

SECTION 70

DELINEATION DEVICES

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708.01 APPLICATION

Temporary condition and delineation devices shall be used to channelize traffic when 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 and is not acceptable.***

Delineators including all construction markers, chevrons, barricades etc. shall be in reasonable condition to be effective for both day and night conditions. While delineation devices cannot always be in new condition, they shall always be in reasonable condition. Unacceptable conditions that warrant replacing shall be those which are: covered in asphalt splatter, dirt, dust or snow; have several large abrasions or tears; have deformation and dented considerably; have significant loss of lettering; lettering has been touched up or poorly modified; message is partly missing or illegible; have colour fading or loss of more than 20% of its reflectivity.

708.02 LOCATION OF DELINEATION DEVICES

Any construction activity on or within 1 metre 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 LENGTH
50 km/h or less	30 m
60 km/h	40 m
70 km/h	60 m
80 km/h	90 m
90 km/h	110 m
100 km/h	180 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:

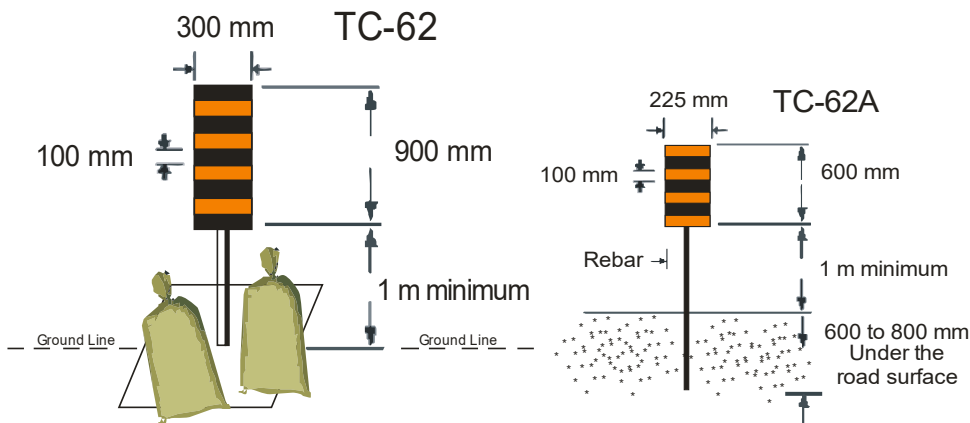
REGULATORY SPEED LIMIT	MINIMUM TANGENT BETWEEN TAPERS
50 km/h or less	50 m
60 to 70 km/h	100 m
80 km/h	150 m
90 km/h or greater	240 m

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 799-1 IN THE Traffic Control Manual for further details.

708.04 CONSTRUCTION MARKERS (TC-62 AND TC-62A)

Construction Markers shall be of the dimensions indicated. They shall be retro-reflectorized using high intensity grade orange reflective sheeting to indicate the same color and shape by night as by day.



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

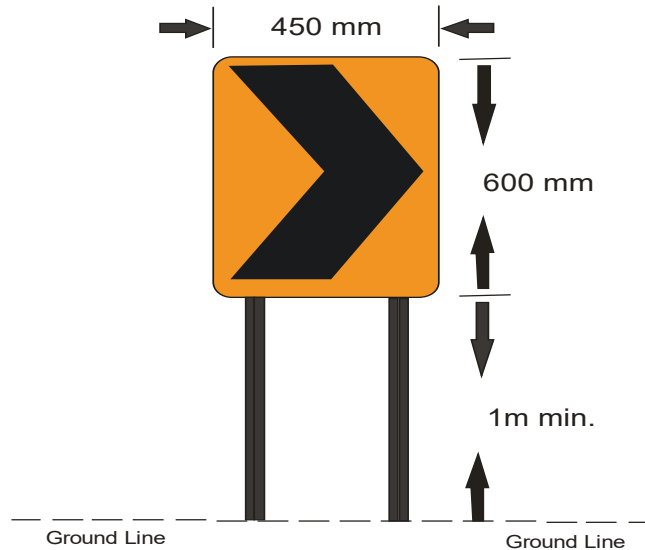
708.05 CHEVRON MARKERS (TC-31)

Chevron Markers shall be used on tapers for detours and diversions. They shall replace the normal construction marker at a spacing of every 30 m from the start of the taper. The arrow head 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 millimetre rebar to a height of 1 metre minimum above the traveled portion of the roadway to the bottom edge of the sign.



