Arges Training & Consulting (ATC)

Comments on 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 2, July 22, 2016)

1. General Comments

These comments represent our review of the 2014 final updated OTM Book 7 Version 2, dated January, 2014, as revised after MTO's issuance of the July, 2016, Errata Document for Book 7. We note that there have been many changes, some useful Content additions which we have recommended previously (roundabouts, unplanned events), and many format revisions, some of which are positive, some less so (in our view). The update of OTM Book 7 also provided many opportunities for useful additions and improvements, some of which were accepted and others were not. ATC has provided MTO extensive comments on Book 7 Drafts 1 and 2, some of which were adopted, and some not. (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.)

These comments are a companion piece to the ATC Website Revised Posting Part 1, which is a Practical User's Guide to the Changes to OTM Book 7, also revised to reflect the MTO Errata Document. Both Parts 1 and 2 apply to the Book 7 Office Edition.

These comments are organized into three parts:

1. General Comments
2. Specific Comments on 2014 Final edition, Version 2, as revised in accordance with the MTO Errata Document.
3. Grammatical and typographical errors

For many years, in the Traffic Control Manual for Roadway Work Operations and in the 2001 Book 7, a fundamental principle was that the typical layouts and other stated requirements represented **minimum typical guidelines**. It was clear that a typical layout could be enhanced, but reductions below the minimum typical guidelines were not permitted. We believe that this principle should continue to be clearly stated, and apply to all Ontario roads. While it is made clear that OTM Book 7 practices must be adhered to for work on MTO highways, it is only recommended that they be followed on other highways. In keeping with the MTO's role as the organization charged with and responsible for setting traffic control standards in the province, in Section 1.3, paragraph 2, we would prefer sentence 2 to read similar to the following: "The minimum typical guidelines and principles for temporary conditions outlined in OTM Book 7 apply to (rather than "it is highly recommended that the guidelines... be adopted by") all public authorities and private companies and contractors with safety responsibilities in construction, maintenance, utility and other work on public highways and streets."

In the 2001 Book 7, MTO and the Technical Advisory Committee were very keen on making the manual user-friendly by including many more detailed guidelines and procedures. While some of these remain in the 2014 Book 7, many of them have been deleted or significantly cut.

2. Specific Comments on 2014 Final Version of OTM Book 7, as revised in MTO Errata Document

1. **Foreword**, p. i: With the MUTCD and KHGSPM having passed from current use, para 2 should state that this is an update of the March, 2001 edition of Book 7 rather than that it draws from MUTCD. (The wording has simply been carried over from the 2001 Book 7.)

2. **Table of Contents and structure of Book 7**
    a. Section 2.3.6 (Rolling Closures) would appear to fit more naturally as Section 3.2.5 (after Pace Vehicles) in Section 3.2 (Devices to Regulate/Control the Flow of Traffic), similar to the way they are grouped together in Section 5.1.
    b. Section 3.3.6 (Truck or Trailer-mounted Attenuators) would appear to fit more naturally after or within Section 3.3.1 (Buffer Vehicles and Longitudinal Buffer Areas), since all buffer vehicle crash trucks must have TMAs. It would also be desirable to use different terms for Truck-mounted Attenuators and Trailer-mounted Attenuators (not TMAs for both), since they are mounted differently and behave differently.
    c. It would be desirable to address the use of the Rb-91 (YIELD TO ONCOMING TRAFFIC) along with TCPs, in Section 3.2, as the devices in 3.2.1 and 3.2.2 form a progression and family of devices. This also applies to Section 5.2.
    d. Table of Contents and structure of Book 7 has been substantially revised.
    e. We suggest an additional pedestrian sign, with text 'Pedestrians Use Other Sidewalk', perhaps as TC-40A. We also suggest some additional Cyclist signs, see comments below.

