

FORM 708



GOVERNMENT OF NEWFOUNDLAND AND LABRADOR
Department of Transportation and Works
Highway Design Division

SECTION 708 DELINEATION DEVICES

INDEX

708.01 APPLICATION

708.02 LOCATION OF DELINEATION DEVICES

708.03 SPACING OF DELINEATORS

708.04 DESIGN AND COLOUR

708.05 FORMS OF DELINEATORS

708.06 BASIS OF PAYMENT

708.01 APPLICATION

Delineation devices shall be used to channelize traffic when the traffic flow is impeded as a result of obstructions, work areas or a narrowing of the roadway. They form part of the general category called Traffic Control Devices and shall be used as a supplement to signs and barricades.

Where the temporary condition exists during darkness, delineation shall be achieved by the use of construction markers, traffic barrels, barricades, chevron markers, delineator posts, flashing beacons or similar devices. In all cases, markers and barricades used to achieve delineation during the hours of darkness shall be retro-reflectorized using high intensity grade sheeting to show the same color and shape by night as by day. **Fluorescent paint shall not be used as a reflectorized substitute.**

708.02 LOCATION OF DELINEATION DEVICES

Any construction or maintenance activity on or within 1 m of a roadway shall be marked by delineators along the work site and the approaches to the work site or obstruction. The angle at which the delineations are placed across the closed portion of the road is called the taper and should vary according to the maximum regulatory speed and shall be as follows:

REGULATORY SPEED LIMIT	MINIMUM TAPER
50 KM/H AND LESS	30 M
60 TO 70 KM/H	60 M
80 KM/H	120 M
90 KM/H AND MORE	240 M

If the work area affects more than one traffic lane width, each traffic lane shall be closed separately and a tangent section provided between the two tapers. The minimum length of the tangent section shall be as follows:

REGULATORY SPEED LIMIT	MINIMUM TANGENT BETWEEN TAPERS
50 KM/H AND LESS	50 M
60 TO 70 KM/H	100 M
80 KM/H	150 M
90 KM/H AND MORE	240 M

FORM 708

708.03 SPACING OF DELINEATORS

The centre to centre distance between delineators varies with the regulatory speed for both tapers and tangents. Refer to the Construction Distance Table shown on Form 799-1.

708.04 DESIGN AND COLOUR

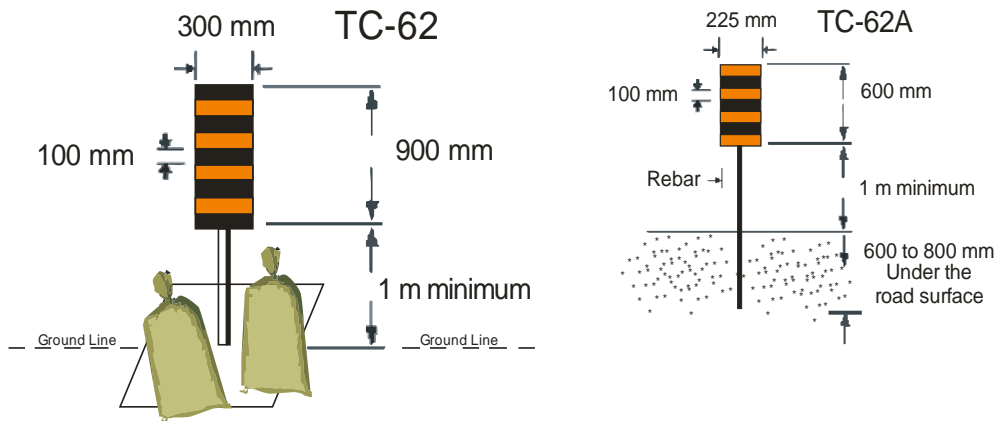
Delineators, with the exception of traffic cones and delineator posts, shall be designed with alternating striped orange and black colour placed in a horizontal position. Traffic cones shall be solid orange in colour. Delineator posts shall be orange in colour with two reflectorized white strips (75 mm) per post.

