# Table of Contents

Table of Contents ........................................................................................................ 1

Introduction .................................................................................................................. 3
  Traffic Control Re-Qualification................................................................................ 3
  Welcome ...................................................................................................................... 5
  How to Use This Guide............................................................................................... 6

Unit 1: Roles and Responsibilities ........................................................................... 7
  1.1 About This Unit ..................................................................................................... 7
  1.2 Responsibilities of a Traffic Control Person .................................................. 8
  1.3 Job Locations and Conditions .......................................................................... 10
  1.4 Responsibilities of a Traffic Control Supervisor ........................................... 13
  1.5 Provision of Health and Safety Information for the Job Site .................... 14

Unit 2: Complying with Regulations and Standards .......................................... 16
  2.1 About This Unit .................................................................................................. 16
  2.2 WorkSafeBC Authority and Jurisdiction ...................................................... 17
  2.3 Traffic Control Standards ................................................................................. 19
  2.4 Motor Vehicle Act and Regulations ................................................................ 20

Unit 3: Using Traffic Control Equipment ............................................................ 21
  3.1 About This Unit .................................................................................................. 21
  3.2 Using Personal Protective Equipment ............................................................ 22
  3.3 What You Must Provide .................................................................................... 22
  3.4 What the Employer Must Provide .................................................................... 24
  3.5 Maintaining Your Personal Protective Equipment ....................................... 26
  3.6 Traffic Control Equipment and Devices ........................................................... 26
  3.7 Maintaining Your Personal Traffic Control Equipment ................................ 28
  3.8 Traffic Control Equipment ................................................................................ 28
  3.9 Maintaining Traffic Control Devices .............................................................. 30

Unit 4: Setting Up, Maintaining and Removing Work Zones ................................ 31
  4.1 About This Unit .................................................................................................. 31
  4.2 Parts of a Work Zone ......................................................................................... 32
  4.3 Work Zone Layouts ........................................................................................... 35
  4.4 Setting Up a Work Zone ..................................................................................... 39
  4.5 Inspecting and Maintaining a Traffic Control Zone ....................................... 43
  4.6 Removing the Work Zone ................................................................................ 45

Unit 5: Working Around Equipment ..................................................................... 46
  5.1 About This Unit .................................................................................................. 46
  5.2 Recognizing Construction Equipment ............................................................ 48

Unit 6: Basic Traffic Control Skills ....................................................................... 56
  6.1 About This Unit .................................................................................................. 56
Acknowledgements:
The BC Construction Safety Alliance acknowledges the enormous contribution of all those who participated in the development of the Traffic Control Person training materials. WorkSafeBC, Traffic Control Master Trainers, Traffic Control Trainers and the BC Construction Safety Alliance’s Technical Committee have provided invaluable advice and support to this project.

Contact:

BC Construction Safety Alliance
625 Agnes Street, Suite 400, New Westminster, BC V3M 5Y4
Phone (604) 636-3675 Fax (604) 636-3676
Toll Free: 1-877-860-3675
tcp@bccsa.ca
www.bccsa.ca

Disclaimer:

Acts and Regulations can change or be updated; it is your responsibility to ensure you have the most up to date information. Please refer to the original documents and websites for the most current information available.

© 2010 BC Construction Safety Alliance Prepared by Kathleen Savory and Associates
Introduction

Traffic Control Re-Qualification

All persons controlling traffic on roads in British Columbia must have Traffic Control Training acceptable to WorkSafeBC. Successful training and demonstration of skills leads to a Traffic Control “ticket” or qualification. This qualification is valid for three years. At the end of three years, re-qualification by passing the re-qualification exam is required. A pass mark is 80% or greater.

You have three options for re-qualification:

1. Take the Exam

There is no specific requirement for study or preparation. If you feel confident that you have kept up with any changes and that your knowledge and skills are up to the same standard as when you obtained your original qualification, you may wish to take the exam without further review.

2. Self Study

Go to the BC Construction Safety Alliance Website and download the complete Study Guide, or select the modules you feel you need and download those. You may also go to the Ministry of Transportation’s Traffic Control Home Page at:

    http://www.th.gov.bc.ca/trafficcontrol/home.htm

to download or view the Traffic Control Manual for Work on Roadways and/or WorkSafeBC at:

    http://www.worksafebc.com

to review any sections of the Regulation. You can then review all the materials on your own time and take the exam when you are ready.
3. Complete the Traffic Control Refresher Course

If you would like to review traffic control knowledge and skills in a group setting with the assistance of an instructor, you may wish to complete this course.

Qualified Traffic Control Instructors throughout British Columbia offer the one-day Traffic Control Refresher Course. Visit the BC Construction Safety Alliance’s Website for a schedule.

When You are Ready To Take the Exam

Take the exam at any approved location in British Columbia. There is a list of approved exam providers on the BC Construction Safety Alliance’s Website. The exam will be open book. Please bring a copy of the Traffic Control Manual for Work on Roadways and this TCP Refresher Self Study Guide to the exam for reference. The exam facility may or may not have these available for you to use. The cost to take the exam is $25.00 to do it on the computer or $40.00 by paper. If you pass, you will be issued with a temporary 3-month certificate, followed by permanent ticket from the BC Construction Safety Alliance. If you do not pass, you may re-take the exam when you are prepared, or you may wish to take the one-day Traffic Control Refresher Course. If you fail the exam a second time, you will be required to take the original two-day TCP course again.
Welcome

Welcome to the Traffic Control Person Re-qualification Study Guide. This Guide will assist you through the self-study option as you prepare for your re-qualification exam.

The Study Guide reviews the knowledge and skills you need to work safely according to the WorkSafeBC Occupational Health and Safety Regulation, Ministry of Transportation (MOT) standards and other regulatory requirements.

Although you may have been working for the past three years or more as a qualified and trained Traffic Control Person (TCP), it is important to regularly review the safety regulations and recommendations in your occupation. The Study Guide gives you that opportunity, and includes any changes that have been made.

You will need the following materials in order to get the most out of your self-study:

- Traffic Control Person Re-qualification Study Guide (or specific modules as required)
  - Excerpts from the Occupational Health and Safety Regulation (current edition) and Worker’s Compensation Act, WorkSafeBC
  - Excerpts from the Motor Vehicle Act and Regulation, Province of British Columbia
  - 7 Steps to Electrical Safety, BC Hydro
  - Marks of Safety, Transport Canada
  - Sample Traffic Control Plan Form
  - Preventing Heat Stress at Work, BK30 WorkSafeBC
How to Use This Guide

This Guide is designed to help you prepare for the Traffic Control Person Requalification Exam. You will see the following icons to refer you to the correct source materials:

**WorkSafe** Workers Compensation Act or Occupational Health and Safety Regulation (WorkSafeBC)
Website: [http://www.worksafebc.com](http://www.worksafebc.com)

**The Traffic Control Manual for Work on Roadways**
Website: [http://www.th.gov.bc.ca/trafficcontrol/home.htm](http://www.th.gov.bc.ca/trafficcontrol/home.htm)

**The Motor Vehicle Act**
Website: [http://www.qp.gov.bc.ca/statreg/list_statreg_m.htm](http://www.qp.gov.bc.ca/statreg/list_statreg_m.htm)

*Important! Regulations can change or be updated; it is your responsibility to ensure you have the most up to date information. Please refer to the original documents and websites for the most current information available.*

Many of you will already know parts of the content of this Study Guide, and are performing them safely. In these cases, the Guide serves as reinforcement for a job well done. You may find sections, however, where your workplace is not following safety rules and recommendations, or where you have let your performance slip now and then. Review these sections carefully. Go back to your workplace with renewed commitment to staying safe and keeping your co-workers and the public safe.

Review of the materials will help ensure you pass the exam. You may also wish to complete the Practice Test in Unit 8 of this Study Guide.

Together, we have made great progress in keeping this important occupation safe. Please help continue to improve safety by refreshing your knowledge and continuing to work safely.
Unit 1: Roles and Responsibilities

1.1 About This Unit

This Unit reviews the job of Traffic Control Person (TCP). As you know, the job is a demanding one. You will be reminded of the skills that are needed to work safely and professionally.

You may have noticed that traffic control in British Columbia has changed a great deal over the years. Good traffic control is now a very important part of roadway job site safety.

1.1.1 Performance Objectives

When you have successfully reviewed this Unit you will be able to:

- Describe the responsibilities of a Traffic Control Person
- Identify when a TCP is required to control traffic through a work zone
- Describe the different conditions that TCPs work in
- Identify the symptoms and treatments for heat and cold stress
- Identify the responsibilities of the Traffic Control Supervisor
- Describe requirements for safety information
1.2 Responsibilities of a Traffic Control Person

After having worked in the TCP role for some time, you are aware of the challenges of the job. A Traffic Control Person (TCP) must stay alert and in control for long hours, sometimes under difficult conditions. It is a challenge for TCPs to remain alert and work safely.

As you know, TCPs have a great deal of responsibility on the job. TCPs are present at work zones to control traffic, to provide for safe passage of equipment and workers, and to allow work to proceed as smoothly as possible. The safety of workers, motorists, cyclists and pedestrians depends on the directions TCPs give.

Here are some of the activities most TCPs perform on the job:

- Attend and participate in regular onsite safety meetings with the Traffic Control Supervisor and other TCPs
- Check with the supervisor before the shift starts to find out about the activities for that day
- Check hand signals used by crew to indicate work activities
- Check location of first aid stations and identify workers with first aid certification
- Identify and locate equipment working on the site
- Assist in setup of traffic control zones in accordance with regulations and standards
- Locate safe escape routes
- Control traffic from highly visible and safe positions
- Adjust work zones as work progresses
- Check for variations in the worksite and adapt the worksite setup as required
- Respond to emergency situations and hazards
- Remove traffic control devices at the end of the day or when the job is finished

TCPs must be professional on the job. This means you must not engage in horseplay, allow your attention to wander, or otherwise fail to take the job seriously. You should have a sense of responsibility for safety.
18.5 When required
(1) Except as permitted by subsection (2) traffic control persons must be used when any of the following conditions prevail:

(a) traffic is required to pass a worker, equipment or other obstruction which may block all or part of the travelled roadway;

(b) workers or equipment are employed on the travelled way over the brow of a hill, around a sharp curve, or at any other location where sight distance is not adequate for oncoming traffic to have adequate warning of their presence;

(c) it is necessary to institute a one-way traffic system through a construction zone where traffic volumes are heavy, approach speeds are high, and a traffic signal system is not used;

(d) construction vehicle traffic is not coordinated with an existing traffic control system, or an existing traffic signal light system is not adequate to regulate traffic, or the work encroaches into an intersection so as to interfere with regular traffic movement;

(e) traffic speed or volume is a hazard to workers while setting up or removing other traffic control devices;

(f) other traffic control devices are not available for emergency protection;

(g) workers are not adequately protected by other traffic control devices.

