



# Temporary Traffic Control Manual

Revised April 2004



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# INTRODUCTION

## 1.0 Preamble

This manual was developed by the City of Regina Engineering and Works Department - Traffic Engineering and Operations. Contractors, government agencies, or city crews doing work on City streets must follow the minimum standards contained herein. They are provided for the purpose of protecting workers and all road users from the inherent dangers of the work zone. It will also aid contractors and suppliers when estimating costs for traffic accommodation. Where there may be a conflict between these regulations and the *Occupational Health and Safety Act*, the Act shall apply.

The standard plans detailed in this manual provide **minimum** standards based on a work area and the street classification. In more complex situations, these plans will form the basis of more specific, detailed design plans for traffic accommodation and if necessary, the standards may need to be exceeded.

Failure to meet these standards is considered to be a liability risk. Private companies doing private work are subject to fines contained in Traffic Bylaw 9900. City work crews or private companies performing work for the City or other utility company will be subject to a stop work order.

## 1.1 Definitions

**Advance Signing** – means all signs used to give advance notice to motorists of an activity or road obstruction ahead. This type of signing does not require an immediate reaction from the motorist.

**Buffer Space** – means the open and unoccupied area between the transition area and work areas. It provides a margin of safety for both motorist and workers.

**Channelization** – means a system of traffic control devices commonly used in construction or maintenance areas on the road right-of-way to define the traveled way.

**Closure** – means any portion of the public-right-of-way unavailable for normal use.

**Contractor** – means any City of Regina construction or maintenance crew, work crew or construction company hired by a Utility company, private construction or maintenance company, Utility Corporation, or Provincial Department works crew.

**Delineator** – means all types of reflector units capable of reflecting light from the headlights of a vehicle for the purpose of guiding a motorist through a work zone.

**Director** – means the Director of Engineering and Works Department and anyone authorized to act on behalf of the Director of the Engineering and Works Department.

**Downtown** – means the area of the City bounded by Thirteenth Avenue to the south, Albert Street to the west, Saskatchewan Drive to the north and Osler Street to the east, including the sidewalks and boulevard on both sides of those streets.

**Emergency** – means a situation requiring repairs to infrastructure as a result of power outage, water leakage, sewer blockage, cave in, or pavement failure. The degree of emergency is relative to the seriousness of the danger to the public or loss of service.

**Inspector** – means an employee of the Engineering and Works Department, whose responsibility is to ensure work on the street is carried out as specified by the Engineering and Works Department.

**Peak Hour** – means the time between 7 A.M. and 8:30 A.M., and 4 P.M. and 6 P.M.

**Regulatory Sign** – means a sign imposing legal obligations and/or restrictions on all traffic.

**Restriction** – means the driving lane(s) in a particular direction, the parking lane, and/or sidewalk is reduced from normal useable traffic width but not closed to the point where another street must be used.

**Street Closure** – means all driving lanes of a street in a particular direction are closed to traffic.

**Termination Area** – means the area used to provide the necessary distance for traffic to clear the work zone and return to normal traffic operations.

**Transition Area** – means the area that traffic is channeled from the normal alignment to the path required to move traffic past the work area. The transition area contains the tapers that are used to effectively close the lane(s).

**Warning Area** – means the area used to alert motorists of an altered situation prior to reaching it.

**Work Area** – means that portion of the roadway closed to traffic and set aside for exclusive space for workers, equipment and materials.

**Work Zone** – means the section of roadway between the first warning sign and the point beyond the work area where traffic is no longer affected. Work zones are divided into five areas, Advance Warning Area, Transition Area, Buffer Area, Work Area, and Termination Area.

## 1.2 Authority

The Director of Engineering and Works is authorized to set regulations for traffic control devices for the purpose of controlling, warning, guiding, informing and directing traffic. Any work that occurs on private property where the activity encroaches on street right-of-way is also regulated and approved by the Traffic Engineering. The authority is granted in the Regina Traffic Bylaw.