3. **Introduction:**
    a. Section 1.3: Application of Guidelines.
        i. Para 1: Reference to providing more than the minimum guideline, where special situations occur, has been removed. This is an unfortunate and undesirable deletion. It would be helpful to insert in sentence 3, "…may require variations from or enhancements to the guidelines as illustrated."
    b. Section 1.4: How to Use This Book
        i. P. 6, Descriptions of Sections 5 and 6, sentence 1: We suggest that "...used on MTO highways" should be "...used on Ontario highways." Some of the applications in Sections 5 and 6 apply to all roads rather than to MTO roads only, and MTO is not the only jurisdiction with freeways.

4. **Section 2, Temporary Work Zone Design**
    a. Section 2.1, Fundamental Principles of Work Zone Design
        i. P. 8, para 3. We suggest that the last sentence apply to all road authorities, rather than MTO only.
    b. Section 2.2, Defining the Roadway Environment

i. P. 11, “rural two-lane environments”: The first sentence appears misleading, in that many southern Ontario rural two-lane roads are not typically characterized by long trip distances or few alternate routes. We suggest something along the following lines: “Depending on location, some rural two-lane roads may be characterized by ....” The alternatives suggested for consideration seem odd. First, on rural two-lane roads, many road authorities are looking for the minimum traffic control, rather than for added traffic control, at additional cost and inconvenience (additional signs, higher reflectivity clothing, and more active devices). The first bullet point, rather than suggesting additional advance warning signs, might be better to suggest “Ensure proper placement of advance warning signs, taking into consideration ~~expected length of queue and~~ limited visibility by a horizontal or vertical curve.” Why would there be a reference to a queue length (result of congestion) when the text above says that such roads are characterized by rare congestion? The second bullet point recommends higher reflectivity clothing. Higher than what? If reflective clothing meeting the requirements may be used elsewhere, why wouldn’t it be acceptable on these roads? The last bullet point is always a possibility, but it should be noted that the tables A, B and C already assume that the operating speeds are about 10 km/h higher than the normal posted speed.

c. Section 2.3, Configurations for Temporary Conditions
   i. Section 2.3.1, Off Shoulder: para 2, sentence 2: If a shoulder is not clearly defined, how does one determine the edge of the travelled lane, or a point 3.0 m beyond it?
   ii. Section 2.3.1, Off Shoulder: Subject to clarification by MOL, this section should state whether or not a Traffic Protection Plan (TPP) is required for such work.
   iii. Section 2.3.3, Lane Encroachment: Para 2 refers only to freeways, suggesting that lane encroachment on non-freeways is acceptable. Should not TL-13 be retained for this purpose for both non-freeways and freeways? We are not fully convinced that lane encroachment on freeways for short or long duration is unacceptable, but if the consensus is that it should not be used under any circumstances, we would suggest wording along the following lines: “Except where required for some maintenance mobile operations, lane encroachment <u>must not be used on freeways for work operations, but a full lane closure must be used instead.”</u> Road authorities or contractors may decide by policy not to permit such operations, but should the typical layout not be retained for those who choose to do so? See comment under General Notes, note 7, p. 197.
   iv. Section 2.3.4, Partial Lane Shifts: we suggest the following wording for sentences 1 and 2: “A partial lane shift is where <u>the centreline on a two-lane road</u> ~~more than one lane~~ is temporarily realigned. This is used when the encroachment of roadside operations will result in a traffic lane width of less than 3.0 m, <u>but where</u> ~~however~~ squeezing all lanes minimally will provide lane widths that are at least 3.0 m ~~(3.5 m for freeways)~~ for each lane.” These revisions will correct two possible misinterpretations of the existing text: (1) the use of ‘however’ rather than ‘but where’ suggests that

squeezing all lanes minimally will always provide necessary lane widths of 3.0 m, and this is not necessarily true; (2) that partial lane shifts may be used on multilane roads, both non-freeways and freeways.

v. Section 2.3.4, second last paragraph: Reference should be to 'partial lane shifts', not 'lane shifts'. .