(2) The requirements for traffic control persons may be waived where

(a) adequate protection for workers is provided by other traffic control devices or procedures, or

(b) circumstances allow self-regulating single lane traffic controlled by signs as specified in the Traffic Control Manual.

Note: Circumstances where subsection (2) applies may include emergency or brief duration obstruction (usually less than 15 minutes) of one traffic lane where traffic is light and sight distance is adequate. Typical activities would include: unblocking catch basins, removing fallen tree limbs, water valve operation, cleanup of material spills or filling isolated potholes.
1.3 Job Locations and Conditions

One of the challenges of working as a TCP is working safely and comfortably in different locations, environmental conditions and at various times of the day.

1.3.1 Job Locations

You may be asked to control traffic:

- on quiet country roads,
- on major highways,
- on hectic city streets,
- in small residential neighbourhoods,
- around shopping malls, or
- through busy commercial areas.

In each location you need to watch for different hazards or take specific precautions.

1.3.2 Road Configurations

Road configurations also affect the way you control traffic in a work zone. You may be positioned on a straight stretch of roadway, on hills or curves.

1.3.3 Drivers

As you know, drivers are often attentive and co-operative, but at times, you may have some who are rude and impatient. Keeping cool under pressure is tough to do. However, you are expected to remain professional at all times.

Drivers may not do what you want them to do. You can help to make sure they know what to do by being assertive, confident and clear. You must be courteous but firm.

1.3.4 Environmental Conditions

In summer it can be hot and TCPs can suffer sunburn, dehydration, insect bites and heat stress. Winter conditions can cause cold stress and other problems.

Some jobs are very noisy while others are dusty.

Your shift may start early in the morning, or you may have to work throughout the night, in fog, snow or rain. At times, there can be dramatic changes in the weather throughout the day.
Recognizing and treating heat stress

Refer to “Heat Stress” in the OHS Regulation, particularly Section 7.29, 7.30, 7.31 and 7.32.

Refer to the booklet “Preventing Heat Stress at Work” which is available for download on the BC Construction Safety Alliance’s Website.

If the body gains heat faster than it removes heat, body temperature rises and a person experiences heat stress. Workers should be aware of early signs and symptoms. If heat stress is not recognized and treated in the early stages, more serious and even fatal conditions such as heat exhaustion and heat stroke may quickly develop.

Early signs and symptoms include:

- Feeling unwell, headache, nausea
- Decreased efficiency, co-ordination, and alertness
- Increased irritability
- Light-headedness or dizziness
- Fainting
- Swelling of hands, feet, and ankles, usually one to two days after first exposure

If a worker exhibits or reports early signs and symptoms of heat stress:

- Remove the worker from the hot environment to rest in a cool place and to drink cool water.
- If a worker has fainted, have the worker rest with his or her legs and feet elevated.
- Have the worker assessed by the first aid attendant, if available, or by a physician.
- Keep the worker under observation until he or she is fully recovered from the effects of heat. If there is any doubt about the worker’s condition, obtain medical advice.
- Change the work schedule or reduce the work pace before he or she returns to work.
Warning: Aspirin or non-steroidal anti-inflammatory drugs should not be given to workers with symptoms of heat stress.

The symptoms and treatments for heat cramps, heat exhaustion and heat stroke are included in the Heat Stress booklet. Refer in particular to the chart on page 16.

Recognizing and Treating Cold Stress

Refer to “Cold Stress” in the OHS Regulation, particularly Section 7.72 and 7.74.

People who are exposed to lower temperatures are at risk for injuries ranging from frostbite to serious loss of body heat that could result in brain damage or death.

Dress warmly, in layers. Preserving an air space between the body and the outer layer of clothing help retain body heat. Choose fabrics such as fleece or wool, which insulate but also allow sweat to evaporate. It is especially important to protect the feet, hands, head, and face. These parts of the body are farthest from the heart and are the hardest to keep warm. Almost half your body heat can be lost through the head, so cover it up as well.

Keep dry. Wetness greatly increases the chance of cold stress. Always have extra clothing available if there is a chance you could get wet. Keep your feet dry, they are very susceptible to frostbite.

Take a break. You may think it is wise to keep on working in cold temperatures. Physical work makes you feel warmer, but if you become tired, your body loses its ability to retain heat. This causes rapid cooling which can quickly lead to cold stress. When you take a break, be sure to replace lost fluids and calories by drinking warm, sweet, caffeine-free non-alcoholic drinks and soup.

A proper diet provides your body with the nutrients it needs to withstand cold stress. A poor diet may deprive your body the ability to work well in cold temperatures.

The effects of cold stress may not be apparent to its victim. The first symptoms of hypothermia are uncontrollable shivering and the sensation of cold. The heartbeat slows and may become irregular, and the pulse weakens. As the condition worsens, severe shaking or rigid muscles may be evident. With severe hypothermia, the victim may also have slurred speech, memory lapses, and drowsiness. Cool skin, slow, irregular breathing, exhaustion, and rigidity occur as the body temperature drops even lower. This is a serious condition requiring immediate medical attention.

Frostbite can occur without accompanying hypothermia. Frostbite occurs when the fluids around the body's tissues freeze. The most vulnerable parts of the body are the
nose, cheeks, ears, fingers, and toes. Symptoms of frostbite include coldness and tingling in the affected part, followed by numbness, changes in skin color to white or greyish-yellow, initial pain which subsides as the condition worsens, and possibly blisters. Frostbite can cause irreversible tissue damage and requires immediate medical attention.

If you work in lower-temperature environments, always be alert for the possibility of cold stress. Do not work alone. In cold stress-prone environments, use a buddy system. Look out for each other and be alert for the symptoms of cold stress. Follow these guidelines to help protect yourself from injury. Remember, it does not have to be freezing for cold stress to occur. Take steps to protect yourself.

Treat impending or mild hypothermia by removal from the cold, wet environment, providing external heat (fire, blankets) and providing warm, sweet drink (no alcohol, tea or coffee) and high-energy food. Keep the head and neck covered to prevent further heat loss. If the victim has already progressed to severe hypothermia, call an ambulance and warm the person, but do not provide drinks or food.

### 1.4 Responsibilities of a Traffic Control Supervisor

It is important for TCPs to identify the Traffic Control Supervisor (TCS) at the beginning of each shift. The TCS is a supervisor who has been designated responsible for the complete traffic control installation and who is knowledgeable and competent in all aspects of traffic control. Your TCS may have a different job title and other duties. Every TCP must know who the TCS is.

**Refer to OHS Regulation Section 18.3 and Guideline 18.3 Revised March 2005**

The TCS is responsible to ensure that:

- Required traffic control devices are in place
- All TCPs are wearing the required personal protective clothing and equipment
- TCPs are positioned in a safe location clear of potential environmental hazards such as a slide or avalanche
- TCPs perform traffic control duties competently and safely
• Responsibility for co-ordination of changes in traffic flow when two or more TCPs are required to work as a team in a traffic control zone has been assigned to an experienced TCP

WorkSafeBC’s Traffic Control Supervisor guideline was revised in March 2005 and now specifies that:

• A Traffic Control Supervisor must be designated whenever traffic control is being used. This includes situations where traffic control devices are being used without a traffic control person or persons.

• The Traffic Control Supervisor needs to have knowledge of the applicable parts of the OHS Regulation and the Traffic Control Manual for Work on Roadways and the traffic management plan for the workplace. Qualification as a TCP is recommended.

• The Traffic Control Supervisor must be present as necessary to effectively carry out their duties. This includes being reasonably available to respond to questions or to address changing conditions at the site. In a circumstance where a supervisor is not on site, contact by phone or similar means is sufficient if supervisory responsibilities and site issues can be effectively addressed by such means.

Your Traffic Control Supervisor is an important source of information about specific job conditions and requirements, so do ask questions – the life you save may be your own!

An experienced Traffic Control Person may become a Traffic Control Supervisor. Despite your experience, it is important that you do not take on any more responsibility than you can handle.

### 1.5 Provision of Health and Safety Information for the Job Site

Your employer is required to make you “aware of all known or reasonably foreseeable health or safety hazards in the area where (you) work”. This is often communicated through a supervisor.

Earlier in this section, onsite safety meetings were mentioned as one of the things that TCPs participate in. Often a worksite has regular on-site safety meetings. On the job, you may have heard these meetings called a variety of names. In this manual, they are called “toolbox” meetings.
These meetings are very important because the traffic control plan and safety issues are discussed in them. They are a very good time for TCPs to ask questions and raise concerns about safety. Often, toolbox meetings are held at the beginning of a shift, but they may occur throughout the shift, particularly if the work zone is moving or if adjustments are required to the work zone setup.

Throughout this manual we will refer to topics and procedures that should be discussed in toolbox meetings to remind you to ask your Traffic Control Supervisor about them if they are not covered. Do not be shy about asking questions! Remember that your safety depends on you being absolutely clear on work zone hazards and safety procedures.

If your job site does not have a meeting, the employer may give you safety information one-on-one.
Unit 2: Complying with Regulations and Standards

2.1 About This Unit

All traffic control in British Columbia is governed by the current WorkSafeBC Occupational Health and Safety Regulation and the latest edition of the Ministry of Transportation (MOT) Traffic Control Manual for Work on Roadways.

Other regulations that govern traffic control include the Motor Vehicle Act and Act Regulations and the federal Transportation of Dangerous Goods Act and Regulations.

These regulations and standards have been developed to protect you, the onsite workers, and the general public while they are traveling on roadways throughout the province.

If you have been working as a TCP, you will already be familiar with many of these regulations. However, there may be some you are not sure of. This Unit reviews the regulations, standards and procedures with which you must comply when you are working as a TCP.

---

1 Disclaimer:

Acts and Regulations can change or be updated; it is your responsibility to ensure you have the most up to date information. Please refer to the original documents and websites for the most current information available.
2.1.1 Performance Objectives

When you have reviewed this Unit you will be able to:

- Comply with specific provisions of Part 1 and 3 of the Workers’ Compensation Act.
- Comply with specific regulations located in Parts 3, 4 and 7 of the Occupational Health and Safety Regulation.
- Comply with the parts of the Motor Vehicle Act and Act Regulation that govern the control of traffic in temporary work zones.

2.2 WorkSafeBC Authority and Jurisdiction

Most of you now know some of the health and safety regulations and services provided by WorkSafeBC. WorkSafeBC is an agency that operates under the authority of the Workers’ Compensation Act. WorkSafeBC is dedicated to the safety, protection and good health of workers.

Several parts of the Act and Regulation contain requirements that you must know, because they define TCP responsibilities and safe work practices.

2.2.1 Workers’ Compensation Act

The Workers’ Compensation Act is organized into four parts.

Excerpts from or summaries of the following important sections are included in the Resource Materials available on the BC Construction Safety Alliance website.