## 1.3 Disclaimer

The information presented in this publication is intended to direct those people responsible for providing traffic accommodation in work zones. Measures included in this manual represent the minimum requirements may have to be supplemented or modified where necessary to ensure that each particular work zone is safe. The uniformity established throughout all roadway work zone projects will greatly improve driver recognition, understanding, interpretation and ultimately safety.

## 1.4 Compliance

Compliance with the standards contained in this manual is mandatory. Contractors must inspect the work zone regularly to ensure compliance with the standards. Contractors must be aware of the consequences for not meeting the standards. Failure to comply with the standards may result in any or all of the following:

- Increased liability;
- Issuance of a cease work area;
- Deficiencies repairs by others and the cost charged to the Contractor; and
- Occupational Health and Safety contacted for contravention of the OH and S Act.



# **SELECTING A TRAFFIC PLAN**

## **2.0 Work Areas and Street Classifications**

Before a traffic accommodation plan is selected, the area required to do the work safely must be determined. The street classification is used in selecting the appropriate traffic accommodation plan. The most recent edition of the official City Tourist Map illustrates all street classifications. Busier arterial streets or expressways will require higher levels of traffic accommodation than quieter local streets.

The traffic accommodation plans contained in this Manual are based on the knowledge of the work area and street classification. Appropriate traffic accommodation cannot be determined without this information. Requirements for the three main street classifications follow in Section 2.1 to 2.3.

### **2.1 Expressways, Arterials, and Streets in Downtown**

Traffic Engineering must be notified of any work on these streets a minimum of 14 days in advance, except in an emergency. Special attention will be given to those Arterial streets that are bus routes. Traffic Engineering will prepare or approve traffic accommodation drawings for work on all arterial streets. The contractor will notify all affected residents and merchants of the closure if the closure is longer than four hours with a detailed notice approved by Traffic Engineering. For closures longer than one day, the general public must be notified by newspaper advertisement or public service announcement. Traffic Engineering will prepare the advertisement.

Traffic Control Devices must be set up and maintained according to drawings and specifications provided and approved by Traffic Engineering.

Often, it may be required that work occurs on a specific day of the week (Sunday) or period of the day (evening or early morning) to minimize the effect on traffic. When possible, two-way traffic set-ups are preferred over detouring traffic to another street. Also, if only one lane is available, it is preferred that it be utilized and only one direction of travel be detoured.

### **2.2 Collector Streets and Alleys in Downtown**

Traffic Engineering must be notified of any work on these streets a minimum of 7 days in advance, except in an emergency. Special attention will be given to those Collector streets that are bus routes. The contractor will notify all residents, merchants, and the general public of closures longer than one day. The Contractor will inform local residents and/or merchants with a detailed notice approved by Traffic Engineering.

Traffic Engineering will prepare or approve drawings and specifications for closures longer than one day. The drawings must adhere to standards set in this Manual.

### **2.3 Local Streets and Alleys Outside Downtown**

The Contractor may close or restrict a local street during the day without notifying Traffic Engineering as long as any affected residents or businesses are notified two days in advance. For closures required overnight, Traffic Engineering must be notified two days in advance to ensure any necessary additional safety precautions are undertaken. Access to businesses must be maintained at all times. This access may be via alternatives like alleys, adjacent streets, or private property. Private property should be considered only after the Contractor obtains all the necessary approvals from the property owner. The Contractor is responsible for the supply and installation of traffic control devices to comply with this Manual.

# STANDARD PROCEDURES

## 3.0 General

The procedures detailed herein apply to all Utility Corporations, Private Contractors, Provincial Agencies, and City Departments working within the street right-of-way.

Work during peak hour traffic periods (7:00 A.M. to 9:00 A.M. and 4:00 P.M. to 6:00 P.M.) should be always be avoided where possible. For example, tree watering should always take place between 9:00 A.M. and 11:30 A.M. or 1:30 P.M. and 4:00 P.M. The noon hour (11:30 A.M. to 1:30 P.M.) should also be avoided where possible, although not as critical.

