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## 9 Urban Work Areas

### 9.1 Introduction

This Chapter provides supplemental information on temporary traffic control devices for work carried out on urban roads within New Brunswick municipalities. It focuses on roads with **speed limits of 50 and 60 km/h**. Many of the guidelines presented in previous chapters of this manual are not applicable to urban roads due to factors such as:

- Space limitations caused by more frequent driveways, intersections, and existing roadside signage;
- The presence of additional road cross section features such as turning lanes, curbs, gutters, bicycle lanes, and sidewalks (as opposed to shoulders and ditches); and
- Higher volumes of pedestrians, cyclists, and other road users.

This chapter is intended to supplement, not contradict, the previous chapters of WATCM. As a result, **the guidelines from the previous chapters are valid for urban roads with the few exceptions noted below:**

- **Approvals are required by the Municipality** rather than the Department of Transportation and Infrastructure's Maintenance and Traffic Branch;
- The process for selecting the appropriate traffic control layout has been revised to better reflect urban conditions. As a result, Chapter 6 - Selecting the Appropriate Traffic Control Layout has been replaced by new guidelines presented in Section 9.13;
- Minimum threshold values for sign sizes, device spacing, and work area component lengths have been revised for 50 and 60 km/h speed zones to better accommodate the space constraints often present in urban environments. These revised thresholds are contained in Sections 9.6, 9.10, and 9.11.
- Buffer Vehicles (i.e. trucks equipped with Truck Mounted Attenuators as described in Section 3.11) are not required on Urban Roads with posted speed limits of 50 and 60 km/h.

Additional guidance is also provided on the following aspects of urban work areas:

- Definitions;
- Legal Authority;
- Planning and Preparation;
- Traffic Control Principals;
- Urban Work Area Components;
- Intersecting Roads (including roundabouts);
- Night Work;
- Urban Traffic Control Signs and Devices;
- Sign Installation; and
- Work Area Personnel.

Finally, Section 9.14 contains 31 typical layouts for work on urban roads with speed limits of 50 and 60km/h.

## 9.2 Definitions

The terms previously defined in this manual remain applicable to urban roads. However, a few additional terms are defined below.

**Bypass Highway** – A highway in a municipality where the administration and control are under the jurisdiction of the Minister of Transportation and Infrastructure. A bypass is usually a controlled access highway.

**Central Island** – The raised areas in the center of a roundabout around which traffic circulates. The central island does not necessarily need to be circular in shape. In the case of mini-roundabouts, the central island is traversable.

**Circulatory Road** – The curved path used by vehicles to travel in a counter-clockwise fashion around the central island in a roundabout.

**Local Road** – A subset of municipal roads as defined by each municipality. Typically, local roads consist of residential roads and public lanes where volumes are lowest and the primary function is land access rather than traffic movement.

**Major Road** – A subset of municipal roads as defined by each municipality. Typically, major roads consist of arterial and collector roads where traffic volumes are highest and traffic movement is of equal or greater importance than land access.

**Lane Closure Taper** – A transition taper used to reduce the number of travelled lanes in a single direction.

**Municipal Road** – All roads, streets or lanes in a municipality intended for public use, excepting provincial highways.

**Provincial Highway** – Roads, streets or highways designated by the Minister under Section 15 of New Brunswick's *Highway Act*, lying within a municipality. The primary consideration for designation is whether, in the Minister's opinion, the roadway is a necessary link in a comprehensive provincial network.

**Shifting Taper** – A transition taper used to deviate traffic from its normal path without reducing the number of lanes (e.g. in Diversions)

**Splitter Island** – A raised or painted area on an approach used to separate entering from exiting traffic, deflect and slow entering traffic, and allow pedestrians to cross the road in two stages.

**Traffic Controlled Taper** – A transition taper used for lane closures on single lane roads in conjunction with yield signs, traffic control persons, or traffic signals.

**Truck Apron** – The traversable portion of a roundabout's central island adjacent to the circulatory roadway that may be needed to accommodate the wheel tracking of large vehicles. An apron is sometimes provided on the outside of the circulatory roadway.

**Urban Road** – All of the roads in a municipality with the exception of bypass highways.

### 9.3 Legal Authority (*Supplement to Section 1.2*)

New Brunswick's *Motor Vehicle Act* states that the Minister of Transportation and Infrastructure shall provide a manual and specifications to local authorities for a uniform system of traffic control devices for use upon highways within the Province. *The Transportation Association of Canada's Manual of Uniform Traffic Control Devices for Canada (MUTCDC)* is the manual currently specified by the Department.

New Brunswick's Work Area Traffic Control Manual has been developed as a supplement to the MUTCDC providing more specific guidelines for the use of work area traffic control devices. Individuals engaged in work within the Right of Way of **urban roads** are expected to utilize and comply with the MUTCDC and this chapter of WATCM. This chapter of WATCM shall also be applied where the guidelines are referenced in contract documents and agreements between Contractors and a Municipality.

Responsibility for maintenance and construction activities on urban roads in New Brunswick depends on the road's designation under the *Highway Act*. DTI's policy regarding provincial and municipal responsibilities is described in *A Reference Manual to Department of Transportation Involvement in New Brunswick Municipalities* (1986). According to the manual, municipalities are responsible for all maintenance and construction activities undertaken on all **municipal roads** and **provincial highways** located within municipal boundaries, with the following exceptions (which fall under DTI's jurisdiction):

- Bypass highways
- Bypass interchanges including the ramps;
- Railway crossings on provincial highways;
- Bridges on provincial highways, and on municipal roads at the Minister's discretion;
- Extruded signs on provincial highways;
- Signs on provincial highways related to their function as a designated highway;
- Signs on provincial highways in villages (not cities or towns) except for those related to parking and pedestrians; and
- Highway markings on provincial highways in villages (not cities or towns).

**9.4 Planning & Preparation (Supplement to Section 1.3)**

A *Traffic Control Plan* shall be prepared prior to undertaking any maintenance, construction, or utility work on an urban road. The required level of detail for the plan shall be determined in consultation with the governing Municipality.

Urban roads are often characterized by additional complexities and/or constraints that must be considered in the Traffic Control Plan. Consequently, a site visit is strongly recommended prior to preparing the plan to identify specific work area characteristics such as those listed below.

Items from Section 1.3	Additional Considerations for Urban Roads
<ul style="list-style-type: none"> <li>• Traffic volumes and speeds</li> <li>• Sight distance limitations</li> <li>• Sidewalks or other pedestrian routes</li> <li>• Conflicts with driveways or intersecting roads</li> <li>• Existing signs which may need to be removed or covered</li> <li>• The amount of shoulder space available</li> </ul>	<ul style="list-style-type: none"> <li>• Road type (i.e. local or major)</li> <li>• Type of intersection control</li> <li>• Transit, truck, and bicycle routes</li> <li>• Potential alternate routes for road users</li> <li>• Emergency vehicle access</li> <li>• Other utility infrastructure</li> <li>• School zones</li> <li>• Bus stop locations</li> <li>• Parking</li> <li>• Level of encroachment on travel lanes</li> <li>• Available roadside space for placing signs</li> <li>• Existing lighting if night work is required</li> </ul>

In many cases, the plan may consist of a reference to a typical layout contained in this manual showing the required devices, their placement and location, and possibly the location of traffic control persons. However, some situations will require a more detailed design combining elements from more than one layout. The plan should also specify appropriate procedures for sign and device installation and removal; required personal protective equipment; and procedures for the safe and efficient passage of emergency vehicles.

The plan may also include:

- Public advisory notices as determined by the municipality;
- Detours for different roadway users such as commercial vehicles, pedestrians, or cyclists;
- Scheduling to avoid or limit work area activity during peak hours;
- Temporary bus stops, waiting areas, and pull-outs;
- Removal of parking spaces; and
- Lighting requirements if working at night.

## 9.5 Traffic Control Principles (*Supplement to Section 2.1*)

The traffic control principles listed in Section 2.1 all apply to urban work areas. However, an fourth principle is presented below that recognizes the wider range of road users affected by urban work areas.

### 4. **Accessibility should be maintained for all users within an urban road right-of-way.**

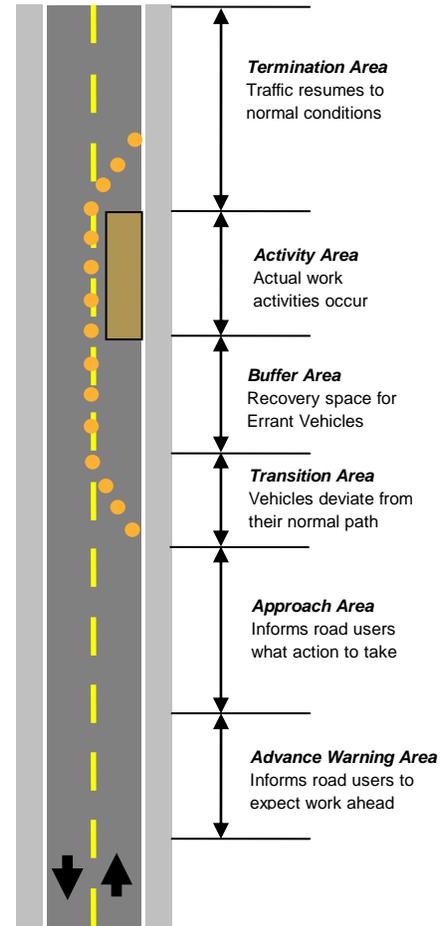
- Bicyclists and pedestrians, including those with disabilities, should be provided with a detour, or access and safe passage through the work area;
- Signs and devices shall be placed so that they do not interfere with vehicular, pedestrian, or bicycle flows;
- Traffic control devices that are accessible to, and usable by, pedestrians with disabilities should be considered;
- Access shall be maintained to the fullest extent possible to abutting residences, businesses, and properties;
- Emergency vehicles shall be able to access the site and adjacent residences and businesses; and
- The needs of rail, transit, and commercial vehicles shall be assessed and appropriate accommodations made (where applicable).

### 9.6 Urban Work Area Components (Supplement to Section 2.3)

Urban work area components are the same as in rural areas. However, the MUTCDC allows some of the areas to be reduced or eliminated when spacing is limited and traffic volume, speed, and visibility permit. For example:

- The advance warning area may be eliminated, when active devices such as flashing arrow boards or flashers are used (MUTCDC Section D1.9).
- The longitudinal buffer area can be reduced or eliminated after alternatives such as relocating the taper and buffer area upstream of the intervening obstruction have been considered and deemed impractical. In this situation, additional advance warning and delineation devices should be considered (MUTCDC Section D4.2.2)
- The lengths of tapers in transition areas used to divert road users from their normal path should only be compromised as a last resort (MUTCDC Section D4.2.2).

Table 9-1 presents minimum lengths for various Work Area components on Urban Roads. **The distances shown are applicable for both 50 and 60 km/h posted speed limits.**



**Table 9-1: Minimum Work Area Component Measurements for Urban Roads**

Work Area Component Measurements	Minimum Length (m)
Advanced Warning Distance <sup>1</sup>	100 m
Transition Taper Length <sup>2</sup>	
• Lane Closure Taper	40 m
• Shifting Taper	20 m
• Traffic Controlled Taper	15 m
Buffer Area	40 m

1. Advanced Warning Distance is measured from the first Traffic Control Sign to the start of the Activity Area.
2. See Section 9.2 for definitions of Lane Closure, Shifting, and Traffic Controlled Taper.

Where longitudinal space is restricted, the minimum recommended sign spacing of 50 m may be reduced to 30 m *provided the first warning sign is located at least 100 m from the Activity Area.*

## 9.7 Intersecting Roads (*Supplement to Section 2.5*)

Work areas on urban road networks often affect traffic flows at intersections. Installing temporary traffic control at an intersection is more complicated than on a road segment due to the presence of pre-existing traffic control devices such as signals and stop signs. Furthermore, a basic four-legged intersection consists of 12 possible directional movements, compared to just two for a road segment. As a result, supplemental signs and devices may be required when undertaking work at or near an intersection.

Section 9.14 includes 11 typical traffic control layouts for work areas in the vicinity of intersections. General guidelines are also provided below.

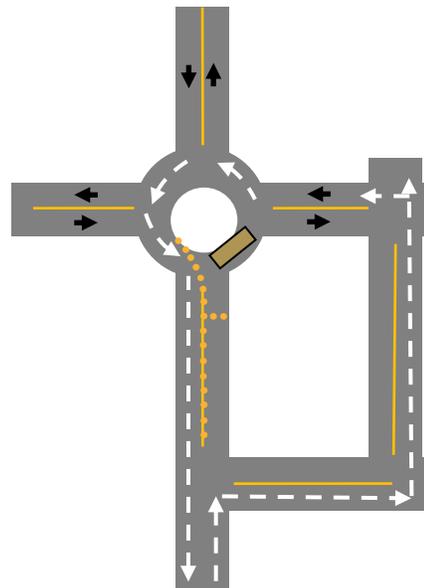
- Typical layouts for intersections should be used whenever a road intersects the Work Area between the first warning sign and the Activity Area.
- Warning signs should be placed on all intersection approaches as shown in the typical layouts. If practical, warning signs on the road containing the work area should be placed at the next closest intersection to give drivers the opportunity to detour around the site.
- Traffic control can be simplified by closing one or more of the approaches to turning traffic or, if possible, all traffic.
- Whenever possible, turning lanes on intersection approaches should be used to divert traffic around work areas rather than closing lanes and using traffic control persons.
- Traffic control persons should be positioned as shown in the typical layouts. They shall not stand in the centre of an intersection to direct traffic.
- Traffic control persons should not give signals to drivers that conflict with other traffic control devices such as stop signs or traffic signals.
- A lead traffic control person should be designated in all instances.
- Peace officers should be used to regulate traffic whenever drivers must be directed in a manner that conflicts with existing traffic control devices.

## 9.8 Roundabouts (Supplement to Section 2.5)

Roundabouts present unique challenges for implementing temporary traffic control because their successful operation is contingent upon having continuous and self-regulated traffic flows. They are not designed to accommodate stopped or waiting traffic within the *circulatory road*. A wide range of factors must be considered when designing a temporary traffic control plan for a roundabout. **Therefore, typical layouts for traffic control at roundabouts are not provided in Section 9.14. All temporary traffic control plans for work on roundabout approaches or circulatory roadways require consultation with, and approval by, the Municipality.** General considerations for temporary traffic control at roundabouts are provided below.

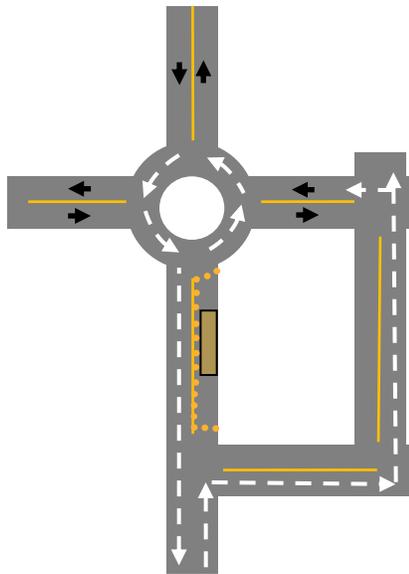
As with other facilities, the level of traffic control will depend on where the work area is located within the roundabout footprint and the available road width for vehicles to safely drive by the area. Work areas can be located on the approach roads, *splitter islands*, *circulatory road*, *truck apron*, or *central island*. The following information may assist in the preparation of a temporary traffic control plan.

- Priority should be given to traffic exiting the roundabout to avoid delays on the circulatory road.
- Large trucks need the full width of the circulatory road plus the truck apron to travel in the roundabout. Therefore, if the work area encroaches on the truck apron or circulatory road, then trucks should be detoured.
- A lane width of 4.0 m (including the truck apron) is required for passenger vehicles to travel through a roundabout with a minimum circle diameter. As the diameter of the circle increases, the required lane width decreases.
- At multilane roundabouts, a work area in one lane of the circulatory road usually requires the entire roundabout to be converted to a single-lane roundabout.
- There are several options available if the circulatory road must be closed to accommodate the work area:
  - Detour all traffic;
  - Detour traffic that would use the section of the circulatory road that is closed;
  - Allow one approach to proceed at a time travelling clockwise and counterclockwise to reach the exit leg (using Traffic Control Persons); or
  - Work at night to minimize impacts on traffic flows.