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.

708.06 BARRICADES

For reasons of traffic safety and for the protection of workers, barricades shall be used to define the work area where required by the traffic control layout and 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.

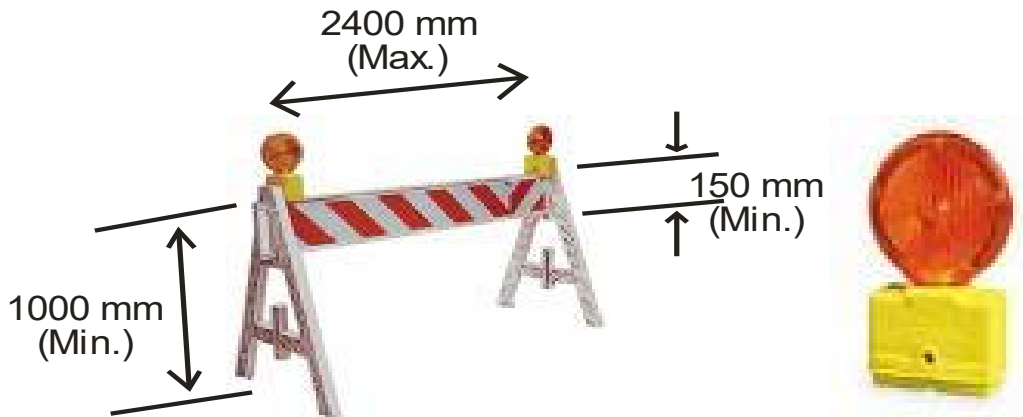
Barricades are always placed immediately preceding the work area on the approach side between the road user and the obstruction or activity.

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 Department.

708.06.01 LIGHT BARRICADE

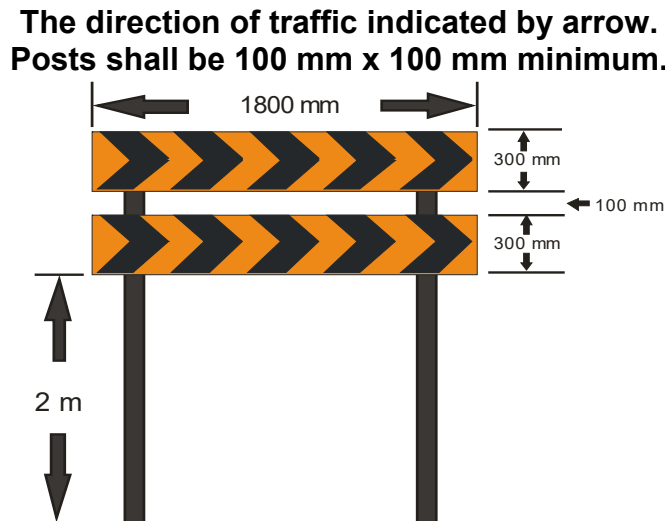
Light barricades shall be used for work of short duration to provide closure of a traffic lane or roadways or blocking road excavation sites or other work site hazards. Light barricades shall not be used as a channelizing device. The use of fluorescent paint on light barricades shall not be considered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



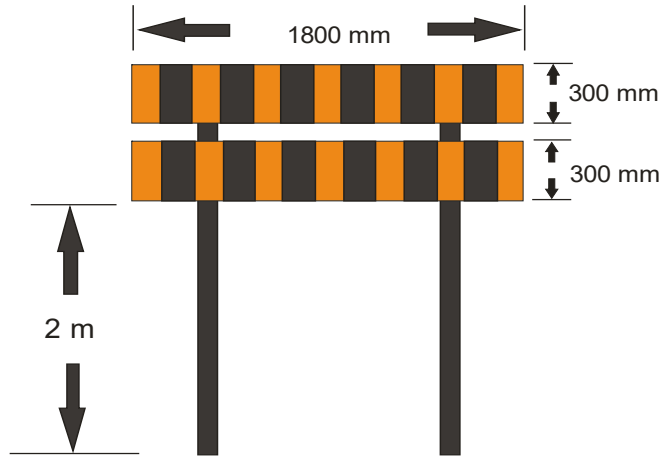
Flashing Beacon (Optional)

708.06.02 HEAVY BARRICADE

Heavy barricades shall be used to provide complete closure of a road or lane for an extended period of longer than 5 days. Their supports shall consist of posts set in the ground with two TC-64C heavy barricade faces attached as shown below:



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



Posts shall be 100 mm x 100 mm minimum.

