

## Arges Training & Consulting (ATC)

### A Practical User's Guide to the Changes to the January 23, 2014 MTO Final OTM Book 7 Version 2 Office Edition **Revised in accordance with July 2016 MTO Errata Document** **(ATC Website Revised Posting Part 1, July 22, 2016)**

#### 1. General

The purpose of this ATC Website Posting Part 1 is to provide a Practical User's Guide to the changes in the MTO Final 2014 OTM Book 7 (Version 2), dated January, 2014, **as revised after MTO's issuance of the July, 2016, Errata Document for Book 7.** It is a companion piece to the ATC Website **Revised** Posting Part 2, which provides more detailed comments on the 2014 Book 7, **also revised to reflect the MTO Errata Document.** (Note: we are disappointed that the MTO Errata Document, while it addressed some of the items we identified in the original of this document, left many of the more important issues unaddressed/uncorrected.)

Much of the material in the 2014 Book 7 is the same as in the 2001 Book 7, with the following significant changes:

- There has been a major reorganization of the Book 7 material.
- All typical layouts (TLs) have been redrawn, and some new ones have been added, including typical layouts for work in roundabouts.
- Most signs and devices are depicted on pages xii to xviii at the beginning of Book 7, but this is not referenced in the Table of Contents. The TC-12 Flashing Arrow Board is shown at the end rather than in its normal numerical sequence.
- Some typical layouts have been deleted in the 2014 Book 7: lane encroachment on freeways (TLs 13 and 15), and median crossovers (TLs 34A & 34B).
- The typical layouts for the set-up and removal of freeway lane closures have been taken out of the typical layout sections (formerly TL-77A to TL-82D) and converted to Figures 3 to 8.
- A new section (Appendix A1) on Unplanned Events has been added.
- The position of the Traffic Control Person has been changed (more below).
- Requirements are more demanding where the normal posted regulatory speed is 70 km/h or higher.
- Material on traffic control devices is now split into three major sections, Section 3 (Description of devices) and Sections 5 and 6 (Specifications for Devices). It is confusing, and not user-friendly, to separate the brief description of these devices/measures in Section 3 from the description of their operation in Sections 5 and 6. If this confusing arrangement is to be retained, the corresponding section on usage in Sections 5 and 6 should at least be referenced at the end of each section in Section 3.
- Table G (formerly Table F), the Decision Matrix for the Typical Layouts, has been reorganized and simplified. The TL titles in Table G do not always match the titles on the TLs themselves, however.
- In the typical layouts, the option has been removed of using a TC-12 (Flashing Arrow Board, or FAB) to replace the TC-3 (Lane Closed Ahead) and the TC-4 (Lane Closure Arrow) for a lane closure in short duration operations. Now on most typical layouts the

TC-3 and TC-4 must always be used, and the TC-12 must be added at normal posted regulatory speeds (NPRS) of 70 km/h or higher.

## 2. User's Guide to Changes in the 2014 Book 7

- 2.1 Section 2.6.2 (Pedestrian Safety Considerations), p. 29, and Section 2.6.3 (Cyclist Safety Considerations), p. 31, have been expanded. Although stated as "should" rather than "must" conditions, the requirements have been significantly expanded.
- 2.2 Section 3.2.2.1, p. 49: Terminology has been changed from 'Remote Control Device' (RCD) to 'Automated Flagger Assistance Device' (AFAD).
- 2.3 Section 3.2.5 (Paid Duty Police Officers), p. 52, has been added.
- 2.4 Section 4 (Implementation of Temporary Traffic Control), p. 63, corresponds in large part to Section 2 (Procedures) in the 2001 Book 7. Distinction is drawn between the Traffic Protection Plan (TPP) and the Traffic Control Plan. Figure 2 (Conditions that Affect Traffic Control Requirements), p. 67, is a form which contains many of the elements that would be in a TPP, but is not a TPP, as some important elements are missing, such as identification of the hazards and measures to be taken to address them. It would have been more helpful to include a TPP template, which users could adapt as appropriate.
- 2.5 **Procedures for Lane Closure Set-up and Removal on Freeways (Sections 4.2.1 and 4.2.2)**

Figures 3 to 8, p. 73-86, showing the procedures for set-up and removal of freeway lane closures, correspond largely to the TLs 77-82 in the 2001 Book 7, but there are some changes.

Figure 3 is essentially the same as TLs 77A-77C in the 2001 Book 7, except that a fourth sub-figure has been added. **The MTO Errata Document in the last two bullet points of Section 4.2.1.1, changes the references to 'BV' (Buffer Vehicle) to 'CT' (Crash Truck).**

Figure 4 is essentially the same as TLs 78A-78D in the 2001 Book 7. In the 2001 Book 7, it was felt that a crash truck within the closed lane, beyond the lane closure tapers, should have the flashing arrow board (FAB) in bar mode. Experience has shown that it is better to have the FAB in left flashing arrow mode (for right lane closures), in that it is more effective in keeping drivers out of the closed lane. This is now reflected in Figure 4 Step D (= TL-78D), and this is an improvement. However, for consistency, it should also have been shown in arrow mode in Figure 3 Step 4.

Figure 5 is essentially the same as TLs 79A-79D in the 2001 Book 7. As for Figure 4, the final Figure 5 Step E (= TL-79E) shows the FAB on the lead crash truck #2 in right flashing arrow mode. This is an improvement over TL 79E, which showed it in bar mode. Figure 5 corrects an error in TL-79E in the 2001 Book 7, which shows crash truck #1 positioned at the end of the first taper (at MTO's insistence). This would not be consistent with the guidelines for buffer vehicles in Section 5.5.3 (p. 117), which states that "A BV should not be placed at the end of the taper." This has been corrected, but

there is still an error in Figure 5, Steps D and E. There is no TC-12 at the end of the first taper. The FAB at the end of the first taper should be trailer-mounted and in arrow mode, and the FAB on the crash truck at an LBA distance downstream from the end of the taper should be in bar mode.

Figure 6 is essentially the same as TLs 80A-80C in the 2001 Book 7. As for Figure 4, Figure 6 Steps A and B (= TL-80A and TL-80B) show the FAB on the crash truck in left flashing arrow mode. This is an improvement over TL-80A and TL-80B, which showed it in bar mode. **The MTO Errata Document makes the following change: P. 81, Section 4.2.2.1, Removing the Taper (Figure 6, Step B), the MTO Errata Document replaces "...upstream end of the lane closure taper..." with "...downstream end of the lane closure taper..."** This corrects an error in the original text.

Figure 7 is essentially the same as TLs 81A-81D in the 2001 Book 7. As for Figure 4, Figure 7 Steps A and C (= TL-81A and TL-81C) show the FAB on the crash truck in left flashing arrow mode. This is an improvement over TL-81A and TL-81C, which showed it in bar mode. **P. 83, Section 4.2.2.2, Removing the Second Lane Taper (Figure 7, Step B), the MTO Errata Document replaces "...upstream end of the centre lane closure taper..." with "...downstream end of the centre lane closure taper..."** This corrects an error in the original text.

Figure 8 is essentially the same as TLs 82A-82D in the 2001 Book 7. As for Figure 4, Figure 8 Steps A and C (= TL-82A and TL-82C) show the FAB on the crash truck in left flashing arrow mode. This is an improvement over TL-82A and TL-82C, which showed it in bar mode.

## 2.6 Use of Traffic Control Persons (TCPs) (Sections 3.2.1 and 5.2)

Most of the information on the use of TCPs in the 2014 Book 7 is essentially the same as the information in the 2001 Book 7 and in the CSAO/IHSAO *Handbook for Construction Traffic Control Persons*. The 2001 Book 7 Table 6 (Deployment of TCPs) has been deleted in the 2014 Book 7, but the information in the table has been summarized in the box on page 48.

However, there are some important differences, primarily relating to the TCP position in the work zone:

Both versions of Book 7 had a TCP Table (Table 7 in the 2001 Book 7, Table 2 in the 2014 Book 7). However, the two TCP Tables are not the same. In 2001, the TCP table specified the TCP distance from the work area (which was also the taper length for the work zone), varying from 10 m to 50 m, depending on traffic volume and normal posted regulatory speed (NPRS). In 2014, the TCP table specifies the TCP distance from the first cone of the transition taper. So the TCP distance from the work area is now the specified taper length (from Table A or Table B) for the given NPRS, plus the specified value from the TCP table. The TCP distance from the work area will be similar for low NPRSs for both versions of Book 7. For high NPRSs and particularly for Long Duration, the TCP distance from the work area will now be much longer, up to a maximum of 190 m (rather than 50 m).

