

Traffic Control Person Training

Participant Guide

Acknowledgements:

The Construction Safety Network would like to thank WorkSafeBC for funding this important initiative. In addition to funding, WorkSafeBC has provided guidance, expertise and resources to this project. Their support is greatly appreciated.

The Traffic Control Person training materials have been developed, revised and updated through an inclusive process. Without the invaluable support and input of the original TCP committee, the Master Trainers, TCP Trainers, the Safety Network Board and Technical Committee, these materials would not have been completed. The Construction Safety Network acknowledges the enormous contribution of all those who participated in the development of these training materials.

Contact:

Construction Safety Network

Suite 225, 8678 Greenall Avenue, Burnaby, BC V5J 3M6

info@safetynetwork.bc.ca

Phone (604) 436-0232 Fax (604) 436-2627

Toll Free: 1-866-860-0232

www.safetynetwork.bc.ca

© 2007 Construction Safety Network

Prepared by Kathleen Savory & Associates • Graphic Design by Donna Pollard

Table of Contents

Agenda..... iii

Course Introduction 0 -1
 Welcome 0-3
 How to Use This Guide 0-4
 Course Description 0-4

Unit 1

Roles and Responsibilities 1-1
 1.1 About This Unit..... 1-3
 1.2 Responsibilities of a Traffic Control Person..... 1-3
 1.3 Job Locations and Conditions..... 1-6
 1.4 Responsibilities of a Traffic Control Supervisor 1-10
 1.5 Provision of Health and Safety Information for the Job Site 1-11

Unit 2

Complying with Regulations and Standards 2-1
 2.1 About This Unit..... 2-3
 2.2 WCB Authority and Jurisdiction 2-4
 2.3 Traffic Control Standards..... 2-6
 2.4 Motor Vehicle Act and Regulations 2-7

Unit 3

Using Traffic Control Equipment..... 3-1
 3.1 About This Unit..... 3-3
 3.2 Using Personal Protective Equipment..... 3-4
 3.3 What the Employer Must Provide 3-6
 3.4 Maintaining Your Personal Protective Equipment 3-8
 3.5 Traffic Control Equipment and Devices 3-9
 3.6 Maintaining Your Personal Traffic Control Equipment..... 3-10
 3.7 Traffic Control Equipment 3-11
 3.8 Maintaining Traffic Control Devices 3-13

Unit 4

Setting Up, Maintaining and Removing Work Zones 4-1

4.1 About This Unit.....	4-3
4.2 Parts of a Work Zone.....	4-4
4.3 Work Zone Layouts.....	4-7
4.4 Setting Up a Work Zone	4-12
4.5 Inspecting and Maintaining a Traffic Control Zone.....	4-17
4.6 Removing the Work Zone.....	4-18

Unit 5

Working Around Equipment..... 5-1

5.1 About This Unit.....	5-3
5.2 Recognizing Construction Equipment.....	5-5

Unit 6

Basic Traffic Control Skills 6-1

6.1 About This Unit.....	6-3
6.2 Using and Interpreting Signals	6-4
6.3 Controlling Traffic	6-7
6.4 Practical Skills Evaluation: Checklist 1	6-10
Practical Skills Evaluation: Checklist 1	6-13
Practical Skills Evaluation: Setup Diagram 1	6-14

Unit 7

Building on Basic Traffic Control Skills..... 7-1

7.1 About This Unit.....	7-3
7.2 Dangerous Goods and Other Hazards	7-4
7.3 Controlling Uncommon Traffic.....	7-7
7.4 Intermittent Moving Work	7-9
7.5 Controlling Traffic in an Intersection.....	7-10
7.6 Using Two-Way Radios	7-11
7.7 Practical Skills Evaluation: Checklist 2	7-13
Practical Skills Evaluation: Checklist 2	7-15
Practical Skills Evaluation: Setup Diagram 2	7-17

Unit 8

Course Review and Exam 8-1

8.1 About This Unit.....	8-3
8.2 TCP Checklist.....	8-4
8.3 Contact Numbers and Websites.....	8-5

Agenda

Day 1 Course Introduction
Unit 1 - Roles and Responsibilities
Unit 2 - Complying with Regulations and Standards
Unit 3 - Using Traffic Control Equipment
Unit 4 - Setting Up Work Zones
Unit 5 - Working Around Equipment

Review Review workbooks and resource materials
Theory Practice Test

Day 2 Unit 6 - Basic Traffic Control Skills

- Practical Exercise and Competency Demonstration: Controlling a Two-lane, Two-way Roadway, 50 km/h

Unit 7 - Building on Basic Traffic Control Skills

- Practical Exercise and Competency Demonstration: Controlling Work Zones in an Intersection
- Practical Exercise and Competency Demonstration: Controlling Work Zones with One TCP