708.07 TRAFFIC CONES

The required height of traffic cones is related to the normal maximum posted speed of the roadway and shall comply with the following minimum requirements.

Maximum Speed	Minimum Height
50 km/h or less	450 mm
Greater than 50 km/h	700 mm



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

708.08 DELINEATOR POSTS

Delineator posts used to channelize or delineate traffic shall be 1100 millimetres in height and 100 millimetres in diameter. The markings consist of two white high intensity reflective bands 75 millimetres in width. The unit is weighed down with a standard 6.8 kilogram rubber base. Additional 6.8kilogram base inserts may be required to prevent turning or toppling by wind conditions.



708.09 DRUMS

Drums are to be flexible and typically 200 liters in capacity. 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, with a minimum of two white reflectorized strips (100 millimetres width minimum) per drum.

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



708.10 BARRIERS

Barriers are devices designed to physically prevent road users from entering into the work zone area which may be occupied by workers, materials, equipment or hazards. Barriers provide the following primary functions:

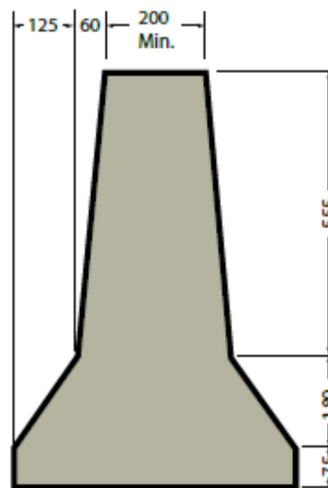
- Protect workers by preventing errant vehicles from entering the work zone.
- Protect errant drivers by redirecting them from a hazard.
- Provide separation for two-way traffic on one side of a normally divided roadway.

Barriers will typically be found installed in areas around excavations and scaffolding where the prevention of vehicles entering this area is of high importance.

In order to be effective, barriers must be properly installed otherwise they may pose a hazard instead of providing protection. Proper installation practices include:

- Securely fastening individual barrier devices together to form a continuous structure that acts as a single unit when impacted.
- Ensuring there are no gaps between each barrier device.
- Ensuring that the barrier is installed at a 4:1 taper on the approaches to minimize the probability of blunt end collisions.
- Any blunt ends exposed to traffic must be protected by an impact attenuator. The attenuation devices used must meet the requirements, based on the roadway speed limit, of the National Highway Research Program NCHRP 350 TL-3 for current inventory and MASH TL-3 for devices acquired after 2018.
- Maintaining at least a 0.5 metre offset between the Barrier and the adjacent travelled lane, where possible
- Installing appropriate retroreflective markings, such as construction markers or other devices meeting a minimum ASTM Type III, along the length of the barrier system.

There are many different types of Barrier devices available. The only Barrier device pre-approved for use on provincial roads is the F-shape concrete Barrier meeting the NCHRP 350 TL-3 standard. Other Barriers may be approved by the Department of Transportation and Infrastructure, provided the devices offer an equivalent level of protection.



Dimensions are in mm

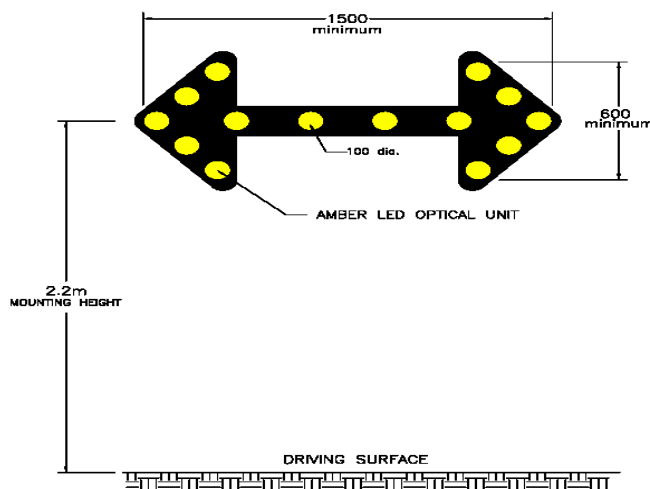
708.11 FLASHING ARROW BOARDS

Flashing Arrow Boards (FABs) are traffic Control Devices comprised of a group of lighting elements capable of displaying directional arrows (Arrow Mode) or a horizontal line (Caution Mode).

