/>
Hand Tools <input type="checkbox"/>	Selection/Suitability <input type="checkbox"/>	Voltage <input type="checkbox"/>	Cable Check/Protection <input type="checkbox"/>	Guards <input type="checkbox"/>	Generators Outside <input type="checkbox"/>	Compressor & Whip Checks <input type="checkbox"/>	Jack Hammer/Vibration Controls <input type="checkbox"/>	Dust Suppression <input type="checkbox"/>	Chain Saw/Training: PPE: Maintenance <input type="checkbox"/>	Con Saw/Abrasive Wheels <input type="checkbox"/>

PART 2

HAZARD OR ACTIVITY	CONTROL Tick the <input checked="" type="checkbox"/> box to identify controls required; Tick the <input checked="" type="radio"/> circle when control is in place.									
<input type="checkbox"/> Excavation	<input type="checkbox"/> Batter Back <input type="radio"/>	<input type="checkbox"/> Trench Box <input type="radio"/>	<input type="checkbox"/> Sheet Piling <input type="radio"/>	<input type="checkbox"/> Shoring <input type="radio"/>	<input type="checkbox"/> Environment Risk Assess <input type="radio"/>	<input type="checkbox"/> Back Fill <input type="radio"/>	<input type="checkbox"/> Spoil Back <input type="radio"/>	<input type="checkbox"/> Chock <input type="radio"/>	<input type="checkbox"/> No Undermining <input type="radio"/>	<input type="checkbox"/> Ladder/Access/Egress <input type="radio"/>
	<input type="checkbox"/> Exclusion Zone <input type="radio"/>	<input type="checkbox"/> Barriers <input type="radio"/>	<input type="checkbox"/> Covers <input type="radio"/>	<input type="checkbox"/> Pumping <input type="radio"/>	<input type="checkbox"/> Safe Stacking <input type="radio"/>	<input type="checkbox"/> Propping <input type="radio"/>	<input type="checkbox"/> Lighting <input type="radio"/>	<input type="checkbox"/> Examination & Inspection <input type="radio"/>	<input type="checkbox"/> Weather <input type="radio"/>	<input type="checkbox"/> Warning Signs <input type="radio"/>
<input type="checkbox"/> Falls and Falling Objects	<input type="checkbox"/> Risk Assess <input type="radio"/>	<input type="checkbox"/> Scaffolding <input type="radio"/>	<input type="checkbox"/> Working Platform <input type="radio"/>	<input type="checkbox"/> Trestle Platform <input type="radio"/>	<input type="checkbox"/> Edge Protection <input type="radio"/>	<input type="checkbox"/> MEWP <input type="radio"/>	<input type="checkbox"/> Safe Ladder <input type="radio"/>	<input type="checkbox"/> Tie Ladder <input type="radio"/>	<input type="checkbox"/> Open Holes <input type="radio"/>	<input type="checkbox"/> Propping <input type="radio"/>
	<input type="checkbox"/> Service Supplier <input type="radio"/>	<input type="checkbox"/> Divert / Off <input type="radio"/>	<input type="checkbox"/> Survey Map <input type="radio"/>	<input type="checkbox"/> Detect & Mark <input type="radio"/>	<input type="checkbox"/> Permit to Work <input type="radio"/>	<input type="checkbox"/> Hand Dig <input type="radio"/>	<input type="checkbox"/> Over Head Lines <input type="radio"/>	<input type="checkbox"/> Barriers <input type="radio"/>	<input type="checkbox"/> No Flames <input type="radio"/>	<input type="checkbox"/> Gas Bottle Storage <input type="radio"/>
<input type="checkbox"/> Sewers/Culverts/Mains/Services	<input type="checkbox"/> Edge Protection <input type="radio"/>	<input type="checkbox"/> Working Platform <input type="radio"/>	<input type="checkbox"/> Safety Line/Grab Line <input type="radio"/>	<input type="checkbox"/> Personal Floatation Device <input type="radio"/>	<input type="checkbox"/> Life Ring <input type="radio"/>	<input type="checkbox"/> Boat <input type="radio"/>	<input type="checkbox"/> Fall Arrest & Rescue <input type="radio"/>	<input type="checkbox"/> Diving <input type="radio"/>	<input type="checkbox"/> Coffer Dam <input type="radio"/>	<input type="checkbox"/> Platform & Crane <input type="radio"/>
