



RIICWD503D

Prepare work zone traffic management plan

THIS UNIT FORMS PART OF THE
RIISS00045 Work Zone Traffic Control Guidance Plan
Developer Skill Set

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Knowledge and Skills

The following is a list of the skills and knowledge required to prepare work zone traffic management plans for worksites, it includes

- Prepare and develop a Work Zone Traffic Management Plan
- Incorporate environmental management plans Design TGSs or TCPs to suit the specific road environment
- Follow organisational and legislative WHS policies and work procedures
- Select signs for a TGS/TCP (as required)
- Sign-off a TGS/TCP (if required)
- Keep records of all modifications to the TGS/TCP
- Monitor control systems & interpret control systems to apply to the drawing, selection or design
- Use approved methods and follow recognised local legislation
- Use the site/location assessment, distinguish topographical landmarks and carry out authorised risk control
- Conduct an onsite check of the plan to identify any unexpected risks/hazards
- Able to interpret plans, that is, must be aware of the distance and measuring devices of the method
- Interpret standards/requirements with local policy and procedures
- Arrange/draw up a TGS/TCP to recognise graphical representation such as pedestrian movement plans, vehicle movement plans, notification of authorities
- Understand speed, environment, type and class of vehicles, traffic density, sight lines, environmental conditions, weather patterns and surface type
- Identify record-keeping structure, type of records to be maintained, approvals, duration records must be maintained, depository location and custodian
- Select and modify a TGS/TCP based on risk assessment, statutory and regulatory requirements, standards, road authority requirements and project brief
- Interpret engineering plans and drawings, interpret and apply relevant standards, interpret manufacturer's specifications, interpret engineering terms and phrases
- Identify all potential hazards and implement appropriate risk treatment control measures
- Determine the recommended spacing between signs and traffic control devices in line with standards; measure width of trafficable surface; calculate edge clearances to barriers, cones and clearance to work personnel
- Collate traffic volume data, type and class of vehicles
- Determine lane capacity, road network performance and lane closure restrictions
- Identify impacts from any concurrent or adjacent works
- Identify times and dates of any planned public events that may result in increased or redistributed traffic patterns
- Identify approvals required, identify approval agencies & types of approvals for roadway access, railway reserve access, authority to install signs on roads, variation to standards
- Identify affected stakeholders and type of notification required and prepare notifications
- Develop and design a TGS/TCP in accordance with relevant regulations, standards and road authority requirements.

Expectations

This is a level 5 mapped unit of competency from the RII Resources and Infrastructure Training Package.

At this level you are expected to meet the following learner outcomes;

- Apply sound solutions to client requirements
- Analyse data and provide appropriate evaluation
- Apply all the skills and knowledge required for technical and specific outcomes
- Demonstrate a strong understanding of traffic management and traffic management methodologies
- Access and interpret high level concepts
- Obtain, read and interpret specific and technical information
- Ability to utilise appropriate technology and computer systems
- Have a strong and sound understanding of legislative, statutory and jurisdictional requirements
- Apply strong client focus

Unit of Competency

RIICWD503D	Prepare work zone traffic management plan
Application	This unit is appropriate for those working in operational roles.
Elements	Performance Criteria
1 Plan for the preparation of work zone traffic management plans	1.1 Access, interpret and apply traffic management documentation and ensure the work activity is compliant 1.2 Obtain, read, interpret, clarify and confirm work requirements 1.3 Identify and confirm the work zone traffic management plan project requirements and information 1.4 Prepare a preparation plan which makes best use of the available resources and meets the traffic management plan requirements
2 Undertake the work zone traffic management plan preparation	2.1 Interpret and analyse data and identify viable options 2.2 Interpret and analyse data and make a recommendation for the preferred option 2.3 Complete the detailed work zone traffic management plan 2.4 Prepare a cost estimate for executing the work zone traffic management plan 2.5 Participate in the review of the work zone traffic management plan with peers and stakeholders 2.6 Complete the documentation for the work zone traffic management plan 2.7 Monitor and coordinate the progress of other team members involved in the preparation process 2.8 Gain plan approval
3 Finalise preparation processes of work zone traffic management plan	3.1 Ensure filing of preparation records is completed 3.2 Complete and submit preparation cost and other reporting 3.3 Participate in performance review of the preparation process 3.4 Seek client feedback and contribute to the verification of the plan 3.5 Close out all systems
4 Support and review the application of the work zone traffic management plan	4.1 Provide clarification and advice to those applying the plan 4.2 Review the application of the plan and recommend changes for continuous improvement 4.3 Contribute to the validation of the plan

Introduction

Construction and maintenance occur on roads throughout Australia on a daily basis. When these types of activities occur, a structured approach must be carried out to ensure the safety and wellbeing of workers and road users.

A formalised approach to traffic management has been adopted by all states and territories in Australia and this is supported by a set of Australian standards, jurisdictional guidelines and standards regarding signs and devices.

All of this is to minimise the risk to all those involved in road worksites.

In order for this to occur correctly and efficiently, those authorised to do so are required to create and provide a detailed Traffic Management Plan

In most jurisdictions in Australia, only trained, accredited and authorised personnel are allowed to complete Traffic Management Plans.

What is a Traffic Management Plan (TMP)?

A Traffic Management Plan (TMP) is a plan detailing work to be undertaken and describing its impact on the general area, especially its impact on public transport and passengers, cyclists, pedestrians, motorists and commercial operations. It also describes how these impacts are being addressed.

It will also include details on Traffic Control Guidance Schemes, and Vehicle Movement Plans. Traffic Control Guidance Schemes also known as Traffic Control Plans are a major component of a TMP.

TMPS are designed to make sure that work zone traffic control is carried out in accordance with the relevant standards for traffic control for the jurisdiction in which the work is to be carried out.

Within a TMP

A TMP provides the details of proposals to safely manage traffic during the conduct of works on roads and normally includes:

- A traffic control guidance scheme– Is an arrangement of temporary signs and devices to warn traffic and guide it through or past a work area or temporary hazard.
- Worksite hazard assessment, such as a Safe Work Method Statement
- Details of the location, nature and duration of the works.

For long-term work, the plan should also include details of the requirements to manage traffic through the worksite outside normal working hours or when workers are not present at the site (after-care).

Principles of Traffic Management

The success of a system of traffic control at worksites depends on the knowledge, skills, cooperation and efforts of all people with a responsibility for traffic control at a worksite and managing traffic in general.

An effective traffic management may include, but are not limited to:

- Minimising the risk of accident.
- Minimising risk of death and injury.
- Keeping traffic flowing smoothly.
- Enhancing worker and public safety.
- Minimising incidents (i.e. near-hits).
- Enabling works to be conducted.
- Meeting legal obligations.

Primary aims of Traffic Management

A Traffic Management Plan is a key workplace document that has legal standing. As such it is critical that the structure and content of the Plan is sufficient to explain the potential hazards, the assessed risks and the proposed treatments for the proposed work activities and work site.

The Traffic Management Plan aims to:

- Protect workers, road users and pedestrians.
- Adequately instruct and guide road users safely through, around or past the worksite.
- Provide appropriate warnings of changes in the road surface, driving conditions and of personnel/workers and plant engaged in work on or adjacent to the road.
- Minimise the impact of the works on traffic and adjacent landowners/occupiers.
- Minimise disruptions to public transport.
- Communicate the arrangements for and impacts of, any activities affecting traffic

The TMP must clearly state the objectives of the plan.

Primary objectives will include requirements to ensure the safety and health of work personnel, the public and those who will be impacted by the work and to ensure that road users are not inconvenienced and the road network be kept at a satisfactory level of performance.

Traffic Management around workzones strives to achieve two different goals:

- The safety of workers in the workzone
- The safety and convenience of road users.

Road users

Road users need to be protected from the work that is being carried out on or near the roadway. It is important to have the correct provisions in place to protect road users from plant and equipment, but also to keep road users away from workers.

This can be done by:

- Varying speed limits
- Warning and notice of loose surfaces
- Restricting access to the road completely where feasible
- Providing alternate routes
- Isolating pedestrians

Works on or near roadways should also seek to minimise:

- Disruption of established traffic movements and patterns;
- Interference with traffic at peak movement periods;
- Interference with public transport services and;
- The amount of road closed to traffic at any one time.

Safety of workers

Work shall be arranged so that workers are able to work safely and are separated from road users wherever possible

Essential Documentation for Preparing Traffic Management Plans

A large number of documents will need to be taken into consideration when preparing a TMP, they may include:

- Legislative, organisational and site requirements and procedures
- Manufacturer's guidelines and specifications
- Australian standards
- Code of practice
- Employment and workplace relations legislation
- Equal Employment Opportunity and Disability Discrimination legislation

Do not discount the importance of these compliance documents and ensure that you reference them correctly.

Planning Documentation

At this level

Since technical writing is normally intended to deliver factual and technical information, you should read these types of documents at a time when you can grasp and retain the information. There are also additional strategies to reading technical writing, such as limiting your reading only to the information you need, and using a glossary to determine the meanings of certain words or phrases

- Determine the information you need from a technical document
- Scan the document in its entirety before reading
- Find information you need from the document using the table of contents, index or headings
- Take note of important or crucial pieces of information as you read
- Use a glossary or dictionary to determine the meaning of words and phrases you may not understand
- Paraphrase technical writing into your own words where possible
- Read technical documents when you feel most alert and energetic

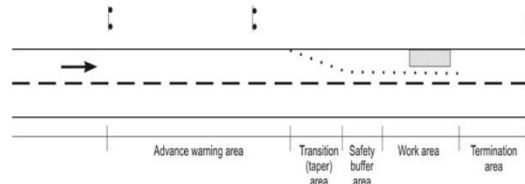
Categories of works on or near roads

A 'Work Site means the whole area of road affected by the actual work and the traffic control requirements including all signs (a formal definition may include "an area of road or bridge or road reserve which includes the work area or areas and any additional length of road or bridge required for traffic control such as signs and tapers").

Roadwork's are undertaken to build new roads, maintain existing roads and complete emergency repairs, although traffic control may be used for maintenance in and around roads

The work site is made up of five smaller areas:

- Advanced warning area.
- Transition area.
- Safety buffer area.
- Work area.
- Termination area.