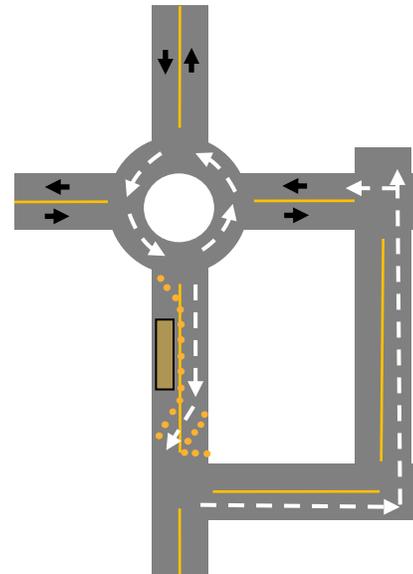


Work area in circulatory road, detour approaching traffic

- If two-way traffic cannot be maintained on an approach, it is recommended that traffic entering the roundabout be detoured and the circulatory road be used for exiting traffic as shown below.



Work area in approach lane, detour approaching traffic



Work area in departure lane, detour approaching traffic

### 9.9 Night Work (*Supplement to Section 2.6*)

In addition to the guidelines contained in Section 2.6, the following are also important considerations when working on Urban Roads at night:

- If temporary pedestrian or bicycle facilities are implemented, or obstructions or surface hazards are introduced, check that the path provided is adequately lighted.
- In residential areas, avoid aiming work space lights into homes or yards.
- Municipalities shall be consulted before working at night to ensure compliance with local noise bylaws.

### 9.10 Urban Traffic Control Signs and Devices (*Supplement to Section 3*)

#### *Traffic Control Signs*

Standardization of traffic control signs and devices is important to ensure they are recognizable and comprehensible by road users at a glance. In addition to the signs contained in Section 3.1, the following signs have also been approved for work on urban roads.

**Lane Closure Arrow**

**Description:** The *Lane Closure Arrow* sign indicates that traffic must pass either to the left or the right of a close travelled lane. This sign represents a less costly alternative compared to flashing arrow boards on low-speed roads.

**Minimum Size:** 50 - 60 km/h . . . . . 60 cm x 120 cm (TC-7)

**Colour / Sheeting:** Black on Orange, High Intensity



**Bicycle Lane Closed**

**Description:** The *Bicycle Lane Closure* sign indicates that the temporary closure of a dedicated bicycle lane. Cyclists are to merge with other motorized traffic.

**Minimum Size:** 50 - 60 km/h . . . . . 45 cm x 75 cm

**Colour / Sheeting:** Black on Orange, High Intensity



**Bicycle Lane Detour**

**Description:** The *Bicycle Lane Detour* sign indicates a temporary shift of the normal alignment on a dedicated bicycle lane.

**Minimum Size:** 50 - 60 km/h . . . . . 45 cm x 45 cm

**Colour / Sheeting:** Black on Orange, High Intensity



**Sidewalk Closed**

**Description:** The *Sidewalk Closed* sign indicates a complete closure of the pedestrian pathway.

**Minimum Size:** 50 - 60 km/h . . . . . 45 cm x 45 cm

**Colour / Sheeting:** Black on Orange, High Intensity



**Pedestrian Detour**

**Description:** The *Pedestrian Detour* sign is used to direct pedestrian to an alternate route in advance of a sidewalk closure.

**Minimum Size:** 50 - 60 km/h . . . . . 45 cm x 45 cm

**Colour / Sheeting:** Black on Orange, High Intensity



Table 9-3 lists the signs and devices included in the typical layouts in Section 9.14 by both the MUTCD Reference Number and DTI Catalogue Number. Most of the signs are diamond shaped temporary warning signs. **The minimum size for temporary warning signs in work areas on 50 - 60 km/h urban roads is 75 cm x 75 cm.** Custom signs not included in Section 3.1 or the MUTCDC require approval from the municipality responsible for the roadway.

**Table 9-2: Temporary Traffic Control Signs for Urban Work Areas**

Sign Name and Image	DTI Reference(s)	MUTCDC Reference
Construction Ahead 	#4300-S, #4347-L, #4344-R	TC-1
Road Work 	#4364	TC-2
Traffic Control Person Ahead 	#4604	TC-21
Lane Closed Ahead 	#4370-L, #4375-R	TC-5L, TC-5R
Road Narrows 	#4398-L, #4399-R	n/a
Road Diversion 	#4160-L, #4159-R	TC-13L, TC-13R
Road Realignment 	#4144-L, #4145-R	TC15-L, TC15R
Two-Way Traffic Ahead 	#4203	TC-24
Traffic Signals Ahead 	#3031	WB-4
Yield Ahead 	#3011	WB-2
Construction Zone Ends 	#4316	n/a
Stop Here on Red 	#4393	n/a
Detour Ahead 	#4110	TC-10
Detour 	n/a	TC-11

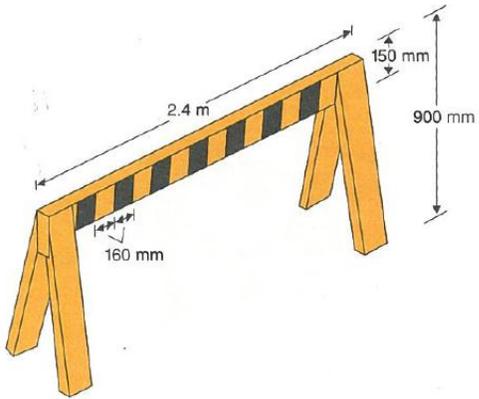
**Delineation Devices**

The guidelines on delineation devices in Section 3.7 apply in urban areas with the exception of the ones related to traffic cones. The MUTCDC permits a wider range of uses for traffic cones where the speed limit is 60 km/h or less. The following table compares the guidelines from Section 3.7 to the MUTCDC guidelines.

Traffic Cone Guidelines from Section 3.7	MUTCDC Guidelines on Traffic Cones for 60 km/h or less Speed Zones
<ul style="list-style-type: none"> <li>• Minimum height of 70 cm</li> <li>• May be placed along the tangent sections of the road adjacent to the Buffer and Activity Areas for Very Short and Short Duration Work only.</li> <li>• Not used for night time operations</li> <li>• Not recommended for delineation along tapers although may be used provided they are spaced at half the distance for other devices (see Table 3-3).</li> </ul>	<ul style="list-style-type: none"> <li>• 45 or 70 cm cones may be used during day time</li> <li>• 70 cm cones must be used for nighttime work operations</li> <li>• May be used for diversions, channelizing tapers, and to delineate a separation between road work and the flow of traffic.</li> <li>• Maximum spacing of 8 m for 50 km/h zones, and 12 m for 60 km/h zones except for tapers for lane closures on 2-lane roadways where the spacing is reduced to 6 m.</li> </ul>

**Barricades**

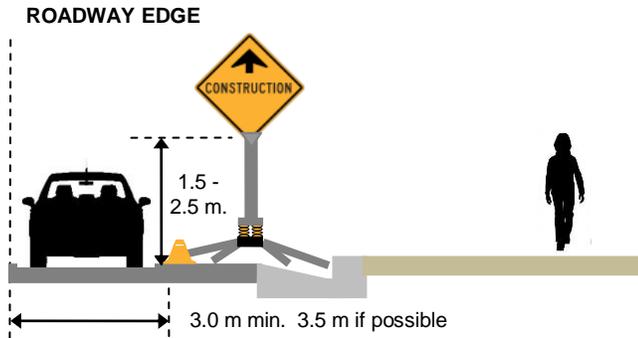
Section 3.9 provides guidelines on heavy barricades which are used to provide a complete closure of a road, street, lane or shoulder for an extended period. The MUTCDC also permits the use of light barricades for short duration work. Standard dimensions for these devices are depicted in Figure 9-1. Light barricades may have a reduced length whenever they are used to close narrow shoulders, lanes, or sidewalks.



**Figure 9-1: Light Barricade**  
(TC-64A from MUTCDC)

### 9.11 Sign Installation (Supplement to Section 4.1)

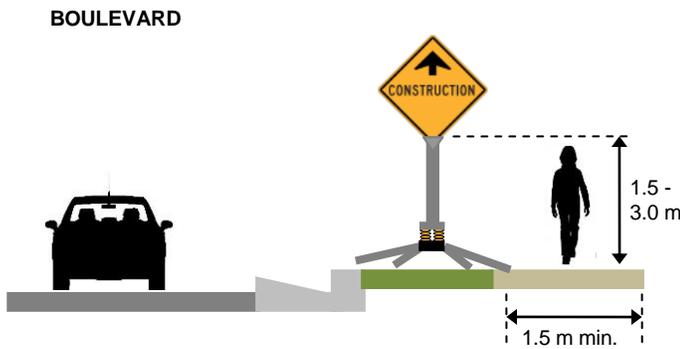
The sign installation guidelines in Section 4.1 are applicable to urban roads. However, the presence of additional roadside constraints often makes it difficult (if not impossible) to adhere to these guidelines. As previously noted in Section 9.6, the minimum recommended sign spacing of 50 m may be reduced to 30 m *provided the first warning sign is located at least 100 m from the Activity Area*. The following diagrams provide additional guidance for the lateral placement of signs on a variety of urban road cross sections.



A lane width of at least 3.0 m shall be maintained. An additional 0.5 m should be provided as clearance to the sign where space permits.

Signs shall not be placed on the roadway edge where bike lanes are present unless a delineated bicycle diversion or detour is provided.

Signs shall not be placed on the roadway edge where on-street parking is permitted unless parking has been temporarily prohibited by the municipality.

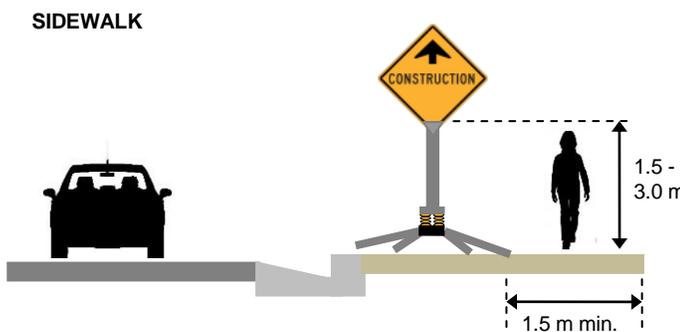


75 cm x 75 cm signs shall be used to minimize any obstruction to pedestrians and cyclists.

Signs may partially encroach onto the sidewalk provided that an unobstructed path of at least 1.5 m is maintained. Otherwise, an alternate pedestrian path shall be specified (e.g. detour or diversion).

Signs on portable stands shall be mounted at a height of between 1.5 and 3.0 m to minimize obstruction to pedestrians and ensure sign visibility.

Signs on fixed posts shall be mounted at a height of 2.0 m.



75 cm x 75 cm signs shall be used to minimize any obstruction to pedestrians and cyclists.

Signs may be placed on the sidewalk provided at least 1.5 m of unobstructed path is available. Otherwise, an alternate pedestrian path shall be specified (e.g. detour or diversion).

Signs on portable stands shall be mounted at a height of between 1.5 and 3.0 m to minimize obstruction to pedestrians and ensure sign visibility.

Signs may be mounted on existing supports used for other purposes (e.g. utility poles) to minimize sidewalk obstruction.

Signs on fixed posts shall be mounted at a height of 2.0 m.

Signs may be placed behind the sidewalk provided they are within 4.0 m of the curb.

## 9.12 Work Area Personnel (*Supplement to Section 5*)

### *Personal Protective Equipment*

All Work Area personnel shall comply at a minimum with the provisions of the *Occupational Health and Safety Act, Regulation 91-191 (OHSA)*. Currently, the regulations do not specify a standard for personal protective equipment. However, Work Safe New Brunswick has recommended that the Canadian Standards Association Standard CSA-Z96-09 for High-Visibility Safety Apparel be adopted for New Brunswick. The standard provides more detail on acceptable safety apparel for workers than the OHSA regulations and is recommended by the Canadian Centre for Occupational Health and Safety. Municipalities can specify the CSA standard for work area personnel in their jurisdiction if worker visibility is a concern.

### *Traffic Control Persons*

For work areas in close proximity to intersections, where drivers have an expectation to stop, the minimum distance between the Traffic Control Person Ahead sign and the Traffic Control Person can be reduced to 50 m (see typical intersection layouts in Section 9.14).

## 9.13 Selecting the Appropriate Traffic Control Layout (*Replaces Section 6*)

Section 9.14 contains typical traffic control layouts for common urban work activities. The following four factors must be considered when selecting the most appropriate layout:

- Work Location
- Work Duration
- Road Class
- Vehicle Speeds

Three of the four factors are the same as the ones described in Section 6 for rural roads. Road Class is used for urban roads instead of Traffic Volumes. Each of these factors is described in the following sections.

### *Work Location*

The location of an Activity Area within the right-of-way is a major factor when selecting the appropriate traffic control layout. The more an Activity Area encroaches onto the road and interferes with the flow of traffic, the greater the level of traffic control required. On urban roads, work location is defined by the following two categories:

#### **Roadway Edge....**

Work that is carried out on the shoulder area of the road or in a travelled lane without reducing the remaining useable lane width below 3.0 m or the remaining usable roadway width below 6.0 m (for 2 lanes).

#### **Full Lane...**

Work that is carried out on the travelled way and reduces the remaining useable width of one or more lanes to less than 3.0 m.

**Work Duration**

Work duration is the length of time that a Work Area occupies a single location or several adjacent locations that are sufficiently close to be effectively considered as one. There are four categories of work duration:

- Moving Operations...** Work that is either done *continuously*, usually at slow speeds, or *intermittently*, with brief stops related to the work. Examples of Moving Operations include: line painting, mowing, sweeping, and pavement testing.
  
- Very Short Duration...** Work that occupies a fixed location for up to 30 minutes, including the time required to setup and remove Traffic Control Devices.
  
- Short Duration...** Work that occupies a fixed location for longer than 30 minutes, yet less than 1 day.
  
- Long Duration...** Work that occupies a fixed location for longer than 1 day.

As work duration increases, so too does the exposure for workers. As a result, the magnitude of traffic control is typically greater for longer duration Work Areas.

**Road Class**

Urban roads have been divided into two categories – major and local. Major roads are typically arterial and collector highways that have higher traffic volumes and levels of traffic control compared to local roads. The primary function of major roads is mobility, rather than land access. Local roads have lower volumes and are used primarily for land access. **It is the responsibility of municipalities to identify the major and local roads within their jurisdiction.** Local roads often require a less complex traffic control layout than major roads because traffic volumes are lower and worker exposure to traffic is reduced.

**Vehicle Speeds**

As previously noted in Section 6.4, the spacing and size of traffic control devices varies with vehicle speed. **The typical layouts in Section 9.14 apply to urban roads with speed limits of 50 and 60 km/h. The previous sections of WATCM should be used for higher speed roads.**

9.14 Typical Layouts for Urban Roads (Supplement to Sections 7 & 8)

TWO AND FOUR LANE ROAD SECTION LAYOUTS				
Road Cross Section	Work Location	Duration	Road Class	Figure No.
Two Lanes (no turning lanes)	Roadway Edge	Moving	Major & Local	9-3
		Very Short	Major & Local	9-4
		Short / Long	Major & Local	9-5
	Single Lane	Moving	Major & Local	9-3
		Very Short	Major & Local	9-4
		Short	Major & Local	9-7
		Long	Major & Local	9-8
	Center Line	Very Short, Short	Major & Local	9-9
	Two Lanes with Two-Way-Left-Turn Lane	Two-Way-Left-Turn-Lane	Very Short / Short / Long	Major
Adjacent to Two-Way-Left-Turn-Lane		Very Short / Short / Long	Major	9-11
Four Lanes, Undivided (no turning lanes)	Roadway Edge	Moving	Major	9-3
		Very Short	Major	9-12
		Short / Long	Major	9-5
	Single Lane (left or right)	Moving	Major	9-3
	Single Lane (left or right)	Very Short	Major	9-12
	Single Lane (left or right)	Short / Long	Major	9-13
	Two Lanes	Short / Long	Major	9-14
	Centre Line	Very Short	Major	9-15
Four Lanes, Undivided, with Two-Way-Left-Turn Lane	Two Lanes	Short / Long	Major	9-16
	Two-Way-Left-Turn-Lane	Short / Long	Major	9-17
	Left Lane	Short / Long	Major	9-18