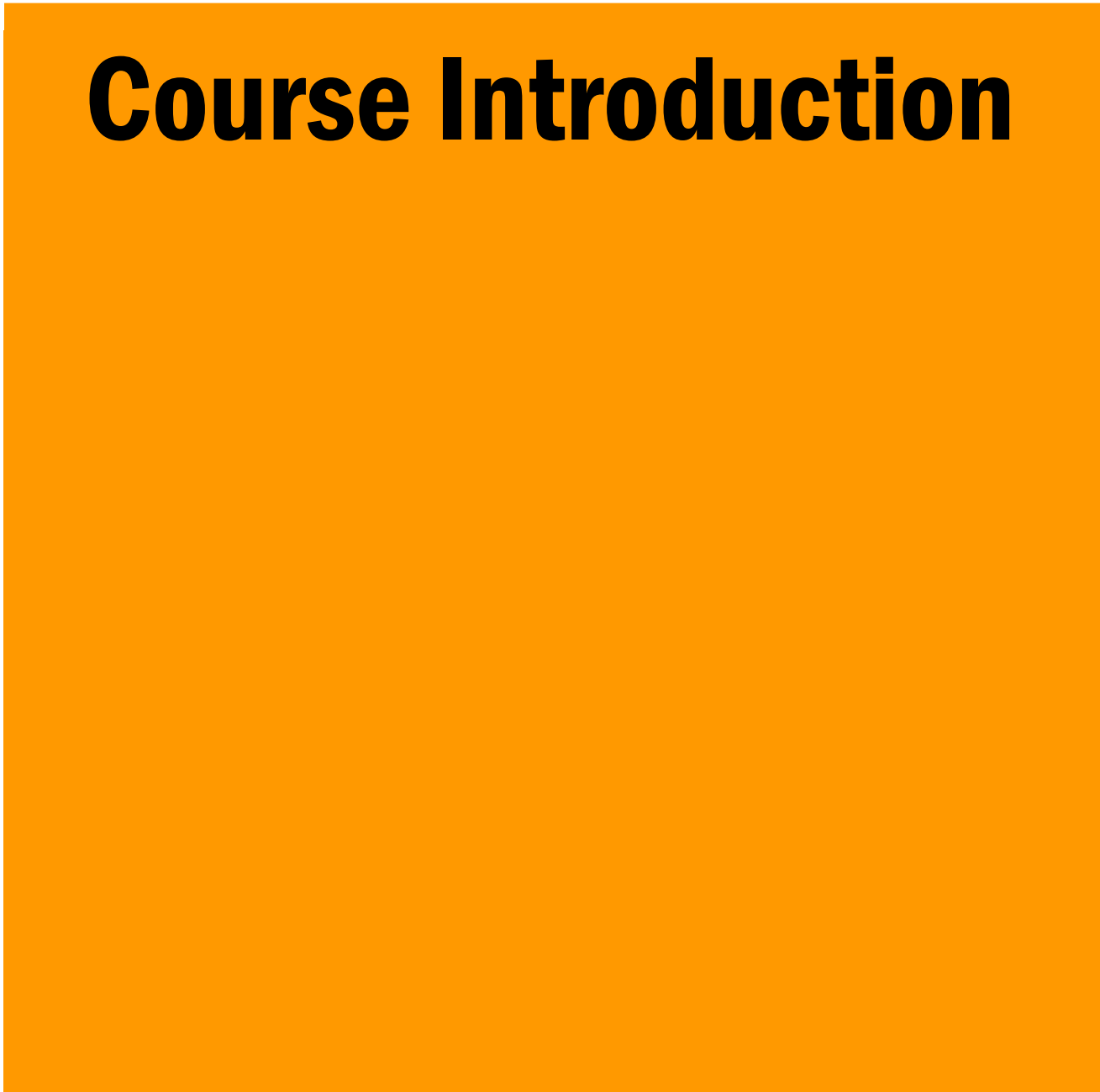
Unit 8 - Course Review

- Traffic Control Person Theory Exam

Note: The instructor may change the order of this agenda



Course Introduction







Welcome

Welcome to the *Traffic Control Person Training Course*. Successful completion of this course will provide you with the qualification that is required to enable you to become a Traffic Control Person (TCP). You will be eligible to work on public roads throughout British Columbia.

The course covers the knowledge and practical skills you will need to work safely according to WorkSafeBC *Occupational Health and Safety Regulation*, Ministry of Transportation (MOT) standards and other regulatory requirements.

At the time of registration in this course, you should have been advised to bring:

- Approved Safety footwear with toe and ankle support
- All weather clothing for outdoor practical sessions
- Your refreshments and lunch, as you may be in a location where you cannot buy food or anything to drink.

The following course materials will be provided to you by your instructor:

- Traffic Control Person Training Participant Guide
- Traffic Control Manual for Work on Roadways, current Office Edition, Ministry of Transportation
- Resource Materials, including:
 - Excerpts from the Occupational Health and Safety Regulation (current edition) and Worker's Compensation Act, Workers' Compensation Board of British Columbia
 - Excerpts from the Motor Vehicle Act and Regulation, Province of British Columbia
 - 7 Steps to Electrical Safety
 - Marks of Safety, Transport Canada
 - Traffic Control Plan Form
- Personal protective equipment except safety footwear
- Traffic control equipment required for the practical sessions



How to Use This Guide

This Guide is designed as your workbook as you complete the *Traffic Control Person Training Course*. It will also be used as a reference during the classroom sessions.

You will see the following icons to refer you to the correct source materials:

 *Worker's Compensation Act or Occupational Health and Safety Regulation*



The Traffic Control Manual for Work on Roadways (the Manual)



The Motor Vehicle Act

Course Description

Traffic Control Person Training is a minimum two day, competency-based course that covers the basic theory and practical skills that are required to become a qualified traffic control person.

The course has four components:

- Classroom Sessions
- Review
- Practical Sessions
- Evaluation



Classroom Sessions

In the classroom sessions, your instructor will review the main points in each unit. She or he will also highlight key topics and procedures through group discussions, demonstrations and displays. These sessions will give you an opportunity to ask any questions or discuss any problems that arise.

Review

Review of the course materials will help ensure you pass the exam. You may wish to complete the Theory Practice Test.

You can review the resource materials and this workbook at home. If you have any questions or concerns, make sure to ask your instructor.

Practical Sessions

The field sessions will give you a chance to practice basic traffic control skills and demonstrate your competence. They will include setting up, controlling and removing work zones on:

- a two-lane, two-way roadway with a speed limit of 50 km/h,
- an intersection, and
- a work zone that uses only one TCP.

Participant Evaluation

Your knowledge and practical skills will be evaluated during the course through:

- a written exam, and
- practical skills evaluation exercises in Units 6 and 7.

You must achieve 80% on the written exam and demonstrate 100% of the competencies in order to pass the course.

The criteria used to evaluate your practical skills are given in the Practical Skills Evaluation Checklists. You will be expected to sign off on the completion of these Checklists.

It will help to read over these exercises before you begin them.



Upon completion of the course, successful participants will be registered with the Construction Safety Network.

Course Evaluation

At the end of the course, you will be asked to fill in an evaluation form. Your comments and suggestions regarding the course assist your instructor to improve the delivery. Your feedback will also be used make changes to the training program where required.

Unit 1



Roles and Responsibilities





1.1 About This Unit

This unit introduces you to the job of Traffic Control Person (TCP). The job is a demanding one. In this unit you will be introduced to some of the requirements of the job. You will also learn about the personal skills that are needed in order to do the work safely and professionally.

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

1.1.1 Performance Objectives

When you have successfully completed 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

Controlling traffic may look easy, but it is not. 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!

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 TCP give. Everyone relies on TCPs to give them proper directions for passing safely through work zones.

What do TCPs do during a day? Here are some of the activities they perform:

- 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 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.



1.2.1 TCPs Required

WorkSafe Read the following excerpt from the *Occupational Health and Safety Regulation*, to learn when TCPs may be used.

18.6 Use of a traffic control person NEW

- (1) A traffic control person may be used only
 - (a) if the use of signs and other traffic control devices and procedures alone cannot provide effective traffic control, or
 - (b) during emergency or brief duration work if it is not practicable to control traffic with signs and other devices and procedures.
- (2) Without limiting the generality of subsection (1), one or more traffic control persons must be used if
 - (a) it is necessary to institute a one-way traffic system by or through a work zone and the circumstances do not allow self-regulating single lane traffic controlled by signs and other devices as specified in the *Traffic Control Manual*, and a traffic signal system is not used,
 - (b) work-related traffic cannot safely self-regulate to move in or out of the work area or safely coordinate with other traffic,
 - (c) an existing traffic control system, or an existing traffic signal light system, is not adequate to regulate traffic,
 - (d) 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, or
 - (f) other traffic control devices are not available in an emergency situation.

[Enacted by B.C. Reg. 242/2006, effective January 1, 2007.]



1.3 Job Locations and Conditions

One of the challenges in working as a TCP is learning how to work 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, or on hills or curves.

1.3.3 Drivers

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.



1.3.4 Environmental Conditions

In the 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

WorkSafe Refer to “Heat Stress” in the OHS Regulation, particularly Section 7.58, 7.59 and 7.61.

Refer to the Booklet “Preventing Heat Stress at Work” which is part of your Resource Materials.

