THE CITY OF CORNER BROOK

Occupational Health & Safety Program

MUNICIPAL TRAFFIC CONTROL MANUAL

REVISION 2 EDITION
APRIL 2012

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INTRODUCTION

1.1 SCOPE

This Municipal Traffic Control Manual is intended to act as a guide for the use of proper traffic control related to temporary work carried out in the City of Corner Brook, which may expose our employees, citizens, or equipment to hazards associated with construction. The details contained within this manual will help ensure supervisors, employees, and contractors plan and use proper traffic control for the various types of work carried out and to minimize the risk of hazards associated with their work around traffic.

Construction within The City of Corner Brook requires employees to work around traffic hazards and requires citizens to maneuver through changes to normal driving conditions. Through these work zones, temporary condition signs and devices, control vehicles, and in certain instances Traffic Control Persons (TCP) will be used to regulate, warn and guide drivers where construction, maintenance or utility activities, or other temporary and unusual conditions are on or adjacent to the road. To be effective, the City will ensure the all traffic control devices meet the five basic requirements below:

a) fulfill a need;
b) command attention;
c) convey clear and simple meaning;
d) provide adequate time for a proper response; and
e) command respect of road users.

Various references were used in the creation of this document. They include, but are not limited to, the Transportation Association of Canada's (TAC) Manual of Uniform Traffic Control Devices for Canada, the Newfoundland Labrador Department of Transportation & Works Traffic Control Manual (April 2011), and The City of St. John's Specifications for Temporary Signs & Devices.

FUNDAMENTAL PRINCIPLES

As conditions may change over the length of a work zone or vary over a short period of time and, by their nature, are often unfamiliar to drivers, fundamental principles should be followed when implementing a temporary work zone. When preparing and setting up a temporary work zone, these principles must be followed:

- Traffic should be routed through areas in situations that are as similar as possible to the regular/normal conditions, but that also ensures safe conditions for both employees and public traffic.
- For larger significant projects, the City and contractors should complete a traffic control plan to accompany their pre-job hazard assessment.
- Sudden changes should be avoided – i.e. sudden lane narrowing and closures resulting in the need for sudden speed reductions.
- The Supervisor/Contractor will use whichever measure or combination of proper signs, devices, markers, pavement markings, and TCPs that is appropriate for the type of work being carried out.
- Regular check-ins will be carried out by the Supervisor/Contractor to make sure the traffic control plan stays appropriate as the work progresses/changes – i.e. covering or removing any signs/devices that are no longer applicable.
- Minimize the work zone as much as possible as priority should be given to public traffic attempting to get through.
- Guide traffic in a clear path as it approaches and travels through the temporary work zone. This is accomplished through:
    - Adequate warning, delineation, and channelization;
    - Placing signs where they do not pose a hazard – the public should be able to easily understand so they can adjust driving safely;
    - Aiming signs where they are most visible to drivers;
    - Covering or removing signs that do not apply to the temporary work zone;
    - Inspecting signs/devices frequently and deciding if they need to be changed or repositioned based on changes to the work.
- When work is completed or stopped for a period of time, uncover or reinstall all permanent signs that exist under normal traffic conditions.

IMPLEMENTATION REQUIREMENTS

1) Signs/devices used in our work are intended as a measure to minimize the risk of traffic hazards to the public and workers. Further information about temporary condition signage shall come from the TAC Manual of Uniform Traffic Control Devices for Canada, Part D – Temporary Conditions.
2) For long term significant projects, the Supervisor/Contractor must conduct frequent checks of the traffic control used to make sure it remains adequate as the work changes.
    a. The Supervisor/Contractor must keep a record in a separate field book, of all traffic control signs/devices used on a project. Daily status of traffic control must be noted, along with any changes to adjust with the progression of work or changing location. The time and date must be noted for any changes.
3) All signs/devices must meet the TAC Manual of Uniform Traffic Control Devices for Canada relating to shape, colour, size, and position.
4) Within 24-hours of being notified, the City/Contractor must replace or repair all signs/devices that are poorly maintained, defaced, damaged, or dirty, to ensure they stay effective.
5) Work will not start until proper traffic control has been put in place.
6) Signs/devices must be removed immediately after the work has been finished. Any permanent signs that may have been covered up must be uncovered.
7) Objects on or next to the street that may pose a hazard to traffic must be marked with a "Hazard Marker."
8) Construction speed zones must be implemented, as per the directions in this manual.
9) After dark all signs must be checked and documented that they are visible – those that are not clear after dark must be cleaned, replaced, adjusted, or illuminated

1.2 AUTHORITY

Relating to traffic control procedures, the Minister of Government Services has the authority to approve "procedures established by a municipality," as per section 373 of the Newfoundland Labrador Occupational Health and Safety (OHS) Regulations, 2009. Once approved by the Minister, the practices and procedures outlined in this document will be used by the City of Corner Brook and its Contractors for its traffic control needs. In the event there are situations not covered under this document, the Department of Transportation & Works Traffic Control Manual (April 2011) will apply, as per section 373 of the OHS Regulations (April 2009).

1.3 DISCLAIMER

This manual is intended to direct those people in charge of traffic control in temporary work zones for the City of Corner Brook. The information contained here are minimum requirements outside of the Department of Transportation & Works Traffic Control Manual (April 2011). The requirements may have to be supplemented or modified where necessary to ensure safety at each temporary work zone. Consistency across the set up of City temporary work zones will improve driver recognition, interpretation, and ultimately safety.

1.4 COMPLIANCE

Compliance with the regulations contained in this manual is mandatory. Supervisors and Contractors must be educated on the consequences of not following these guidelines – which will include any or all of the following:

- Increased risk of injury;
- Department of Government Services contacted for contravention of the Provincial OHS Act;
- Discipline of the individual(s) in charge of traffic control;
- Termination of contract.

HOW TO CHOOSE A TRAFFIC CONTROL PLAN

2.1 DURATION OF WORK

Practices outlined in this manual are intended to apply to urban areas – which are typically categorized by relatively low speeds posted at 60 km/hour or less, a wide range of traffic control volumes, narrower traffic lanes, frequent intersections and turning movements, significant pedestrian and cyclist traffic, and multiple roadside obstacles.

The duration of work is a major factor when choosing traffic control measures, including the number and types of signs/devices to use in temporary work zones. Durations are broken down into four categories of Mobile Work, Very Short-Term Work, Short-Term Work, and Long-Term Work:

a) **Mobile Work** – involves work that is done while moving continuously, usually at low speeds, or intermittently, with periodic stops which do not exceed a few minutes in duration. The advance warning area of the temporary work zone moves with the activity area. For some continuously moving

operations, such as street-sweeping, snow removal, street salting/sanding, etc., where volume is light and visibility is good, a well signed work vehicle with an operational, amber 360° beacon and 4-way flashers may be sufficient. If volume and/or speed are higher, a control vehicle should follow the work vehicle. In addition, vehicles may be equipped with devices such as flashing vehicle lights, truck-mounted attenuators and appropriate signs. ***See diagrams D4-1 to D4-3***.

b) Very Short-Term Work – occupies a fixed location for less than 30 minutes. The work site may be moved along the road and make frequent, short stops. This may include, but not limited to, pothole patching, arrow, line, and crosswalk painting, minor road maintenance, crack sealing, and stormwater catchbasin cleanout, street scraping/pile removal, manhole checks, hanging/watering of flower baskets etc. The time required to set up and remove normal traffic control devices in these situations often exceeds the time required to perform the work itself. Consequently, the use of active devices such as flashers and flashing arrow boards, along with simplified set up and removal procedures, is advocated for very short-term work. The use of these active devices ensures adequate traffic control, reduces worker time spent exposed to traffic hazards and yields more efficient, productive work operations. ***See diagrams D4-4 to D4-24.***

c) Short-Term Work – characterized as stationary work that requires a separate work space that is continuously attended by workers for more than 30 minutes and less than 24 hours. It may include maintenance, construction, or utility work, line dotting, curb work, sidewalk work, asphalt cuts/paving, water & sewer work, putting up street signs, etc. The work crew is present to monitor and maintain the temporary traffic control zone. The road is completely restored and returned to normal operation when the work is complete. ***See diagrams D4-4 & D4-5, D4-8 to D4-26.***

d) Long-Term Work – this is stationary work that requires a separate work space for longer than 24 hours. At long-term temporary work zones, there is ample time to install and to realize the benefits from the full range of traffic control devices and procedures that are available for use. ***See diagrams D4-4 & D4-5, D4-8 to D4-22, D4-27 to D4-37.***

2.2 NUMBER OF LANES

When choosing an appropriate traffic control plan, the number of lanes on the roadway where the work is being carried out will have an impact on the decision of which plan to use. For this purpose, roadways are broken into two categories of 2-lane Roadways and Multi-lane Roadways:

a) 2-lane Roadways – these are described typically as two lanes travelling in opposing directions. This will apply to most streets throughout the City of Corner Brook. ***See diagrams D4-1 & -2, D4-4 & -5, D4-8 & -9, D4-22 & -23, D4-27.***

NOTE: for 2-lane Roadways where both lanes are travelling in the same direction (i.e. West Street), and work must occur in the centre of the road, consideration may be given to close down both lanes.

b) Multi-lane Roadways – any roadways that contain more than two lanes, which can include two lanes travelling in the same direction and two lanes going in the opposite direction; or left and right turning lanes. This may also be instances where a portion of the road is a 2-lane Roadway, and another portion of the road has multiple lanes (i.e. Mount Bernard Avenue – has two lanes in the middle, but near the intersections at both ends, also has turning lanes. Traffic control plans for 2-lane Roadways would apply to the 2-lane portion of Mount Bernard; whereas plans for Multi-lane Roadways would apply to the portions that have multiple lanes). ***See diagrams D4-1 & -3, D4-6 & -7, D4-10 to -22, D4-24 to -26, D4-28 to -32.***

Examples of streets within the City of Corner Brook that are considered multi-lane, or have multi-lane sections include, but are not limited to:

- Confederation Drive
- O'Connell Drive (2-lane section between Elswick and Margaret Bowater Park; and 2-lane section between Bliss Street and Lewin Parkway)
- Griffin Drive (leading up to the Lewin Parkway intersection)
- St. Mark's Avenue & Prince George Avenue (near the Lewin Parkway intersection)
- Herald Avenue (near the Mount Bernard intersection)
- Mount Bernard Avenue (near both the Herald Avenue and O'Connell Drive intersections)
- Main Street (near the Humber Road and West Street intersections)
- Humber Road (near the Main Street intersection)
- Maple Valley Road (near the Lewin Parkway intersection)
- Mill Road (near the Lewin Parkway and Main Street intersections)
- Elizabeth Street (near the O'Connell Drive and Grenfell Drive intersections)
- University Drive (near the O'Connell Drive intersection)

2.3 LOCATION OF WORK

The level of encroachment onto the roadway is a contributing factor in choosing proper traffic control measures to implement. There are four levels of work location which will apply to making your choice of traffic control plans:

a) Off-shoulder Work – is work within the street right-of-way, but completely beyond the shoulder of the road. Workers, equipment, and vehicles do not encroach on the shoulder. Off shoulder work requires no traffic control signs or devices if the work area is beyond the shoulder and all work vehicles, equipment and personnel are beyond the shoulder.

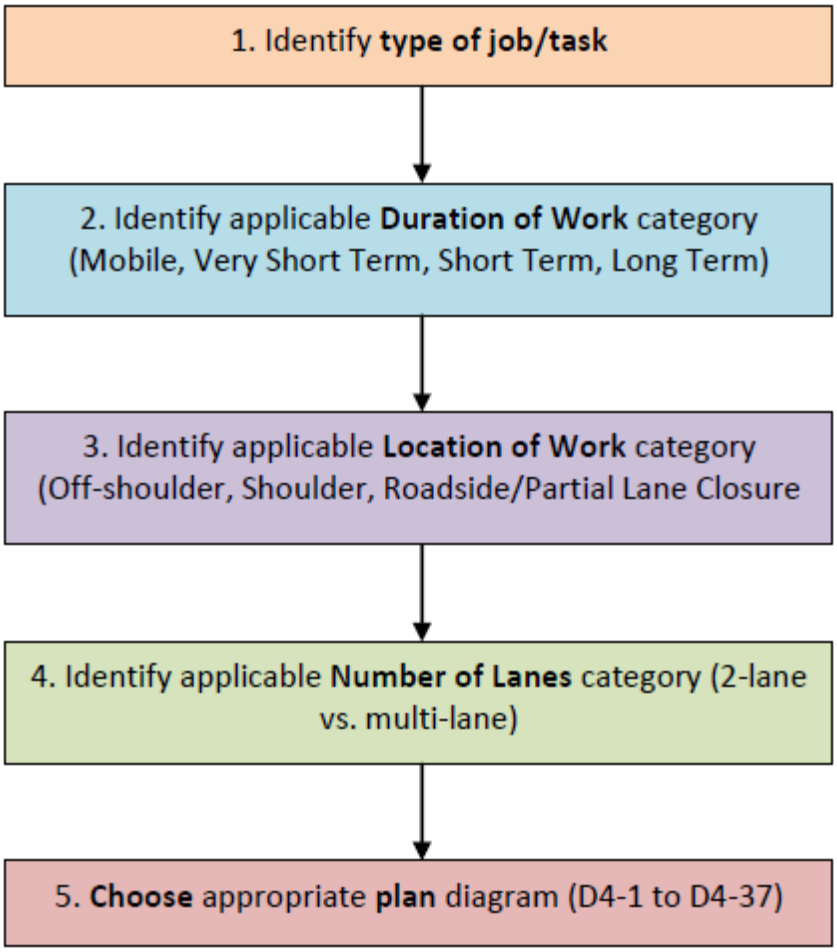
b) Shoulder Work – is work on the shoulder of a road and off the travel lanes. Workers, equipment, and vehicles do not encroach into travel lanes. Shoulder work requires traffic control signs and/or devices. ***See diagrams D4-1, D4-22 to -24, D4-27 & -28.***

c) Roadside Work/Partial Lane Closure – is work which results in part of a travel lane being closed while guiding traffic in the narrowed lane. A minimum of 3.0 metres of usable lane must be available to traffic for a partial lane closure to be considered. Partial lane closures require traffic control signs and devices. ***See diagrams D4-1, D4-23 & -24, D4-27 & -28.***

d) Lane Closure – will result in less than 3.0 metres of useable lane width available to traffic. Under this condition a travel lane is closed by blocking the lane and directing traffic around the closed portion of the lane and back into the original lane once past the diversion. Lane Closures require traffic control signs and devices. ***See diagrams D4-2 to -21, D4-25 & -26, D4-29 to -32.***

****See next page for Decision Matrix****

2.4 Decision Matrix for Choosing a Traffic Control Plan



STANDARD PROCEDURES

3.1 SECTIONS OF A TEMPORARY WORK ZONE

A well-designed temporary traffic control plan should reflect the six distinct sections of a temporary work zone, which are (see diagram on page 11 of this manual):

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

The **Advance Warning Area** is used to inform drivers to expect road work ahead. The advance warning may vary from a single sign or flashing lights on a vehicle to a series of signs in advance of the approach area signing. In urban areas, where speed limits are 60 km/h or less, the **Construction Ahead (TC-1)** advance sign is sufficient. The distance before the approach area can be determined by referencing the appropriate diagram for the task in section 4. The TC-1 is also placed on roads that cross over the road under construction, and are near the construction area. For very short-term and short-term work, the **Road Work (TC-2)** sign may replace the TC-1. **NOTE**: *(1) When survey crews are working on the right-of-way, the **Survey Crew Ahead (TC-3)** sign must be used at all times*; *(2) When using a Traffic Control Person, the **Traffic Control Person Ahead (TC-21)** must be used at the appropriate distance. The distance can be no less than the stopping sight distance for the respective speed limit of the road where work is being performed – see appropriate diagram in section 4.*
As most City streets have a posted speed limit of 50 km/hour, in this case, the appropriate distance would be 65 metres.

When active devices such as flashing arrow boards or flashers are used, the advance warning area may be eliminated (as shown in the typical diagrams in section 4).

In the **Approach Area**, the driver is informed of lane changes, speed reductions, passing restrictions, etc. Drivers require the information at a sufficient distance in advance to allow them enough time to adjust to the irregular situation before reaching it. The devices may vary from a single sign or flashing lights to a series of signs in advance of the transition area.

When work is being performed in one or more lanes, lane closure is required. In the **Transition Area**, traffic is channeled from the normal alignment to the path required to move traffic past the work area. It is imperative that no work material, vehicles or equipment be stored or parked in this section of the temporary work zone. The transition area should be delineated by channelizing devices, unless otherwise indicated in the typical layouts in section 4. It contains tapers and parallel sections that are used to effectively close the lanes. Guidelines for tapers and parallel sections are outlined in section 4.

The transition area must be obvious to drivers. The intended path must be clearly delineated so that drivers will not mistakenly follow the wrong path. For long-term work, there may be a requirement to remove existing pavement markings and possibly to enhance the transition area with temporary pavement markings to identify a clear route where there could be confusion regarding the proper path.

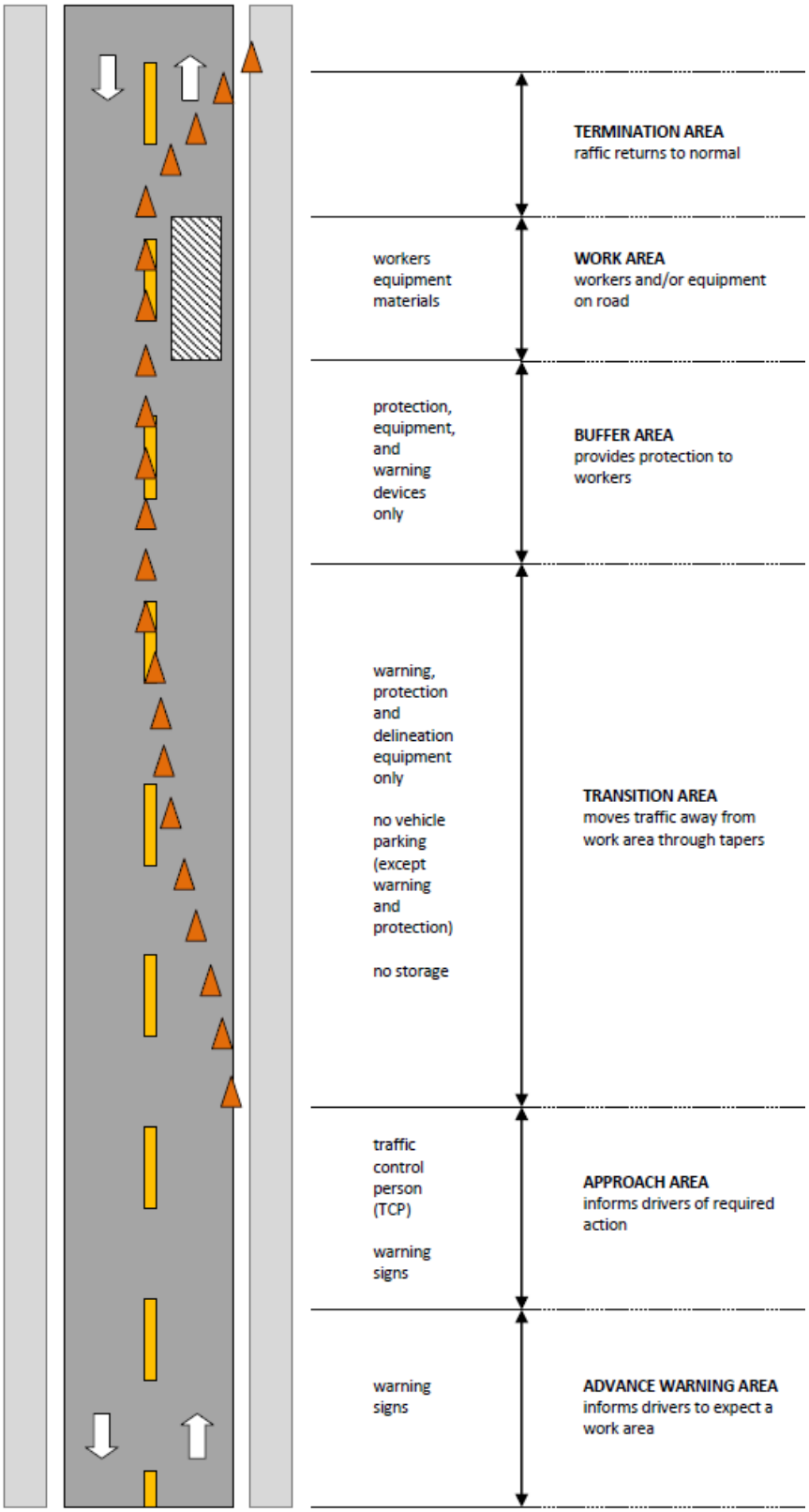
Following the Transition Area is the **Buffer Area**. This section of the temporary work zone provides protection for traffic and workers. It must be defined by delineation devices, except for mobile work as defined in section 4. This area provides a recovery area for a wayward vehicle. No work material, vehicles or equipment should be stored or parked in the buffer space. When a control vehicle is placed in advance of the work area, the buffer space should be provided between the control vehicle and the work space. Guidelines for length of the buffer area are outlined in section 4 diagrams and are illustrated on the typical layouts, where applicable.

The **Work Area** begins immediately following the Buffer Area, and is set aside for workers, equipment and material storage. It may be in a fixed location or may move as work progresses. It may be defined by delineation devices. In a confined location, the work area may be shielded by barriers as an additional feature. Every practical effort should be made to minimize hazards and distractions to drivers and workers. Traffic space must be provided in this section to allow for traffic to pass by the work area. The traffic space should provide minimum lane widths of 3.0 metres. There should also be lateral buffer space which will provide separation between the work space and the adjacent traffic space.

Temporary Work Zones end with the **Termination Area**, which are used for traffic to make the transition back to the normal path of the road. The termination area extends from the downstream end of the work space to the point where traffic is able to resume normal driving.

Temporary Work Zone

Not to Scale



3.2 TAPERS AND BUFFERS

The diagram on page 11 illustrates the normal sections of a temporary work zone, which include the transition and buffer areas where lane closure tapers and longitudinal buffer space would be provided. The lengths of tapers and buffer spaces will vary with the speed limit and are designed to provide adequate operating conditions for drivers. Guidelines for the recommended lane closure taper lengths and buffer lengths are provided on the appropriate traffic control plan diagrams in section 4 of this manual. Generally, they should follow the table below:

SPEED LIMIT	TAPER	BUFFER
50 km/h	30 m*	35 m**
60 km/h	40 m*	45 m**
	*distance between 2 consecutive signs	**distance from last sign in approach area to the work area

The lane closure taper lengths are approximately equal to the breaking distance while the buffer lengths are approximately equal to the brake reaction distance such that:

Lane Closure Taper Length + Buffer Length = Stopping Sight Distance

There may be circumstances where recommended taper and buffer lengths cannot be implemented because of space restrictions (i.e. urban areas where intersections are close together). Where necessary, the buffer length may be reduced or eliminated, but the taper length should only be reduced as a last resort. If space becomes an issue, follow these steps:

1. Look at relocating the taper and buffer lengths upstream of the work area; If this is impractical,
2. Consider reducing the buffer length. If there is still not enough room, then consider eliminating the buffer length and placing additional advance warning and delineation devices.
3. If this still does not correct the issue, then consider reducing the taper length. Under such conditions (where speed exceeds 70 km/h and traffic volume is high), use a control (buffer) vehicle or other protection device, along with extra advance warning and guidance devices.

3.3 CONSTRUCTION SPEED ZONE

Speed limits must reflect the traffic control requirements at the time, as determined by the supervisor responsible. He/she has the authority to implement a reduced speed limit in a temporary work zone. Relevant government agencies and/or police forces must be contacted by the supervisor for emergencies, and can be contacted by him/her for questions, or to request a patrol of the area.

Signs must be removed or changed immediately when reduced speed limit is no longer required. When conditions do not warrant reduced speed during non-working periods, overnight, or weekends, the signs shall also be removed or covered.

All conflicting signs within the reduced speed zone shall be removed or covered while the temporary speed limit is in effect.

Speed Signs

- All speed limits must be signed using reflectorized maximum speed limit signs as specified in the Manual of Uniform Traffic Control Devices for Canada.
- All speed limits indicated on these signs must be in 10 km/h increments.
- The Maximum Speed Ahead signs must be placed in advance of a construction speed sign where the speed reduction is more than 10 km/h from the normal speed. Where the normal speed limit is less than 80 km/h the Maximum Speed Ahead sign must be a minimum of 50 metres in advance of the speed limit sign.
- At the end of a construction zone for which a reduced speed limit has been posted, the supervisor must ensure that a speed limit sign is posted indicating a return to the normal speed limit for that particular section of street. This sign may be omitted if there exists a permanently installed speed limit sign within 300 metres from the end of the reduced speed zone.
- Reduced speed limit signs left in place by a Contractor when the work zone condition no longer warrant any reduction will be expropriated by the City.

3.4 SET UP AND REMOVAL OF A TEMPORARY WORK ZONE

Before work starts on any construction or maintenance activity, it is essential that a plan for traffic control be chosen that provides protection for workers and motorists, not only during the construction activity, but also during the setup and removal of traffic control signs and devices. While each construction or maintenance activity can have its own unique circumstances that may impact the plan for traffic control setup and removal, the following basic safety guidelines shall be considered and adhered to:

- Before work starts, review the tasks to be completed and the protection that is needed.
- An emergency plan shall be in place in the event that an incident should occur, and shall take into account the following:

    - Have a stocked first aid kit on site at all times;
    - Employees shall not work alone in the area;
    - If an incident should occur, the work Supervisor/Foreman shall be contacted immediately;
    - If an incident should occur, medical personnel should be contacted immediately if necessary.