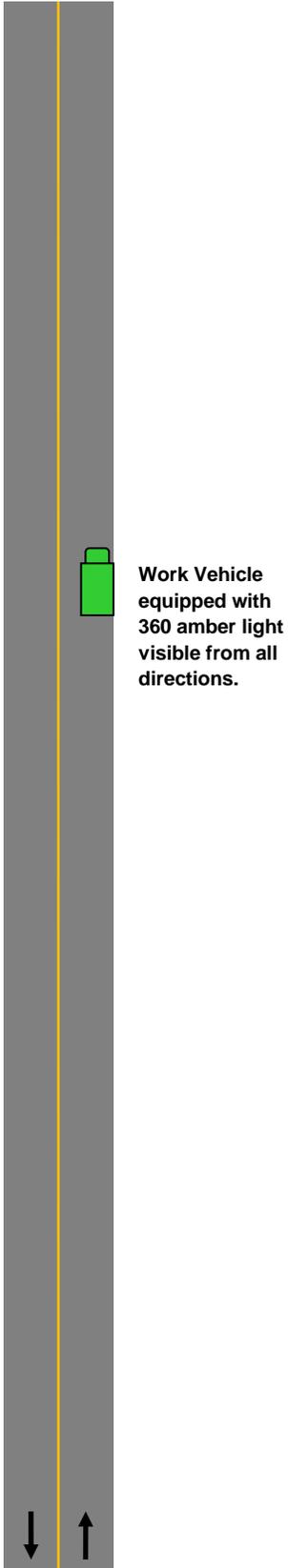
INTERSECTION LAYOUTS				
Approach Cross Section	Work Location	Duration	Road Class	Figure No.
One Through Lane (no turning lanes)	Near Side – Signalized and Stop Controlled Intersections	Very Short, Short	Major & Local	9-19
	Far Side – Signalized and Stop Controlled Intersections	Very Short, Short	Major & Local	9-20
One Through Lane with Left Turn Lane	Near Side, Right Lane	Very Short / Short / Long	Major & Local	9-21
One Through Lane with Left and/or Right Turn Lane	Near Side, Left or Right Turn Lane	Very Short / Short / Long	Major & Local	9-22
Two Through Lanes (no turning lanes)	Near Side - Left or Right Lane	Very Short / Short / Long	Major	9-23
	Near Side - Two Lanes	Very Short / Short / Long	Major	9-24
	Far Side - Left or Right Lane	Very Short / Short / Long	Major	9-25
	Far Side -Two Lanes	Very Short / Short / Long	Major	9-26
Two Through Lanes with Left and/or Right Turn Lane	Near Side - Through Lane Adjacent to Turn Lane	Very Short / Short / Long	Major	9-27
	Near Side - Through Lane and Turn Lane	Very Short / Short / Long	Major	9-28
	Far Side - Single Lane	Very Short / Short / Long	Major	9-29
OTHER LAYOUTS				
Approach Cross Section	Work Location	Duration	Road Class	Figure No.
Urban Network – All Cross Sections	Entire Block (i.e. detour)	Short / Long	Major & Local	9-30
Bicycle Lanes	Bicycle Lane and Full Adjacent Vehicle Lane	Very Short / Short / Long	Major & Local	9-31
Bicycle Lanes	Bicycle Lane and Partial Adjacent Vehicle Lane	Very Short / Short / Long	Major & Local	9-32

**LEGEND**

 Activity Area   Sign Graphic	 Continuous Barrier   Traffic Control Sign   Delineation Device	 Flashing Arrow Board   Barricade   Traffic Control Person	 Work Vehicle   Trail Vehicle   Spacing
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**NOTES:**

- 1. Layout only applies to work areas where work vehicle does not stop and workers remain in the vehicles.
- 2. On four lane roads, the work vehicle shall be equipped with a **Flashing Arrow Board** displaying the caution, arrow left, or arrow right mode as appropriate.

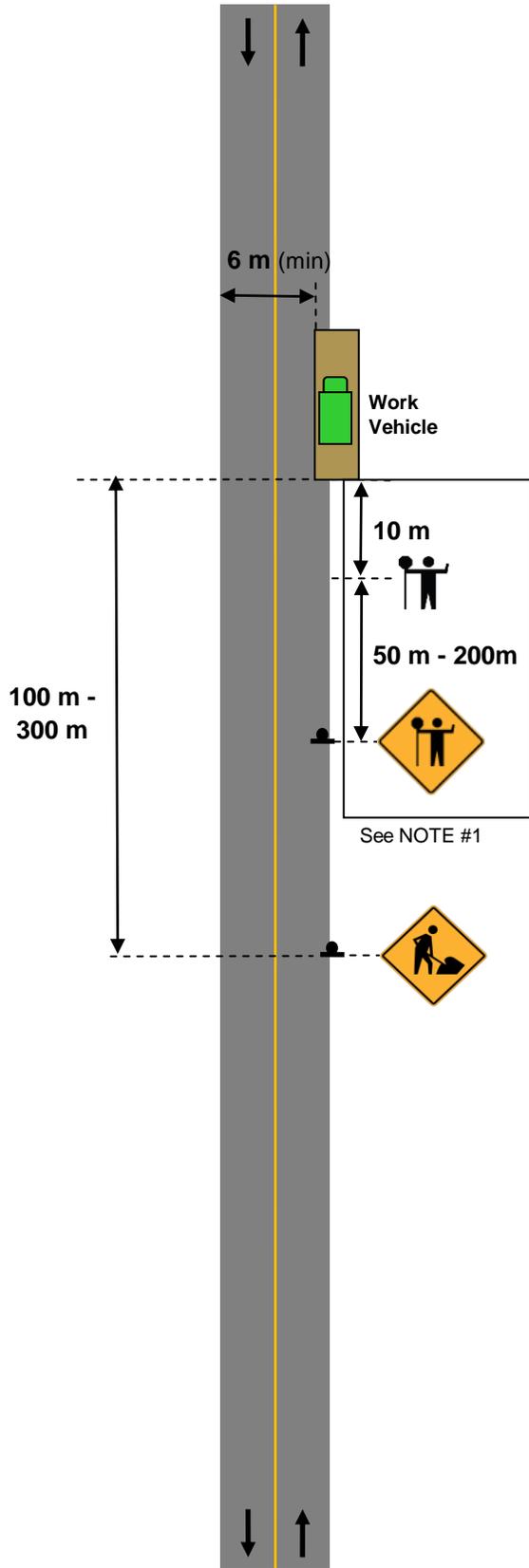


**Figure 9-3**

Cross-section:	<b>Two Lanes / Four Lanes (no turning lanes)</b>
Work Location:	<b>Roadway Edge, Single Lane</b>
Duration:	<b>Moving</b>
Road Class:	<b>Major &amp; Local</b>

**NOTES:**

1. **Traffic Control Person** and **Traffic Control Person Ahead** signs only required where 6 m minimum road width cannot be provided.
2. Work vehicle shall display 360 degree amber beacon that is visible from the rear at all times.
3. Layout can be used for patching operations.

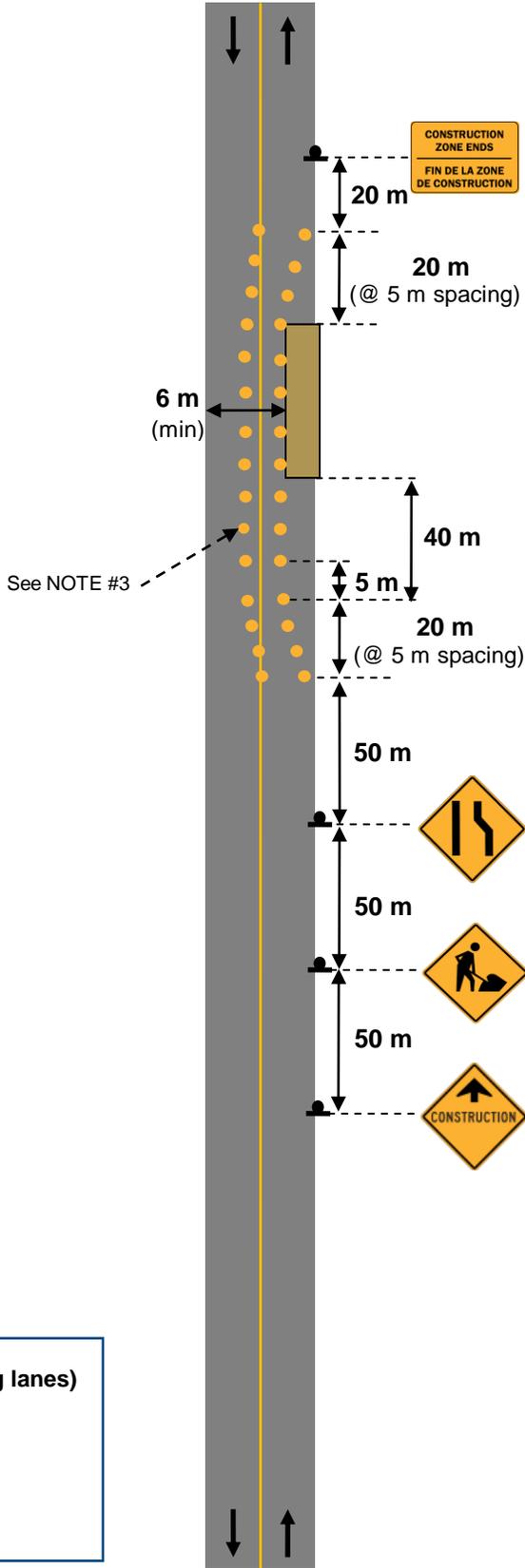


**Figure 9-4**

Cross-section:	<b>Two Lanes (no turning lanes)</b>
Work Location:	<b>Roadway Edge, Single Lane</b>
Duration:	<b>Very Short</b>
Road Class:	<b>Major &amp; Local</b>

**NOTES:**

1. **Sign opposite approach in same manner using the Lane Narrows Left sign** (if on major road).
2. Layout also applies to activity areas at the edge of four lane roads.
3. Centreline delineators are only required where centreline already exists.
4. **Construction Ahead** and **Construction Zone Ends** signs only required for long duration work.
5. **Road Narrows** sign only required for long duration work on major roads.

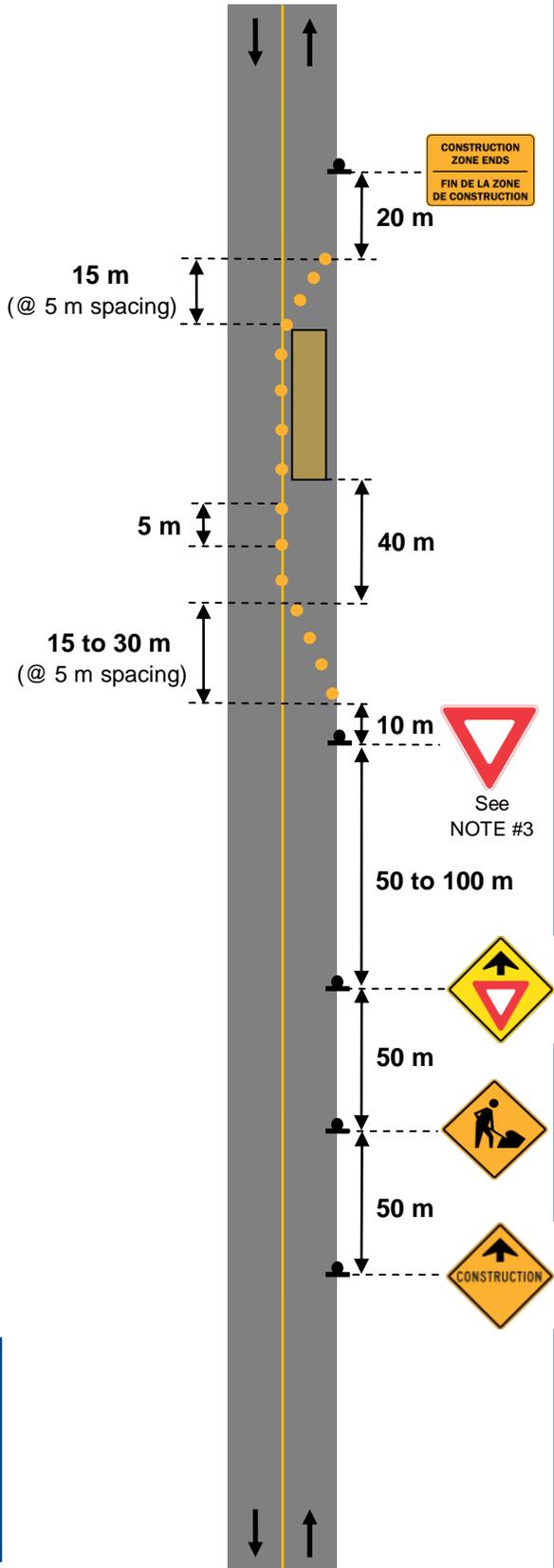


**Figure 9-5**

Cross-section:	<b>Two Lanes / Four Lanes (no turning lanes)</b>
Work Location:	<b>Roadway Edge</b>
Duration:	<b>Short / Long</b>
Road Class:	<b>Major &amp; Local</b>

**NOTES:**

1. **Sign opposite approach in same manner without the Yield Ahead and Yield signs.**
2. **Construction Ahead** and **Construction Zone Ends** signs only required for long duration work.
3. **Traffic Control Persons** or **signals** shall be used if sight distance is not sufficient to see oncoming traffic (see Figures 9-7 and 9-8).

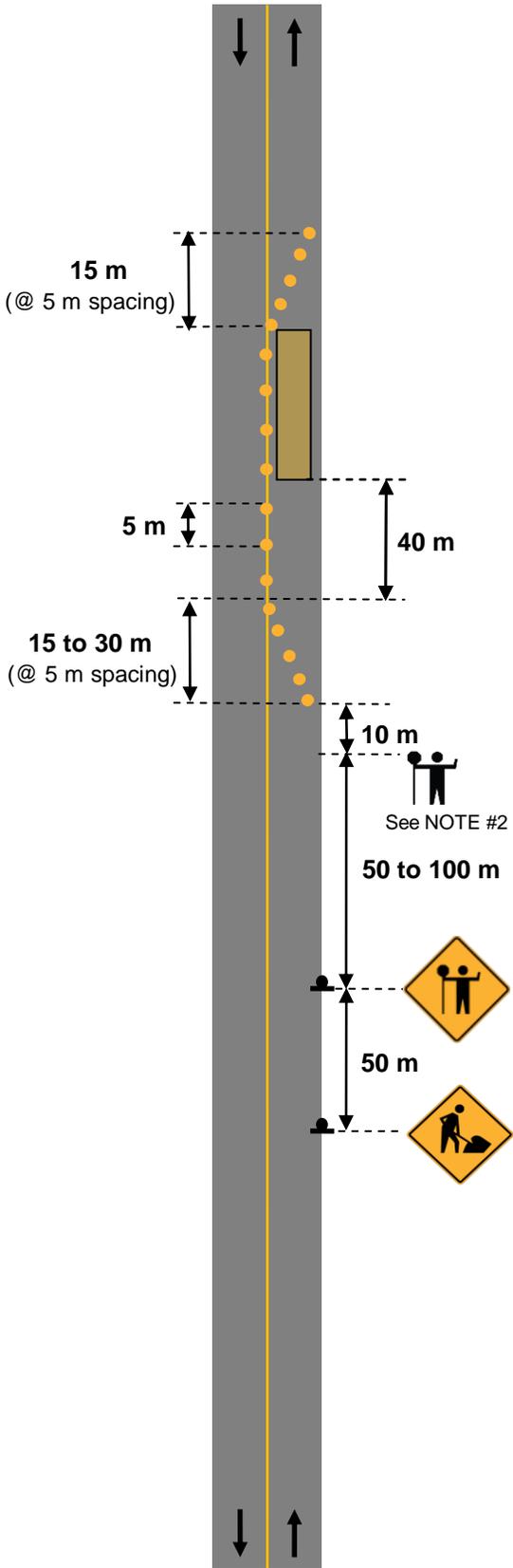


**Figure 9-6**

Cross-section:	<b>Two Lanes (no turning lanes)</b>
Work Location:	<b>Single Lane</b>
Duration:	<b>Short / Long</b>
Road Class:	<b>Local</b>

**NOTES:**

1. **Sign opposite approach in same manner.**
2. **Traffic Control Person** and **TCP Ahead** sign on local roads can be replaced by **Yield** and **Yield Ahead** signs as shown in Figure 9-6 if sufficient sight distance is available.