There are a wide range of activities that could take place on or near roads that would require traffic to be managed. Each type of work has its own requirements for how traffic should be managed around the work area and presents its own challenges in terms of planning for the works and for traffic management activities, below are some examples of common types of work that may be carried out.

Intermittent work (planned/unplanned) –

Work, which is undertaken on travel lanes without obstructing traffic and without compromising the safety of workers. "Unplanned intermittent work" can refer to emergency situations requiring traffic control.

Short term work

Work where obstruction to traffic occurs and a traffic guidance scheme is required only while work personnel are in attendance. Short-term work is generally limited to the duration of one work shift where road conditions are returned to normal when the shift ends.

Short-term work may be day or night work – e.g. 10.00pm to 4.00am is a single shift. Hence many standard TCPs contain provision for day or night work.

Long term work

Work where a traffic guidance scheme is required to operate both day and night and may be left unattended.

Mobile work

Work, which entails work vehicles moving continuously along a roadway at speeds significantly lower than other traffic. All sign and devices are either vehicle mounted or are regularly moved along the road.

Make sure that you understand the type of work that is being carried out and that you refer to the relevant clauses or sections of your jurisdiction's standards for traffic control when you are planning how traffic will be managed.

Methods of Traffic Control at worksites

You will need to consider a range of factors to determine which methods will be the most effective in achieving the aims of traffic management for the site within the plan.

At a broad level, there are 3 main methods of traffic management.

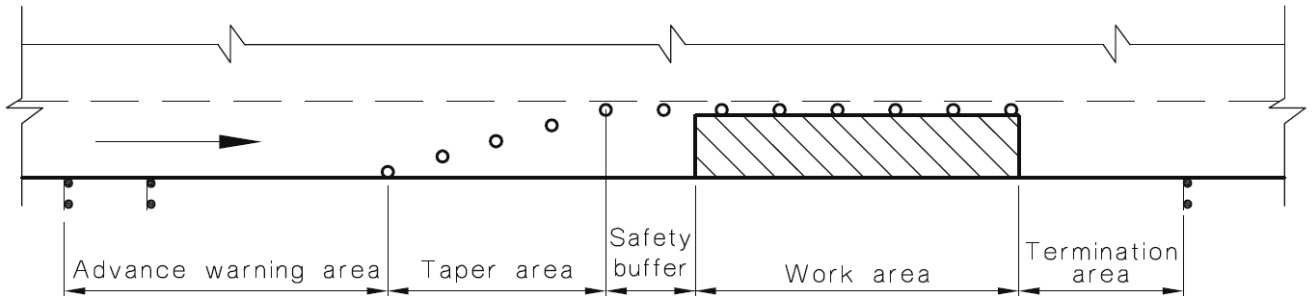
Traffic can be:

Traffic will move either around, past or through work areas.

- **Around** – a work area with traffic on a detour, side track or different carriageway.
- **Past** – a work area with traffic on the same carriageway as the work area, to the side of, and not directly over the area being worked on.
- **Through** – a work area with traffic over the area being worked on with or without a pilot vehicle.

Components of a typical work site

The diagram below provides a very simple example of what a workzone could look like, but the basic parts of the workzone are the same on all sites, regardless of the circumstances of the site, such as the number of lanes or the presence of roundabouts or intersections.



Advance Warning Area: The area before the work zone where signs and devices should be placed to warn road users that work is taking place and that there will be workers on or near the roadway.

Taper Area: If a section of the road has been closed for works, the taper area is where the road is delineated and where traffic is diverted.

Safety buffer: Safety buffers are an area of empty space that provide distance between traffic and workers, especially where traffic is moving through the workzone at higher speeds. Safety buffers are only required (but may be presented in other situations) for work zones where the approach speed is greater than 60km/h – instances where traffic controllers are not to be used.

Work area: The area where the actual physical works are being carried out

Termination area: Where the work zone ends and road users are transitioned back to normal traffic conditions.

1 Plan for Preparation of a Work Zone Traffic Management Plan

Before commencing the development of a Traffic Management Plan, you need to make sure that you have gathered all of the information you will need to create a safe and effective plan. You will need to interpret the different types of documents.

Clarify work instructions, if there are any specific statutory or mandatory requirements
Understand and confirm the work zone management plan project from all stakeholders
Prepare a preparation plan before you jump right in developing the TMP, this will assist in identifying resources that meet the need

1.1 Access, interprets and apply traffic management documentation and ensure the work activity is compliant

The most important compliance documents that relate to Traffic Management Plans are:

- State and territory traffic management legislation, regulations
 - Work Health & Safety Act 2011
 - Work Health & Safety Regulations 2017
- Codes of practice.
 - RMS Traffic Control at Worksites Manual 2010
 - Hazardous manual tasks code of practice 2011
- Australian Standard
 - AS1742.3 – 2009: Manual of Uniform Traffic Control Devices (MUTCD) – Part 3: Traffic Control Devices for Works on Roads.
- Specific technical publications by the road authorities
 - RMS –Technical Specification e.g. Barrier Systems, PPE, Traffic Signals

Other documents that will be useful are as follows:

- Additional codes of practice and guidelines
- Other Technical publications that may refer to traffic data
- Licensing requirements.
- Employment and workplace relations legislation.
- Equal Employment Opportunity and Disability Discrimination legislation.
- Australian standards.
- Codes of practice.
- Emergency and evacuation procedures.
- Safe Work Method Statements (SWMS) and Job Safety Analysis (JSA).
- Plant and equipment manufacturer's guidelines and specifications.
- Material Safety Data Sheets (MSDS).
- Traffic flow statistics
- Organisation works instructions and Policy and Procedures

Work instructions can take many other forms, either verbally or in writing, including, but not limited to:

- Verbal or written and graphical instructions
- Signage
- Work schedules/plans/specifications
- Work bulletins, Charts and hand drawings
- Memos, Maps, Safety Data Sheets & Diagrams or sketches

Usually, these types of technical documents are organised into:

- Parts – break up very large documents into smaller, sub-documents,
- Sections – break up individual documents based on content.
- Clauses – Clauses cover the specific details in the document. Each clause is usually a distinct and separate piece of information.
- Paragraphs – Paragraphs normally sit under clause

1.2 Obtain, read, interpret, clarify and confirm work requirements

Prior to developing the work zone traffic management plan, it is important to ensure that all work requirements are well understood so that the plan actually meets the purpose for which it is created.

In order to understand the requirements, all documents relevant to the work site that will have an effect on the management of traffic when the site is in operation will need to be located, interpreted and applied to the traffic management plan.

The following main components of a TMP will determine the relevant types of documentation that you may need to obtain.

These requirements could be given to you as:

Introduction	Incident procedures
Purpose and scope	Environmental conditions
Objectives and strategies	Work access
Project overview	Cyclist and pedestrians
Project location	The vulnerable and people with disabilities
Site constraints	Emergency vehicles
Project representatives and stakeholders	Public transport
Traffic management representatives	Existing Parking
Safety plan	Special events
Communication strategies	School crossing
Impact on adjoining road network	Heavy vehicles
Hazard arrangements	Contingencies
Approval	Public notification
Traffic assessment	Existing speed zones
Temporary barriers	Geological, Hydrological and survey data
Cultural and Heritage constraints	Standards
Staging of work	Night work provisions
TCPs	Signage and devices
Work sequence	Monitoring
Reporting	Site inspections
After hours	Auditing
Public feedback	Project review
Variations	Submissions

Understanding the project requirements will enable you to allocate resources to where they are needed.

1.3 Identify and confirm the work zone traffic management plan project requirements and information

Traffic management plans are detailed and complex documents that have a significant influence on the safety and effectiveness of works on or near roads. It is vital to ensure that your traffic management plans are correct and accurate. Whatever the management plan looks like, there is usually some agreement about what an organisation needs to be managed.

The broad categories are people; money; supplies and equipment; activities; and relationships with the outside world (funders, the media, the community, target population, etc.). Each of these categories should have a set of policies and procedures that addresses whatever you can think of that might come up in that area.

Not all of these management areas have to be addressed by the same person, although in small organisations they probably will be. In larger organisations, there are often assistants and directors or program directors who oversee one area or another. If the organisation is large enough, the director/project manager may delegate much of this work.

The consultation phase will allow you time to spend with the client/stakeholder to gather as much information as possible about the projected works. Most organisations will have a TMP template to work from, although a good habit to get into is to have a pre plan template/project plan to help you with the final TMP outcome.

Whatever methods you choose, gather as much information as possible and check for understanding at this point, you do not want to go over the same ground/information again as this can affect your timelines.

Please see a sample of a quick consultation

Project Details	
Company Details	
Directors name	
Company name	
Company address	
Company contact number	
Onsite Contact person responsible for compliance with this plan	
Name	
Contact number	
After hours	

I..... have sue authorisation and delegation to sign this traffic management plan on behalf of the conman listed above and take responsibility for ensuring compliance with our commitment specified herein.

	Requirements	Yes	No	n/a	Outline details/justification	Shown on plan	
						Yes	no
General							
	Short term						
	Long term						
	Mobile						
1	Specific staging and timing of proposed works				Permit No Details:		

2	Provide details of any permanent or temporary vehicle crossing				Permit No Details:		
3	Provide details of any construction zone permit				Permit No Details:		
4	Has the location of the site and adjoining access been specified of the plans				Permit No Details:		
Foot paths, roads and pedestrian access							
5	Is pedestrian access and a crossing provided at the site				Permit No Details:		
6	Provide details of any permit to occupy space on the road or footpath				Permit No Details:		
7	Provide details of current road opening permit if applicable				Permit No Details:		
8	Has the road authority relevant sections been notified				Permit No Details:		
Plant and equipment							
9	Provide details and permits for any heavy plant, cranes, towers and other equipment						
Signage							
10	Will there be changes to current signage						
Traffic Flow and Public Impact							
11	Will the impact on the site cause issue with surrounding traffic flows and public transport						
12	If traffic conditions are to change, who is to be notified						
13	Will the general public be informed, notified of any changes						
14	Will traffic controller be used to coordinate traffic and pedestrians						

Sample from Roads and Maritime Services G10 TMP requirements

At least four (4) weeks before undertaking work which affects traffic conditions, submit for the Principal's approval your Traffic Management Plan (TMP) for the Works.

The Principal may agree to a reduced period of notice for the proposed traffic management measures if they do not involve pavement or drainage works, or for Minor Works Contracts.