- All workers shall wear personal protective equipment (PPE) that includes CSA approved high visibility clothing, safety footwear, hard hat, and other equipment as necessary.
- A service vehicle shall accompany workers involved in the setup and removal of traffic signs and devices, and shall be equipped with an operational, amber flashing light unit (360° beacon) and standard 4-way flashers.
- It is prohibited for any person to ride in an area of the service vehicle not specifically designed (tailgate, box of truck, etc.) to provide secure accommodation for a person, or to ride unsecured in a vehicle when it is in motion. Seatbelts must be worn at all times when the vehicle is moving.
- Depending on the length of time it takes to set-up/remove signage, the location of the temporary work zone, and the number of lanes, the Supervisor/Foreman may decide to use a TCP during the installation and removal process.
- While installing or removing signs/devices, workers shall:
    - Ensure the vehicle is completely stopped.
    - When installing or removing signs, exit or enter the vehicle after each sign is installed or removed, or walk along the shoulder of the road beside the service vehicle to complete the next task, ensuring that the service vehicle is completely stopped each time. Always complete this action **with** the flow of traffic.

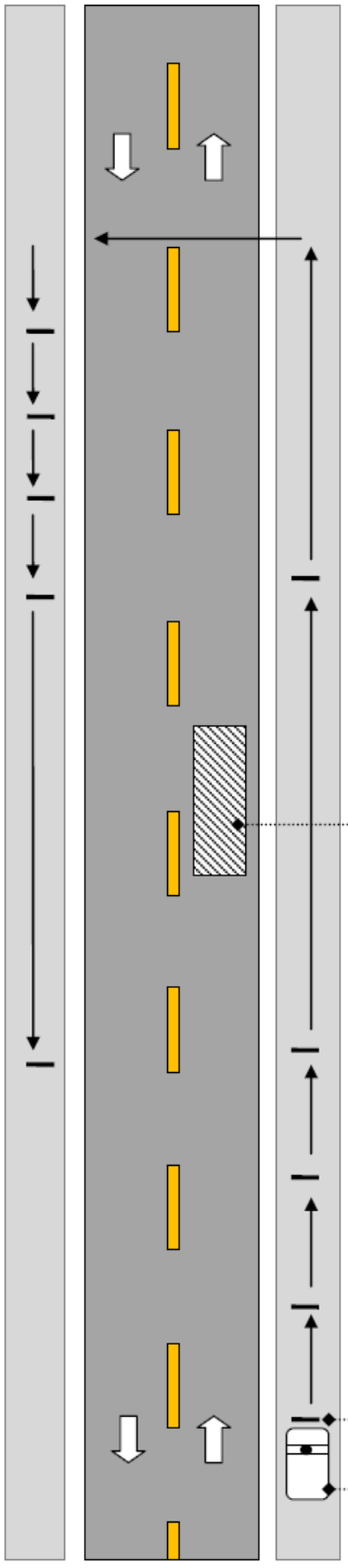
- When installing delineation devices or other traffic control devices around the tapers in the temporary work zone, exit or enter the vehicle after each device is installed, or walk along the shoulder of the road beside the service vehicle to complete the next task, ensuring that the service vehicle is completely stopped each time. Always complete this action **with** the flow of traffic.
- When removing delineation or other traffic control devices around the tapers and the work zone, exit or enter the vehicle after each sign is removed, or walk along the shoulder of the road beside the service vehicle to complete the next task, ensuring that the service vehicle is completely stopped each time. Always complete this action **against** the flow of traffic.
- Offload and load signs/devices from the side of the vehicle that is farthest from the open traffic lane OR if not practical, from the back of the vehicle.
- Assemble or disassemble traffic control devices away from the roadway.
- Avoid pointing the service vehicle toward the flow of traffic, especially at night.

- The sequence for setting up signing of a temporary work zone requires that advance warning and approach signs be installed first, followed by delineators, signs, and traffic control devices in the tapers around the work area.
- The sequence for removal of a temporary work zone requires that the traffic control devices and delineation around the tapers of the work area be removed first, followed by the removal of the approach and advance warning signs.

Diagrams on the subsequent pages show the appropriate set-up and removal procedures for a temporary work zone.

Temporary Work Zone
Sign Setup (2-lane Roadway)

Not to Scale



PROCEDURE:

1. Begin at the first advance warning sign located on the same side of the road as the work area.
2. Proceed with the flow of traffic, placing all signs on the same side of the road as the work area.
3. Following placement of the last sign in this direction, make a legal turn.
4. Sign the opposite approach, beginning at the first advance warning sign and working with traffic, install all remaining signs in this approach.

Temporary Work Zone

Work Area Setup (2-lane Roadway)

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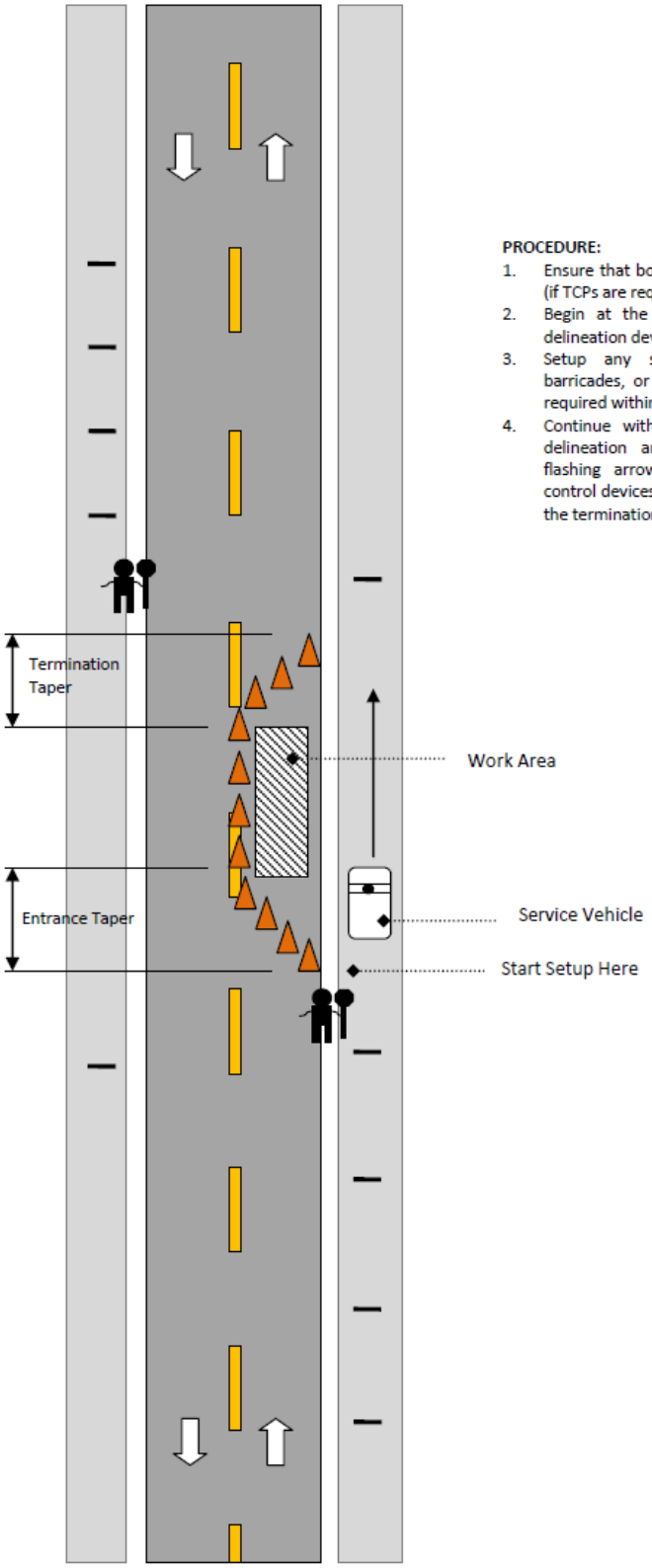

PROCEDURE:

1. Ensure that both TCPs are positioned as shown (if TCPs are required for setup and removal).
2. Begin at the entrance taper, laying out all delineation devices to complete the taper.
3. Setup any signs, flashing arrow boards, barricades, or any other traffic control device required within the entrance taper.
4. Continue with traffic flow to complete the delineation and setup of any other signs, flashing arrow boards, barricades or traffic control devices required in the work area and at the termination taper.

Temporary Work Zone

Work Area Removal (2-lane Roadway)

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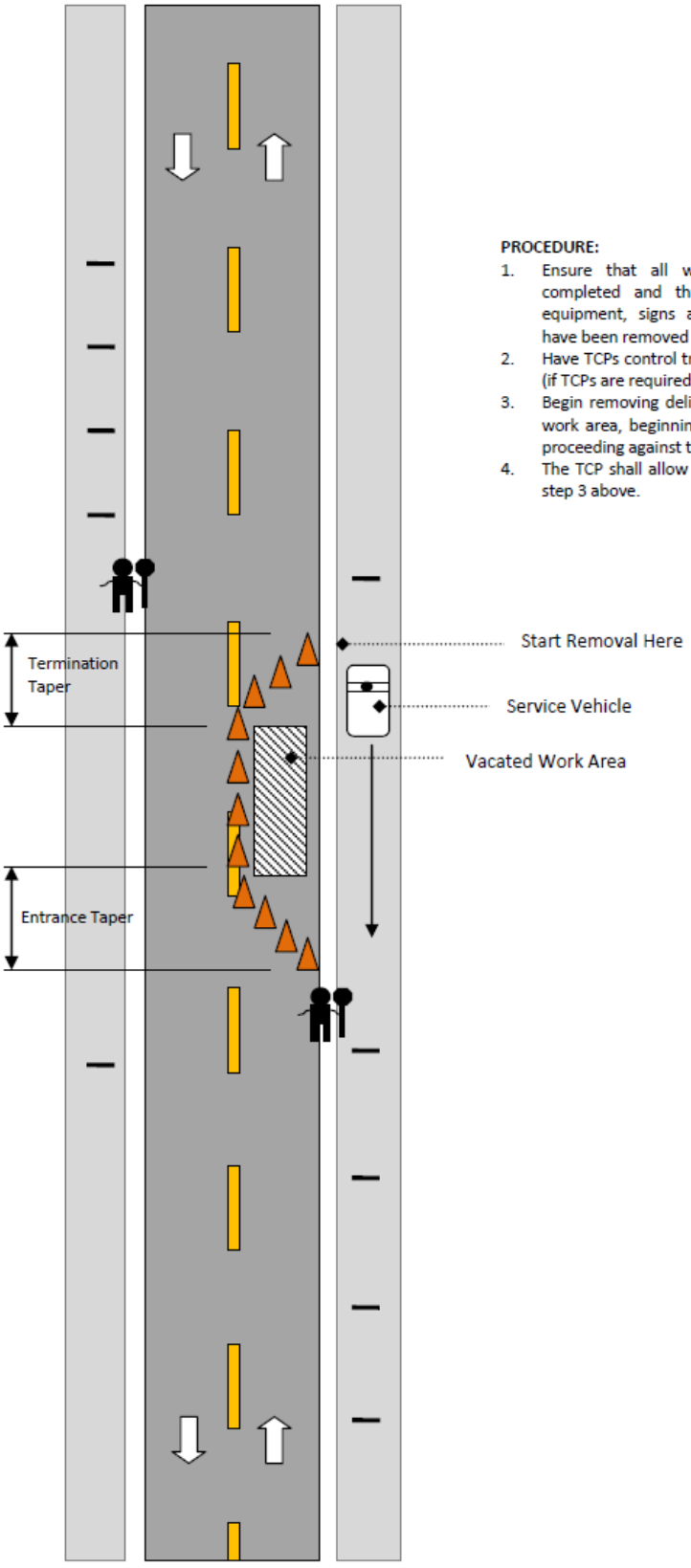
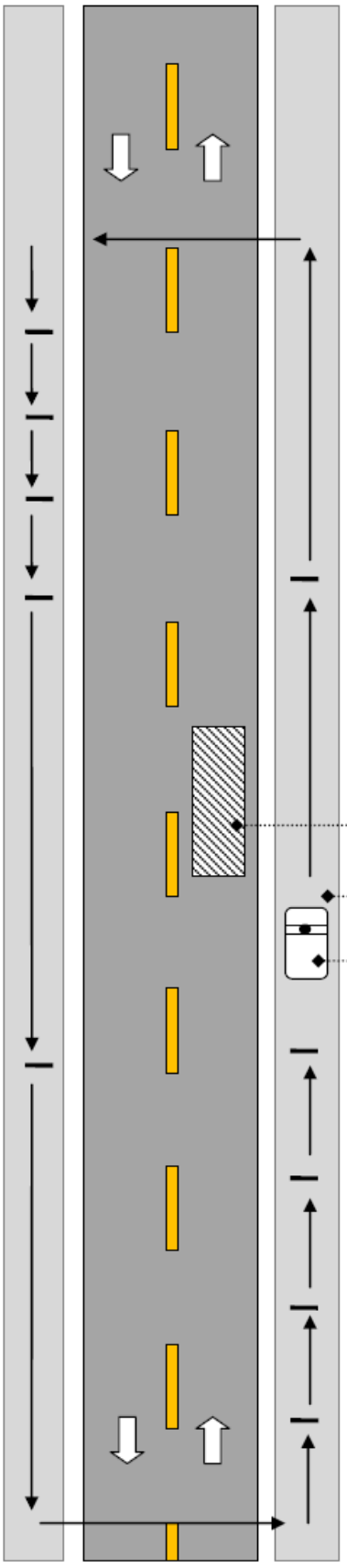


PROCEDURE:

1. Ensure that all work activities have been completed and that all workers, materials, equipment, signs and traffic control devices have been removed from the work zone.
2. Have TCPs control traffic flow in both directions (if TCPs are required).
3. Begin removing delineation devices around the work area, beginning at the termination taper, proceeding against the flow of traffic.
4. The TCP shall allow traffic to proceed following step 3 above.

Temporary Work Zone
Sign Removal (2-lane Roadway)

Not to Scale



PROCEDURE:

1. Ensure that all work activities have been completed and that all workers, materials, equipment, signs and delineation devices have been removed from the work area and the lane is open to traffic flow.
2. Begin on the same side of the road as the work area, at a point near the start of the former entrance taper, and working with the flow of traffic, remove all remaining signs in this direction.
3. Make a legal turn.
4. Beginning at the first advance warning sign in the opposite approach, and working with the flow of traffic, remove all remaining signs in this direction.
5. Make a legal turn.
6. Beginning at the first advance warning sign located in the lane that contained the work area, and working with traffic flow, remove all remaining signs in this direction.

3.5 EMERGENCIES

Where an emergency situation occurs, traffic control and public communication should not be compromised. Minimum standards must be achieved as soon as possible.

3.6 TRAFFIC CONTROL PERSON (TCP)

The primary role of a TCP, or Flagger, is to regulate the flow of traffic through temporary work zones and to prevent conflicts between pedestrians, drivers, and work zone activities. TCPs may stop traffic intermittently as needed by the work progress, or to maintain continuous traffic flow past the work area at reduced speeds to protect workers. The final decision as to the use of a TCP on a temporary work zone will be directed by the Supervisor/Foreman or respective Superintendent if necessary.

QUALIFICATIONS

As per section 374 of the Newfoundland Labrador OHS Regulations, 2009, "*a person shall not work as a traffic control person unless he or she has completed a traffic control training program as prescribed by the commission*." A valid commission recognized TCP course must be successfully completed prior to and as a condition of working as a flagger.

TCPs must keep a copy of their certificates on their presence while flagging. Copies will be kept on file in the Human Resources division, in the event that an individual has forgotten their certificate. TCPs who forget their certificates may be subject to appropriate discipline.

EQUIPMENT

The TCP must wear the following personal protective equipment:

- **Safety Vest:** must meet CSA standard Z96-02, class 2 (fluorescent background material) and level 2 (retro-reflective striping of a colour contrasting the background material). The vest must cover the entire upper torso and be worn over all clothing. Alternatively, the Director or Assistant Director of Operational Services may permit TCPs to wear other high visibility apparel of the same CSA standard, class, and level as noted above (i.e. coveralls, etc.).

- **Safety Footwear:** must meet CSA Z195, grade 1, footwear (indicated by the green triangular patch on the outside of the boot and green rectangular label on the inside).
- **Hard Hat:** must meet CSA Z94.1-05, type II, class E with reflective material for night work.
- **Stop/Slow Paddle:** must be a minimum of 450mm x 450mm. The "Stop" sign must be mounted back to back with the "Slow" sign on top of a pole, and both signs must be reflectorized. The top of the signs must be a minimum of 2.5 metres from the bottom of the pole.

Other equipment may be used in response to site conditions:

- **Eye Protection:** must meet CSA Z94.3. Safety sunglasses may be worn in conditions of blinding sun; and safety glasses must be worn where the worker is exposed to conditions that are likely to injure or irritate the eye.
- **Rain Wear:** may be worn as needed and should be highly visible orange or yellow.
- **Red Signaling Baton Flashlight:** must be used when flagging at night, to supplement the diamond shaped paddle.

ADVANCE TCP SIGNAGE

Except for mobile or very short-term work situations, the TC-21 (Flagperson Ahead) sign shall be posted in advance of each TCP. It shall be of a design shown in the TAC Manual of Uniform Traffic Control Devices for Canada. Where the sign may be used after dark, it must be reflectorized to indicate the same colour and shape by night as by day.

All advance TCP signage must be removed or covered promptly when flagging operations are terminated for a work zone for any period of time.

TCP GUIDELINES

- TCPs should be highly visible. For this reason they must stand alone, never permitting a group of workers to congregate around them.
- TCPs should report dangerous drivers to the worksite Supervisor/Foreman.
- TCSs should be alert to emergency services. Ambulance, police and fire vehicles have priority over all other traffic.

- The Supervisor/Foreman shall provide TCPs where the activity or work zone requires their use, in accordance with the Newfoundland Labrador OHS Act, 2009. If a worker feels that flagperson should be provided for a given situation, he/she shall advise the Supervisor/Foreman, who shall determine if it is required.
- TCPs must stay alert at all times and always face traffic. An escape route should be planned before flagging operations begin.
- TCPs working as team must agree on communication signals before commencing their duties. If the TCPs are not visible to one another, two-way radios or a third TCP are necessary to ensure proper communication and directing of traffic. Any concerns related to communication must be brought to the attention of the supervisor.
- No TCP will start working unless all required advance TCP signage is in place. No other construction signs must be located between the TCP position and the advance TCP signage.
- At no time are TCP permitted to use flags to control traffic. He/she must use proper Stop/Slow paddle.
- No TCP must leave their post unless authorized to do so by the Supervisor/Foreman or replaced by another qualified TCP. As long as traffic cannot flow freely, the TCP must remain on duty.
- TCPs should stand just outside the lane of traffic at a point from the end of the working area so as to be able to protect personnel and equipment. The distance from the TCP to the work area must be 10 metres for every 10 km/h of speed limit (i.e. speed limit = 50 km/h, then the TCP must be 50 metres away from the work area of the temporary work zone; in the event that the supervisor reduces the speed limit in the temporary work zone, then the same rule applies – i.e. speed limit is reduced to 30 km/hour, then the TCP must be 30 metres away from the work area of the temporary work zone).
- TCPs must place the flag sign in the right hand and use the left hand to point to indicate where they want traffic to stop. The TCP must turn the sign from “Stop” to “Slow” to regulate traffic and ensure traffic has cleared from the job site before turning signs.
- TCPs with co-operation from workers and equipment operators working at that location are to make every effort to keep delays to motorists to a minimum. In heavy traffic, delays should be split equally between the opposing lines of traffic and in normal operations no more than eight (8) vehicles in one (1) direction can be kept waiting. At all times priority must be given to the motorist to proceed through the construction zone. TCPs not following these guidelines will be subject to appropriate discipline, as per the City’s Occupational Health and Safety Program.

REQUIREMENTS AND RESPONSIBILITIES

Persons employed as TCPs **must be** alert, conscientious, trained, accredited, and properly equipped. They must possess:

- Good physical health, good vision, and good hearing;
- Good physical and mental alertness;
- Mature judgment;
- A pleasant, co-operative manner.

TCPs assigned to regulate traffic **must not**:

- Be assigned or attempt to carry out any other work;
- Permit the TCP sign to be displayed when a TCP is not directing traffic;
- Stand near any other persons. The TCP must be clearly visible;
- Stand near a vehicle or sit in a vehicle;
- Sit;
- Lean on a post or other object;
- Use any audio/visual device (i.e. MP3 player, cell phone, TV, radio, etc.) that impairs sight, hearing, or diverts attention;
- Turn their back on approaching traffic;
- Become impatient or enraged;
- Attempt to slow traffic by displaying the "Stop" sign rather than the "Slow" sign;
- Regulate traffic if their judgment is impaired in any way, or if for any reason they have suffered a reduction in their performance that could increase the hazard to themselves, road workers, or road users.

FLAGGING SIGNALS

Standard flagging signals shall be used and given in a clear and precise manner.

- To **instruct a fellow TCP to halt traffic**, raise the free hand with fist clenched straight above the shoulder, wave the entire arm slowly from the upright position to a position directly out to the side at shoulder height and repeat signal as long as necessary;
- To **indicate an all clear situation** and instruct a fellow TCP that he or she may allow traffic to proceed, raise the free hand directly out to the side at shoulder height, lower the entire arm until it rests against the side of the body and repeat signal as long as necessary;

- To **indicate the approach of emergency vehicles**, drop the stop and slow paddle, raise both arms to the side at shoulder height, then rapidly waive both arms from the shoulder level to a point above the head where the wrists will cross and continue signal until fellow TCP is seen to take necessary action;

A TCP shall stand in a safe position, preferably on the driver's side of the lane used by traffic under his or her control, where he or she will be clearly visible and where he or she has an unobstructed view of approaching traffic.

TCPs shall use normal signals when stationed on the driver's (left) side of the lane used by traffic under his or her control and appropriate signals shall be used only when the TCP is stationed on the right side of traffic under his or her control.

Normal signals to STOP traffic

1. <u>In daylight:</u>
    - The TCP shall face approaching traffic and shall extend his or her free arm horizontally across the approach lane;
    - The TCP paddle shall be held upright with the "STOP" side facing traffic;
    - When an approaching vehicle is almost stopped, the free arm shall be used to indicate the point at which vehicles are required to stop.
2. <u>In darkness:</u>
    - The TCP shall assume the same basic position as for the day signal;
    - He or she shall hold a reflectorized paddle in his or her free hand and flashlight with red signaling baton attached in his or her free hand;
    - The free arm shall be moved slowly back and forth between limits corresponding to the third and sixth hour positions on a clock face; and
    - When an approaching vehicle has almost stopped, the flashlight and baton shall be used to indicate the point at which the vehicle is required to stop.

Normal signals to SLOW traffic

1. <u>In daylight:</u>
    - The TCP shall take up a position similar to the one used for the signal to stop with the "SLOW" side of the paddle facing approaching traffic.
2. <u>In darkness:</u>

- The same position and motions shall be assumed as for the night stopping signal except that the "SLOW" side of a reflectorized paddle shall face approaching traffic.

Normal signals to MOVE traffic

1. In daylight:
    - The TCP shall face across the approaching traffic lane and shall look across his or her shoulder at the traffic he or she is about to move;
    - Traffic shall be advanced by rotating the lower free arm in an oval manner corresponding to the direction in which the vehicle wheels will rotate;
    - If traffic is required to proceed slowly, the TCP shall also extend his or her free arm horizontally towards the approach lane with the "SLOW" side of the paddle facing traffic; and
    - If traffic is allowed to proceed at the prevailing speed limit, the TCP shall lower the STOP/SLOW paddle and ensure it is hidden from motorists.
2. In darkness:
    - The same signals as for daytime shall apply;
    - A flashlight with red baton attached shall be used in the free hand;
    - The order to proceed or to proceed slowly may be given verbally;
    - The TCP paddle shall not be used to wave traffic on and shall never be displayed to traffic in other than a static manner;
    - All motions of the TCP arms, both by day and night, shall be performed precisely and unhurriedly so that the meaning of signals given cannot be misunderstood.

WHEN TO USE A TCP

TCPs are used in temporary work zone when all other methods of controlling traffic are considered not feasible to warn, direct, and regulate drivers. As noted earlier they can be used as a means for regulating traffic and preventing traffic-related conflict between various road users and temporary work zone activities.

For the City of Corner Brook operations, the following conditions may warrant the use of a TCP:

a) **Very Short-Term or Short-Term Work where "Yielding to Oncoming Traffic" is not possible**.

NOTE: *The "Yield to Oncoming Traffic" signs, TC17S and WB-2, should only be used where the one-lane operation is short, and where visibility is available in both directions beyond the one-lane section, and where the open lane is at least 3.0 metres wide.*

b) **Very Short-Term and Short-Term Work at the intersection of a 2-lane Roadway**, when either the near-side lane or the far-side lane is closed; and the crossing street cannot be detoured. The main thoroughfare should remain open, and the side street that crosses the main should be closed and detoured. One (1) flagger can be use to direct traffic in this scenario.