d. Section 2.4, Component Areas for Temporary Conditions
   i. Section 2.4.3, Transition Area, why is the term used in this section 'parallel sections' but in Tables A, B and C, the term used is 'tangent section'?
   ii. Section 2.4.4, Longitudinal Buffer Area (LBA).
      1. Para 4: An LBA is <u>not</u> recommended in all situations where practicable. There are situations where an LBA is not recommended or required. We suggest that the third bullet point begin: "On two-lane roads, that is, …" It would be useful to point out in this bullet point that space restrictions in urban areas may often mean that there is insufficient space for an LBA.

e. Section 2.6, Road User Considerations
   i. Section 2.6.1, Speed Control in Temporary Work Zones
      1. P. 25, para 1, sentence 1: This could easily be interpreted to mean that some active, deliberate action to manage speed is necessary. We recommend that the first two paragraphs of Section 1.11 in the 2001 Book 7 be reinstated, which make the points that unwarranted or excessive regulatory speed limits are not very effective (a reflection of the findings of the 1995 MTO Construction Zone Speed Limits forum), and sometimes no reduction in the speed limit is required, and such reductions should be avoided where possible.
      2. P. 25, bullet point 2. We suggest rewording along the following lines: "establishment of a designated construction zone <u>with reduced regulatory speed limits and the doubling of speed fines when workers are present. This measure is only effective with police presence and enforcement."</u> Somewhere in Book 7 (if not here, somewhere else), the issue of doubling fines when workers are present needs to be addressed. How do road users and the police know when workers are present? If they wait until they see a worker, it may be too late. We recommend that the TC-2A or TC-2B (ROAD WORK AHEAD) sign be used for this purpose, whenever workers are present, and that it be removed when they are not present. This will assist both road users and police. Further, somewhere it should be addressed whether the doubling of fines applies to work areas where workers are protected by concrete barriers.
      3. P. 28, Turn Prohibitions and Other Regulations in the Construction Zone: It seems oddly out of place to find this section in a main section on Speed Control (or Management). We suggest that it might be preferable to state, in sentence 3, "The regulations should desirably be formally enacted through the regulatory process." (Sometimes it may be desirable to install regulatory turn restriction signs even if they haven't been formally approved due

to insufficient time. Most road users will obey them, which is the desired objective.)

ii. Section 2.6.2, Pedestrian Safety Considerations
    1. We recommend that this section should include a bullet point noting that often the best protective measure for pedestrians is to direct them to a sidewalk across the road before they even reach the work area, using the TC-40 sign and a new sign "PEDESTRIANS USE OTHER SIDEWALK", to be included and shown in Book 7.

iii. Section 2.6.3, Cyclist Safety Considerations
    1. We recommend the addition of three new signs to Book 7, a CYCLISTS USE PEDESTRIAN PATH sign, a CYCLISTS DISMOUNT AND WALK sign (where cyclists are directed to use a pedestrian path), and a CYCLISTS MERGE WITH TRAFFIC sign (where a designated bicycle path, demarcated or not, is cut off by a work zone). This last sign advises both motorists and cyclists that lateral space is being reduced and emphasizes that they need to share the road. The rationale for such signs should be outlined, either here or where the signs are described.

5. Section 3, Description of Typical Traffic Control Devices

a. Opening para, p. 37, sentence 4: We recommend adding to this sentence, as underlined: "The information will be of interest to users who are required to apply or modify a typical layout or...."

b. P. 38, Section 3.1.1, Cones, third sentence. Since cones may be used on both non-freeways and freeways for SD operations, we recommend that this sentence be rewritten along the following lines: "Cones are used primarily for very short duration and short duration operations on both non-freeways and freeways." (the text suggests that they may be used for all durations on non-freeways, which is not correct.) The MTO Errata Document clarifies this point.

c. P. 40, Section 3.1.6.1, Orange Temporary Pavement Markings. In the interest of uniform application, it would be helpful to list in Book 7 the criteria applied in the MTO Regions for their use.

