Equipment Lighting and Visibility Requirements

Purpose

- To help ensure that adequate warning of work vehicles and equipment is provided to motorists, pedestrians and workers, in and adjacent to construction and maintenance work zones.
- To ensure high visibility lighting is adequate and consistent for all vehicles engaged in work activities for the City of Winnipeg's Public Works Department.

Scope

All vehicles and powered mobile equipment must be equipped with a consistent level of High Visibility Lighting(HVL) to ensure they are visible to motorists, pedestrians and workers. The risk level of equipment/vehicles determines the level of equipment lighting/visibility required. These risk levels are based upon work location and type, travel and working speeds, environmental conditions and applicable regulatory requirements, including but not limited to, the Highway Traffic Act.

This document is designed to assist with the purchase and placement of High Visibility Lighting and establishes the minimum specifications of High Visibility Lighting necessary to operate vehicles/equipment for or with the City of Winnipeg's Public Works Department, with the intent that all applicable Regulations are met or exceeded.

Hazard Categories and explanations for the different classes of equipment are included in the following pages, along with some practical examples. There are many different pieces of equipment that are not listed due to the variety of equipment involved, however, reference to general equipment types/classes are included to assist in ensuring that the equipment engaged is highly visible and meets the minimum requirements described in this document. Four Hazard categories are described in this document, with Level 1 having the highest risk to Level 4 having the lowest risk.

High Visibility Lighting is critical for the visibility of the equipment on the road and in work areas. With recent technological advances, the preferred High Visibility Lighting(HVL) for today's vehicles is becoming LED lighting, however other types will also meet these minimum HVL requirements. These LED lights can be extremely bright with a typically lower current draw on the vehicles electrical system, and can be more dependable and durable.

Be reminded that this document identifies minimum High Visibility Lighting(HVL) requirements, and vehicles/equipment can be equipped with additional High Visibility Lighting if a user wishes, providing the additional level of lighting does not create a hazard to motorists, pedestrians and workers, in and adjacent to construction and maintenance work zones.

With the exception of mobile machinery, valid permits for displaying beacons may be required to be in the vehicle at all times (see Appendices for additional information)..

All City of Winnipeg or contractor supplied equipment and vehicles must meet the minimum High Visibility Lighting requirements identified.

Hazard Categories

Minimum visibility requirements and risk levels are as follows:

Level 1 – Highest Risk

- Equipment that falls under Level 1 includes, but is not limited to, units that operate against the flow of traffic, or which work on the roadway centerline such as:
  - Pavement Marking Truck
  - Water Truck (Figure 1.0)
  - Road Patcher

- Equipment Visibility **Must** include the following:
  - 360° visibility amber beacon/strobe light or equivalent
  - Approved flashing or sequential arrow traffic control device(Figure 1.2)
  - 4-way hazard lights
  - Retro-reflective striping

Figure 1.0



Figure 1.1



Figure 1.0 and 1.1: Tanker equipped with 4 beacons, retro-reflective striping and combined directional lighting/caution signage.

Figure 1.2



Figure 1.3

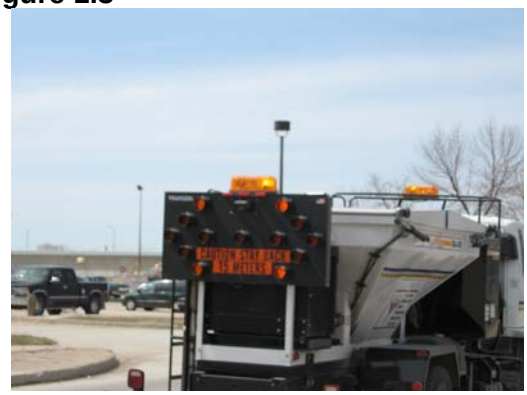


Figure 1.2 and 1.3: Roadpatcher with directional lighting and informational sign (note front and rear mounted beacon lights)

Hazard Categories (continued)

Level 2

- Equipment that falls under Level 2 includes, but is not limited to, equipment that may work during periods of low visibility such as:
  - Sander
  - Truck Plow (greater than 1 ton)
  - Motor Grader
  - Tow Truck