NOTE: *Where the intersection is equipped with traffic lights/signals, every effort shall be made by the Supervisor/Foreman to get the lights deactivated immediately before any TCPs are required to direct traffic through the intersection. In the event that a TCP is needed through a signalized intersection, then the TCP shall exercise caution and good judgment to ensure the traffic flow around the work zone is maintained in conjunction with the operation of traffic light sequences. In the event that traffic lights cannot be deactivated, the primary route shall remain open and the intersecting side street that intersects shall be detoured. One TCP will be used to direct traffic through the open, primary route.*

c) 2 TCPs shall be used **when traffic flow in one direction is diverted** wholly or partially into the lane of oncoming traffic AND the lane of oncoming traffic is not clearly visible beyond the one lane section as noted in the following table:

MAX SPEED	CLEAR VISIBILITY REQUIRED IN EACH DIRECTION
60 km/h	170 m
50 km/h	140 m
40 km/h	110 m

d) 2 TCPs shall be used **when traffic flow in BOTH directions is diverted** from its normal path onto a one lane section (where traffic flow in both directions is diverted from its normal path onto a 2-lane section, TCPs are not needed – Traffic may be safely diverted through the use of signage).

e) During **long-term work/major detours**, 2 TCPs shall be positioned at each end of the detour and must be familiar with the area of the detour route. Extended operations of a detour will require public advertising and detour signs along the complete detour route, in place of TCPs.

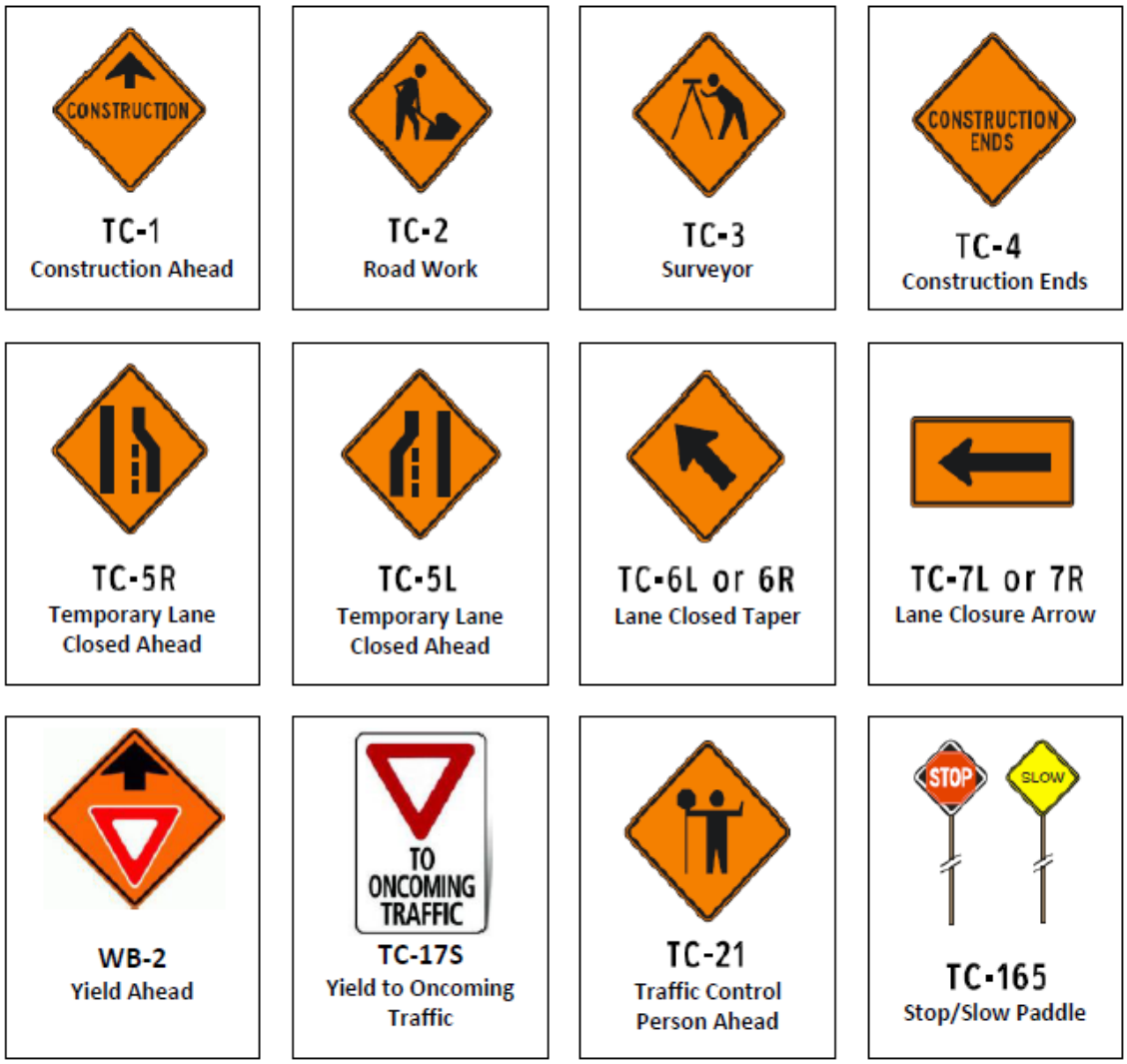
f) TCPs are not required on sections of new street that are not open to public use.

g) Any other situation as determined by the Supervisor/Foreman.

TEMPORARY TRAFFIC CONTROL PLAN DIAGRAMS

4.1 SIGNAGE AND DEVICES

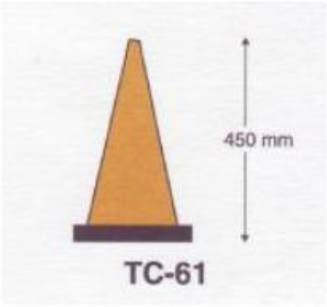
Typical Construction Signage



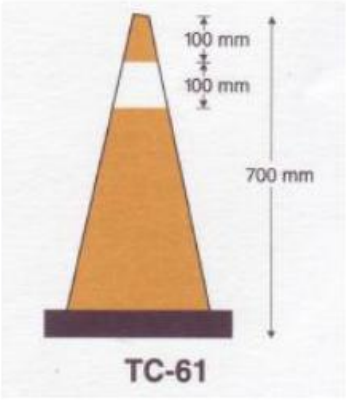
Typical Construction Devices

700 mm must be used for night time work, but can also be use for daytime work

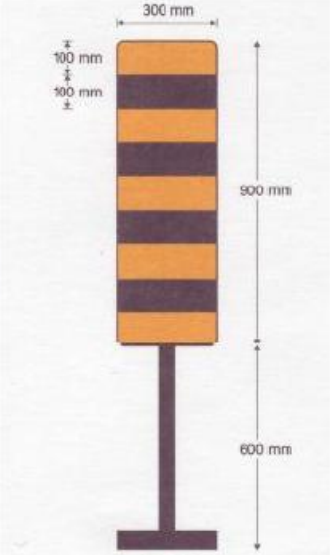
450 mm must be used for daytime work only



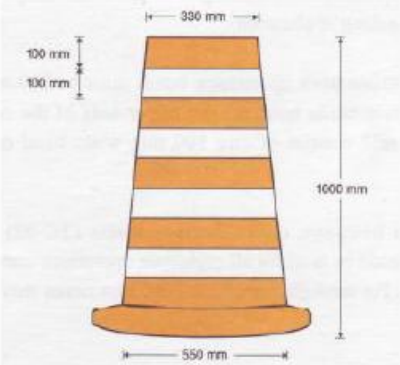
TC-61



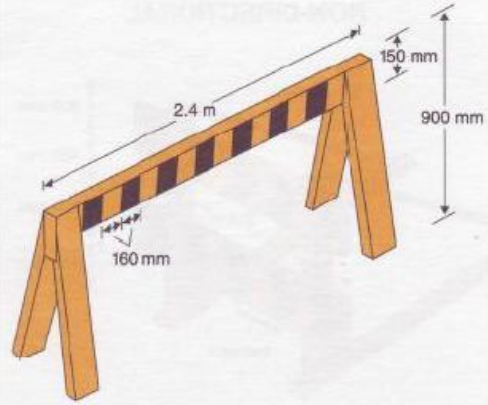
TC-61



TC-62
300 mm x 900 mm



TC-63
VARIABLE

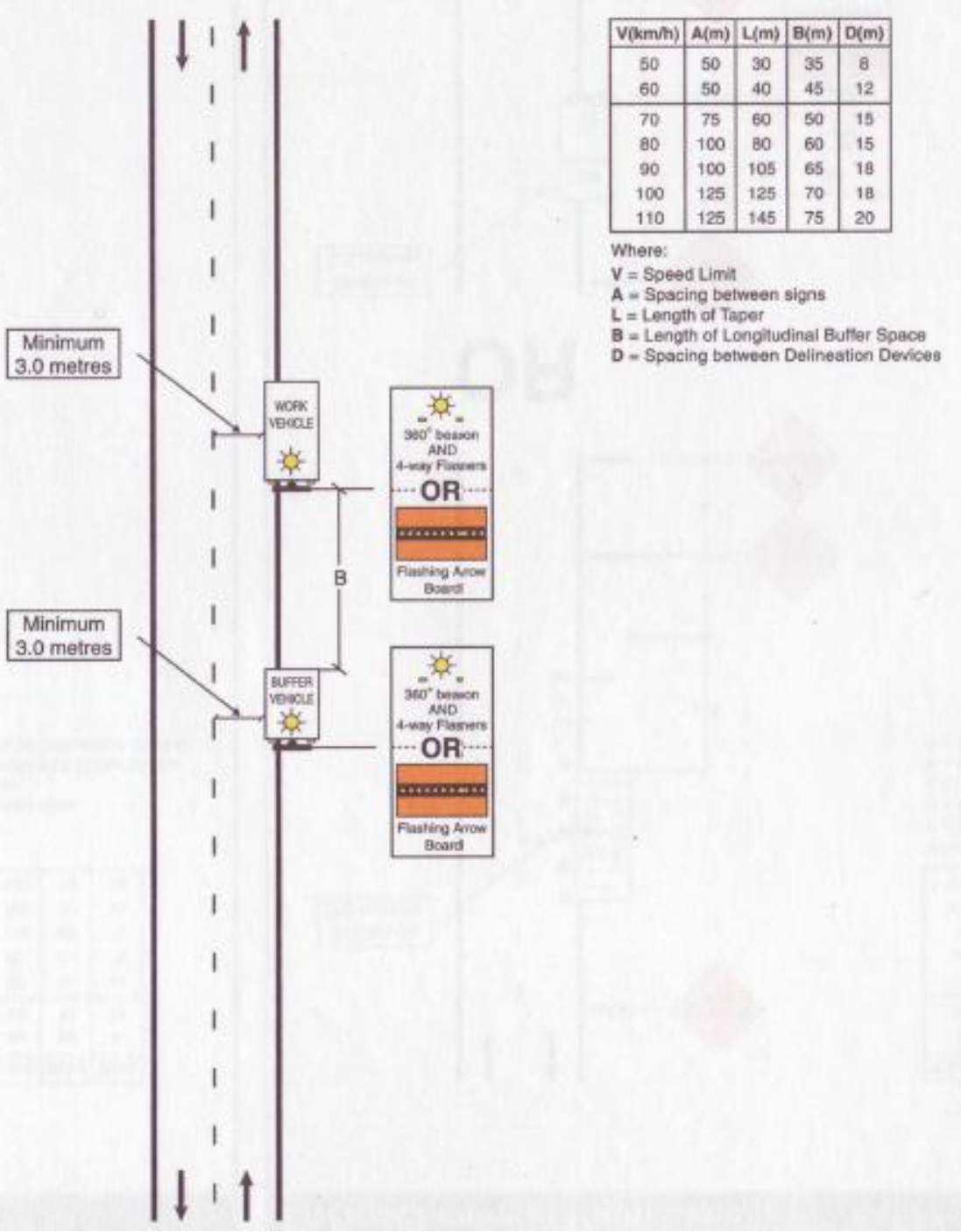


TC-64A

Barricades are used only to protect workers, and **MUST NOT** be used as delineators to channel traffic. They must not be placed in the Buffer Area of a Temporary Work Zone.

D4-1 MOBILE WORK

Roadside and Shoulder Work, Encroachment in Right Lane (2-Lane Roadway & Multi-Lane Roadway)

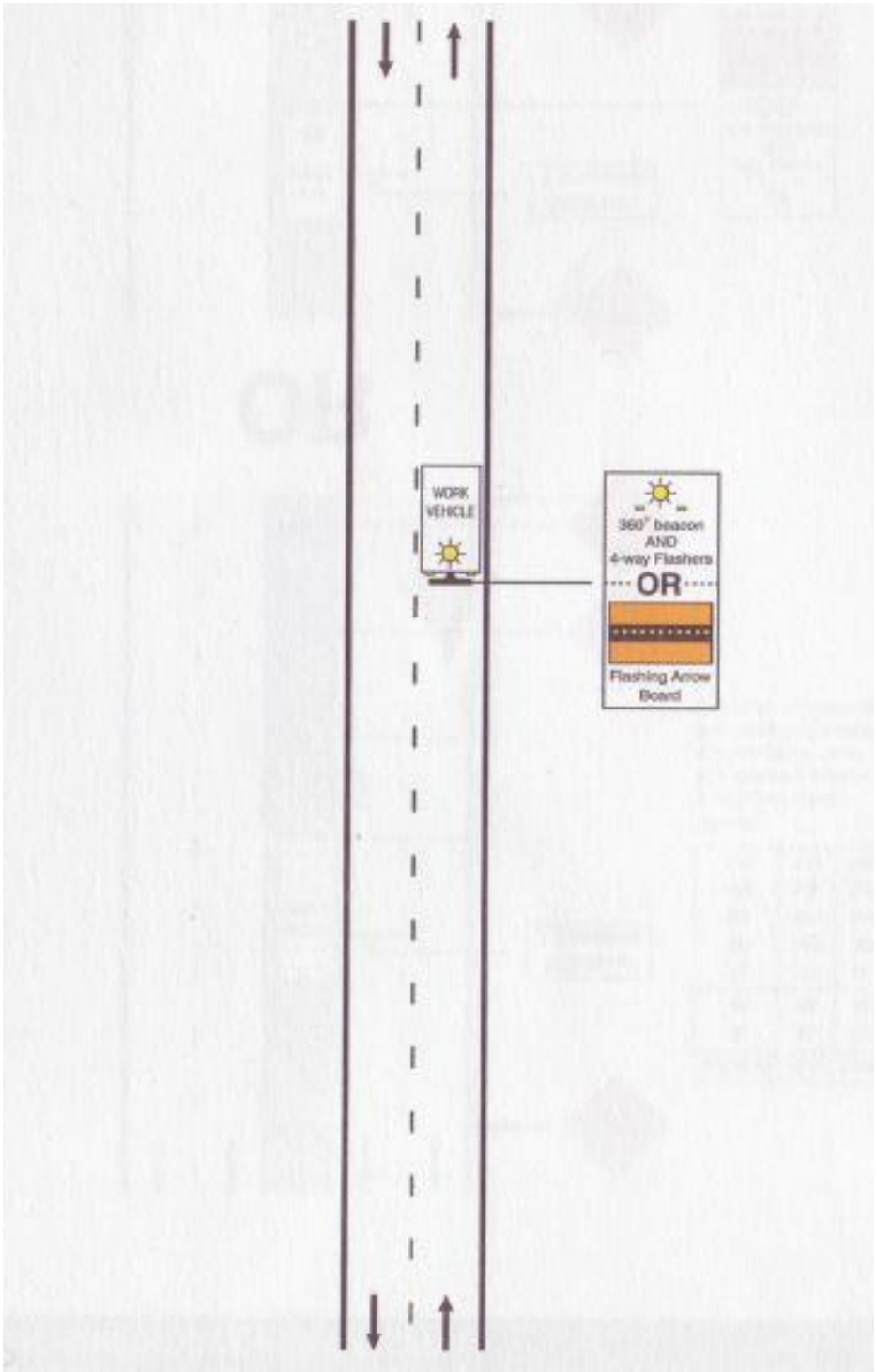


V(km/h)	A(m)	L(m)	B(m)	D(m)
50	50	30	35	8
60	50	40	45	12
70	75	60	50	15
80	100	80	60	15
90	100	105	65	18
100	125	125	70	18
110	125	145	75	20

Where:
V = Speed Limit
A = Spacing between signs
L = Length of Taper
B = Length of Longitudinal Buffer Space
D = Spacing between Delineation Devices

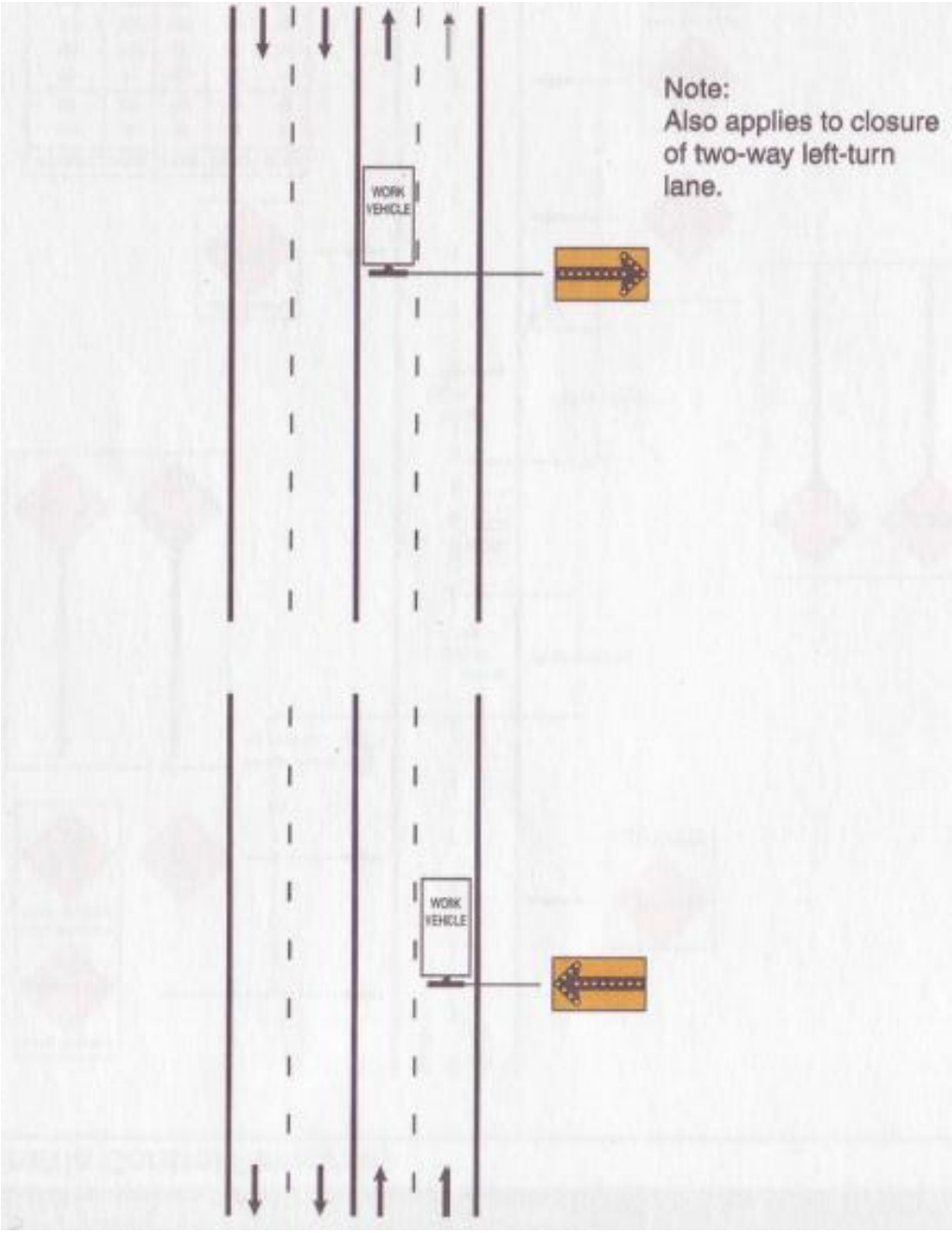
D4-2 MOBILE WORK

Single Lane Closed, Right Lane Closed (2-lane Roadway)



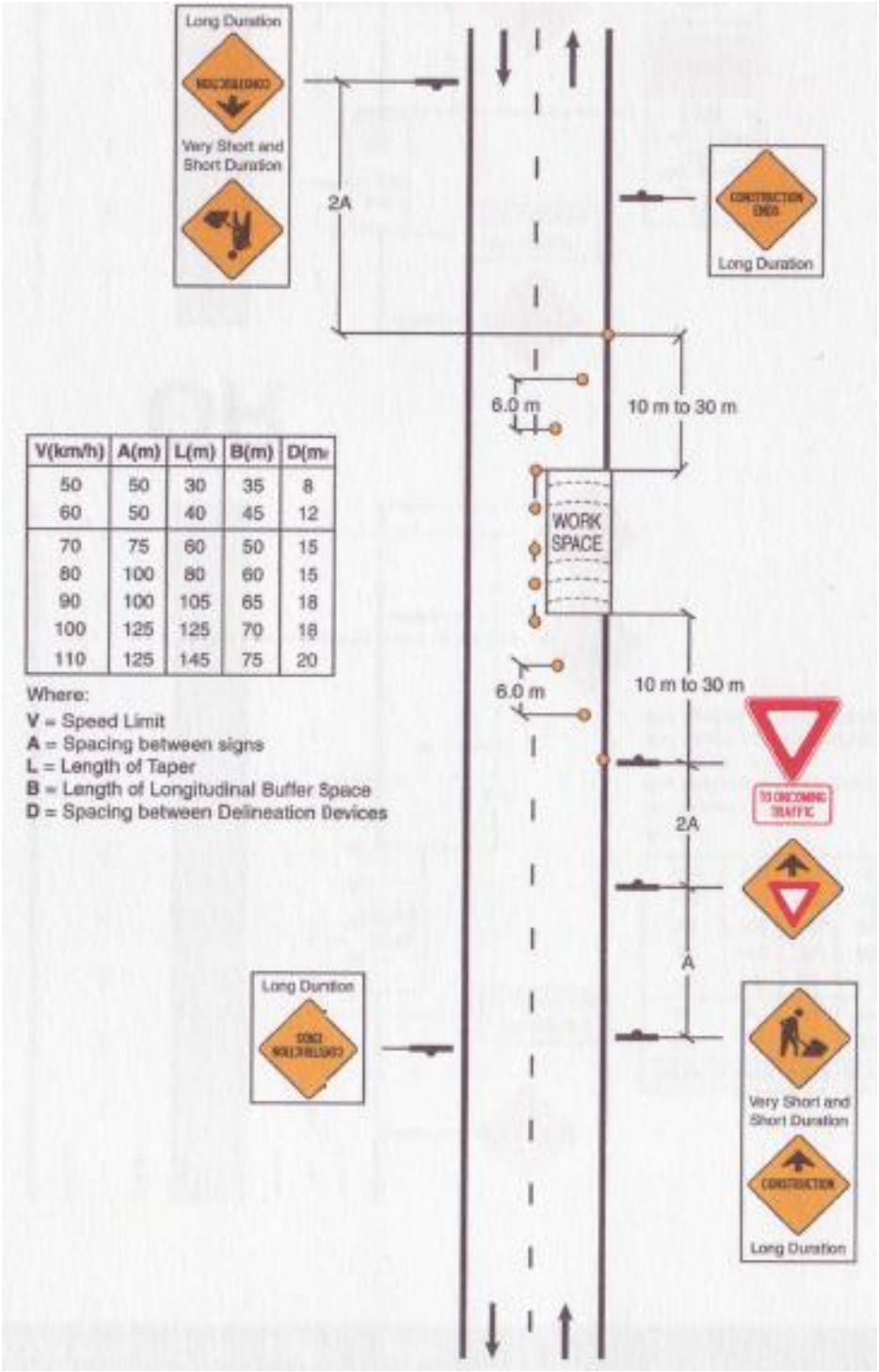
D4-3 MOBILE WORK

Single Lane Closed, Left and Right Lanes Closed (Multi-lane Roadway; Speed ≤ 60 kmh)



D4-4 VERY SHORT TERM, SHORT TERM, LONG TERM WORK

Single Lane Closed, Right Lane Closed, Yield to Oncoming Traffic (2-lane Roadway)