708.05 FORMS OF DELINEATORS

A number of forms of delineation may be used, as outlined in the following:

1. Construction Markers

Construction markers shall be of the dimension indicated. They shall be retro-reflectorized with high intensity grade orange reflective sheeting to indicate the same colour and shape by night as by day.



Where Construction Markers are required for a distance of greater than 300 m the use of 225 mm x 600 mm marker is permissible. (TC-62A).

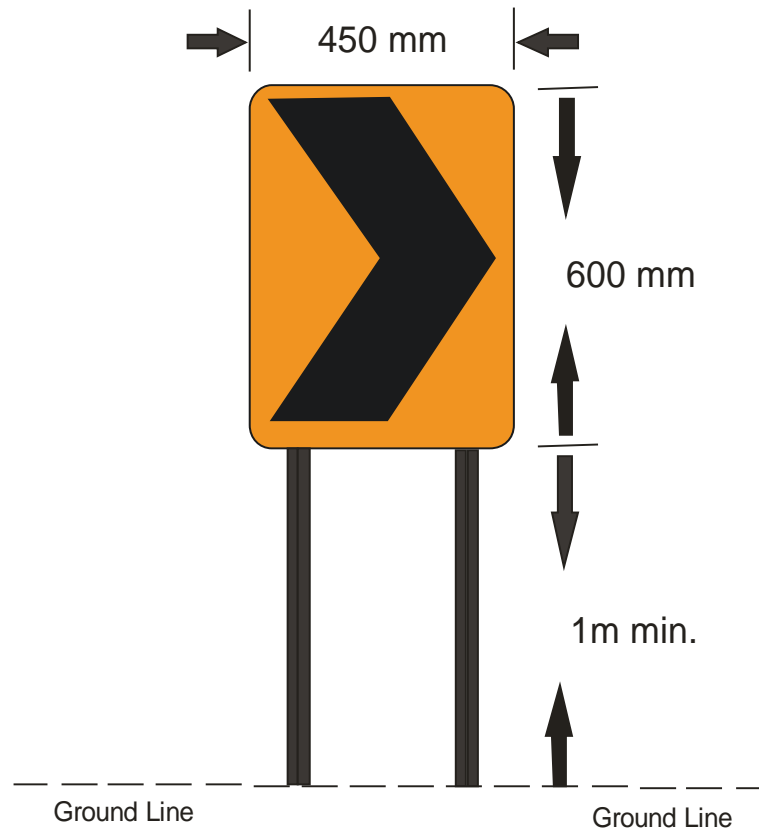
2. Chevron Markers

Chevron markers shall be used on tapers for detours and diversions. They shall replace the normal construction marker at a spacing of 30 m. The arrowhead shall point in the direction of the turn. They shall be retro-reflectorized using high intensity grade orange reflective sheeting to indicate the same color and shape by night as by day.

Markers that may require a weight to keep them from being knocked down or blown over, shall use sandbags. **The use of rocks or boulders will not be considered.**

TC-31 signs shall be installed on two piece of 25 mm rebar to a height of 1 m minimum above the traveled portion of the roadway to the bottom edge of the sign.

FORM 708



Where chevron markers are used to divide two-way traffic, chevron markers must be installed back-to-back on both sides of the same rebar installation.

3. Barricades

For reasons of traffic safety and for the protection of workers, barricades shall be used to define the work area. Such protection is considered a part of the temporary signing arrangement. Barricades shall also be used to close streets or roads in the area where the work is being carried out.

Barricades are always placed immediately preceding the work area on the approach side between the road user and the obstruction or activity.