If the body gains heat faster than it removes heat, the 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 to relieve 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.

Cold Stress

WorkSafe 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 will help retain body heat. Choose fabrics such as cotton 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. After all, working makes you break a sweat and you feel warmer. However, if you become fatigued during physical activity, your body loses its ability to retain heat properly. 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 restrictive diet may deprive your body the ability to work well in cold temperatures.

Do not work alone. In cold-stress prone environments, a buddy system should be used. Look out for one another and be alert for the symptoms of cold stress.

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 grayish-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. 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 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

Every employer must ensure that during traffic control operations a supervisor is designated to ensure all requirements are being met. The TCS is a **supervisor who has been designated by the employer as 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. It is important for TCPs to identify the Traffic Control Supervisor (TCS) at the beginning of every shift.

WorkSafe *Refer to OHS Regulation Part 18, Section 18.4*

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

Your supervisor is an important source of information about specific job conditions and requirements, so do not hesitate to ask questions – the life you save may be your own!

When you gain more traffic control experience you may become a Traffic Control Supervisor. Until then, 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

Earlier in this section, onsite safety meetings were mentioned as one of the things that TCPs participate in. On the job, these meetings may be called a variety of names. In this manual, they are called toolbox meetings.

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

WorkSafe *Refer to Part 3, Division 1, Sections 115 and 117 of the Worker’s Compensation Act.*

Often a worksite will have regular on-site safety 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. 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 the course 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 Workers' Compensation Board *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 travelling on roadways throughout the province.

This unit introduces the regulations, standards and procedures with which you must comply when you are working as a TCP.

2.1.1 Performance Objectives

When you have successfully completed 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*
- Locate MoT traffic control standards and procedures in the *Traffic Control Manual for Work on Roadways*, current Office Edition
- Comply with the parts of the *Motor Vehicle Act* and *Act Regulation* that govern the control of traffic in temporary work zones.



2.2 WCB Authority and Jurisdiction

The Workers' Compensation Board of British Columbia (WCB) is an agency that operates under the authority of the *Workers' Compensation Act*. The WCB is dedicated to the safety, protection and good health of workers.

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

2.2.1 Workers' Compensation Act

The Workers' Compensation Act is organized into four parts.

WorkSafe *Excerpts from or summaries of the following important sections are included in your Resource Materials.*

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

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 Regulations (often referred to as “the Regs”) can be found in the new regulation book or downloaded from the WorkSafe BC website. (www.worksafebc.com)

WorkSafe *Excerpts from or summaries of the following important sections are included in your Resource Materials.*

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 will be reviewed in other units of this course.

It is important that you become familiar with WCB requirements so you can prevent injuries to yourself, your co-workers, and the public. You must also follow emergency procedures properly in assisting others. A safe workplace is everyone’s responsibility.

If your employer has health and safety practices that exceed the WCB requirements, you will also be 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*.

The WCB has adopted the standards in the *Traffic Control Manual* as part of the Regulation and WCB field officers will expect compliance with it at worksites.

WorkSafe Refer to OHS Regulation Part 18, Section 18.3

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*, the *Office Edition* and the *Field Edition*.

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



Refer to the following sections in the *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 traffic such as 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 derive their authority to direct traffic under the Motor Vehicle Act.



Refer to the Act Part 3, Chapter 318:

- **Section 122**
- **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 your Resource Materials.

2.4.1 Authority and Jurisdiction

The *Motor Vehicle Act* and *Act Regulations* including Schedule 1 –Signs, 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

It is important to become familiar with the equipment you will use on the job. This unit covers personal protective equipment (PPE) and traffic control equipment.

3.1.1 Performance Objectives

When you have successfully completed 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

The use of personal protective equipment (PPE) on the job is required by the OHS Regulation. You are **always** required to wear the following safety equipment:

- Safety footwear
- Safety headgear
- Approved high visibility garment
- Retroreflective ankle bands
- Retroreflective wrist bands

3.2.2 What You Must Provide

Workers are required to provide the following:

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

WorkSafe Refer to the OHS Regulation part 18, section 18.11

3.2.3 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.



3.2.4 Safety Footwear

Your feet are always subjected to potential hazards at the work zone. Safety footwear conforming to the **CSA Standard CAN/CSA-Z195-M92** must be worn, including protection for the toes, soles and ankles. Running shoes or other footwear is not acceptable.

A small green tag in the shape of a triangle will be attached to the footwear. This indicates the footwear meet a CSA standard. On the underside of the tongue there will be a listing of which standards they meet.

WorkSafe Refer to the OHS Regulation Section 8.22.

3.2.5 Safety Headgear

TCPs are required to wear approved safety headgear that meets or exceeds to *WCB OHS Regulations Section 8.11*. As per the *Traffic Control Manual for Work on Roadways*, the headgear must be orange with a strip of retroreflective 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.

WorkSafe Refer to the OHS Regulation Section 8.11 and 18.10.



3.2.6 Other Personal Equipment

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 will 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

3.3 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.

3.3.1 High Visibility Garment

Your garment (often a vest) must meet or exceed WCB approved standard for high visibility garments. The garment must meet the WorkSafe BC requirements for colours, reflective stripes and configurations: two vertical stripes down the front, two horizontal stripes, one on each side at the waist and one crossed stripe "X" on the back. These requirements ensure that there is 360 degrees of reflective visibility for the person wearing the garment.

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



WorkSafe *Refer to WCB Regulation Section 8.24 “High Visibility Apparel” and “WCB Standard: Personal Protective Equipment Standard 2-1997 High Visibility Garment”.*

3.3.2 Wrist Bands and Ankle Cuffs

Reflective wrist and ankle bands meeting WorkSafe BC standards (fitted with a minimum 5 cm retroreflective strip) must be worn by TCP’s on all high-risk work sites.

WorkSafe *Refer to OHS Regulation Section 8.9.*

3.3.3 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 noise level, 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.

3.3.4 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 will 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.



3.3.5 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.

A tight face seal usually requires a clean-shaven face.

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.

If you are unsure about the protection that you require for the work situation, you should consult with your Traffic Control Supervisor or employer.

3.4 Maintaining Your Personal Protective Equipment

Your equipment will only be 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 retroreflective vests and accessories carefully when they are not in use. Check them before use for cleanliness and damage or missing retroreflective 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.

3.5 Traffic Control Equipment and Devices

Traffic control equipment is 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.

3.5.1 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



3.5.2 Paddles and Flashlights

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

WorkSafe Refer to Part 18, OHS Regulation in particular: Section 18.9 - 18.11

3.5.3 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.

3.5.4 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.

3.6 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

3.7 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*.

3.7.1 Signs

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



Reference: Manual Section 2.1

3.7.2 Channelizing Devices

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

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



Reference: Manual Section 2.2.2

3.7.3 Lighting devices

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

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



Reference: Manual, Section 2.2.3

3.7.4 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: Manual, Section 2.2.4 and 2.2.5.

3.7.5 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 concealed by parked vehicles.