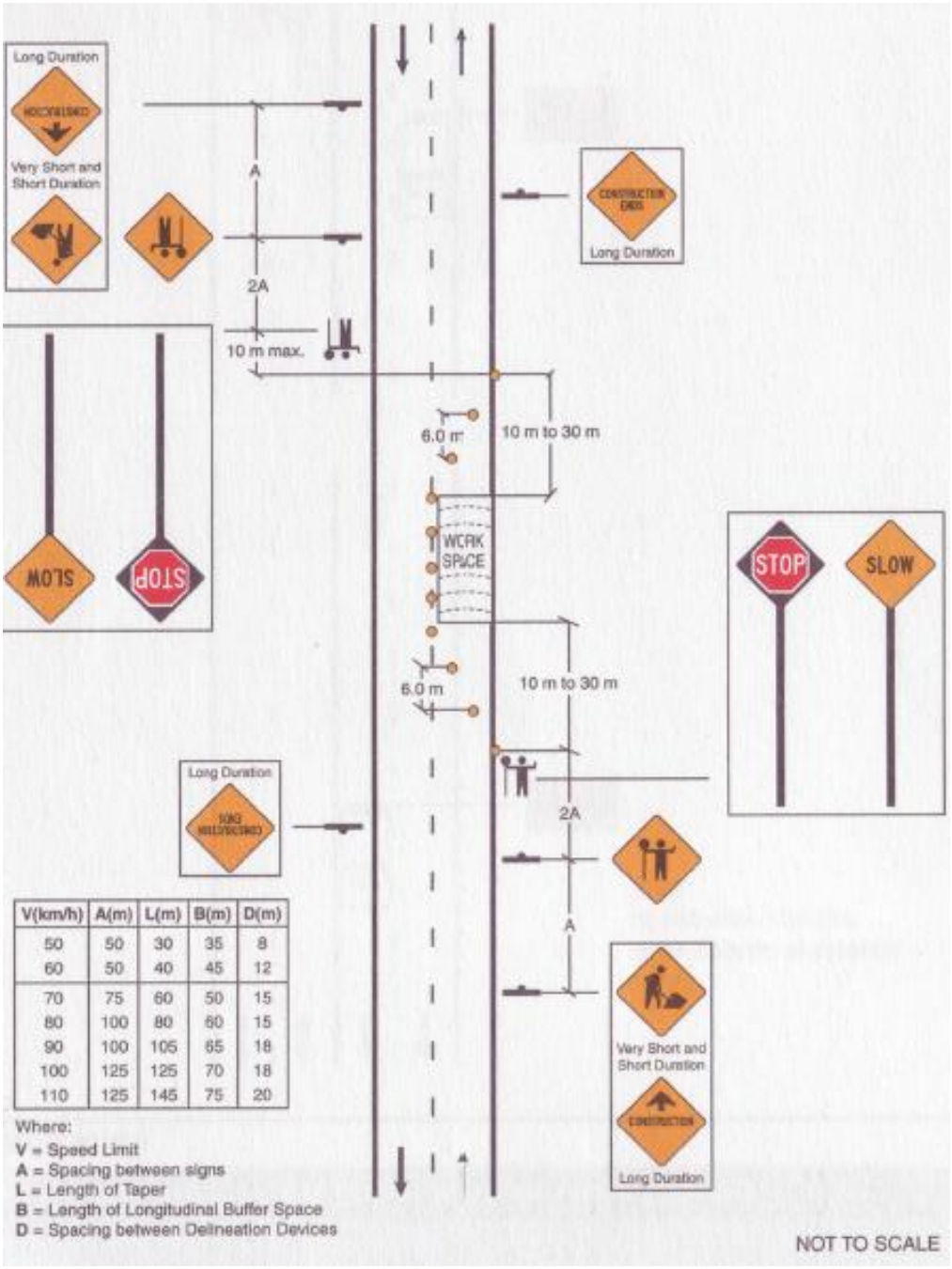


V(km/h)	A(m)	L(m)	B(m)	D(m)
50	50	30	35	8
60	50	40	45	12
70	75	60	50	15
80	100	80	60	15
90	100	105	65	18
100	125	125	70	18
110	125	145	75	20

Where:
V = Speed Limit
A = Spacing between signs
L = Length of Taper
B = Length of Longitudinal Buffer Space
D = Spacing between Delineation Devices

D4-5 VERY SHORT TERM, SHORT TERM, LONG TERM WORK

Single Lane Closed, Right Lane Closed, Traffic Control Person (Flagger) (2-lane Roadway)

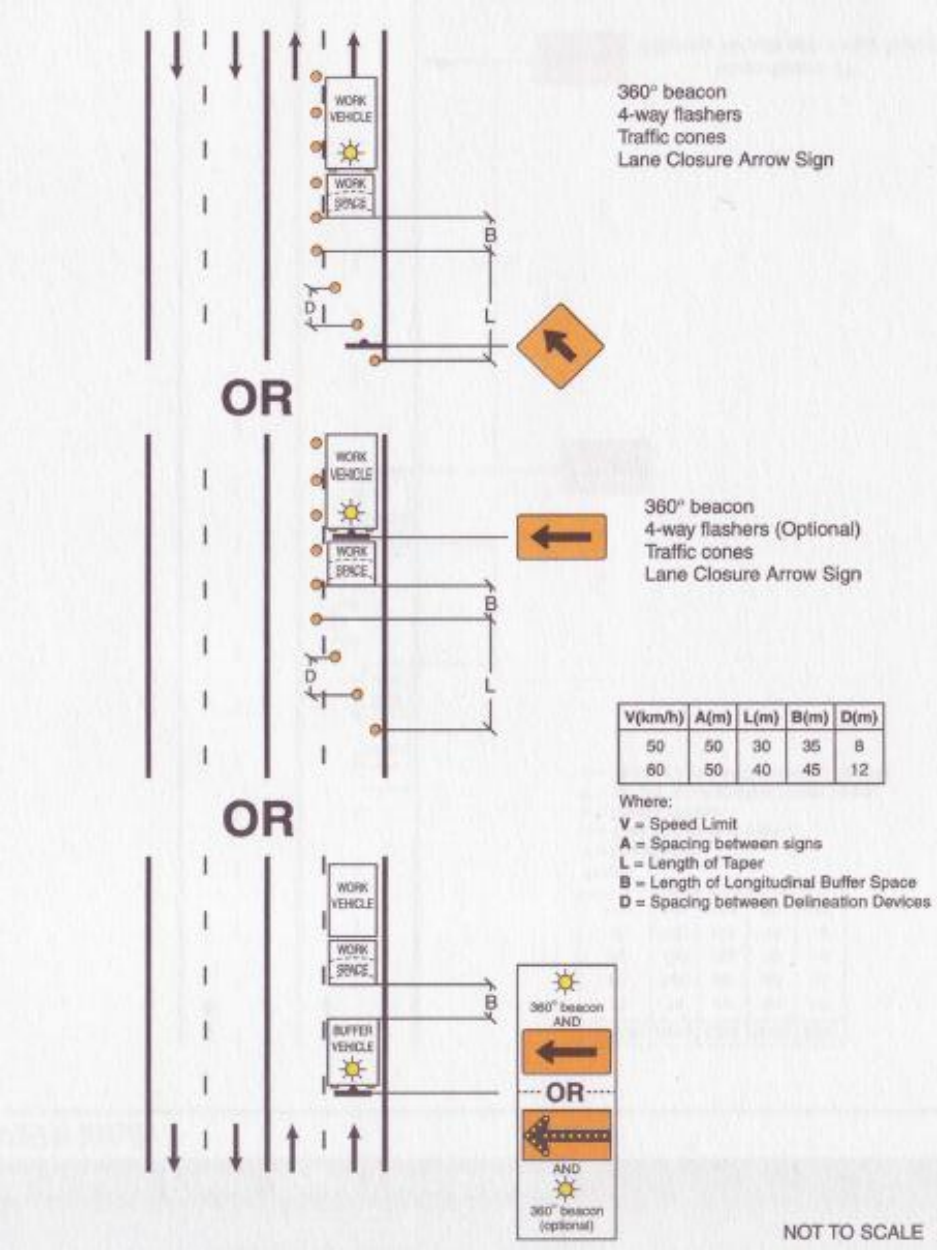


V(km/h)	A(m)	L(m)	B(m)	D(m)
50	50	30	35	8
60	50	40	45	12
70	75	60	50	15
80	100	80	60	15
90	100	105	65	18
100	125	125	70	18
110	125	145	75	20

Where:
V = Speed Limit
A = Spacing between signs
L = Length of Taper
B = Length of Longitudinal Buffer Space
D = Spacing between Delineation Devices

D4-6 VERY SHORT TERM WORK

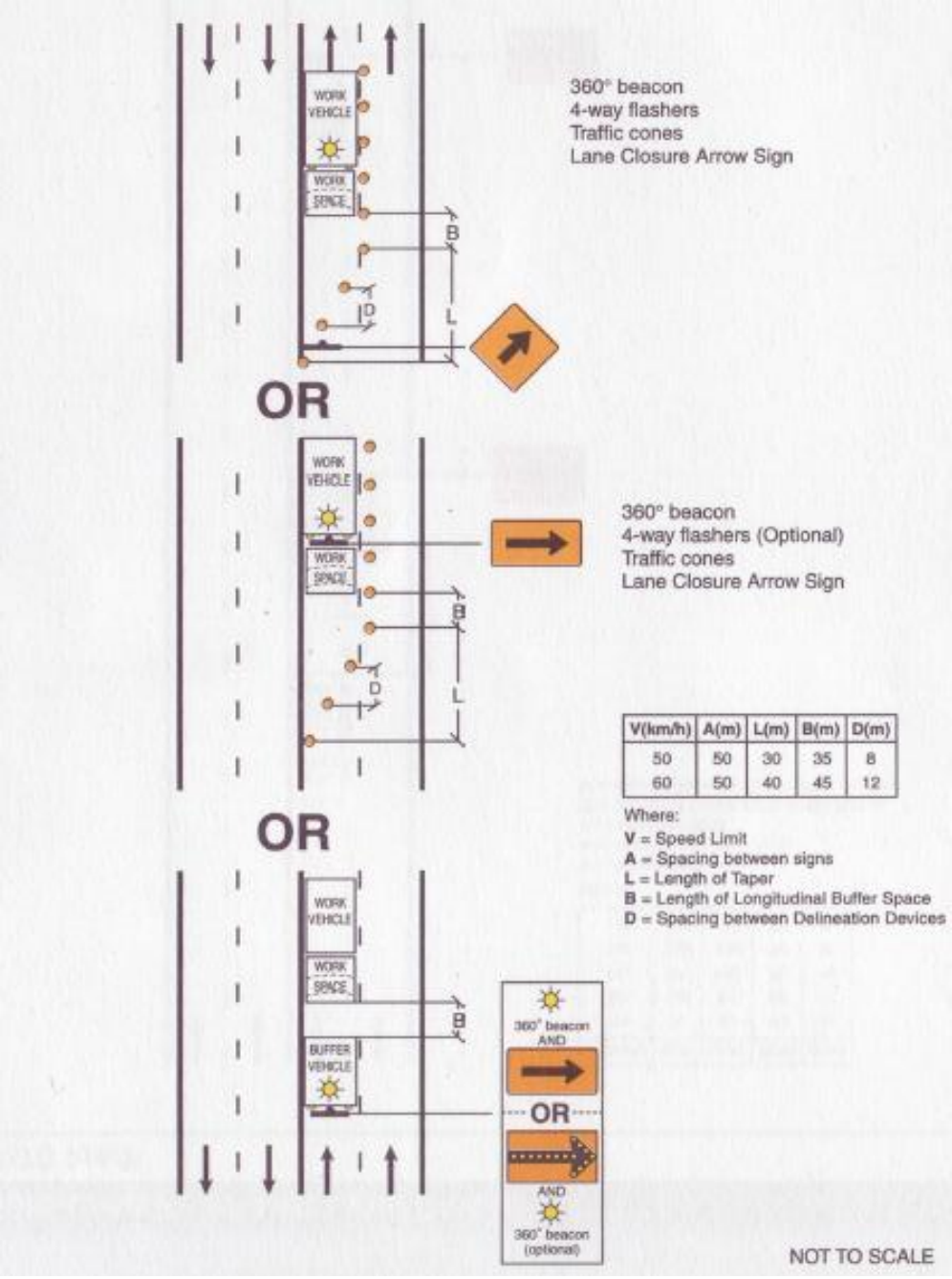
Single Lane Closed, Right Lane Closed (Multi-lane Roadway)



V(km/h)	A(m)	L(m)	B(m)	D(m)
50	50	30	35	8
60	50	40	45	12

D4-7 VERY SHORT TERM WORK

Single Lane Closed, Left Lane Closed (Multi-lane Roadway)

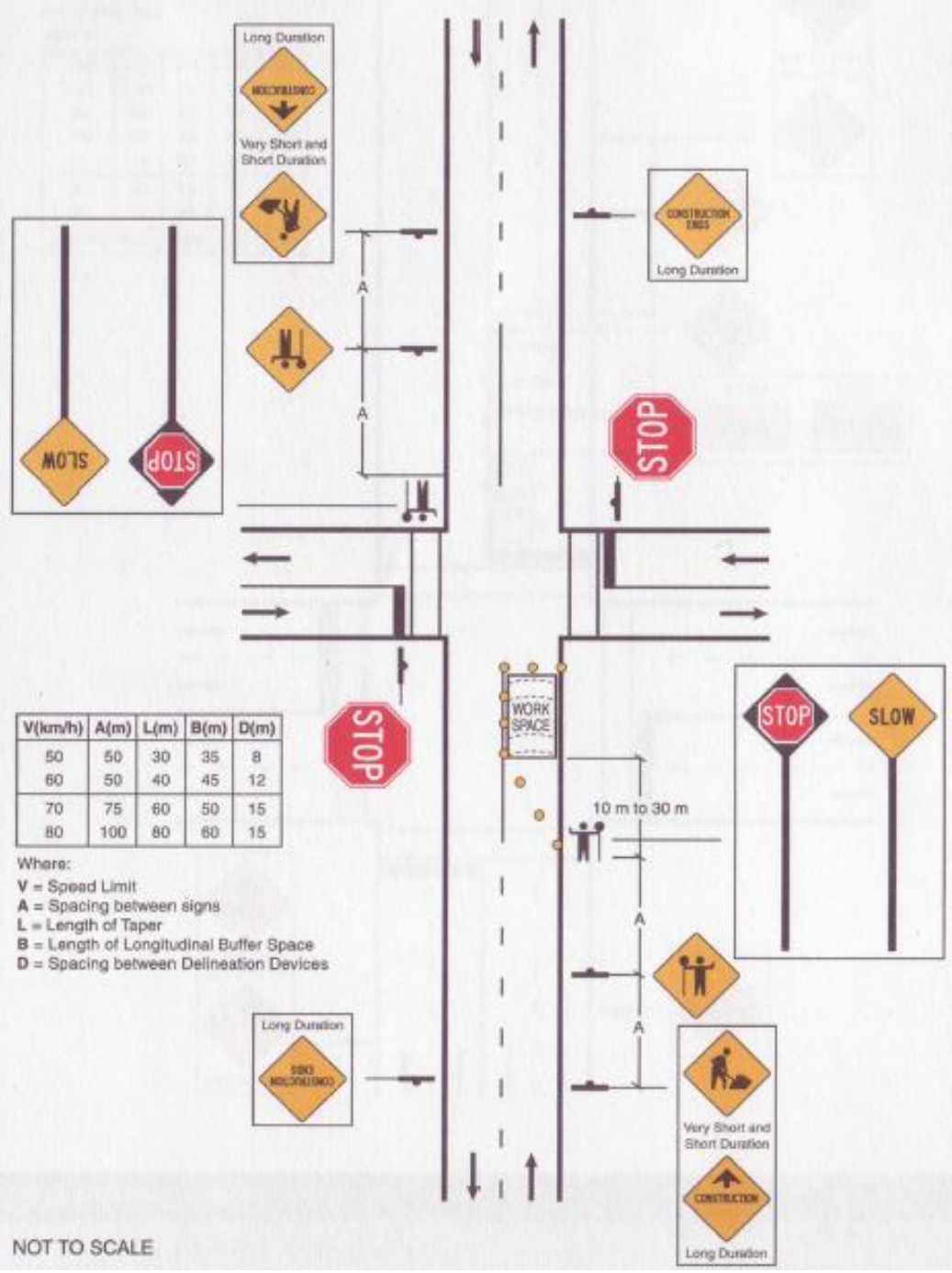


V(km/h)	A(m)	L(m)	B(m)	D(m)
50	50	30	35	8
60	50	40	45	12

Where:
V = Speed Limit
A = Spacing between signs
L = Length of Taper
B = Length of Longitudinal Buffer Space
D = Spacing between Delineation Devices

D4-8 VERY SHORT TERM, SHORT TERM, LONG TERM WORK

Intersection, Near Side Lane Closed (2-lane Roadway)

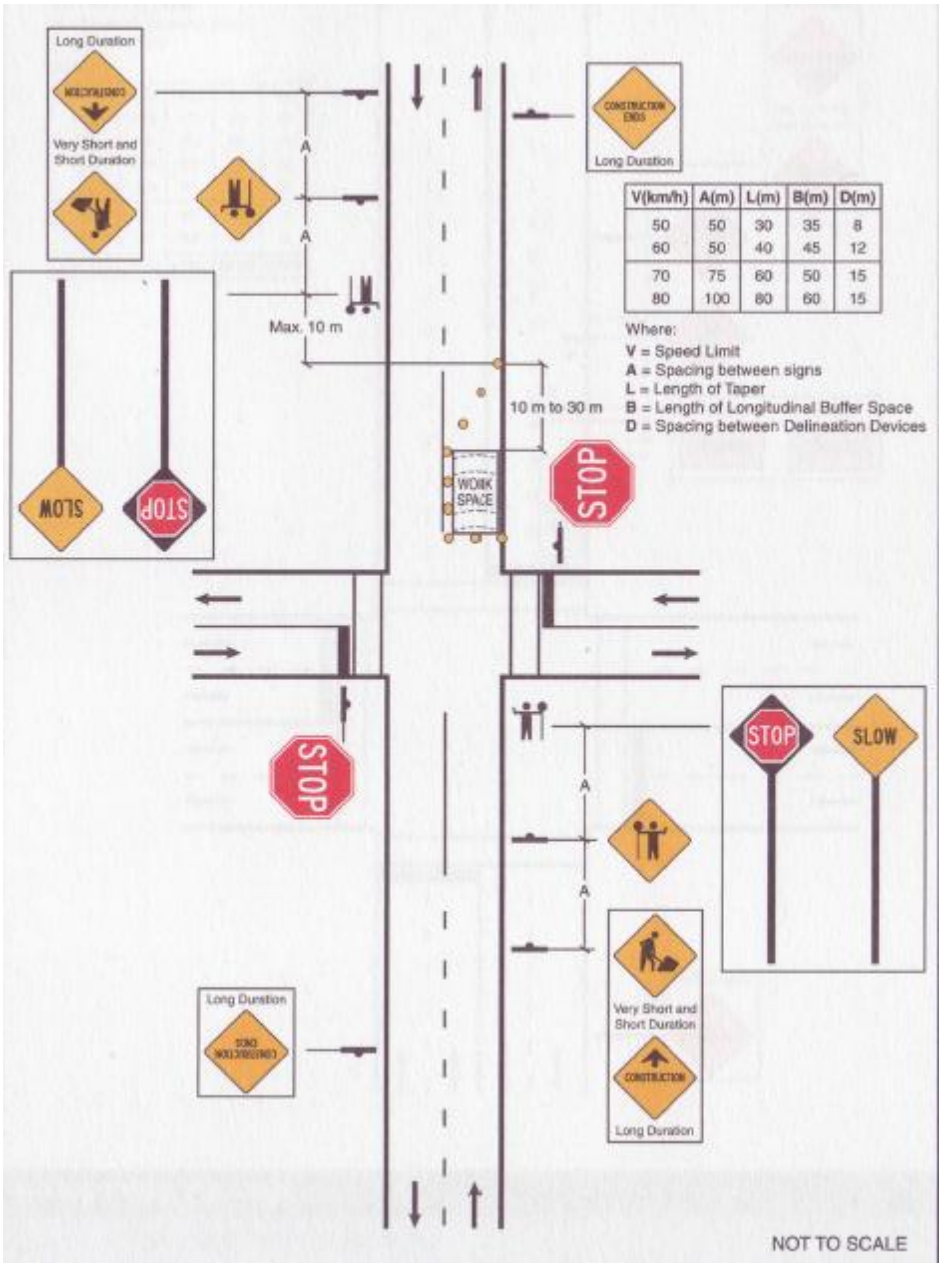


V(km/h)	A(m)	L(m)	B(m)	D(m)
50	50	30	35	8
60	50	40	45	12
70	75	60	50	15
80	100	80	60	15

Where:
V = Speed Limit
A = Spacing between signs
L = Length of Taper
B = Length of Longitudinal Buffer Space
D = Spacing between Delineation Devices

D4-9 VERY SHORT TERM, SHORT TERM, LONG TERM WORK

Intersection, Far Side Lane Closed (2-lane Roadway)

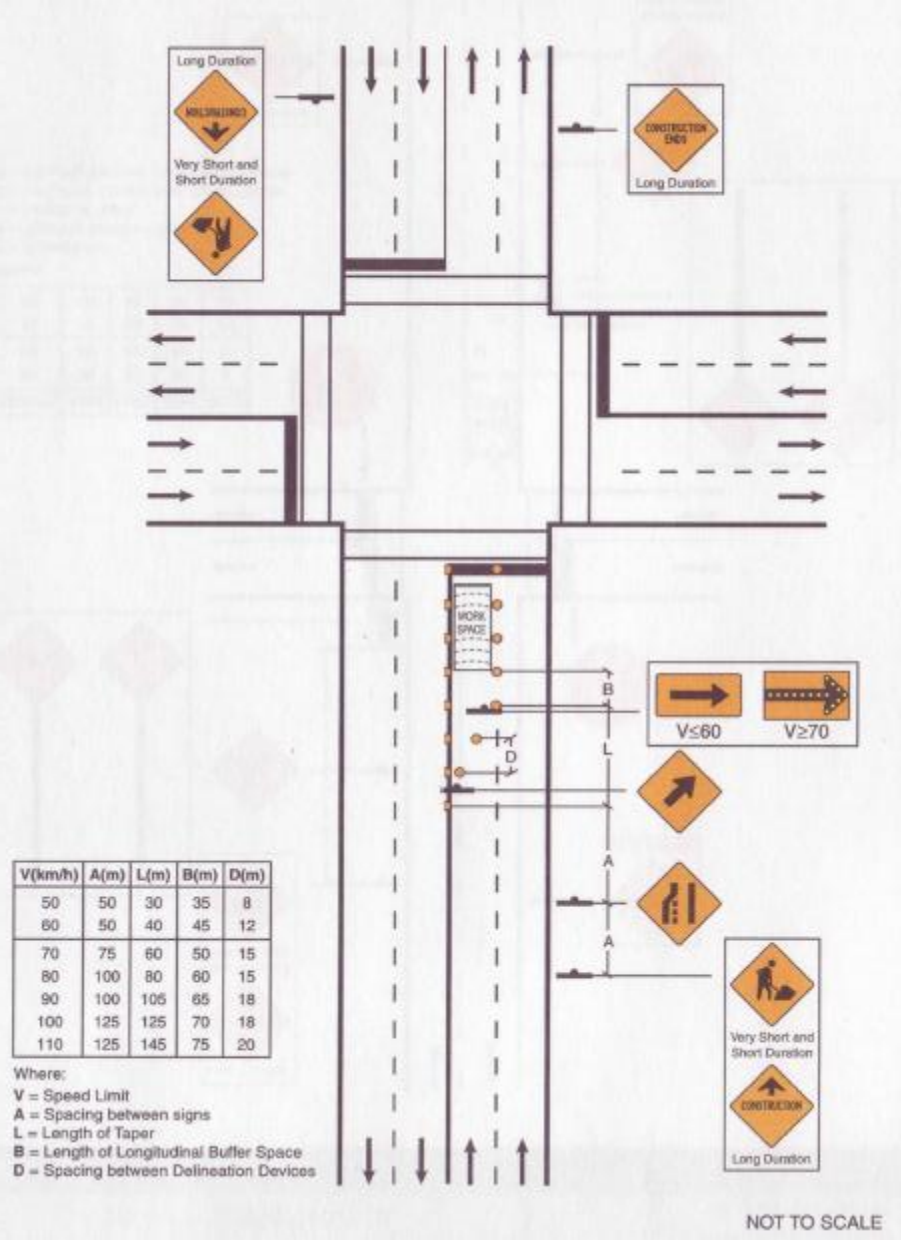


V(km/h)	A(m)	L(m)	B(m)	D(m)
50	50	30	35	8
60	50	40	45	12
70	75	60	50	15
80	100	80	60	15

Where:
V = Speed Limit
A = Spacing between signs
L = Length of Taper
B = Length of Longitudinal Buffer Space
D = Spacing between Delineation Devices

D4-10 VERY SHORT TERM, SHORT TERM, LONG TERM WORK

Intersection, Near Side Left Lane Closed (Multi-lane Roadway)

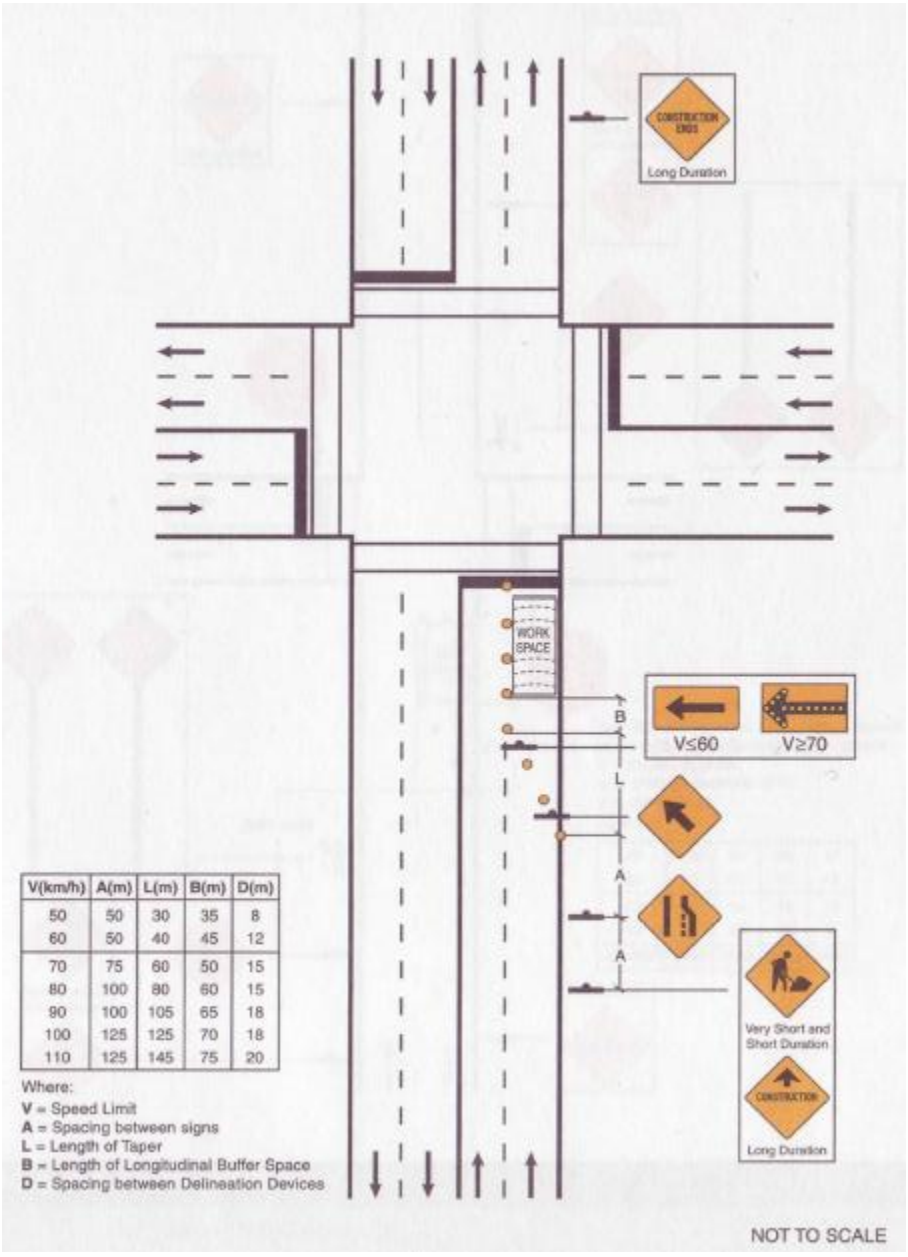


V(km/h)	A(m)	L(m)	B(m)	D(m)
50	50	30	35	8
60	50	40	45	12
70	75	60	50	15
80	100	80	60	15
90	100	105	65	18
100	125	125	70	18
110	125	145	75	20