d. P. 44, Section 3.1.8.2 Flashing Arrow Board Signs (TC-12s): The clarification in the MTO Errata Document actually makes things worse. The original text states that "In mobile operations, flashing arrow boards 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), and the bar mode is used on two-lane roads (where a flashing arrow could suggest to drivers that they can safely overtake the work vehicle/BV." Thus, in mobile operations on multi-lane roads, all TC-12s on vehicles would be in arrow mode. MTO's clarification states that only the TC-12s on the sign trucks and buffer vehicles are in arrow mode, implying that the work vehicle, in the lead, would have its TC-12 in bar mode, as shown on some typical layouts. Further, the MTO Errata Document deletes the reference to the use of bar only on two-lane roads. Oddly, MTO has left certain figures inconsistent with its new proposed convention.

In our view, the convention should be: (1) for two-lane roads, bar mode for all operations, for the reason cited above; (2) for multi-lane roads: (a) a flashing

arrow means 'Stay this Side', and a lane shift is usually required (but not necessarily a lane shift for each flashing arrow used, as is suggested by the current Book 7 text). For mobile operations, all vehicles should have TC-12s in arrow mode, for the reason cited above. For stationary operations, the TC-12 at the end of a lane closure taper should always be a flashing arrow; if a lane is closed, but there is no taper (e.g., far side intersection closure), the TC-12 should also show a flashing arrow, pointing to the open lane. For work on a shoulder or in a lane beyond the end of the lane closure taper, the TC-12 should show a bar. The 2014 Book 7, for a multi-lane road lane closure, recommends a TC-12 flashing arrow at the end of the taper, but permits one optional additional TC-12 on the shoulder at the beginning of the taper. Use of TC-12s on MTO freeways has deviated widely from such practice, where we have often seen three, four or five TC-12 flashing arrows used for a single lane shift.

e. P. 47, Section 3.2.1, TCPs. We recommend reconsideration of the deletion of Table 6 to clarify where TCPs may and may not be used. The MTO Errata Document replaces the boxed information on p. 48 with what appears to be the old Table 6, but has changed it from Table 6. Previously, there were four columns instead of the now five columns; previously the speed ranges were 60 km/h or lower, and 70-90 km/h. The revised table now permits measures for 70 km/h that were previously prohibited. It is not known whether MTO got Ministry of Labour's agreement for this change.

f. Section 3.2. It is confusing, and not user-friendly, to separate the brief description of these devices/measures in Section 3.2 from the description of their operation in Section 5. If this confusing arrangement is to be retained, the corresponding section on usage in Section 5 should at least be referenced at the end of each section in Section 3.2.

g. P. 49, Section 3.2.2.1, last para, we recommend an addition to the last sentence. It would be clearer to say, "Road authorities may establish their own policies on AFAD use in work zones, and approval from the road authority is required before they are used." The MTO Errata Documents deletes the last sentence of the first paragraph in Section 3.2.2.1, which says, "At least one TCP must be dedicated to controlling the AFADs." The MTO Errata Document also deletes the second bullet point in Section 3.2.2.1, which says, "Where the work zone is short and visibility is good one operator can control multiple units at a distance by a remote control or can control traffic at one end of the work zone with a STOP/SLOW paddle and the unit at the opposite end with a remote control." These revisions are problematic; they encourage the assumption that two AFADs can always be operated by a single TCP, whereas the original text implied that under some circumstances (e.g., poor visibility due to hills and curves), two TCPs might be required to operate the two AFADs. It is recommended that the original text be retained.

h. P. 51, Section 3.2.2.4, Temporary Traffic Signals (TTSs): This section should refer to the relevant section of the HTA.

i. P. 51, Section 3.2.3, Pilot Vehicles, para 1, last sentence: Is it intended that pilot vehicles might be controlled by traffic controls other than TCPs at each end of the one-lane section? If not, it would appear preferable to say, "Pilot vehicle operators must be in communication with the TCPs controlling traffic at each end of the one-lane section."