Arrow mode may be used on multilane roads to direct approaching traffic from a closed lane into the adjacent open lane. The caution mode may be used on both multilane and two lane roads when the location of work does not require any lane closures or when a Traffic Control Person is directing traffic. The left arrow shall never be used on a two lane road, as this may cause drivers to divert into the lane of oncoming traffic. No other displays, such as sequential arrows or ‘four corner’ warning lights, are permitted.

For highways with a speed limit equal or greater than 90 km/h, detours and diversions that are anticipated to be in place 12 hours or more shall have a standalone flashing arrow board unit located within each taper. The arrow board shall be of a type and design as approved by the Department.

Flashing arrow boards shall have an arrowhead height of 600 to 760 millimetres and a minimum length of 1200 to 1500 millimetres. These arrow boards shall consist of an array of a minimum of 14 AMBER lights, with each light being 100 millimetres in diameter, and provide a minimum legibility distance of 600 metres. The AMBER arrow signals shall be on a black background with all bulbs displaying the same yellow or amber colour and light intensity. The flashing arrow boards may be mounted on a vehicle or trailer and will achieve a height from the driving surface to the centreline of the Flashing arrow board of approximately 2.2 m



Flashing Arrow Boards shall be in reasonable condition to be effective for both day and night operation. While such devices cannot always be in new condition, they shall always be in reasonable condition. Unacceptable conditions that warrant replacing shall be those which operate: in Arrow Mode with 2 or more lamps out in the bar or any out in the arrow head; or have less than 5 bulbs operating in Caution Mode.

A 35 watt incandescent bulb is considered the standard element for flashing arrow boards. Alternate elements such as low wattage or halogen 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. Any flashing arrow board 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.

708.12 ATTENUATION DEVICES

Attenuation devices are energy absorbing devices that may be attached to a truck or in a trailer format which upon impact deform in a controlled manner. Attenuation Devices perform the following functions:

- Reduces the rate of deceleration of the errant striking vehicle thereby reducing the impact upon the attenuation device which also reduces the likelihood of injury to the occupants of the vehicle striking the attenuator.
- Reduces the rate of acceleration of the attenuator device, thereby protecting the attenuator operator if it is truck mounted, and protecting the workers in the work zone.

Attenuation devices, either truck mounted or trailer type, must meet the requirements of the National Highway Research Program NCHRP 350 TL-3 for current inventory. Any attenuator acquired after April 2016 must meet MASH TL-3 standards. (Manual for Assessing Safety Hardware which is administered by the American Association of State Highway and Transportation Officials, AASHTO).

Sign Layout Diagrams have been developed showing use of attenuation devices, however these devices may also be included in other layout diagrams and situations for added protection of workers in work zones. In general these devices shall be placed in advance of the work zone within the buffer area.

708.13 BUFFER VEHICLE

Buffer Vehicles, typically a truck with a truck mounted attenuator, are placed in advance of the work zone and used to block a travel lane to protect workers from errant vehicles.

In addition to the truck mounted attenuator a buffer vehicle shall have a flashing arrow board to provide warning and guidance to approaching vehicles.

The buffer vehicle used must meet the truck mounted attenuator manufacturer's requirement, such as overall vehicle mass, in order for the device to be effective. The truck mounted attenuator must be approved to meet the following requirements:

- If approved before 2018.01.01, it must meet the requirements of NCHRP 350 Level TL-3(100km/h impact speed).
- If approved on or after 2018.01.01 it must meet MASH TL-3 standards.