- Equipment Visibility **Must** include:
  - 360° visibility amber beacon/strobe light or equivalent
  - 4-way hazard lights
  - Two strobe lights for the rear-facing warning lights
  - Retroreflective striping

- Additional lighting/signing is required on units being used for specific tasks, such as pilot vehicles, and shadow/buffer vehicles, etc (Appendix I). All equipment/vehicles used for snowplowing operations will be equipped with two strobe lights for the rear-facing warning lights for increased visibility(Appendix III)

Figure 2.0



NOTE - Blue beacons or strobes can **only** be used during Winter snow removal operations and must be removed or de-energized when the vehicle is not being used in snow removal operations (Figure 2.1 and 2.2)

NOTE - Vehicles typically traveling at a speed less than 40 kilometers per hour **must** be equipped with a slow moving vehicle sign indicating that it is a slow moving vehicle in compliance with the Highway Traffic Act. (See Appendix I)

Figure 2.0: Articulating Loader with roof mounted dual function, amber/blue LED beacon.

Figure 2.1



Figure 2.2



Figure 2.1 and 2.2: Motor Grader with roof mounted dual rotating halogen beacons, slow moving vehicle sign, and caution signage.

Hazard Categories (continued)

Level 3

- Equipment that falls under Level 3 includes, but is not limited to, equipment and passenger vehicles that may be used to enter construction or work zones, examples are:
  - Cars, Vans (excludes those used solely for administrative purposes)
  - Foreman's Trucks (Figure 3.0 and 3.1)
  - Out-front Lawnmowers
  - Skid Steer Loaders
  - Cement Trucks
- Equipment Visibility **Must** include
  - 360° visibility amber beacon light or equivalent
  - 4-way hazard lights


Figure 3.0


Figure 3.1


Figure 3.2



Figure 3.3

Smaller beacons (Figure 3.3) **or equivalent** such as a 360° LED strobe light may be used on the smaller units (i.e. All terrain vehicles, skid steers or out front mowers, etc)

NOTE - Vehicles typically traveling at a speed less than 40 kilometers per hour **must** be equipped with a slow moving vehicle sign(Figure 3.3) indicating that it is a slow moving vehicle in compliance with the Highway Traffic Act. (See Appendix I)

Hazard Categories (continued)

Level 4

- Equipment that falls under Level 4 includes, but is not limited to, units that are not self-propelled (trailers and equipment) and are normally working in a signed or flagged work zone and are attached to other units equipped with beacons, these may include
    - Caboose (work trailer)
    - Compressor
    - Tar Kettle

- Equipment Visibility **Must** include
    - Retro-reflective striping visible on all sides including the trailer tongue

- Towed units that obstruct the towing vehicles tail lights **must** be equipped with tail lights/signal lights as per the Highway Traffic Act. Directional Lighting may be added (Figure 4.2).
- Trailers and attachments not designed to be towed over 40 kilometers per hour **MUST** display a slow moving vehicle sign (Figure 4.3). Especially important when the attachment obscures the towing equipment's slow moving vehicle sign (Appendix I).


Figure 4.0


Figure 4.1


Figure 4.2


Figure 4.3

Lighting/Mounting Locations and Standards

Daytime Running Lights

All vehicles with a Risk Level of 1 to 3 must maintain daytime running lights that comply with the *Motor Vehicle Safety Act* (Canada). (See Appendix I)

Beacons

Mounted in such a way that 360° visibility is achieved. If this is not possible with one beacon, additional beacons must be added to achieve 360° visibility. If this is not possible with a beacon alone then supplemental lighting must be used. This supplemental lighting may include additional beacons and/or strobes until 360° visibility is effectively achieved (See Appendix II)

- Protective cages enclosing the beacons are recommended but not required, provided they do not impede the efficiency of the beacon or alter the structural integrity of the vehicle

Minimum Requirement for Beacons/Strobes

- For all new installations lighting equipment must meet or exceed **SAE J845 Class 2(2007)**

Or

- Previously installed equipment lighting must meet or exceed **SAE J1318 Class 2**

An LED beacon or equivalent is recommended for all new installations(LED recommended due to the dependability and high visibility). They must be able to either rotate, oscillate, pulsate, flash or light intermittently. They must be clearly distinguishable by an approaching motorist at a distance of at least 500 metres (0.5 km) on a bright sunny day.