j. P. 53ff, Section 3.3.1, Buffer Vehicles and Longitudinal Buffer Areas

i. We find the separation of this subject into Sections 3 and 5 to be confusing.
ii. Are BTs to be retained? After 2003, it would make sense to make them all CTs, since they are so much safer for motorists and for CT drivers.
iii. In para 1, we recommend wording for sentence 2 along the following lines, "The BV in stationary operations should be unoccupied (except when being moved), to remove the driver from risk of injury."
iv. It appears that trailer-mounted attenuators are now acceptable. How were they approved? Are there any standards or conditions that must be met? Are any of them on the DSM?
v. P. 54, para 2. The last sentence says CTs are not required but are recommended for VSD work on freeway shoulders. The OHSA regulation does not require them in such circumstances, but MOL issued an order against MTO many years ago requiring their use on shoulders for MTO Central Region. What is current MTO practice on this matter, both in Central Region and in other regions? Should this not be clarified here? Without clarification, the sentence seems misleading.

k. P. 54ff, Section 3.3.3, Barriers.
i. P. 54, Section 3.3.3, the MTO Errata Document deletes the last sentence of the first paragraph in Section 3.3.3, Barriers, which reads, "Most systems can absorb a hit from a passenger car up to an angle of 20 degrees without penetration.
ii. P. 55, Section 3.3.3.1, Para 2, the third-last and second-last sentences are confusing. The first part of the third-last sentence says that concrete barriers "...do not have to be placed at an angle for the purpose of a road closure" (which means that it can be placed perpendicular); the second-last sentence says that "...TCBs must not be placed perpendicular to the direction of travel. The two sentences appear contradictory. The MTO Errata Document removes the contradiction by replacing the whole of Section 3.3.3.1 with two paragraphs stating, after a description of TCB, that TCB shall be according to OPS or other standard when specified by a road authority, and TCB must not be placed perpendicular to the direction of travel and are not intended to be used across a roadway for a road closure. (These paragraphs would be improved by consistent use of 'TCB' as either singular or plural.) The MTO Errata Document also deletes the margin note on TCBs.
iii. P. 56, Section 3.3.3.3. Some reference should be made to the need to ensure that ballast-filled barriers are sufficiently filled, and not underfilled to ease portability. (In years past, MTO would not approve their use for this reason, as contractors were underfilling them, greatly reducing their effectiveness.)
iv. The MTO Errata Document replaces the title of Section 3.3.3.4 Barrier End Treatments with the new title Energy Attenuators. A clearer title would be Barrier Energy Attenuators. The complete text of Section 3.3.3.4 has been deleted and replaced with "Energy attenuators on barrier ends are needed to reduce the severity of impacts. Energy attenuators shall be according to OPS or other standard as specified by the road authority." Removed are the references to connections, attachments, flaring the barrier and burying the barrier end.

v. P. 58, Section 3.3.5, Vehicle Arresting Systems. Have these been approved for use in Ontario? Which ones? Which criteria must they meet? Are there specs for them? Are they included in OPSS? Are any of them on the DSM? Are guidelines for their use included in Book 7? If not, is it desirable to encourage their use (by inclusion in Book 7) without describing how they should be used?

6. Section 4, Implementation of Temporary Traffic Control

a. P. 63ff, Section 4.1, Preparation Before Beginning Work

i. P. 67, Figure 2. Should the form include "Work Zone Reduced Speed Limit"? Note that Figure 2 does not constitute a Traffic Protection Plan (TPP). It might be preferable to show a sample TPP, which would include some of this same info, rather than suggest that two forms are required, or leave it ambiguous.