P. 98, Section 5.2.2, TCP Position and Location, the MTO Errata Document replaces the fifth bullet with “stand from 5 to 30 m in advance of the first cone of the transition taper in the direction of the closed lane (or 5 to 30 m in advance of the last cone of the termination taper of the closed lane in the opposite direction), so as to be able to protect workers and equipment (see Table 2 Traffic Control Person placement (TCP Table)). For situations where there is no taper (e.g., TL-48), the TCP distance should be considered from the work area.”

P. 99, Section 5.2.2: The MTO Errata Document notes that the existing 2014 text states that “The dimension for the distance of the position of TCP from the work area for open lanes (the dimension provided on top right of each of the three types of roadway sections, i.e., straight road, curve, and hill in Figure 10 Positioning of Traffic Control Persons reads ‘5-30 m + Taper See TCP Table’”. The MTO Errata Document provides clarifying text that “The taper in open lanes within the above dimension will be considered as the termination taper, the length of which is considered as half of the taper length of the full lane closure (1a\*) according to Tables A and B. The position of the TCP for an open lane should be consistent with TL-20A.” This brings the requirement into somewhat closer compliance with IHSA’s “Handbook for Construction Traffic Control Persons.” Also, on p. 100, in Table 2, to be consistent with the changes made above, the heading of the third row of the first column is replaced by “Distance of TCP from First Cone of Transition Taper (or from Last Cone of Termination Taper for Opposing Direction.”

This change has also led to some inconsistencies:

- (1) On Figure 10 (p. 99) Positioning of TCPs on Hills or Curves, TCP 3, controlling the open lane, is shown at a distance from the work area of 5-30 m (from the new TCP Table) plus the taper. But there is no taper for this lane. This may result in the TCP being too close to the work area. **This has been corrected in the MTO Errata Document, see above note for p. 99.**
- (2) On TL-46 and TL-50, these TLs have not been modified to match the new defined TCP position, but still show the TCP position based on the old TCP Table, not the new one. **These have been corrected in the MTO Errata Document.**

## 2.7 Use of Paid Duty Police Officers (Sections 3.2.5 and 5.4)

The 2014 Book 7 contains guidelines for the use of paid duty police officers (PDPOs). Important guidelines include:

- Before work begins, clarify roles and responsibilities (the PDPOs are your employees, except for enforcement).
- Familiarize PDPOs with traffic control plan, traffic protection plan, work zone.
- Training of PDPOs in application of Book 7 is recommended.
- PDPOs are required to control traffic within 30 m of a signalized intersection. Though not stated in Book 7, there are some situations where work can be done near/at an intersection and traffic can be safely channelized, while the traffic signals can continue to control traffic flow in a normal manner. In such cases,

paid duty police officers are not required. The intent appears to be that TCPs must not control traffic within 30 m of a signalized intersection. However, the text states categorically that “Paid duty officers must be used to control traffic within 30 m of an intersection with active signals.” Unfortunately, unless MTO modified this requirement as stated, users may face increased liability risk if they do not use PDPOs at signalized intersections. We suggest the following addition (underlined): “Paid duty officers must be used to control traffic within 30 m of an intersection with active signals, when the operation of the traffic signals has been modified or stopped.”

- PDPOs are required to use MOL-prescribed personal protective equipment.

## 2.8 Implementation of Buffer Vehicles (Sections 3.3.1 and 5.5)

Very Short Duration (VSD) work on freeway shoulders: TL-11 in both Book 7 versions does not require use of a crash truck. However, a long-standing MOL order against MTO required use of a crash truck for this situation, for work in MTO’s Central Region. MTO has not clarified whether this order is still in effect, or whether it has been rescinded. It is recommended to check with MTO.

Trailer-mounted attenuators are now accepted, in addition to truck-mounted attenuators (TMAs), provided they meet the relevant NCHRP requirements.

As stated in the Ministry of Labour Occupational Health and Safety Act and Construction Regulations, buffer vehicles are a requirement only on freeways, not on non-freeways. In the 2014 Book 7, MTO has introduced some situations where buffer vehicles are required on non-freeways: TL-25, and TL-67 (where a buffer vehicle was previously required for zone painting on MTO two-lane roads, but not on non-MTO roads).

The 2014 Book 7 states that crash trucks (CTs) used on MTO contracts must have a minimum mass of 6800 kg, excluding attachments or ballast (not an exclusion in the 2001 Book 7), and a maximum mass of 12000 kg, including ballast, FABs, or TMAs. It would be more helpful to express the minimum and maximum in the same terms. For example, if the ballast, FABs and TMAs exceed 5200 kg, it creates an impossible situation: either the mass without attachments and ballast has to be less than 6800 kg, or the maximum of 12000 kg will be exceeded. It is not a MOL requirement that the minimum mass of 6800 excludes attachments or ballast. The 2014 Book 7 does permit a maximum mass greater than 12000 kg with the approval of the road authority.

## 2.9 Orange Temporary Pavement Markings (Sections 3.1.6.1 and 6.2.1)

Orange temporary pavement markings are now addressed in Book 7, ostensibly to address certain concerns. On MTO highways, orange pavement markings are only to be used when recommended by the Regional Traffic Sections. It is not clear what criteria the Regional Traffic Sections will apply in determining the need/desirability of orange temporary pavement markings. This would have been helpful.

## 2.10 Sign Reflectivity Standards (Section 6.3.2)

Table 7 in the 2014 Book 7 outlines the minimum reflectivity requirements for TC and Rb signs used in work zones. The following signs have been moved from high intensity (intermediate reflectivity level) to high reflectivity micro-prismatic fluorescent (highest reflectivity level: TC-3 and the family of TC-16 signs. The effective date of January 1, 2016, for the changes is stated elsewhere but should also be stated in Table 7.

The MTO Errata Document states: The following notes should be considered with Table 7:

1. Minimum reflectivity of TC-3 signs – High Intensity (Type III) before February 1, 2016 and becomes High Reflectivity Micro-Prismatic Fluorescent (Type VII) after February 1, 2016.
2. Minimum reflectivity of TC-16AL, TC-16BL, TC-16CL, and TC-16DL signs – Engineering Grade (Type I) before February 1, 2016 and becomes High Reflectivity Micro-Prismatic Fluorescent (Type VII) after February 1, 2016.
3. However, the information given in the first column of Table 7 does not appear to have been revised.

#### 2.11 Positioning and Installation of Signs (Section 6.3.4)

Figure 14 (p. 134) in the 2014 Book 7 is almost identical to Figure 2 in the 2001 Book 7, with minor differences in the vertical offsets from the edge of pavement in the two-post situation. Under 'Ground Mounted Signs', the notes are helpful, identifying the upper diagram as being for smaller signs and the lower diagram as being for larger signs. These two drawings are rather puzzling (square signs rather than diamond-shaped signs, and indeterminate horizontal dimensioning).

The MTO Errata Document states the following: "In Figure 14, Typical Sign Placement, the dimension should extend from the edge of the roadway to the nearer edge of the sign, consistent with the wording of the third bullet under Ground mounted signs on page 135. The horizontal dimension (2.0 to 4.0 m) for larger than 1200 x 1200 signs should extend from the edge of the roadway to the nearer edge of the sign and the vertical dimension should be from the bottom edge of the sign to the top of travelled portion of the roadway." (Note: this addresses the dimensional issue, but Figure 14 still shows square signs instead of diamond-shaped signs.)

#### 2.12 TC-12 Flashing Arrow Board (FAB) Sign (Sections 3.1.8.2 and 6.3.6)

Section 3.1.8.2, p. 44, paragraph 3, recommends that in mobile work operations on multi-lane roads, FABs should be used in flashing arrow mode, to reinforce the need to keep to the side of the vehicle, where no cones can be used. We agree with this practice. However, the 2014 Book 7 is inconsistent in its recommendations. Section 6.3.6, p. 168, multi-lane roads, paragraph 3, recommends that if a sign truck/buffer vehicle follows a work vehicle, the FAB on the buffer vehicle(s) shall be in arrow mode and the FAB on the work vehicle in bar mode. The MTO Errata Document re-emphasizes this convention, but not consistently. Arges Training & Consulting believes that the FAB on the work vehicle should also be in flashing arrow mode. (Note: the MTO Errata Document revision really doesn't change things, only adding references to specific TLs. In our view, the revision perpetuates the errors in the original Book 7. In a

convention where the flashing arrow means “stay this side” on a multi-lane road, and because there are no cones in a mobile operation, we believe that if there is an open lane for traffic to use, they should be given a flashing arrow indication pointing them to the open lane, rather than be presented with a bar.)