Reflective Striping (Conspicuity Tape)

Mounted on all sides of the vehicle that faces the flow of traffic and where the vehicle width is 2032mm (80 in.) or wider AND GVWR 4536 kg (10,000 lb.) or more (See Appendix II). All trailers must have retro-reflective tape on all sides.

Requirements of Flashing or Sequential Arrow Traffic Control Devices

The Manual of Temporary Traffic Control (MTTC, 2011 edition) references traffic control devices, see Vehicle Mounted Flashing or Sequential Arrow Traffic Control Device for correct use of Directional lighting. A copy of the MTTC can purchased for a nominal fee at Public Works Customer Service, front desk at 1155 Pacific Avenue Winnipeg, MB. or a copy can be printed from the following link: http://winnipeg.ca/publicworks/InformationAndResources/TrafficControl/manual_of_temp_traffic_control.asp

Special Mobile Machines

A special mobile machine or other vehicle owned or operated by the government or a municipality and being used in snow removal operations shall be equipped with one or more lamps. (Appendix I) Vehicles, up to and including 1 ton trucks, used in snow clearing operations will not be required to be equipped with rear facing strobe lights. These vehicles do require 360° HVL. **Light fleet vehicles (up to 1 tons) engaged in truck plowing in parking lots and Park roadways must not display Blue Beacons.**

Compliance Schedule

All City of Winnipeg vehicles and equipment as well as equipment supplied by organizations under contract with the City of Winnipeg's Public Works Department must meet the Equipment Lighting/Visibility requirements as outlined in this document.

Cement Mixers are new additions and have a compliance date of: October 1, 2012

Appendix I – Excerpts from The Highway Traffic Act

MINIMUM LIGHTING EQUIPMENT REQUIRED

Lighting equipment of vehicles

35(1) Except as otherwise provided in this Act, every vehicle shall, at all times while it is upon a highway, be equipped with lamps and other equipment in good working order as in this section provided, namely:

(n) Every motor vehicle manufactured on or after December 1, 1989, other than a motorcycle or moped, shall carry daytime running lights that comply with the standards prescribed for such lights by the regulations made under the *Motor Vehicle Safety Act* (Canada), and any motor vehicle manufactured before that date, other than a motorcycle or moped, may carry daytime running lights that comply with the standards approved for such lights by the Canadian Standards Association.

Lamps on repair and escort motor vehicles (Figure A1)

35(15) Notwithstanding subsection 38(1), a motor vehicle that is used

(a) by a repairer or a person engaged in the business of towing vehicles, or in connection with the repair or removal of damaged or disabled vehicles; or

(b) to escort oversized vehicles or loads as required by a permit issued therefore under the regulations;

shall be equipped with at least one lamp on its top that is capable of emitting an amber or a yellow light and that has a flashing or oscillating beam clearly visible under normal atmospheric conditions, when illuminated, from all directions for a distance of 150 metres, and, where the motor vehicle is being operated on a highway at a speed in excess of 80 kilometres an hour, clearly visible under normal atmospheric conditions, when illuminated, from all directions for a distance of one kilometre.

Figure A1



Directional Arrows and beacon/strobe for increased visibility, used as a blocking/shadowing vehicle

Appendix I – Excerpts from The Highway Traffic Act (continued)

Lamps on special mobile vehicles (Figure A2)

35(16) A special mobile machine or other vehicle owned or operated by the government or a municipality and being used in snow removal operations shall be equipped with one or more lamps

(a) which, if there is only one, shall show a blue or amber light; and

(b) some of which, if there are two or more, shall show a blue light and some of which shall show an amber light;

and the lamps, in either case, shall have a flashing or oscillating beam and shall be of such size, candle power, and design as may be approved by the traffic board.