### 3.1 Five Components of a Work Zone

All work zones will consist of five distinct areas each playing a specific role. They are commonly referred to as:

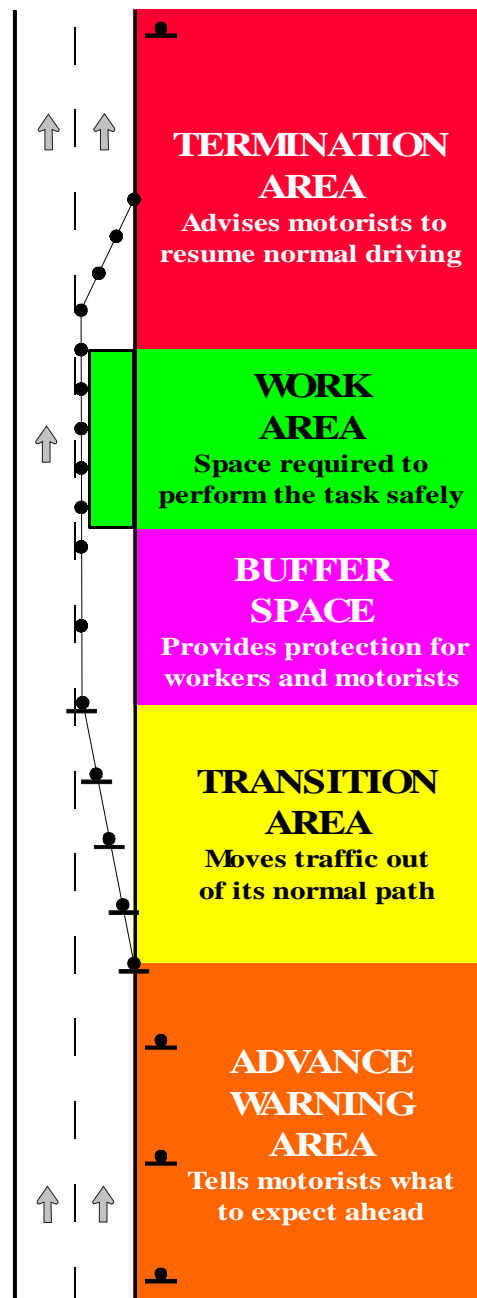
- Advance Warning Area to tell motorists what to expect ahead;
- Transition Area to move traffic out of its normal path;
- Buffer Space to provide protection for workers and motorists;
- Work Area to provide space to perform the task safely;
- Termination Area to advise motorists to resume normal driving.

An illustration of these areas is best described with the figure to the right.

### 3.2 Traffic Tapers and Longitudinal Buffers

One of the most important elements of temporary traffic control is the traffic taper. A traffic taper gradually diverts traffic to an adjacent lane and thereby taking a lane out of service or deflecting traffic into a lane normally used for parking. Traffic tapers usually consist of chevron signs or barrels placed in a line that gradually forces motorists to change lanes into the adjacent lane. An inadequate taper will almost always produce undesirable results like lengthy traffic backups and unsafe conditions that may result in an accident. Therefore, it is very important to provide adequate tapers based on the speed limit.

The longitudinal buffer, unlike the taper consists of delineators instead of chevron signs or barrels and placed along the lane lines. Together with the taper, the overall length makes up what is often referred to as the “stopping sight distance”.



The lengths were derived so that:

$$\textit{Taper Length} + \textit{Longitudinal Buffer Length} = \textit{Stopping Sight Distance}$$

Required spacing between signs, number of devices in taper length, number of devices in longitudinal buffer length are shown in the following table:

**Guidelines for Traffic Tapers and Longitudinal Buffers**

<b>Speed Limit (Km)</b>	<b>Taper Length (m)</b>	<b># Devices in Taper</b>	<b>Longitudinal Buffer Space (m)</b>
50	30	5	15
60	40	5	20
70	60	7	30
80	80	9	40
90	110	12	55
100	130	14	65

Situations may be encountered where the recommended values for taper lengths and buffer space cannot be achieved within the available space. Private access and closely spaced intersections may force taper lengths to be compromised on occasion. However, taper lengths should only be compromised as a last resort and with the approval of Traffic Engineering.

