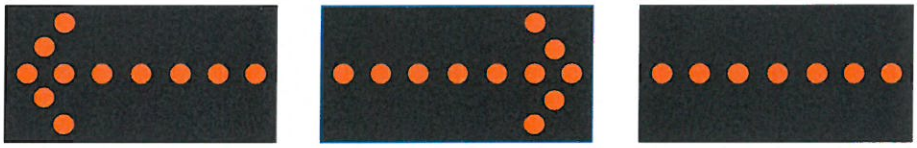
RSDSs have been demonstrated in some applications to reduce 85th percentile speeds up to an additional 10 km/h over the reduction caused by conventional signs alone. For maximum effectiveness, it is desirable to supplement the RSDS with law enforcement from time to time.

Where used, RSDSs must be placed where they do not conflict with other traffic control signs and devices. To be most effective, it is recommended that the numbers on the display be at least 45 cm tall. Some models are also capable of displaying a supplementary message informing the driver to "slow down". If the display is supplemented with a text message, the same minimum requirements apply as for Variable Message Signs.

3.4 Flashing Arrow Boards

Flashing Arrow Boards (FABs) are Traffic Control Devices, either mounted on a truck or trailer, with a group of elements capable of displaying directional arrows (Arrow Mode) or a horizontal line (Caution Mode) as shown in Figure 3-1.



Arrow Left Mode **Arrow Right Mode** **Caution Mode**

Figure 3-1: Flashing Arrow Board Displays

The directional arrows are used primarily on multilane roads to direct traffic from a closed lane into the adjacent lane. The appropriate direction (left or right) must be displayed. Directional arrows may also be used on two lane roads to divert traffic to the right only. The left arrow shall never be used on two lane roads, as it may cause drivers to divert into oncoming traffic.

The caution mode may be used on both multilane and two lane roads. It is used when the location of work does not require any lanes to be closed, diverting traffic to the left on a two lane road or when a Traffic Control Person is directing traffic on a two lane road. All FABs shall meet the minimum requirements shown in Table 3-2.

Table 3-2: Minimum Requirements for Flashing Arrow Boards

Type	Normal Posted Speed Limit	Section / Work Duration	Minimum Size	Minimum Height above Road	Minimum Legibility	Minimum # of Elements	Flash Rate
A	50 – 70 km/h	Section 7 / 8 All Durations	120 cm x 60 cm	1.5 m	800 m	12	25 – 40 flashes per minute
B	80 – 110 km/h	Section 7 All Durations Section 8 Moving / Very Short / Short Durations	150 cm x 75 cm	1.5 m	1200 m	13	25 – 40 flashes per minute
C	110 km/h	Section 8 Long Duration	240 cm x 120 cm	1.5 m	1600 m	15	25 – 40 flashes per minute

Note: Arrow boards that are a minimum 120 cm in length maybe used as caution bars in Section 7 and 8 for all Durations providing they meet all other criteria (excluding height).

A 35 watt incandescent bulb is the standard element for FABs. Alternate elements such as halogen bulbs, low wattage bulbs, and groups of light-emitting diodes (LEDs) may be used provided they maintain the same flash rate and brightness as a 35 watt incandescent bulb. All FABs used during night work shall be equipped with at least one photocell that progressively reduces light intensity during hours of darkness to prevent road users from being temporarily blinded.

3.5 Flashing Lights

360 Degree Amber Lights

All Work Vehicles stationed in a Work Area must be equipped with an amber light visible from all sides (360 degrees). This includes round or rectangular lighting devices. If the ability to view a light is obscured, other lights shall be mounted to ensure visibility on all sides. These lights shall be displayed whenever a vehicle is positioned such that it could influence traffic. Standard vehicle 4-way flashers shall not be used as a substitute.

Flashing Beacons

Flashing amber and flashing red beacons may be mounted on Barricades or other special construction signs to provide additional emphasis, particularly at night. Amber warning lights are used to indicate "caution", while red warning lights are used to indicate "do not enter". Note: beacons shall not be used on Barricades in close proximity to traffic control signals.