Figure A2



Motor Grader with Dual Rotating Strobe lights, where blue is active **only** during Winter snow removal

Lamps on special government or municipal vehicles

35(17) A special mobile machine or other vehicle owned or operated by the government or a municipality and being used in the maintenance or construction of roads or the collection of refuse may be equipped with a lamp or lamps which show an amber light, and the lamp or lamps shall have a flashing or oscillating beam and shall be of such size, candle power, and design as may be approved by the traffic board.

Special permits

37(6) A motor vehicle may be equipped with lighting equipment prohibited under subsection 38(1) if the owner thereof has, upon written application, obtained from the registrar a permit for the purpose specifying the lighting equipment authorized thereby, and stating the conditions, if any, under which it may be used; but the registrar may issue the permit only if, in his absolute discretion, he is satisfied

(a) that the circumstances in which the lighting equipment applied for is required are of such a special and unusual character that it is not in the public interest to refuse to issue the permit; and

(b) that the owner of the vehicle will use the lighting equipment, or cause it to be used, with due regard to the public safety

Appendix I – Excerpts from The Highway Traffic Act (continued)

Prohibited lamps

38(1) Except as otherwise provided in this Act, the regulations or the *Motor Vehicle Safety Act* (Canada), or when authorized by permit under subsection 37(6) or (7), a motor vehicle on a highway shall not be equipped with

(a) more than five lamps of over four candle power (of which not more than four are headlamps) on the front of, or visible from in front of, the vehicle; or

(b) any search light or any lamp other than a stationary lamp; or

(c) any lamp

(i) that casts a light of a colour other than white, or

(ii) that lights intermittently or in flashes; or

(d) any lamp casting a light of over four mean spherical candle power unless it is so constructed, arranged, and adjusted, that no portion of the parallel beams of reflected light, when measured 25 metres or more ahead of the lamp, rises above 1.07 metres from the level surface on which the vehicle stands, as those heights are determined while the vehicle is fully loaded.

Lighting Equipment on Certain Vehicles

Certain utility vehicles

38.1(7) A vehicle owned by Manitoba Hydro, The Manitoba Telephone System or The City of Winnipeg that is equipped or designed for overhead wire construction or repair work may be equipped with one or more amber lamps that rotate, oscillate, pulsate, flash or light intermittently.

NOTE- The Highway Traffic Act prohibits any flashing, strobing or rotating lights on a motor vehicle other than signal lights. As such, beacons are prohibited on all motor vehicles in any color with the exception of specialty vehicles. As such, there is an allowance for the registrar to issue permits for having these kinds of lights. Permits can be obtained from Vehicle Standards and Inspection of MPI.

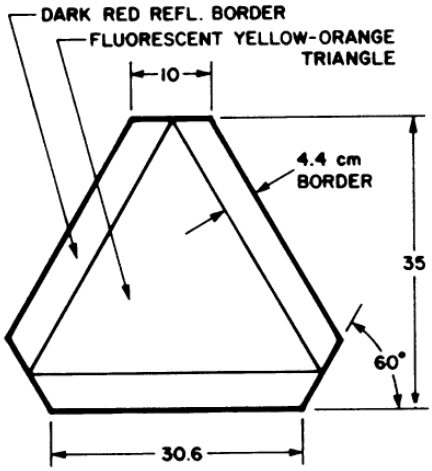
A permit for beacons must be carried in the vehicle at all times. An permit application is found on page 14 of this document.

City of Winnipeg vehicles are not required to carry a permit for beacons but must comply with the standards outlined in this document.

Appendix I – Excerpts from The Highway Traffic Act (continued)

Warning device on slow vehicles

178(1) Subject to subsection (2), no person shall drive or operate on a highway any vehicle travelling at a speed less than 40 kilometers per hour unless there is displayed on the back thereof a reflectorized warning device of a type approved by the traffic board indicating that it is a slow moving vehicle, or the vehicle is permitted to be equipped with, and is equipped with, a lamp that emits an amber light and that lights intermittently or flashes, and the lamp is in operation and the light there from is visible from the rear.