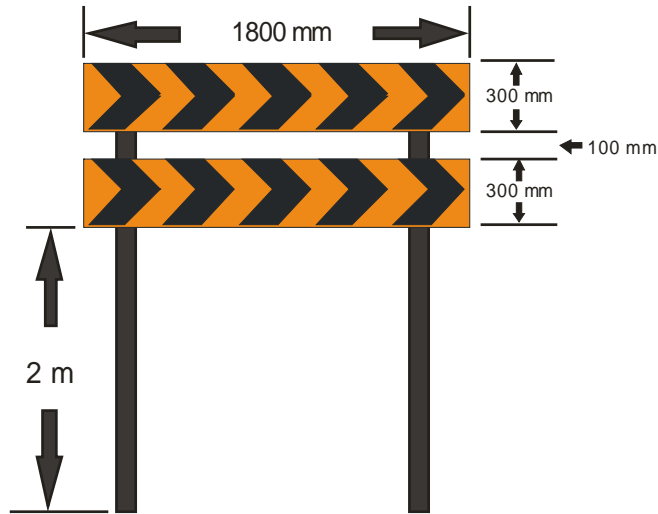
These barricades shall be reflectorized to indicate the same color and shape by night as by day. **The use of fluorescent paint on barricades shall not be considered for use after dark.**

All barricades shall have a retro-reflective high intensity grade orange background and black print meeting the approval of the Engineer.

Heavy barricades shall be used to provide complete closure of a road or lane for an extended period of longer than five days. Their supports shall consist of posts set in the ground with two TC-64C heavy barricade faces attached as shown below:

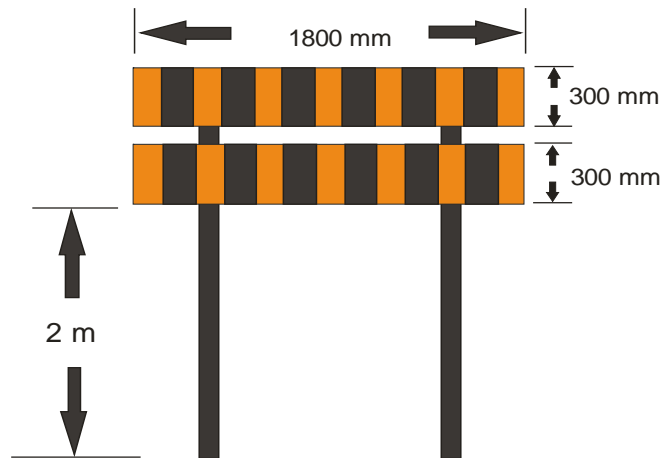
FORM 708

The direction of traffic indicated by arrow.
Posts shall be 100 mm x 100 mm minimum.



4. Heavy Barricades

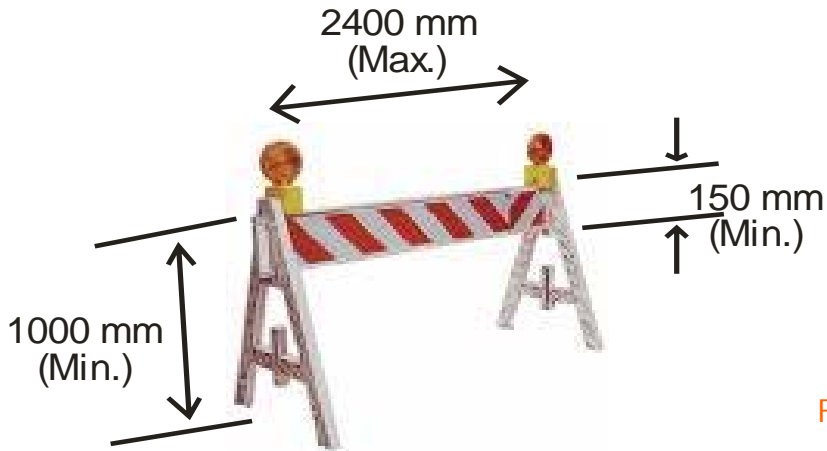
Where no direction is required barricade TC-64B shall be used, as shown below:



Posts shall be 100 mm x 100 mm minimum.

5. Light Barricades

Light barricades shall be used for works of short duration to provide closure of a traffic lane or roadways or blocking off road excavation sites or other work site hazards. Light barricades shall not be used as a channelized device. The use of fluorescent paint on light barricades shall not be considered for use after dark (TC-64A sign is required on each light barricade).



Flashing Beacon (Optional)

6. Drums

Drums are to be flexible and normally 200 liters capacity set on end and used as delineators. Drums shall be reflectorized to indicate the same color and shape by night as by day. The drums are to be predominantly orange, not fluorescent, but a minimum of two white reflectorized strips (100 mm width minimum) per drum is required.