Part 1 Division 5 Procedures and Miscellaneous

- 53 Worker’s notification of injury
- 54 Employer’s notification of injury

Part 3, Division 3: General Duties of Employers, Workers and Others

- 115 General duties of employers
- 116 General duties of workers
- 117 General duties of supervisors
Roles and Responsibilities

Part 3, Division 10: Accident Reporting and Investigation

- 172 Immediate notice of certain accidents

2.2.2 Occupational Health and Safety Regulation

The Occupational Health and Safety Regulation (often referred to as “the Regs”) are contained in three books, and are also found on the WorkSafeBC website.

Excerpts from or summaries of the following important sections are included in the Resource Materials on the BC Construction Safety Alliance Website.

Part 3: Rights and Responsibilities

- Occupational Health And Safety Programs
- Correction of Unsafe Conditions
- Refusal of Unsafe Work

Part 4: General Conditions

- Impairment
- Working Alone or In Isolation
- Workplace Conduct
- Violence in the Workplace

Part 7: Noise, Vibration, Radiation and Temperature

- Noise
- Heat Stress
- Cold Stress

More parts of the Regulation are reviewed in other Units of this Study Guide.

Review WorkSafeBC requirements so you can continue to prevent injuries to yourself, your co-workers, and the public. A safe workplace is everyone’s responsibility.

If your employer has health and safety practices that exceed the WorkSafeBC requirements, you are required to follow them.
2.3 Traffic Control Standards

Traffic control is required whenever traffic must be moved through or around work on or next to a roadway. The Ministry of Transportation has developed standards for traffic control on highways and roads in British Columbia. These standards are located in the *Traffic Control Manual for Work on Roadways*. You are probably already using this Manual at work.

WorkSafeBC has adopted the standards in the *Traffic Control Manual for Work on Roadways* as part of the Regulation and WorkSafeBC Field Officers expect compliance with it at worksites.

It is important that you are able to locate these standards quickly and easily because they describe how many of your activities as a TCP must be carried out.

There are two versions of the *Traffic Control Manual for Work on Roadways*, the *Office Edition* and the *Field Edition*.

Employers must make sure a copy of the *Field Edition* is available at the work site. You need it as a reference when you are setting up or adjusting a work zone.

Refer to the following sections in the *Traffic Control Manual for Work on Roadways Office Edition*:

- Section 1.1.1 Fundamental Principles
- Section 1.1.2 Definitions
- Section 2.1.3 Sign Illustrations at a Glance
- Section 2.3 Traffic Control Persons
2.4 Motor Vehicle Act and Regulations

The *Motor Vehicle Act* regulates the movement of motor vehicles, pedestrians and bicycles on all public roads. This includes rural highways, municipal streets and other places such as shopping centre parking lots.

TCPs get their authority to direct traffic from the *Motor Vehicle Act*.

Refer to the excerpts from the Act that are included in the Resource Materials available on the BC Construction Safety Alliance Website:

- Section 138
- Section 139
- Section 141
- Section 142

The *Motor Vehicle Act Regulations* contain standards and procedures that are more specific than those found in the Act. Refer to the excerpts from the *Motor Vehicle Act Regulations* included in the Resource Materials available for download from the BC Construction Safety Alliance Website.

2.4.1 Authority and Jurisdiction

The *Motor Vehicle Act* and *Act Regulations* give authority for the placement of traffic control devices to the Ministry of Transportation for provincial highways and unorganized areas, and to cities and municipalities for streets in their local areas.

Municipalities and cities have also adopted MoT’s standards as provided in the *Traffic Control Manual for Work on Roadways*. 
Unit 3: Using Traffic Control Equipment

3.1 About This Unit

You are already using personal protective and traffic control equipment on the job. This Unit reviews requirements for personal protective equipment (PPE) and traffic control equipment. It is important to take the time to review this and make sure you are following the requirements to do your job as safely as possible.

3.1.1 Performance Objectives

When you have successfully reviewed this Unit, you will be able to:

- Describe specific safety standards with which personal protective equipment must comply
- Identify the required personal protective equipment
- Determine which PPE is provided by the employer and the employee
- Identify traffic control equipment
- Describe the maintenance of traffic control equipment and devices
- Comply with specific requirements located in Parts 8 and 18 of the *Occupational Health and Safety Regulation*
3.2  Using Personal Protective Equipment

3.2.1  What You Must Wear

As you know, the OHS Regulation requires the use of personal protective equipment (PPE) on the job. You are always required to wear the following safety equipment when working:

- Safety footwear
- Safety headgear
- Approved high visibility garment
- Retro-reflective wrist bands

3.2.2  When You Must Wear PPE

You must wear your personal protective equipment whenever you are on the job. This includes during on-site safety meetings, and when you are placing or removing traffic control devices.

3.3  What You Must Provide

Workers are required to provide the following:

- clothing needed for protection against the natural elements,
- work gloves,
- safety footwear, and
- safety headgear.

Refer to the OHS Regulation Section 8.2 and 8.3.

3.3.1  Clothing

For most worksites, long pants and a shirt with sleeves will provide adequate protection. Do not wear clothing that will distract motorists.
If there is a hazard of hot material falling into your footwear, you should wear long pants with the cuffs outside of your footwear.

### 3.3.2 Safety Footwear

There are many hazards to your feet at any road construction worksite. Safety footwear conforming to the [CSA Standard CAN/CSA-Z195-M92](https://www.csa.ca) must be worn, including protection for the toes, soles and ankles. Running shoes or other footwear are not acceptable.

You will see a small green tag in the shape of a triangle on footwear that meets a CSA standard. Under the tongue there is a list of the standards they meet.

Refer to the OHS Regulation Section 8.22.

### 3.3.3 Safety Headgear

TCPs must wear approved safety headgear that meets or exceeds the [WorkSafeBC OHS Regulations Section 8.11 and 18.10](https://www.worksafebc.ca/en/). As per the [Traffic Control Manual for Work on Roadways](https://www.worksafebc.ca/en/traffic-control), the headgear must be orange with a strip of retro-reflective tape around the crown.

Choose headgear that fits you properly and comfortably. In cold weather, you can use an insert in your headgear to keep warm.

Do not write on, paint or decorate your headgear with stickers or other items, as glues and paints may deteriorate the plastic and detract from the warning colour.

Refer to the OHS Regulation Section 8.11 and 18.10.
3.3.4 Other Personal Equipment

Since you have been working in the field, you will already know that conditions on a job site can change quickly during a shift. It may be sunny in the morning and raining by the afternoon. You may need sunscreen, insect repellent or more liquids to stay alert and comfortable. You may find you are more comfortable and less likely to be distracted if you carry a kit with the following items in it:

- Water bottle
- Lip balm
- Insect repellent
- Sunscreen
- Band-Aids and antiseptic cream
- Spare socks and gloves
- Washcloth
- Sunglasses
- Raingear

3.4 What the Employer Must Provide

Employers are responsible for providing all other items of personal protective equipment required by the Occupational Health and Safety Regulation at no cost to workers. A summary of the employer’s responsibilities follows.

3.4.1 High Visibility Garment

Your garment (often a vest) must meet or exceed WorkSafeBC approved standard for high visibility garments. The garment must meet WorkSafeBC colour requirements with one vertical fluorescent and retro-reflective stripe on each side of the front, an ‘X’ on the back and retro-reflective strips below the arms or on the sleeves.

For situations where visibility is extremely poor, a battery-powered flashing-light vest can be worn for additional safety.


3.4.2 Wrist Bands and Ankle Cuffs

You are required to wear 5-cm wide fluorescent, retro-reflective wrist bands.

Refer to OHS Regulation Section 8.24.
Retro-reflective ankle cuffs are optional. They are recommended to provide additional safety when visibility is poor.

3.4.3 Ear Protection

The noise from construction machinery can damage your hearing permanently. High noise levels can also make you irritable, and decrease your ability to stay alert and concentrate.

If there is a high level of noise, choose a style of ear protection that you can wear comfortably and that meets or exceeds recognized standards. For example, earplugs may be more comfortable in hot weather than earmuffs. Earplugs should be pliable, fit each ear tightly and be disposable or easy to keep clean. In high noise situations, you may have to wear both earplugs and earmuffs for adequate protection.

You must have annual hearing tests if you work in an area that has loud noise. Hearing tests are the responsibility of the employer.

3.4.4 Eye Protection

In areas where there is the danger of flying objects or a lot of dust, you must wear shatterproof CSA-approved safety glasses to protect your eyes. Regular glasses or sunglasses do not provide adequate protection. Choose a style and type of eye protection that is comfortable and applicable to the type of worksite in which you work.

Dust can also make contact lenses a hazard for the wearer.

3.4.5 Respiratory Protection

You may find yourself on a worksite where there is an unacceptable level of dust, fumes or other pollutants. You should protect yourself from inhaling hazardous materials by wearing respiratory protection.

In areas where there is a high dust level such as on a dusty road, you should wear an approved particle mask for protection. If the dust levels are extreme, you may need to wear a respirator rather than a particle mask. You may also advise your Traffic Control Supervisor that water is needed to wet down the road for improved visibility.

If there is a danger from fumes or chemical pollution (such as near an asphalt burner) you must wear a cartridge-style mask. It is important that the correct cartridge is installed to protect you from the particular hazard. A particle mask is not adequate protection from fumes or chemicals.

A tight face seal usually requires a clean-shaven face.
If you are unsure about the protection that you require for the work situation, you should consult with your Traffic Control Supervisor or employer.

### 3.5 Maintaining Your Personal Protective Equipment

Your equipment is only effective if you take care of it and keep it in good condition. You should:

- Keep your footwear waterproofed and clean to prevent deterioration of the leather.
- Keep your earplugs clean and store them in their protective case when you are not using them. Replace them if they are disposable or if they become damaged.
- Keep your earmuffs clean and free from damage.
- Store protective eyeglasses in a case to prevent damage when you are not using them. Keep them clean at all times.
- Store retro-reflective vests and accessories carefully when they are not in use. Check them before use for cleanliness and damage or missing retro-reflective stripes. Also, check the batteries of flashing type vests.
- Keep your headgear clean and check it for damage.
- Check for an expiry date of your headgear and replace it when required.
- Check your headgear regularly by flexing it to see if it has become brittle from heat or cold.
- Check the suspension inside your headgear and replace it annually or sooner if there is evidence of damage or extreme wear.

### 3.6 Traffic Control Equipment and Devices

Traffic control equipment and devices are used to regulate, warn and guide motorists and pedestrians. In work zones, traffic control is achieved by the use of temporary equipment, devices and TCPs.
3.6.1 Personal Traffic Control Equipment

TCPs use the following equipment:

- Traffic control paddles – C27 with handles and 2002 Diamond Grade Reflectivity
- Wooden 1.3 meter round staff extension (optional – to eliminate fatigue)
- Flashlights with red signalling wands (night use and in poor visibility)
- Whistle and/or two way radios
- Recording materials

3.6.2 Paddles and Flashlights

The traffic control paddle and the flashlight with a red signalling wand attachment are important tools that you are already using to direct traffic.