	<input type="checkbox"/> Storage/Labels <input type="radio"/>	<input type="checkbox"/> Safety Data Sheet <input type="radio"/>	<input type="checkbox"/> Hand Wash <input type="radio"/>	<input type="checkbox"/> No Eating <input type="radio"/>	<input type="checkbox"/> Biological Agents	<input type="checkbox"/> Survey/Risk Assess <input type="radio"/>	<input type="checkbox"/> Permit to Work <input type="radio"/>	<input type="checkbox"/> Litter Picker <input type="radio"/>	<input type="checkbox"/> Cover Cuts <input type="radio"/>	<input type="checkbox"/> Wash Hands <input type="radio"/>
<input type="checkbox"/> Working Close to Water	<input type="checkbox"/> Identity/Survey <input type="radio"/>	<input type="checkbox"/> Risk Assess <input type="radio"/>	<input type="checkbox"/> Procedure <input type="radio"/>	<input type="checkbox"/> Dust/Wetting <input type="radio"/>	<input type="checkbox"/> Waste Removal <input type="radio"/>	<input type="checkbox"/> Examination & Inspection <input type="radio"/>	<input type="checkbox"/> Confined Space	<input type="checkbox"/> Risk Assess <input type="radio"/>	<input type="checkbox"/> Survey <input type="radio"/>	<input type="checkbox"/> Permit to Work <input type="radio"/>
	<input type="checkbox"/> Housekeeping <input type="radio"/>	<input type="checkbox"/> Lighting <input type="radio"/>	<input type="checkbox"/> Ground Conditions <input type="radio"/>	<input type="checkbox"/> Degassing/Purging <input type="radio"/>	<input type="checkbox"/> Street Structures/Drawings <input type="radio"/>	<input type="checkbox"/> Fire Control/Assembly <input type="radio"/>	<input type="checkbox"/> Emergency Procedures <input type="radio"/>	<input type="checkbox"/> Detect/Monitor <input type="radio"/>	<input type="checkbox"/> Tripod <input type="radio"/>	<input type="checkbox"/> Communication <input type="radio"/>
<input type="checkbox"/> Substances	<input type="checkbox"/> Assess Health Effects <input type="radio"/>	<input type="checkbox"/> Health Surveillance <input type="radio"/>	<input type="checkbox"/> Manual Handling	<input type="checkbox"/> Risk Assess <input type="radio"/>	<input type="checkbox"/> Mechanical Aids <input type="radio"/>	<input type="checkbox"/> Work Organisation <input type="radio"/>	<input type="checkbox"/> Training <input type="radio"/>	<input type="checkbox"/> Identify <input type="radio"/>	<input type="checkbox"/> Other <input type="radio"/>	<input type="checkbox"/> Other <input type="radio"/>
	<input type="checkbox"/> Safety Helmet <input type="radio"/>	<input type="checkbox"/> Safety Boot/Hi-Vis <input type="radio"/>	<input type="checkbox"/> Eye Protection <input type="radio"/>	<input type="checkbox"/> Safety Gloves <input type="radio"/>	<input type="checkbox"/> Ear Protection <input type="radio"/>	<input type="checkbox"/> Dust Mask <input type="radio"/>	<input type="checkbox"/> Respiratory Equipment <input type="radio"/>	<input type="checkbox"/> Face Protection <input type="radio"/>	<input type="checkbox"/> Safety Harness <input type="radio"/>	<input type="checkbox"/> Other <input type="radio"/>
<input type="checkbox"/> Asbestos Cement Water Pipes	PPE									
	Other									

Hazards, activities and controls on this SSWP identified by: _____ Date: _____ Time: _____