LED lamps are now permitted for use on FABs (p. 170).

See the comments on FAB use on typical layouts as noted below.

### 2.13 **Portable Variable Message Signs (PVMSs) (Sections 3.1.8.1 and 6.3.7)**

The guidelines for PVMS use in the 2014 Book 7 have been abbreviated, relative to the guidelines in the 2001 Book 7. The 2001 Book 7, pp. 58 and 59, contained some very useful guidelines and examples for formulating PMVS messages, in Table 5, PVMS Messages for Road Closure Scenarios. These have been eliminated from the 2014 Book 7. The 2014 Book 7 Message Guidelines, much abbreviated, are in Section 6.3.8. The reason given by MTO is that all MTO PVMS messages are centrally controlled, and therefore there is no need for their inclusion in Book 7. However, Book 7 is intended as a manual for the whole province of Ontario, and these guidelines would have been useful for non-MTO users of Book 7, even if MTO doesn't need them.

### 2.14 **Table A, Work Zone Component Dimensions: Very Short Duration and Short Duration Work (Non-freeways), p. 186**

Table A is now clearly labelled as applicable to both Very Short Duration work and Short Duration work.

The option of not using a TC-2A or TC-2B (Road Work Ahead sign) at low speeds, and visibility of 150 m or more has been removed. Arges Training & Consulting considers this to be an improvement, as it reinforces the principle of showing the TC-2A or TC-2B whenever workers are present, and removing it when workers are not present.

Table A now requires more markers in the taper for higher speeds. Rather than the previous minimum requirement of four markers, the requirement is now for four to eight markers, depending on the speed.

Other than that, Table A in the 2014 Book 7 is the same as Table A in the 2001 Book 7.

A note at the bottom makes it clear that the speed to be used in Table A is the normal posted regulatory speed limit, and that the speed posted in the work zone may not be reduced to be able to use shorter dimensions in the work zone.

### 2.15 **Table B, Work Zone Component Dimensions: Long Duration Work (Non-freeways), p. 187**

Table B now requires more markers in the taper for higher speeds. Rather than the previous minimum requirement of four markers, the requirement is now for five to thirteen markers, depending on the speed.

Other than that, Table B in the 2014 Book 7 is the same as Table B in the 2001 Book 7.

A note at the bottom makes it clear that the speed to be used in Table B is the normal posted regulatory speed limit, and that the speed posted in the work zone may not be reduced to be able to use shorter dimensions in the work zone.

**2.16 Table C, Work Zone Component Dimensions: Freeways, p. 188**

A note at the bottom makes it clear that the speed to be used in Table C is the normal posted regulatory speed limit, and that the speed posted in the work zone may not be reduced to be able to use shorter dimensions in the work zone.

Other than that, Table C in the 2014 Book 7 is the same as Table C in the 2001 Book 7.

**2.17 Table D, Application of Longitudinal Buffer Area (LBA) and Lateral Intrusion Deterrence Gap (LIDG), p. 189**

Table D in the 2014 Book 7 is the same as Table D in the 2001 Book 7.

**2.18 Table E, Typical Usage of Signs through a Temporary Work Zone, p. 190**

The title of this table has been changed from Table E.1 to Table E. Other than that, the table is the same as in the 2001 Book 7.

**2.19 Table F, Usage of Channelizing Devices, Barricades and Barriers, p. 192**

The title of this table has been changed from Table E.2 to Table F. Other than that, the table is the same as in the 2001 Book 7. **The previous sentence is no longer valid. P. 192, Table F. The MTO Errata Document makes the following changes to Table F:**

- i. The TC-52 marker and TC-54 barrel are now shown in separate columns.
- ii. The TC-51B (700 mm cone) and the TC-52 marker may now be used on multi-lane non-freeways for VSD and SD only if the NPRS is 70 km/h or lower. For SD with NPRS of 80 km/h or higher, and for LD, the TC-54 barrel must now be used. It is not clear whether cones or barrels are required for VSD for NPRS of 80 km/h or higher. The TC-51B may still be used for VSD and SD on two-lane roads for all posted speeds.
- iii. The TC-51B (700 mm cone) and the TC-52 marker may no longer be used on freeways. On freeways, TC-54 barrels are always required.
- iv. Barricades TC-53A and TC-53B may no longer be used on freeways.
- v. The typo (Barrier) under the TC-54 has been corrected to Barrel.
- vi. (Note: We have seen no evidence of safety problems with the original Book 7 provisions, where 700 mm cones were permitted for use for VSD and SD on both non-freeways and freeways (freeways: daytime use only). We are unclear on why the changes were made, but without conclusive evidence we see no need for the more restrictive provisions, which will only add to operating costs.)

**2.20 Table G, Decision Matrix: Typical Layouts, pp 193-196 (not all pages numbered)**



The title of this table has been changed from Table F to Table G.

The format and organization of Table G have been substantially revised and to some degree simplified. We consider the new Table G to be an improvement over the old Table F. Under Duration of Work, the four categories are no longer split into Divided and Undivided Roads. Table G is now divided into two major categories, the first 2 ½ pages organized by Location of Work on the Road (though this major category is not labelled as such), and the last 1 ½ pages organized by Type of Activity.

The typical layout titles in Table G do not always match the titles on the actual typical layouts themselves.

P. 196, Table G (page number missing): The MTO Errata Document revises the TL-74 in the eleventh row (Intersections) to TL-75.

The MTO Errata Document replaces the text below Table G with the following new text: “When a technician is intermittently and **MOMENTARILY (NOT CONTINUOUSLY)** on the travelled lanes of the roadway, the typical layouts TL-73B, TL-74, TL-76 can only be used if sight lines in both directions:

- Exceed 250 m where NPRS is greater than 80 km/h,
- 200 m where the NPRS is greater than 60 km/h and less than or equal to 80 km/h, or
- 150 m where the NPRS is 60 km/h or less.

## 2.21 **General Notes to Typical Layouts, p. 197**

The actual notes in the General Notes section have been changed from the 2001 Book 7 to the 2014 Book 7. They are generally an improvement.

Note 4: the definition of a 360 beacon appears to disallow the use of strobe lights as an alternative to the rotating beacon.

Note 7: Lane encroachment (closing part of a lane) on a freeway is not recommended. TL-13 and TL-15, which dealt with this, have been removed from the 2014 Book 7. Alternate TL numbers are referenced for use where encroachment is necessary for some mobile maintenance activities. **In Note 7, the MTO Errata Documents replaces the first sentence with “Lane encroachments on freeways are not recommended.” This change excludes lane encroachment as possibly being necessary for some mobile maintenance operations.**

Note 13: Freeways: Crash trucks are not required for VSD work on freeway shoulders. This is a change from previous policy in MTO Central Region. See Section 2.8 of these notes, above. Non-freeways: The second note states that on multi-lane roads, normal posted regulatory speeds of 70 km/h or higher, a crash truck is preferred over a blocker truck (a vehicle without a truck-mounted attenuator). Arges Training & Consulting’s view is that a crash truck is always preferred over a blocker truck, because it affords a greater chance of survivability to motorists who strike the truck.

## 2.22 Changes to Typical Layouts (TLs)

In all the TLs, the fonts used are very small and difficult to read.

**Note that in many cases, the titles on the TLs do not match the TL titles in Table G. This should be corrected.**

In all the TLs, wherever the TC-2B or TC-2A is shown, it applies to both SD and LD operations, when workers are present. This is covered in a blanket statement in General Note 3, but it would be helpful if it were shown on the TLs themselves.

In the Legend of Symbols used in the Typical Layouts on p. 200, Barricades are shown as TC-53A or TC-53B, or temporary concrete barrier. We do not believe that these should be interpreted in any way as being equivalent. Also, some of the typicals for pedestrians refer to pedestrian barricades, but nowhere are they defined. It would be reasonable to treat TC-53A as pedestrian barricades (but not TC-53B or temporary concrete barriers).

**TL-1, Designated Construction Zone Signing, p. 201:** TL-1 now applies only to two-lane roads rather than two-lane roads and multi-lane undivided non-freeways. TL-1 now includes some other signs, the TC-2B or TC-2A, and signs on the doubling of speed fines when workers are present.

**TL-2, Designated Construction Zone Signing, p. 201:** TL-2 now applies to multi-lane non-freeways and freeways rather than multi-lane divided non-freeways, and freeways. TL-2 now includes some other signs, the TC-2B or TC-2A, and signs on the doubling of speed fines when workers are present.