While in active use as a temporary traffic control device, a buffer vehicle:

- Must be fitted with a highback seat and a head rest for the operator.
- Must not be loaded with materials that would have a reasonable expectation of causing a fire or a chemical hazard, if the vehicle is struck.
- Must not carry passengers while actively providing protection.
- Must remain in constant radio contact with the operators of work and control vehicles.
- Must be positioned to protect the workers.
- Must display the correct flashing arrow board message.

Must have the wheels angled away from the open travel lane and workers.

When a buffer vehicle is used at a stationary location in advance of the work zone the additional requirements must be followed:

- Have the vehicle's brakes set.
- Be placed in 'park' or in a low gear.
- Be unoccupied while performing the blocking function.

708.14 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 board. In addition, the vehicle shall be equipped with a 360 degree beacon, standard four-way flashers and two bumper mounted signs, being 150 millimetres high x 450 millimetres 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 in the Traffic Control Manual on pages 80 to 85.

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 360 degree 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 0.6 metres, then the operation is no longer considered very short term work, and shall be signed as per the relevant Work Adjacent to Roadway diagrams.

708.15 PILOT VEHICLES

Pilot vehicles may be used in situations where traffic control is required over a considerable length of work zone and where it may otherwise be difficult to control traffic with traffic control persons or temporary traffic signals. The decision to use Pilot Vehicles to control traffic rests with the road authority having jurisdiction. The pilot vehicle may guide or lead a platoon of vehicles in one direction through the work zone where it would be complex to delineate and would be more efficient to pilot traffic. Pilot vehicles may also be used to control vehicle speeds in the work zone and to protect workers by preventing vehicles from entering a closed lane too soon (such as when milling asphalt or waiting for placed asphalt to cool.).

The following procedures shall be used when Pilot Vehicles are used:

1. Traffic Control Persons (TCP) shall regulate traffic at each end of the Pilot Vehicle controlled section. The operation of using Pilot Vehicles must include communication links with the other traffic controls at each end of the work zone, such as the TCPs.
2. The Pilot Vehicle shall move into leading position at the front of the stopped vehicle queue prior to release by the TCP.
3. When directed by the TCP, the Pilot Vehicle shall guide traffic through the Work Zone, travelling at a speed that would keep traffic together in a continuous flow till the end of the work zone.
4. At the end of the Work Zone, the Pilot Vehicle shall pull over at the first safe location to allow the queue of vehicles to pass.
5. When the last following vehicle has passed, the Pilot Vehicle shall then return to the end of the Work Zone to guide a queue of vehicle back to the original starting end of the work zone.

To maintain driver discipline and ensure delays are kept to a minimum, at least two Pilot Vehicles shall be used in this continuous operation. More Pilot Vehicles would be required

for a higher volume roadway with a long work zone. All Pilot Vehicles should be equipped with a 360-degree amber flashing light and a “Follow Me” sign mounted over a “Do Not Pass When Flashing” sign mounted in a conspicuous location on the rear of the Pilot Vehicle. Where significant queuing occurs or is expected to occur, or visibility at the end of the queue is not sufficient a “Prepare to Stop” Sign should be used upstream of the expected end of the queue.

The Traffic Control Persons should manage work vehicles that enter the work zone so that they are the last vehicle in the Pilot vehicle queue, to avoid other vehicles following the work vehicles in the Work Zone.

Where work zones extend over a long distance and pilot vehicles are in use for traffic control, intermediate signs should be placed at 0.5 kilometre intervals to restrict vehicles from passing. Sign RB-31 “Do Not Pass” with tab sign RB-31T are required to be installed.

708.16 VEHICLE STROBE LIGHTS

Government maintenance vehicles are to be equipped with Blue Strobe Lights and a 360-degree beacon. All other vehicles, such as contractor vehicles, tow trucks; survey vehicles, etc. are to be equipped with Amber Strobe Lights and a 360 degree beacon.

708.17 PORTABLE TRAFFIC LIGHTS

With the approval of the Department, portable traffic control signals may be used to alternate traffic past a work zone, in lieu of flagpersons. The Assistant Deputy Minister shall be advised in each case of the intent to use this device 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 metres.

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 of the Traffic Control Manual. It is essential that traffic flow be monitored regularly to determine if timing adjustments are required. Time of Day sequences may be required to handle traffic patterns which are not symmetric.