Controls put in place by: _____ Date: _____ Time: _____

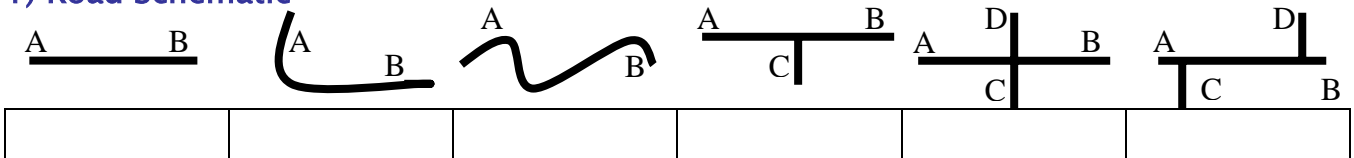
I have been made aware of the hazards & controls for this activity. Signed by Team:

NOTE: This list of Hazards and Controls is not exhaustive and is in no particular order.

IF IT'S NOT SAFE DON'T DO IT AND INFORM SITE MANAGEMENT

GENERIC TRAFFIC MANAGEMENT PLAN FOR ROUTINE WORKS

1) Road Schematic



2) Traffic Management Selection

2.1) Classification	Road Type	Road Width	Speed Limit	Urban/Rural	Traffic 3min	
2.2) Selection	All Stop	Give & Take	Priority	Stop/ Go	Lights	2-Way
2.3) Semi-Static	Will Semi-Static Management be used?				Yes	No

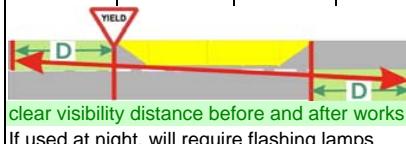
3) Signage (Warn / Inform / Direct / End)

No	Sign	Dir	No	Sign	Dir	No	Sign	Dir	No	Sign	Dir		
1 + 2 ARE SEMI-STATIC		A	5		A	10		A	15		A		
		B			B			B					
		C			C			C					
2		D	6		A	11		A	16		A		
		B			B			B					
		C			C			C					
3		D	7		A	12		A	17		A		
		B			B			B					
		C			C			C					
4		D	8		A	13		A	18		A		
		B			B			B					
		C			C			C					
4		D	9		A	14		A	19		A		
		B			B			B					
		C			C			C					
										If Using Traffic Lights/ Stop-Go, Have Gardaí Been Notified?		YES	NO
										Are All Required Cones /(Lamps & Beacons) In Place (& operating)?		YES	NO

ROUTINE WORKS TRAFFIC MANAGEMENT DESIGN

SHUTTLE CONTROL SELECTION

Method	Max. Speed Limit	Length of Works (m)	Max. Traffic (veh/hr)	3 Minute Count	Notes	
All Stop	100	n/a	300	15	5-10 mins max.	
Give & Take	50	50	400	20	Clear Visibility required from both directions	
Priority	100	80	850	43	Speed Limit	
					Clear vis. Distance D	
					50 km/h	60 m
					60 km/h	70 m
80 km/h	80 m					
100 km/h	100 m					
Stop/Go	100	20	500	25	Can be one person/Single Sign	
	100	100	1400	70	Can be one person-Auto Sign	
	100	200	1250	63	Can be one person-Auto Sign	
	100	300	1050	53	Has to be two people-Two Sign	
	100	400	950	48	Has to be two people-Two Sign	
	100	500	850	43	Has to be two people-Two Sign	
Traffic Lights	100	500	n/a	n/a	Vehicle Actuated preferred	