The TMP must include, as a minimum and where appropriate, the following elements:

- (a) Details of any traffic staging arrangements associated with each proposed construction stage, including Traffic Staging Plans (refer Clause 2.6), and the time periods during which each stage will be in operation;*
- (b) Copies of any Road Occupancy Licences (ROL) and approvals from other relevant authorities obtained;*
- (c) Traffic Control Plans (TCP), including the specific traffic control arrangements associated with obtaining a ROL;*
- (d) Vehicle Movement Plan(s) showing the preferred travel paths for vehicles to enter, leave or cross the through traffic stream;*
- (e) Provision for access to adjoining properties affected by the construction;*
- (f) Provision for the safe passage of cyclists and pedestrians;*
- (g) Design drawings for any temporary roadways and detours, including alignment and surface levels, pavement widths, pavement cross-sections and drainage*
- (h) Names and contact details of nominated personnel (including the TCSM if applicable) responsible for maintenance of traffic control devices and temporary roadways outside normal working hours, together with confirmation that these details have been provided to the Police.*

The TMP and associated documentation must be prepared by person(s) suitably experienced in the design and implementation of traffic management plans of equivalent complexity to those required in the Contract and holding qualifications acceptable to the Principal, including as a minimum, a qualification in the RMS

The TMP and associated documents may be submitted in stages in accordance with the requirements of RMS for the staged submission of the PROJECT QUALITY PLAN

1.4 Prepare a preparation plan which makes best use of the available resources and meets the traffic management plan requirements

Organisation and planning is paramount the success of any project, writing a pre plan will assist to get the ball rolling. A pre plan is a bit like an overall checklist to the bigger end project/TMP, you can use it to identify broader resources and systems required.

It will be based on your client consultation of what is required, you can compare what is required, to what resources you have and then you will be able to identify what resources you will be required to gather.

It can be approached in a simpler form, then fleshed out for example, most if not all business is made up of 3 main areas:

- Plant and Equipment (include systems, reporting, polices, computers)
- People/HR (expertise, team members)
- Capital/budget, finances)

To project manage a TMP, you may ask the following:

- Do we have the manpower? or expertise? if not do we have the capital to obtain additional HR and expertise?
- Do we have the right computer systems and design software?
- Do we have the systems in place to manage the project? And are they up to date?
- Are our communicating and reporting systems adequate?
- Is this a regional project and do we have the physical resources?
- Do we have historical and current data required?
- Can we get the right approvals?
- Do we understand the risks?
- Can we leverage off similar or likeminded projects? (not re-invent the wheel)
- Do we have the capacity or are we over booked?

Typical activities in the preparation process

- Review all of the work instructions and requirements for the site/project
- A review of the standards and legislation that will apply to the site
- Consult with
 - The client and all other stakeholders
 - Ensure that all the relevant authorities are
 - Ensure that you have established your TMP development team
 - Peer developers
 - Engineers or other 3rd party construction teams
- Where possible it is vital that you conduct a survey or inspection of the proposed work site to determine risks and to consider operational concerns and difficulties associated with traffic management

- **Gathering of additional site data that could apply to the site, including:**

- **Geological data** for the site (do we understand the surface and ground structure of the site, will there be in excavation, drilling etc.)
- **Geotechnical data** for the site (information on infrastructure, civil engineering requirements or restrictions on the ground and surface already in place)
- **Hydrological data** for the site (this may refer to precipitation, stream flow, groundwater levels, catchment areas and rivers, dams, lakes)
- **Survey data** for the site (this will refer to property boundaries, titles)
- **Meteorological data** for the site (this will refer to the atmosphere, weather conditions, temperature)
- Known hazards, constraints and conditions
- Information about the usage of the road,
 - including traffic flows (ADT)
 - Pedestrian and cyclist access and use,
 - Public transport infrastructure, etc.
- **Cultural and heritage data** that applies to the site (is this area sacred, special or have some significance)
- Utilities (underground, overhead, planned)

2 Undertake the Work zone traffic management plan

You have now consulted and collected all the significant and important information from the stakeholders, now it is time to move to the next phase of TMP development.

From this point on; you will be considering, completing and or conducting the following in brief:

- Sites inspections
- Risk assessments
- Modelling
- Analyse traffic data
- Providing options
- Commencing applications
- Proving costings
- Complete and submit the plan

2.1 Interpret and analyse data and identify viable options

This is a crucial stage that requires research and access to historical and current data sources. Most organisations at this level would have generated substantial amounts of traffic management data, TMP's, TCGS/TCP's as well as been involved in short term and major projects.

From this data you will be able to communicate and finalise viable, practical and workable options for the elements within the TMP:

- Are there any other plans that are similar?
- Is this part of a bigger project that can be leveraged?
- Will this plan affect other surrounding projects?
- Will you have an impact on current infrastructure?
- Can the Hierarchy of control be used?
- What can be eliminated?

What data should you be gathering and analysing?

- Traffic Volume surveys
- Travel time and queuing
- Pedestrian and cyclist activity
- Historical Roadway construction and conditions
- Signal capacity
- Network monitoring
- Holiday traffic impacts
- Average daily traffic
- Accident and incident rates
- Public transport rates

2.2 Interpret and analyse data and make a recommendation for the preferred option

Analysing information involves examining it in ways that reveal the relationships, patterns, trends, etc. that can be found within it. The process of data analysis is the process of turning data into meaningful information. Although there are no hard and fast rules for how to analyse statistical data, ensuring that you have a methodical and systematic approach is vital to ensuring your analysis is accurate. Poor quality analysis can lead you to draw incorrect and inappropriate.

Being able to turn data into information or communicate statistical information accurately is vital for effective decision-making. Your evaluation process and your recommendations should always be based on an analysis of the available data for the site and for the project. Your recommendations should be the most effective traffic management strategies to achieve the client's objects and a balancing of convenience and safety for road users and workers alike within the context of the conditions at the site.

2.3 Complete the detailed work zone traffic management plan

It is now time to get down to business and completed the TMP

- You have identified all of the relevant documents and requirements
- You have consulted with the stakeholder
- Conducted a pre plan
- Gathered integral data
- Now is time put it all together

There are many software programs and templates available to assist in developing a TMP.

Programs such as RAPID PLAN, AUTOCAD, COREL DRAW etc. can assist in automating the drawing process.

Traffic Controls Plans that are drawn using such programs produce more professional documents. Some programs offer built in signs and devices and are easy to use and allow importation of Google maps to design the road layers.

On the down side, some programs are expensive and requires a yearly subscription

General Details that may be included in common construction TMP

Purpose and scope

This section is used to provide a broad overview of the purpose of the TMP and the extent to which it covers.

Traffic Management Objectives

The TMP must clearly state the objectives of the plan.

Primary objectives will include requirements to ensure the safety and health of work personnel, the public and those who will be impacted by the work.

Location

Include a plan or sketch outlining the location of the worksite and its relationship to the surrounding network.

Site constraints

Consider current posted speed limits, land widths, traffic volume, lane widths, number of lanes.

Project representatives

Who are the key personal and stakeholders, the road authority representatives, prime contractors, sub-contractors, project manager?

Administration

Contact details of the TMP designer and all those responsible for the implementation of the TMP.

Competencies

The TMP should include a commitment by the stakeholder to exercise duty of care to workers and all road users ahead in the implementation of the TMP. Considerations that need to be included are, PPE, Plant and equipment, registration, licensing, permits, staff qualifications.

Incident procedures

Include all procedures in the event of an incident occurring including first aid response, emergency services contact and clearing the site.

Environmental conditions

Potential conflict with signage and the natural surroundings.

Access

Consider all road users move past the worksite and / or access properties adjacent to the worksite.

Cyclists and Pedestrians

Consider pedestrians and cyclists and the impact it will have, include likely sources and routes taken by pedestrians and cyclists.

Emergency vehicle access

Include provisions for priority of emergency services vehicles to travel through a road works site to another location, and also to access the site should an emergency situation arise on-site during the works.

Public transport

Identify any bus stops and railway crossings etc. are located within the traffic control zone.

Parking

Existing parking facilities and parking limits that may be impacted by the proposed work.

Special Events

There may be instances where roadwork will be conducted on public holidays, and adjacent to sporting venues or other public places at times of peak use of that venue/location.

School Crossings

The location of school crossings should be identified during site visits.

Risk Management

To clearly understand the risks associated with the Project and then outline the manner in which identified risks will be managed.

Emergency arrangements

Consider any dangerous goods sites (fuel stations, public pools, generating plants etc.), gas and electricity transmission features, or any other potentially dangerous facilities/situations in the vicinity of the worksite.

Approvals

Include evidence of how road, utility and service authorities have been consulted with and their requirements and complied with.

Public Notification

It may be necessary to provide advice to the public of the proposed works and traffic management arrangements in advance of the works commencing.

Existing and proposed Speed zones

Details of existing posted speed zones should be recorded in the TMP (i.e. speed zone limit and sign location) and advice should be provided on Traffic Control Plans where existing signs are to be covered or completely obscured.

Staging of work

TMP must take this into account if works are to be conducted in stages and provide the relevant detail.

Night Work

Roadwork sites may be in operation or shutdown during the hours of darkness, however, the need to manage traffic during either of these situations is still required.

Traffic Control Guidance Schemes/Traffic Control Plans

TMP provides details and location of all devices proposed to be used at the roadwork site for all situations. These will be shown on a TCGS/TCP that should form an attachment to the TMP along with an itemised list of all required signs and devices.

Signs and Devices

All signs used shall conform to the designs and dimensions as shown in Australian Standard AS 1742.3, AS 1742.1 and the jurisdiction guidelines.

Work Sequence

Where the situation requires that there are several traffic management schemes to be developed for different work activities, the TMP shall detail the sequence of work and provide the links to the respective Traffic Control Diagram for each stage.

Communication

A communication plan to ensure that all stakeholders are informed notified and kept up to date.

Monitoring

All temporary signs, devices and controls need to be maintained at all times. To achieve this, the TMP should outline suitable monitoring procedures.

Auditing

To ensure compliance with the requirements of the Code of Practice, it may be necessary to conduct audits of TMPs depending on the nature of the TMP.

Review

For long term projects management should incorporate procedures into the TMP that involve a formal review of the Traffic Management Plan as part of a continuous improvement approach to ensure its continuing suitability, adequacy and effectiveness.