b. P. 68ff, Section 4.2, General Principles for Set Up and Removal of Traffic Control

i. P. 70, Section 4.2, first paragraph under "Additional Principles for Freeways". When the 2001 Book 7 was written, the first sentence was considered valid, because it was understood MOL would rescind its order against MTO. This has not happened, to our knowledge. Therefore some clarification would be helpful regarding sentence 1, because a CT still appears to be required for this purpose, in Central Region, and may have been extended by MTO to other regions. This also applies to Section 4.2.1.1 (p. 71), first bullet point.

ii. P. 71-72, Section 4.2.1.1, Steps A through D. There have been some changes from the 2001 Book 7, which described the set-up procedures at a level of detail insisted upon by MTO. The description is now somewhat abbreviated, although Figure 3 has been modified from the old TL-77 series, and a fourth sub-figure has been added. In Draft 2, the text for Step D stated that after passing the TC-12 at the end of the taper, the BV switches its TC-12 to bar mode. This is now shown in step D, but has been deleted from the text. We recommend that the BV continue to show the left flashing arrow throughout the installation. If this were adopted, the reference to switching to bar mode in Step D would be deleted. The MTO Errata Document, in the last two bullet points of Section 4.2.1.1, replaces 'BV' (Buffer Vehicle) with 'CT' (Crash Truck).

iii. P. 74-76, Section 4.2.1.2, Steps A through D. Again, we would raise the question of whether the CT should show the TC-12 in left flashing arrow mode or bar mode after it passes the second trailer-mounted TC-12, as in ii. MTO now shows it in arrow mode in Figure 4, which is our preference. This has now been reflected in the text and in Figure 4, Step D. Note, however, that this is different from the practice recommended by MTO in Section 4.2.1.1.

iv. P. 77-79, Section 4.2.1.3, Steps A through E. Step A, first bullet point, sentence 2, see note i above. There is also a reference to installing signs on the shoulders, whereas the title says there are no shoulders. However, this sentence is valid if, as shown in the title, there is no shoulder on the roadway side where the lanes are being closed, but advance signs may be placed on shoulder on the opposite side of the roadway. But then the last sentence of the first bullet point is not general

enough; it should say, “Signage is installed either on both sides of the freeway if space permits, or on the right side (or left side, as the case may be) of the roadway by using double signage.” Figure 5, Steps D and E now correctly show CT1 positioned at an LBA distance beyond the end of the taper. There is still an error, however, in Figure 5, Steps D and E. If CT1 is in its proper position, as shown, this leaves no TC-12 at the end of the first taper. This is incorrect and undesirable. CT1 should tow a TC-12 trailer and park it at the end of the first taper in right-flashing arrow mode. The 2001 Book 7, at MTO insistence, showed CT1 parked at the end of the first taper. We objected at the time, but MTO insisted on this unsafe practice. Again, as before, we recommend that CTs keep their TC-12 in right-flashing arrow mode as long as they are moving forward, and revert to bar mode when they are positioned an LBA distance downstream from the trailer-mounted TC-12s at the ends of the tapers.

v. See other comments in ATC Website Posting Part 1.

vi. 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.

vii. 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.

7. Section 5, Specifications for Devices to Control the Flow of Traffic

a. P. 89, we believe that the reference to traffic control devices “used on provincial highways and other roadways where MTO is the road authority” is too MTO-centric. We recommend that the reference should be to traffic control devices “used on Ontario highways”, which includes municipalities?

b. P. 90, Section 5.1.1, Pilot Vehicles, para 1: Is it intended that pilot vehicles might be controlled by traffic controls other than TCPs at each end of the one-lane section? If not, it would appear preferable to say, “Pilot vehicle operators must be in communication with the TCPs controlling traffic at each end of the one-lane section.”

c. P. 96, Clothing, bullet point 1, The requirement that reflective tape be on the hard hat goes beyond Ministry of Labour requirements. The MTO Errata Document changes the original wording on the hard hat “If used at night, the hard hat must have reflective tape...” to “If used at night, it is recommended that the hard hat have reflective tape...”

d. 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.”

e. 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."