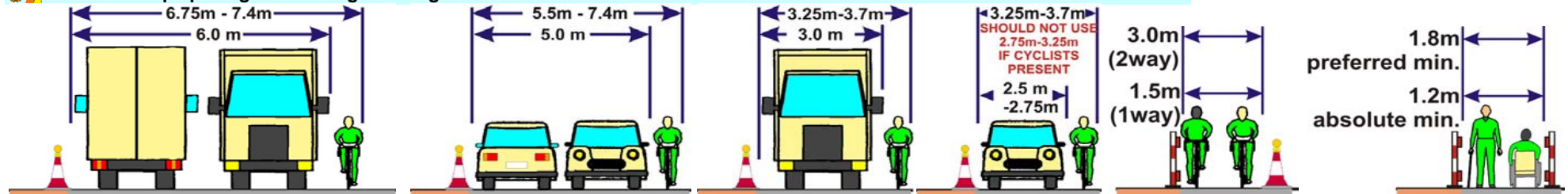


LAYOUT PARAMETER SELECTION SHEET

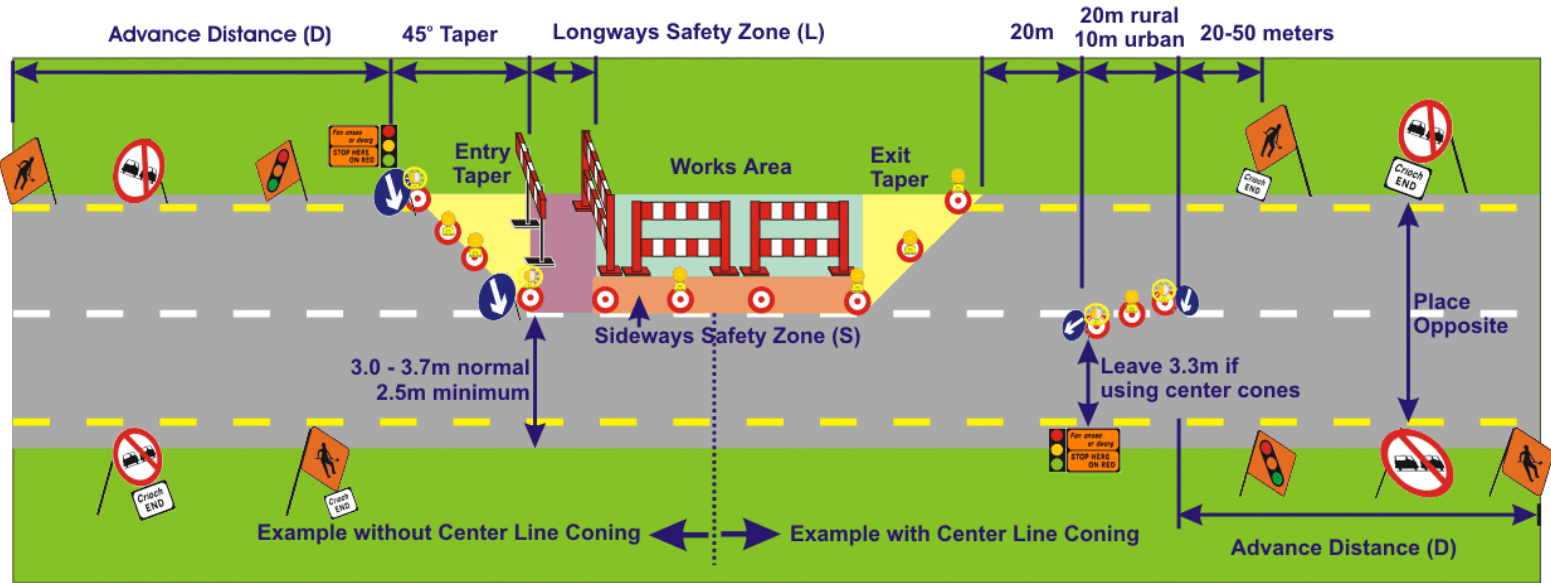
Type of Road	Advance sign distance (D) (m)	Min. no. & type of advance signs in sequence	Min. clear visibility of signs (m)	Min. size of signs (mm)	Min. height of cones (mm)	Long. safety zone (L) (m)	Side safety zone (S) (m)	Long. cone space (m)	Long. lamp space (m)	2-way taper multiply factor	Taper cone spacing (m)	Taper lamp spacing (m)	Lead-in cone tapers (See Notes below) Recommended lengths. SHUTTLE TAPERS = 45°	Width of hazard (including safety zone) NOTE: TAPERS ARE ONLY WHERE TWO WAY TRAFFIC MAINTAINED				Hard shoulder taper multiply factor
														1 m	2 m	3 m	4 m	
Single Carriageway, 60km/h	50	1 (r.w.a.) 1 (t.m.)	50	600	750	5	0.5	6	12	5	3 45°=1	6	Length of taper (T) in (m) Minimum No. of Cones Minimum No. of Lamps	5 3 2	10 5 3	15 7 4	20 8 5	5
Single Carriageway 100km/h	600	1 (r.w.a.) 1 (n.o.) 1 (t.m.)	120	600* 750*	750	45	1.2	12	12	40	3 45°=1	6	Length of taper (T) in (m) Minimum No. of Cones Minimum No. of Lamps	40 15 8	80 28 15	120 42 22	160 55 28	20