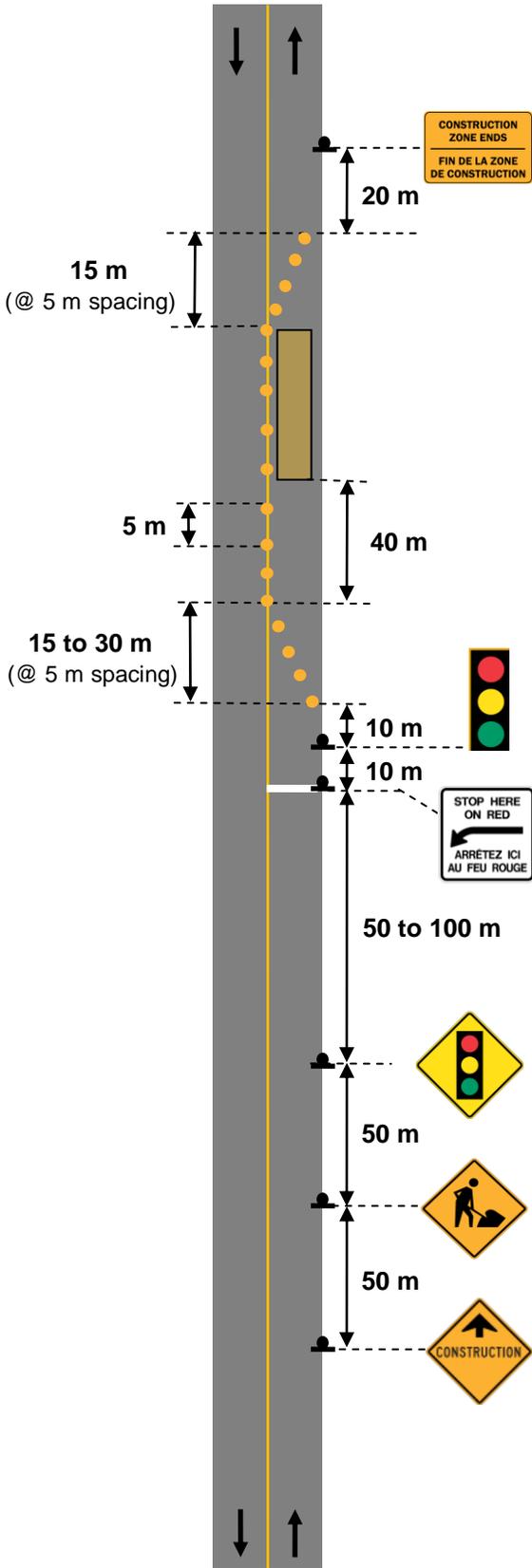


**Figure 9-7**

Cross-section:	<b>Two Lanes (no turning lanes)</b>
Work Location:	<b>Single Lane</b>
Duration:	<b>Short</b>
Road Class:	<b>Major &amp; Local</b>

**NOTES:**

1. **Sign opposite approach in same manner.**
2. **Signals** and **Signals Ahead** signs on local roads can be replaced by **Yield** and **Yield Ahead** signs as shown in Figure 9-6 if sufficient sight distance is available.



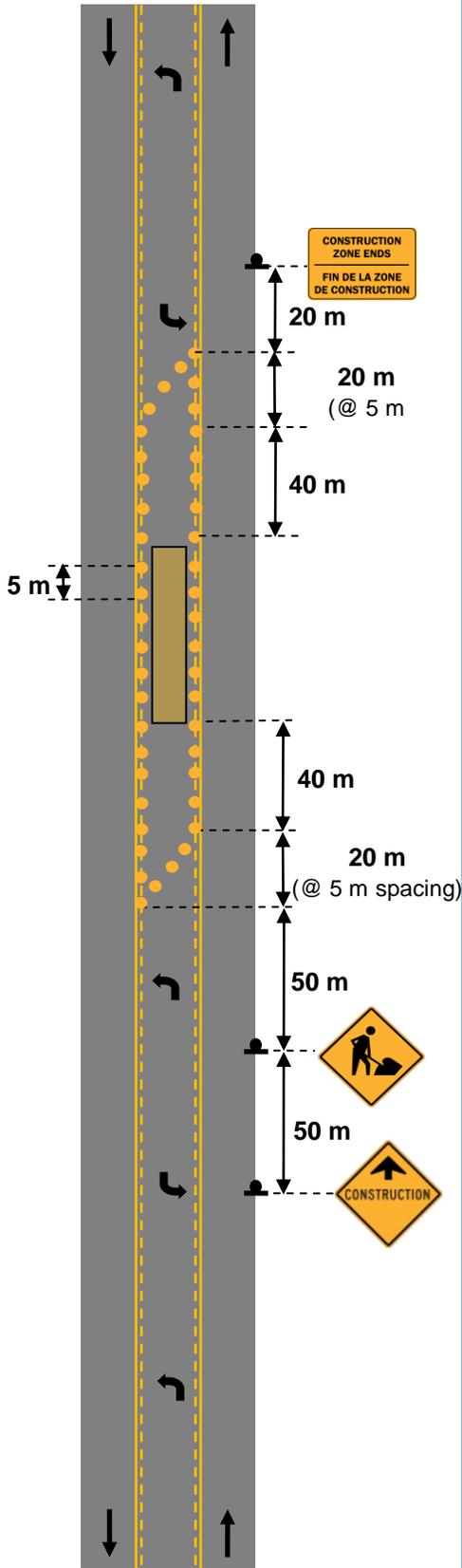
**Figure 9-8**

Cross-section:	<b>Two Lanes (no turning lanes)</b>
Work Location:	<b>Single Lane</b>
Duration:	<b>Long</b>
Road Class:	<b>Major and Local</b>



**NOTES:**

1. Sign opposite approach in the same manner.
2. **Construction Ahead** and **Construction Zone Ends** signs only required for long duration work.

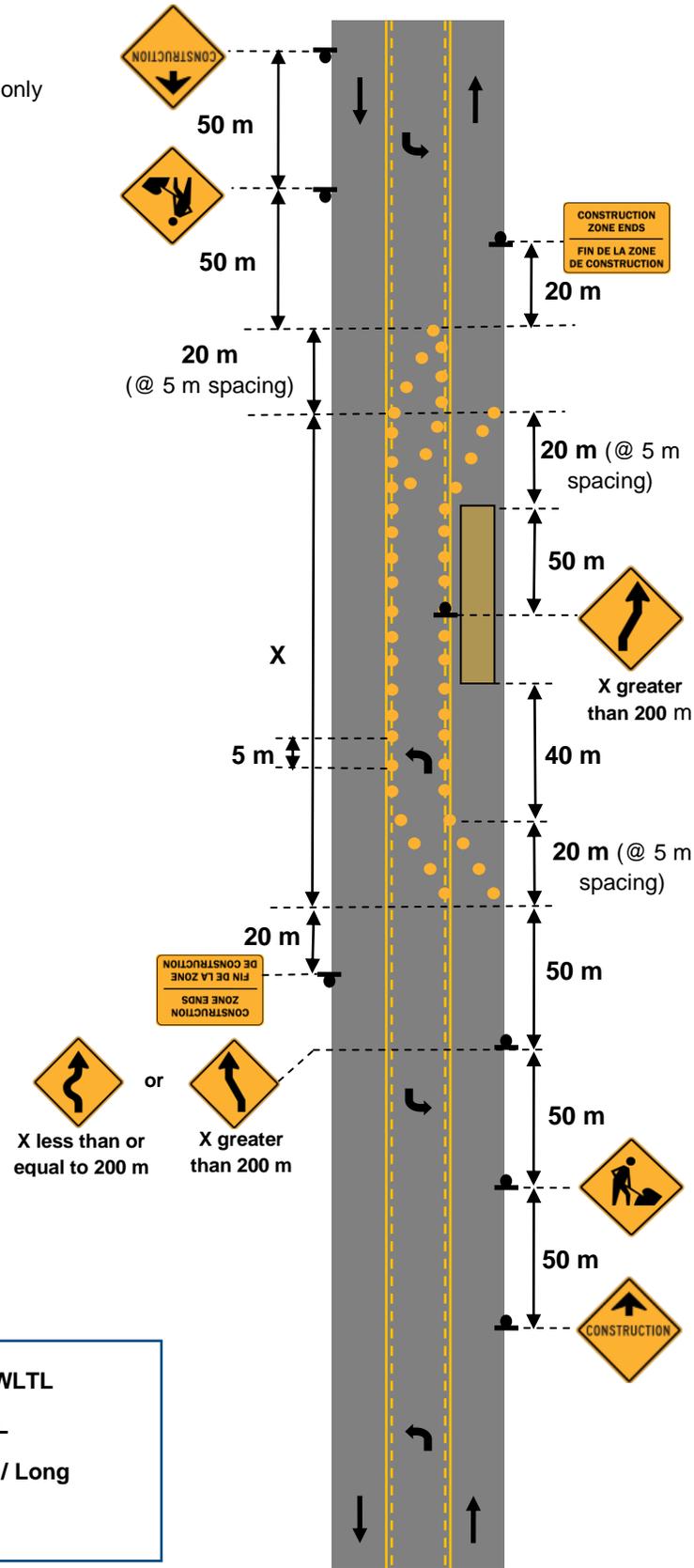


**Figure 9-10**

Cross-section:	<b>Two Lanes with TWLTL</b>
Work Location:	<b>Two-Way-Left-Turn-Lane</b>
Duration:	<b>Very Short / Short / Long</b>
Road Class:	<b>Major</b>

**NOTES:**

1. **Construction Ahead** and **Construction Zone Ends** signs only required for long duration work.

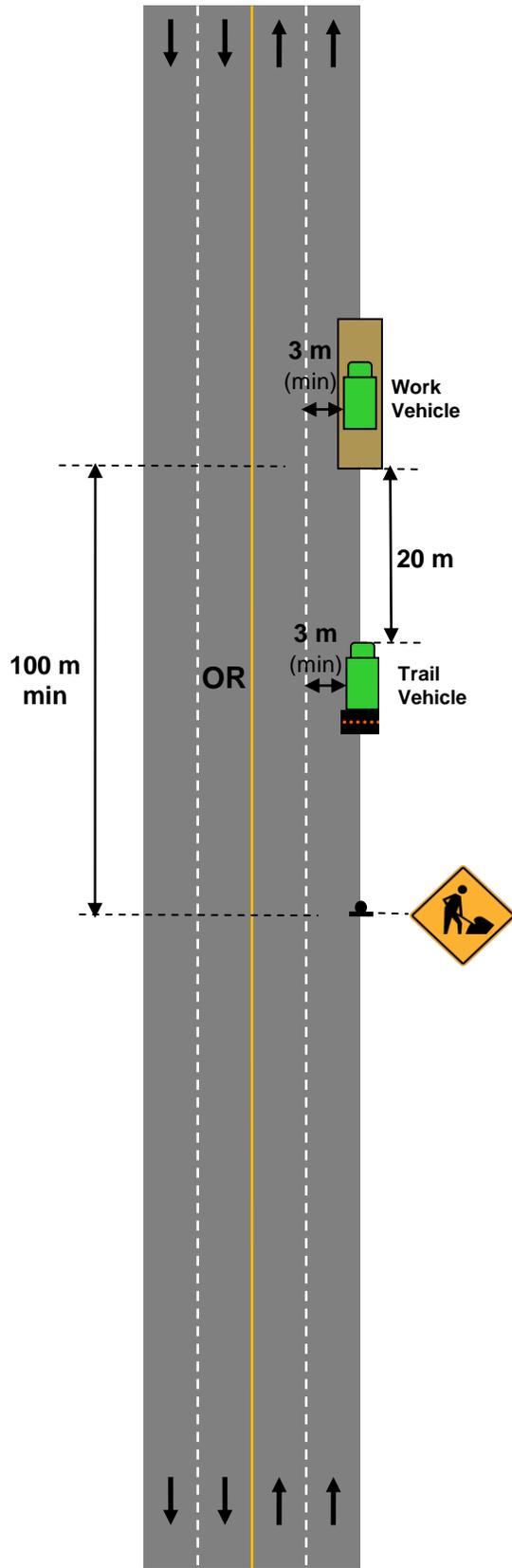


**Figure 9-11**

Cross-section:	<b>Two Lanes with TWLTL</b>
Work Location:	<b>Adjacent to TWLTL</b>
Duration:	<b>Very Short / Short / Long</b>
Road Class:	<b>Major</b>

**NOTES:**

1. Use either **Trail Vehicle OR Road Work** sign at spacing shown.
2. If 3 m lane width cannot be maintained, **Trail Vehicle** shall display right or left directional arrow as appropriate.
3. Layout can be used for patching operations.
4. Figure 9-13 may be used as an alternative setup for very short duration work.

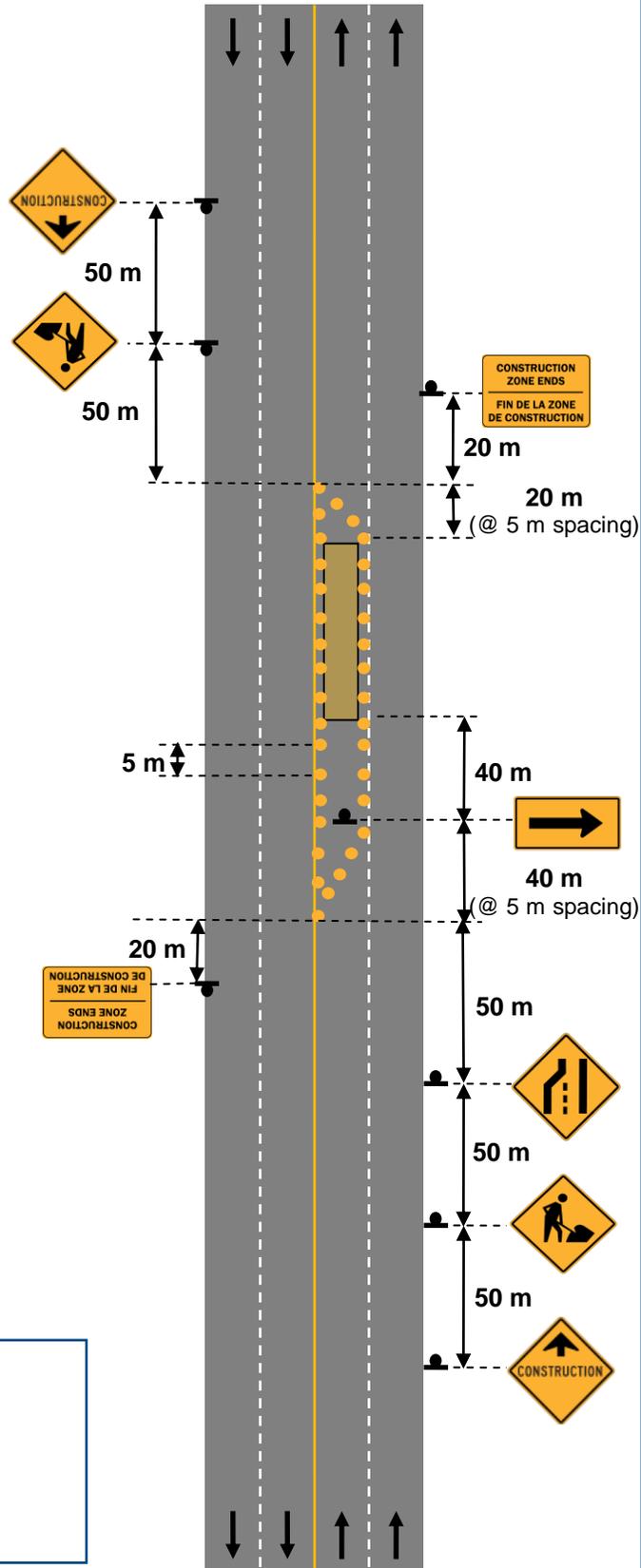


**Figure 9-12**

Cross-section:	<b>Four Lanes (no turning lanes)</b>
Work Location:	<b>Roadway Edge, Single Lane (left or right)</b>
Duration:	<b>Very Short</b>
Road Class:	<b>Major</b>

**NOTES:**

1. **Construction Ahead** and **Construction Zone Ends** signs only required for long duration work.