### **3.3 Emergencies**

Where an emergency situation arises, traffic control and public communication should not be compromised. Minimum standards must be achieved as soon as possible. The Regina Police Service will determine if an emergency exists and if police officers are required to control traffic.

### **3.4 Pedestrian Considerations**

In situations where work is taking place on a sidewalk, steps must be taken to ensure the safety of pedestrians. All pedestrian facilities are important particularly in the downtown area or near schools. The following considerations shall occur to the satisfaction of Traffic Engineering when pedestrian traffic is affected:

- When work is taking place adjacent to a sidewalk, precautions must be taken to ensure that there is no danger to pedestrians from above. This may include the need for hoarding or scaffolding;
- When a sidewalk must be closed, it should be closed and properly signed at the nearest intersection. This allows pedestrians to use the sidewalk on the opposite side of the road rather than allowing pedestrians through to the work site.
- When a sidewalk must be closed and it is not possible to direct pedestrians to the other sidewalk, a proper closure of the adjacent curb lane may be used to provide pedestrians with a temporary sidewalk. A minimum width of 1.2 metres is required.
- Work near schools may require additional accommodations determined by Engineering and Works.

### **3.5 Traffic Signals**

Whenever construction work takes place in close proximity to a signalized intersection, the Contractor must notify the Traffic Engineering so that any necessary changes in the signal timing is made. Close communication shall continue until the signals are back to operating as they did before the timing or operational adjustments were made.

### 3.6 Speed Limits

Orange speed limit signs are legally enforceable and the installation and maintenance of these signs requires special attention. Traffic Engineering has the authority to set construction zone speed limits but only City Council has the authority to set permanent speed limits, commonly known as white regulatory signs. Reduced speed limits in construction zones must be approved by Traffic Engineering prior to setting up the traffic accommodation. The Traffic Bylaw specifies posted speed limits shall not exceed 60 % of the normal speed limit as follows:

Posted Speed Limit (km/h)	100	80	70	60	50
Typical Work Zone Speed Limit (km/h)	60	50	45	40	30

The sign should be covered or removed when the street is no longer considered a work zone.

### 3.7 Traffic Control Persons (TCP's)

If traffic congestion warrants or if the Project Coordinator on the job determines it necessary, the Contractor shall provide a Traffic Control Person (TCP). TCP's are required:

- When workers or equipment intermittently block a traffic lane and there is only one remaining lane for both directions of travel to use;
- When a higher level of safety deemed necessary.

TCP's must be selected with care. They must possess current certification issued by the Saskatchewan Safety Council and should be alert, neat in appearance, have good hearing and eyesight, and be capable of directing traffic. They should be stationed far enough from the work area to slow down or stop traffic before they enter the work area. All pre-warning signs shall be placed well in advance of the TCP as practicable.

All TCP's shall wear the proper safety equipment at all times when directing traffic. Safety vests, hard hats and steel toe work boots are required at all job sites. TCP's will comply with all Saskatchewan Safety Council requirements regarding flagging operations.

# SIGNS

## 4.0 Sign Types

Signs are an integral part of an effective traffic accommodation plan. They should be used to provide advance warning and guidance through the construction area. It is also the duty of the contractor to maintain or cover existing signs to suit conditions.

Signs are necessary whenever a motorist is required to change the path of travel or there is a need to warn motorists of construction activity beside the roadway. It is important that signs give clear and concise instructions. Traffic signs are classified into the following categories:

- Regulatory;
- Warning;
- Guide.

**Regulatory** signs indicate a traffic regulation that applies at a specific time or place on the road. These signs are essential to indicate the applicability of legal requirements that may not otherwise be apparent to the driver. All road users must abide by them and unlike warning and guide signs, they are enforceable. Existing regulatory signs within or adjacent to the work area must be retained by the contractor. If existing signs are not appropriate for the traffic conditions in the work area, the city Traffic Engineering must be notified to determine if the signs should be covered, replaced or relocated.