* Use 600mm signs where Vehicles Per Day < 5,000. Use 750mm signs where VEHICLES Per Day > 5,000

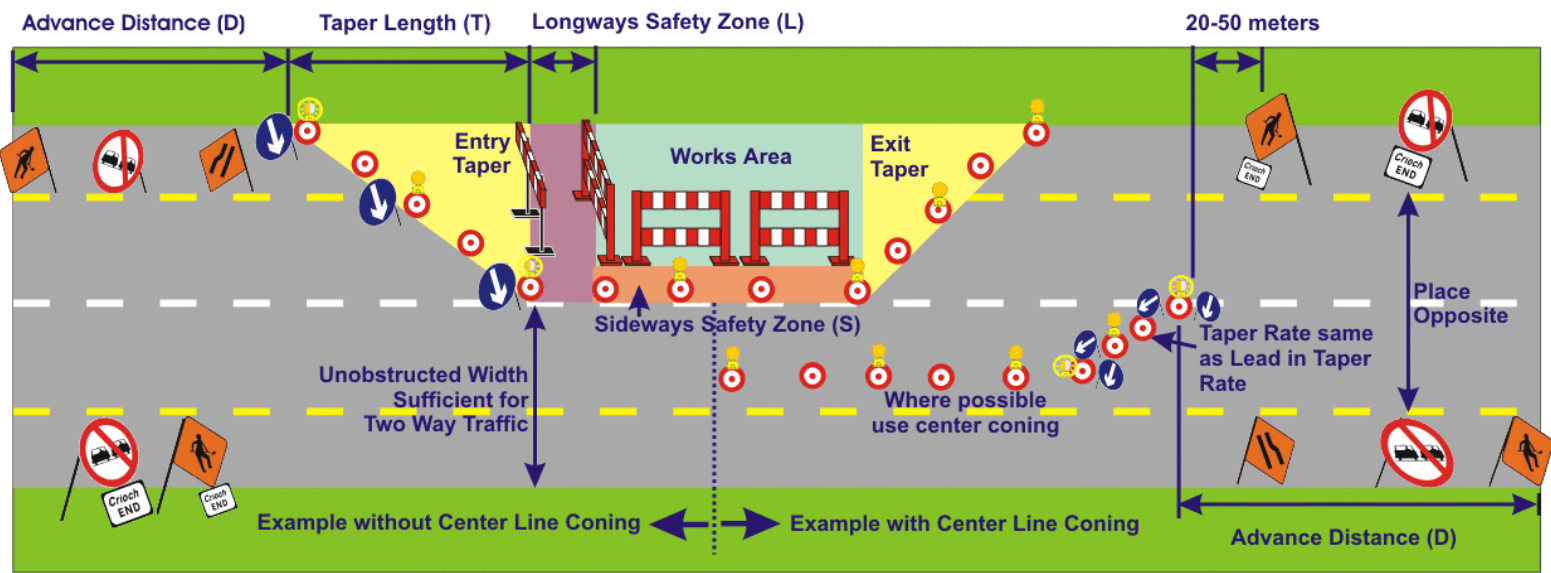
Double Lamp spacing when using Rotating Reflectors. ROTATING REFLECTORS ARE NOT ALLOWED ON TAPERS