Refer to Part 18, OHS Regulation in particular: Section 18.10 to 18.12

3.6.3 Communication Devices

You should have a whistle that can get the attention of a worker or motorist who may not see you or may not be paying attention to you. It is recommended that you pin the whistle to your garment rather than wear it on a string around your neck. You may also require a two-way radio.

3.6.4 Recording Materials

You should carry at least one pen or pencil and a small notebook that you can use to make notes, such as the license number of a vehicle that did not obey your signals.

You can also attach a strip of masking tape to the handle of your paddle so that you can make a quick note on it and then transfer it to paper when you have time.
3.7 Maintaining Your Personal Traffic Control Equipment

Keep your traffic control equipment in good repair and top working condition. Before beginning your shift you should:

- Check your traffic control paddle to make sure that it is clean and undamaged
- Test the flashlight for operation and replace the batteries or bulb if necessary. Always carry spare batteries and bulb for your flashlight. Package them securely with the contacts covered.
- Check the signalling wand for damage and replace it if necessary
- Check to make sure that the whistle and/or radio works (always carry spare batteries for the radio)
- Check that your pens or pencils work

3.8 Traffic Control Equipment

Work zone traffic control equipment may include:

- Signs
- Channelizing devices
- Lighting devices
- Buffer and shadow vehicles
- High level warning devices
- Flags

The equipment may be used in any combination to achieve the desired control of traffic provided they meet the standards given in the Traffic Control Manual for Work on Roadways.

3.8.1 Signs

Signs are: Construction and Maintenance (C), Temporary Warning (TW), or Regulatory (R) Signs. The Traffic Control Manual for Work on Roadways expands on the signs set out in the Motor Vehicle Act Regulation by describing more C and TW signs and their use and placement.

Reference: Traffic Control Manual for Work on Roadways Section 2.1
3.8.2 Channelizing Devices

Channelizing devices are used to guide motorists and pedestrians safely away from, around, or though the work zone. They may also be used to separate traffic traveling in opposite directions. Channelizing devices include:

- Flexible drums
- Cones
- Temporary delineator posts
- Barricades
- Barriers
- Tubular markers

Reference: Traffic Control Manual for Work on Roadways Section 2.2.2

3.8.3 Lighting Devices

Warning lighting devices draw attention to traffic control devices and work vehicles. Lighting devices include:

- Flashing yellow warning lights
- Flashing arrow boards
- Flashing vehicle lights
- Floodlights
- Steady burn warning lights

Reference: Traffic Control Manual for Work on Roadways, Section 2.2.3

3.8.4 Buffer and Shadow Vehicles

Buffer vehicles equipped with the appropriate warning devices can be used to help protect workers. Shadow vehicles, with an appropriate sign on the rear, are used as advanced warning devices in moving operations.

Reference: Traffic Control Manual for Work on Roadways, Section 2.2.4 and 2.2.5.
3.8.5 High Level Warning Devices

These devices are used mostly in areas where the normal advance warning distances are not available or where regularly mounted temporary signs might be hidden by parked vehicles.

Reference: Traffic Control Manual for Work on Roadways, Section 2.2.7

3.8.6 Flags

Fluorescent red or orange flags may be used with any signs mounted on temporary supports. They are required in speed zones of 70 km/h or higher for temporary signs that give warning of people working on or adjacent to a roadway. These signs include:

- C-4 CREW WORKING AHEAD
- C-28 TRAFFIC CONTROL PERSON AHEAD
- C-36 SURVEY CREW AHEAD
- C-58 ACCIDENT SCENE AHEAD

Reference: Traffic Control Manual for Work on Roadways, Section 2.2.9

3.9 Maintaining Traffic Control Devices

Traffic control devices must be constantly checked and maintained to provide good visibility and performance.

Before placing any traffic control device, check it carefully. Make sure that they are current and have not been hit, displaced, damaged, worn or are deteriorating in any way. Check flashing lights and rotating beacons for operation and brightness. Inspection must be frequent enough so that the safety of the work zone is maintained.

Replace any traffic control devices that are damaged. Additional devices should be available to replace any that are likely to be damaged while the work is in progress.

Reflectorized devices need extra care when handling and transporting to ensure that the reflectorizing elements are not damaged or worn.

When the job is completed and the control devices are collected for storage, make sure that they are in good condition.
Unit 4: Setting Up, Maintaining and Removing Work Zones

4.1 About This Unit

Many factors are considered when a work zone is planned and set up. Duration of the work, road configuration, volume of traffic, site requirements and environmental issues must all be considered. All the traffic control devices must be placed accurately to ensure they will help protect workers and motorists.

On most projects, the planning and layout of the work zone is handled by a Traffic Control Supervisor rather than a TCP. However, TCPs may assist in setting up the traffic control devices and they are responsible for checking them as the work progresses to ensure they remain correctly placed. In order to check and adjust the traffic control devices, you must be able to recognize parts of the work zone and locate and check work zone layouts. The topics in this Unit will review the knowledge you need to do this properly.

4.1.1 Performance Objectives

When you have successfully reviewed this Unit, you will be able to:

- Describe the parts of a work zone in work zones
- Describe the purpose of each area
- List factors that affect the choice of a work zone layout
- Locate standards in the Traffic Control Manual for Work on Roadways that describe the requirements for placing traffic control equipment in work zones
- Describe procedures for setting up, maintaining and removing a work zone
- Lay out traffic control devices under the direction of a Traffic Control Supervisor
4.2 Parts of a Work Zone

The work zone is the area between the first advance warning sign and a point beyond the Work Area where traffic is no longer affected. Figure 4-1 shows how most work zones are divided into the following parts:

- Advance Warning Area
- Transition Area
- Buffer Space
- Work Area
- Termination Area

If the work activity affects more than one direction of travel, the same principles apply to traffic in both directions.
4.2.1 Advance Warning Area

The Advance Warning Area is necessary so that motorists know what to expect before they reach the work zone. This provides enough time for them to adjust their driving patterns in response to the warning signs.

The length of the Advance Warning Area must be planned with consideration of the speed of the vehicles and the location. It could be as simple as one sign, a flashing light on a vehicle, or a series of signs up to two km from the Work Area.

Advance Warning Areas are not required if the work zone is completely off the road shoulder and does not interfere with traffic.

4.2.2 Transition Area

A Transition Area is used when work is being performed within one or more of the lanes that are normally used by traffic. If no lane or shoulder closure is involved, the Transition Area will not be used.

A taper is a line made by a series of markers that gradually move from one side of a lane (the driver’s right) to the other. The Transition Area contains the tapers necessary to close off the lane or lanes in which the work is being performed.

The Transition Area should be obvious to the motorists. It must be clearly marked so that they do not make a mistake and try to follow the old path. Tapers are used to indicate to the motorist the path they should follow to move out of their normal lane. A taper is identified by a series of channelizing devices and possibly pavement markings placed on an angle to move traffic out of its normal path. They may also be used to guide traffic back into its normal lane beyond the Work Area.

If the Work Area is constantly moving, then the Transition Area must also move. A vehicle with a sign, warning lights or a flashing arrow board may be used to guide traffic into the proper lane.

In long duration work, pavement markings may have to be removed and replaced with new markings or pavement marking arrows if the existing markings cause confusion.

4.2.3 Buffer Space

The Buffer Space is between the Transition Area and the Work Area. If the motorist fails to respond to the advance warnings and does not manage to negotiate the Transition Area, the Buffer Space provides a place to regain control or stop before reaching the Work Area. If distance permits, you should always include a Buffer Space, even though it may not appear necessary.
If the Work Area is moving, then the Buffer Space will be the area between the shadow vehicle and the Work Area.

A Buffer Space helps make the worksite safer for both workers and motorists. It must be kept clear of equipment, workers, materials and vehicles.

If two opposing lanes of traffic are redirected so that one lane of traffic must move into a lane normally used by the other traffic, a Buffer Space can separate the two tapers to prevent head-on collisions.

4.2.4 Work Area

The Work Area is that portion of the roadway or shoulder that contains the work activity and is closed to vehicle traffic and pedestrians. The Work Area may remain in one place or move, depending on the type of job.

Work Areas tend to become more hazardous in proportion to:

- How close the Work Area is to the normally travelled lanes
- How much traffic passes by
- How fast the traffic is going
- How complex the operations are in terms of equipment movement and road conditions
- How far from the normal path the traffic must be diverted

To eliminate as many hazards as possible, the Work Area should be clearly delineated. Devices can be placed to effectively allow safe entry and exit for work vehicles and still keep traffic out of the Work Area.

4.2.5 Termination Area

The termination area provides a short distance beyond the Work Area for the traffic to return to its normal lane or lanes. If the termination area requires that traffic be shifted out of opposing lanes, then a lane closure taper is included to channel traffic back where it belongs.

Make sure that there are no gaps in the traffic control areas that make the motorist think that they have cleared the work zone.
4.3 Work Zone Layouts

The layout of a work zone is planned by Traffic Control Supervisors or project managers prior to the work starting. They refer to typical work zone layouts given in the Traffic Control Manual for Work on Roadways and select a layout that most closely resembles their project. In some cases, the typical layouts in the manual do not match their project and they must modify one.

It is useful for TCPs to be familiar with this planning process and the factors that are considered in selecting a layout because it will help you to set up, check and adjust the traffic control zone as the work progresses.

Although the Traffic Control Supervisor is responsible for setting up and removing traffic control equipment, this responsibility may be delegated to experienced TCPs.

The following section provides a brief description of the planning process and the main factors that are considered in selecting a work zone layout that include:

- Duration or type of project
- Road configurations
- Traffic variations
- Environmental conditions
- Worksite variations

4.3.1 Duration or Type of Project

The first factor that is considered in selecting a work zone layout is the duration or type of project. The Traffic Control Manual for Work on Roadways groups typical work zone layouts as short duration, long duration and freeways.

Short duration

Short duration work is that which occurs for a period of up to one daytime shift.

Long duration

Long duration work occurs over more than one daytime shift and includes most work at night. The requirements for establishing a traffic control zone for long duration work differ from short duration setup. The typical layouts given in the Traffic Control Manual for Work on Roadways also refers to Table A, which gives similar information to Table A in the short duration section.
Freeways

Freeway work differs from other highway work because of the design of the roadway and the higher speed of traffic. Because of these differences, the requirements for a traffic control zone are also different and usually involve lane closures.

4.3.2 Road Configurations

Another factor to be considered in selecting a work zone layout is the road configuration in and near the work zone.

Road configurations will differ depending on location, design and traffic speeds. The main configurations are:

- Two-lane, two-way roads
- Multi-lane roads

Two-lane, two-way roads may be high or low volume, with or without a centre line. Multi-lane roads (including freeways) have two or more lanes in the same direction of travel.