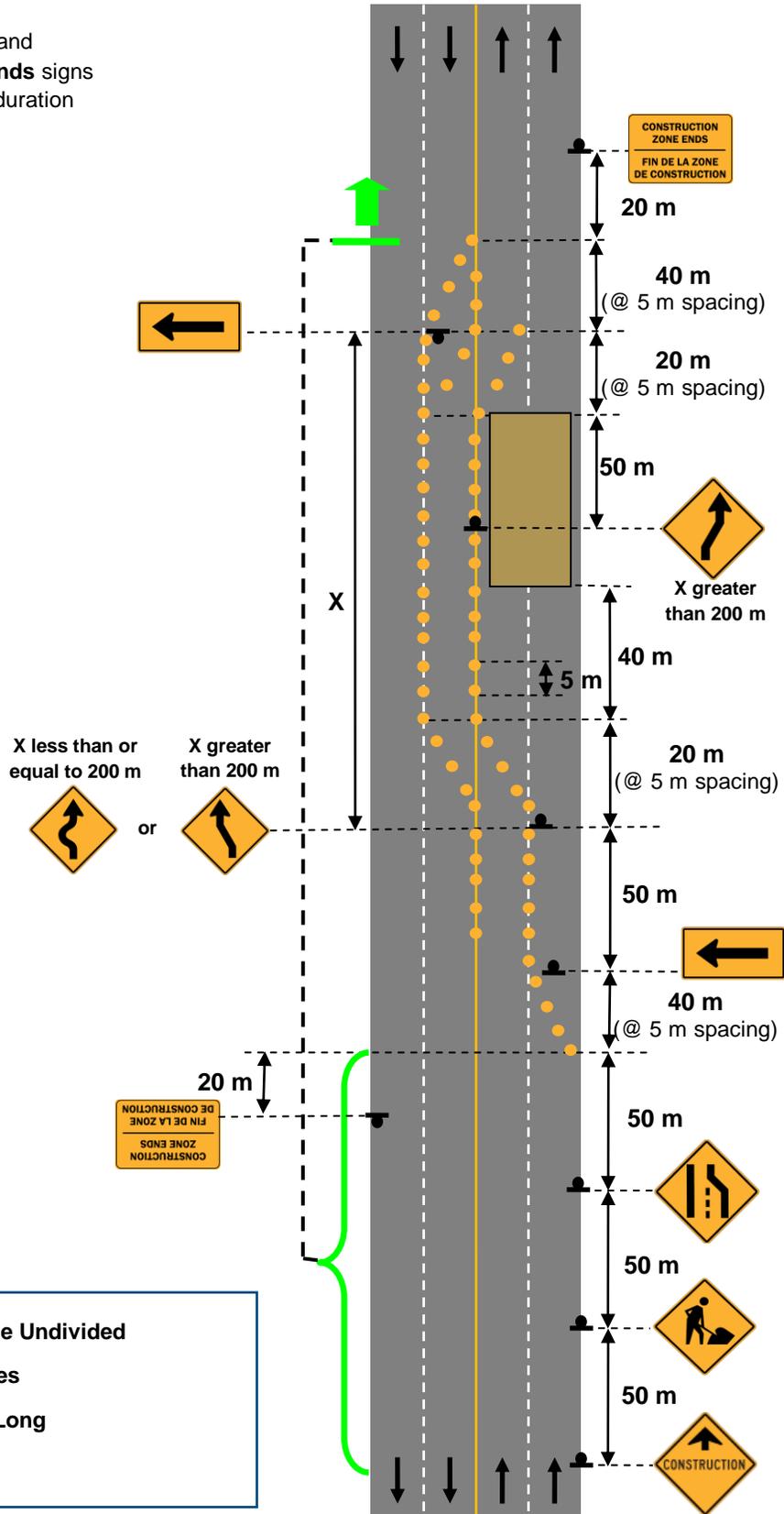


**Figure 9-13**

Cross-section:	<b>Four Lane Undivided</b>
Work Location:	<b>Single Lane (left or right)</b>
Duration:	<b>Short &amp; Long</b>
Road Class:	<b>Major</b>

**NOTES:**

1. **Construction Ahead** and **Construction Zone Ends** signs only required for long duration work.

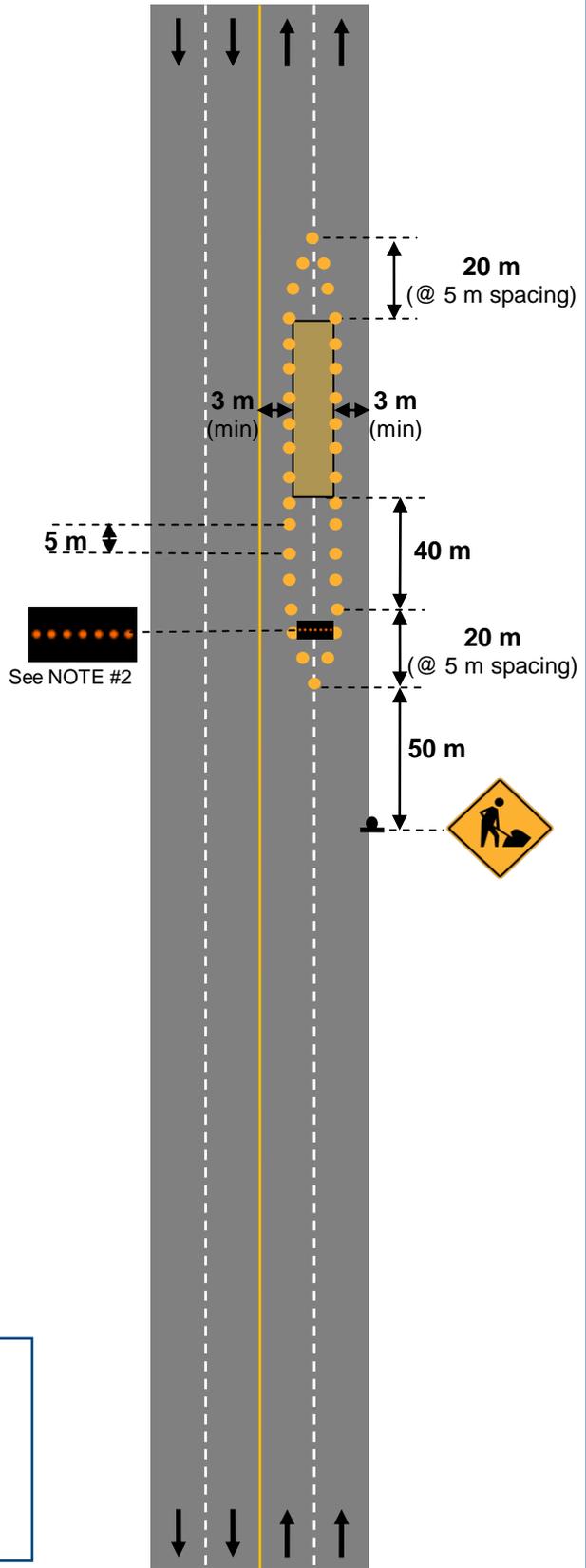


**Figure 9-14**

Cross-section:	<b>Four Lane Undivided</b>
Work Location:	<b>Two Lanes</b>
Duration:	<b>Short &amp; Long</b>
Road Class:	<b>Major</b>

**NOTES:**

1. Figure 9-9 shall be used if the activity area is in the centre of the road.
2. **Flashing Arrow Board** may be replaced by a **Light Barricade**.
3. **Flashing Arrow Board** and taper may be replaced by a **Trail Vehicle**.

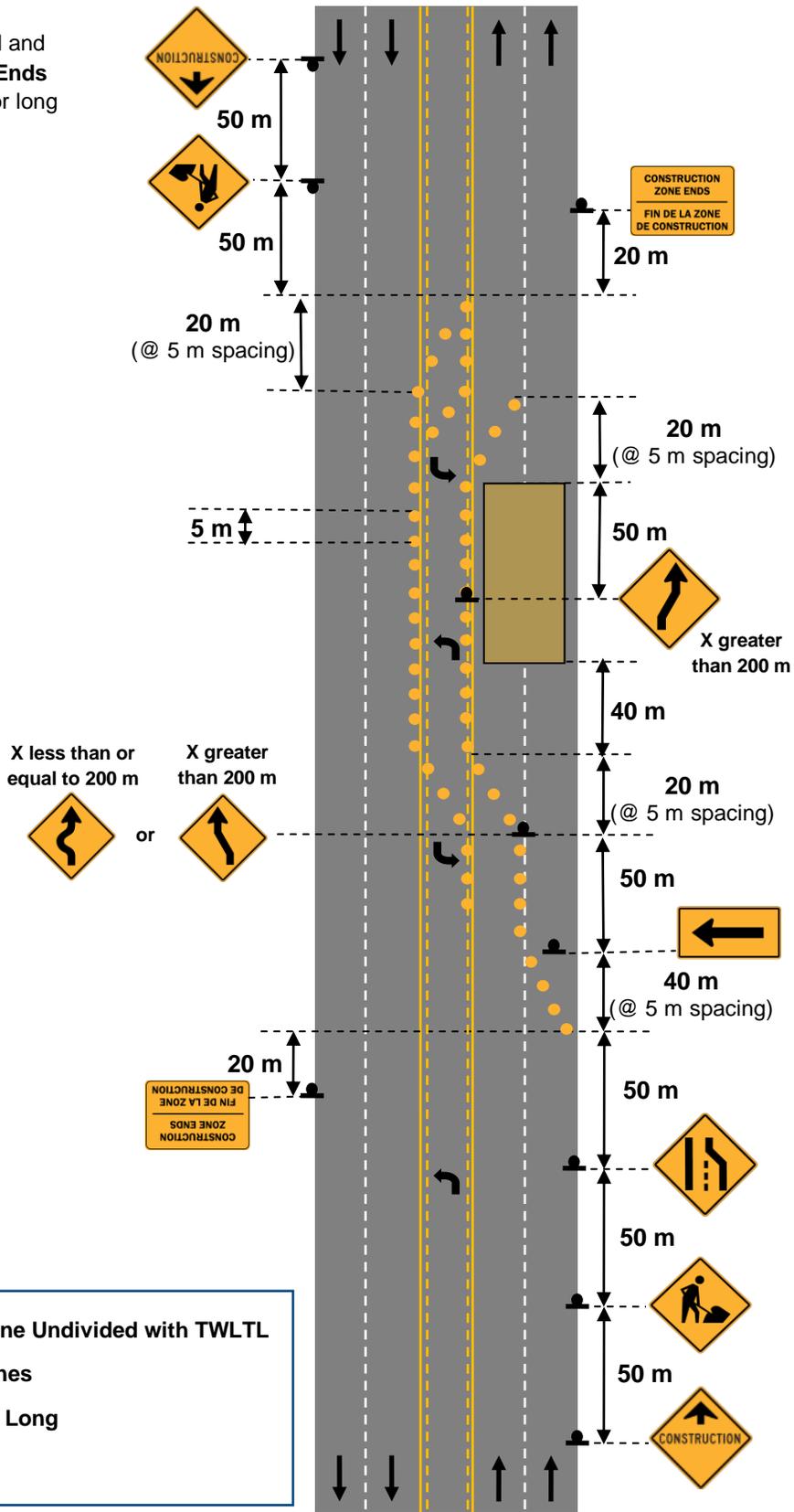


**Figure 9-15**

Cross-section:	<b>Four Lane Undivided</b>
Work Location:	<b>Centre Line</b>
Duration:	<b>Very Short</b>
Road Class:	<b>Major</b>

**NOTES:**

- Construction Ahead** and **Construction Zone Ends** signs only required for long duration work.

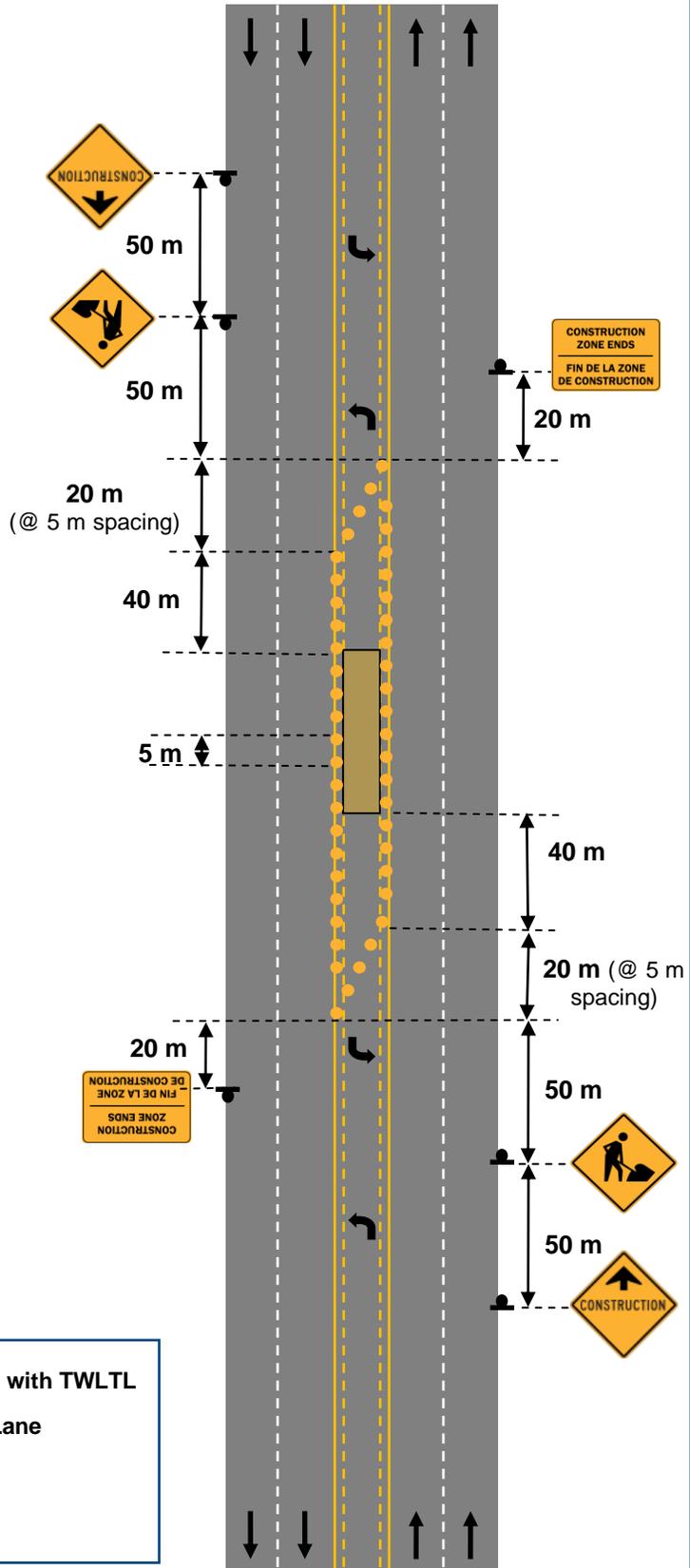


**Figure 9-16**

Cross-section:	<b>Four Lane Undivided with TWLTL</b>
Work Location:	<b>Two Lanes</b>
Duration:	<b>Short &amp; Long</b>
Road Class:	<b>Major</b>

**NOTES:**

1. **Construction Ahead** and **Construction Zone Ends** signs only required for long duration work.

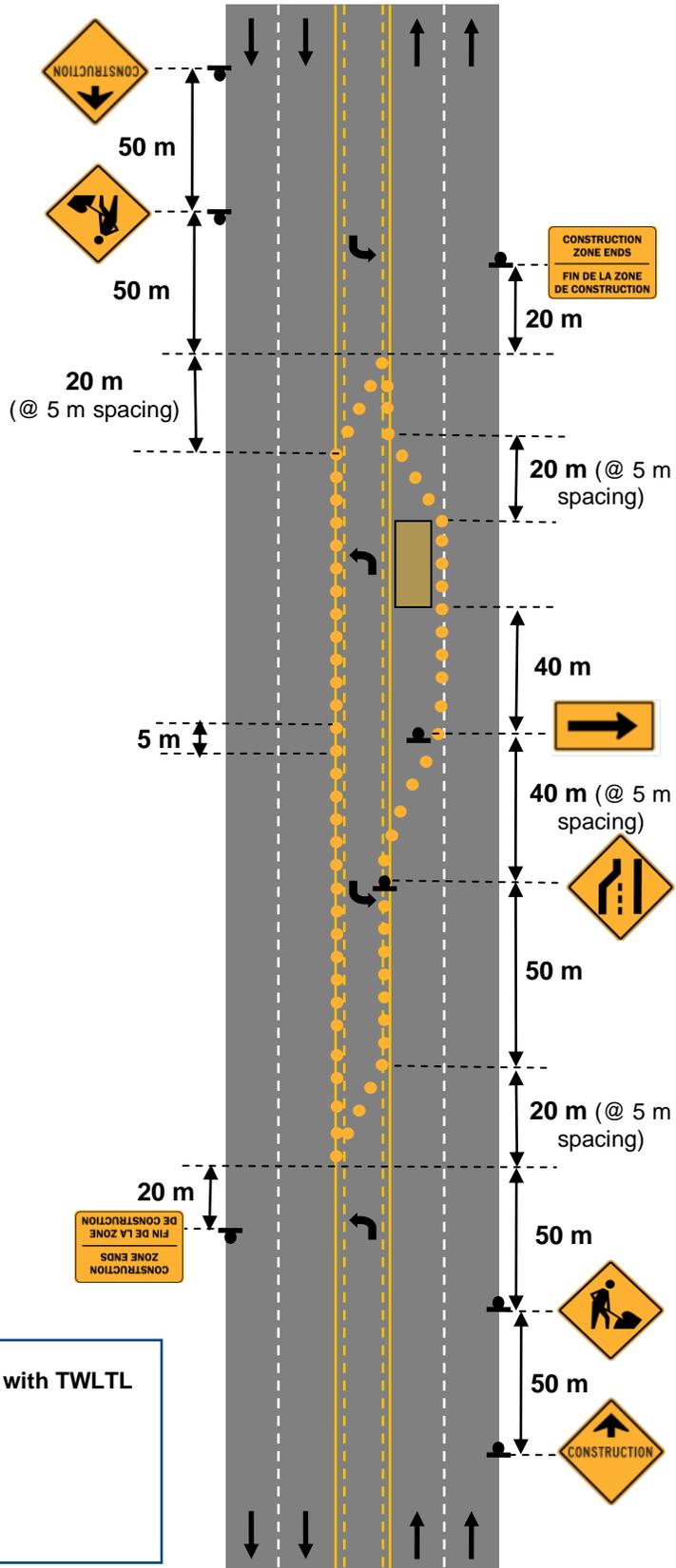


**Figure 9-17**

Cross-section:	<b>Four Lane Undivided with TWLTL</b>
Work Location:	<b>Two-Way-Left-Turn-Lane</b>
Duration:	<b>Short &amp; Long</b>
Road Class:	<b>Major</b>

**NOTES:**

1. **Construction Ahead** and **Construction Zone Ends** signs only required for long duration work.