708.18 AUTOMATIC FLAGGER ASSISTANCE DEVICES (AFADS)

An Automated Flagger Assistance Device (AFAD) is an automated flagging machine that features a circular red lens, a circular yellow lens, and a gate arm. The device is considered an extension of the flagperson's arm and is used to stop/control the flow of traffic. This device is not considered as a portable traffic signal. The flagperson operates the AFAD using a remote control rather than a paddle to control traffic movement along the work zone, this allows the flagperson to be positioned outside the travel lane while still maintaining control of traffic. Two AFADs can be operated by a single TCP at one end of the work zone or at a central location, or multiple AFADs can be operated by multiple TCPs, each positioned near an AFAD. In general the AFADs are placed either at each end of the work zone area or when one unit is used, at one end of the work activity area with a TCP at the opposite end

The AFAD shall be comprised of the following:

- The AFAD shall have two 300 millimetre diameter signal lenses—i.e., a lens that displays solid red above a lens that displays flashing yellow. The flashing yellow lens shall also have solid yellow capability for change intervals.
- The AFAD shall have a conflict monitor that prevents simultaneous illumination of the red and yellow lenses on the same device.
- The AFAD shall have a gate arm with the following properties:
 - A fluorescent orange or red flag shall be installed at the end of the gate arm when the AFAD is in use.
 - The gate arm shall be at least 3.05 metres long, including the flag, and shall have a vertical aspect of at least 100 millimetres.
 - The gate arm shall lower and remain lowered on a red signal.
 - The gate arm shall rise to an upright position on a flashing yellow signal.
 - The gate arm shall have retroreflectivity on both sides with alternating fluorescent red and white bands. The bands shall be 200 millimetres long measured horizontally.
- A black-on-white STOP HERE ON RED or STOP HERE ON RED SIGNAL sign shall be installed on the right side of the approach at the point where drivers are expected to stop. This sign is typically provided with the AFAD, and may be installed on it.

The following guidelines must be considered when determining possible use of AFAD's within a work zone:

- AFADs may be used only on two-lane, two-way roadways and on multilane roadways that have been reduced to one lane.

- AFAD are suitable for low speed locations. High-speed roadways require a speed reduction.
- An AFAD is not a traffic control signal, and it cannot be used to replace or substitute for a continuously-operating temporary traffic control signal.
- An AFAD can be operated only by a TCP who has been trained to operate it.
- A TCP operating an AFAD shall not leave it unattended at any time while it is in use.
- The preferred operating procedure is to have a TCP controller for each AFAD. Assigning a TCP to each device becomes more critical on high-volume roadways and in more complex work zones where construction traffic may be entering and exiting frequently. For simpler, lower volume situations where there are good sight lines, a single TCP may control up to two AFADs:

Where AFAD's have been implemented on a work zone, the following conditions must be observed:

- For road users to **stop**, the AFAD shall display a **steadily-illuminated red lens** with the gate arm in the down position.
- For road users to **proceed**, the AFAD shall display a **flashing yellow lens** with the gate arm in the upright position.
- For the **change** interval between flashing yellow and steady red, the AFAD shall display a **steadily-illuminated yellow lens** with the gate arm remaining in the upright position. The change interval should be at least 3 seconds unless a different duration is approved by engineering judgment. There is no change interval between the steady red and flashing yellow displays.
- During operations with two flagpersons:
 - One flagperson shall operate each AFAD at either end of the work zone; or
 - One flagperson shall operate an AFAD at one end of the work activity area and the second flagperson controls traffic with a paddle at the other end.
- During operations with one flagperson:
 - The flagperson is positioned in a central location simultaneously operates two AFADs that are positioned at either end of the work zone; or
 - The flagperson operates a single AFAD that is positioned at one end of the work activity area while also controlling traffic with a paddle at the opposite end.
- During single operations with one flagperson, all of these conditions shall be met:
 - The flagperson has an unobstructed view of the AFAD(s).
 - The flagperson has unobstructed views of approaching traffic in both directions.
 - The average daily traffic volume on the roadway is 6,000 vehicles or less.

- The maximum distance between traffic control locations (TCP or AFAD) is 250 metres.
- A TCP shall not activate the flashing yellow display (proceed) until the last vehicle from the opposing queue has cleared the work activity area.