Submissions

Work within the road reserve of a public road requires prior approval from the relevant road authority.

Special event TMP

Whilst this unit focuses on traffic control at worksites, namely construction, it is important to note that TMPs are also designed and implemented for special events. Jurisdictions may have a class rating for events in an effort to implement the right TMP.

See below an example from Roads and Maritime Service:

Class 1: Impacts major traffic and transport systems (TMP recommended)

- disrupts the non-event community over a wide area
- requires the involvement of Police, one or more Councils and the road authority
- requires a detailed Transport Management Plan
- requires advertising the event's traffic aspects to a wide audience.

Class 2: Impacts local traffic and transport systems but does not impact major traffic and transport systems (TMP recommended)

- disrupts the non-event community in the area around the event but not over a wide area
- requires the involvement of Police and Local Council
- requires a detailed Transport Management Plan
- requires advertising the event's traffic

Class 3: Does not impact local or major traffic and transport systems (council may require a TMP)

- disrupts the non-event community in the immediate area only
- requires Local Council and Police consent
- is conducted on-street in a very low traffic area such as a dead-end or cul-de-sac • requires Police agreement that event qualifies as Class 3
- is never used for vehicle races.

Class 4: Event is intended for small on street events and:

- requires Police consent only
- is within the capacity of the Police to manage on their own
- is not a protest or demonstration • is always an on-street event
- does not require RTA or Council consent
- does not require advertising the event's traffic aspects to the community
- does not require a TMP
- does not require the involvement of other Government agencies.

Traffic Management

This section of the TMP covers the strategies for traffic routing, traffic control and provisions for pedestrians, cyclists and special users, such as emergency services. This is the core of the TMP and is quite detailed; it will provide information and guidance around Traffic control Guidance Schemes also known as Traffic Control Plans.

Traffic Control Plans (TCPs)/Traffic Control Guidance Plans (TCGPs)

Traffic Control Plans (TCPs) or Traffic Control Guidance Plans (TCGPs) are a visual representation of the arrangement of traffic control signs and devices at a workzone. Traffic Control Guidance Plans are detailed drawings depicting the layout and type of traffic control devices to be used for all situations likely to be encountered during the works. They are crucial documents within a traffic management plan and underpin the successful operation of a workzone.

Traffic Control Guidance Plans (TCGPs) is a commonly used term throughout Australia and for the purposes of this course we will refer to them as a TCGP instead of a TCP. The drawings should reflect and expand upon the written component of the TMP, and be detailed and clearly dimensioned to enable a third party to install the devices without constant referral for additional information or

interpretation. Existing signs should be identified and detailed in the TCGP and it should be indicated where they are required to be covered or removed.

The TCGPs should show the precise type and location (by distances) between traffic control signs and the devices, relative to the works and other easily identifiable landmarks (e.g. power poles, intersecting streets, abutting premises etc.). Some jurisdictions will have a range of pre-prepared, standard TCGPs that cover many typical works on or near roads. Where it is appropriate, you may be able to select one of these standard TCGPs for a TMP that you are preparing, or you may be able to modify a standard TCGP so that it suits the needs of your site.

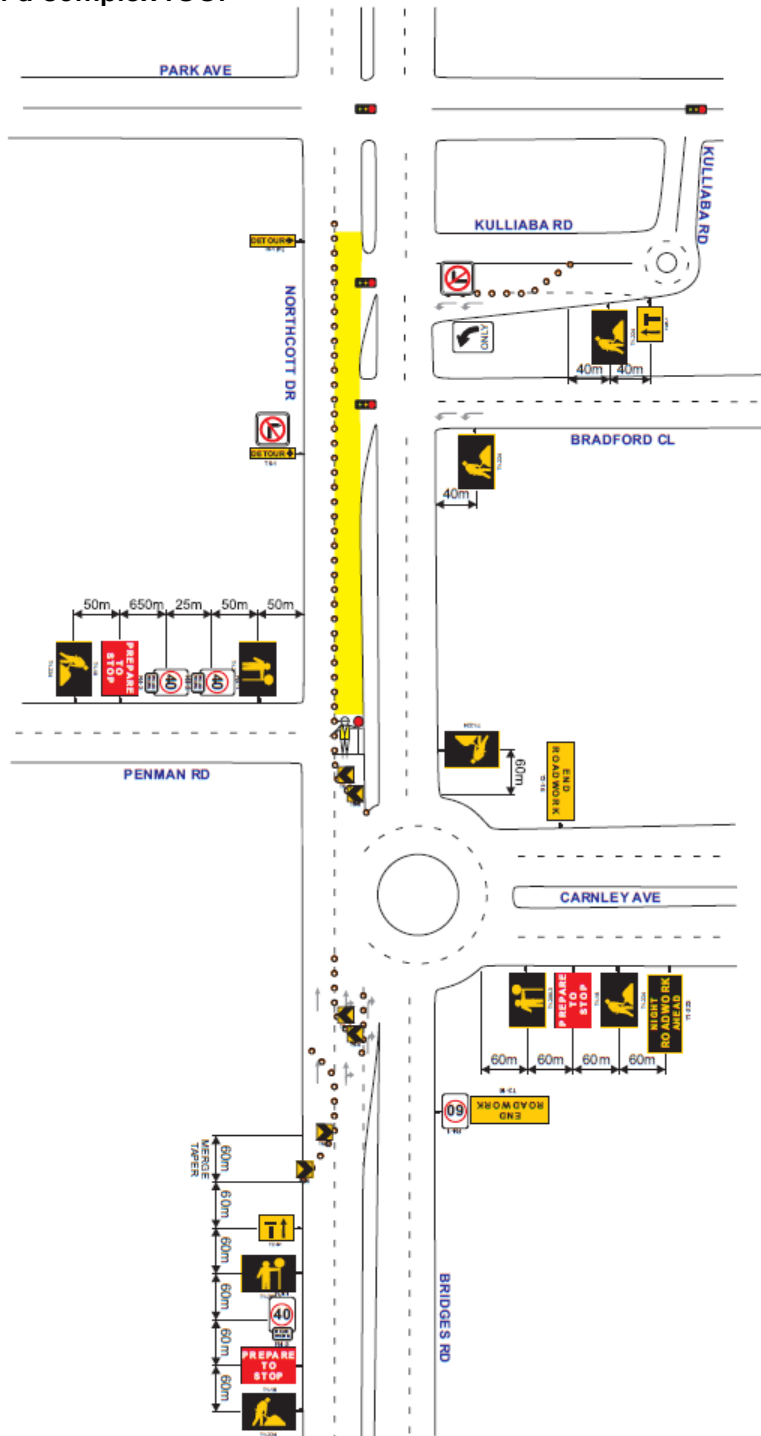
In other situations, there may not be a standard TCGP that will apply to the kind of work that is being carried out – in these situations, you will need to prepare a new TCGP specifically for your site.

As the developer of the TMP, you will need to make a judgement about what is the most appropriate solution for the works that have been proposed. You will also need to be able to justify the decisions that you make, based on the ability of the TCGP (and the TMP as a whole) to effectively and safely manage traffic for a workzone, to minimise disruption to regular road service and on the practicability of the TCGP for installation.

Example of a Traffic Control Guidance Plan

TCGPs are drawings that specify what signs and devices for traffic control should be used, where they should be placed and generally, how the site should be set up for traffic control. This section will give you the skills to be able to read these plans so that you can understand the work instructions that they set for your sites.