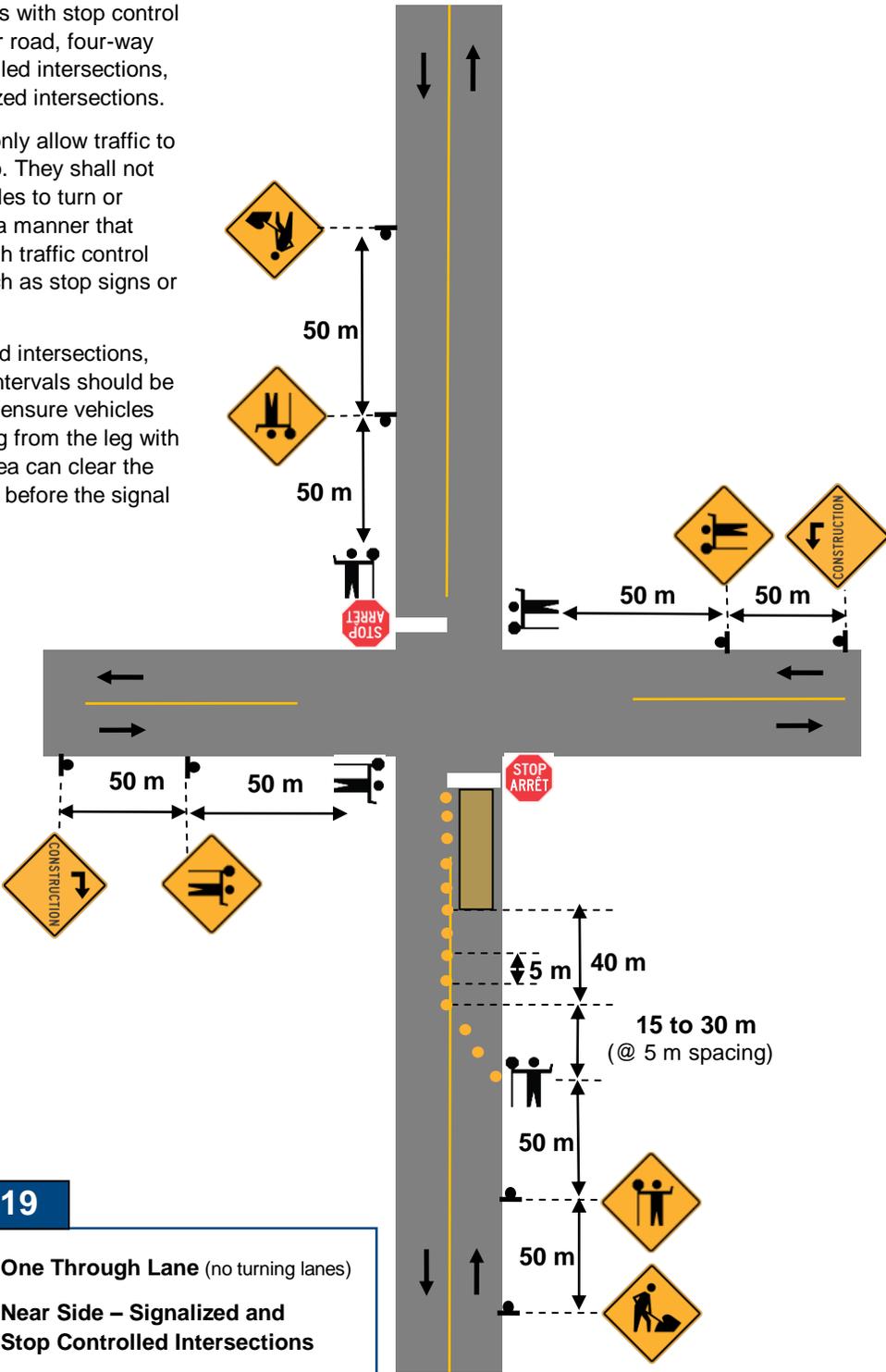


**Figure 9-18**

Cross-section:	<b>Four Lane Undivided with TWLTL</b>
Work Location:	<b>Left Lane</b>
Duration:	<b>Short &amp; Long</b>
Road Class:	<b>Major</b>

**NOTES:**

1. Layout also applies to intersections with stop control on the other road, four-way stop controlled intersections, and signalized intersections.
2. TCPs can only allow traffic to stop and go. They shall not direct vehicles to turn or proceed in a manner that conflicts with traffic control devices such as stop signs or signals.
3. At signalized intersections, clearance intervals should be adjusted to ensure vehicles approaching from the leg with the work area can clear the intersection before the signal turns red.

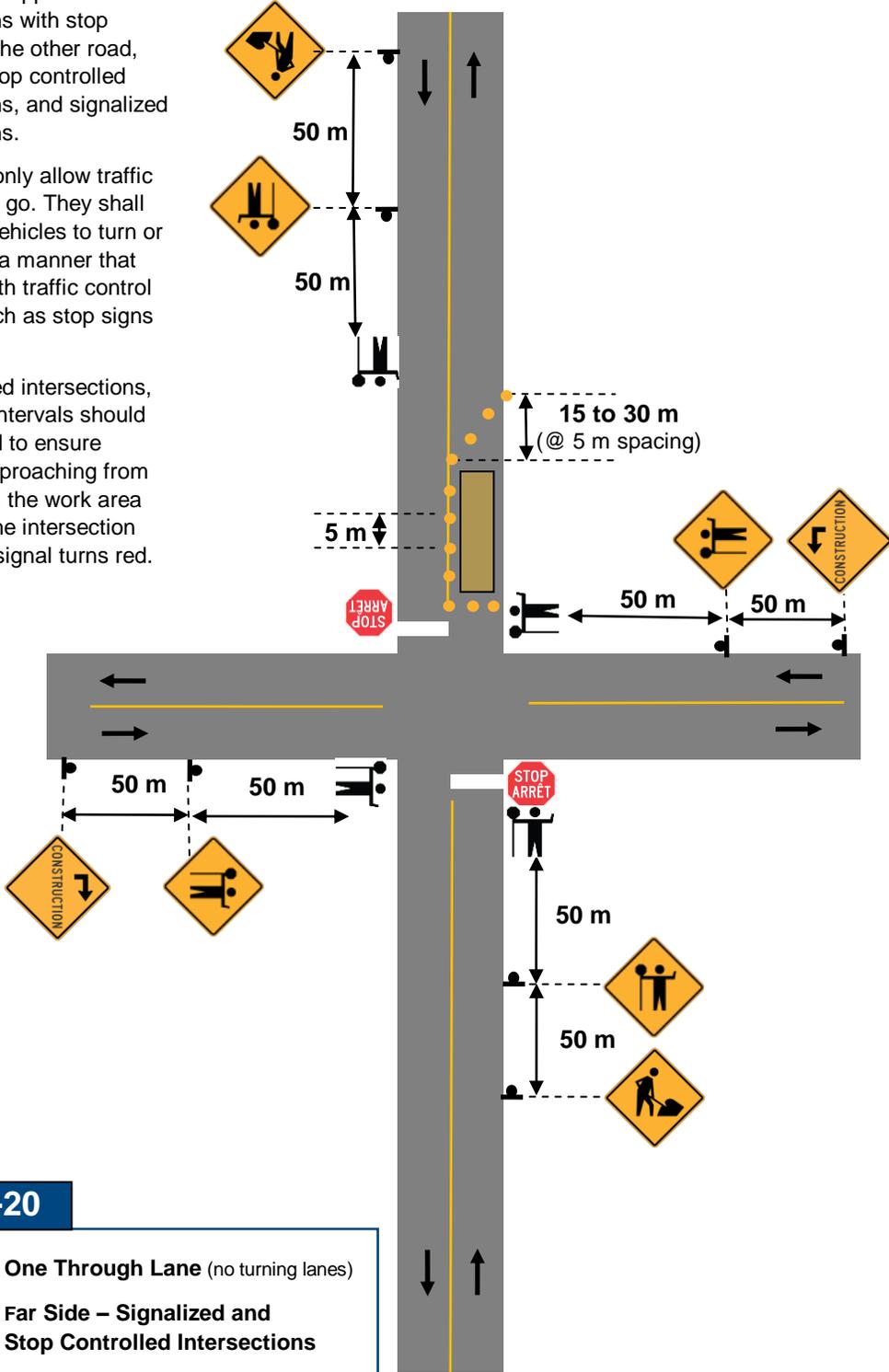


**Figure 9-19**

Cross-section:	<b>One Through Lane (no turning lanes)</b>
Work Location:	<b>Near Side – Signalized and Stop Controlled Intersections</b>
Duration:	<b>Very Short / Short</b>
Road Class:	<b>Major &amp; Local</b>

**NOTES:**

1. Layout also applies to intersections with stop control on the other road, four-way stop controlled intersections, and signalized intersections.
2. TCPs can only allow traffic to stop and go. They shall not direct vehicles to turn or proceed in a manner that conflicts with traffic control devices such as stop signs or signals.
3. At signalized intersections, clearance intervals should be adjusted to ensure vehicles approaching from the leg with the work area can clear the intersection before the signal turns red.



**Figure 9-20**

Cross-section: **One Through Lane** (no turning lanes)

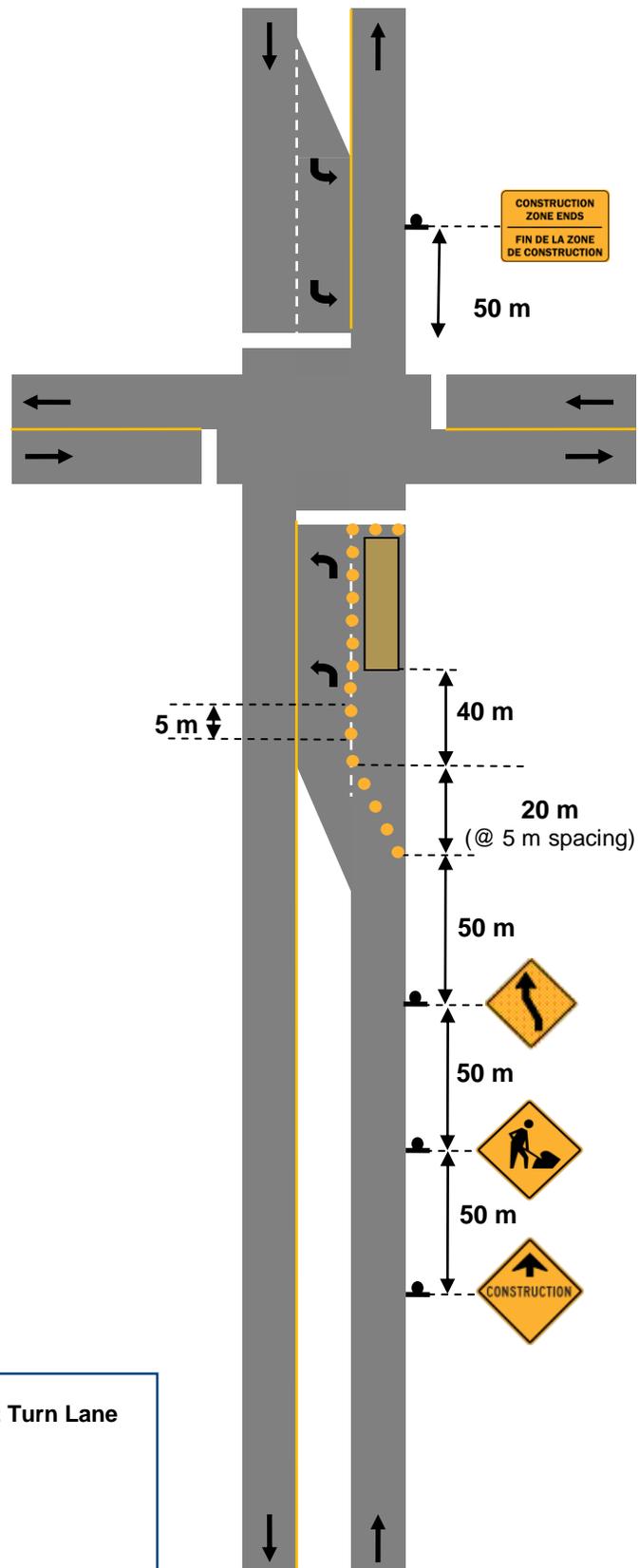
Work Location: **Far Side – Signalized and Stop Controlled Intersections**

Duration: **Very Short / Short**

Road Class: **Major & Local**

**NOTES:**

1. **Construction Ahead** and **Construction Zone Ends** signs only required for long duration work.

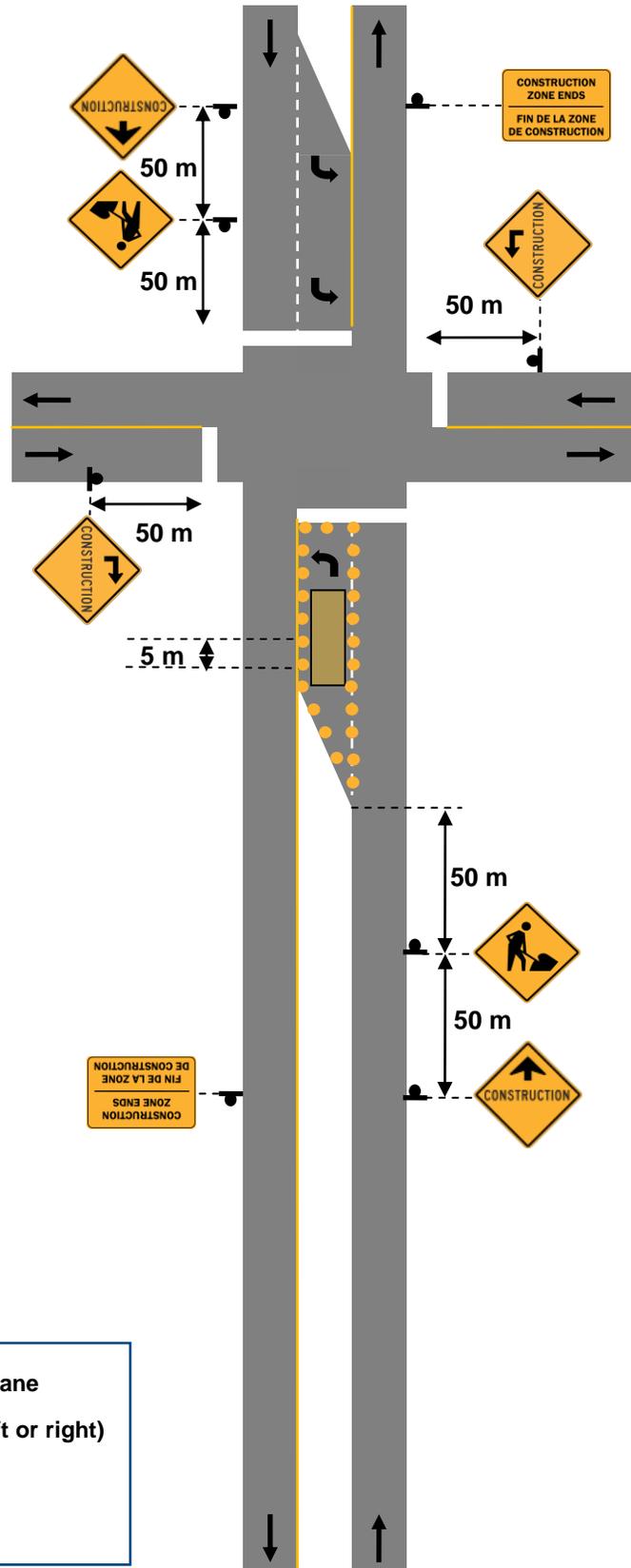


**Figure 9-21**

Cross-section:	<b>1 Through Lane + Left Turn Lane</b>
Work Location:	<b>Near Side, Right Lane</b>
Duration:	<b>All</b>
Road Class:	<b>Major &amp; Local</b>

**NOTES:**

1. **Construction Ahead** and **Construction Zone Ends** signs only required for long duration work.
2. Layout can also be used for work areas in the right turn lane. Signs on other approaches are not required for work areas in the right turn lane.