Freeways are physically divided roadways, sometimes with considerable distance between opposing lanes of traffic. This may simplify the establishment of traffic control to only one direction. However, higher speeds and volume of traffic make freeway work very challenging.

A basic road configuration can be changed by the presence of such complications as:

- Railway crossings
- Driveways
- Tunnels
- Bridges
- Interchanges with on and off ramps
- Intersections
- Alleys

The presence of any of these factors may change the layout of the work zone.

4.3.3 Traffic Variations

Traffic variations will also affect the work zone layout. These variations in traffic include:

- Volume
- Speed
- Type of traffic
High-speed traffic requires longer transition distances.

The type of traffic will also determine how the areas in the work zone will be established. The Traffic Control Supervisor may have to study the traffic to determine if it is mostly commercial, private or mixed.

Another factor that must be considered in selecting the work zone layout is how the work zone will affect traffic and the measures that must be taken to prevent hazardous situations from occurring.

A restriction on the road in high-density traffic will tend to cause a backup. The layout should keep blockages to a minimum and provide the driver with more time to make decisions, since the number of vehicles may create problems in lane changes or other manoeuvres.

### 4.3.4 Environmental Conditions

Environmental conditions often cause adjustments to the layout of a work zone. These environmental conditions include:

- Rain
- Ice or snow
- Fog or clouds
- Bright sunlight
- Dust
- Time of day
- Slide or avalanche hazards

The visibility and control that a driver normally has will be affected by all of these factors. Changes in weather and light conditions can drastically alter the ability of drivers to see warning signs or a TCP. The time of day will affect visibility as well and can also have an affect on a driver's ability to react, particularly if they have been on the road for a time or have been jammed in rush hour traffic.

Make sure you discuss adjustments to the work zone with your Traffic Control Supervisor if traffic control may be affected by any of these conditions.

### 4.3.5 Worksite Variations

Worksites can vary greatly, for instance they may be on hills or curved roads rather than straight roads. These variations will affect the work zone setup. Site
assessment with regard to variations must be included as part of the toolbox meetings.

**Constantly Moving Zones**

Besides stationary work zones there are constant moving zones such as sweeping, grass mowing, and line painting. Most of the stationary sign requirements cannot be applied in these cases.

A shadow vehicle may be used.

**Intermittent Moving Zone**

An intermittent moving zone such as benkimen beam testing, survey crews and pavement patching, could require a combination of moving and stationary devices.

**Reference: Traffic Control Manual for Work on Roadways, figure 3.2.1.**

**Work Zones on Bridges**

Work zones on bridges can be hazardous to workers and TCPs because there is little or no room to escape if motorists drive into the work zone. If possible TCPs should not be positioned on a bridge. Stop the traffic before the bridge begins.

For bridge work, the number of advanced warning signs used is often doubled to warn motorists.

**Monitoring Work Zones**

Changes in the worksite should be observed carefully after the zone has been established and during operation.

It is important to determine if the way the work zone has been set up is correct. If traffic is flowing relatively freely and there is minimal interference between the Work Area and the traffic, then the setup is successful.

Make sure you discuss any worksite variations and how they will affect the work zone layout and traffic control procedures with your Traffic Control Supervisor during toolbox meetings.
Work Zones with Specific Requirements

Some work zones that have specific requirements for traffic control include:

- Ferry terminals
- Parking lots
- Special events

Traffic control in these situations will depend more on the skill of the TCP than the use of traffic control devices.

Discuss the setup and traffic control procedures for these work zones with your Traffic Control Supervisor in your toolbox meeting.

4.4 Setting Up a Work Zone

TCPs often set up or assist with the setup of a work zone. The first step is to review the Traffic Control Plan that has been prepared for the project. A Traffic Control Plan is recommended for each work zone. A sample Traffic control Plan Form is available on the BC Construction Safety Alliance’s website. The plan will show the number and placement of traffic devices that are required. You can check the distance between the devices and other measurements the Traffic Control Manual for Work on Roadways.

A typical layout is shown in Figure 3.4.1 from the Traffic Control Manual for Work on Roadways.
This work zone setup is one that is used often. It is important that you become familiar with it. A Buffer Zone, although it is not illustrated in figure 3.4.1, should be used.

Refer to *Table A Short Duration Work* for information about placement distances for traffic control devices as you examine the work zone layout.

<table>
<thead>
<tr>
<th></th>
<th>Regulatory speed limit</th>
<th>50 km/hr</th>
<th>60 km/hr</th>
<th>70 km/hr</th>
<th>80 km/hr</th>
<th>90-100 km/hr</th>
</tr>
</thead>
<tbody>
<tr>
<td>1a</td>
<td>Taper length for lane closure</td>
<td>35 (1:10)</td>
<td>55 (1:15)</td>
<td>75 (1:20)</td>
<td>90 (1:25)</td>
<td>110 (1:30)</td>
</tr>
<tr>
<td>1b</td>
<td>Taper length for shoulder work or where TCPs are used</td>
<td>5</td>
<td>8</td>
<td>10</td>
<td>12</td>
<td>15</td>
</tr>
<tr>
<td>2</td>
<td>Maximum distance between cones or tubular markers</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>Minimum tangent distance between tapers</td>
<td>30</td>
<td>60</td>
<td>90</td>
<td>120</td>
<td>150</td>
</tr>
<tr>
<td>4</td>
<td>Distance between construction signs</td>
<td>40</td>
<td>60</td>
<td>80</td>
<td>100</td>
<td>150</td>
</tr>
</tbody>
</table>

Dimensions shown are in metres and are minimums except for 2*. Cones and tubular markers are generally used in daylight but if used at night must be reflectorized. Barricades, flexible drums or temporary delineator posts are generally used during hours of darkness and must be reflectorized.

Dimensions 1b* apply to downstream tapers, shoulder tapers, and to two-way traffic tapers on travelled lanes where traffic is controlled by TCPs, portable lane control signals or temporary traffic signals.

Dimensions 4* represent the minimum advance placement distances for initial signs as well as distances between subsequent signs in multi-sign series.
TABLE B
Positioning of devices on freeways.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>*</td>
<td>Regulatory speed limit</td>
<td>80-110 km/hr</td>
</tr>
<tr>
<td>1</td>
<td>Taper length for lane closure</td>
<td>165 (1:45)</td>
</tr>
<tr>
<td>2</td>
<td>Maximum distance between tubular markers for (1)</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>Minimum distance between tapers</td>
<td>200</td>
</tr>
<tr>
<td>4</td>
<td>Distance between construction signs</td>
<td>200</td>
</tr>
</tbody>
</table>

Dimensions shown are in metres and are minimums, except for 2*.

Cone and tubular markers will generally be used only in daylight but if used at night must be reflectorized. Barricades, flexible drums or temporary delineator posts are generally used during hours of darkness and must be reflectorized.

Dimensions 4* represent the minimum advance placement distance for initial signs as well as distances between subsequent signs in multi-sign series.

Downstream tapers should have a minimum length of 15 m per lane.

### 4.4.1 What Devices to Use

Signs and other traffic control devices as shown in the *Traffic Control Manual for Work on Roadways*. Drivers are familiar with these signs and know how to react to them. Other devices may be confusing. Choose signs that are appropriate and that accurately describe the work situation.

**Sign supports**

Signs may be attached to posts or to portable supports. On long-term projects, most signs should be post-mounted. Portable sign supports are more practical for short duration work and for signs that need to be moved often. Sign supports should be lightweight, yielding or have the same breakaway features as for permanent installations. Signs and sign stands must not be weighted down with anything other than sandbags or approved collars, as rocks or similar items can become projectiles.
4.4.2 Placing Traffic Control Devices

Use these guidelines for correct placement of traffic control devices:

- Place devices prior to starting work.
- Place devices in the order that drivers will encounter them, starting with the sign or traffic control device farthest upstream from the Work Area and the others successively as the Work Area is approached.
- Start with general sign messages at the beginning of the work zone, then use signs with more specific messages (stating what action should be taken) closer to the Work Area. The overall effect of signs and other devices should be to make drivers aware of what they are approaching and what actions will be required of them.
- Permanent traffic signs that do not apply during the work should be removed or have the faces completely covered with opaque materials. If you use non-opaque materials, the messages can be seen at night because headlights let the reflectorized messages show through.
- Temporary signs that are installed in anticipation of a traffic pattern change should be covered until required.
- Use the larger of the two standard signs where greater emphasis is required (such as for areas of higher speed).
- On urban streets, recommended advance placement distances may have to be shortened due to the length of city blocks. Additional advance warning signs may be required due to intersections, alleys and accesses.
- Where cyclists and pedestrians are likely to be present, their need for safe and convenient passage must be considered, in particular when signs and other devices are being installed.
- On divided roadways and one-way streets (with two or more lanes in the same direction) signs should be placed on both sides of the roadway.
- If traffic in both directions will be affected, such as with work in the centre lane of a three-lane roadway, the traffic control devices can be placed in both directions at the same time, starting at each end farthest away from the work.
- On multi-lane roadways, for example, traffic traveling in one direction may have to be moved around a Work Area by crossing the median into the left lane normally available only to traffic traveling in the opposing direction. Where this has to be done, it is essential that control devices be installed first to ensure
that traffic in the opposite direction is confined to its right lane before traffic in the diverted direction is moved over the median.

- Temporary STOP and YIELD signs should be mounted at about the same height and the same position as for permanent signs.
- When signs or channelizing devices are to be installed and removed several times during the work operation, spots can be painted to mark device locations, so that the installation can be repeated quickly and with proper placement assured.
- Always check with your Traffic Control Supervisor for the correct measurements and placement of devices if a particular requirement is not covered in the Manual.
- Try to view the work zone through the eyes of a motorist driving through it under the worst possible conditions, then adjust the setup to make signs clearly visible.
- Signs should not block the sight lines of traffic entering a roadway from side roads or accesses.
- In construction zones, permanent traffic control signs may be covered with temporary ones.
- Place signs so they are easily visible.
- Check to ensure devices do not contradict others in the work zone. For instance, signs showing speed limits should all be the same.
- Make sure that parked vehicles do not hide signs.

4.5 Inspecting and Maintaining a Traffic Control Zone

Once the work zone is in place, it is important that you and your Traffic Control Supervisor ensure that it works well and that any changes are made after an inspection.