Sample of a complex TCGP



Sample of a common TCP

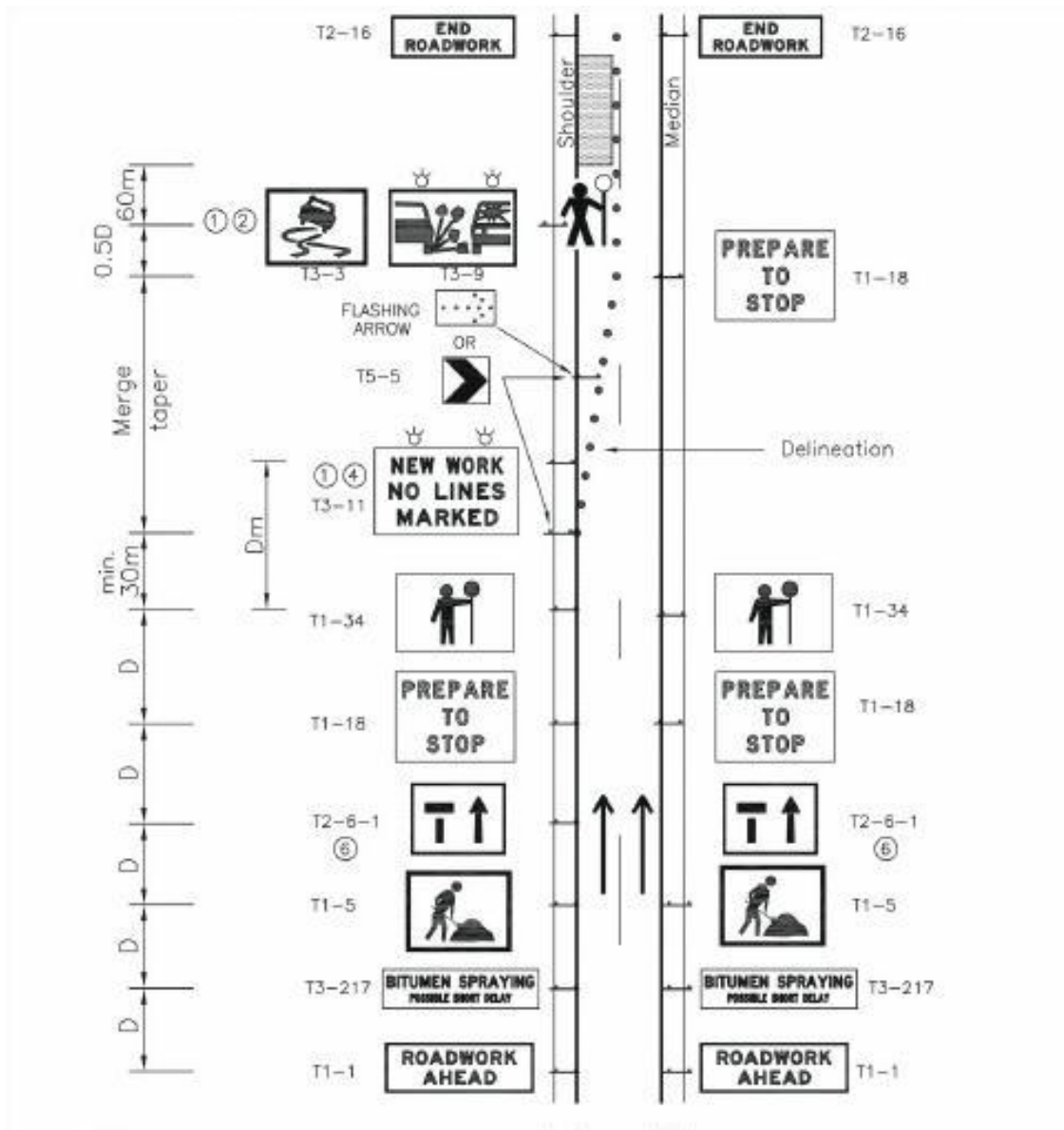








Table with sample signage and TCP symbols

Symbol	Name	Description
	Traffic Controller Location	Any symbol of a person holding a paddle-like sign is a marker for where a traffic controller must be positioned on the site.
	Sign location and specification	<p>There are two things to look at with images like this. The first is the rectangular box, which is a visual representation of the particular sign that must be used at the specified location. The text that appears alongside this representation is the specific sign or device code for that particular sign. This is an indication to whomever sets up the site of the exact sign that must be used at the specified location.</p> <p>Numbers in circles indicate that there is an associated note or description that corresponds to the use of this sign or device. Not every sign or device will have associated notes, but these are normally located off to the side of the plan, or an accompanying page with the plan.</p> <p>The circles on top of the sign indicate that flashing lights should be fixed to the top of the sign.</p>
	Delineation Device	Dots on the plan denote the placement of delineation devices, such as cones or bollards.
	Single facing regulatory sign	This symbol denotes the placement of a regulatory sign, such as a speed limit sign, that faces only one direction of traffic. This would be appropriate, for instance, to mark the approach speed for traffic entering into a workzone, or the exit speed for traffic leaving a workzone.
	Dual-facing regulatory sign	This symbol is also for the placement of a regulatory sign, but in this instance, the sign should apply for both directions of traffic. This would be used, for instance, in the middle of a workzone, denoting the speed limit for all traffic travelling through the workzone.
	Spacing marker	<p>These arrows indicate the distance that should be maintained between two different signs or devices. The lines at the end of each arrow indicate the beginning and end of the area to which each arrow refers.</p> <p>The arrows will always be accompanied by EITHER a fixed distance, or, more commonly with a letter or set of letters. The lettering is an indication that you need to refer to supporting documentation to determine the appropriate distance. The most common letter that is used is D, which refers to the concept of <i>Distance D</i> or <i>Dimension D</i>. This concept is explained below.</p>

Software for designing TCGP/TCP's

The quickest, simplest and most professional approach to generating a TCGP/TCP is the use of specialised software programs. There are a host of software packages available to fulfil this purpose. Software packages can upload a range of commonly used guidance schemes in an effort to save time and money for those wishing to put together an appropriate plan

The advantage this type of software can be seen as:

- Quick
- Efficient
- Cost effective
- Can be uploaded easily
- Can be overlaid on electronic maps to provide greater context
- Easily saved and archives
- Mistakes can be rectified easily
- They are digital and can be transferred across different types of technology
- A number of these programs also include costing options
- They can take into account jurisdiction requirements
- Most of all they look professional and

As the industry becomes more competitive and streamlined, virtually all TMP's and guidance schemes will be generated electronically based on demand and efficiency.

Designing a TCGP/TCP

Firstly: **collect all the information** about the proposed project:

- The type of work being planned,
- The number of lanes the road has at the work area,
- Whether the road is divided or a single carriageway,
- The ADT,
- The approach speed of and clearance to passing traffic,
- Whether it is best to divert traffic around, past or through the work, and
- Whether the work is short term, long term or mobile.

The TCP shall be designed on the basis that:

- As much protection shall be given to all people on the work site, consistent with minimising disruption and risk to road users and minimising the number of signs and devices used to achieve this
- Only approved sign and device shall be used
- Fixed work areas shall be marked by barrier boards or delineation devices spaced appropriately
- The use of a pilot vehicle shall be considered, to lead and control the speed of vehicle platoons, if traffic speed through a work site needs to be very carefully controlled
- Condition sign shall be used where the road surface at the work area is sufficiently different from the approach roads as to be hazardous to traffic
- The needs of all non-vehicular users (pedestrians, cyclists, school children etc) are provided for
- The TCP is to be implemented in accordance with the jurisdictional guidelines

Australian standards

AS 1742.3 2009 – SCOPE AND OBJECTIVE

This Standard specifies the traffic control devices to be used to warn instruct and guide road users in the safe negotiation of work sites on roads. Including work on unsealed roads together with footpaths, shared paths and bicycle paths adjacent to the roadway. It is applicable to traffic guidance schemes for road and bridge construction and maintenance sites, works associated with other public utilities and services, or any other works which cause interference or obstruction to the normal use of a road, by any road user. It also provides guidance for the planning, design, installation and operation of such traffic guidance schemes, together with requirements for maintaining a safe workplace for workers on site.

The objective of this Standard is to provide organizations carrying out works on roads with a set of uniform practices for the signing and delineation of construction and maintenance works, which will promote the safety of both workers and road users, at the work site

RISK

'Risk management entails the identification and analysis of all hazards likely to arise during works on roads including the setting up, operating, changing and ultimate dismantling of a traffic guidance scheme, followed by the determination of appropriate measures to mitigate those risks.' (AS1742.3, 2009)

Ensure that you refer to the previous risk management and risk monitoring subjects.

Signs and Devices

Traffic control signs and devices are used to warn and inform road users, and guide them safely around, past or through work areas. Signs and devices must be:

- In place before work begins.
- Clearly visible to road users and not obscured by vegetation, parked vehicles, plant or other signs and devices.
- Displayed in the correct sequence.
- Removed on completion of the work.

Ensure that you are familiar relevant jurisdiction manual, which lists the sign types used at work sites.

- Work site approaches and departures.
- Regulatory control of traffic.
- Detours.
- Road condition.
- Lane and road closures.
- Pedestrian control signs.
- Other signs.

Sign Sizes

A size:

- Traffic speeds up to 90 km/h where the lateral offset of the sign from the travel path is not more than 8m.
- Traffic speeds up to 110 km/h where the offset is not more than 4.5m.
- Signs directed at pedestrians.

B size:

- Where an oversize sign may be required because the recommendations for an A size sign have been exceeded.
- On expressway/freeway type roads for added emphasis of the onset of works, detours or closures.
- For other critical safety messages.

C and D sizes:

- Larger signs may be used where there is considered to be a need to emphasise the message or there is excessive lateral offset of the sign.

Important points to note about sign sizes:

Standard signs shall be used when they are suitable for the purpose. The Works Supervisor is responsible for selecting sign sizes. Signs are not available in all sizes.

Dimension D

Dimension D is a distance expressed in metres that is dependent upon the speed of the traffic travelling in the area. In other words, the actual number of metres between signs and devices is based on how fast traffic is moving. Dimension D means the same thing between jurisdictions, but the actual speed and distance ranges are different in each jurisdiction.

Spacing between signs

Spacing between the signs shall be prescribed on the Traffic Control Plan

- If variations are required:
 - place close to the original specifications
 - increase the spacing
- Advanced Warning Sign:
 - fixed site, short-term and long-term works or detours – 2D/D
 - frequently changing *work sites* – 2km to 10km
 - Discuss TCP 101 or 94 and give examples of different approach speeds and warning signs
- Team Leader is responsible for spacing and placing signs and devices

Sign Duplication

- On medians of dual carriage-way roads provided there is sufficient room on the median.
- On the outside of left-hand curves where the sign is seen on approach to the *work site*. Normal vision is straight ahead and when approaching a curve the driver is normally looking around the corner not at the left-hand side.
- On medians of dual carriage-ways where parked vehicles or other objects would obscure kerb side/footpath signs.

At other locations where conditions are such that duplicate signs would improve safety and guidance.

Multiple Signs

Where two signs are to be displayed together at the one position (i.e. a worker symbolic and authorised speed restriction sign) they may be displayed on the same mounting, either side by side or one above the other. The sign sizes may be slightly reduced to suit the mounting, provided that the size of legend, size of symbol or area occupied by the legend is unchanged from the approved sign.

Where a regulatory or detour sign and a road condition sign would normally be displayed at the same location but cannot be various reasons the former shall take precedence and the latter should be positioned at the best alternative location.

A maximum of three signs may be displayed together (i.e. Worker Symbolic, Speed Restriction and Roadwork Ahead) if there is sufficient space available. However, use of a multiple sign may not be appropriate where the speed of passing traffic is high. In such situations there may be insufficient time for drivers to fully read and comprehend the message being given.

Sign mountings

- Quick and easy to install.
- Provide secure sign attachment.
- Stable in windy conditions.
- Suitable for both gravel and bitumen surfaces.
- Able to accommodate various sign sizes.
- Easy to handle, transport and store.
- Frangible if hit by traffic.
- Sign mountings shall be in accordance with the requirements listed above.

Unacceptable Traffic Control Devices

The following items shall **not** be used as traffic control devices because they can be hazardous to personnel if hit by vehicles:

- Steel drums.
- Isolated or non-continuous safety barrier units.
- Barrier boards parallel to the direction of the traffic flow.

Sign Positioning

- Should be placed 1m clear of the travelled path
- Works lasting longer than two weeks, mounted on poles sunk into ground and duplicated on right-hand side
- Rural areas, when mounted on posts, minimum 1.5m above the ground
- Urban areas, when adjacent to footpaths or vehicle parking, minimum 2.2m above the ground
- Minimum height to the lower edge of the sign ideally 200mm and may be placed on surface if clearly visible
- They are placed in the specified position on the Traffic Guidance Scheme;
- They are properly displayed and securely mounted;
- They are within line of sight of the intended road user;
- They cannot be obscured from view (e.g. by vegetation or parked cars);
- They do not obscure other devices from the line of sight of the intended road user;
- They do not become a possible hazard to workers, pedestrians or vehicles;
- They do not deflect traffic into an undesirable path;
- They do not restrict sight distance for drivers entering from side roads or streets, or private driveways; and
- They are not installed using supports that could be a hazard if struck by a vehicle.