Reference: Manual, Section 2.2.7



3.7.6 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 which 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: Manual Section 2.2.9

3.8 Maintaining Traffic Control Devices

Traffic control devices must be constantly checked and maintained to provide good visibility and perform the function that they are designed for.

Before placing any traffic control device, check it carefully for damage and condition. Avoid the use of any faded or marred retroreflective surface. Replace any traffic control devices that are damaged. Make sure that they are current and have not been hit, displaced, damaged, worn or are deteriorating in any way. This includes checking flashing lights and rotating beacons for operation and brightness. The inspection interval should be frequent enough that the safety of the work zone is maintained.

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.



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 provide you with the knowledge you need to do this properly.

4.1.1 Performance Objectives

When you have successfully completed 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 which will 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

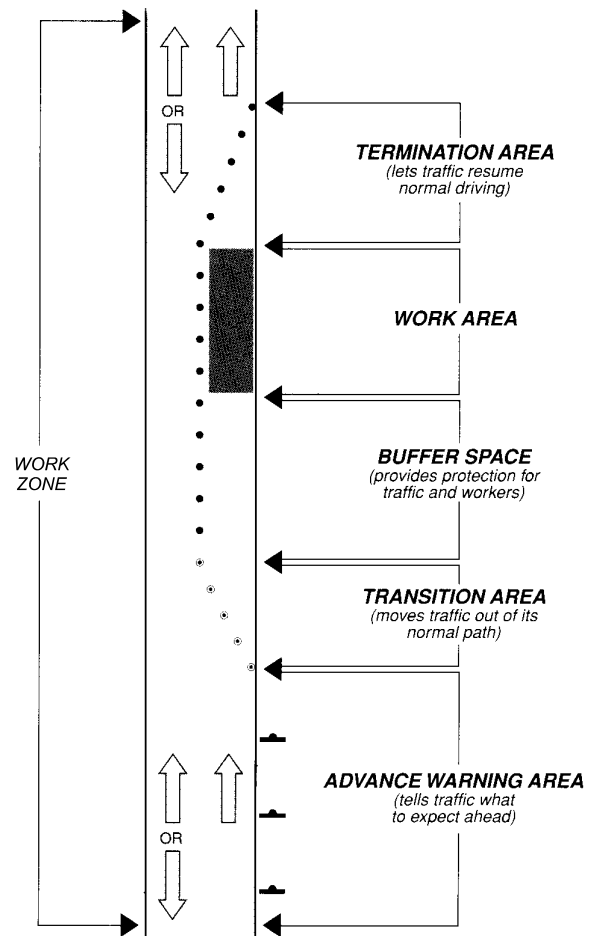


4.2 Parts of a Work Zone

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. Most work zones (Figure 4-1) can be 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, an Advance Warning Area is required for both directions of flow.





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 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. In addition, 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 misleading 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* 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* 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 the area to be constructed or repaired.

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

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 is 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 sign requirements.



Reference Manual 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. 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

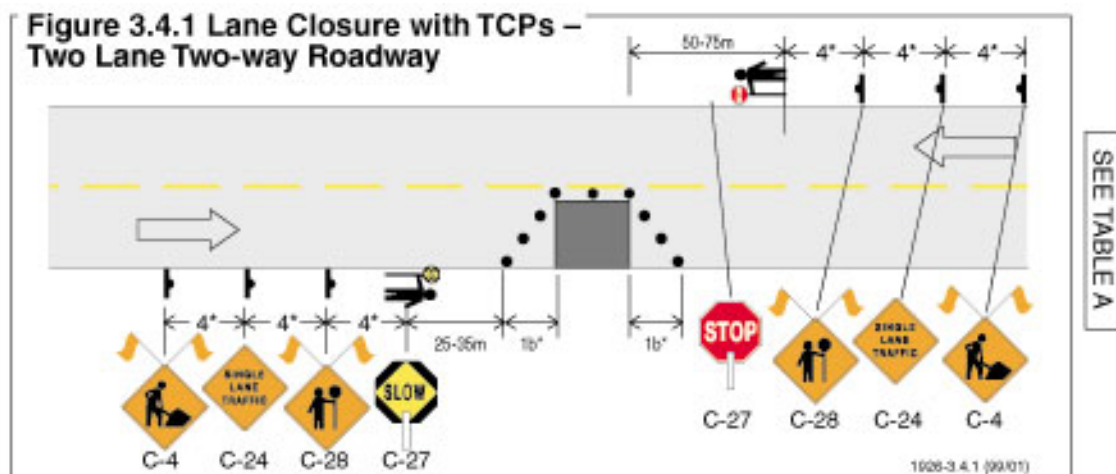
Traffic control in these situations will depend more on the skill of the TCP than the use of traffic control devices.

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

A typical layout is shown in the following figure from the *Traffic Control Manual*.





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. In the field exercise part of this course, you will practice controlling traffic through this type of work zone.

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



Reference: Manual Sections 3, 4 and 5; Tables A and B

The tables have been copied here for your convenience:

TABLE A Positioning of devices on conventional roadways for various speed limits						
*	Regulatory speed limit	50 km/hr	60 km/hr	70 km/hr	80 km/hr	90-100 km/hr
1a	Taper length for lane closure	35 (1:10)	55 (1:15)	75 (1:20)	90 (1:25)	110 (1:30)
1b	Taper length for shoulder work or where TCPs are used	5	8	10	12	15
2	Maximum distance between cones or tubular markers	10	10	10	10	10
3	Minimum tangent distance between tapers	30	60	90	120	150
4	Distance between construction signs	40	60	80	100	150

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.

*	Regulatory speed limit	80-110 km/hr
1	Taper length for lane closure	165 (1:45)
2	Maximum distance between tubular markers for (1)	10
3	Minimum distance between tapers	200
4	Distance between construction signs	200

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

Cones 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* shall be used. 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 repositioned 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, 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:

- Traffic control devices should be placed 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 actual 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) as required by the *Traffic Control Manual for Work on Roadways*.
- 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 travelling 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 travelling 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 installed, it is important that you and your Traffic Control Supervisor ensure that it functions as intended and that any adjustments resulting from an inspection process are made.

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.

On low volume roadways, devices should be removed 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

Working around equipment can be dangerous. It is important to become familiar with the operation of various types of equipment and the activities they perform so you can avoid accidents and control traffic in a safe and effective manner. You must also learn to recognize the hand signals that are used by the construction crew and equipment operators.

This unit will help you to identify the most common types of equipment and become familiar with their operation. It also introduces common signals used by equipment operators and construction crews.

5.1.1 Performance Objectives

When you have successfully completed 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

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 be aware of the hazards associated with each type of equipment.



You should learn to interpret signals used by equipment operators and crew workers. These signals will 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. Your instructor will demonstrate common hand signals during the classroom session.

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

The operator may not see you. 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.



Figure 5-1



Figure 5-2



Figure 5-3

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).