Where:
V = Speed Limit
A = Spacing between signs
L = Length of Taper
B = Length of Longitudinal Buffer Space
D = Spacing between Delineation Devices

D4-11 VERY SHORT TERM, SHORT TERM, LONG TERM WORK

Intersection, Near Side Right Lane Closed (Multi-lane Roadway)

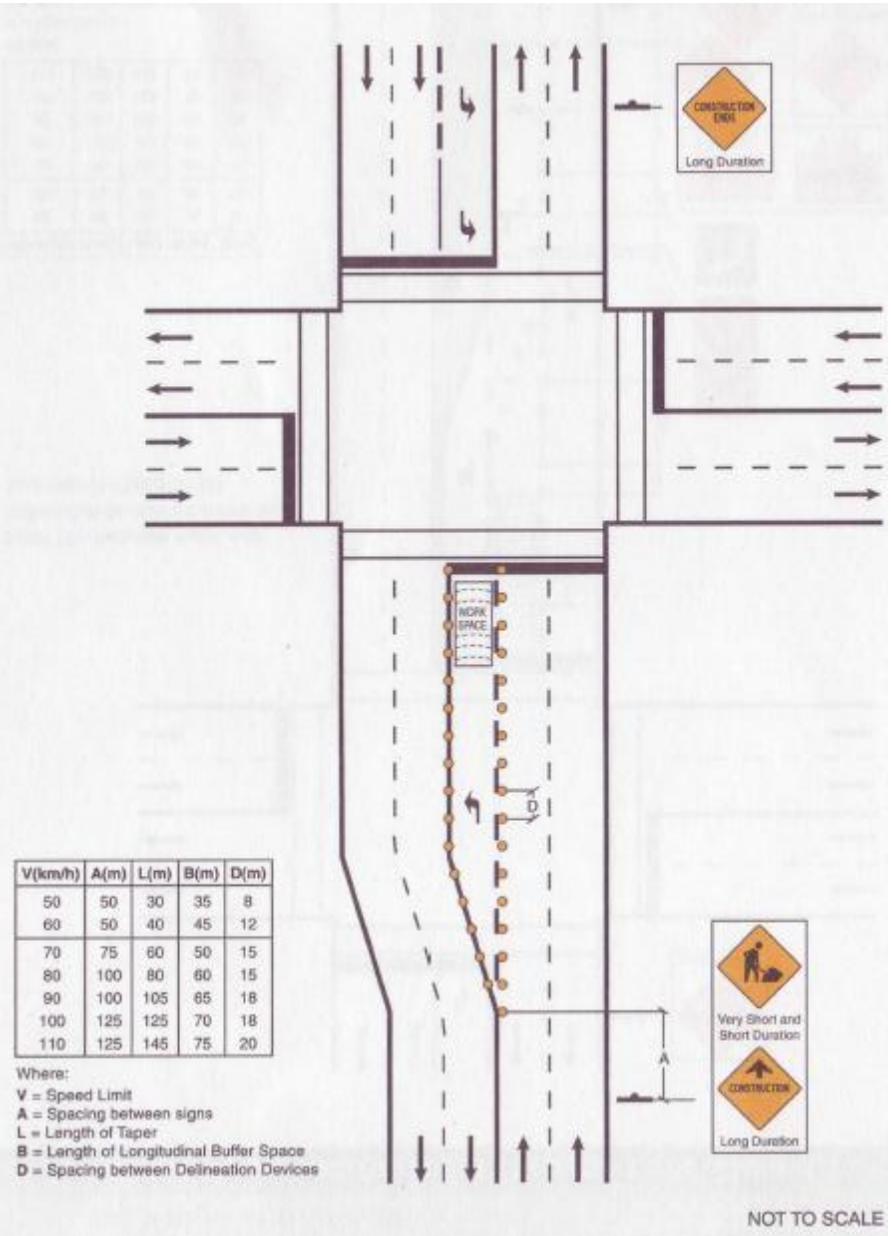


V(km/h)	A(m)	L(m)	B(m)	D(m)
50	50	30	35	8
60	50	40	45	12
70	75	60	50	15
80	100	80	60	15
90	100	105	65	18
100	125	125	70	18
110	125	145	75	20

Where:
V = Speed Limit
A = Spacing between signs
L = Length of Taper
B = Length of Longitudinal Buffer Space
D = Spacing between Delineation Devices

D4-12 VERY SHORT TERM, SHORT TERM, LONG TERM WORK

Intersection, Near Side Left-Turn Lane Closed (Multi-lane Roadway)

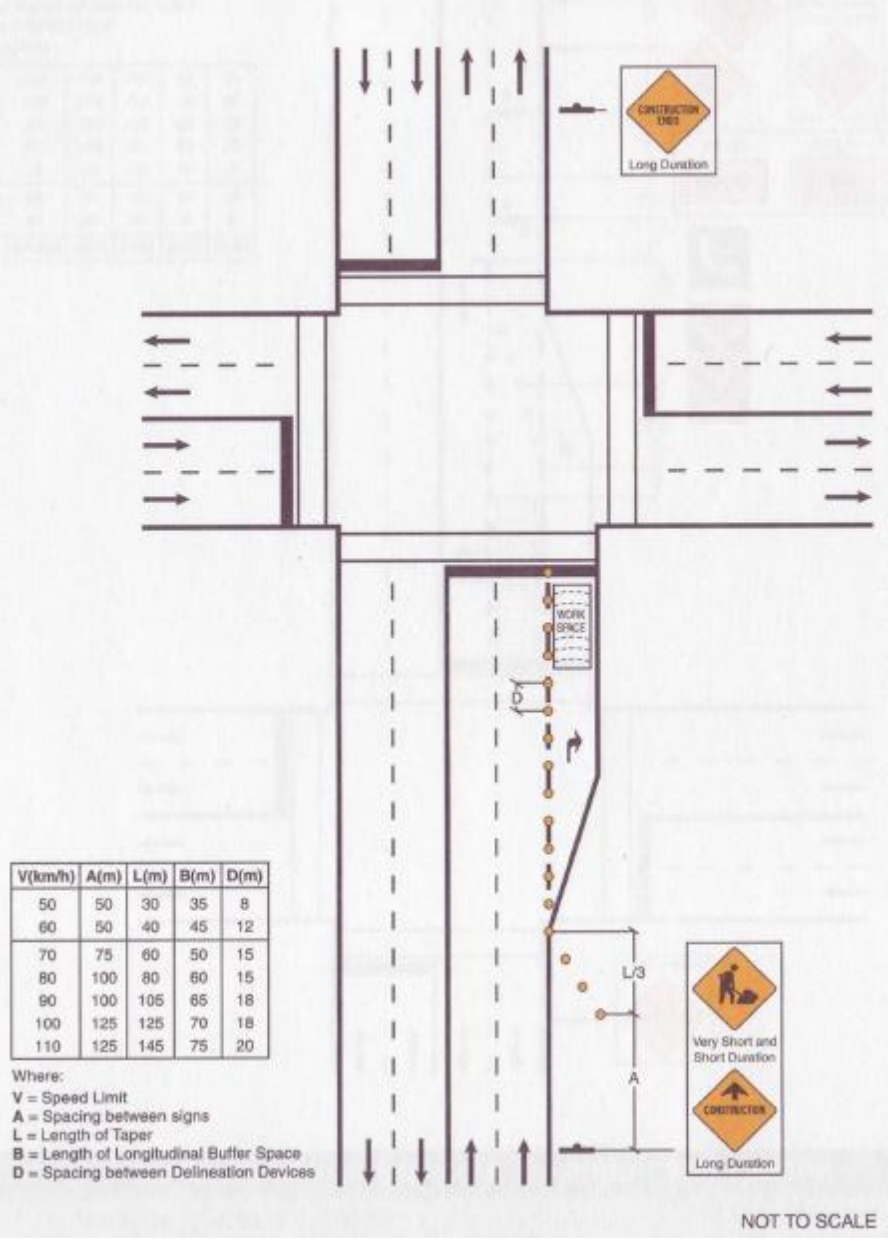


V(km/h)	A(m)	L(m)	B(m)	D(m)
50	50	30	35	8
60	50	40	45	12
70	75	60	50	15
80	100	80	60	15
90	100	105	65	18
100	125	125	70	18
110	125	145	75	20

Where:
V = Speed Limit
A = Spacing between signs
L = Length of Taper
B = Length of Longitudinal Buffer Space
D = Spacing between Delineation Devices

D4-13 VERY SHORT TERM, SHORT TERM, LONG TERM WORK

Intersection, Near Side Right-Turn Lane Closed (Multi-lane Roadway)

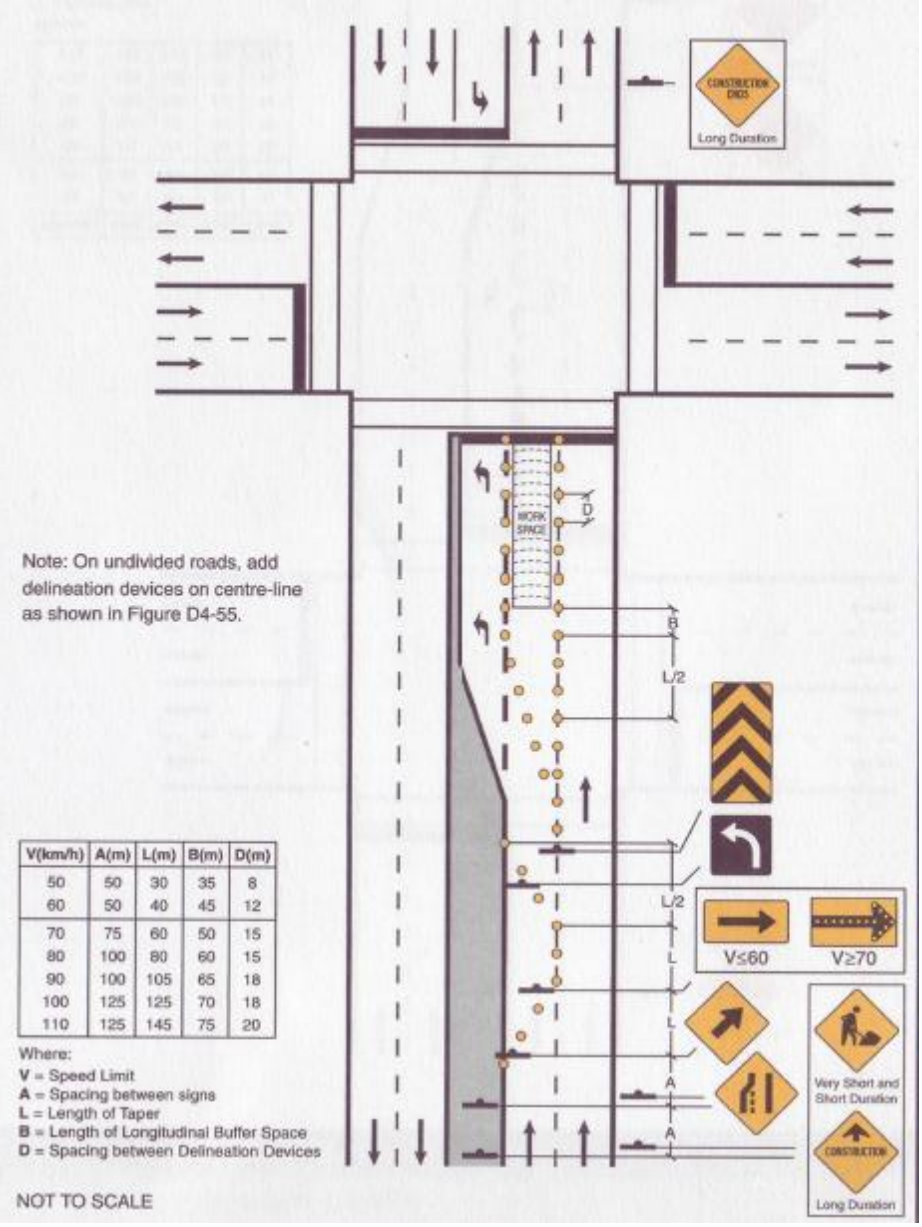


V(km/h)	A(m)	L(m)	B(m)	D(m)
50	50	30	35	8
60	50	40	45	12
70	75	60	50	15
80	100	80	60	15
90	100	105	65	18
100	125	125	70	18
110	125	145	75	20

Where:
V = Speed Limit
A = Spacing between signs
L = Length of Taper
B = Length of Longitudinal Buffer Space
D = Spacing between Delineation Devices

D4-14 VERY SHORT TERM, SHORT TERM, LONG TERM WORK

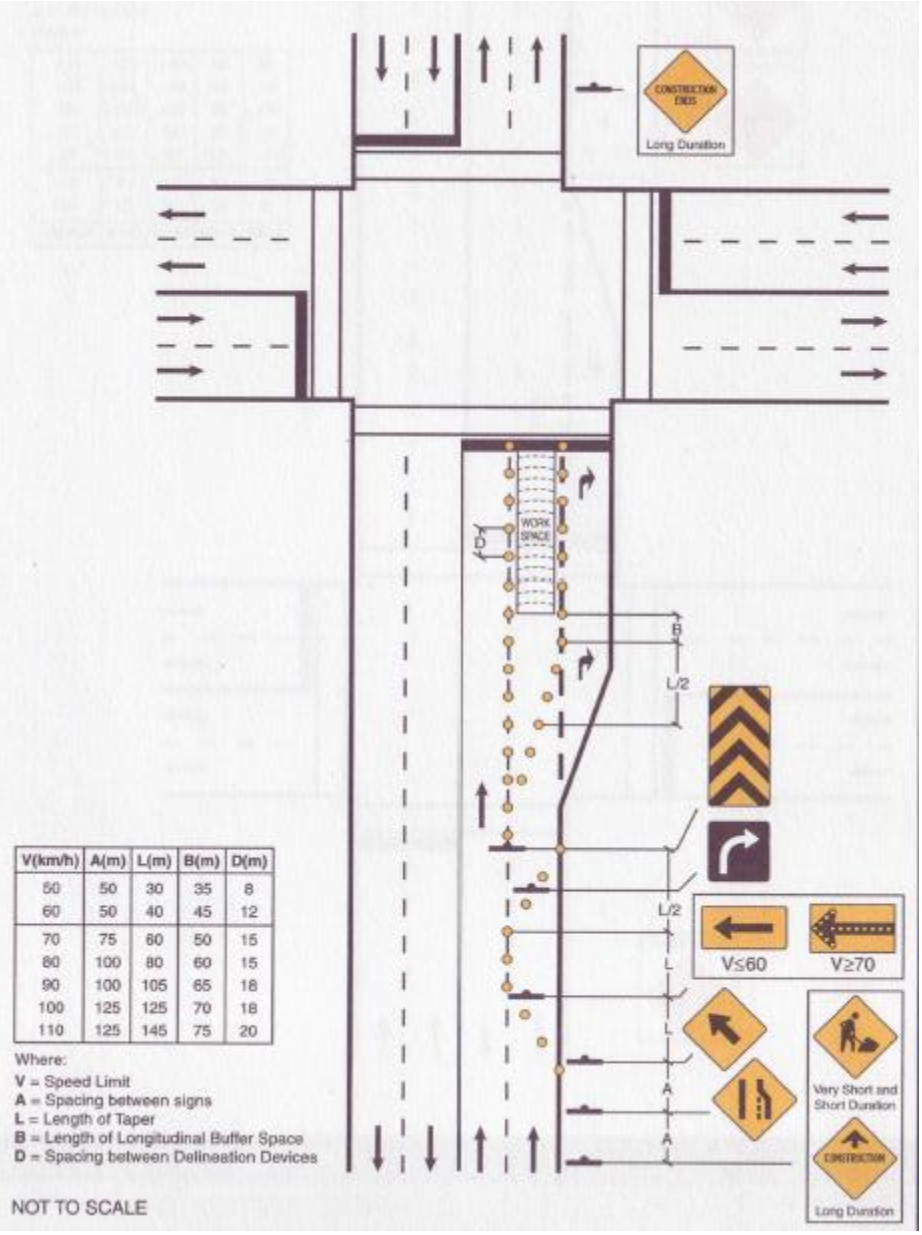
Intersection, Near Side Left-Turn Lane Open & Adjacent Through-Lane Closed (Multi-lane Roadway)



V(km/h)	A(m)	L(m)	B(m)	D(m)
50	50	30	35	8
60	50	40	45	12
70	75	60	50	15
80	100	80	60	15
90	100	105	65	18
100	125	125	70	18
110	125	145	75	20

D4-15 VERY SHORT TERM, SHORT TERM, LONG TERM WORK

Intersection, Near Side Right-Turn Lane Open & Adjacent Through-Lane Closed (Multi-lane Roadway)

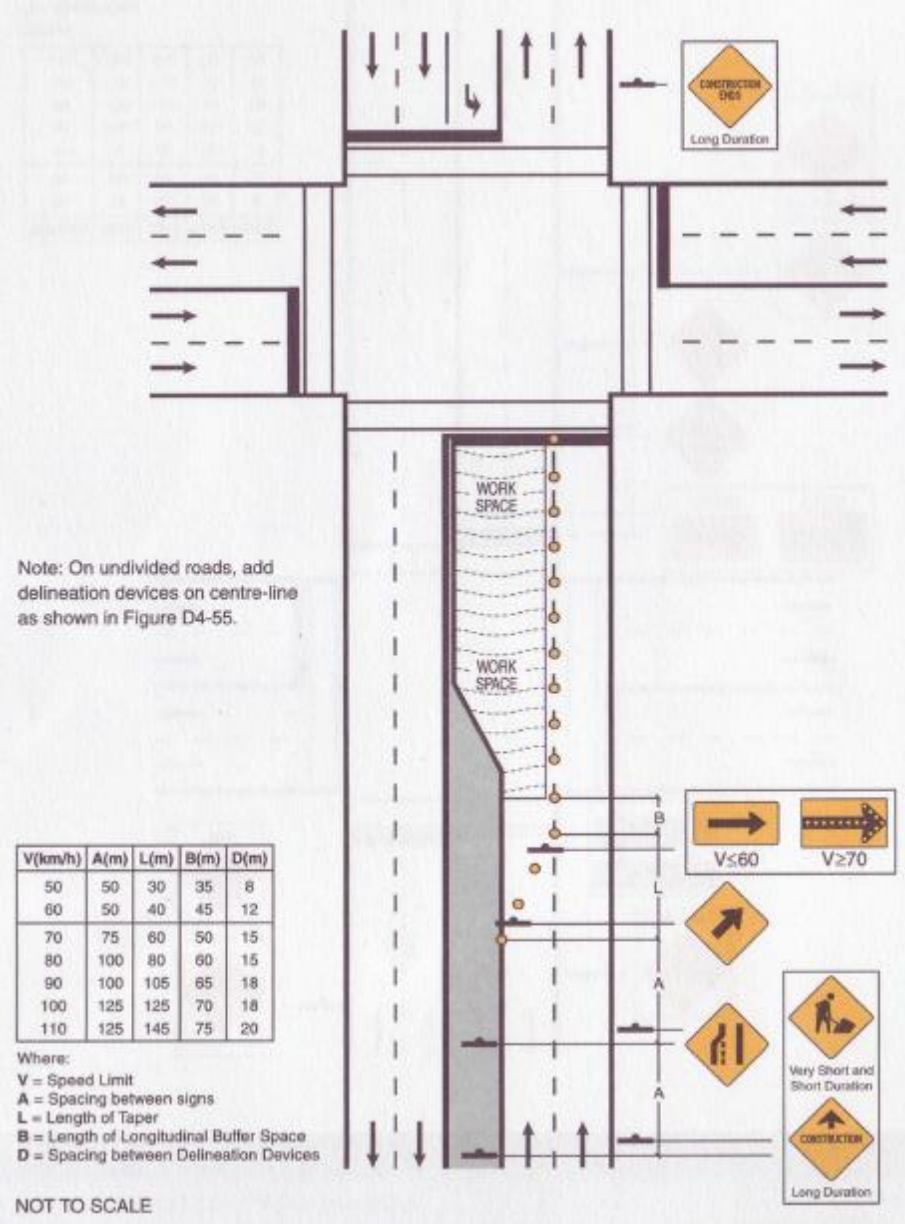


V(km/h)	A(m)	L(m)	B(m)	D(m)
50	50	30	35	8
60	50	40	45	12
70	75	60	50	15
80	100	80	60	15
90	100	105	65	18
100	125	125	70	18
110	125	145	75	20

Where:
V = Speed Limit
A = Spacing between signs
L = Length of Taper
B = Length of Longitudinal Buffer Space
D = Spacing between Delineation Devices

D4-16 VERY SHORT TERM, SHORT TERM, LONG TERM WORK

Intersection, Near Side Left-Turn Lane & Adjacent Through-Lane Closed (Multi-lane Roadway)

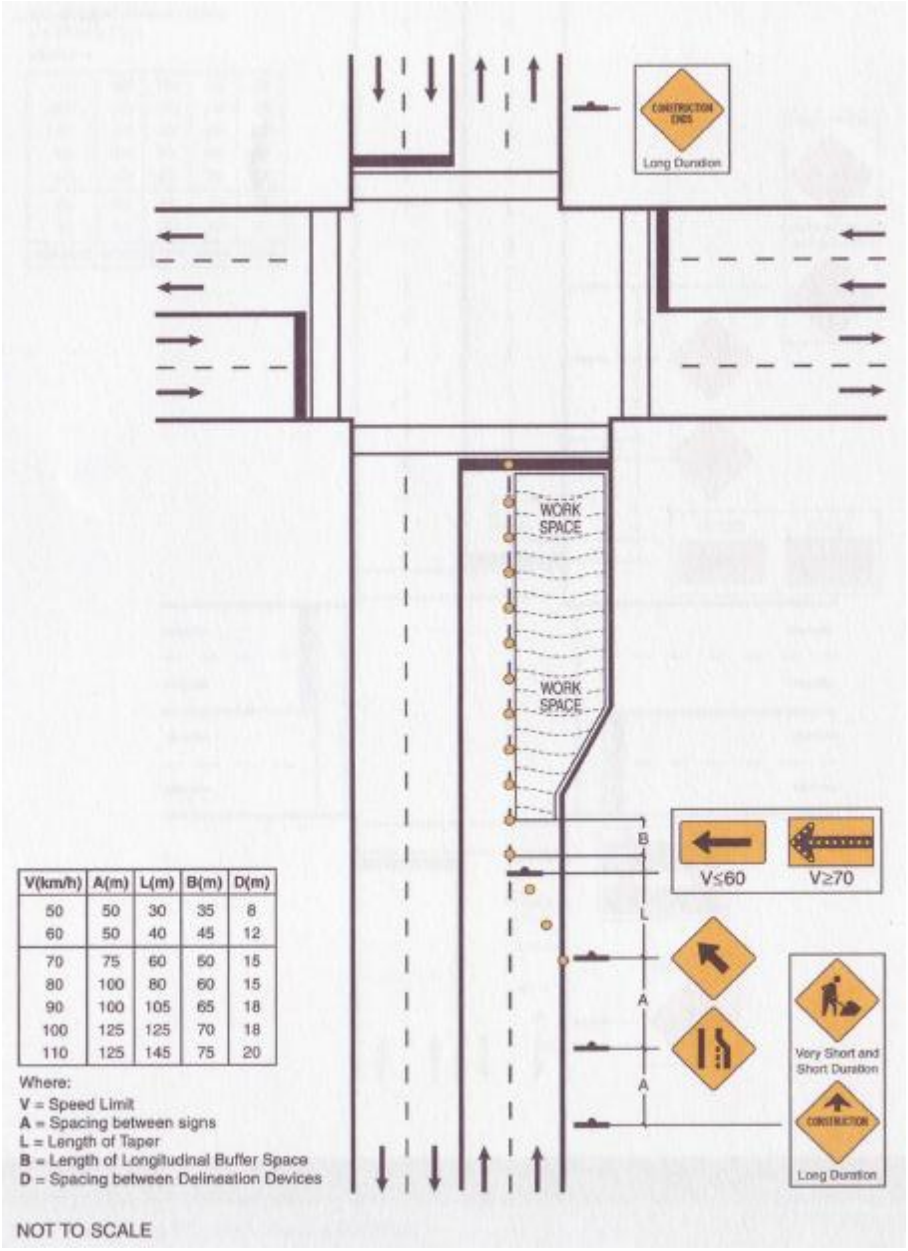


V(km/h)	A(m)	L(m)	B(m)	D(m)
50	50	30	35	8
60	50	40	45	12
70	75	60	50	15
80	100	80	60	15
90	100	105	65	18
100	125	125	70	18
110	125	145	75	20