When a distance is provided as a 'minimum above the ground', it means the distance between the ground and the underside of the sign. 'Ground' refers to the travelled path, kerb or footpath.

Variable message Signs (NSW)

If *Variable Message Signs* are used at or near a road *Works Site* to carry warning or other messages relating to the works, they must comply with the requirements listed below

- No more than four words or numbers on any one screen.
- Letter forms and legend height readable by drivers at the prevailing approach speed.
- No more than two separate screens in any alternating series.
- For alternating screens, 'on' time and 'total' time, as per the requirements of each screen.
- Symbols tested for comprehension.
- Messages shall be relevant and should be changed or switched off when not relevant.
- Shall be additional to and not substitute, or detract from, existing signs.
- *Variable Message Signs* displaying unrelated messages should not detract from any existing signs.

Variable Message Signs should be legible and should cycle through the message at an appropriate speed. It is recommended that you drive past the sign to test it yourself.

Flashing Arrow Signs (NSW)

- A 1260mm by 650mm or roof mounting on light vehicles.
- B 1500mm by 770mm for cab mounting on trucks.
- C 2400mm by 1200mm for trailer mounting and using its own power source or cab mounting on a truck.

Note:

- High-intensity flashing lights may be operated adjacent to the flashing arrow sign at the same time that the flashing arrow sign is operating provided the lights do not draw attention away from the flashing arrow.
- Reiterate that the Works Supervisor is responsible for selecting sign sizes and ensuring they are shown on the TCP.

Any additional or associated signposting or traffic arrangements being used with flashing arrow signs shall conform with relevant requirements.

Portable Traffic Signals

Portable Traffic Signals are only intended for traffic control applications lasting a maximum of three or four weeks. For sites where work will continue for longer than two or three months without the location of the *work site* changing consideration should be given to the installation of temporary traffic signals, rather than *portable traffic signals*.

Portable traffic signals are primarily used to shuttle control, where a portion of the roadway is closed so that a single lane must be used alternately by traffic from opposite directions. They may also be adapted for heavy machinery crossing applications, where manual two-way operation would usually be applied.

Section 51 of the Road Transport (Safety and Traffic Management) Act 1999 states that ‘...a person has appropriate authority to install or display (or to interfere with, alter or remove) a prescribed traffic control device if the person is a public authority that has been directed by the Authority to install or display (or to interfere with, alter or remove) the device’.

Common Traffic Control Devices

Barrier Boards

- **Use:** To prohibit access to the ends of work or to prevent use of a traffic lane
- Trestle supporting barrier boards
- **Use:** To provide firm supports for the barrier board.

Plastic Containment Fencing

- **Use:** To provide a visible separation between the travelled way and pedestrians (including workers), or pedestrians and the work area in situations where a safety barrier is not warranted. Also used to isolate work areas, exclude pedestrians and contain personnel.

Cones

- **Use:** Used for short-term works to define the traffic path through or past the work area, under the following conditions:

Medium Cones 450mm high	most built up and open road applications including footpaths, shared paths and bicycle ways where traffic speeds do not exceed 70km/hr
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Large Cones 700mm high	where traffic speeds exceed 70km/hr
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Bollards

- **Use:** Used for short-term or long-term works to define the traffic path past or through the work area.

Roadwork Delineators

- **Use:** Used for long-term works or where a device more 'permanent' than bollards is required.

Traffic Warning Lamp

- **Use:** Used on temporary work sites. There are two types:

Unidirectional flashing yellow lamps	<ul style="list-style-type: none">• used to draw attention to a particular sign and• are to be mounted above the sign
--------------------------------------	--

Rotating yellow lamps	<ul style="list-style-type: none">• used to draw attention to work vehicles and• plant to which they are attached, or to draw• attention to signs in difficult light conditions or high volume locations
-----------------------	--

Temporary Pavement Markings and Markers

- **Use:** Used at temporary work sites.

Longitudinal channelising barricades

- **Use:** Typical uses include placement in a work area behind safety barriers, to prevent workers from entering the area of deflection of the safety barrier. They may also be used to guide pedestrians and cyclists through or past work areas (subject to the restrictions).

Vehicle Mounted Signs and Devices

Construction: A single rotating yellow lamp.

- **Use:** For emergency or other infrequent use on a vehicle not normally used for road and works purposes, or for use on a plant item or an inspection vehicle operating in

Construction: A pair of rotating yellow lamps.

- **Use:** For use on vehicles (e.g. patrol trucks) so that at least one, preferably both lamps and are visible from any direction.

Construction: An illuminated flashing arrow sign

- **Use:** For any work on roads and for mobile works

Truck Mounted Attenuators (TMA)

Truck Mounted Attenuators (TMA's) are **trucks** with crash **attenuator** cushions designed to protect road works against intrusion by errant vehicles and cushion the impact to protect errant **vehicle** occupants from serious injuries.

Condition of devices

Before installing or deploying any signs or devices, they should be checked for the following

- Colour and fluorescence
- Cleanliness
- Mechanical conditions
- Night-time visibility

Advance Warning

Where the *advance warning sign(s)* are positioned to warn and inform of changes to traffic conditions ahead, and to give motorists time to adjust their driving patterns.

The definition of the *advance warning area*:

- Emphasising drivers should have enough time to alter their driving patterns before reaching the *work area*.
- The *advance warning area* can vary from a series of signs in advance of the *work area*, to a single sign or flashing lights on a vehicle.

Transition or Taper Areas

The *transition area* is where traffic is guided past the *work area* by means of cones or bollards set out in a *taper*.

important points about the *transition (or taper) area*:

- The *transition area* should be obvious to drivers.
- The correct path should be clearly marked with sufficient traffic control devices so drivers will not follow the original path.
- The *taper* is formed by a straight line of traffic control devices such as cones or flaps, placed on an angle to guide traffic.
- The cones, bollards or flaps are spaced in accordance with Table 5.1.
- Some existing pavement markings may need to be removed if they conflict with the *transition taper*.
- Along with the *advance warning area*, the *transition area* is the most important part of any layout and care must be taken when placing it.

- With moving operations, the *transition area* moves with the *work area*. A shadow vehicle is also used to warn and guide traffic into the correct lane.

Tapers are important part of a *work site*, and supervisors need to understand their use.

Tapers are used to gradually reduce or increase the size of the roadway and may be:

- Tapers with traffic controllers or portable traffic signals.
- Lateral shift tapers.
- Merge tapers.

Safety Buffer Areas

The unoccupied space between the *transition* and *work areas*, which allows space for an out of control vehicle to pull up before reaching the *work area*. Generally a length of 20 to 30 metres is sufficient. Vehicular access to the work area can be permitted through the safety buffer area.

The purpose of the safety buffer area is to provide a margin of safety for both traffic and workers.

The following guidelines are associated with Safety Buffer areas:

- *The safety buffer area* should be free of equipment, workers, material, and worker's vehicles.
- Traffic control devices (traffic cones or flaps) should be placed along the edge of the *safety buffer area*.

When opposing streams of traffic are transitioned, allowing one lane of traffic to use a lane that normally flows in the opposite direction, a *safety buffer area* is to be provided to separate the two *transition tapers* for opposing traffic. This can help prevent head on collisions.

Work Area

- Where the work is being undertaken and is closed to through traffic but occupied by workers, plant and materials.

The following are some typical examples of how road works operations can create problems for traffic and possible danger for workers and the public:

- The *work area* gets closer to the travelled lanes.
- The speed and volume of traffic increases.
- Where temporary uneven pavements create problems.
- The loading and unloading of construction vehicles can create problems.
- The change in travel path gets more complex. For example, shifting traffic a few metres, compared to moving traffic across the median and into lanes normally used by opposing traffic.
- The *work area* remains in place overnight, thereby requiring different traffic control devices than used for daytime operations.

The following measures can be taken to minimise traffic conflicts:

- Use traffic control devices to clearly indicate the required travel path.
- Place traffic control devices along the edge of the *work area* adjacent to the travelled lanes.
- Provide a safe entrance and exit for work vehicles.
- Protect mobile operations with adequate warning shown on the work and/or shadow vehicles.
- Provide flashing lights on work vehicles exposed to traffic.

Termination area

The *termination area* extends from the downstream end of the *work area* to where normal traffic conditions resume and may be indicated by an END OF WORK sign and may include a *transition taper* to guide traffic back to its normal lane.

The following additional information about *termination areas*:

- It is desirable to provide a *transition taper* in the *termination area* on multi-lane roads.
- For some minor work operations (such as short-term maintenance) it may not be necessary to display an END ROADWORK sign because it will be obvious to drivers that they have passed the *work area*.

In extended sections of work, avoid 'gaps' in the traffic control that may falsely indicate to drivers that they have passed the *work area*. For example, if the *work area* includes intermittent activity throughout a one-kilometre section the drivers should be reminded periodically that they are still in the *work area*.

Traffic Control Tapers

- Are used to gradually reduce or increase the size of the roadway.

If a roadway has to be partially closed, an appropriate *taper* should be laid out in the *transition (or taper) Area* and wherever possible, should be located so that its full length is visible to approaching traffic. The *taper* is usually defined by using cones or bollards and may include flashing arrow signs or temporary hazard markers.

The three types of *traffic control tapers* are as follows:

- **Tapers with traffic control at the beginning of the taper** – are used at locations with either a *traffic controller* or *portable traffic signals* just before a single lane that is being controlled by the *traffic controller* or signal.
- **Lateral shift tapers** – are used when traffic is required to shift laterally without conflicting with another traffic stream.
- **Merge tapers** – are used when one lane of traffic is required to merge with another lane of traffic.

Discuss how *traffic control tapers* are used:

- Close lane and guide traffic into the adjacent or opposing lane in order to avoid the *work area*.
- Laterally guide traffic around the *work area*.
- Guide traffic back into its normal lane after passing the *work area*.
- Close the shoulder area.

When possible, *Tapers* should be set out in straight lines. This may require repositioning the *Tapers* where work is being undertaken on curves.

Note: A TCP may require the use of one, two or three types of *tapers*. The length of the various *tapers* will depend on the speed of approaching traffic. This subject is covered in a later section of the course

Lateral Shift tapers

The following points relate to *lateral shift tapers*.