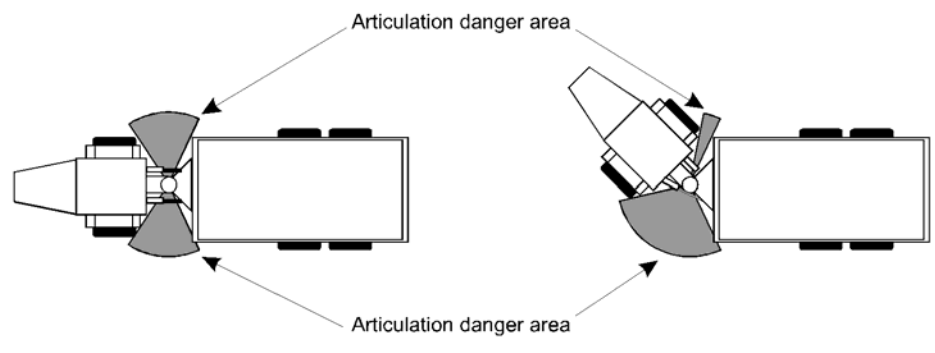


Figure 5-4 Danger area on articulated machines

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.



Figure 5-5

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).



Figure 5-6

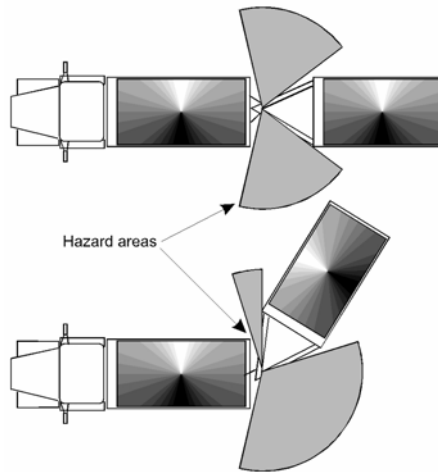


Figure 5-7 Dump truck with a trailer

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 caution should be taken when controlling these machines.



Figure 5-8



Figure 5-9

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.



Figure 5-10

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.



Figure 5-11

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.

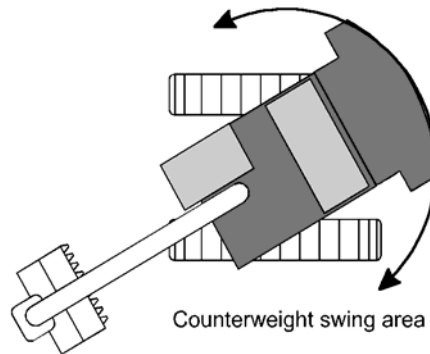


Figure 5-12 Counterweight hazard area



5.2.7 Loaders and Backhoes

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.

Backhoes have a digging arm and often a loader as well.



Figure 5-13



Figure 5-14

5.2.8 Skid steer loaders

Skid steer loaders (Figure 5-15), commonly called bobcats, are in common use on most 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.



Figure 5-15

5.2.9 Paving machines

Paving machines (Figure 5-16, 17, 18, 19) 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 and direct contact should be avoided.

Paving machines have many moving parts such as the side extensions and hopper wings. Paving operations also involve



Figure 5-16



Figure 5-17



Figure 5-18



Figure 5-19

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 the pre-work toolbox meeting.



Figure 5-20

5.2.10 Aerial Lift Vehicles and Auger Trucks

Aerial lift vehicles (Figure 5-20) 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. There is always the chance of the auger losing grip and the pole falling uncontrolled during this operation.

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



Figure 5-21

5.2.11 Tow trucks

Tow trucks (Figure 5-21) are recovery vehicles usually employed to 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 and 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 5-22 and 5-23)

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.



Figure 5-22



Figure 5-23

5.2.13 Wood chipper

Wood chippers (Figure 5-24) 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.



Figure 5-24



Figure 5-25

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 5-25). 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.

Unit 6



Basic Traffic Control Skills





6.1 About This Unit

The control of traffic depends entirely on communication. Your ability to signal your instructions clearly to motorists, workers, pedestrians and equipment operators will determine how effectively and safely you can control the work zone traffic flow. This unit covers the basic communication skills you will need to control traffic. It also includes a practical exercise that will allow you to practice setting up a work zone and controlling traffic through it.

6.1.1 Performance Objectives

When you have successfully completed this unit you will be able 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



6.2 Using and Interpreting Signals

Your job as a TCP requires that you be able to 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 have indicated.

You will have to 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

WorkSafe Refer to Part 18, OHS Regulation in particular, Section 1812 - 18.14.

The basic signals to control traffic are:

1 TO STOP TRAFFIC

<p>Normal</p>	<p>(A) By Day</p> <ul style="list-style-type: none"> • Face traffic. • Display static "STOP" paddle in left hand. • When approaching vehicle has almost stopped, use right arm to indicate stopping point. <p>*Alternative Reverse of normal signal.</p>
<p>Normal</p>	<p>(B) By Night</p> <ul style="list-style-type: none"> • Face traffic. • Display static reflectorized "STOP" paddle in left hand and flashlight, with red signalling baton attached, in right hand. • Move right arm from 3 to 6 o'clock. • When approaching vehicle has almost stopped, use flashlight/baton to indicate stopping point. <p>*Alternative Reverse of normal signal.</p>

2. TO SLOW TRAFFIC

<p>Normal</p>	<p>(A) By Day</p> <ul style="list-style-type: none"> • Face traffic. • Display static "SLOW" paddle in left hand. • If traffic slows below desired speed, give appropriate "Move Traffic" signal. <p>*Alternative Reverse of normal signal.</p>
<p>Normal</p>	<p>(B) By Night</p> <ul style="list-style-type: none"> • Face traffic. • Display static reflectorized "SLOW" paddle in left hand, and flashlight with red signalling baton attached, in right hand. • Move right arm from 3 to 6 o'clock. • If traffic slows below desired speed, give appropriate "Move Traffic" signal. <p>*Alternative Reverse of normal signal.</p>

*Use Alternative Signal only when traffic control person's station is located on the right side of traffic under his or her control.



6.2.2 Signalling Other TCPs

You will have to signal another TCP and get signals from them. When two or more TCPs are working as a team, one must be responsible for traffic co-ordination. That person will issue 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.

WorkSafe Refer to OHS Regulation Section 18.13 and 18.14.

<p>1. TO INSTRUCT A PARTNER TO HALT TRAFFIC FROM OTHER DIRECTION</p>		<p>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.</p>
<p>2. TO INDICATE AN ALL CLEAR SITUATION AND INSTRUCT PARTNER TO ALLOW TRAFFIC TO PROCEED FROM OTHER DIRECTION</p>		<p>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.</p>
<p>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.</p>		<p>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.</p>



6.3 Controlling Traffic

TCPs must be visible to the traffic for 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 Section 2.3 and WorkSafe BC part 18, section 18.8

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 in accordance with the following:

- 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 first you need to make eye contact with the driver to ensure he or she 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 be 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.
- 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 none of the above are possible, stand at the most appropriate location to direct traffic through a work area, consistent with WCB regulations.



6.3.2 Remaining on Duty

TCPs must remain at their assigned traffic control stations until another TCP or the Traffic Control Supervisor relieves them. 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 Professional Conduct

TCPs should be courteous but firm with motorists, pedestrians and workers. They should also have a sense of responsibility for the safety of the work crew and the general public.