Where:
V = Speed Limit
A = Spacing between signs
L = Length of Taper
B = Length of Longitudinal Buffer Space
D = Spacing between Delineation Devices

D4-17 VERY SHORT TERM, SHORT TERM, LONG TERM WORK

Intersection, Near Side Right-Turn Lane & Adjacent Through-Lane Closed (Multi-lane Roadway)

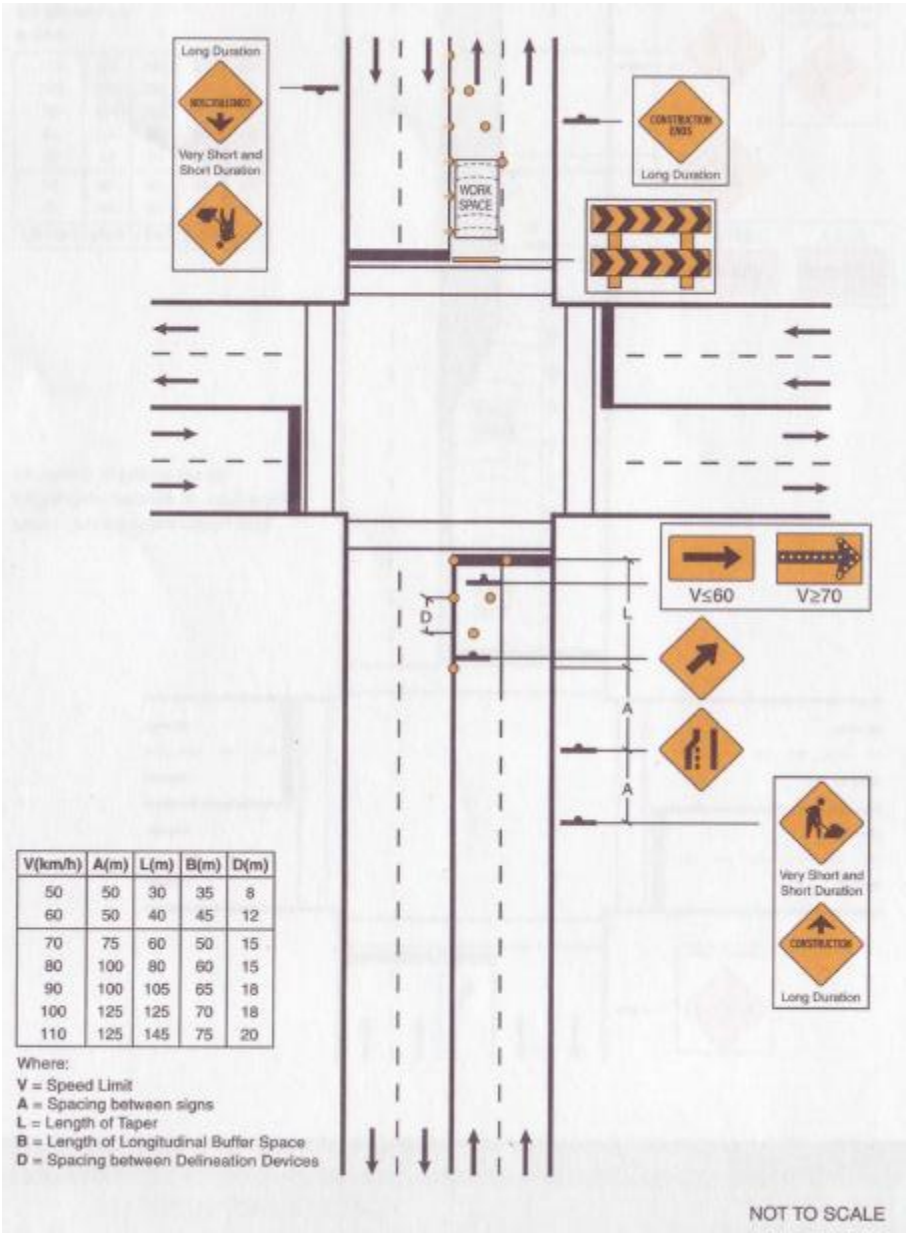


V(km/h)	A(m)	L(m)	B(m)	D(m)
50	50	30	35	8
60	50	40	45	12
70	75	60	50	15
80	100	80	60	15
90	100	105	65	18
100	125	125	70	18
110	125	145	75	20

Where:
V = Speed Limit
A = Spacing between signs
L = Length of Taper
B = Length of Longitudinal Buffer Space
D = Spacing between Delineation Devices

D4-18 VERY SHORT TERM, SHORT TERM, LONG TERM WORK

Intersection, Far Side Left Lane Closed (Multi-lane Roadway)

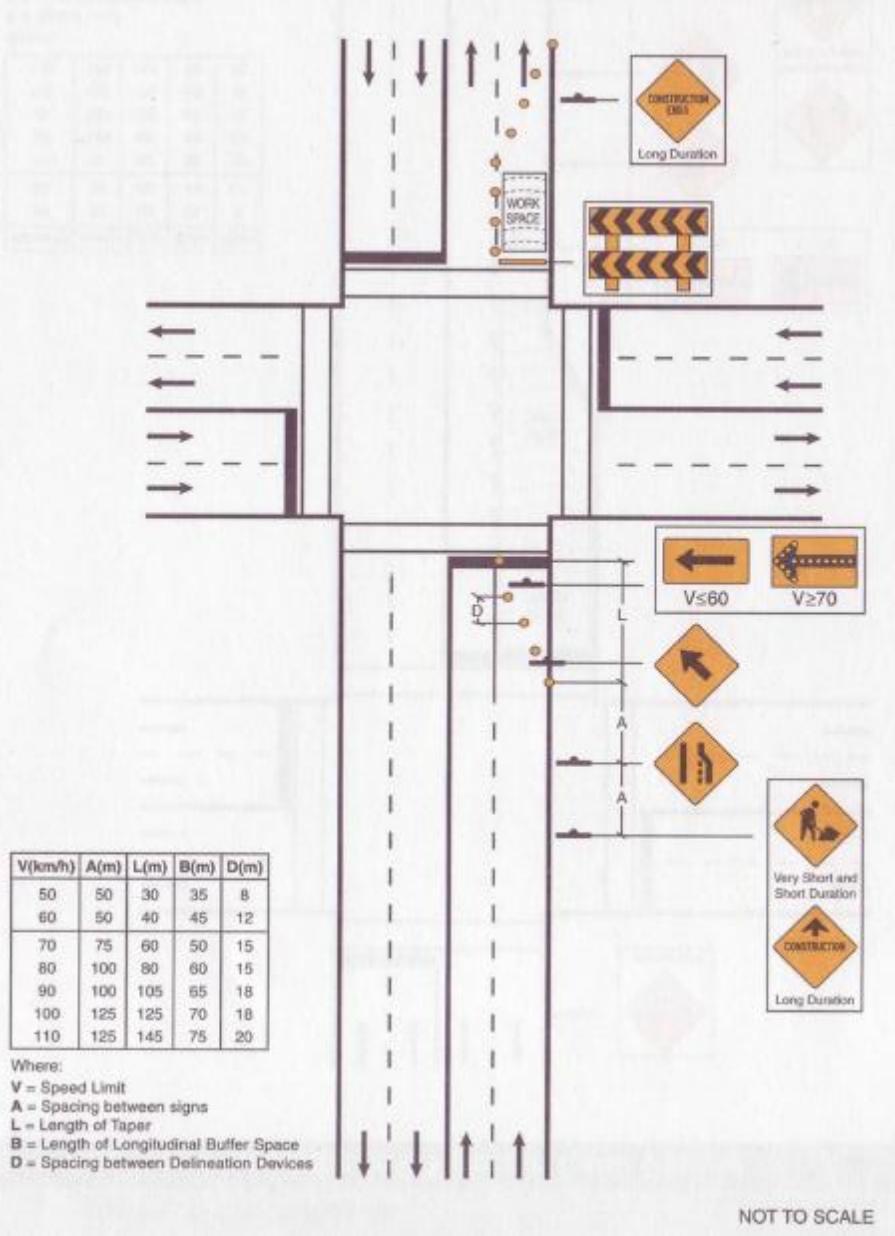


V(km/h)	A(m)	L(m)	B(m)	D(m)
50	50	30	35	8
60	50	40	45	12
70	75	60	50	15
80	100	80	60	15
90	100	105	65	18
100	125	125	70	18
110	125	145	75	20

Where:
V = Speed Limit
A = Spacing between signs
L = Length of Taper
B = Length of Longitudinal Buffer Space
D = Spacing between Delineation Devices

D4-19 VERY SHORT TERM, SHORT TERM, LONG TERM WORK

Intersection, Far Side Right Lane Closed (Multi-lane Roadway)

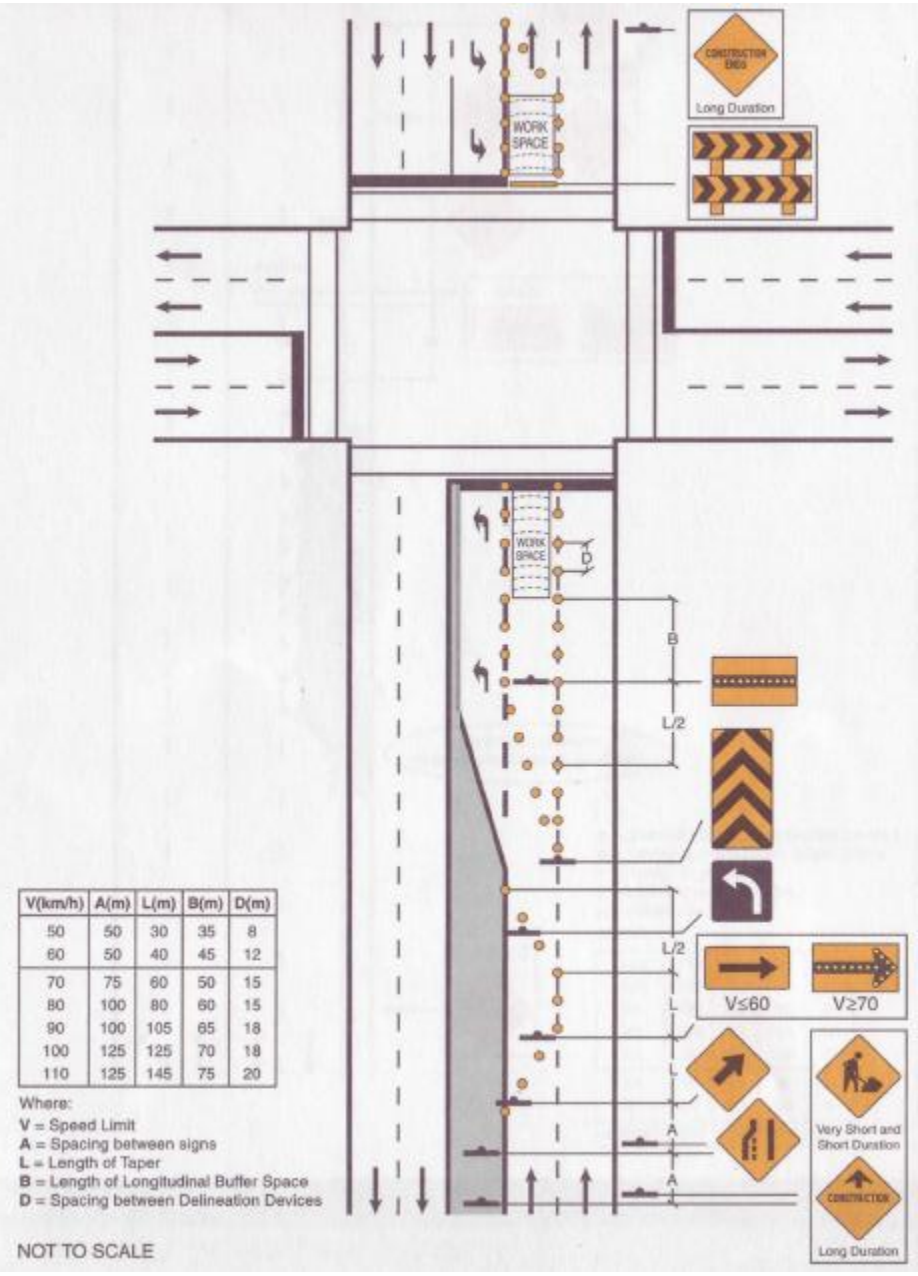


V(km/h)	A(m)	L(m)	B(m)	D(m)
50	50	30	35	8
60	50	40	45	12
70	75	60	50	15
80	100	80	60	15
90	100	105	65	18
100	125	125	70	18
110	125	145	75	20

Where:
V = Speed Limit
A = Spacing between signs
L = Length of Taper
B = Length of Longitudinal Buffer Space
D = Spacing between Delineation Devices

D4-20 VERY SHORT TERM, SHORT TERM, LONG TERM WORK

Intersection, Far Side Left Lane Closed & Near Side Left-Turn Lane Open (Multi-lane Roadway)

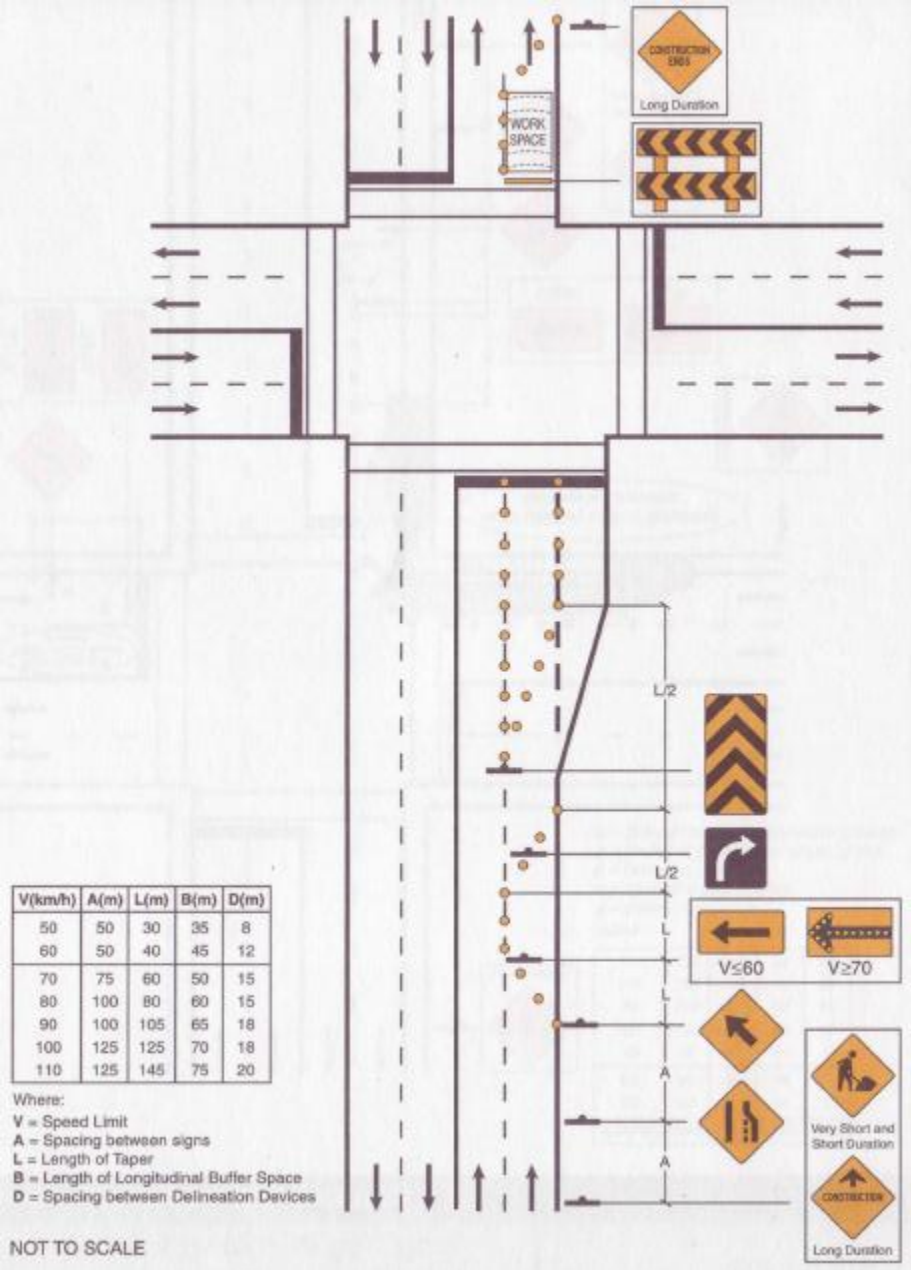


V(km/h)	A(m)	L(m)	B(m)	D(m)
50	50	30	35	8
60	50	40	45	12
70	75	60	50	15
80	100	80	60	15
90	100	105	65	18
100	125	125	70	18
110	125	145	75	20

Where:
V = Speed Limit
A = Spacing between signs
L = Length of Taper
B = Length of Longitudinal Buffer Space
D = Spacing between Delineation Devices

D4-21 VERY SHORT TERM, SHORT TERM, LONG TERM WORK

Intersection, Far Side Right Lane Closed & Near Side Right-Turn Lane Open (Multi-lane Roadway)

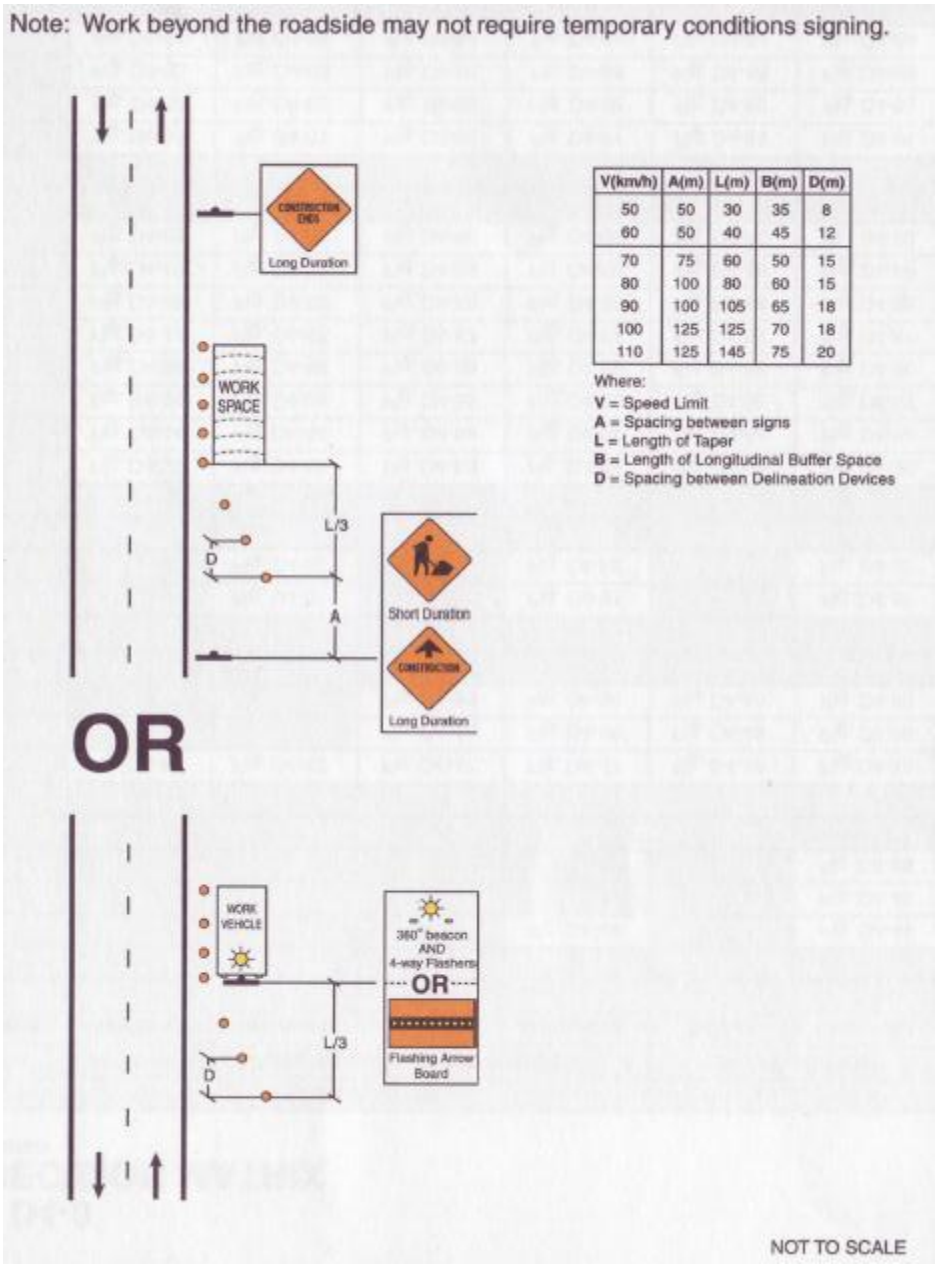


V(km/h)	A(m)	L(m)	B(m)	D(m)
50	50	30	35	8
60	50	40	45	12
70	75	60	50	15
80	100	80	60	15
90	100	105	65	18
100	125	125	70	18
110	125	145	75	20

Where:
V = Speed Limit
A = Spacing between signs
L = Length of Taper
B = Length of Longitudinal Buffer Space
D = Spacing between Delineation Devices

D4-22 VERY SHORT TERM, SHORT TERM, LONG TERM WORK

Roadside or Shoulder Work, Right Shoulder (2-lane Roadway OR Multi-lane Roadway)

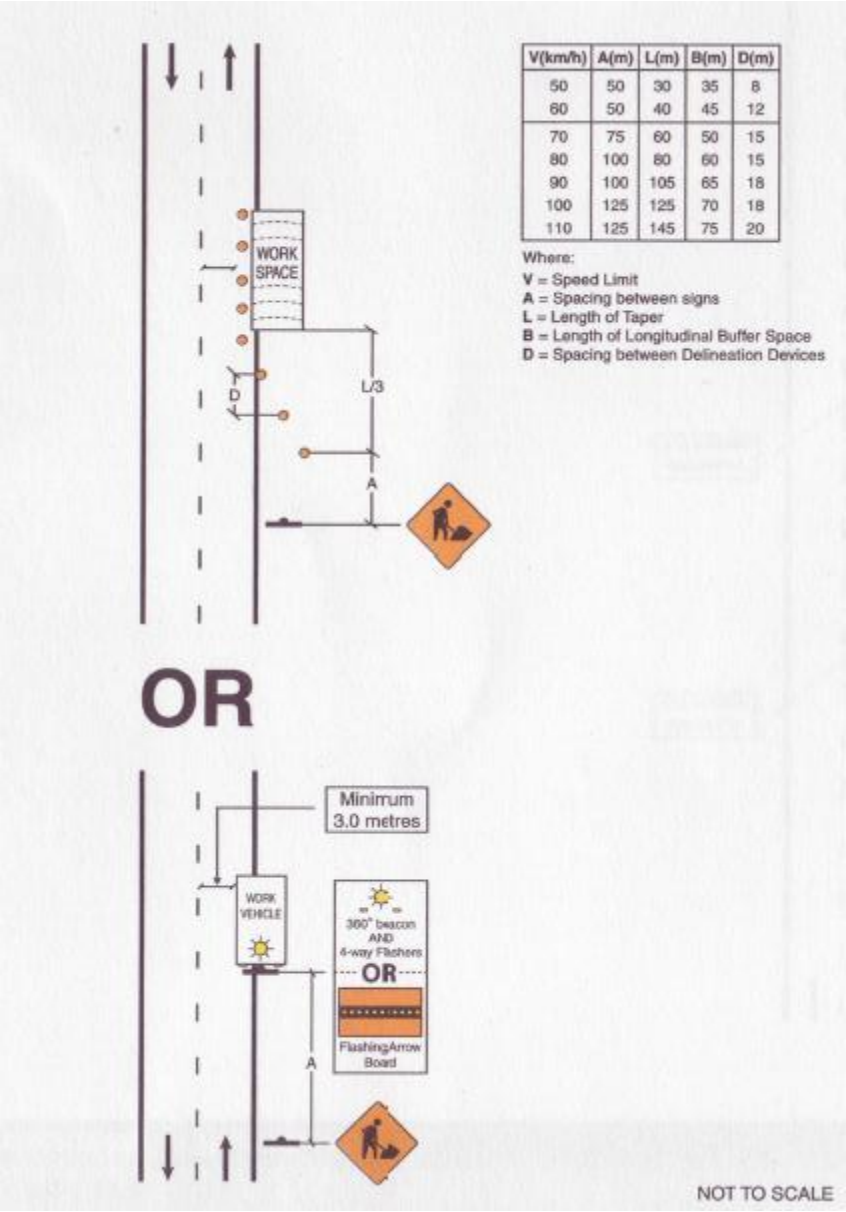


V(km/h)	A(m)	L(m)	B(m)	D(m)
50	50	30	35	8
60	50	40	45	12
70	75	60	50	15
80	100	80	60	15
90	100	105	65	18
100	125	125	70	18
110	125	145	75	20

Where:
V = Speed Limit
A = Spacing between signs
L = Length of Taper
B = Length of Longitudinal Buffer Space
D = Spacing between Delineation Devices

D4-23 VERY SHORT TERM, SHORT TERM, LONG TERM WORK

Roadside or Shoulder Work, Encroachment in Right Lane (2-lane Roadway)
Single Lane Closed, Right Lane Closed (2-lane Roadway)