Assess the situation before the zone is operational, during the operation and after any changes have been made to the setup. Your ability to visualize potential problems and solve them will improve with experience. The following factors will require changes or maintenance:
- Traffic accidents
- Devices displaced or damaged by vehicles, construction activities, workers, wind and truck slipstream
- Weather damage
- Dead or low flashing light batteries or burned out bulbs
- Low fuel levels for electrical generators
- Traffic volume
- Weather conditions
- Dirt on devices
- Vandalism or theft

Your Traffic Control Supervisor will have a comprehensive inspection program that will include the following elements:

- The *Traffic Control Manual for Work on Roadways* or a formal traffic control plan for reference
- A defined inspection procedure
- A repair and replacement procedure
- Assurance of adequate inventory of devices for emergency replacement or repair
- Follow-up procedures to ensure that repairs are made
- A review to ensure that the public travel path is clearly marked through the entire work zone, both day and night, and particularly at the end of a work day, keeping in mind the possibility of poor weather and light conditions
- Documentation by the Traffic Control Supervisor of inspections and repairs made

The person responsible for inspecting traffic control devices must decide if they are in good condition, and must record the inspection and the results.
4.6 Removing the Work Zone

As soon as the work is completed and traffic control devices are no longer needed, they must be removed. Any cones and channelizing devices on the travelled roadway should be removed first, followed by the signs. Flashing arrow boards, high level warning devices, traffic control persons and/or flashing vehicle lights should be used in the removal process.

Do not remove devices until the work is complete and the roadway is clear of workers equipment or hazards.

On low volume roadways, remove devices in the reverse order of installation by first removing those closest to the Work Area and continuing progressively upstream away from the Work Area.

On high volume roadways (particularly multi-lane) devices may be removed as for low volume or they may be removed with the flow of traffic. If removing with the flow of traffic, use a buffer vehicle, which may be equipped with a rear-mounted impact attenuator.

It is never acceptable for a TCP to ride on the tailgate or on the outside of a vehicle.
Unit 5: Working Around Equipment

5.1 About This Unit

You are already aware that working around equipment can be dangerous. This Unit reviews the operation of various types of equipment so you can avoid accidents and control traffic in a safe and effective manner. You must know the hand signals used by the construction crew and equipment operators.

5.1.1 Performance Objectives

When you have successfully reviewed this Unit, you will be able to:

- Recognize common construction equipment used on public roads
- Describe hazards to avoid and precautions to take when working around construction equipment used on public roads
- Communicate with equipment operators

Controlling Traffic Near Equipment

As you know, equipment will often move in and out of the worksite. This movement must be regulated to combine with the movement of traffic without causing congestion or creating a hazardous situation. You must provide the control over the flow of machines and traffic.

Construction equipment has various hazards that will affect how you work and direct traffic in relation to the movements of that equipment.

While each machine is different, they are all hazardous. You should review the hazards associated with each type of equipment.

Hand signals used by equipment operators and crew workers are very important. These signals tell you what the equipment will do and where it will go on the worksite. For instance, a crew worker may signal a loader operator for more sand or gravel.
5.1.2 Dealing with Hazards

Make Sure You are Seen

The equipment operator may not be able to see you.

Equipment operators may lose contact with other equipment, vehicles and workers due to blind spots. These blind spots are caused by equipment design, attachments or loads that obscure vision.

You must be aware at all times whether or not the operator can see you or other workers and vehicles.

Keep Clear of Equipment

Accidents often happen when equipment is backing up and workers are run over.

Stay well clear of all mobile equipment.

Do not stand on an operating machine or try to step onto or off a machine that is in motion. These machines have a single seat for a reason – they are not designed to carry passengers. Never ride, sit or lean on a piece of machinery.

Direct traffic so that it is clear of operating equipment.

Keep Clear of Attachments

Any working attachment requires room to move and operate. You must monitor this operating range to make sure that any changes that the operator makes to the machine’s attachment angles or position does not create a hazard to vehicles or other workers.

Always be sure that you know where the attachments are. Working attachments may move suddenly. Make sure you direct traffic on a route with ample room to avoid the swing or movement of the attachment.

Know the Equipment at the Work Site

Always discuss any equipment that will be operating in the work zone, hazards that are related to it, and precautions to take with your Traffic Control Supervisor at the toolbox meeting. Toolbox sessions must cover all possible hazards so that you can protect yourself, other workers and the public from these hazards.
5.2 Recognizing Construction Equipment

5.2.1 Crawler Tractors

Crawler tractors (Figure 5-1 and 5-2) operate on continuous tracks that allow them to function in rough terrain and in poor traction conditions.

These machines can use a wide variety of attachments from a blade to a bucket, depending on the requirements. An attachment called a side boom can be used for moving and supporting pipe during pipeline installation.

Crawler tractors generally move quite slowly. They are very large and the work attachments can obscure the vision of the machine operator. They can turn or back up suddenly and quickly.

These machines may be equipped with different types of attachments.

5.2.2 Graders

Most graders (fig. 5-3) have a blade that moves horizontally and can extend past the wheels on either side. They often have a special extension on the blade that may be carried at head height.

Graders also have a very wide turn radius. If they have attachments on the front or rear, the attachments can swing beyond the normal range. Some graders are articulated, which means that they bend in the middle. Graders have to have clearance of the blades and other attachments as they can shift sideways on the move.
5.2.3 Articulated Machines

An articulated machine is unique because it bends in the middle. The space in this area (called the pinch zone) will change drastically as the machine turns (Figure 5-4).

![Figure 5-4](danger_area_articulated_machines.png)  
**Figure 5-4** Danger area on articulated machines

This is a very hazardous area, since the machine can articulate (bend) even when standing still. Never stand in the area between the two parts.

5.2.4 Dump Trucks

Dump trucks (Figure 5-5 and 5-6) have limited rear vision and if they are very large, may have limited side vision as well. When reversing, the operator can only see objects that are in the mirrors, away from the centre of the truck. The areas immediately behind the truck and along the front fenders are blind areas. Do not stand in these areas. Dump trucks can be dangerous around power lines while dumping there loads, traffic must be guided carefully while this happens.

Some dump trucks also pull a transfer trailer with a box for hauling material. This combination causes a new hazard because the turn radius of the truck will change, particularly when reversing. There is also an area between the two units that can be hazardous, just as with an articulated machine (Figure 5-7).
The movements of a truck as it parks the trailer, unloads, moves the boxes from the trailer onto the truck, unloads them and reconnects the trailer can also be hazardous if TCPs are not positioned away from the area of activity.

5.2.5 **Rollers and Compactors**

Rollers and compactors (Figure 5-8) move very slowly. They may also have attachments that extend past the sides of the machine.

Rollers and compactors move back and forth without warning, the traffic must pass these machine in a wide berth. They have poor stopping ability therefore be cautious when controlling these machines.
5.2.6 Cranes and Excavators

Cranes are used in construction and in specialized applications such as bridge and overpass building. Cranes may be wheeled (Figure 5-9 and 5-10) or tracked. Cranes are controlled by the ground person therefore the TCP must communicate with this ground person when passing traffic by the machine.

There are many different types of excavators (Figure 5-11) used for different work. They may be a backhoe or shovel type. They may also be wheeled or tracked, although larger excavators are tracked for better stability.

Excavators and cranes have large extensions called counterweights that hang out from the back of the machine. When the machine rotates, the counterweight will swing out farther than the edge of the wheels or tracks (Figure 5-12). You should be cautious, particularly in close quarters, of the area of the swing. Failure to take the swing into account can result in injury to workers and damage to other equipment and vehicles if the machine strikes them.
5.2.7 Loaders

Loaders (Figure 5-13 and 5-14) are commonly used to move material or load trucks. Many loaders are articulated. Loaders have an additional hazard in that the operator’s visibility is also restricted by the bucket. In some phases of operation, the bucket and its load will be directly in front of the operator. Always be aware of the position of the machine and make sure that the operator knows where you are standing.

5.2.8 Skid Steer Loaders

Skid steer loaders (Figure 5-15), are in common use on construction sites. They can be fitted with numerous attachments. The machine moves very quickly and as operator visibility is limited in the rear, caution should be exercised in this area.

5.2.9 Paving Machines

Paving machines (Figure 5-16, -17, -18) are used for applying very hot asphalt paving materials. They move slowly and the paving materials are placed into the hopper of the machine by dump trucks moving along with the paving machine. A paving operation involves several job activities at once, with more than one person involved. This is why a TCP is usually employed to slow passing traffic and help ensure the safety of these operators. The paver has two operators, the Paver Operator or driver and the Screed Operator who controls the level of the surface being put down. The Rakerman blends the joint and levels any imperfection left by the screed. In addition to these people there are several labourers who may carry asphalt to the imperfections to be repaired by the Rakerman.

The paving material is very hot. Avoid direct contact with it.

Paving machines have many moving parts such as the side extensions and hopper wings. Paving operations also involve dump trucks backing up with boxes in the air. This creates a danger of the box contacting low power lines.
This operation must be explained and discussed at a toolbox meeting.

5.2.10 Aerial Lift Vehicles and Auger Trucks

Aerial lift vehicles (Figure 5-19) are used for installing and maintaining overhead electrical, telephone and cable television wires. They are also used for tree trimming.

Auger trucks are used by utility companies for installing and maintaining utility poles.

You should be cautious about working around these vehicles because you could be injured by overhead wires that come down, debris from trees that are being trimmed, or the apparatus itself. In many cases power lines are worked on live, which escalates this hazard. Look up above you occasionally to see that you are still in the clear. It is important that the TCP locate himself or herself in a safe place to control traffic, preferably at the next pole down the line from the one being worked on.

Traffic should not be allowed to proceed past these units while their booms are extended over the travel lanes or swinging. Another hazard is when the Auger truck places 10 to 15 metre poles in the hole by swinging these poles around and up. During this operation, there is always the chance of the auger losing grip and the pole falling.

It is preferable to employ two flag persons to control traffic around this equipment.

5.2.11 Tow Trucks

Tow trucks (Figure 5-20) usually work at a motor vehicle accident or a break down. The size of the vehicle being recovered depends on the size of the tow truck. All tow trucks have winches and cables that assist in this operation. These cables present an extreme hazard to any passing traffic should the cable break under stress. This has been known to cause serious damage and even cause fatal injuries.

The TCP must understand the procedure of the recovery. Communication with the operator of the tow truck is imperative. A short toolbox meeting should be conducted with all parties...
prior to the recovery. In many cases the local police may assist in traffic control during these operations.

**5.2.12 Line Painting Trucks**

This equipment is very unique in its operation and much specialized training is required to control traffic especially when painting through intersections and painting against the flow of traffic. (Figure 5-21 and 5-22)

TCPs must attend safety meetings or be briefed prior to the operation to fully understand the direction of the work being performed. Once the truck is in operation it is not likely the operator could stop without flooding the road with paint and thus causing a traffic hazard.