6.3.4 Traffic Control Violations

You should keep accurate records of 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



6.4 Practical Skills Evaluation: Checklist 1

6.4.1 Controlling a Two-lane, Two-way Roadway, 50 km/h

This exercise will give you the opportunity to practice controlling traffic. You will assist in setting up a work zone, controlling traffic around it, and removing the work zone.

6.4.2 Materials and Equipment

The following equipment and materials are required for this exercise:

- *Traffic Control Manual for Work on Roadways*, Office Edition
- Personal protective equipment
- Signaling equipment

Make sure you have these on hand before you begin.

6.4.3 Procedures

In the classroom

1. Review the work zone setup with your instructor.
2. Put on your personal equipment.
3. Collect all the traffic control devices you will need such as signs, cones and tubular markers.



In the field

4. Set up a work zone on a two-lane, two-way roadway with a maximum speed limit of 50 km/h according to the standards in the *Traffic Control Manual for Work on Roadways* (Figure 3.4.1 Lane Closure with TCPs, Two-lane, Two-way Roadway)
 - Measure distances and set up signs
 - Measure distances and set up cones or tubular markers
 - Locate a safe escape route
5. Control traffic around the work zone, using all safety precautions and following the directions of your instructor.
 - Use visual signals to communicate with motorists and other TCPs including:
 - Stop and slow using a paddle with or without a staff
 - Move traffic ahead
 - Halt traffic from the other direction
 - Allow traffic to proceed from the other direction

As you are practicing these skills, your instructor will make comments and suggestions for improving them.

6. Remove the work zone including all traffic control devices.





Practical Skills Evaluation: Checklist 1

Date		Name	
Location		Instructor	

The instructor will check your skills by marking yes or no for each skill and writing any comments that may be useful. You must demonstrate competence in all skills listed for the evaluation to complete your training.

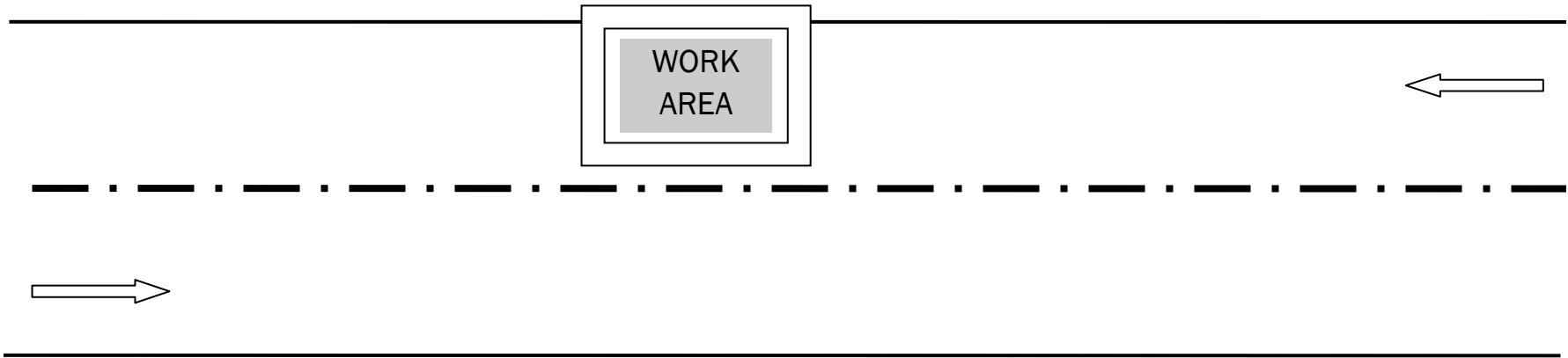
Controlling a Two-lane Two-way Roadway, 50 km/h		Yes	No	Comments
1. Assisted to set up a work zone on a two-lane, two-way roadway; speed limit 50 km/h.	• Followed standards in the Manual (Figure 3.4.1)	Yes	No	
	• Measured distances and set up signs	Yes	No	
	• Measured distances and set up cones or tubular markers	Yes	No	
	• Located a safe exit route	Yes	No	
2. Used visual signals to communicate with motorists and other TCPs including:	• Stop and slow	Yes	No	
	• Move ahead	Yes	No	
	• Halt traffic from other direction	Yes	No	
	• Allow traffic to proceed from other direction	Yes	No	
3. Used audible signals to communicate with motorists and other TCPs.		Yes	No	
4. Positioned self in an area that provided maximum visibility and a safe escape route.		Yes	No	
5. Controlled traffic through the work zone safely and efficiently.		Yes	No	
6. Removed signs in the correct order.		Yes	No	

Student completed each skill	<input type="checkbox"/>	Instructor Signature	
Student required to repeat	<input type="checkbox"/>	Student Signature (confirming instructor has reviewed this with you)	

Practical Skills Evaluation: Setup Diagram 1

Mark on the diagram where you would place the TCPs and the traffic control devices for this job site. Then 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. Use Table A to assist you.



Instructor's Comments _____

Unit 7



Building on Basic Traffic Control Skills





7.1 About This Unit

This unit introduces hazardous materials and situations, as well as controlling traffic in more complex situations. It builds on the traffic control skills you developed in other units. It includes the second practical skills demonstration for the course.

7.1.1 Performance Objectives

When you have successfully completed 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*
- Demonstrate 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 will 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 will allow 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 governing the transportation of any goods that are potentially 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

Refer to the Marks of Safety handout provided by your instructor. Most vehicles that carry dangerous goods must display a special placard that identifies the goods that are being transported. 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 your Resource Materials.

7.2.2 Hazardous Spills

Procedures

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 highway 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 and Mains

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 sewer lines may also be explosive as they can produce gas. 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 is included in your 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 encounter a disabled vehicle notify your supervisor. Do not leave your post unattended; however, you may have to move your control location to include the disabled vehicle.



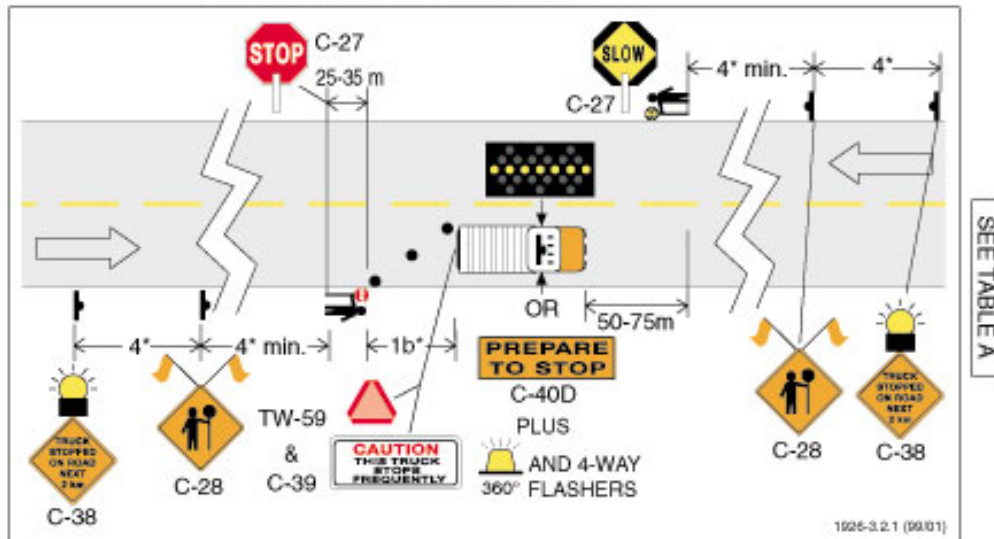
7.4 Intermittent Moving Work

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. All signs must be placed within 2 km of it. 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 as follows:

**Figure 3.2.1 Intermittent Moving Work
– Two Lane Two-way Roadway**



SEE TABLE A

1025-3.2.1 (09/01)



7.5 Controlling Traffic in an Intersection

The configuration, volume of traffic and existing control system will affect the type and positioning of TCP's and devices for intersection work. Work in or near intersections may require the detouring of traffic and pedestrians, the changing of zone area lengths and the establishment of different types of buffer areas.

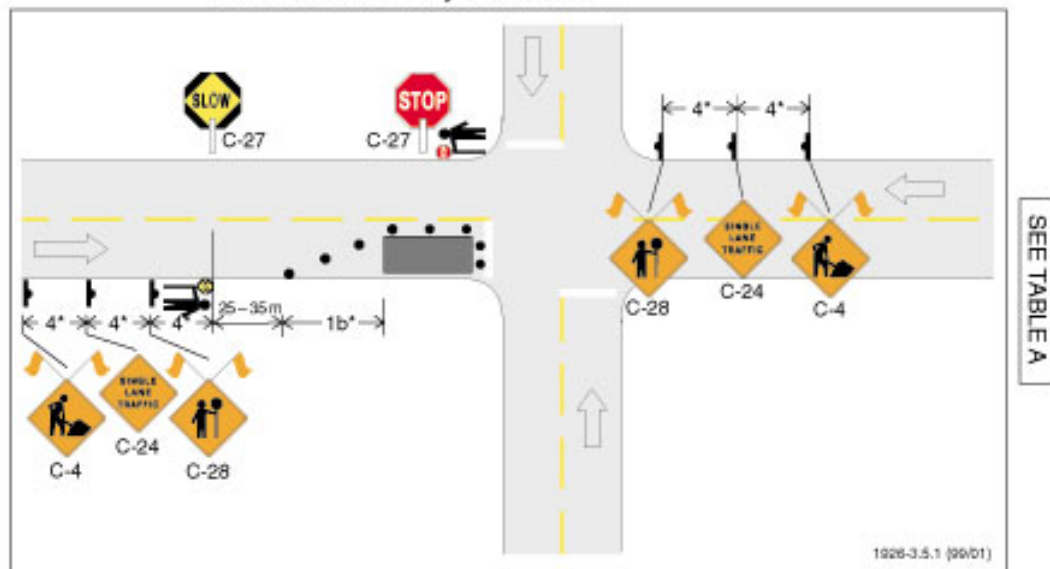
Avoid contradictory instructions to drivers. It may be necessary to place covers over stop signs or lights or to have traffic signals placed in "flash" mode.

You may be able to position yourself at the corner of the open lane you are controlling, maintaining the shoulder as an escape route. You may have to move back and forth between the shoulder and a position part way out into the intersection. In some cases it may be necessary to control traffic from within the intersection. Extreme caution must be taken as you may not have an escape route.

Complex, multi lane intersection work will require additional planning and careful consideration of positioning for TCP's or devices.

A typical layout for a two-lane, two way intersection follows:

**Figure 3.5.1 One Lane Closed (Near Side)
– Two Lane Two-way Intersection**





Additional Reference: Manual Figure 3.5.2

7.6 Using Two-Way Radios

You may not always be able to visually signal other TCPs, other 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.

WorkSafe *Read Sections 21.61 and 21.62 of the OHS Regulation*



7.7 Practical Skills Evaluation: Checklist 2

7.7.1 Controlling Work Zones with One TCP, an Intersection and Intermittent Moving Work

This exercise will give you more practice in setting up work zones and controlling traffic through them.

You will be asked to assist in setting up, controlling traffic through and removing the following types of work zones:

- Work zone requiring only one TCP
- Work zone for a two-lane, two-way intersection
- Work zone with intermittent moving work (optional)

7.7.2 Materials and Equipment

The following equipment and materials are required for this exercise:

- Traffic Control Manual for Work on Roadways, Office or Field Edition, supplied by your instructor.
- Personal protective equipment
- Signaling equipment

Make sure you have these on hand before you begin.

7.7.3 Procedures

In the classroom

1. Review the work zone setups for each of the scenarios with your instructor.
2. Put on your personal equipment.
3. Collect all the traffic control devices you will need such as signs, cones and tubular markers.



In the field

4. Set up a work zone that requires only one TCP according to the standards in the Traffic Control Manual for Work on Roadways. (Figure 3.4.1 Lane Closure with TCPs, Two-lane, Two-way Roadway).
 - Measure distances and set up signs
 - Measure distances and set up cones or tubular markers
 - Locate a safe exit route
 - Select a highly visible and safe position for controlling traffic
 - Control traffic through the work zone
 - Remove the work zone including all traffic control devices
5. Set up a work zone which includes an intersection, according to the standards in the Traffic Control Manual for Work on Roadways (Figure 3.5.1 or 3.5.2)
 - Measure distances and set up signs
 - Measure distances and set up cones or tubular markers
 - Locate a safe exit route
 - Select a highly visible and safe position for controlling traffic
 - Control traffic through the work zone
 - Remove the work zone including all traffic control devices
6. (optional) Set up a work zone with intermittent moving work



Practical Skills Evaluation: Checklist 2

Date		Name	
Location		Instructor	

The instructor will check your skills by marking yes or no for each skill and writing any comments that may be useful. You must demonstrate competence in all skills listed for the evaluation to complete your training.