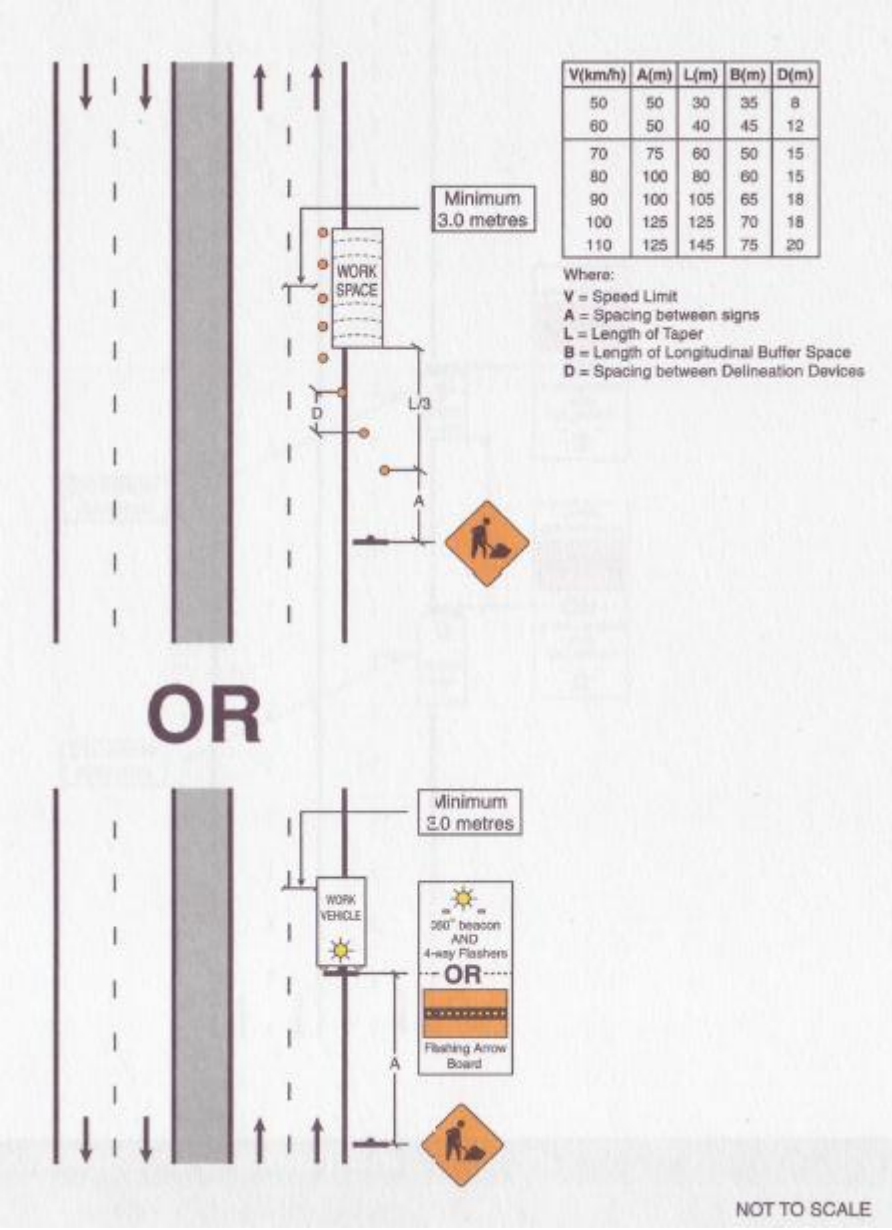


V(km/h)	A(m)	L(m)	B(m)	D(m)
50	50	30	35	8
60	50	40	45	12
70	75	60	50	15
80	100	80	60	15
90	100	105	65	18
100	125	125	70	18
110	125	145	75	20

Where:
V = Speed Limit
A = Spacing between signs
L = Length of Taper
B = Length of Longitudinal Buffer Space
D = Spacing between Delineation Devices

D4-24 VERY SHORT TERM, SHORT TERM WORK

Roadside or Shoulder Work, Encroachment in Right Lane (Multi-lane Roadway)

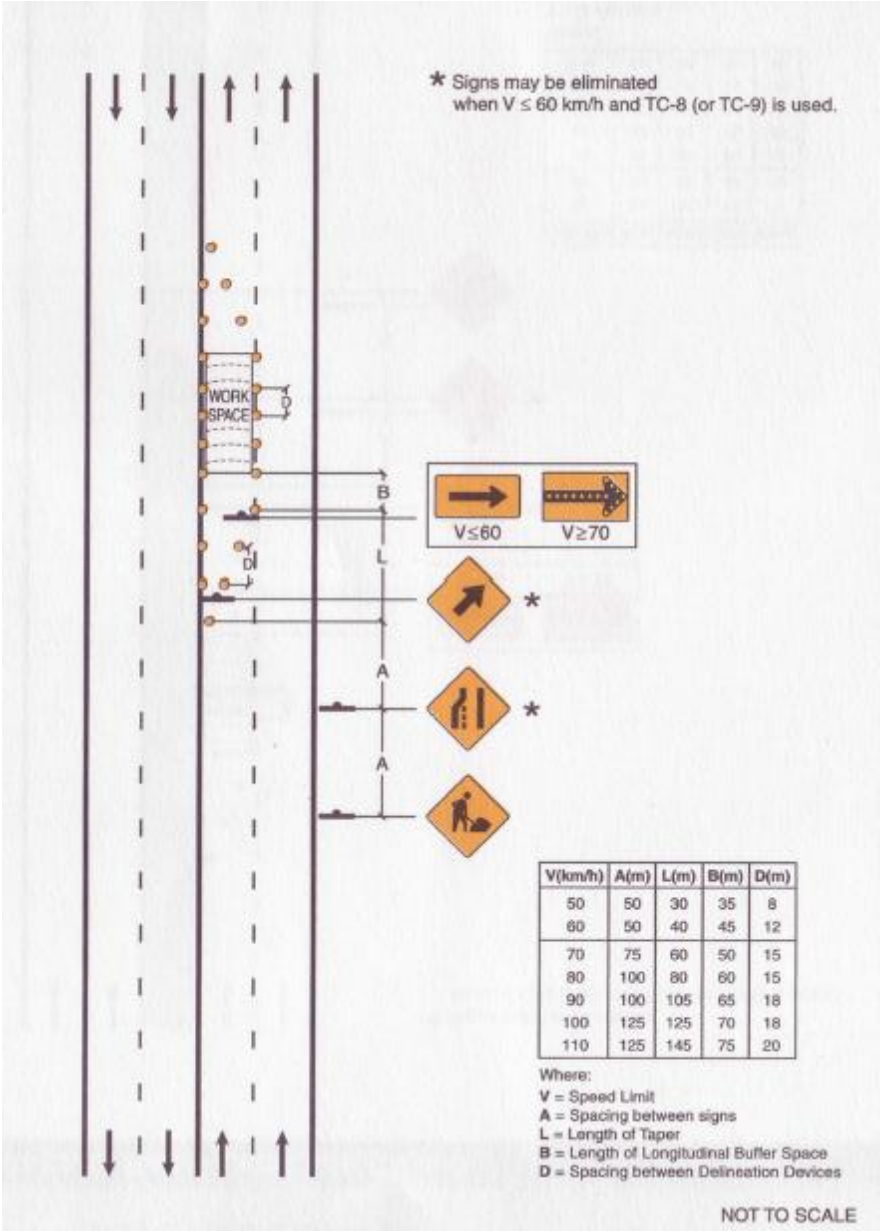


V(km/h)	A(m)	L(m)	B(m)	D(m)
50	50	30	35	8
60	50	40	45	12
70	75	60	50	15
80	100	80	60	15
90	100	105	65	18
100	125	125	70	18
110	125	145	75	20

Where:
V = Speed Limit
A = Spacing between signs
L = Length of Taper
B = Length of Longitudinal Buffer Space
D = Spacing between Delineation Devices

D4-25 SHORT TERM WORK

Single Lane Closed, Left Lane Closed (Multi-lane Roadway)



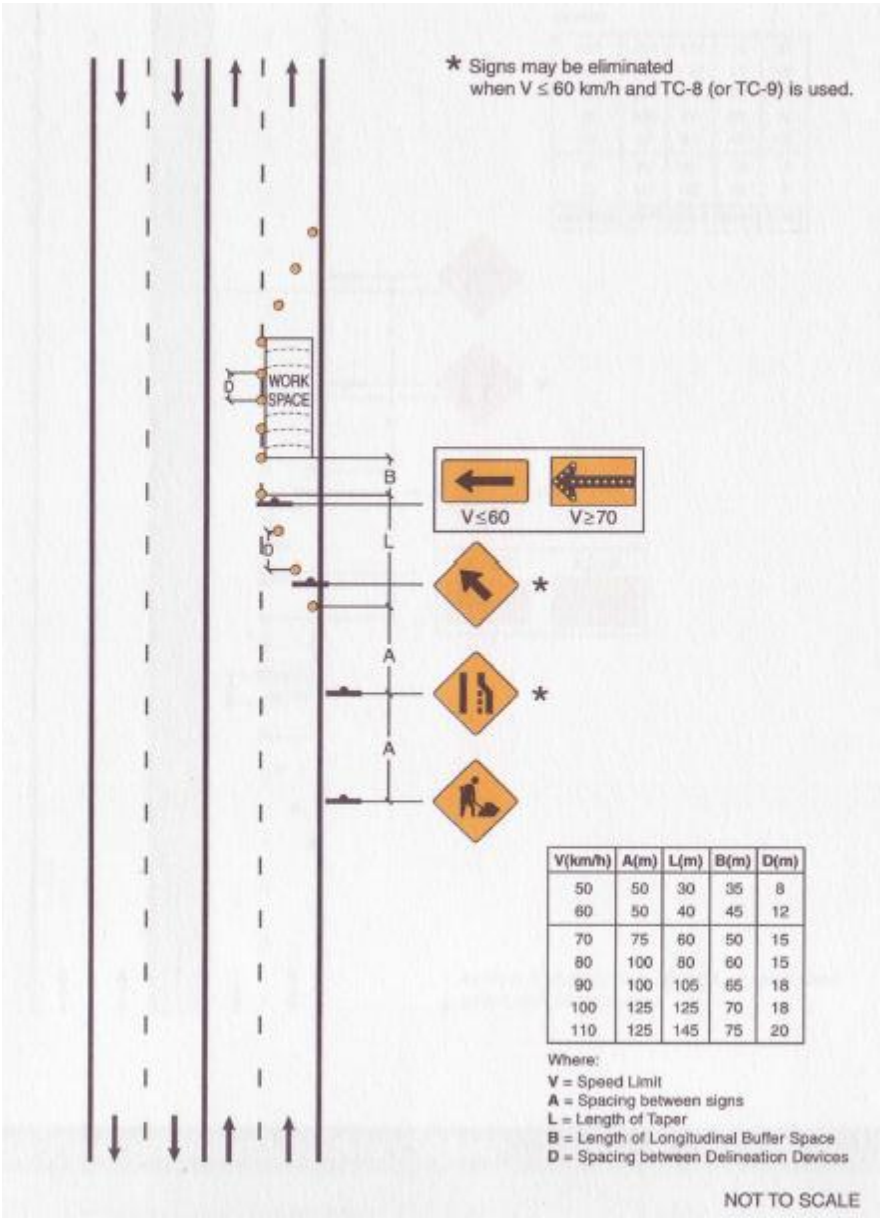
V(km/h)	A(m)	L(m)	B(m)	D(m)
50	50	30	35	8
60	50	40	45	12
70	75	60	50	15
80	100	80	60	15
90	100	105	65	18
100	125	125	70	18
110	125	145	75	20

Where:
V = Speed Limit
A = Spacing between signs
L = Length of Taper
B = Length of Longitudinal Buffer Space
D = Spacing between Delineation Devices

NOT TO SCALE

D4-26 SHORT TERM WORK

Single Lane Closed, Right Lane Closed (Multi-lane Roadway)



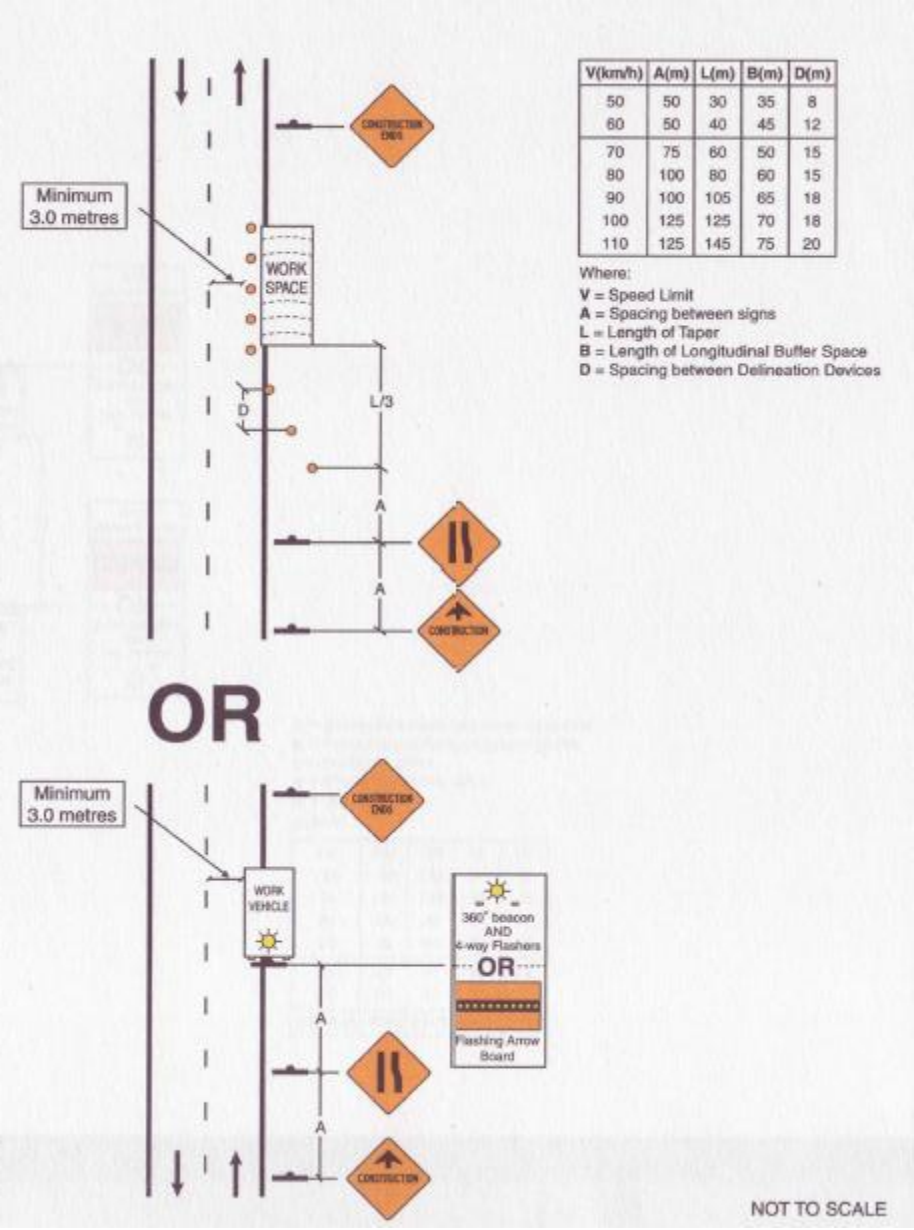
V(km/h)	A(m)	L(m)	B(m)	D(m)
50	50	30	35	8
60	50	40	45	12
70	75	60	50	15
80	100	80	60	15
90	100	105	65	18
100	125	125	70	18
110	125	145	75	20

Where:
V = Speed Limit
A = Spacing between signs
L = Length of Taper
B = Length of Longitudinal Buffer Space
D = Spacing between Delineation Devices

NOT TO SCALE

D4-27 LONG TERM WORK

Roadside or Shoulder Work, Encroachment in Right Lane (2-lane Roadway)

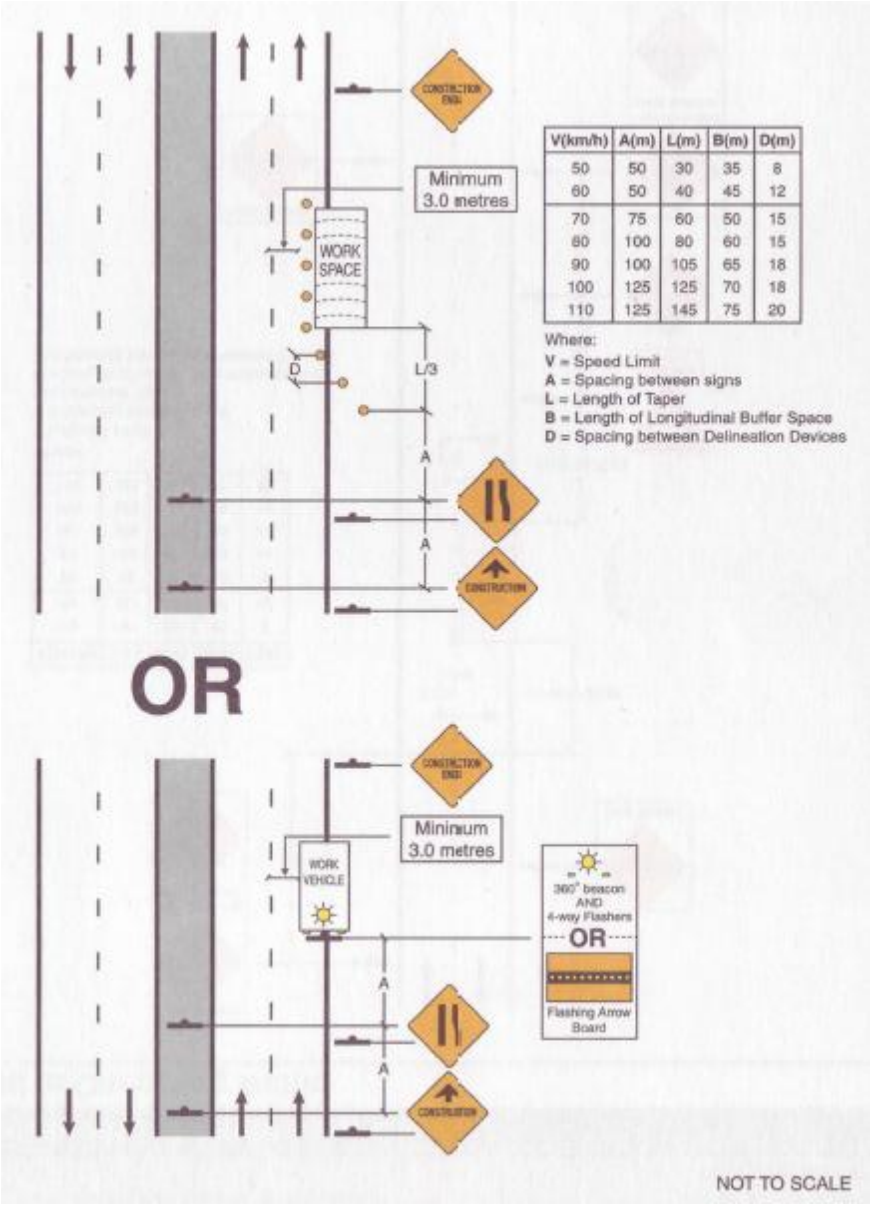


V(km/h)	A(m)	L(m)	B(m)	D(m)
50	50	30	35	8
60	50	40	45	12
70	75	60	50	15
80	100	80	60	15
90	100	105	65	18
100	125	125	70	18
110	125	145	75	20

Where:
V = Speed Limit
A = Spacing between signs
L = Length of Taper
B = Length of Longitudinal Buffer Space
D = Spacing between Delineation Devices

D4-28 LONG TERM WORK

Roadside or Shoulder Work, Encroachment in Right Lane (Multi-lane Roadway)

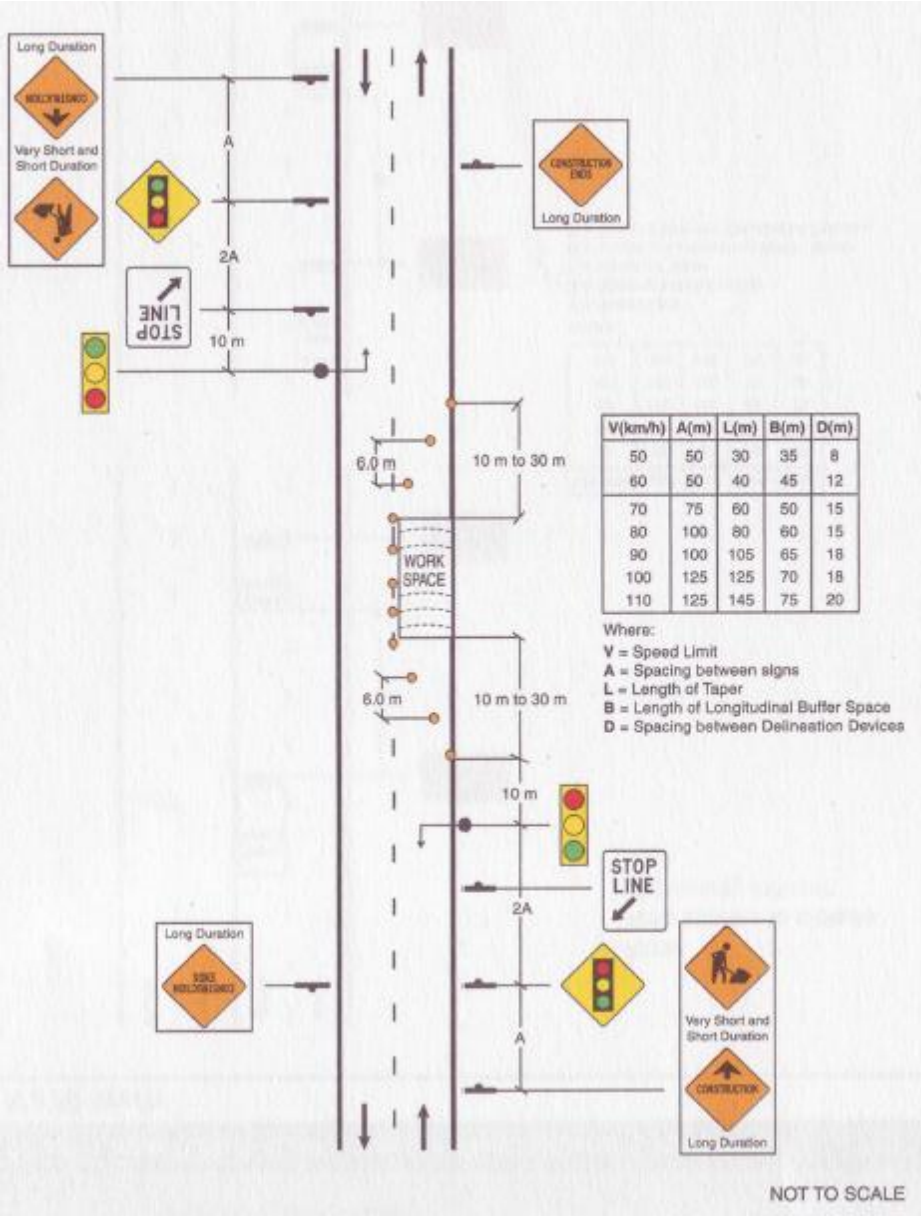


V(km/h)	A(m)	L(m)	B(m)	D(m)
50	50	30	35	8
60	50	40	45	12
70	75	60	50	15
80	100	80	60	15
90	100	105	65	18
100	125	125	70	18
110	125	145	75	20

Where:
V = Speed Limit
A = Spacing between signs
L = Length of Taper
B = Length of Longitudinal Buffer Space
D = Spacing between Delineation Devices

D4-29 LONG TERM WORK

Single Lane Closed, Right Lane Closed, Traffic Signals (2-lane Roadway)