Flashing beacons must be at least 30 cm in diameter and maintain a flash rate of 25 to 40 flashes per minute. Electrical, solar, and battery power sources are all acceptable, provided the beacons are visible for up to 800 m under clear night-time conditions. If a temporary power line must cross over the road, the clearance above the road surface shall be at least 7.0 m.

3.6 Traffic Control Signals

Traffic Control Signals may be used for work on two lane roads for which traffic is reduced to one lane. The area controlled by signals shall not include any intersections or driveways to avoid possible conflicts.

Traffic control signals may be either semi-permanently mounted or mounted on portable trailers. Communication between the traffic control units may either be by hard wiring or radio communication. The traffic control signals shall have two heads in each direction and be oriented to provide maximum visibility to the approaching road users. The signals must be designed in accordance with "The Manual of Uniform Traffic Control Devices for Canada."

The use of Traffic Control Signals requires approval from the Department of Transportation and Infrastructure's Maintenance and Traffic Branch.

8 Typical Layouts for Multilane Roads

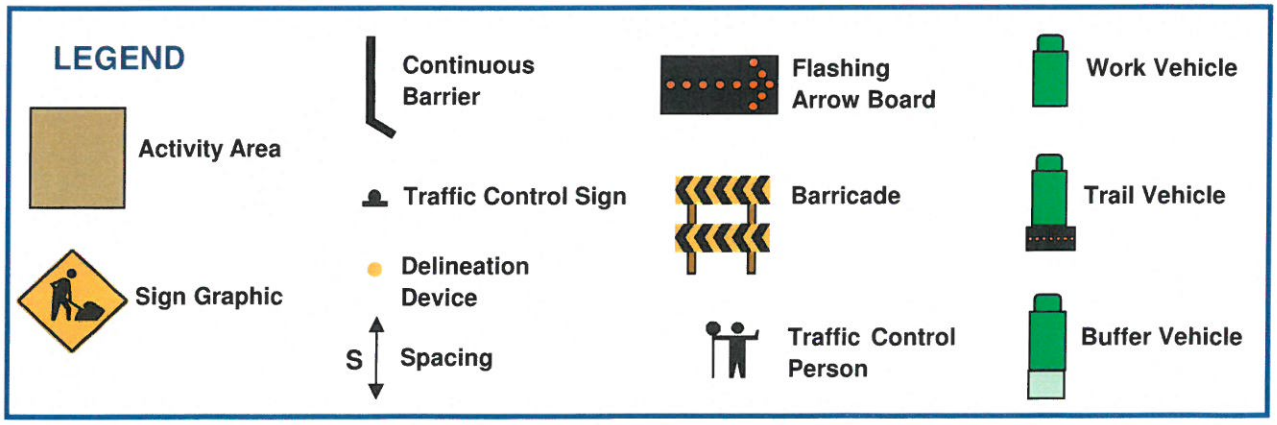
GENERAL LAYOUTS

Activity	Work Location	Duration	Volume	Figure No.
Any	Roadside	Any	All	8-1
	Shoulder	Moving	All	8-2
		Very Short	All	8-3
		Short	All	8-4
		Long	All	8-5
	Single Lane	Moving	All	8-6
		Very Short	All	8-7 VS
		Short / Long	All	8-7
Multilane Diversion	Two Lanes	Short / Long	All	8-8a&b
Bridge	Single Lane	Short / Long	All	8-9
Auxiliary Lane	Deceleration Lane	Short / Long	All	8-10
	Acceleration Lane	Short / Long	All	8-11
Next to Acceleration Lane	Single Lane	Short / Long	All	8-12
Ramp	Off Ramp	Short / Long	All	8-13
	On Ramp	Short / Long	All	8-14

SPECIAL LAYOUTS

Activity	Work Location	Duration	Volume	Figure No.
Surveying	Shoulder	Short	All	8-15
Line Painting	Single Lane	Moving	All	8-16
Blasting Area				8-17
Low Shoulder				8-18
Other Hazards				8-19
After Milling or Paving				8-20
Advance Signing (Major Project)				8-21

NOTE: Use Figure 8-7 for Patching, Milling, and Paving activities.