**TL-3, Reduced Speed Zone Signing, p. 202:** TL-3 now applies only to two-lane roads rather than two-lane roads and multi-lane undivided non-freeways. TL-3 now shows signing for both regulatory speed reductions and advisory speed reductions. The 2001 TL-3 showed signing for advisory speed reductions, but addressed the signing for regulatory speed reductions in a note.

**TL-4, Reduced Speed Zone Signing, p. 202:** TL-4 now applies to multi-lane non-freeways and freeways rather than multi-lane divided non-freeways, and freeways. TL-4 now shows signing for both regulatory speed reductions and advisory speed reductions. The 2001 TL-4 showed signing for advisory speed reductions, but addressed the signing for regulatory speed reductions in a note.

**TL-5, Shoulder Work, p. 203:** The reference to the devices on the work vehicle has been changed from 360 beacon plus four-way flashers (4WF) to beacon plus 4WF. From General Note 4, it is understood that the 360 beacon is intended.

**TL-6, Shoulder Work, p. 203:** The situation with a work vehicle present is no longer shown, but is covered in a note at the bottom referring to General Note 4. This makes the new TL-6 effectively the same as the old TL-6, but in a different format.

**TL-7, Lane Encroachment, p. 204:** TL-7 now applies to two-lane roads and multi-lane non-freeways, rather than to two-lane roads. The situation for VSD with no vehicle present has been added.

**TL-8, Lane Encroachment, p. 204:** TL-8 applies to two-lane roads only, SD and LD, as in the 2001 Book 7. Some changes have been made: an LBA and a TC-12 FAB are required if the normal posted regulatory speed (NPRS) is 70 km/h or higher, a TC-11 Narrow Lanes sign is required, and optional centreline cones are shown. Refer to the notes on the TL and General Note 4.

**TL-9, Partial Lane Shift, p. 205:** In the 2001 Book 7, the application of TL-9 was for VSD and SD. In the 2014 Book 7, VSD has been deleted and LD has been added. The reason is not explained.

**TL-10, Partial Lane Shift: Wide Platform:** In the 2001 Book 7, the application of TL-10 was for VSD and SD. In the 2014 Book 7, VSD has been deleted and LD has been added. The description of the devices, in the box, is unclear. Does it mean (a) if a work vehicle is present, it must have a beacon plus 4WF, and if a work vehicle is not present, a TC-12 in bar mode must be used? or (b) if a work vehicle is present, it must use either beacon/4WF or a TC-12 in bar mode, and no flashing devices are required if there is no work vehicle present?

**TL-11, Shoulder Work, Freeway, p. 206:** TL-11 is only slightly changed, in that for VSD, no work vehicle is shown in 2014, but it is shown in 2001. A note at the bottom says that it is preferable to have a work vehicle present. As noted in note 2.8 above, TL 11 in both Book 7 versions does not require use of a crash truck. However, a long-standing MOL order against MTO required use of a crash truck for this situation, for work in MTO's Central Region. MTO has not clarified whether this order is still in effect, or whether it has been rescinded. It is recommended to check with MTO.

**TL-12, Shoulder Work, p. 206:** No change.

**TL-13, Roadway Edge Work: Encroachment in Right Lane, Multi-lane Non-freeway and Freeway:** TL-13 has been deleted from the 2014 Book 7, because of some comments that encroachment, especially on freeways, was dangerous, and that the work should be done either on the shoulder or occupying a full lane. However, Book 7 acknowledges (Section 2.3.3, Lane Encroachment, p. 12) that lane encroachment, even on freeways, may be required for some maintenance mobile operations. If this is the case, TL-13 would be a useful typical layout. Book 7 recommends using instead TL-7, TL-8, TL-14 or TL-66.

**TL-14, Lane Encroachment, Multi-lane Non-freeway, SD and LD, p. 207:** The situation with a work vehicle present is no longer shown, but is covered in a note at the bottom referring to General Note 4. At a NPRS of 70 km/h or higher, a TC-12 is now required (formerly the 360/4WF was an acceptable option) and the Narrow Lanes sign has been added. A work vehicle with a TC-12 may now replace the cones for SD work; previously this was not an option.

**TL-15, Roadway Edge Work: Encroachment in Right Lane, Freeway, SD and LD:**

TL-15 has been deleted from the 2014 Book 7. See comments for TL-13 above.

**TL-16, Parking Lane Closed, Multi-lane Non-freeway, VSD, SD and LD, p. 207:** This is very similar to TL-16 in the 2001 Book 7. The description of the devices, in the box, is unclear. Does it mean (a) if a work vehicle is present, it must have a beacon plus 4WF, and if a work vehicle is not present, a TC-12 in bar mode must be used? or (b) if a work vehicle is present, it must use either beacon/4WF or a TC-12 in bar mode, and no flashing devices are required if there is no work vehicle present? The TC-4 has been added to this TL if there is no work vehicle present. It should be positioned at the start of the taper, not at the end of it.

The MTO Errata Document states that TL-16 should be updated as follows:

- The TC-4 sign should be shown at or just beyond the beginning of a lane closure taper similar to TL-10 and consistent with the guidelines provided on page 140.
- TC-2B or TC-2A are only required for short and long duration works and not for very short duration works. Therefore, a note in brackets showing short and long duration should be considered under these sign names within the layout.
- The box showing WORK VEHICLE with Beacon plus 4WF OR TC-12 is only applicable to short and long duration works similar to TL-10. Therefore, a note in brackets showing short and long duration should be considered under these sign names within the layout.

**TL-17, Partial Lane Shift: Narrow Lanes, Multi-lane Non-freeway and Freeway, LD, p. 208:** This is essentially the same as the TL-17 in the 2001 Book 7, except that a TC-12 is used at the end of the taper instead of a TC-7.

**TL-18, Lane Closed or Occupied, Two-lane Road, Mobile Operations, p. 208:** TL-18 no longer applies to VSD work. The requirements for Mobile Operations on two-lane roads are essentially the same as before. However, VSD work has been moved to TL-19 or TL-20A. This is a significant change. For VSD work such as pothole patching, catchbasin work, and the like, a much more elaborate set-up with more signs and cones will now be required. We believe that TL-18 has worked safely and well for both Mobile Operations and VSD over the years, and should continue to be applicable to VSD operations, carrying with it the note at the bottom of TL-18 in the 2001 Book 7.

**TL-19, Lane Closed (Yield to Oncoming Traffic), Low Volume Road, Two-lane Road, VSD, SD and LD, p. 209:** VSD operations have now been added to TL-19. A Wb-1A sign (Yield Sign Ahead) is now required for NPRS of 70 km/h or higher. The option to use a TC-12 at the end of the taper, to replace a TC-4 at the start of the taper and the TC-1 and TC-2 is no longer permitted. The position of the Rb-91 Yield to Oncoming Traffic Sign should be in advance of the taper instead of at the end of it.

The MTO Errata Document states the Figure TL-19 layout should be modified as follows:

- The YIELD TO ONCOMING TRAFFIC (Rb-91) Sign should be installed in the direction of the closed lane and located at a distance in advance of the lane closure specified in the appropriate table (Table A or B: 5\*). Therefore, in the layout Rb-91 will be at a distance of 5\* from the work area. (Note: a more

consistent position of the Rb-91 sign would have been to treat it in the same way as a TCP, i.e., a distance of 5-30 m from the start of the lane closure taper. The distance 5\* is considerably longer than this, which may increase driver uncertainty as to where to stop.)

- The position of other signs should be adjusted relative to the new position of Rb-91.

Therefore, the new sequence of signs in the direction of closure will be read as: Rb-91 at 5\* from the start of the work area, Wb-1A at 5\* from Rb-91, TC-2B or TC-2A at 5\* from Wb-1A, TC-1 at 5\* from TC-2B or TC-2A, and TC-1A at 1.0 km from TC-2B or TC-2A. Other dimensions within the layout stay the same.