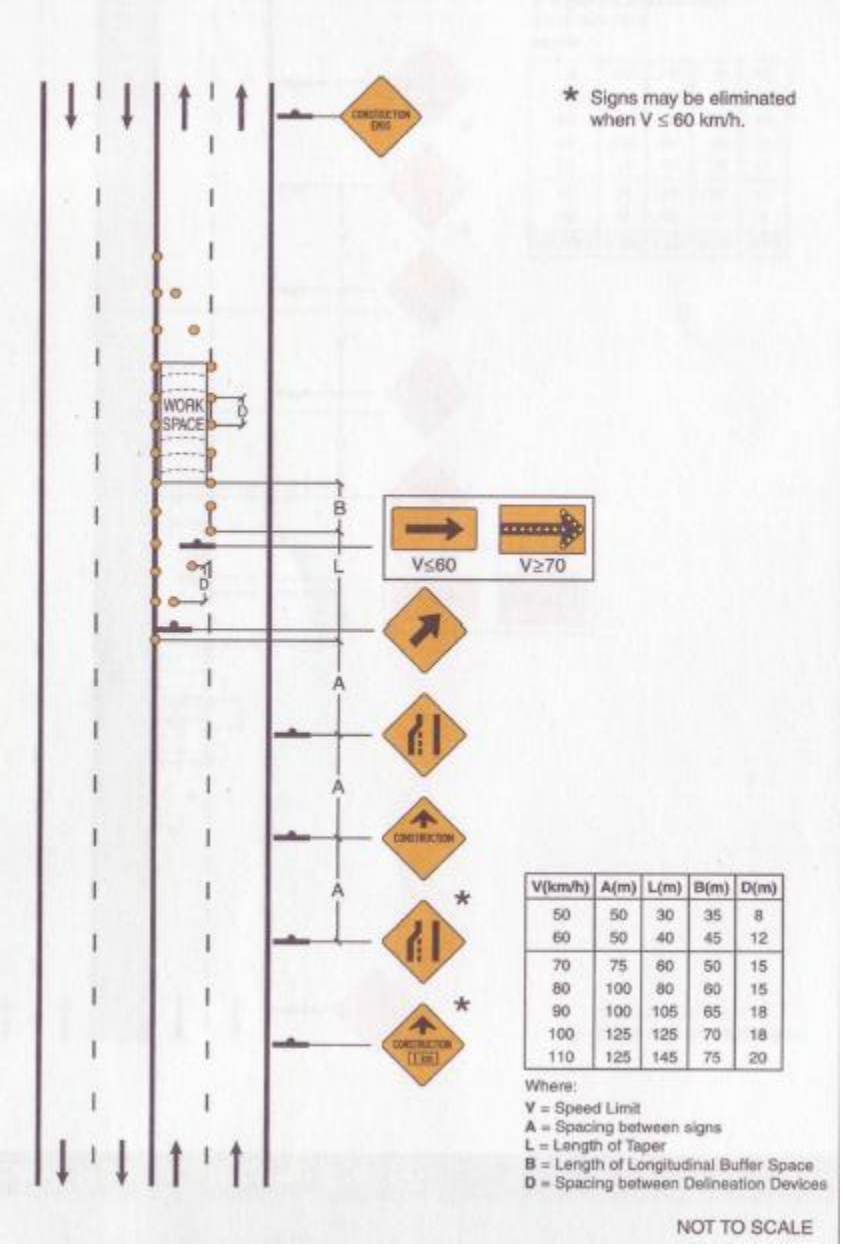


V(km/h)	A(m)	L(m)	B(m)	D(m)
50	50	30	35	8
60	50	40	45	12
70	75	60	50	15
80	100	80	60	15
90	100	105	65	18
100	125	125	70	18
110	125	145	75	20

Where:
V = Speed Limit
A = Spacing between signs
L = Length of Taper
B = Length of Longitudinal Buffer Space
D = Spacing between Delineation Devices

D4-30 LONG TERM WORK

Single Lane Closed, Left Lane Closed (Multi-lane Roadway)

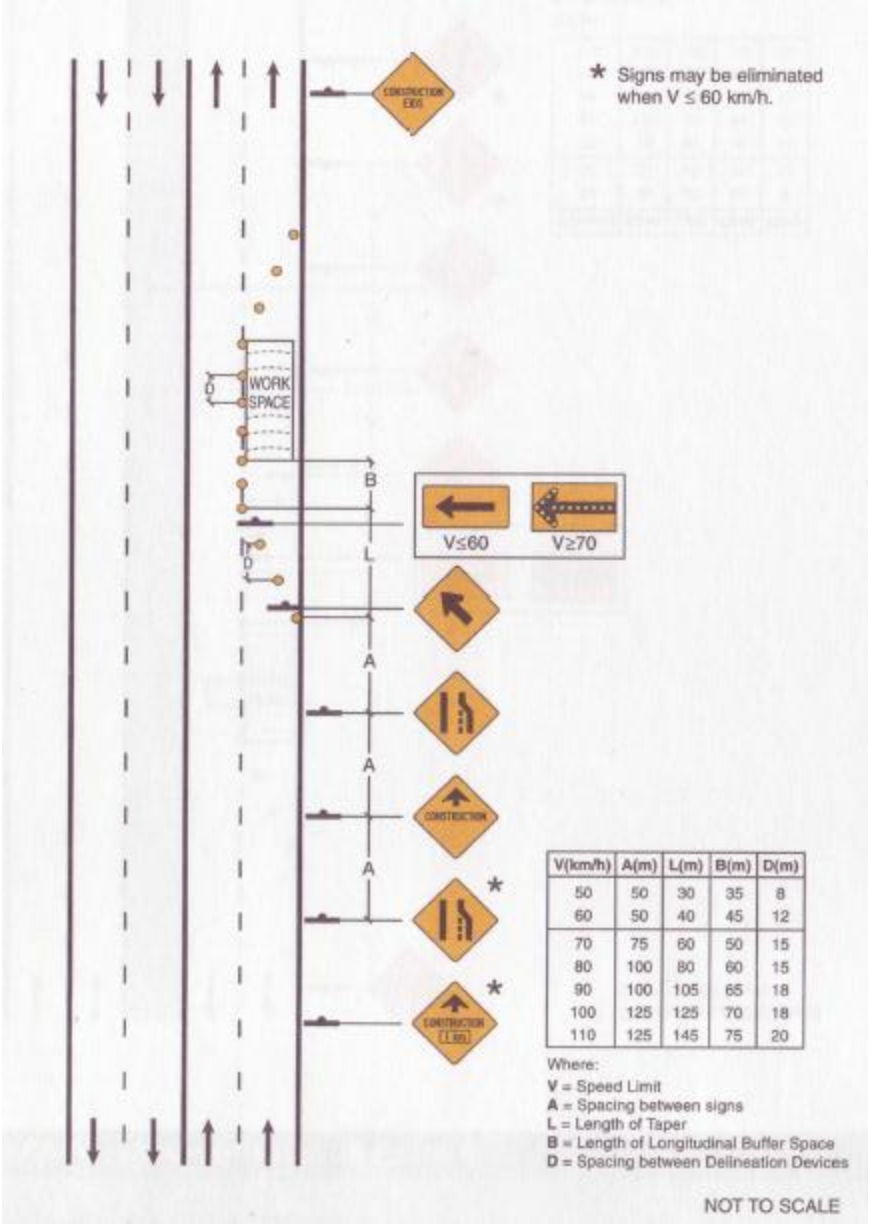


V(km/h)	A(m)	L(m)	B(m)	D(m)
50	50	30	35	8
60	50	40	45	12
70	75	60	50	15
80	100	80	60	15
90	100	105	65	18
100	125	125	70	18
110	125	145	75	20

Where:
V = Speed Limit
A = Spacing between signs
L = Length of Taper
B = Length of Longitudinal Buffer Space
D = Spacing between Delineation Devices

D4-31 LONG TERM WORK

Single Lane Closed, Right Lane Closed (Multi-lane Roadway)

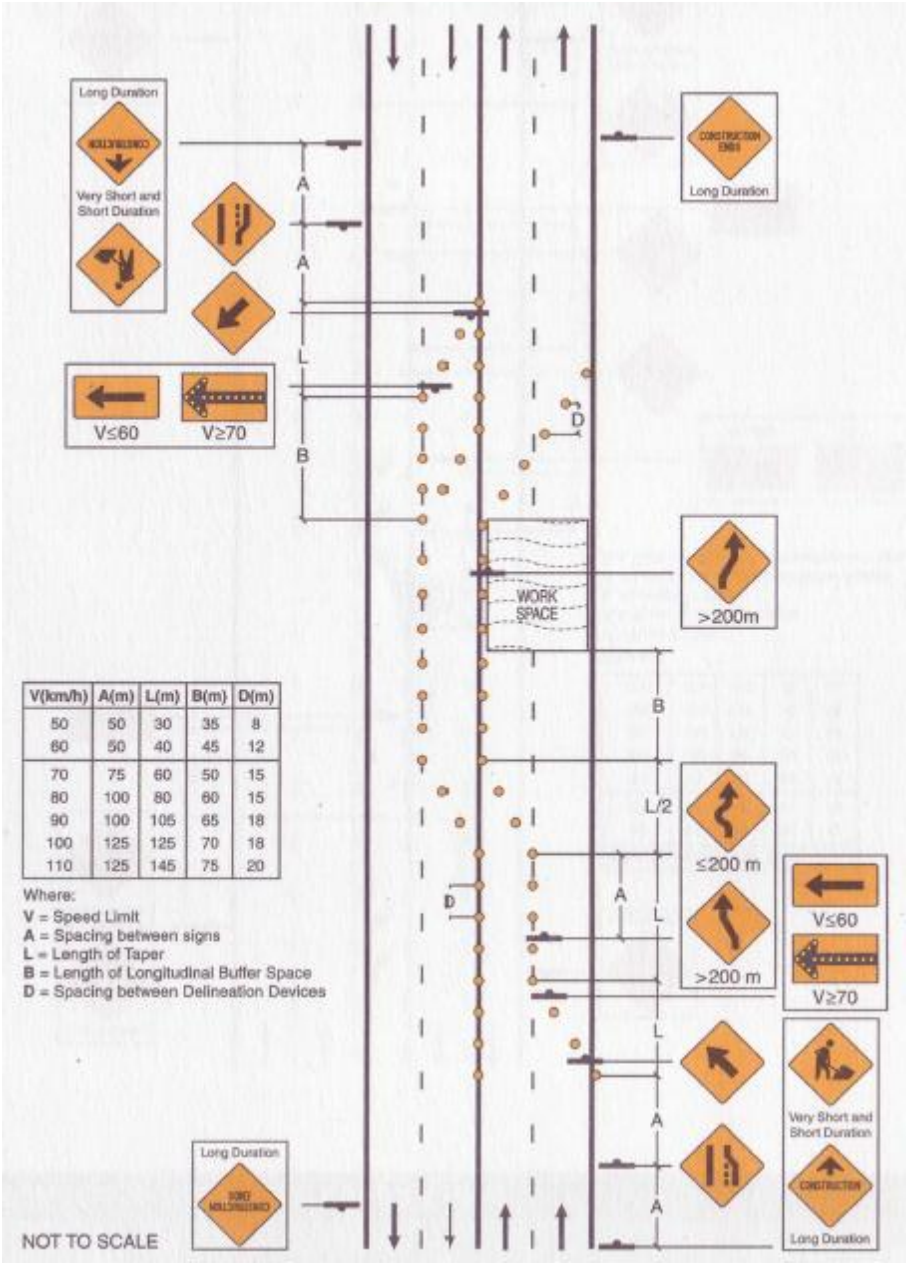


V(km/h)	A(m)	L(m)	B(m)	D(m)
50	50	30	35	8
60	50	40	45	12
70	75	60	50	15
80	100	80	60	15
90	100	105	65	18
100	125	125	70	18
110	125	145	75	20

Where:
V = Speed Limit
A = Spacing between signs
L = Length of Taper
B = Length of Longitudinal Buffer Space
D = Spacing between Delineation Devices

D4-32 LONG TERM WORK

Two Lanes Closed, Two Right Lanes Closed (4-lane Roadway)

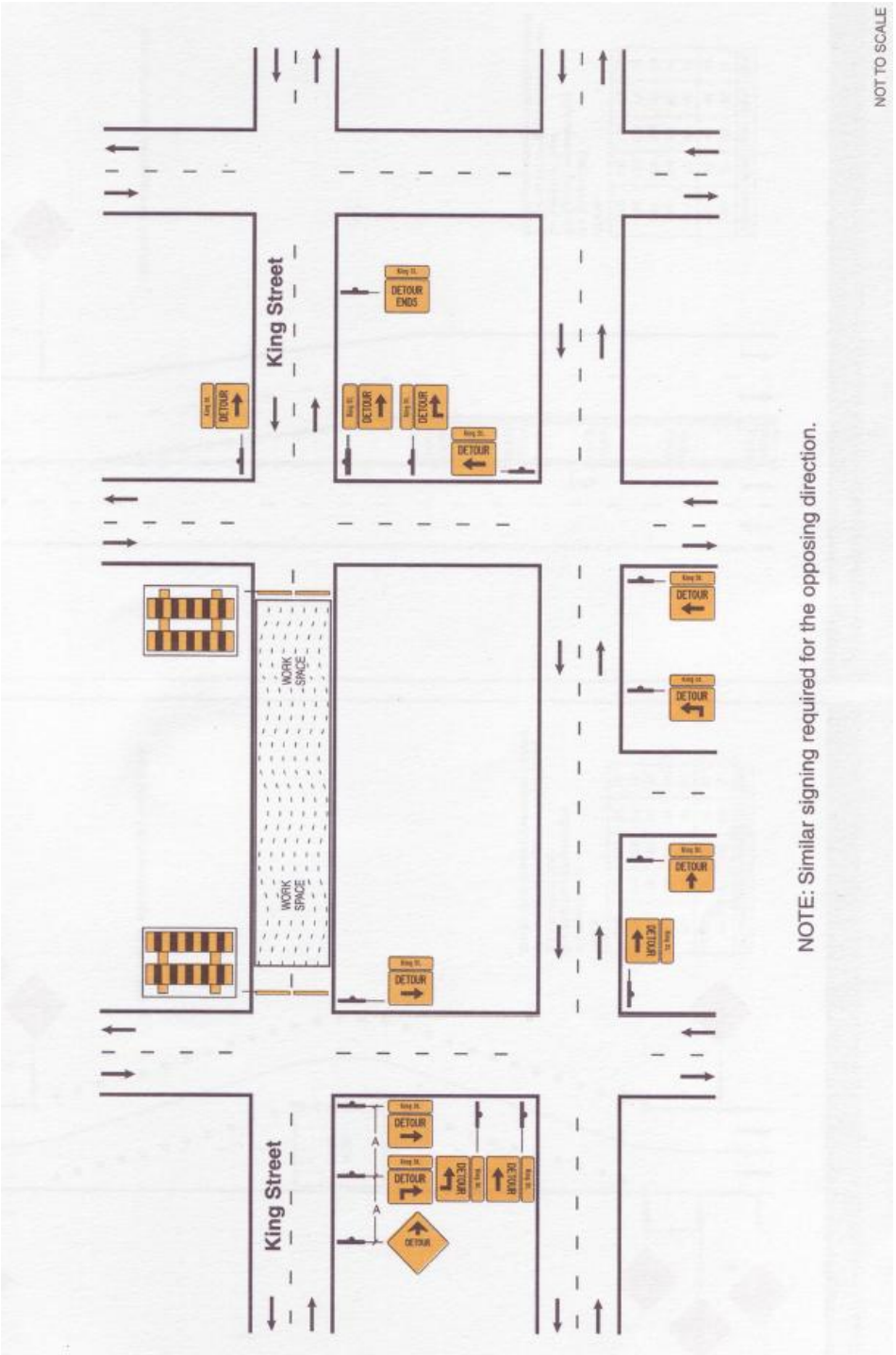


V(km/h)	A(m)	L(m)	B(m)	D(m)
50	50	30	35	8
60	50	40	45	12
70	75	60	50	15
80	100	80	60	15
90	100	105	65	18
100	125	125	70	18
110	125	145	75	20

Where:
V = Speed Limit
A = Spacing between signs
L = Length of Taper
B = Length of Longitudinal Buffer Space
D = Spacing between Delineation Devices

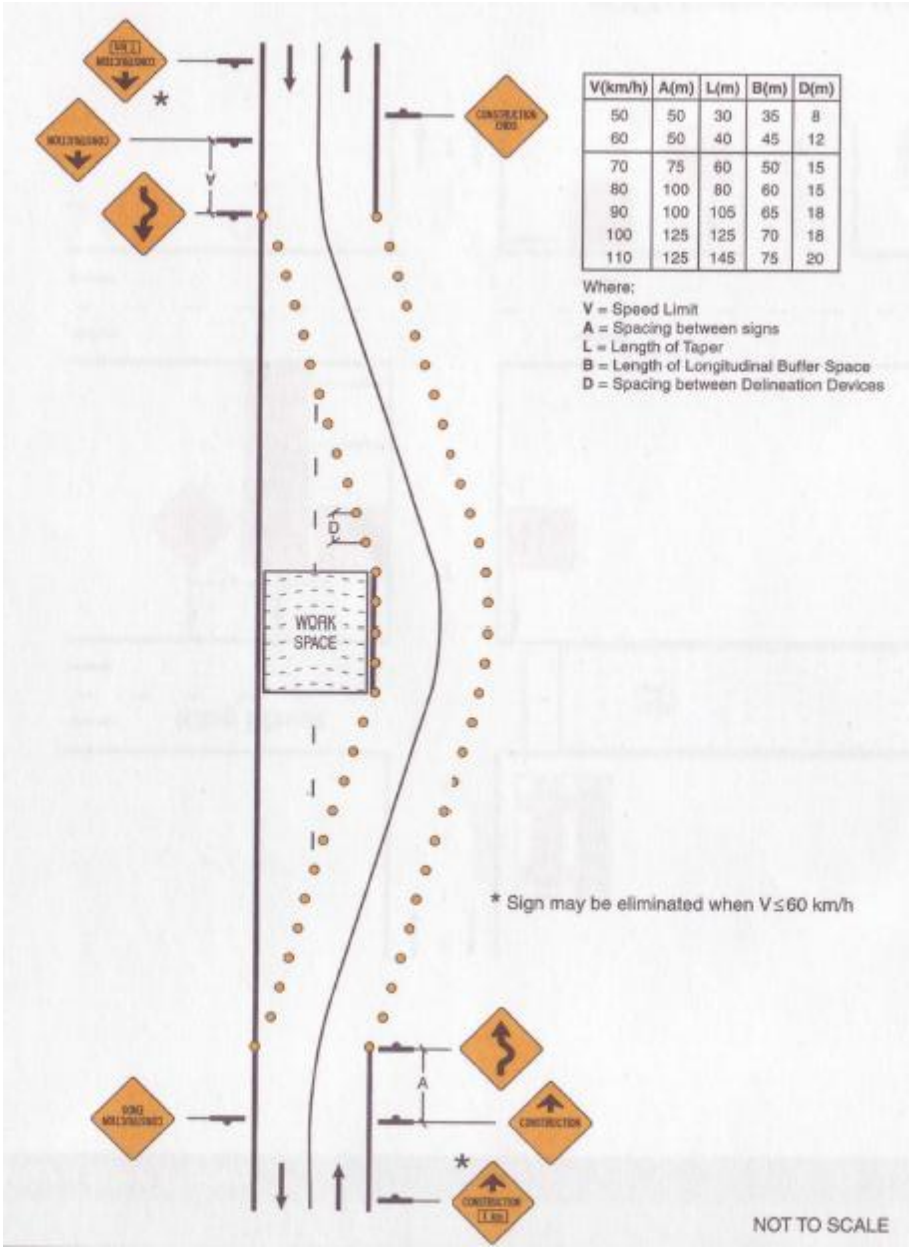
D4-33 LONG TERM WORK

Detour – Alternative Road



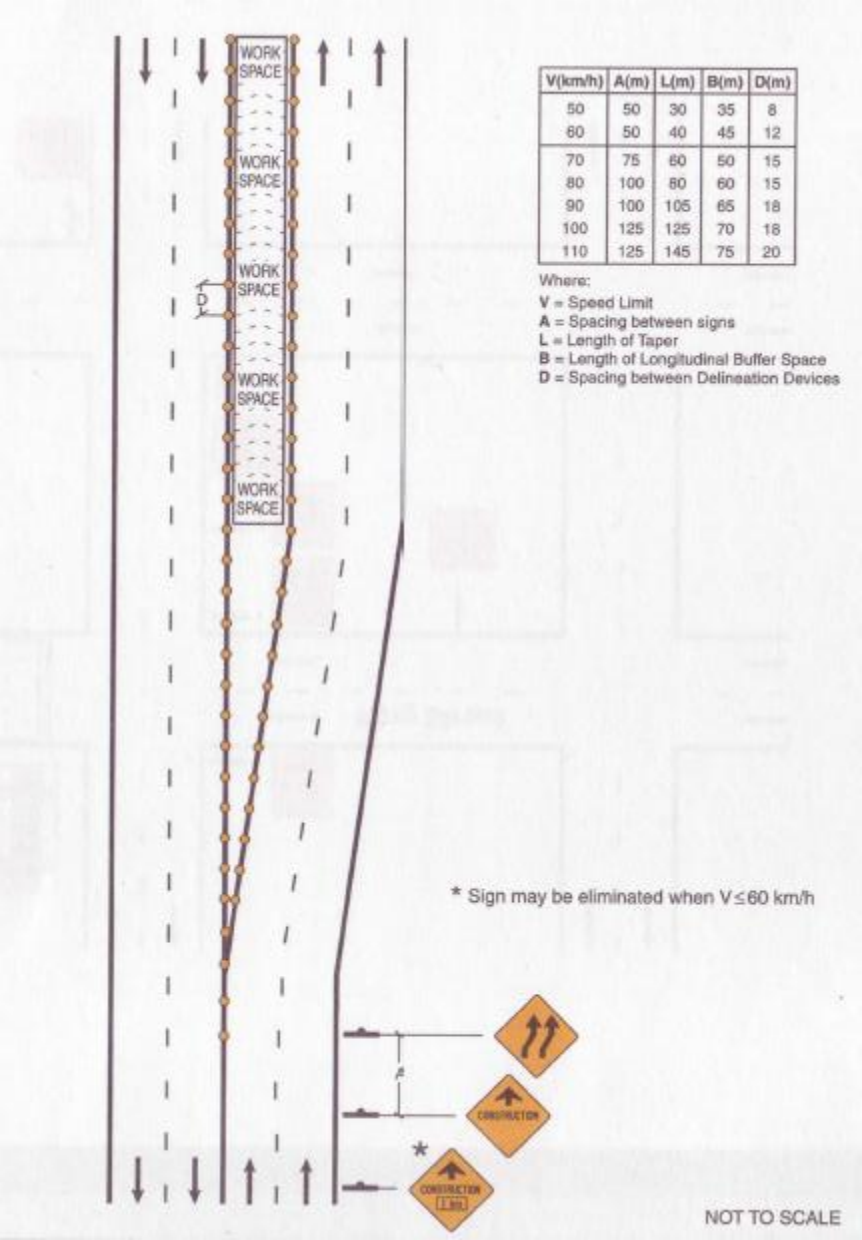
D4-34 LONG TERM WORK

Detour – Roadside Diversion



D4-35 LONG TERM WORK

Detour – Lane Realignment

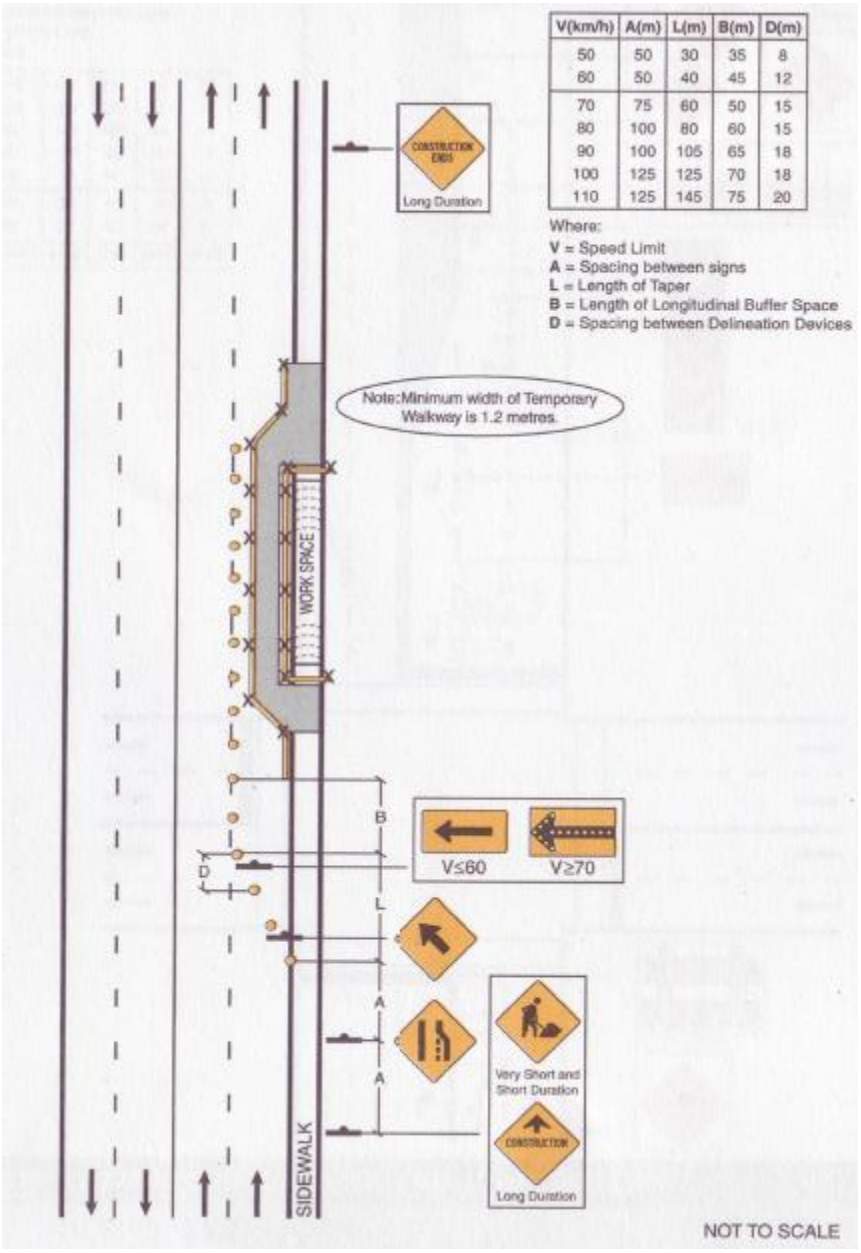


V(km/h)	A(m)	L(m)	B(m)	D(m)
50	50	30	35	8
60	50	40	45	12
70	75	60	50	15
80	100	80	60	15
90	100	105	65	18
100	125	125	70	18
110	125	145	75	20

Where:
V = Speed Limit
A = Spacing between signs
L = Length of Taper
B = Length of Longitudinal Buffer Space
D = Spacing between Delineation Devices

D4-36 LONG TERM WORK

Pedestrian Considerations – Sidewalk Detour onto Road, Mid-Block Location



D4-37 LONG TERM WORK

Pedestrian Considerations – Sidewalk Detour onto Road, Approaching an Intersection