**Warning** signs shall be placed in advance of the work zone to permit the motorist time to assimilate the information and make the required response. Where a series of advance warning signs are used, the warning signs nearest the work site should be placed well in advance to give motorist time to react to the particular situation. Minimum dimensions shall be maintained using the following table as a guide:

**Minimum Dimensions for Warning Signs Within a Work Zone**

<b>Posted Speed Limit</b>	<b>Size of Sign In Advance Area</b>	<b>Size of Sign In Work Zone</b>
100 km/h	1200 x 1200 mm	900 x 900 mm
70 km/h – 99 km/h	900 x 900 mm	750 x 750 mm
30 km/h – 69 km/h	750 x 750 mm	750 x 750 mm

**Guide** signs in work zones are used to indicate a suggested route for traffic to follow. Where work zone activities require a total closure of the road, the detour route shall include appropriate signs placed before all turns and on any straight portions along the route longer than two city blocks to confirm the correct detour route.

The most effective system of **regulating, warning, and guiding** in work zones is provided through planned use of traffic control signs and devices that are placed properly and well maintained. All traffic control signs shall meet the minimum requirements in the *Manual on Uniform Traffic Control Devices for Canada*.

## 4.1 Detour Information Signs

Detour Information Signs will be required for work on arterial streets. Detour Information Signs are necessary for controlling, warning or guiding traffic through or around a work area. Signs shall be mounted approximately at right angles to and facing the flow of traffic, contain as few words as possible and deliver a clear and concise message.

Signs are normally placed prior to an arterial street so that motorists use arterial streets rather than the local or collector street detour provided to bypass the work zone. Detour Information Signs stating a

construction project will start soon shall follow the examples shown on drawing T 110. Detour Information Signs stating a particular street is closed or restricted shall follow the examples shown above and on drawing T 112.

## **4.2 Regulatory Parking Signs and Parking Meters**

On construction projects where it is necessary to utilize the curb lane, the Contractor shall eliminate parking with appropriate signs or orange parking meter bags installed 24 hours before the restriction is required.

If construction work necessitates the removal of a parking meter or requires a parking meter to be taken out of service, the Contractor must request Traffic Engineering to remove or reserve the parking meter. All costs for labour, material, or lease of the metered parking space will be the responsibility of the contractor.

## **4.3 Sign Placement**

Signs are generally placed within the work area to warn, regulate or guide anyone past a roadway construction or maintenance operation. Signs shall be installed before work is to commence and removed promptly to accommodate rush hour traffic whenever possible. The following considerations shall be used when deciding on sign placement:

- Traffic lanes may be narrowed to a minimum of 3.0 metres in width;
- A buffer of at least 3.0 metres shall be provided beside any excavation greater than 1.0 metres in depth;
- Traffic may be shifted onto part of a shoulder, providing that portion is can be used by any vehicle without any pavement failure;
- Two-way traffic operations are always preferred over detouring traffic to another route;
- Traffic may be detoured, providing that the detour route is not already affected by another construction or maintenance project.

When work is carried out at night or under adverse weather conditions, certain signs may require supplementary flashing or steady lights for added visibility. On streets separated by a median wider than one metre, all signs shall be doubled by the provision of a second sign on the median or divider.

## **4.4 Sign Mounting Height**

Signs shall be placed at an angle of 90 degrees to the direction of oncoming traffic and be a minimum of 1.0 to 2.5 metres above the paved surface. Advance warning signs shall be located on the right hand side of traffic lanes and on the centre line where there is sufficient space to accommodate doubling the signs.

## **4.5 Sign Reflectivity**

All traffic control signs shall be reflectorised. Sign faces or supports shall not bear any advertising, company name, or logo. The colour of the sign shall remain the same when viewed by day or night. Lettering and background shall be according to the guidelines set in the *Manual of Uniform Traffic Devices for Canada*. Starting January 1, 2006, only 3M Diamond Grade Fluorescent Sheeting for Work Zones or 3M High Intensity Grade Sheeting for Work Zones or proven equivalents will be permitted on all warning and regulatory signs for work zones. Engineer Grade Sheeting will be permitted only on detour information signs. The type of reflective material to be used on various signs is indicated on Drawings T-100, T-110, T-112, T-120, and T-130.