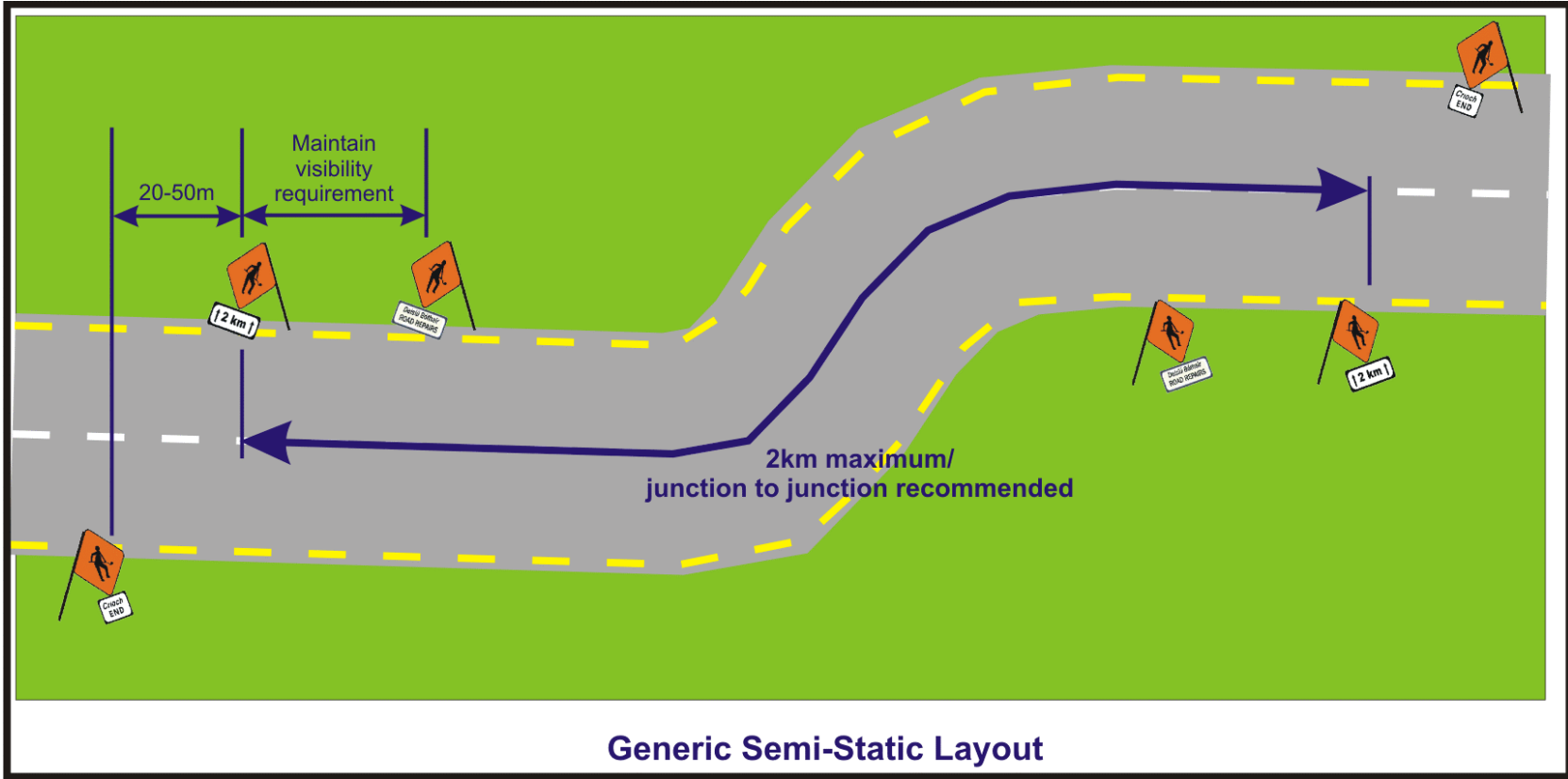
Advance Signs	Warn	r.w.a.			road works ahead
	Inform	t.m.	Priority		traffic management
			1		600 m
			2		
		3		SHOULD	25 km/h 45 km/h 65 km/h
		4		SHALL	600 m
Direct	n.o.			no overtaking	
For Advance Signs space signs evenly through the advance sign distance					
Works Signs	Direct	select appropriate			
End Signs	End				