NOTE – Slow Moving Vehicle signs significantly increase rearward equipment visibility and also help to ensure that equipment remains operational during daylight hours in the event that a beacon or other HVL fails. Slow moving vehicles working for/with the City of Winnipeg's Public Works Department are to be equipped with both HVL and slow moving vehicle signs.

Appendix II

Conspicuity Tape - To be used when the vehicle width is 2032mm (80 in.) or wider AND GVWR 4536 kg (10,000 lb.) or more ***(See Figure A and B)***



Figure A



Figure B

Motor Vehicle Safety Regulations
Conspicuity Systems - Section S5.7 of TSD 108

(21) Notwithstanding section S5.7 of TSD (Technical Standards Document) 108, the color of retro reflective sheeting applied to a vehicle pursuant to paragraphs S5.7.1.4.1(a) and S5.7.1.4.2 of TSD 108 may be white, yellow, white and yellow or white and red, in accordance with the paragraph S5.7.1.2 of TSD 108 or paragraphs 3.1.3, 3.1.2 and 3.1.1 of **SAE Standard J578.** ***(See Table 1 and Figures C to H)***

Table 1

Width 2032mm (80 in.) or wider AND GVWR 4536 kg (10,000 lb.) or more

DESCRIPTION		MANDATORY REQUIREMENTS					
Area	Conspicuity Treatment	DOT Coding	Quantity	Color	Location	Height	Options
9	Rear Upper Body Markings		Exactly 2 pairs of 300mm long strips	White	On the rear upper corners facing rearward	At the top	Reflex reflectors may not be required if they are replaced in their required location with conspicuity treatment. **Optional in Canada:** Rear lower body and side conspicuity treatment may also be solid white, solid yellow, or white and yellow.
10	Bumper Bar Marking	DOT-C DOT-C2 DOT-C3 DOT-C4	Continuous	Red/White	On the rear bumper bar's horizontal element full width - facing rearward	No requirement	
11	Rear Lower Body Marking		Continuous	Red/White *(see options)*	On the rear full width of the vehicle facing rearward	As horizontal as practicable and as close as practicable to the range of 375 to 1525mm from the ground	
12	Side Marking		(see location)	Red/White *(see options)*	Each side - facing sideward continuous, or evenly spaced over minimum of 50% of length starts and ends as close to the front and rear of the vehicle as practicable	As horizontal as practicable and as close as practicable to the range of 375 to 1525mm from the ground	

NOTE: The edge of red conspicuity tape shall not be closer than 75 mm to the edge of any amber lamp and the edge of white conspicuity tape shall not be closer than 75 mm to the edge of any lamp

Appendix II (continued)

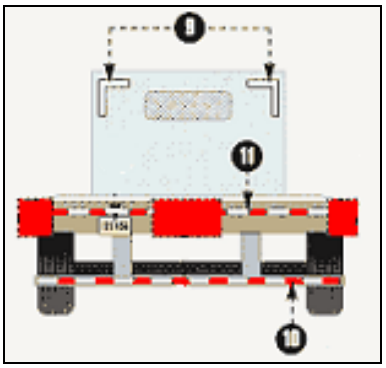


Figure C

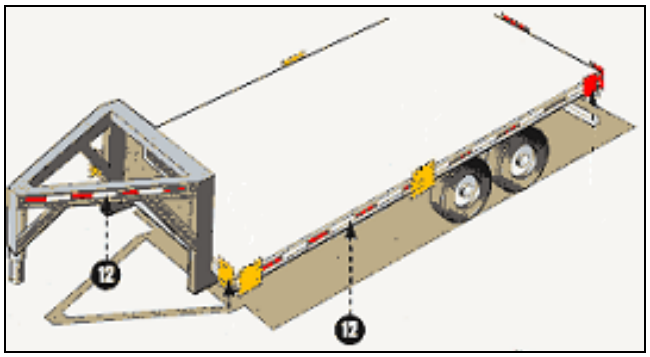


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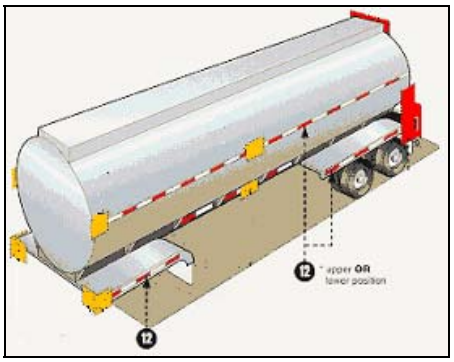