Flexible drums may be used as an alternative method to channelize or delineate flow and shall be approximately 1000 mm in height and a minimum of 550 mm in diameter at the base. The markings on the flexible drums shall be horizontal, circumferential alternating black and reflectorized orange strips.



7. Delineator Posts

Delineator posts used to channelize or delineate traffic shall be 1100 mm in height and 100 mm in diameter. The markings consist of two white high intensity reflective bands 75 mm in width. Unit is weighed down with a standard 6.8kg (15lb) rubber base. +Extra 6.8kg (15lb) base inserts can be used when required by wind conditions.



FORM 708

8. Traffic Cones

The dimensions of traffic cones should be related to the maximum speed on the roadway and their height shall comply with the following minimum requirements.

MAXIMUM SPEED KM/H	MINIMUM HEIGHT (MM)
50 OR LESS	450
GREATER THAN 50	700



The use of traffic cones is only permitted during hours of daylight.

8. Stand Alone Arrow Board

For highways with a speed limit of 90 km/h or higher, detours and diversions that are anticipated to be in place 12 hours or greater shall have a flashing arrow light trailer unit located within each taper.

The arrow board shall be a minimum size, 1200 mm in width by 600 mm high, and shall be of a type and design as approved by the Engineer.

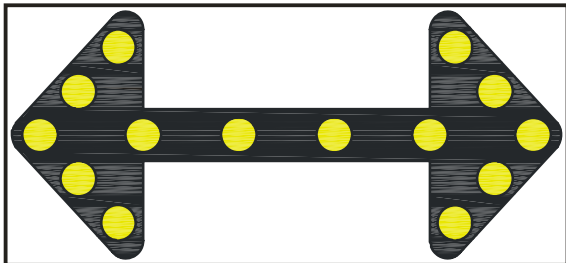


Diagram of a Stand Alone Flashing Arrow Board as used in Sign Layout Diagrams.

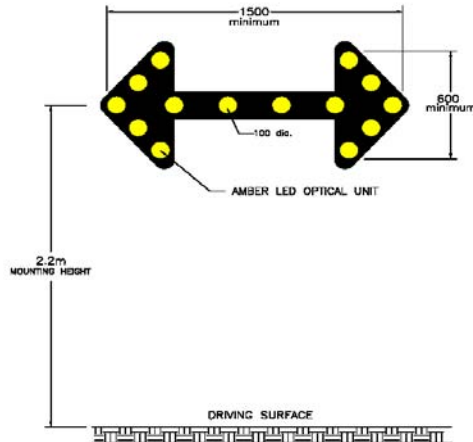
9. Control Vehicle

Control vehicles used during Very Short Term Work (low speed or low volume), Short Term Work (low speed or low volume), and Snow Cleanup Operations, shall be equipped with a vehicle mounted flashing arrow signal (see specifications below). In addition, the vehicle shall be equipped with a blue strobe light, standard four-way flashers and two bumper mounted signs, being 150mm high x 450mm long, with orange and black alternating and opposite stripes at 45°. The signs shall be reflectorized to indicate the same shape and color by day or night. Examples of the use of this vehicle can be found on pages 35 to 40 of the Department of Transportation & Works Traffic Control Manual.

Where the nature of the operations does not encroach on the travel lane or impede traffic flow, such as slow moving inspection of culverts or utility lines, etc., the control vehicle may be substituted by an alternate vehicle equipped with flashing lights and a roof mounted revolving appropriately coloured beacon. If this type of operation becomes stationary for periods exceeding 30 minutes and the parked distance from the travel lane does not exceed 0.6m, then the operation is no longer considered very short term work, and shall be signed as per Work Adjacent to Roadway diagrams on FORM 750-1.

10. Vehicle Mounted Flashing Arrow Signals for Control Vehicles

Flashing arrow signals shall have a minimum arrow head height of 600mm (760mm maximum) and a minimum length of 1500mm. See diagram below. These arrow signals shall consist of an array of a minimum of fourteen (14) AMBER high intensity LED lights, with each light being 100mm in diameter, providing a minimum legibility distance of 600m. The AMBER arrow signals shall be on a black background.