- They are located before the *work* and *buffer areas*.
- They may be located in the *termination area* to indicate to motorists when they can move back into the lane that was closed.
- Downstream *tapers* are optional when the *work area* is located in a one-way carriage-way of a multi-lane road. However, they do assist the traffic flow.
- They are not to be used when accessing the *work area* from the exit point.
- They are essential for guiding traffic back into its original lane in a two-way multi-lane situation and when traffic is guided into the opposing traffic lane to pass the *work area*.

Merge Tapers

Used when traffic is required to merge with other traffic for instance when two lanes travelling in the same direction are reduced to one.

A *merge taper* may be used when one lane of traffic is required to merge into another.

If a carriage-way has three or more lanes and two lanes are to be closed then this is done with one lane at a time with separate *tapers*, with the distance between the *tapers* being at least 1.5D.

Taper Lengths

Approximate approach speed km/h	RECOMMENDED TAPER LENGTH, m		
	Traffic control at beginning of taper	<i>Lateral shift taper</i>	<i>Merge taper</i>
45 or less	15	0	15
46 - 55	15	15	30
56 - 65	30	30	60
66 -75	N/A	70	115
76 - 85	N/A	80	130
86 - 95	N/A	90	145
96 - 105	N/A	100	160
Greater than 105	N/A	110	180

Safe Clearances

TCPs are generally designed to ensure worker safety by providing adequate protection if clearances are small. For example, if the clearance is less than 3 metres but more than 1.2 metres, there are requirements for a "workmen ahead" sign, adequate delineation and a 60 km/h speed limit. If the clearance is less than 1.2 metres, the speed limit is reduced to 40 km/h.

Speed limit km/h	Selection criteria
<40	<ul style="list-style-type: none"> Unusually high level of hazard for workers on foot.
40	<ul style="list-style-type: none"> Workers on foot are working within 1.2m of traffic with no intervening physical protection. There would be structural danger to bridges at higher speeds.
60	<ul style="list-style-type: none"> Workers on foot or operating plant are within 3m of the trafficable area with no intervening physical barrier. A traffic controller is being used In advance of portable or temporary traffic signals. Dust or smoke may reduce visibility Traffic is subjected to a reduced standard alignment due to works. The pavement surface has been degraded. A bituminous seal has just been laid.
80	<ul style="list-style-type: none"> Workers on foot or operating plant are between 3m and 6m of the trafficable area with no intervening physical barrier. There is some disturbance to alignment or pavement surface which makes unrestricted speeds undesirable on traffic safety ground.
80 buffer	<ul style="list-style-type: none"> May be used to give advanced warning of a 40km/h or 60 km/h zone where speed of traffic is 100 km/h or greater.

Assessment of Existing Traffic Conditions

This information looks at how the road space is being used prior to the commencement of the works, additional information requirements that can be met through a site inspection.

A site inspection checklist should include the following:

Location and time and date of inspection

Local topography *including a sketch plan showing:*

- *Road layout eg lane markings, l & r turn lanes, pedestrian crossings etc*
- *Existing road signs*
- *Side roads*
- *Property access*
- *Nearby features eg schools shops and other public buildings or facilities*
- *Railway and/or railway station*
- *Bus routes and bus stops*
- *Parking restrictions*
- *Other local features*
- *Site practicalities*
- *Grades and alignments*
- *Spaces for support facilities eg temporary buildings*
- *Worker parking*
- *Other site practicalities*

Sight distances

Features affecting visibility:

- *Crests dips and bends*
- *E/W orientation*
- *Street lighting at night*
- *Other features affecting visibility*

Road construction and condition:

- *Gravel or bitumen*
- *Good or poor repair*

Traffic characteristics:

- *Peaks and troughs in traffic volumes*
- *Mix of traffic (inc proportions of light & heavy vehicles, motorcycles, cyclists)*
- *Actual approach speed*
- *Other*

Any other features affecting the safety of workers or road users:

- *Utilities eg voltage of overhead power lines*

You will also need to consider how the surrounding road network will be affected by the works, especially if you have elected to detour traffic along another route.

Traffic routing

The TMP should detail exactly how traffic will be moved or directed in relation to the work area. This must include information about where traffic will travel in relation to the work area as well as the signs and devices that are in place to direct traffic and other road users, such as pedestrians and cyclists. It may also include a **Vehicle Movement Plan (VMP)**, which detail how traffic associated works such as trucks, equipment and work vehicles will safely manoeuvre into and out of traffic stream, turn into/out of work areas, stockpile sites and turnarounds. These will be especially important if work vehicles need to interfere with traffic to enter or exit a work area, such as where a truck has to reverse into a work area.

2.4 Prepare a cost estimate for executing the workzone traffic management plan

Once the TMP has been completed, you may be required to prepare a cost estimate for the implementation of the plan. This will be important in the context of planning for the work, but it is also an additional test of the viability of the traffic management strategies that you have selected.

There are two main costs associated with the implementation of the TMP: labour costs and equipment costs. All organisations will have their own profit and loss and cost structures. Cost estimates can be quite a simple quote process, let's have a quick look at both Labour and Equipment.

NOTE if you are designing a TMP only, then the cost structure may just be restricted to labour development costs and any additional systems costs (computer licenses) and additional consultation costs and data capture costs.

If your organisation is preparing the TMP and also managing the TMP and project, then the costs make up is more extensive and will include, traffic control vehicles, traffic control staff, Plant and Equipment etc

Consider the following costs

TMP development

- Development staff: how many hours spent on development, how many team members used, what were their rates
- Consultants: were additional consultants bought on board and what rate are they charging and is this rate passed directly on or is there an additional % added
- Computer licensing for the development of the TCGS/TCP
- Costs associated with obtaining critical data regarding the site from councils, organisation
- Also consider utilities, power, facilities

TMP Implementation

- TCGS/TCP requirements, TCV vehicles, TMA's, additional signage, VMS
- Traffic Controllers
- Plant and equipment
- Additional UHF frequency requirements
- Clean up
- ROL/Permits costs

2.5 Participate in the review of the work zone traffic management plan with peers and stakeholders

No plan of any sort is complete without a mechanism for evaluating and improving on it. This is especially true for a management plan, which may be the foundation for success or failure. If a management plan works well in practice, then it's likely that all stakeholders will be reasonably happy and the planners work will get done well. If the plan doesn't work well, then the reasons for that need to be understood, and management needs to be changed accordingly.

There are both formal and informal ways of telling whether a management plan is working, and both can be used as part of an evaluation plan.

An informal assessment of the plan might include answers to the following questions, among others:

- Is the plan and all information included reliable?
- Is the information accurate and of reasonable quality?
- Is the plan easy to understand (even though it is a technical document)?
- Is the information included up to date?
- Will the plan meet the desired outcomes?
- Can the plan and content be measured?

Peer Review

Peer review involves having other traffic management plan developers look at your TMP in the context of the project brief that you have been going. Peer review is a process used for checking the work performed by one's equals (peers) to ensure it meets specific criteria.

Generally, the goal of all peer review processes is to verify whether the work satisfies the specifications for review, identify any deviations from the standards, and provide suggestions for improvements.

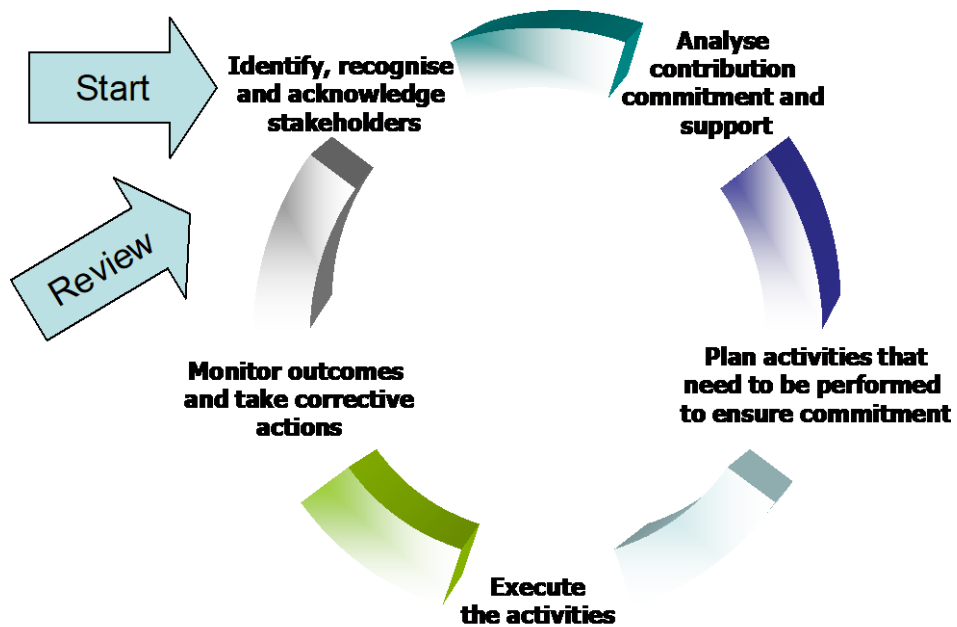
It is often a good idea to have more experienced developers engage in this peer review process, since they can bring their experience of preparing plans to the review, and could offer highly constructive feedback as to how your plan could be reviewed. Peer review will look at the traffic management strategies that you have opted to use in your plan and assess how appropriate and effective these strategies will be.

This high level review will help to ensure that you TMP strikes the correct balance between safety and convenience for all stakeholders. Typically, these strategies will be apparent by looking at the TCGPs included in the plan.

Stakeholder Review

Stakeholder reviews are significantly important as these parties may be the end user of the project/TMP. Stakeholders are individuals who represent specific interest groups served by the outcomes and performance of a project or program.

A typical stakeholder cycle may look like this;



Stakeholders may include;

- The public
- Road authorities
- Environmental groups
- Construction companies
- Community groups
- Landholders
- Legislative bodies

The extent to which stakeholders will be consulted will likely vary between projects. The degree to which a stakeholder is required to contribute to a project to ensure success depends on a number of factors, including the stakeholder's position and authority within the organisation, the degree to which the project is reliant upon the particular stakeholder to provide a product or service.