**5.2.13 Wood Chippers**

Wood chippers (Figure 5-23) are used to chip or cut up brush, small trees, limbs and other wood waste debris for municipalities, tree and landscape services, utility and right-of-way contractors. Wood chippers are extremely noisy and ear protection must be used when working around them. You should also wear safety glasses around these machines because they discharge a high volume of chips and some of the chips may fly loose. The operator is restricted in hearing any vehicle movement. The TCP should encourage the chipper feeder to operate from the shoulder rather than the centreline side of the machine when traffic is passing; also eye contact with the chipper operator is a must.
5.2.14 Emergency Signal for Controlling Heavy Equipment Operators

You may find situations where you must signal to equipment operators to stop their equipment. The common signal for emergency stop is a clenched fist (Figure 5-24). It is not recognized by all machine operators and you must clarify with your Traffic Control Supervisor what signals are used on the work site. This should be discussed at a Toolbox meeting so the TCPs and the equipment operators know what the signal is and what it means.

Figure 5-24
Unit 6: Basic Traffic Control Skills

6.1 About This Unit

As you know, the control of traffic depends very much on communication. Your ability to clearly signal your instructions to motorists, workers, pedestrians and equipment operators determines how effectively and safely you can control the work zone traffic flow. This Unit reviews the basic communication skills you use to control traffic.

6.1.1 Performance Objectives

When you have successfully reviewed this Unit, you will know how to:

- Use audible signals to communicate with motorists and other TCPs
- Use visual signals to communicate with motorists and other TCPs
- Position yourself for controlling traffic in an area that provides maximum visibility and a safe escape route
- Assist in setting up a work zone on a two-lane, two-way roadway that has a speed limit of 50 km/h
- Control traffic in a two-lane, two-way roadway that has a speed limit of 50 km/h

6.2 Using and Interpreting Signals

A TCP must indicate to motorists, workers, equipment operators, pedestrians and other TCPs what they have to do. You must be able to signal quickly and accurately and know that your signals are clear and will not cause confusion.

The most important aspect of signaling is that you must first gain the other person's attention. If they are not aware of your signals, they cannot be expected to do what you want.

You use a variety of methods to make sure that people are aware of what you want them to do as a result of your signals.
Eye contact is a very good way to tell if someone is paying attention to you. You will also know that they are looking at you if they react when you signal them.

6.2.1 Signalling Motorists

Refer to Part 18, OHS Regulation; in particular, Section 18.14 to 18.15.

The basic signals to control traffic are:
6.2.2 Signalling Other TCPs

As a TCP, you are constantly signalling other TCPs and getting signals from them. When two or more TCPs are working as a team, one must be responsible for traffic co-ordination. That person issues the required signals for change of traffic flow. Responsibility for co-ordinating traffic flow can be switched from TCP to TCP throughout the day depending on which one has the best visibility.

Refer to OHS Regulation Section 18.14 and 18.15.

1. TO INSTRUCT A PARTNER TO HALT TRAFFIC FROM OTHER DIRECTION
   Raise free hand with fist clenched, straight above the shoulder. Move entire arm slowly from the upright position to a position directly out to the side at shoulder height. Repeat signal as long as necessary.

2. TO INDICATE AN ALL CLEAR SITUATION AND INSTRUCT PARTNER TO ALLOW TRAFFIC TO PROCEED FROM OTHER DIRECTION
   Move the free hand directly out from the side at shoulder height. Lower the entire arm until it rests against the side of the body. Repeat signal as long as necessary.

3. TO INSTRUCT A PARTNER TO STOP ALL VEHICLES IN EVENT OF APPROACH OF EMERGENCY VEHICLES OR OTHER EMERGENCY SUCH AS OUT-OF-CONTROL VEHICLES ENTERING THE CONTROL ZONE.
   Drop the STOP/SLOW paddle. Raise both arms to the side at shoulder height, then rapidly move both arms above the head where the wrists will cross. Continue signal until the partner is seen to take the necessary action.
6.3 Controlling Traffic

TCPs must be visible to the traffic from a sufficient distance to allow them to signal motorists and get the required response before the traffic enters the Work Area. For this reason, TCPs are equipped with clothing and traffic control devices that make them stand out from their surroundings.

6.3.1 Positioning

Reference: Traffic Control Manual for Work on Roadways, Section 2.3

You must ensure that you position yourself:

- in an area that provides the maximum visibility, and
- where you have a safe escape route.

This positioning is very important, particularly in areas where visibility may be limited, such as near curves or hills.

TCPs should be positioned as follows:

- When you start to direct traffic, you should place yourself in a safe position, usually on the shoulder of the road, out of the way of vehicles. Display your paddle with the STOP side visible to the first vehicle.

- As the vehicle approaches, make eye contact with the driver to ensure she or he has seen your signal/sign. After stopping your first vehicle, you will generally proceed to the driver's side of the lane under your control, and stand in a comfortable position that allows you to observe traffic and be seen from all directions, preferably with their feet facing the centre line of the roadway. You will normally conduct your traffic control from this position.

- Always ensure there is a space between the first vehicle and your position, so if that vehicle is rear-ended, you are less at risk of being hit.

- Stand outside the lane carrying moving traffic.

- Stand 25-75 m from the Work Area, unless otherwise specified, in order to provide some manoeuvring room for lane changing.

- Face the centre line and be aware of what is happening in both the stopped lane and the moving lane of traffic.

- Always have your paddle fully extended from your side. Do not hide behind it.
- Always plan a safe escape route.
- Do not leave your paddle unattended on the roadway. Never stick the paddle into a cone or tubular marker as it may get turned by the wind from vehicles and display the wrong message to motorists and pedestrians.
- Do not lose eye contact with the driver until the vehicle is completely stopped.
- Where work is in progress in or adjacent to an intersection, you may have to stand in the middle of the intersection.
- Stand where you can see and be seen by approaching drivers.
- Stand where the background will make you as conspicuous as possible.
- Draw attention to your position by using a cone situated near you.
- If there is no line of sight between two TCPs, and they do not have radio communication, it will be necessary to position a third TCP between them to relay visual signals.
- Position yourself so there are no confusing instructions to drivers. If a TCP cannot be positioned so there will be no interference with other traffic control devices, such as stop signs or a traffic signal, it may be necessary to place covers over stop signs or to flash traffic signals in order to avoid contradictory instructions to drivers.

If all of the above are not possible, stand at the most appropriate location to direct traffic through a Work Area, consistent with WorkSafeBC regulations.

6.3.2 Remaining on Duty

TCPs must remain at their assigned traffic control stations until they are relieved by another TCP or the Traffic Control Supervisor. Although at times it may be awkward or difficult for TCPs to comply with, it is an important requirement. Make sure you discuss the procedure and the time intervals for relief at the toolbox meeting for each shift.

6.3.3 Traffic Control Violations

Keep accurate records of any traffic violations so you can provide the information to the police. Record violations of your instructions and note information about the violators. The more information that you have, the easier it will be for police to take care of the problem.

In order of importance, you should note:

- License plate number
- Province or state
- Make and colour of vehicle
- Description of the driver
- Time of day
- Names and telephone numbers of witnesses

**Traffic Control Plan Diagram 1**

*Review Traffic Control Plan Diagram # 1 on the next page. Answer the following questions as you complete the sketch.*

What factors do you need to consider when planning traffic control for this site?

_________________________________________________________________________
_________________________________________________________________________

What information that you need is missing, if any?

_________________________________________________________________________
_________________________________________________________________________

What would you watch for when monitoring this site?

_________________________________________________________________________
_________________________________________________________________________

Where should the TCPs be positioned and why?

_________________________________________________________________________
_________________________________________________________________________
Traffic Control Plan Diagram 1

Mark on the diagram where you would place the TCPs and the traffic control devices. This is a utilities job that will obstruct the lane for about two days. Equipment will occasionally move into the other lane. Mark the distances between devices and between the TCPs and the Work Area on this diagram.

Speed limit is 50 km hour. This is a low volume roadway. Use Table A to assist you.
Unit 7: Building on Basic Traffic Control Skills

7.1 About This Unit

This Unit reviews hazardous materials and situations, as well as controlling traffic in more complex situations. It builds on the traffic control skills presented in other Units. It includes diagrams for you to complete as practice.

7.1.1 Performance Objectives

When you have successfully reviewed this Unit you will be able to:

- Identify classifications used in the transportation of dangerous goods
- Describe procedures for responding to hazardous incidents such as broken gas lines, sewer lines and gas mains or downed power lines
- Describe procedures for controlling uncommon traffic
- Describe procedures for using radios
- Comply with Part 21, Section 21.61 - 21.62 in the Occupational Health and Safety Regulation
- Describe basic traffic control skills in controlling traffic in a work zone that requires only one TCP, and controlling traffic at an intersection

7.2 Dangerous Goods and Other Hazards

When you are controlling traffic, hazardous situations occasionally develop. It is important that you are able to identify the hazards involved and respond quickly to the incident to ensure the safety of workers and the public.
Communicate with your TCS and the crew to see if there are any hazards that may be encountered in their work. This allows you to plan traffic control procedures for possible incidents ahead of time.

### 7.2.1 Transportation of Dangerous Goods

The federal and provincial governments have established regulations for the transportation of any goods that may be dangerous. These regulations describe how those goods must be packaged, loaded and transported. They also provide a method of identifying vehicles that are carrying dangerous goods.

#### Identifying classifications

Most vehicles that carry dangerous goods must display a special placard that shows what is on board. The placard must be displayed on both sides, front and back of the vehicle and will carry a visual symbol, a classification number and a classification division.

There are nine classifications for dangerous goods:

1. Explosives
2. Gases
3. Flammable Liquids
4. Flammable Solids, Substances Liable to Spontaneous Combustion, Water Reactive Substances
5. Oxidizing Substances and Organic Peroxides
6. Toxic and Infectious Substances
7. Radioactive Materials
8. Corrosives
9. Miscellaneous Products, Substances or Organisms

The placards used to identify these classifications are shown in *The Marks of Safety* in the Resource Materials available on the BC Construction Safety Alliance website.
7.2.2 Hazardous Spills

If a hazardous spill occurs around your work zone, or if a vehicle carrying hazardous materials is involved in an accident in your work zone:

1. Do not take undue risks:
   - Do not approach or investigate until the hazard and/or material has been identified
   - Do not touch, taste or smell material if it has not been identified
   - Remain upwind and uphill of spill if possible

2. Direct traffic around the spill if possible.
   - Close road 1,000m each side of spill area if necessary

3. Gather the following information to report a hazardous spill:
   - Type of terrain (flat, hill, ditch, river, lake, etc.)
   - Type of dangerous goods label and placard, if visible

4. Notify your Traffic Control Supervisor
   - If no Traffic Control Supervisor is available, call the local police and the Transport Canada Emergency Centre CANUTEC collect at (613) 996-6666, or cellular *666, or
   - Call the BC Provincial Emergency Program @ 1-800-663-3456; (open 24 hours)

7.2.3 Broken Gas Lines

A broken gas line is very hazardous because it could cause a widespread explosion. When working around gas lines, position yourself further back from the Work Area so you can stop traffic if the line is broken. Find an emergency route that will allow you to escape away from any broken gas line.