11. Vehicle Strobe Lights

Government maintenance vehicles are to be equipped with Blue Strobe Lights. All other vehicles, such as contractor vehicles, tow trucks, survey vehicles, etc. are to be equipped with Amber Strobe Lights.

12. Portable Traffic Lights

With the approval of the Department of Transportation and Works, portable lane control signals may be used to alternate traffic past a work area, in lieu of flag persons. The Department's Director of Maintenance shall be advised in each case of the intent to use this device, at least four weeks before application.

Portable signals shall be used only under conditions where the lights are clearly visible to an approaching motorist such that the vehicle can be brought to a safe stop. Intensity of the signal lamps shall be maintained in such a manner that the lights are clearly visible for a distance of at least 500 meters.

It is essential that these devices be removed immediately when conditions no longer require them.

Traffic light timings are calculated using the table shown in drawing 791-1. It is essential that traffic flow be monitored to determine if timing adjustments are required.

13. Variable Message Signs

Variable Message Signs are electronic signs that are used to convey additional information about upcoming road work. These signs shall be used only as a supplement to, but not a substitute for, conventional temporary condition signs and devices. Their use in the field shall be limited to installation either prior to, or within the advance warning area. The Highway Maintenance Division of the Department of Transportation and Works shall be contacted prior to the use of Variable Message Signs on provincially controlled highways or projects.

FORM 708

Variable Message Signs may display either a single fixed message or a number of sequential messages. When programmed to display sequential messages, each message will be referred to as a phase. Each phase shall be visible to approaching motorists for a minimum of three seconds, and shall be able to be read a least twice by the approaching motorist. If sequential messages exceed two phases, additional Variable Message Signs may be required. In this situation, the distance between Variable Message Signs shall be given careful consideration, based on the speed limit and the phase cycle, ensuring that the message(s) on each sign can be read twice by approaching motorists.

The following guidelines shall be used to determine the information to be displayed on Variable Message Signs:

- Messages shall consist of upper case text with a minimum letter height of 30cm.
- The messages shall be displayed in bright yellow or orange, providing a sharp contrast to the sign's black or dark blue/grey background colour.
- Each message shall convey a single, relevant and concise thought.
- Abbreviations shall only be used if they are easily understood.

Roadway construction or maintenance applications, where Variable Message Signs may be considered, include the following:

- On high speed, multi-lane roadways where significant delays, queuing or lane changes are anticipated;
- On high volume roadways where complex and frequently changing alignment or surface conditions exist;
- Approaching a construction or maintenance project where an alternate route may be available, but not apparent to approaching motorists.

14. Radar Display Speed Signs

Radar Display Speed Signs are electronic signs that are equipped with a radar unit that detects an approaching vehicle's speed, and displays the information back to the driver. These signs shall be used only as a supplement to, but not a substitute for, conventional temporary condition signs and devices. Their use in the field shall be limited to installation within the approach area, where speed control is essential. The Highway Maintenance Division of the Department of Transportation and Works shall be contacted prior to the use of Radar Display Speed Signs on provincially controlled highways or projects.

Radar Display Speed Signs shall only be used where speeding is an issue, and to achieve maximum effectiveness, their use should be supplemented with law enforcement from time to time. The numbers displayed on Radar Display Speed Signs shall be a minimum of 45cm high. If these signs are capable to display any supplementary message, then the minimum requirements for Variable Message Signs shall apply.

15. Miscellaneous

Other miscellaneous traffic control devices, such as flares, flashlights, floodlights, lanterns, etc., may be used, as required, to supplement the signs and other devices described in this section.

708.06 BASIS OF PAYMENT

All costs associated with temporary condition signing to standards as outlined in this Section shall be the responsibility of the Contractor. Cost of the signs, handling, installation, removal, asphalt reinstatement and / or repair, materials, and labour shall be paid by the Contractor and no payment shall be considered by the Department of Transportation and Works.