Generic Shuttle Layout



Generic 2-Way Layout



Generic Semi-Static Layout

Appendix D	Regulatory Procedures	Page
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NOTES ON A TEMPORARY CLOSURE OF A PUBLIC ROAD

- Section 75 of the Roads Act 1993/ Article 12 of the Road Regulations 1994/ DOE Guidance Notes (June 1994).
- Two public notices required – one at least 14 days before proposed closure (Intention), one at least 7 days before closure (Decision). The Gardaí must also receive the above notices in writing.
- Manager's Orders are required for both Intention and Decision.
- Notice of Intention must invite objections, which must be considered prior to a final decision being made.
- The maximum period for a temporary closure is 12 months. This can be extended by the making of a further order.
- Both the Notice of Intention and Notice of Decision must state:
 - The **road** to be closed
 - The **period** of the closure
 - The **reason** for the closure
 - The **alternative route(s)** available
- DOE Guidance Notes on Road Closures (June 1994) recommends that particular attention be given to notifying local people in advance.
- Section 75(2)(a) of the Act deals with authorising persons to use a public road while a Temporary Road Closure is in effect.

1 - Manager's Order PROPOSING the temporary closure of a public road**ROADS ACT 1993 - SECTION 75****TEMPORARY CLOSURE OF (insert road/street name)**

An application has been made to the Council/It is intended (**delete as appropriate**) to temporarily close the following public road(s) to through traffic to facilitate (**insert reason**).

- _____ Road (**insert days and dates of closure and, if appropriate, the times of day of the proposed closure**).

Any interested person may lodge an objection in writing with the (**Insert name of Official and address of relevant offices**) not later than _____.

I recommend (i) the publication of the statutory notice informing the public of the proposed closure and that objections may be made in writing to the Council as detailed above and (ii) that the Superintendent of An Garda Síochána, the Councillors for the area and the Chief Fire Officer be informed in writing of the proposed closure.

Senior Executive Officer/Senior Engineer

ORDER: Recommendation of Senior Executive Officer/Senior Engineer is hereby approved. I hereby order the publication of notice of intention to close _____ Street from (day/date) to (day/date) for the purpose of carrying out _____.

Date _____

Signed _____
County Manager

2 - Manager's Order AUTHORISING the temporary closure of a public road

ROADS ACT 1993 - SECTION 75

TEMPORARY CLOSURE OF (insert road/street name)

Manager's Order no. **(insert details)** authorised the publication of a notice in the public press notifying the public of a proposal to temporarily close the following public road to through traffic to facilitate **(insert reason)**.

- _____ Road **(insert days, dates and times of closure)**.

Having considered submissions received **(give details if desired)**, I recommend that the order to close the road(s) be now made.

Senior Executive Officer/Senior Engineer

ORDER: Recommendation of Senior Executive Officer/Senior Engineer is approved. I hereby order the closure of _____ Street from (day, date) to (day, date) (from ___ am to ___ pm each day) for the purpose of carrying out _____.

Date _____

Signed _____

County Manager

3 - Public Notice of INTENTION to close a public road

ROADS ACT 1993 – SECTION 75

TEMPORARY CLOSURE OF (insert road/street name)

An application has been made to the Council/It is intended (**delete as appropriate**) to temporarily close the following public road(s) to through traffic to facilitate (**insert reason**).

- _____ Road (**insert days and dates of proposed closure and, where appropriate, the times of day of the proposed closure**).

The alternative routes for traffic for the duration of the closure are as follows: (**list all alternative routes**).

The operation of all Pay and Display parking bays on these streets will be suspended during the course of the proposed closure (**insert if appropriate**.)

Any interested person may lodge an objection in writing with the (**List Official and address of relevant offices**) not later than 5.00p.m.on (**list date**).

**List Official
Title
Department Address**

4 - Public Notice of DECISION to temporarily close a public road

ROADS ACT 1993 – SECTION 75

TEMPORARY CLOSURE OF (insert road/street name)

_____ Council has made an order to temporarily close the following public road(s) to through traffic to facilitate **(insert reason)**.