**TL-20A, Lane Closed, Traffic Control Persons, Two-lane Road, VSD and SD, p. 209:**

There are several changes to TL-20A. Long Duration is now shown in TL-20B. The biggest change is the revised position of the TCP. In the 2001 Book 7, the TCP stands at the first cone of the taper, a distance from the work area of between 10-50 m, as determined by the TCP table, Table 7. In the 2014 Book 7, the TCP stands a distance from the work area equal to the taper length from Table A, plus a distance of 5-30 m, as determined by the new TCP table, Table 2. The Rb-31 Do Not Pass sign is now required for SD at NPRS of 70 km/h or greater, whereas previously it was required only for LD. The note iii at the bottom suggests using TL-20B for SD as well as LD on high speed roads (70 km/h or higher) or where lane keeping/compliance is an issue. **The MTO Errata Document deletes Note i at the bottom of TL-20A. (Note: this is an improvement, as this note has been found to be confusing.) The MTO Errata Document replaces Note iii with: "On high speed (70 km/h or greater) or where lane keeping/compliance is an issue, consider using TL-20B Lane Closed (Traffic Control Persons). For Short Duration projects on MTO highways it is recommended to use TL-20B.**

**TL-20B, Lane Closed, Traffic Control Persons, Two-lane Road, LD, p. 210:** This is the LD companion to TL-20A, whereas the new TL-20A and TL-20B were previously combined for SD and LD in the old TL-20A. This is essentially the same as the LD provisions in the old TL-20A, except for two things: the revised position of the TCP (see comments under TL-20A, above) and the cones along the centreline at each end of the work area, together with Rb-25 Keep Right signs; note ii at the bottom states that the centreline cones and Rb-25 signs are optional.

The first note at the bottom of TL-20B reads, "For low volume roads (< 3000 vehicles per day) and visibility more than 150 m beyond the end taper, the TCP and TC-21 may be eliminated for the direction that is not closed." This makes it almost the same as TL-19, but not quite, because it retains the DO NOT PASS sign whereas TL-19 does not require it. **The MTO Errata Document deletes existing Note i, adds the text "In addition to being used for Long Duration, TL-20B also applies for Short Duration (Note: this is confusing), and replaces Note iii with: "Centreline cones between the Rb-25 signs are optional and may be used in one or both directions if lane keeping becomes an issue. For projects on MTO highways it is recommended cones be used in both directions."**

**TL-20C, Lane Closed (Automated Flagger Assistance Device), Two-lane Roads, SD and LD, p. 210:** The terminology has changed from Remote Control Device (RCD) to

Automated Flagger Assistance Device (AFAD). Traffic control in both directions of travel is now shown on TL-20C (which was TL-20B in the 2001 Book 7).

**TL-21, Lane Closed (Portable Lane Control Signals), Two-lane Roads, SD, p. 211:** In the 2001 Book 7, TL-21 was for SD and LD; now it is for SD only. There is no longer any TL depicting Portable Temporary Traffic Signals (PTTSs) or Temporary Traffic Control Signals (TTCSSs). Note (ii) at the bottom states that Portable Lane Control Signals (PLCSSs) may be used only while the contractor is on site and on roads with NPRS of 60 km/h or less. For work zones where no contractor is on site or on roads with NPRS of 70 km/h or higher, PTTSSs are required, which also require road authority approval of layout and signal timing. The RB-25 Keep Right signs and cones on each approach are now required; they are not optional. In the 2001 Book 7 they were not required.

**TL-22, Lane Closed or Occupied, Multi-lane Non-freeways, Mobile and VSD, p. 211:** This TL has now been split into two parts, the top one with work vehicle present, the bottom one with no work vehicle present. With a work vehicle present, a sign truck on the shoulder, with a FAB in left flashing arrow mode, upstream of the work vehicle is required for NPRS of 70 km/h or higher, as before. The work vehicle previously required a FAB in left flashing arrow mode at NPRS of 70 km/h or higher, or a 360 beacon and TC-4 Lane Closure Arrow mounted on the vehicle at NPRS of 60 km/h or lower. Now it requires either a 360/4WF or a FAB in bar mode, regardless of NPRS. Arges Training & Consulting believes that the TL-22 is incorrect. At NPRS of 60 km/h or lower, since Book 7 provisions may be enhanced, we recommend a 360 beacon and TC-4 on the work vehicle. At NPRS of 70 km/h or higher, we recommend a TC-12 FAB in left flashing arrow mode on the work vehicle, as in the 2001 Book 7. See note 2.12 above, and Section 3.1.8.2, p. 44, which states: "In mobile operations, FABs are used in the arrow mode on multi-lane roads (to reinforce the need to keep to the side of the vehicle, where no cones can be used." To be consistent with p. 168 in Book 7, at NPRS of 60 km/h or lower, if a FAB is used on the work vehicle, it would have to be in flashing arrow mode, but this is not noted on TL-22. A flashing bar usually means a lane shift is not required. But a lane shift is required here.

The MTO Errata Document states that "The box within the top part of Figure TL-22 shows the existing "Beacon plus 4WF OR TC-12 (in bar mode)" is to be replaced with "Beacon plus 4WF AND TC-12 (in left arrow mode)." (Note: we agree that the TC-12 should be in left arrow mode, but are puzzled as to why the beacon/4WF AND the TC-12 are required.)

**TL-23, Lane Closed, Multi-lane Non-freeway, SD and LD, p. 212:** The new TL-23 combines the 2001 TL-23 and TL-24. In SD, the option of replacing the TC-3 and TC-4 with a TC-12 FAB has been deleted.

**TL-24:** Deleted from Book 7, as it has been combined with TL-23.

**TL-25, Left Closed or Occupied, Undivided Multi-lane Non-freeway or No Shoulder, Mobile and VSD, p. 212:** TL-25 splits the 2001 TL-25 into two parts, the upper part with vehicle present (Mobile or VSD) and the lower part with no vehicle present. We recommend that in the upper part of the diagram, with vehicle(s) present, the TC-12 FAB

on the work vehicle should be in flashing arrow mode regardless of whether a sign truck is present, since there are no cones or barrels indicating a closed lane. This would be consistent with Section 3.1.8.2, p.44. This is one of the few non-freeway TLs where a buffer vehicle is now required, at VPRS of 70 km/h or higher. It is not clear why it is required, since TL-22, for the right lane closed or occupied, a very similar situation, does not require a buffer vehicle.

**TL-26, Left Lane Closed, Undivided Multi-lane Non-freeway or No Shoulder, SD and LD, p. 213:** TL-26 was previously SD only; it is now SD and LD. In SD, the option of replacing the TC-3 and TC-4 with a TC-12 FAB has been deleted. The TC-12 FAB is now required for NPRS of 70 km/h or higher or for LD, and the TC-3 and TC-4 are always required. For LD, the TC-7 is no longer permitted; the sign must be a TC-12 FAB.

**TL-27, TL-28 and TL-29, Right or Left Lane Closed or Occupied, Multi-lane Freeway, Mobile Operations (TL-27), VSD (TL-28) and SD and LD (TL-29), pp. 213 and 214:** Previously MO and VSD were combined in TL-28, and SD and LD were shown in TL-29.

In TL-27 we recommend that the TC-12 FAB on the work vehicle be in flashing arrow mode, since this is MO, and there are no cones. The second note, as modified, is now confusing: "Where no shoulder Sign Truck may be eliminated and the TC-12 on the Work Vehicle should be in arrow mode. Optionally a Crash Truck with TC-12 in arrow mode can replace the Sign Truck and follow in the occupied lane." In the first sentence, it is not clear why the elimination of the sign truck should be accompanied by TC-12 arrow mode on the work vehicle. We agree that it should be in arrow mode, but regardless of whether the sign truck is there or not. In the second sentence, this is the same as saying the sign truck may be eliminated. It would be clearer in our view to say "If left shoulder does not exist or is not wide enough, the sign truck should move into the left lane behind the crash truck or be eliminated."

The MTO Errata Document replaces Note ii with: "Left Lane Closed: mirror image of Right Lane Closed, where shoulder exists. Where no shoulder or narrow shoulder will be modified by replacing the sign truck with a crash truck with a TC-12 in arrow mode moving behind the first crash truck."

In TL-28, the new TL is essentially the same as the 2001 TL-28 for VSD.

In TL-29 (SD and LD), the new TL-29 is essentially the same as the previous TL-29, except that the first TC-12 FAB, on the shoulder, is optional, but may not replace the TC-3 and TC-4 for SD, as was previously the case.

**TL-30, Two-Way Left Turn Lane Closed, Multi-lane Undivided Non-freeway, VSD, SD and LD, p. 215:** The new TL-30 is essentially the same as the previous TL-30, except that the provisions are described differently. The TC-7 may no longer be used for LD, but a TC-12 FAB must be used instead where the NPRS is 70 km/h or higher or the work is LD.

**TL-31, Passing Lanes: Single Lane Direction Closed, Multi-lane Undivided Non-freeway, SD and LD, p. 215:** There has been some change in terminology. The reference in the title to Truck Climbing Lanes has been removed. The use of a TC-7 as an alternative to a TC-12 FAB is no longer permitted. The left-side TC-3 Left Lane Closed sign in the southbound direction has been deleted, though it may still be used if desired (we recommend it). In the northbound direction, the TC-12 FAB at the end of the lane closure taper is retained, the TC-12 FAB at the end of the return taper has been replaced by a TC-4 Lane Closure Arrow at the beginning of that taper. (As an enhancement to a TC-4, a TC-12 FAB may be used instead, and we recommend it as being safer.) The reference to allow the added lane to develop only beyond the work zone, if feasible, has been deleted. This is still advisable, however.