Skill		Yes	No	Comments
Controlling Work Zones in Two-lane, Two-way Intersections				
1. Assisted to set up work zone for a two-lane, two-way intersection.	• Followed standards given in the Traffic Control Manual for Work on Roadways (Figure 3.5.1 or 3.5.2)	Yes	No	
	• Measured distances and set up signs	Yes	No	
	• Measured distances and set up cones or tubular markers	Yes	No	
	• Located a safe exit route	Yes	No	
2. Used visual signals to communicate with motorists and other TCPs including:	• Stop and slow	Yes	No	
	• Move ahead	Yes	No	
	• Halt traffic from other direction	Yes	No	
	• Allow traffic to proceed from other direction	Yes	No	
3. Used audible signals to communicate with motorists and other TCPs/workers.		Yes	No	
4. Positioned self for controlling traffic in an area that provided maximum visibility and a safe escape route.		Yes	No	
5. Controlled traffic through the work zone, safely and efficiently.		Yes	No	
6. Removed signs, starting with ones in the termination area and moving towards the advanced warning area		Yes	No	

Skill		Yes	No	Comments
Controlling Work Zones with One TCP				
1. Assisted to setup a work zone that requires only one TCP.	<ul style="list-style-type: none"> Followed standards given in the Traffic Control Manual for Work on Roadways (Figure 3.4.1) 	Yes	No	
	<ul style="list-style-type: none"> Measured distances and set up signs 	Yes	No	
	<ul style="list-style-type: none"> Measured distances and set up cones or tubular markers 	Yes	No	
	<ul style="list-style-type: none"> Located a safe exit route 	Yes	No	
2. Used visual signals to communicate with motorists and other workers including:	<ul style="list-style-type: none"> Stop and slow 	Yes	No	
	<ul style="list-style-type: none"> Move ahead 	Yes	No	
	<ul style="list-style-type: none"> Halt traffic from other direction 	Yes	No	
	<ul style="list-style-type: none"> Allow traffic to proceed from other direction 	Yes	No	
3. Used audible signals to communicate with motorists and other workers.		Yes	No	
4. Positioned self for controlling traffic in an area that provided maximum visibility and a safe escape route.		Yes	No	
5. Controlled traffic through the work zone, safely and efficiently.		Yes	No	
6. Removed signs, starting with ones in the termination area and moving towards the advanced warning area		Yes	No	

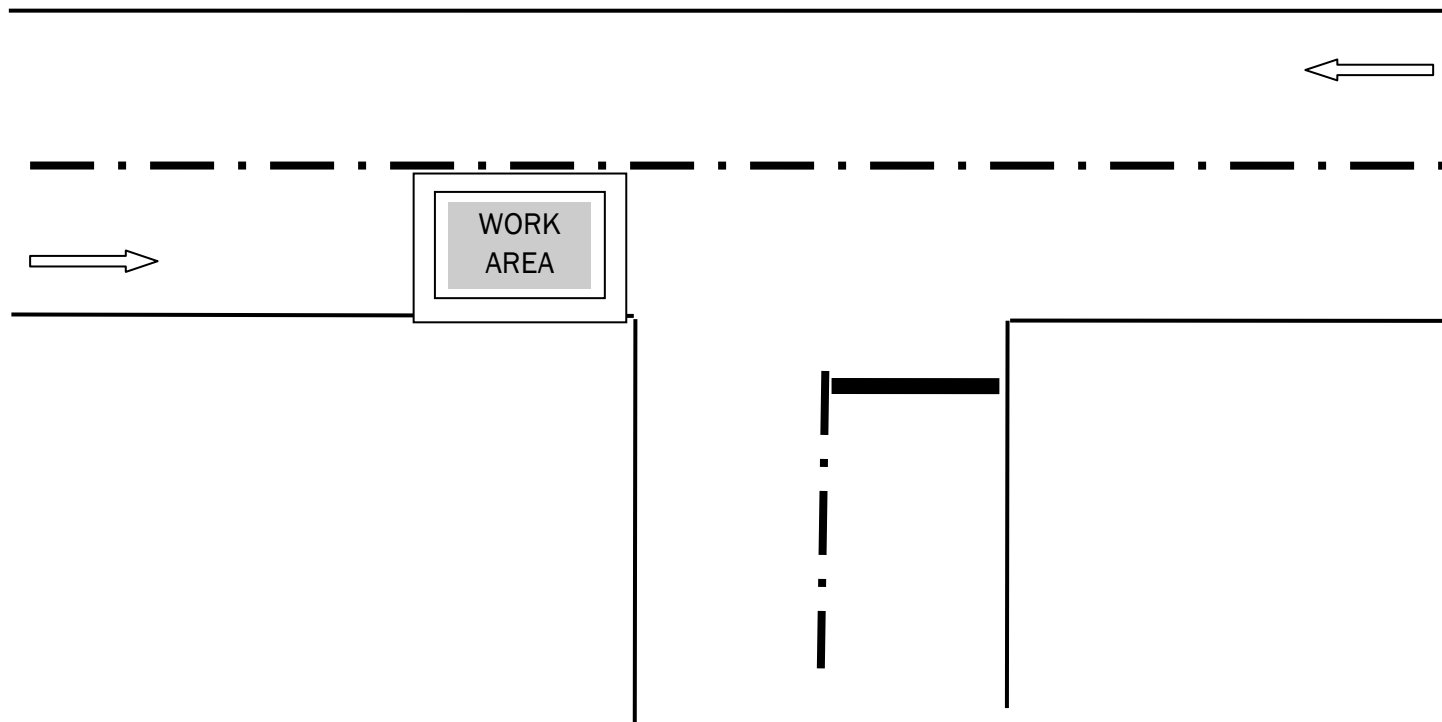
Student completed each skill	<input type="checkbox"/>	Instructor Signature	
Student required to repeat	<input type="checkbox"/>	Student Signature (confirming instructor has reviewed this with you)	



Practical Skills Evaluation: Setup Diagram 2

Mark on the diagram where you would place the TCPs and the traffic control devices for this job site. Then 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.



Instructor's Comments _____

Unit 8



Course Review and Exam





8.1 About This Unit

This unit will help you review the knowledge and skills covered in the course. After the course review, you will be asked to complete a written examination, which will be reviewed by your instructor and discussed with you.



8.2 TCP Checklist

- Check with the crew leader or your Traffic Control Supervisor before your shift starts for the day's activities. Note what equipment will be working on the site and what activities it will be doing.
- Check location of the first aid station on a new worksite and identify workers with first aid certification.
- If you become the first aid attendant for the job, identify the person who will replace you if you must respond to an emergency.
- Check signals used by crew and equipment operators so you will be able to direct traffic safely and allow the work to progress efficiently.
- Check that the work zone setup follows the traffic plan or work zone layout and is in accordance with standards in the *Traffic Control Manual for Work on Roadways*.
- Ensure that all your personal protective equipment meets WCB standards.
- Monitor the work zone throughout the day to ensure that all traffic devices are in place. Note any changes in traffic patterns or speed of the vehicles. They may indicate that the signs or devices are out of place.
- Adjust the work zone setup if required, as the day progresses.
- From your position observe the work area, equipment movements and the activities of the workers. Note any changes in routine and try to determine the cause.



8.3 Contact Numbers and Websites

Government Publication Services

Website: <http://www.publications.gov.bc.ca>

Phone: (250) 387-6409 or 1-800-663-6105

Fax: (250) 387-1120

Email: QPPublications@gems5.gov.bc.ca

Ministry of Transportation

Website: <http://www.gov.bc.ca/tran/>

WorkSafeBC

Website: <http://www.worksafebc.com/>

Phone: (604) 276-3100 or 1-888-621-7233

Transport Canada, Transportation of Dangerous Goods

Websites: <http://www.tc.gc.ca/tdg/menu.htm>

<http://www.tc.gc.ca/tdg/documents/tp11504e.htm>

Phone: (604) 666-3518

Fax: (604) 666-7255

Accidents and Emergencies

Emergencies (in most of British Columbia) dial 911