Each of these factors can be analysed in more detail during stakeholder analysis. The outcome is summarised into a contribution index, which has the following values

- **Critical.** The stakeholder has the power to make the project succeed or to prevent it from succeeding altogether;
- **Desirable.** The project can be completed even without an active contribution from the stakeholder, but this would have a serious impact on the quality, elapsed time and cost of execution. Is able to act as an advocate for the project to peers;
- **Non-essential.** Although the stakeholder can contribute to the project, this contribution is either not essential or can be more easily obtained from other stakeholders. (Note: an individual with a contribution index below Non-essential is not a stakeholder).

On short term, low-impact projects, it is unlikely that this review process will be extensive, if it takes place at all – you may only require approval from the project client, who will want to ensure that their needs are being met by the plan.

Longer term or more impactful projects however may require more extensive engagement and consultation.

2.6 Complete the documentation for the work zone traffic management plan

You need to be aware of the different road authority requirements for submitting documentation. In addition, depending on internal procedures and stakeholder engagement, you may also be required to complete and submit internal paperwork.

The TMP may be developed as a technical document, although supplementary appendices, memorandums, reports, approval documents and analysis may be required. Ensure that you are familiar with these requirements.

2.7 Monitor and coordinate the progress of other team members involved in the preparation process

Monitoring and Coordinating

As stated previously, TMP's may be created as a collaborative process as there are a number of components and sections, it may require a team effort. If you are the lead on the TMP, it is important to manage the team and work closely with any others you have enlisted or who have been allocated to the project.

The preparation of a traffic management plan for a site is a project in its own right. Often, you as the developer will be the only person working on the plan however; you may also be part of a team of people who are all working on the same traffic management plan.

Teams sometimes run into obstacles and problems, even if they are experienced professionals.

Often, however, managers wait until a problem surfaces or until it becomes obvious that the team isn't reaching its interim goals or performing at expected levels. It's much better to prevent small problems from getting out of hand and to correct situations that threaten the overall success of the team

Team leaders who practice such maintenance will have a better chance of directing a team that operates at peak efficiency and successfully achieves its mission.

- Make sure the team has a clear purpose
- Check for clarity and understanding
- Ensure all team members have the tools they require and a copy of the initial brief
- Meet regularly and discuss progress
- Ask for progress reports or copies of drafts
- Communicate regularly
- Maintain consistent approach to monitoring progress
- Ensure that you delegate the right tasks to the right people
- Always consider other workloads and provide additional support where needed
- Provide continuous feedback and praise where needed

On a final note, ensure that you engage all team member on the reporting the progress of the TMP to stakeholders where possible

2.8 Gain plan approval

You have taken the time to put together a TMP; you reviewed the TMP, engaged stakeholders and prepared all the relevant documentation, it is now time to submit the TMP for approval. This may take the form of escalating through to management, then onto the relevant road authority and key stakeholders (councils, emergency services etc)

Each jurisdiction and road authority will have a different process; you need to be familiar with applications and submission processes. Some will require the TMP to be submitted electronically or by hard copy, in addition there may be a fee attached

3 Finalise the preparation process of traffic management plan

Because the development of a traffic management plan can be considered a project in its own right, there are a number of activities that you and your team must complete even after the TMP has been submitted and approved.

3.1 Ensure filing of preparation records is completed

Depending on your processes and systems, you may have been filing and archiving certain sections and processes during the development stage. This is a good habit to get into as it provides a level of risk management to ensure that work is saved and archived.

This systematic approach to filing records also assists in auditing and quality assurance practices. When filing records, you must consider the types of documentation, location and sensitivity of the documents. Make sure that you follow all relevant policy and procedures as well as fulfil in statutory requirements (such as the length of time records should be maintained).

On a final note, ensure that your record management system is logical, and can be accessed when needed (always have a backup procedure).

Some of these records may include:

- Peer reviews
- Licences
- Legal advice
- Professional services such as contractors

3.2 Complete and submit preparation cost and other reporting

All projects cost money to create, complete and implement, even if the work is done internally, you will be required to attribute a dollar value to the development of the TMP.

You will be required to track all areas of the development that equate to a dollar value, this may include;

- Consultants and advisors
- Secondment from other teams
- Hourly rates for services
- Licence fees
- Submission costs
- Sundry costs
- Penalty costs
- Preparation costs
- Travel costs
- Additional equipment
- Inspection costs

You may be required to create a mini profit and loss statement as these types of services will be charged out to clients. Ensure that you have the correct and accurate evidence of any expenditure.

3.3 Participate in performance review of the preparation

All projects and workplace work benefits from a formal review process, in addition staff and team members also benefits from formal feedback. This process provides a candid and valuable snapshot of the development and submission phase and can be used to streamline processes for the next TMP project.

Performance review and feedback can come in many different forms, it can be informal and it can be formal. Regardless of the direction you take, you need to be able to learn from the review process. Take a professional and logical approach to reviewing all elements, sections and team performance, ensure you have a process in place to measure each part.

For the review to be effective, you should ensure that:

- All personal involved provide valuable and measurable feedback as well as receiving feedback
- Make sure that aspects are reviewed, positive aspects as well as those that may need improvement
- Conduct a self-evaluation on your own performance (perhaps conduct a mini 360 degree feedback review)
- Make sure that all feedback and reviews are available for all to read (dependant on confidentiality and sensitivity)

3.4 Seek client feedback and contribute to the verification of the plan

Client feedback is crucial to the ongoing success of TMP development and ongoing business relationship. You need to have a formal feedback mechanism in place to ensure that you are on the right track, feedback can come in many forms:

- Feedback from clients may include
 - Communication process
 - Billing and invoicing
 - Documentation
 - Timing
 - Reporting
 - Value added aspects
 - Relationships with staff and the company
 - Overall Professionalism
 - General outcomes

This feedback can be accessed through a number of ways and avenues;

- Formal pro forma and feedback sheets
- Formal debrief meetings
- Surveys

3.5 Close out all systems

The practice of a project close-out finalises all project activities completed across all phases of the project to formally close the project and transfer the completed project as appropriate. The purposes of a project close-out is to assess the project, ensure completion and derive any lessons learned and best practices to be applied to future projects.

Recognition

The most direct reason that Project Closeout phase is neglected is lack of resources, time and budget. Even though most of project-based organisations have a review process formally planned, most of the times, given the pressure of work, project team members could find themselves being assigned to new projects as soon as a current project is completed.

Analysis

When the project is finished, the closeout phase must be implemented as planned.

Completion

First of all, the project manager must ensure the project is 100% complete.

Documentation

The importance of maintaining documentation is vital, it is imperative that everything learned during the project, from conception the initial operations to completion, should be captured and become an asset. Detailed documentation will allow future changes to be made without extraordinary effort since all the aspects of the project are written down.

Project Systems Closure;

All project systems must close down at the closeout phase. This includes the financial systems

Project Reviews;

The project review comes usually comes after all the project systems are closed. Project reviews transfer not only tangible knowledge such as numerical data of cost and time but also the tacit knowledge which is hard to document.

Disband the project team

Before reallocating the staff amongst other resources, closeout phase provides an excellent opportunity to assess the effort, the commitment and the results of each team member individually

Stakeholder satisfaction

Ensure that the actions and activities are necessary to confirm that the project has met all the stakeholders' requirements

Next Steps

Even when the client accepts the delivery of the final product/job or service with a formal sign-off, the closeout phase should not be seen as an effort to get rid of a project. Instead, the key issue in this phase is identifying the follow-up business development potential for the next project.

Typical systems which may be used as a part of the preparation of a TMP, and hence need to be closed out, include systems relating to:

<ul style="list-style-type: none">• Project Management Office	<ul style="list-style-type: none">• Finance
<ul style="list-style-type: none">• Project Lifecycle	<ul style="list-style-type: none">• Communications
<ul style="list-style-type: none">• Records Management	<ul style="list-style-type: none">• Quality Management
<ul style="list-style-type: none">• Project Management Office System	

4 Support and review the application of the workzone management plan

The final stages of the project process is to ensure that the TMP is applied. You are required to have a process in place to:

- Adjust where necessary
- Obtain feedback on application
- Conduct some form of evaluation
- Where possible conduct an inspection
- And provide a final validation and sign off of the plan

4.1 Provide clarification and advice to those applying the plan

Most of the time, TMP's are developed off site and the designers may not always be present during implementation and management. Regardless of physical location, the TMP designed needs to be available to provide clarification and any advice.

Depending on the scale of the project and the jurisdiction contract requirement, it may be that the designer must be on site all of the time or regularly. A risk management approach is to ensure that the person or team who prepared the plan is available. Part of the TMP includes a communication section and it is here where the relevant contact details of designer and managers are included for such an occasion.

4.2 Review the application of the plans and recommend changes for continuous improvement

Measuring the performance of the work zone (and thus, the TMP) during the project will enable you to check whether predicted outcomes match actual outcomes. This will reveal whether the TMP was effective in managing the impacts of the project on traffic, and allows for a cycle of continuous improvement to be used to make the site run more effectively.

A safety/compliance inspection is a structured procedure whereby an independent and suitably qualified person uses a checklist to determine the level of compliance at work sites with the practices and requirements.

The overriding objectives of an inspection are:-

- To ensure that the work site is operating safely.
- To ensure that, if required, a plan has been provided and is on site, has been approved and has been implemented as approved.
- To ensure any variations to the plan (for instance in sign location due to shade, parked vehicles etc) are recorded on the TCGP/TCP and TMP.
- To highlight discrepancies and, if appropriate, make recommendations.

All work sites are subject to traffic control safety/compliance inspections. Whilst independent inspections are to be undertaken, inspection can also be carried out by suitably qualified members of crews involved in any work as a further means of ensuring safe and compliant working conditions.

Traffic control safety/compliance audits are consistent with the principles of continuous improvement. The overriding objective of a these inspections in relation to work sites is to ensure that they operate as safely as possible.

Where problems are identified with the management of traffic at the site, you may be asked to provide advice and recommendations about how the TMP can be changed to make the traffic management strategies more effective.

4.3 Contribute to the validation of the plan

All projects require formal validation during and after completion. At this stage of the TMP process, you are required to validate that the TMP is appropriate, some of the questions and actions that need to take place may include:

- Any traffic related incidents
- Contractor incidents
- Issues from the public
- Complaints from road users
- Any impacts on other projects
- Extended queue lengths
- Any major delays
- Were there any breaches to the plan?
- WHS and risk issues