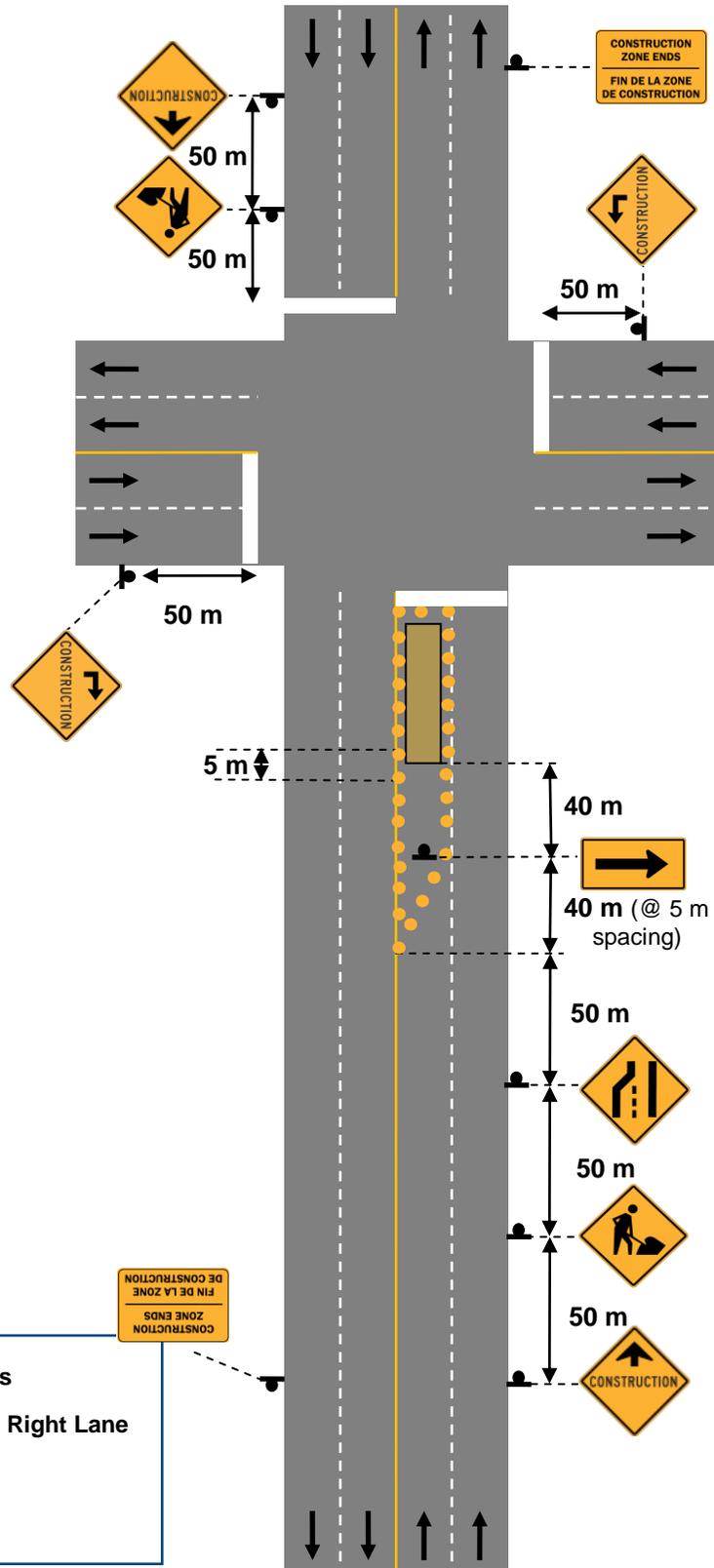


**Figure 9-22**

Cross-section:	<b>1 Through Lane + Turn Lane</b>
Work Location:	<b>Near Side, Turn Lane (left or right)</b>
Duration:	<b>All</b>
Road Class:	<b>Major &amp; Local</b>

**NOTES:**

1. **Construction Ahead** (on through street) and **Construction Zone Ends** signs only required for long duration work.
2. Layout can also be used for work areas in the right lane. Signs on other approaches are not required for work areas in the right lane.

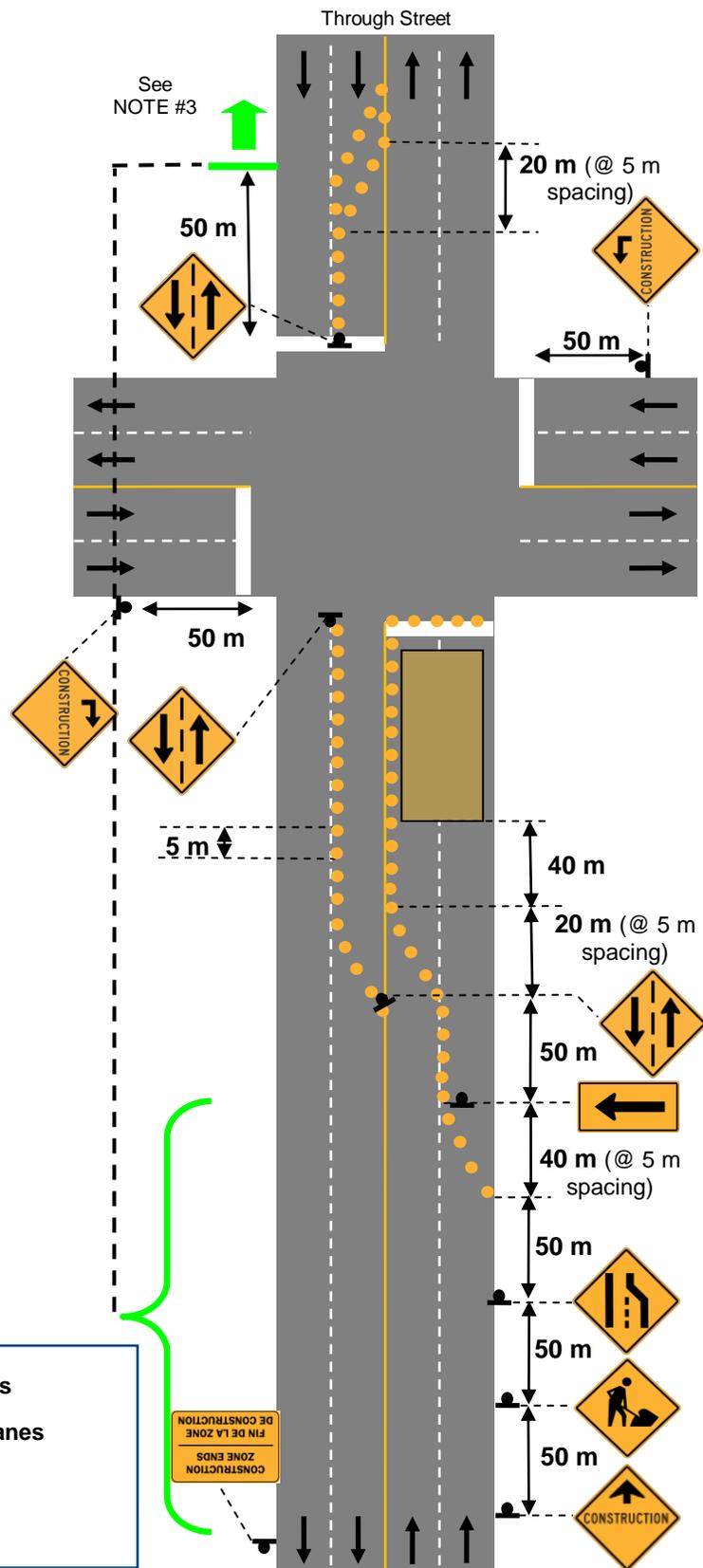


**Figure 9-23**

Cross-section: **Two Through Lanes**  
 Work Location: **Near Side - Left or Right Lane**  
 Duration: **All**  
 Road Class: **Major**

**NOTES:**

1. **Sign opposite approach in similar manner** (see Figure 9-13 for additional guidance).
2. **Construction Ahead** (on through street) and **Construction Zone Ends** signs only required for long duration work.
3. Prohibit parking on through street approaches to the work area.

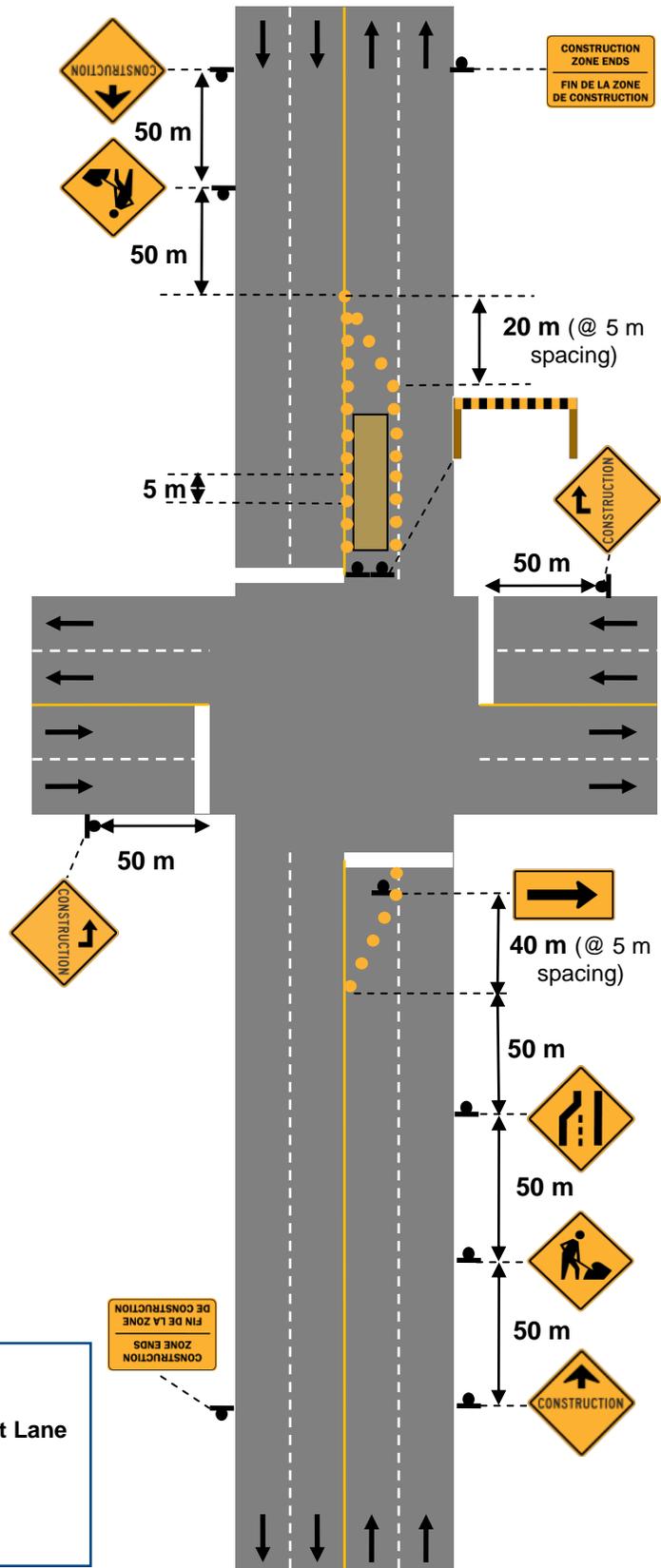


**Figure 9-24**

Cross-section:	<b>Two Through Lanes</b>
Work Location:	<b>Near Side – Two Lanes</b>
Duration:	<b>All</b>
Road Class:	<b>Major</b>

**NOTES:**

1. **Construction Ahead** (on through street) and **Construction Zone Ends** signs only required for long duration work.
2. Replace **Light Barricade** with **Heavy Barricade** for long duration work on major roads.



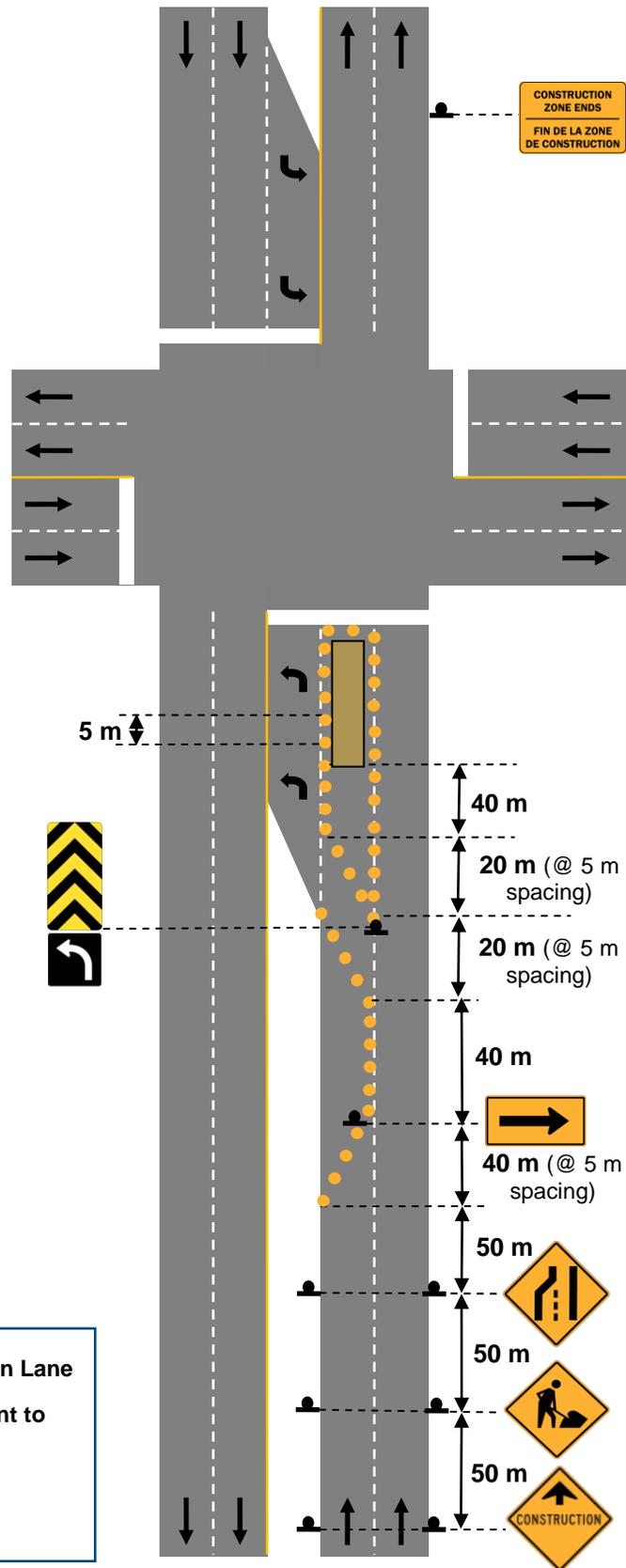
**Figure 9-25**

Cross-section: **Two Through Lanes**  
 Work Location: **Far Side – Left or Right Lane**  
 Duration: **All**  
 Road Class: **Major**



**NOTES:**

1. **Construction Ahead** and **Construction Zone Ends** signs only required for long duration work.