Figure E

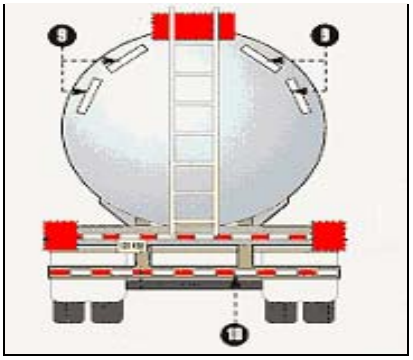


Figure F

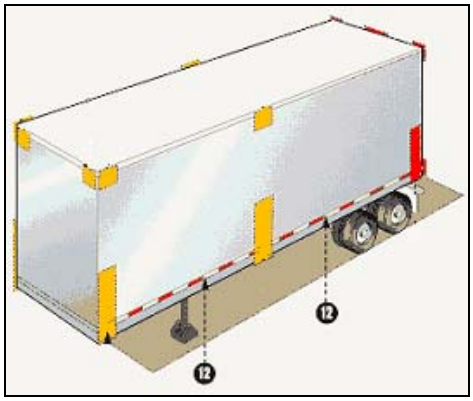


Figure G

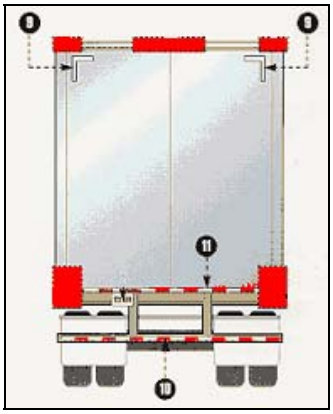


Figure H

Appendix III-Rear Facing Strobes

Strobe lights facing rear

Figure A3-1



Beacon centered on lip of box with protective cage (recommended), providing 360° visibility in combination with strobe lights amber and blue on rear of vehicle (blue - snow removal operations only)

Figure A3-2



Double beacons mounted on lip of box with protective cage (recommended), providing 360° visibility (blue - snow removal operations only) – blue lens and/or beacon to be de-energized for all non snow removal operations

Figure A3



Amber Strobe light at top, with brake/signal/backup light array in side configuration

Figure A3-4



APPLICATION FOR A PERMIT FOR LIGHTING

EQUIPMENT PROHIBITED UNDER SECTION 38(1) OF

THE HIGHWAY TRAFFIC ACT

Name: _____ **Address:** _____

City/Town: _____ **Phone Number:** _____ **Postal Code:** _____

Serial Number: _____ **Licence Plate Number:** _____

Vehicle Make: _____ **Vehicle Model:** _____ **Year:** _____

Application is hereby made for permission to equip the above vehicle with (please check all that apply):

1. **FLASHING AMBER** ( )
2. **FLASHING PURPLE (Funeral vehicles only)** ( )
3. **OTHER (Please specify colour and type)** ( ) _____

State the reasons the additional lighting equipment is needed: (Please give full details)

_____

_____

_____

_____

_____

If permission is granted the additional lighting equipment will be used with due regard to public safety at all times.

_____ _____/_____

DATE **NAME OF APPLICANT (printed)** **SIGNATURE OF APPLICANT**

For Department Use Only:
Conditions of Issue:

Forward to:

Manitoba Public Insurance
Vehicle Standards and Inspections
Box 6300
1981 Plessis Road, Bldg "B"
Winnipeg MB R3C 4A4
FAX - (204) 954-5319