## **4.6 Sign Maintenance**

Sign maintenance plays an important role in traffic safety. All signs should be kept clean, legible, and in proper position at all times. Damaged signs should be repaired as soon as possible. Well-maintained signs

have more credibility as traffic control devices. Damaged, defaced or dirty signs are less effective, discredit the City and may increase exposure to litigation.

To ensure adequate maintenance, a suitable schedule for inspection, cleaning and replacement of signs should be established, including inspection at night to determine the effectiveness of sign reflectivity. Special care should be taken to remove weeds, construction materials, or snow obscuring the sign face.

Signs should also be covered or removed when the condition they are warning about does not exist. Unnecessary signs create frustration and, in the long run, motorists lose respect for all traffic signs. If this occurs, poses a risk to both work crews and road users. If contractors always ensure the signs in work zones are current and accurate, however, these signs will achieve the desired effect of warning, guiding and regulating traffic.

# OTHER DEVICES

## 5.0 Barricades

Barricades serve the following purposes:

- To alert the that a particular area is closed to traffic;
- To prevent drivers, bicyclists, and pedestrians from entering the area;
- To protect the workers, equipment, and anyone else in the work area;

Barricades shall not be placed in a driving lane or bicycle lane without advance warning signs. When barricades are used to close a street, they should be placed so there is no gap large enough for a vehicle to pass through, except when it is necessary to provide access for local traffic or emergency vehicles. Barricades are especially valuable for outlining the construction area on the street. When used in this way, the barricades help prevent traffic from driving into the construction areas. Barricades shall have reflective sheeting, be freshly painted, and kept clean at all times. Barricades should not be used to channelize traffic.

Markings for barricade panels shall be reflective material with alternate orange and white stripes. Typically, the entire area of the rails shall be reflectorized using a minimum of 3M High Intensity or proven equivalent sheeting. No barricade rail face shall bear any commercial or company name.

A single barricade is not enough to close a street and, above all, the barricade should not be expected to replace a sign, light, delineator, or a flag person. The larger barricades command more respect and effectively support signs providing motorists the direction needed at the point of street closure.

**Type 1 Barricade** – is an device with a top hinge and at least one reflective panel per side. This type of barricade is particularly convenient for folding, stacking, and transporting from one site to the next. They can be used on local or collector streets where traffic is maintained through the area. Type 1 Barricades shall be used on local street closures, although for combined works of long duration, the larger Type 2 barricades are recommended. They are acceptable on arterial and collector streets during emergencies where a high degree of mobility is desired.

**Type 2 Barricade** – is a larger device than the Type 1 barricade with reflective panels on one side. They are less mobile in nature and shall be used in the larger construction projects where they are required to function in one location for a relatively long period of time. Type 2 barricades shall be used on all arterial street closures requiring a detour.

Refer to Drawing T-150 for illustrations of standard barricades.

## 5.1 Delineator Posts and Cones

Delineator posts are markers which help the road user to determine the location and alignment of the traffic lane or edge line. By day, the effectiveness of the delineator is determined by position, spacing, form, texture, size and color. By night, the effectiveness is determined by position and visibility. All delineator posts used at night must be equipped with a minimum 100 mm band of high intensity reflective sheeting.

Delineator posts are used to:

- Channel and divert traffic in advance of work zone;
- Define the travel way through the work zone;
- Define a change in the position of the existing lanes around the work zone;
- Define a curve or edge of the roadway.

Delineator posts shall consist of a material that will withstand impact without appreciable damage to the device, the vehicle, or passing traffic. Weighted bases should be used to stabilize all delineators against



knockdowns or high winds. Because these devices are highly portable, they must be inspected regularly to ensure they have not been knocked down, blown away, or unlawfully removed.