**TL-32, Passing Lanes: Centre Lane Closed, Multi-lane Undivided Non-freeway, SD and LD, p. 216:** For some reason, the orientation of TL-32 has been reversed from TL-31 and reversed from the 2001 TL-32, but the new TL-32 is essentially the same as the 2001 TL-32. Curiously, the northbound left side TC-3 is shown, although it has been deleted from TL-31. The reference to allow the added lane to develop only beyond the work zone, if feasible, has been deleted. This is still advisable, however.

The MTO Errata Document deletes note i on TL-32.

**TL-33, Four Lane Road: Two Lanes Closed, Multi-lane Undivided Non-freeway, SD and LD, p. 216:** The new southbound direction is the same as before. The new northbound direction significantly reduces the requirements: no TC-12 FABs required below 70 km/h. We believe that the northbound direction in TL-33 is incorrect and confusing. The TC-4 should be shown at the beginning of the northbound return taper and a TC-12 or TC-7 should be shown at the end of the northbound return taper, as in 2001 Book 7. Instead, it now appears as if a TC-4 with flashing amber beacon (beacon required at NPRS of 70 km/h or greater) is expected to serve the purpose of both a TC-4 at the beginning of the taper and a TC-12 at the end of it. It is also surprising that a TC-12 would be required at the end of the taper in the southbound direction at all speeds, but not in the northbound direction. Since enhancements to Book 7 are permitted, we recommend use of TC-12 FABs at the end of both northbound lane closure tapers, and a TC-4 at the beginning of the northbound return taper and a TC-12 at the end of it.

**TL-34A and TL-34B, Two Lanes Closed (Median Crossover):** Deleted from Book 7.

**TL-35, Five Lane Road: Two Through Lanes Closed, Multi-lane Undivided Non-freeway, SD and LD, p. 217:** In the new TL-35, the three TC-12s at the ends of the tapers are not required at speeds below 70 km/h, whereas in the 2001 Book 7, there were four TC-12 and they were required. As in TL-33, we believe the TC-4 should be shown at the beginning of the northbound return taper and a TC-12 or TC-7 should be shown at the end of the northbound return taper, as in 2001 Book 7. Instead, it now appears as if a TC-4 with flashing amber beacon (beacon required at NPRS of 70 km/h or greater) is expected to serve the purpose of both a TC-4 at the beginning of the taper and a TC-12 at the end of it.

**TL-36, Five Lane Road: Through Lane and Left Turn Lane Closed, Multi-lane Undivided Non-freeway, SD and LD, p. 217:** In the southbound direction, a TC-4 has



been added (an improvement) and in the northbound direction, the TC-12s are required only at NPRS of 70 km/h or higher.

**TL-37, Six Lane Road: Centre Lane or Two Lanes Closed, Multi-lane Undivided and Divided Non-freeway, SD and LD, p. 218:** The new TL-37 is essentially the same as the previous one, except that the TC-12s at the end of the lane closure tapers are required only at NPRS of 70 km/h or higher.

**TL-38, Six Lane Road: Centre Lane or Two Lanes Closed, Multi-lane Freeway, SD and LD, p. 218:** The new TL-38 is essentially the same as the previous one, except that the TC-12 on the shoulder is optional, but may not replace the TC-3 and TC-4 which are required in all cases.

**TL-39, Median Crossover on an Intersection Approach:** Deleted from Book 7.

**TL-40, Roadside Diversion, Two-lane Road, LD, p. 219:** The new TL-40 is essentially the same as the previous one, except that the TC-2B or TC-2A has been added in each direction (an improvement), and the angle of the arrow on the TC-7s has been changed from diagonally up to the right (or left) to straight right (or left). There is an error in TL-40. The southbound TC-7 should be pointing left rather than right. **The MTO Errata Document states that the southbound TC-7 should be pointing towards the left for southbound traffic.**

**TL-41, Lane Realignment, Multi-lane Non-freeway and Freeway, LD, p. 219:** In the new TL-41, a crash truck is now required on freeways, upstream of the work area. This is reasonable. However, not shown, if a crash truck is used, it should be positioned an LBA distance downstream from the lane diversion barrels. Also, the crash truck should have a TC-12 FAB in bar mode. There is an error in TL-41. The second TC-16ER(2) sign should be a TC-16EL(2) sign, diverting traffic back to the left (following the curve in the road) rather than to the right. **The MTO Errata Document states: "TL-41 should be considered with the following modifications:**

- A TC-12 on the crash truck should be shown in bar mode,
- The location of the truck should be at an LBA distance from the end of the transition taper (2\* from Table C), similar to Figure 38,
- The TC-16ER(2) sign across from the work area should be replaced by a TC-16EL(2) sign.
- (Note: this correction addresses our concerns.)

**TL-42 (i), Detour: Alternative Roads, and TL-42 (ii), Route Detour (Alternative Roads), Two-lane and Multi-lane Road, Non-freeway, SD and LD, p. 220:** The new TL-42 (i) and TL-42 (ii) are essentially the same as in the 2001 Book 7, except for some minor changes: (a) three new roundabout detour tabs have been added; (b) the titles have been changed from TL-42A and TL-42B to TL-42 (i) and TL-42 (ii); (c) the two TL titles are no longer the same for the two typical layouts; (d) TL-42 (i) is shown for LD only, whereas TL-42 (ii) is shown for SD and LD. We believe that, as in the 2001 Book 7, these TLs should apply to both SD and LD. **The MTO Errata Document states that: "Figure TL-42(i) should apply to both short and long duration works, similar to Figure TL-42(ii)."**

**TL-43, Lane Closed at Exit Ramp, Multi-lane Non-freeway and Freeway, SD and LD, p. 221:** The third note is a useful addition. Although the 2001 Book 7 TL-43 showed the lane coned off in this way, it did not describe it. A second Exit sign has been added.

**TL-44, Lane Closed at Entrance Ramp, Multi-lane Non-freeway and Freeway, SD and LD, p. 221:** The new TL-44 is essentially the same as in the 2001 Book 7, except that the TC-3R, TC-4 and TC-12 (NPRS of 70 km/h or higher) have been added (good feature). We recommend that the TC-12 be in left flashing arrow mode rather than bar mode (to be consistent with Sections 3.1.8.2 and 6.3.6: the flashing arrow is used at the end of a lane closure taper). **The MTO Errata Document states: "Figure TL-44 shows a TC-12 sign in bar mode. The TC-12 sign should be in left arrow mode."**

**TL-45, Ramp Closed, Multi-lane Non-freeway or Freeway, SD and LD, p. 222:** The new TL-45 is essentially the same as in the 2001 Book 7. One difference is that the TC-12 FAB on the ramp is now required only for a NPRS of 70 km/h or higher.

**TL-46, Intersection: Near-Side Lane Closed (TCP), Two-lane Road, VSD and SD, p. 222:** The new TL-46 is essentially the same as in the 2001 Book 7, except that TC-2Bs or TC-2As are now required on the side roads. Note (ii) is incomplete: it was apparently intended to repeat the same note as in the 2001 Book 7, but some of it is missing: the following words should be added: "...with any intersection control such as traffic signals or stop signs." There is an inconsistency in TL-46: the position of the TCP is as shown in the 2001 Book 7, namely the TCP table distance from the work area. But to be consistent with Section 5.2.3, the TCP should stand a distance from the work area equal to the taper length from Table A plus the value from the new TCP table. **The MTO Errata Document states: "The position of the TCP in TL-46 should be consistent with other similar layouts (e.g., TL-20A). The TCP should be placed at a distance specified in the TCP Table on page 100 from the first cone of the transition taper. The length of the transition taper should be equal to 1a\* (Table A and Table B). The Note ii should read: "When traffic volumes are high or when the intersection is signalized, consult the road authority to determine whether police assistance is required. Care should be taken by the TCP to coordinate with intersection control such as traffic signals or stop sign."**

**TL-47, Work in Intersection: Near-Side Lane Closed (Detour), Two-lane Road, LD, p. 223:** The new TL-47 is to some extent the same as in the 2001 Book 7, except that in the 2001 Book 7 TL-47, the north-south road was a through road with Stop sign control on the side road. In the new TL-47 it is unclear which is the main road. A TC-2B or TC-2A has been added for northbound traffic and eastbound traffic, in whose lanes the work is being done (good).