Refer to Layouts 792-1 through 792-4 in the Traffic Control Manual for application of AFAD's.

708.19 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.

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 at 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 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 project where an alternate route may be available, but not apparent to approaching motorists.

Variable Message Signs shall be in reasonable condition to be effective for both day and night operation. While such devices cannot always be in new condition, they shall always be in reasonable condition. Unacceptable conditions that warrant replacing shall be those which operate with less than 90% of the pixels in each character.

708.20 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.

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. Where approved for use a Radar Display Sign shall meet the following requirements:

- The numbers displayed on Radar Display Speed Signs shall be a minimum of 45 centimetres high.
- The threshold speed to activate the sign's display shall be set at a minimum of 5 km/h over the posted speed.
- A maximum threshold speed to activate the sign's display shall be set to prevent drivers from try to test how fast they can go.
- If the sign is capable to display any supplementary message, then the minimum requirements for Variable Message Signs shall apply.
- The only approved message for display shall be "SLOW DOWN".
- Signs shall be installed in the Approach Area adjacent to posted speed limit signs, where present as part of the typical advance warning signage, or in a similar location when reduced speed limit signage is not required.

708.21 TEMPORARY CONDITIONS PAVEMENT MARKINGS

Temporary Conditions Pavement Markings are used in combination with other appropriate warning signs, delineation devices and traffic control devices to mark the intended vehicle path traffic is expected to follow through the work zone.

Instances where temporary pavement marking may be used are on a paved diversion to bypass a work site, such as a new bridge construction, or where partial pavement removal or incomplete replacement has occurred in a multiple asphalt overlay process.

Where temporary condition pavement markings are used they shall be placed as soon after an original lane marking has been removed to restore the guidance which was in place prior to the construction operations. In the case of temporary diversions, lane markings shall be placed prior to opening of the diversion.

Whenever temporary condition pavement markings are applied, any conflicting pavement markings shall be removed or obscured to eliminate any possible confusion. Paint grinders and black sealing compounds can be used but must be approved for the removal operation based on existing lane marking conditions.

Typical temporary pavement markings consist of temporary marking tape, raised pavement markers and standard traffic paint with glass beads. Yellow markings shall be used where two-way traffic occurs and to delineate opposing traffic. White markings shall be used for shoulder edge lines or multiple lanes where traffic flows in the same direction, such as on divided highways.

Short term lane markings may be smaller in size and with a less frequency of spacing. More temporary markings shall be used in areas of curves than on straight sections to highlight road curvature. Temporary markings for long term applications shall follow usual line painting practices governed by national standards.

708.22 TEMPORARY RUMBLE STRIPS

Temporary rumble strips are portable rubber devices placed across a roadway perpendicular to the direction of traffic flow. The primary use of temporary rumble strips is their effectiveness in alerting drivers, through noise and vibration, to other traffic control devices and upcoming circumstances such as lane changes, detours, or other hazardous conditions. These devices may also provide a secondary benefit in providing a small reduction in roadway speeds in the direct vicinity of the rumble strip installation.

When determining if use of temporary rumble strips is applicable, the following key factors must be considered:

- A sign warning drivers of the rumble strips should be placed in advance of the rumble strip installation.

- Temporary rumble strips should not be placed on roadways used by bicyclists unless a minimum clear path of 4 feet is provided at each edge of the roadway or on each paved shoulder.
- Temporary rumble strips should not be placed within intersections, through pedestrian crossings, or on sharp horizontal or vertical curves.
- Temporary rumble strips are not recommended for quickly moving mobile road work.
- Potential to cause erratic or avoidance manoeuvres by drivers.
- Potential rough ride or hazard for motorcyclists.
- Potential for movement of rumble strips due to inadequate installation.
- Noise complaints by nearby residents.
- Can result in increased breaking and reduced speeds
- Temporary rumble strips are primarily practical for low speeds only because they are easily dislodged by high speed traffic.
- Even strips with very shallow depths or heights may affect control of motorcycles and bicycles, especially in night situations where these users cannot see them in advance.

Refer to Layouts 740-1 through 740-4 in the Traffic Control Manual for general information of the placement of temporary rumble strips.

708.23 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.

708.24 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.