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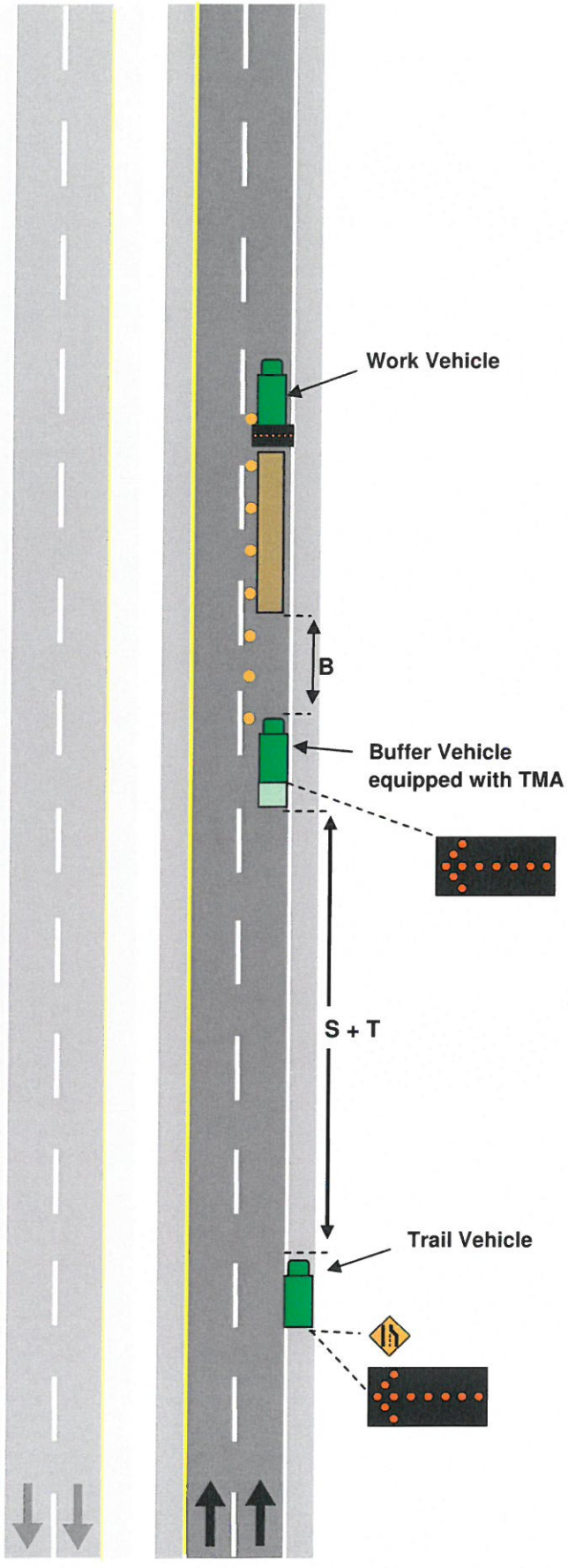
NOTES:

1. Trail Vehicle shall have a 90X90 Lane Closed Sign attached to the rear.
2. An additional Trail Vehicle may be used based upon site specific conditions such as restricted sight distances.
3. Work Vehicle shall be equipped with a Flashing Arrow Board set to caution mode or a 360 degree amber light.
4. Delineators to be installed using Dedicated Traffic Observers and Device Installers.
5. To install delineators, position the trail vehicle in the proper location and move Buffer Vehicle into traffic a distance B from the Device Installers. Buffer Vehicle would then progress with the Device Installers until it is at the proper location.



Single Lane Closure
Very Short Duration
(less than 30 min)
All Volumes

V	50	60-70	80-90	100-110
S	50	75	100	150
T	30	64	110	180
D	6 / 8	8 / 10	10 / 14	18 / 24
B	35	50	70	75

V – Existing Speed Limit (km/h)

S – Minimum Sign Spacing (m)

T – Taper Length (m)

D – Maximum Delineator Spacing in Taper/Tangent (m)

B – Buffer Area Length (m)

Figure 8-7 VS