**TL-48, Intersection: Far-Side Lane Closed (TCP), Two-lane Road, VSD and SD, p. 223:** The new TL-48 is essentially the same as in the 2001 Book 7, except that TC-2Bs or TC-2As have been added on the side road.

**TL-49, Intersection: Far-Side Lane Closed (Detour), Two-lane Road, SD and LD, p. 224:** The new TL-49 is essentially the same as in the 2001 Book 7, except that TC-2s and TC-1s have been added on all approaches (an improvement).

**TL-50, Work in Intersection (TCP), Two-lane Road, VSD and SD, p. 224:** The new TL-50 uses four TCPs to control both the through road and the side road, whereas the 2001 Book TL-50 used two TCPs to control the through road and the Rb-91 Yield to Oncoming Traffic sign on the side road approaches. There is an inconsistency in TL-50: the position of the TCP is as shown in the 2001 Book 14, namely the TCP table distance from the work area. But to be consistent with Section 5.2.3, the TCP should stand a distance from the work area equal to the taper length from Table A plus the value from the new TCP table. **The MTO Errata Document states: "The position of the TCP for south and east approaches of the intersection in TL-50 should be consistent with other similar layouts (e.g., TL-20A). The TCP should be placed at a distance specified in the TCP Table on page 100 from the first cone of the transition taper. The length of the transition taper should be equal to 1a\* (Table A and Table B).**

**TL-51, Intersection: Near-Side Right or Left Through Lane Closed, Multi-lane Non-freeway, VSD, SD and LD, p. 225:** The new TL-51 is essentially the same as in the 2001 Book 7, except that fewer options are permitted. The TC-12 at the end of the lane closure taper is required for NPRS of 70 km/h or higher, rather than all the time in LD. For consistency with other TLs, the southbound direction should also have a TC-2B or TC-2A, and these signs should also be required for VSD. In several TLs, including TL-51, the TC-4 Lane Closure Arrow sign (northbound) has not been properly positioned at the beginning of the taper, but at some undefined positioned part way through the taper.

**TL-52, Intersection: Right-Turn Lane Closed, Multi-lane Non-freeway, VSD, SD and LD, p. 225:** The new TL-52 is essentially the same as in the 2001 Book 7.

**TL-53, Intersection: Left Turn-Lane Closed, Multi-lane Non-freeway, VSD, SD and LD, p. 226:** The new TL-53 is essentially the same as in the 2001 Book 7, except that a TC-1 has been added in the southbound direction (for consistency, a TC-2B or TC-2A should also have been added). Note (ii) does not seem to apply to this TL; it says, "It may be necessary to prohibit left turns in the direction reduced to one lane." But none of the roadways in TL-53 is reduced to one lane. **The MTO Errata Document states: "Note ii of Figure TL-53 should read: 'It may be necessary to prohibit left turns.'"**

**TL-54, Intersection: Lane Adjacent to Right-Turn Lane Closed, Multi-lane Non-freeway, SD and LD, p. 226:** The new TL-54 is essentially the same as in the 2001 Book 7, except that fewer options are permitted. The TC-12 at the end of the lane closure taper is required for NPRS of 70 km/h or higher, rather than all the time in LD. An LBA has been added upstream of the work area.

**TL-55, Intersection: Lane Adjacent to Left-Turn Lane Closed, Multi-lane Non-freeway, SD and LD, p. 227:** The new TL-55 is essentially the same as in the 2001 Book 7, except that the TC-12 is now required for NPRS of 70 km/h or higher, and it can no longer replace a TC-3 and TC-4 for SD. The Wa-33LR hazard marker has also been removed.

**TL-56, Intersection: Right-Turn Lane & Adjacent Through Lanes Closed, Multi-lane Non-freeway, VSD, SD and LD, p. 227:** The new TL-56 is essentially the same as in the 2001 Book 7, except that fewer options are permitted. The TC-12 at the end of the

lane closure taper is now required for NPRS of 70 km/h or higher, rather than all the time in LD, and it can no longer replace a TC-3 and TC-4 for SD.

**TL-57, Intersection: Left-Turn & Adjacent Thru Lanes Closed, Multi-lane Non-freeway, VSD, SD and LD, p. 228:** The new TL-57 is essentially the same as in the 2001 Book 7, except that the TC-12 at the end of the lane closure taper is now required for NPRS of 70 km/h or higher, rather than all the time in LD, and it can no longer replace a TC-3 and TC-4 for SD.

**TL-58, Work in Intersection: Right Lane Closed, Multi-lane Non-freeway, SD and LD, p. 228:** The new TL-58 is essentially the same as in the 2001 Book 7, except that fewer options are permitted. The TC-12s at the end of the lane closure tapers are now required for NPRS of 70 km/h or higher, rather than all the time in LD, and a TC-12 can no longer replace a TC-3 and TC-4 for SD.

**TL-59, Work in Intersection: Left Lane Closed, Multi-lane Non-freeway, SD and LD, p. 229:** The new TL-59 is essentially the same as in the 2001 Book 7, except that fewer options are permitted. The TC-12 at the end of the lane closure taper is now required for NPRS of 70 km/h or higher, rather than all the time in LD, and it can no longer replace a TC-3 and TC-4 for SD. A TC-1 and TC-2B or TC-2A have been added to the southbound approach. The arrow is missing from the westbound TC-7. **The MTO Errata Document states: "The TC-7 sign in the westbound direction should be considered having an arrow pointing towards right."**

**TL-60A, Work in Intersection: Road Closed (Detour) – Option 1, Multi-lane Non-freeway, SD and LD, p. 229:** The new TL-60A is essentially the same as in the 2001 Book 7, except that it has been rotated through 90 degrees. A TC-1 and TC-2B or TC-2A have been added to the southbound approach. The 2001 TL title for TL-60A was the same as for TL-60B, so that it was clearly understood that the two options were for the same situation.

**TL-60B, Work in Intersection: Two Lanes Closed - Option 2, Multi-lane Non-freeway, SD and LD, p. 230:** The new TL-60B is essentially the same as in the 2001 Book 7, except that fewer options are permitted. The TC-12 at the end of the lane closure taper is now required for NPRS of 70 km/h or higher, rather than all the time in LD, and it can no longer replace a TC-3 and TC-4 for SD. As an enhancement, we recommend another TC-7 in the northbound direction, with the arrow up and to the left, on the south side of the work area, to the left of the TC-7 with the arrow to the right already shown. This will help ensure that northbound traffic stays out of the work area.

**TL-61, Intersection: Far-Side Lane Closed, Multi-lane Non-freeway, VSD, SD and LD, p. 230:** The new TL-61 is essentially the same as in the 2001 Book 7, except that fewer options are permitted. The TC-12s are now required for NPRS of 70 km/h or higher, and a TC-12 can no longer replace a TC-3 and TC-4 for SD. TC-1s have been added for all approaches for LD. A TC-2B or TC-2A has been added for the southbound approach, but not for the eastbound or westbound approaches. We believe that the far-side TC-12 should be in right flashing arrow mode rather than bar, since it's more similar to the TC-4 message.

**TL-62, Intersection: Right Turn Lane (Far-Side Right Lane Closed), Multi-lane Non-freeway, SD and LD, p. 231:** The new TL-62 is essentially the same as in the 2001 Book 7, except that fewer options are permitted. The title should say “Intersection: Right Turn Lane Open (Far-Side Right Lane Closed). The TC-12 at the end of the lane closure taper is now required for NPRS of 70 km/h or higher. The TC-12 in bar mode in the near-side closed lane has been deleted. We believe that the far-side TC-12 should be in left flashing arrow mode rather than bar, since it’s more similar to the TC-4 message.

**TL-63, Intersection: (Left Turn Lane Open) Far-Side Left Turn Lane Closed, Multi-lane Non-freeway, SD and LD, p. 231:** The new TL-63 is essentially the same as in the 2001 Book 7, except that fewer options are permitted. The TC-12 at the end of the lane closure taper is now required for NPRS of 70 km/h or higher. The TC-12 in bar mode in the near-side closed lane has been deleted. Consistent with the principles of Book 7, it may be added, and we recommend it. We believe that the far-side TC-12 should be in right flashing arrow mode rather than bar, since it’s more similar to the TC-4 message. Also, the northbound TC-4 should be positioned at the beginning of the taper rather than part way along it.

**TL-64, Pedestrian Accommodation: Mid-Block Sidewalk Detour onto Roadway, Multi-lane Non-freeway, SD and LD, p. 232:** The new TL-64 is essentially the same as in the 2001 Book 7, except that the TC-12 at the end of the lane closure taper is now required for NPRS of 70 km/h or higher, rather than all the time in LD. Notes have been added at the bottom. We believe note ii should say, “If close to an intersection, pedestrians....” rather than “If close to a sidewalk, pedestrians....”