If a line breaks, stop all traffic as far away as possible and wait for directions from your Traffic Control Supervisor or the crew foreman.

7.2.4 Broken Sewer Lines and Water Mains

When a sewer line is broken the effluent from it may be toxic. Broken water mains can be hazardous because the water may undermine the road structure and cause the road to collapse.
Stay away from the area and wait for directions from your Traffic Control Supervisor or the crew foreman.

7.2.5  Downed or Broken Power Lines

At the beginning of your shift you should note any power lines that may run through or close to the worksite. The raised bucket from an excavator or the raised box of a dump truck can bring down power lines. If this occurs, the TCP should stop traffic immediately and keep workers and motorists away from the area. Your Traffic Control Supervisor or the crew foreman will call the local electrical utility for assistance.

Review “7 Steps to Electrical Safety” which can be downloaded from the BC Construction Safety Alliance website under Resource Materials.

7.3  Controlling Uncommon Traffic

There will be occasions when emergency vehicles, over-width vehicles or run-away vehicles will require you to act to ensure safe traffic control in your work zone.

7.3.1  Emergency Vehicles

At the beginning of each shift, review a plan for directing emergency vehicles through the work zone with your Traffic Control Supervisor. It is important that you establish this plan because it will help you to respond quickly and correctly when an emergency situation occurs.

When an emergency vehicle with sirens on and lights flashing approaches, if time permits, you should try to direct existing traffic out of the way and have equipment operators clear the way if necessary. Signal other traffic control persons and pilot cars to inform them that there is an emergency vehicle in transit through the work zone.

In some cases, emergency vehicles may be required to stop until a clear path can be made, for instance when a blast is ready to be ignited or an excavation closes off the road.

7.3.2  Over-width Vehicles

A TCP must provide a clear path for an over width vehicle or “wide load”, otherwise traffic would come to a stop causing serious traffic jams.
If a job is located on a narrow road or the lanes are restricted in such a way to not permit passage of an oversize vehicle in a two-way traffic set-up, it is advisable to single lane the traffic using two TCPs. This will allow maximum lane width should such a vehicle approach.

The TCP should stop the oversize vehicle and communicate with the operator to ensure the width required. Stop other traffic, inform workers and other TCP, and then have the vehicle guided through the site. Once it has passed all traffic control devices should be checked to ensure they are in place. Then allow the other traffic to proceed and the work to commence.

If the vehicle must cross a bridge or pass another obstruction, make sure that side clearance is okay before sending the vehicle.

Remember, the driver of the wide load wants to be safe too – the driver will not mind waiting for a safety concern.

### 7.3.3 Run-away Vehicles

Run-away vehicles present a serious hazard not only to you, but to other vehicles and workers as well. In most cases, run-away vehicles will probably be large trucks with heavy loads that require considerable distance to stop. You may have only moments to warn workers, other drivers and pedestrians as you attempt to provide a path for the vehicle to travel through.

If the potential for run-away vehicles exists (such as in a work zone on a steep hill) the traffic control plan should include a run-away lane or an action plan should an incident occur. If you are in a work zone where you feel that there could potentially be a run-away vehicle, check with your Traffic Control Supervisor to find out what options have been included in the traffic control plan.

If traffic is heavy this can be difficult, but if the control zones have been properly selected and constructed you should be able to direct the operator of the vehicle into an area where the least amount of damage will occur. Above all, you must remain calm.

Radio-controlled warning devices are available that can be triggered by TCPs to activate horns and lights to warn workers and other controllers that there is a run-away vehicle approaching.

### 7.3.4 Disabled Vehicles

If you see a disabled vehicle notify your supervisor. Do not leave your post unattended.
7.4 Intermittent Moving Work

The procedures for controlling traffic in a work zone that moves intermittently are similar to those used for two-lane, two-way roadway, but there are some additional hazards.

Make sure you relocate your traffic control signs promptly as the work zone moves. Place all signs within 2 km of the work zone. Carry a traffic cone along with you to provide additional advance warning around curves and hills. In some cases, radios or a third TCP are required.

A typical layout for intermittent moving work is shown in Figure 3.2.1 of the Traffic Control Manual for Work on Roadways:

![Figure 3.2.1 Intermittent Moving Work - Two Lane Two-way Roadway](image)

7.5 Controlling Traffic in an Intersection

Intersections may be controlled by traffic lights or signs. They may also be uncontrolled, affecting the positioning of the devices in relation to the work zone. Roadways with intersections may require the detouring of traffic and pedestrians, the changing of zone area lengths and the establishment of different types of buffer areas.

Study Guide 2010
If the Work Area is in or adjacent to an intersection, you may be able to control traffic from the shoulder or you may have to stand in the middle of an intersection to control the traffic.

It may be necessary to place covers over stop signs or lights or to flash traffic signals in order to avoid contradictory instructions to drivers.

A typical layout for a two-lane, two way intersection is shown in Figure 3.5.1 from the *Traffic Control Manual for Work on Roadways*:

![Figure 3.5.1](image)

**Additional Reference:** Traffic Control Manual for Work on Roadways Figure 3.5.2

### 7.6 Using Two-Way Radios

You may not always be able to visually signal other TCPs, workers or equipment operators. You may have to communicate by radio. You may also need to be in radio contact with pilot cars when traffic control takes place over long work zones.
7.6.1 Radio Communication

You will usually be provided with a fixed-frequency, two-way radio. The company you work for will establish radio protocols. It is your responsibility to know what they are.

The operation of radios should follow these basic rules:

- Do not use radio equipment unless you are authorized and have been given instructions on its use.
- If the radio should fail (and replacing the batteries does not correct the situation) have someone contact your Traffic Control Supervisor immediately to arrange for a replacement. Have someone inform all other TCPs in your team so that they are aware of the situation.
- Speak clearly and use words and phrases that are easy to understand.
- Sometimes interference can make understanding the conversation difficult and lead to the wrong conclusions. If communication conditions are poor, have your message confirmed by the receiver.
- Do not chat on a radio. It reduces the battery life of the radio and ties up the channel.
- Carry spare batteries for your radio in a plastic bag with the contact points covered.
- Test the radios before going out on the road.

7.6.2 Blasting Areas

Radio transmitters and cellular phones can inadvertently set off an explosion.

Read Sections 21.61 and 21.62 of the OHS Regulation.
Traffic Control Plan Diagram 2

Review Traffic Control Plan Diagram 2 on page 76. Answer the following questions as you complete the sketch.

What factors do you need to consider when planning traffic control for this site?
________________________________________________________________________
________________________________________________________________________

What information that you need is missing, if any?
________________________________________________________________________
________________________________________________________________________

What would you watch for when monitoring this site?
________________________________________________________________________
________________________________________________________________________

If a TCP is required, where should they be positioned and why?
________________________________________________________________________
________________________________________________________________________

Traffic Control Plan Diagram 3

Review Traffic Control Plan Diagram 3 on page 77. Answer the following questions as you complete the sketch.

What factors do you need to consider when planning traffic control for this site?
________________________________________________________________________
________________________________________________________________________

What information that you need is missing, if any?
________________________________________________________________________
________________________________________________________________________

What would you watch for when monitoring this site?
________________________________________________________________________
________________________________________________________________________
If a TCP is required, where should they be positioned and why?

________________________________________________________________________
________________________________________________________________________

Traffic Control Plan Diagram 4

Review Traffic Control Plan Diagram 4 (Controlling Traffic with one TCP) on page 78. Answer the following questions as you complete the sketch.

What factors do you need to consider when planning traffic control for this site?
________________________________________________________________________
________________________________________________________________________

What information that you need is missing, if any?
________________________________________________________________________
________________________________________________________________________

What would you watch for when monitoring this site?
________________________________________________________________________
________________________________________________________________________

If a TCP is required, where should they be positioned and why?
________________________________________________________________________
Traffic Control Plan Diagram 2

Mark on the diagram where you would place the TCPs and the traffic control devices for this job that will fully obstruct the lane for about 3 days. Mark the distances between devices and between the TCP and the Work Area on this diagram.

Speed limit is 50 km hour. This is a low volume roadway on a steep hill near an industrial park. Use Table A (on page 42).
Traffic Control Plan Diagram 3

Mark the TCPs and devices for this water main repair job that will take about 6 hours. Mark the distances between devices, the TCP and the Work Area, using Table A on page 42. Speed limit is 50 km/hour. It is a high volume roadway.
Traffic Control Plan Diagram 4

Mark on the diagram where you would place the TCP and the traffic control devices to control traffic with only 1 TCP. This is a utilities job that will obstruct the lane for about two days. Equipment will occasionally move into the other lane. Mark the distances between devices and between the TCPs and the Work Area on this diagram.

Speed limit is 50 km hour. This is a low volume roadway. Use Table A (page 42) to assist you.
Unit 8: Practice Test

These questions are similar to the questions you will see in the TCP Re-qualification On-line Test. There may be more than one reasonable answer. Circle the BEST answer.

TCP = Traffic Control Person

1. TCPs are not required when workers are adequately protected by other devices.
   T    F

2. Symptoms of cold stress include:
   a) dilated pupils
   b) high blood pressure
   c) severe shivering
   d) all of the above

3. One of the employer’s responsibilities is to:
   a) provide compensation to injured workers
   b) maintain a worker’s personal protective equipment
   c) maintain a safe workplace
   d) all of the above

4. If your Traffic Control Supervisor assigns you to a position in which you do not feel safe, you should:
   a) refuse the work and go home
   b) contact WorkSafeBC and stay on the job until a Field Officer arrives
   c) try the position for at least a reasonable period of time before making a decision what to do
   d) explain your concerns to the Traffic Control Supervisor and refuse the work if the problem is not fixed
5. The Motor Vehicle Act regulates only the movement of motor vehicle traffic on highways, not on city streets and roads.

   T   F

6. If you are placing or removing control devices before or after directing traffic, it is acceptable to wear only your high visibility garment and safety footwear. Safety headgear is not required at this time.

   T   F

7. Drivers should normally see this sign:

   a) immediately before they see the TCP
   b) first in a long duration traffic control zone
   c) first in a short duration traffic control zone
   d) right after a temporary speed sign in a long duration traffic control zone

8. A taper is:

   a) the gradual narrowing of a lane or shoulder using devices to move traffic into the next lane
   b) a traffic control flashlight that looks like a candle
   c) the path that traffic takes through a work zone
   d) a device to mark lane closures
9. The maximum distance between cones and tubular markers in a short duration work zone on conventional roadways in a 50km speed zone is:

a) 40 meters
b) 10 meters
c) 50 meters
d) 60 meters

10. In Figure 19 above, please circle the letter corresponding to where the Traffic control Manual for Work on Roadways suggests that TCP # 1 should be positioned.

A      B    C      D
Practice Test Answer Key

1 T
2 c
3 c
4 d
5 F
6 F
7 b
8 a
9 b
10 a