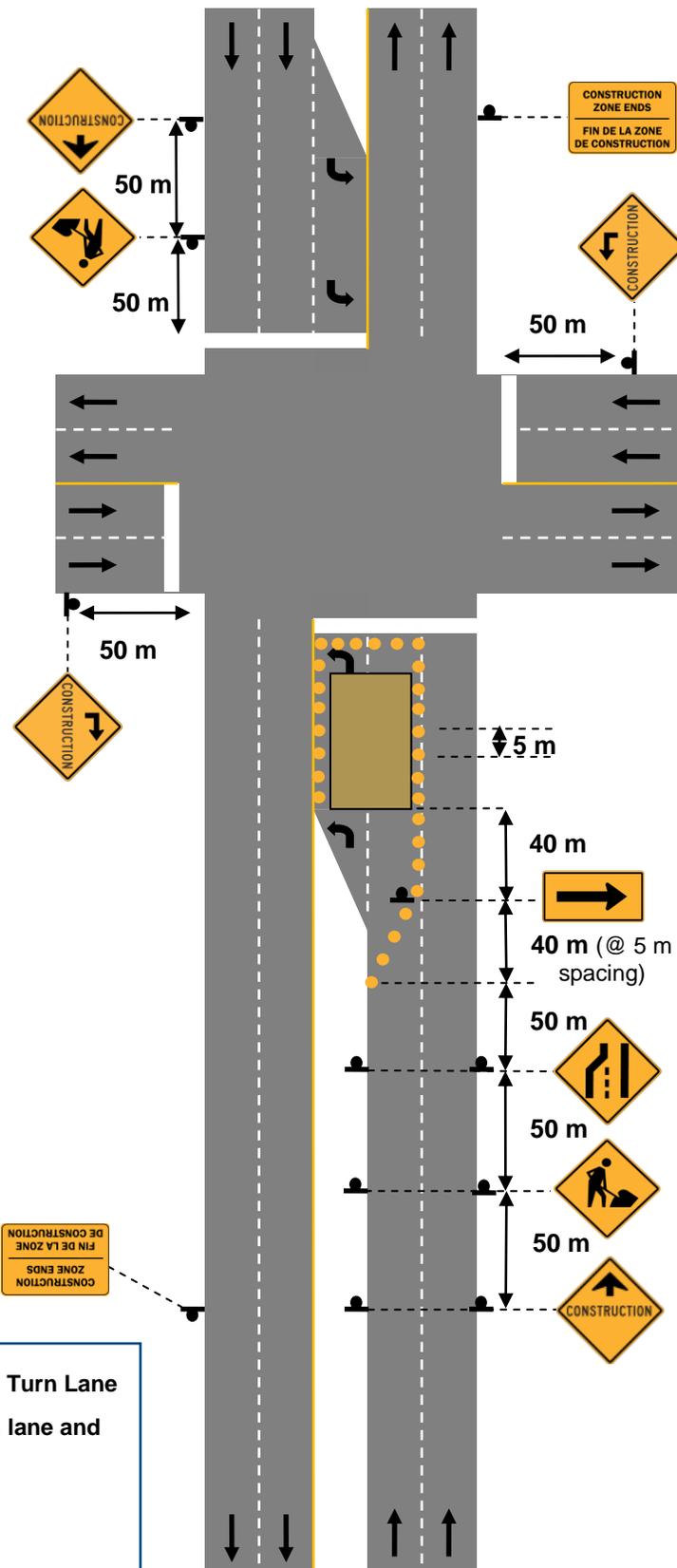


**Figure 9-27**

Cross-section:	<b>2 Through Lanes + 1 Turn Lane</b>
Work Location:	<b>Near Side – Lane adjacent to turn lane</b>
Duration:	<b>All</b>
Road Class:	<b>Major</b>

**NOTES:**

1. **Construction Ahead** (on through street) and **Construction Zone Ends** signs only required for long duration work.

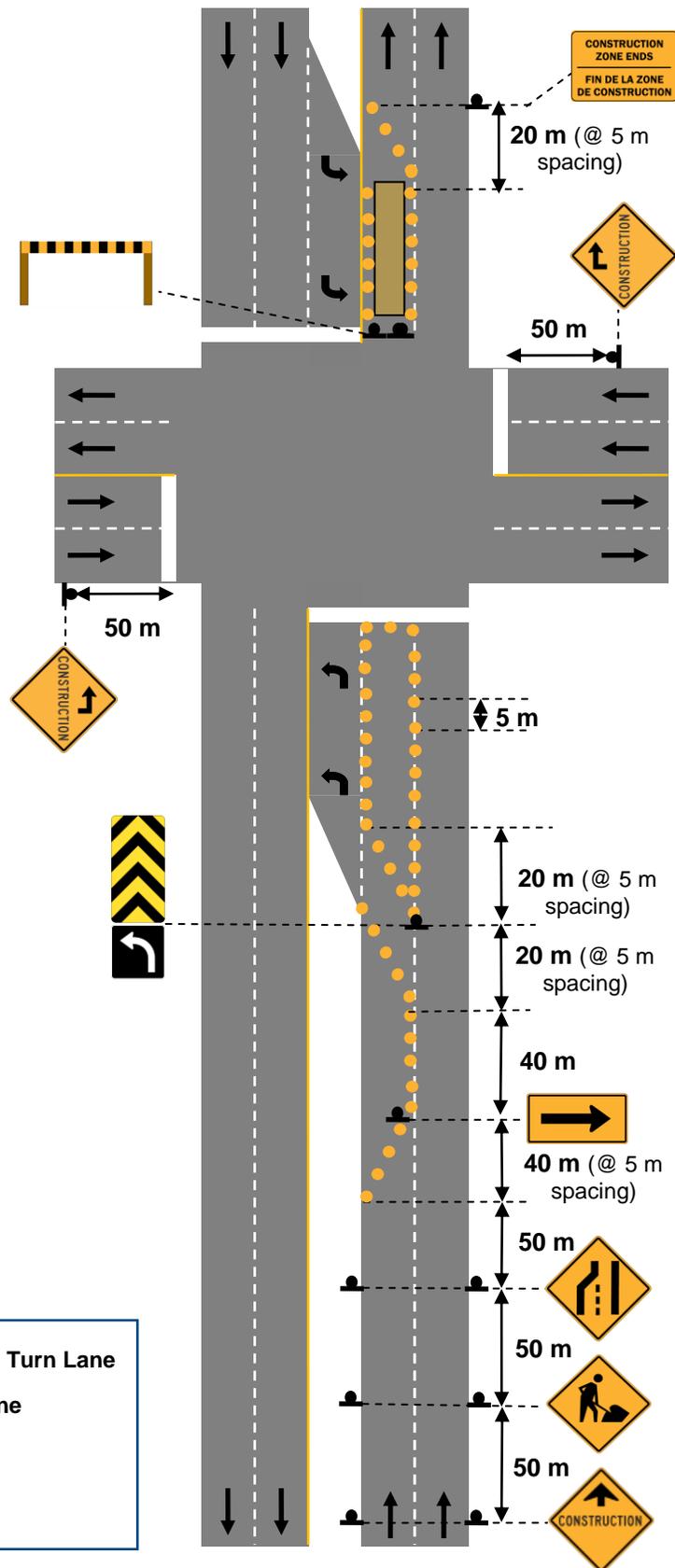


**Figure 9-28**

Cross-section: **2 Through Lanes + 1 Turn Lane**  
 Work Location: **Near Side – Through lane and turn lane**  
 Duration: **All**  
 Road Class: **Major**

**NOTES:**

1. **Construction Ahead** (on through street) and **Construction Zone Ends** signs only required for long duration work.
2. Replace **Light Barricade** with **Heavy Barricade** for long duration work on major roads.

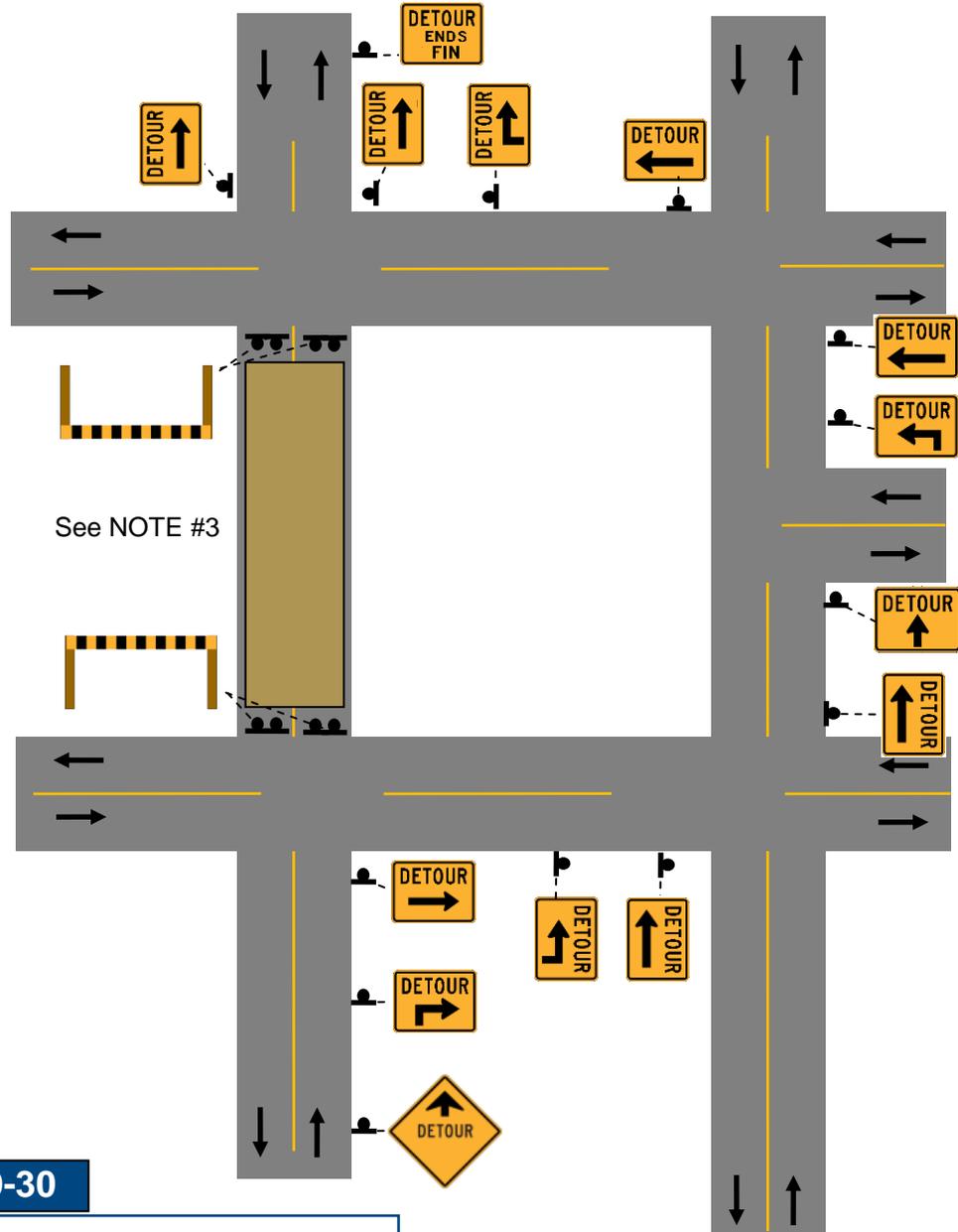


**Figure 9-29**

Cross-section: **2 Through Lanes + 1 Turn Lane**  
 Work Location: **Far Side – Single Lane**  
 Duration: **All**  
 Road Class: **Major**

**NOTES:**

1. Add appropriate street name signs to detour tabs for major road closures.
2. Detour signage may not be required for local road closures at the discretion of the Municipality.
3. Signs shall be spaced 50 m apart if possible.
4. Replace **Light Barricade** with **Heavy Barricade** for long duration work on major roads.

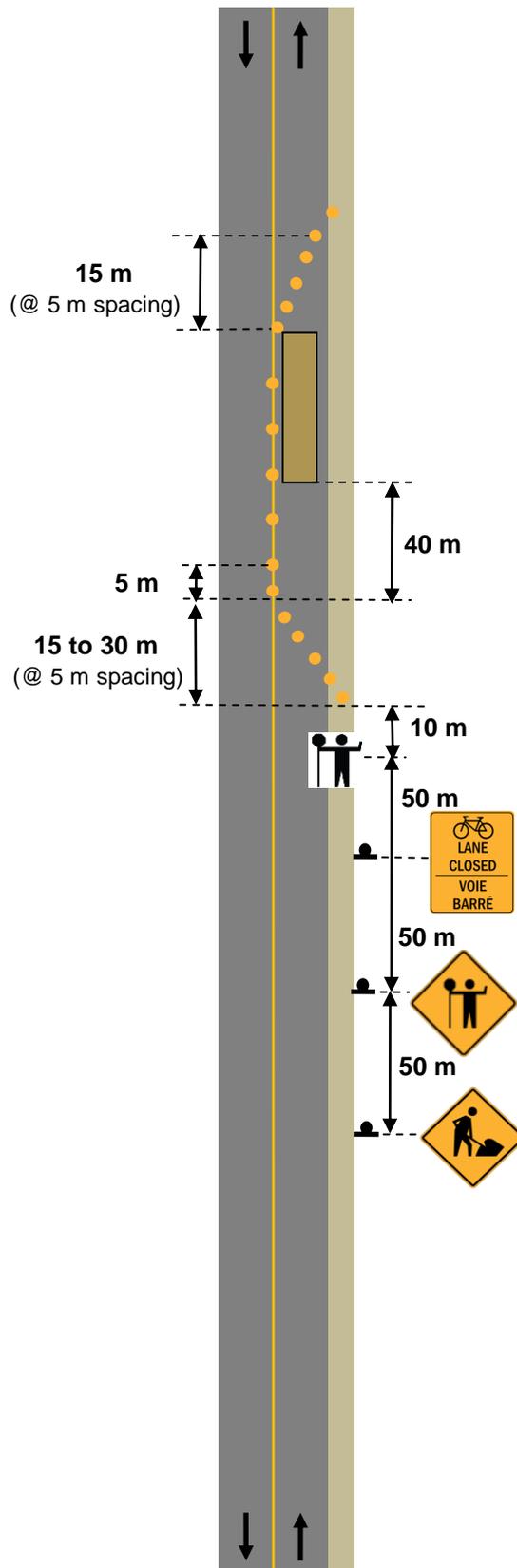


**Figure 9-30**

Cross-section:	<b>All Cross Sections</b>
Work Location:	<b>Entire Block</b>
Duration:	<b>Short / Long</b>
Road Class:	<b>Major and Local</b>

**NOTES:**

1. All advanced warning signs shall be placed so that the path of travel for bicycles is not blocked, while maintaining visibility for road users.
2. Warning sign layout for cyclists also applies to yield and signal traffic control (see Figures 9-6 and 9-8).

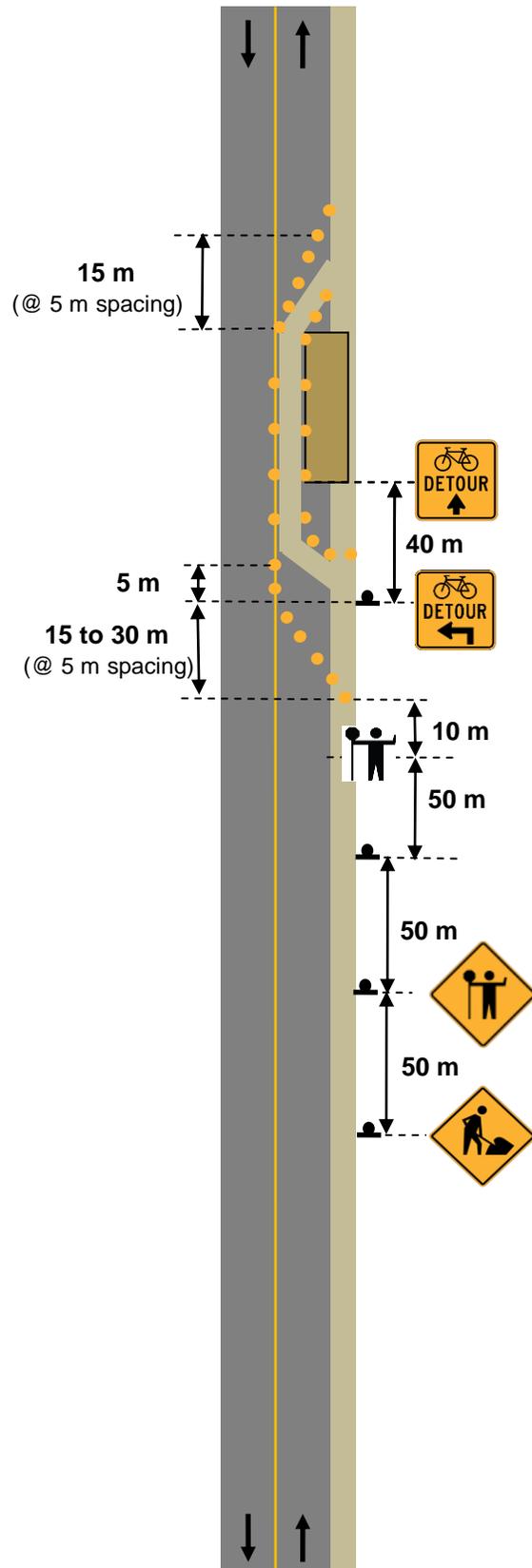


**Figure 9-31**

Cross-section:	<b>Bicycle Lane</b>
Work Location:	<b>Single Lane and Bicycle Lane</b>
Duration:	<b>Very Short / Short / Long</b>
Road Class:	<b>Major and Local</b>

**NOTES:**

1. All advanced warning signs shall be placed so that the path of travel for bicycles is not blocked, while maintaining visibility for road users.
2. Warning sign layout for cyclists also applies to yield and signal traffic control (see Figures 9-6 and 9-8).



**Figure 9-32**

Cross-section:	<b>Bicycle Lane</b>
Work Location:	<b>Partial Lane and Bicycle Lane</b>
Duration:	<b>Very Short / Short / Long</b>
Road Class:	<b>Major and Local</b>