**TL-65, Pedestrian Accommodation: Intersection Sidewalk Detour onto Roadway, Multi-lane Non-freeway, SD and LD, p. 232:** The new TL-65 is essentially the same as in the 2001 Book 7. The TC-12 at the end of the lane closure taper is now required for NPRS of 70 km/h or higher, rather than all the time in LD. In the upper right corner of TL-65, a box is shown with a TC-4 or, if the NPRS is 70 km/h or higher, a TC-12 in bar mode. The orientation of the box reads as if it applies to the northbound traffic, whereas it is intended to apply to the eastbound traffic. This box should be re-oriented through 90 degrees so that it clearly applies to eastbound traffic. Further, the TC-4 in that box should be shown with the arrow pointing up and to the left (not to the right), and the TC-12 should be in left flashing arrow mode rather than bar, since it’s more similar to the TC-4 message. **The MTO Errata Document states: “The box should be considered as oriented in a way so that it applies to eastbound traffic. The TC-4 should be considered pointing up and to the left.”**

**TL-66, Pedestrian Accommodation: Vehicle Encroachment on Road/Sidewalk, Multi-lane Non-freeway, VSD and SD, p. 233:** The new TL-66 is essentially the same as in the 2001 Book 7, except that fewer options are permitted. The TC-12 at the end of the lane closure taper is now required for NPRS of 70 km/h or higher. TL-66 shows it as a VSD and SD typical layout, but Table G shows it as a SD and LD typical layout. **The MTO Errata Document states: “The usage of TL-66 as shown in Table G on page 195 should be considered as correct. TL-66 should be considered for short and long duration with the following modifications:**

- Additional TC-1 sign should be considered for long duration works in advance of and at a distance of 5\* from the TC-2B or TC-2A sign for both directions.
- TC-2B or TC-2A should be installed as required. The notes in brackets showing “(short duration)” under TC-2B or TC-2A for both directions in the layout should be omitted.”

**TL-67, Zone Painting (non-coning paint), Two-lane Road, Mobile Operations, p. 233:** The new TL-67 changes the requirement for non-MTO road authorities. The 2001 TL-67 did not require a crash truck on non-MTO roads, and the sign truck only on roads with high speed (80 or higher) and/or high volume. The new TL-67 requires a crash truck on non-MTO roads with high speed (80 or higher) and/or high volume, and, implicitly, requires a sign truck on low volume and low speed roads. Requirements for MTO two-lane roads have not changed. Both the TL text itself and text in Note 1 imply that a sign truck is a buffer vehicle. This is incorrect; a sign truck is not a buffer vehicle. **The MTO Errata Document states: Figure TL-67, the wording on the right side of the shown buffer vehicle should read: Buffer Vehicle: Crash Truck (NPRS 80 km/h or greater); Blocker Truck (NPRS less than 80 km/h). Note i of the layout should read: A Crash Truck must be used on high volume roads and/or where the NPRS is 80 km/h or higher. Road Authorities, other than MTO, may not require a Buffer Vehicle on Low Volume roads with NPRS less than 80 km/h.”**

**TL-68, Zone Painting: Right or Left Lane Closed (non-coning paint), Multi-lane Non-freeway and Freeway, Mobile Operations, p. 234:** The new TL-68 is essentially the same as in the 2001 Book 7. The requirements for non-freeways have not changed. However, TL-68 has always been problematic, as it applies to freeways. BV3 is separated from the striper by LIDG, which is appropriate. But if BVs 1 and 2 are intended to function as buffer vehicles, they should be positioned closer to BV3 than 100-600 m so that they could protect against both lateral and longitudinal intrusions. If MTO wants to use the 100-600 m distances shown in TL-68, primarily for paint drying, recognizing that BVs 1 and 2 serve virtually no buffering function, then it might as well use sign trucks with TC-12s, rather than use BVs. At the very least, BV1 could be replaced by a sign truck. If MTO wants to retain three BVs for buffering purposes, they should all be separated by an LIDG distance. As drawn, TL-68 appears to serve both purposes (buffering and paint drying), but really serves only paint drying, except for BV3.

**TL-69, Zone Painting: Intersection Turn Arrows, Two-lane and Multi-lane Non-freeway, VSD and SD, p. 234:** The new TL-69 is essentially the same as in the 2001 Book 7, except that a work vehicle with 360/4WF or a TC-12 is now required when workers are present and the NPRS is 70 km/h or higher.

**TL-70, Zone Painting: Intersection Stoplines and Crosswalks, Two-lane Road, VSD and SD, p. 235:** The new TL-70 is essentially the same as in the 2001 Book 7, except that an Rb-91 Yield to Oncoming Traffic sign has been added on the approach where the stopline is being painted. This traffic control may be used only on low volume roads, with speed of 60 km/h or lower, otherwise TCPs must be used. (improvement)

**TL-71, Zone Painting: Intersection Left Lane Closed, Multi-lane Non-freeway, VSD and SD, p. 235:** The new TL-71 is essentially the same as in the 2001 Book 7, except that TC-3 signs and termination areas have been added on all approaches.

**TL-72, Zone Painting: Intersection Right Lane Closed, Multi-lane Non-freeway, VSD and SD, p. 236:** The new TL-72 is essentially the same as in the 2001 Book 7, except that TC-3 signs have been added on all approaches.

**TL-73A, Survey Operations, Instrument on Shoulder or Centreline, Two-lane Road, VSD and SD:** Deleted from Book 7.

**TL-73B, Intermittent Work, Two-lane Road, VSD and SD:** There are no longer any TLs specifically called Surveying in the new Book 7, though the TL diagrams and notes do reference Surveying. In TL-73B, TL-75, and TL-76, the three ranges of speed in the note are ambiguous. It is not clear whether 60 km/h requires 200 m sight distance or 150; it is not clear whether 80 km/h requires 250 m sight distance or 200, or is this speed not covered? Also, the last part of the notes on TL-73B, TL-75 and TL-76 is confusing: “duration equals continuous or total of intermittent momentary work on shoulder”. What does this mean? **The MTO Errata Documents states: Replace the boxed explanation in Figures TL-73B, 75 and 76 with: “This layout is applicable where a worker/technician is moving throughout the work area intermittently with only brief stationary moments, for example a survey technician. A technician may intermittently and MOMENTARILY (NOT CONTINUOUSLY) enter the travelled lanes of the roadway ONLY if sight lines in both directions:**

- Exceed 250 m where NPRS is greater than 80 km/h,
- 200 m where the NPRS is greater than 60 km/h and less than or equal to 80 km/h, or
- 150 m where the NPRS is 60 km/h or less.

**Any worker/technician/equipment that occupies the live lane continuously, whether moving or stationary is considered very short or short duration and the appropriate typical layouts must be used. The duration of the work equals total time between setup and removal of traffic control devices to complete the work within the intermittent work area.”**

**TL-74, Work on Centreline (Curve or Hill):** Deleted from Book 7.

**TL-75, Intermittent Work: Intersection, Two-lane Road, VSD and SD, p. 237:** The new TL-75 is essentially the same as in the 2001 Book 7, except for the name change and the note, which is ambiguous. See TL-73B above.

**TL-76, Intermittent Work, Multi-lane Non-freeway, VSD and SD, p. 237:** The new TL-76 is similar to the one in the 2001 Book 7, but some useful notes have been deleted: “For non-freeway, undivided, work on centreline, use TL-26” and “For survey work on freeways, use TL-29.” (not TL-28, which is now only Mobile).

**TL-85 to TL-93: Roundabouts, pp. 238-242:** These TLs are all new to Book 7, as roundabouts were not addressed in the 2001 Book 7. There are some issues related to these TLs, which are described in our ATC Website Posting, Part 2.

**The MTO Errata Document replaces the original TL-86 with a revised version of TL-86. (Note: However, the revisions have introduced errors into TL-86. There are now several unidentified signs on the TL. Also, considering the upper left approach, the two signs in**

the island nearest the circle are incorrect. For example, the Rb-43 (left or straight through) sign cannot be used together with the TC-25L Keep Left sign. The straight through movement cannot be made by keeping left. The same also applies to some other signs in TL-86.)

**Appendix 1: Temporary Traffic Control for Unplanned Events, pp. 243-263:** This appendix on unplanned events is new to Book 7, as these were not addressed in the 2001 Book 7. There are some issues related to this section, which are described in our ATC Website Posting, Part 2.

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