- _____ Road – **(insert days and dates of closure and, where appropriate, the times of day of the closure)**.

The alternative routes for traffic for the duration of the closure are **(list all alternative routes)**.

The operation of all Pay and Display parking bays on these streets will be suspended during the course of the proposed closure.**(insert if appropriate)**

The Transportation Department regrets any inconvenience caused.

**Name of Official
Title
Department Address
Date**

NOTES ON ROAD WORKS SPEED LIMIT ORDER

- Section 10 of the Road Traffic Act 2004.
- In the interest of road safety, a speed limit not less than 30 km/h can be set by the Manager on a road or part of a road where road works are being carried out.
- Called a Road Works Speed Limit Order.
- In place for the duration of the works to a maximum period of 12 months. Can be extended by the making of a further order.
- If on a National Road or Motorway, prior written consent of NRA is required.
- In all cases, the Manager must notify the Garda Commissioner and consider any representations made by him or her.
- The Commissioner has up to 1 month from the date of the notification to make representations.
- The Manager's Order makes 'exemption' for emergency vehicles etc.
- **Once made**, notice of the Order must be published indicating:
 - The **location** where the Order will have effect
 - The **period** for which the Order will have effect
 - The **Speed Limit** which is to apply through the Order
- Representations may be made to the Manager, who shall have regard to any such representations. The Manager may at any time revoke or amend a Road Works Speed Limit Order made by him or her.

Manager's Order for a Road Works Speed Limit

ROAD TRAFFIC ACT 2004

Road Works Speed Limit Order (insert road name/number)

In order to facilitate the carrying out of **(insert brief details of the works concerned)** and in the interests of road safety, it is recommended that a road works speed limit of **(insert speed limit to apply, which must not be lower than 30 km/h)** shall apply on the **(insert road name/number)** at the location and for the period detailed hereunder. The Garda Commissioner has been notified (and representations made by him within the specified time have been considered). The National Roads Authority has consented in writing to the making of this Order.

Insert the exact location along the road/s in question where the Order is to apply,

Insert the period during which the Order is to apply (not more than 1 year)

Director of Services

ORDER: The recommendation of the Director of Services is approved. I hereby order that a speed limit of ___ km/h shall apply on the _____ Road from the ___/___/___ to the ___/___/___.

County Manager

Public Notice of the Making of a Road Works Speed Limit Order

Road Works Speed Limit Order
(Give details of the road number and description)

Notice is hereby given that the County Manager, _____ County Council, in exercise of the powers vested in him/her under Section 10 of the Road Traffic Act 2004, and in the interests of road safety, has made an Order as follows:

On the (give details of the road number and description), from a point _____ to a point _____, a speed limit of ___ km/h shall apply for a period from _____ to _____ inclusive.

Representations in relation to this Order may be made in writing to (give name and address of the official to whom representations should be made).

County Manager

Dated _____

NOTIFICATION OF POSITIVE TRAFFIC CONTROL

Under the following Road Traffic Acts/Regulations

- Section 37 of the Road Traffic Act, 1994
- Road Traffic (Signs) Regulations 2006 (S.I. No. 637 of 2006)
- Road Traffic (Control of Traffic) Regulations 2006 (S.I. No. 638 of 2006)

The Roads Authority of/Contractor

Hereby notifies

Of the use of

TEMPORARY TRAFFIC LIGHTS

STOP-GO BOARD(s)

at the following location:

Road

From a point

To a point

ON/ BETWEEN (delete as appropriate) the following dates

and

Observations (if any) should be faxed to:

Signed: _____

On behalf of the Roads Authority/Contractor



Local Government Management Services Board

Local Government House, 35-39 Ushers Quay
Dublin 8, Ireland.

Tel: + 353 1 6438400
Fax: + 353 1 6438401
Web: www.lgmsb.ie

Department of Transport

Transport House, Kildare Street
Dublin 2, Ireland.

Tel: + 353 1 670 7444
Web: www.transport.ie