Traffic cones and tubular markers of various configurations are available and considered good delineation devices. Cones range in size from 600 mm to 900 mm high. The City of Regina does not allow the use of cones less than 600 mm high anywhere on the public right-of-way. For visibility purposes, all cones must have a 150 mm reflective collar placed approximately 100 mm from the top of the cone.

## 5.2 Pavement Markings

Under certain circumstances, the use of pavement striping and raised pavement markers may be justified to supplement devices for delineation. On major construction projects where traffic is diverted for extended periods, pavement striping or markers are required to delineate traffic and minimize confusion.

Typical applications include two-way traffic situations on busy arterial streets where proper delineation is essential. All pavement markings must be approved by the Director of Engineering and Works. All newly paved surfaces shall be completely marked or pre-marked before being opened to traffic.

## 5.3 Variable Message Boards

Variable Message Signs (VMB) may be used to communicate accurate, timely, and pertinent information to motorists. Using these signs, messages can be displayed to convey specific information about existing conditions and helps motorists avoid hazards or delays by responding to changing roadway conditions. The following should be considered when using VMB:

### **VMB may be used:**

- On Arterials or Expressways;
- In alignment or surface condition changes;
- When there are significant delays;
- During construction, maintenance, or special event activities.

### **VMB Messages should:**

- Be legible from all lanes at a minimum of 200 metres;
- Be readable twice while travelling at the posted speed limit;
- Not scroll the text horizontally or vertically;
- Not contain both the words left and right;
- Use standardized abbreviations;
- Be accurate and timely.

### **VMB placement should:**

- Always be placed on same side of roadway when two are used and spaced at least 300 metres apart;
- Take the reflection of sun into account;
- Should be removed when not in use.

## 5.4 Flashing Light Boards

Flashing light boards shall be utilized on arterial streets to alert drivers of a lane closure and the requirement to merge with the adjacent lane in advance of the work site and should have the capability of following basic mode selections:

- **Flashing Arrow** – recommended for full closures with the option of directing traffic in any direction;
- **Sequential Flashing Arrow** – recommended for full closures where a change of direction is required and/or a specific direction is desired;
- **Sequential Flashing Chevron** – recommended for partial closures or restrictions where traffic is required to change lanes, but not direction of travel;
- **Caution** – recommended for closures of the curb lane where work may intermittently present a hazard to motorists in adjacent driving lanes.

Refer to Drawing T-140 for illustrations of standard operating modes.

## 5.5 Traffic Barrels

Traffic Barrels are an effective device used to delineate an unusual vehicle path made necessary by the construction activity. Barrels are highly visible and have excellent target value. They give the appearance of a more formidable obstacle than delineator posts or cones and therefore command a higher level of respect from motorists, yet minimal damage to the vehicle will result in the event of a collision.

Barrels shall contain sand, water or other substances only to the extent specified by the manufacturer. Overfilling a barrel can be hazardous and should be avoided.

Refer to Drawing T-160 for an illustration of standard traffic barrels used by the City.

## 5.6 Metal Plates

Pavement cuts on arterial streets should, wherever possible, be plated to accommodate rush hour traffic or when work is discontinued for the day. They are useful to accommodate traffic while concrete cures and surface repairs cannot be done immediately.

Steel plates shall be used to avoid closing a street or too many traffic lanes of a street and be of sufficient strength to support traffic. Plating shall also be provided to maintain street access to private businesses when needed.

## 5.7 Concrete Barriers

Portable concrete barriers are primarily intended to protect construction workers from errant vehicles. The City of Regina has several Jersey Barriers readily available to city crews or contractors for use on city construction projects. The Jersey Barrier is designed to minimize vehicle damage by allowing the vehicle tires to ride up on the lower sloped face. Jersey Barriers can be joined together to form a continuous longitudinal barrier on high speed roadways. They are regularly used to protect workers on bridge rehabilitation projects and when excavations exceed 1.0 metre in depth. End sections directly exposed to oncoming traffic should be supplemented with proper end pieces deflect vehicles away from the work area and minimize damage to the vehicle.