f. P. 100, Table 2 (TCP Table): this table has been revised from Table 7 in 2001 Book 7, and from the Table 2 in Draft 2. The distances of the TCP in final Book 7 are now from the first cone of the transition area rather than from from the work area, and Table A or B is used to determine the length of the transition area (taper). This leads to some very long distances from the TCP to the work area (in some cases, double the distance), and also leads to some anomalies (as outlined in a separate document), and is not as clear as the Table 7 in 2001 Book 7. Other questions: why is the taper length (from which the position of the TCP is to be determined) on roundabouts prescribed as ½ 1a*, without explanation? Also, on typicals TL-46 and 50, some carryover dimensions from the old convention do not make sense with the new convention. P. 99, Figure 10: The reference to '5-30 m + Taper' in the open lane makes no sense, because no taper would be used in the open lane. But 5-30 m by itself would be too short. This last point has been corrected by item (e) above. On p. 100, the MTO Errata Document deletes the margin note. Also on p. 100, in Table 2, to be consistent with the changes made in (e) 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)."
g. P. 101, the MTO Errata Document deletes the margin note. Also, in the fourth bullet point, under Section 5.3.1 (AFADs), the words "A TCP" are replaced with "TCPs". AFAD operation is well described in this section, covering situations where two TCPs are required as well as situations where only one TCP is required. It would be helpful if Section 3.2.2.1 (p. 49) where the MTO Errata Document revisions now suggest that AFADs can be operated with one TCP, were made consistent with Section 5.3.1 (see our comment above).
h. P. 104, Section 5.3.3 (PTTS), the MTO Errata Document replaces the fourth paragraph of the section with: "Driver action is prescribed by Section 146 in the HTA. PTTS must be installed to meet the requirements of Regulation 626 and Section 144 in the HTA."
i. Material Requirements and General Hardware Requirements for Portable Temporary Traffic Signals (pp. 106-109, to the end of the Section) are extremely detailed; couldn't this be covered by just referring to OTM Book 12?
j. P. 115-121, Section 5.5 Implementation of Buffer Vehicles.
    i. P. 115, Section 5.5.1, Para 4, MTO should clarify the situation vis-a-vis MOL order requiring BV use on freeway shoulders in MTO Central Region.
    ii. P. 116, Non-Freeways, Para 1, we recommend that the last sentence could be deleted, since it is covered in Section 5.5 Intro, para 1. Qualifying their use as described suggests that on roads where the

normal posted speed is less than 60 km/h, BTs are OK, whereas CTs are actually preferred over BTs everywhere.

iii. P. 116, Section 5.5.2, Vehicle/Attenuator Requirements, para 2: The final text says that CTs used on Ministry contracts must have a minimum mass of 6800 kg. This is misleading, as this requirement applies to any blocker trucks or crash trucks, not just those used on MTO contracts. The final text says that this 6800 kg excludes attachments or ballast (Draft 2 said that it included these); this may be a MTO requirement, but it is not a MOL requirement, and need not apply to non-MTO roads. The text also now says that the maximum mass of 12,000 kg includes ballast, FABs or TMAs. This effectively narrows significantly the range of CT weights that may be used.

iv. P. 120, Section 5.5.4, Requirements for Freeway Zone Painting. TL-68 has always been problematic. 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.

k. P. 121-122, Section 5.6, Temporary Concrete Barriers

i. Para 1, p. 121, we recommend that this should read: “On long-term freeway construction projects <u>longer than five days in duration</u>, vehicle penetration into the work areas must be prevented by TCB walls or equivalent <u>if practicable</u>” before the reference to the OHSA regulation in parentheses. The MTO Errata Document changes (see iii below) do not provide this clarification.

ii. P. 122, third bullet point: There is an error in this bullet point. The second sentence should read: “The leading end of the barrier can then be tapered <u>away from</u> (not ‘towards’) the edge of the lane.” The MTO Errata Document simply removes this bullet point.

iii. P. 121, the MTO Errata Document deletes the margin note beside Section 5.6.

iv. P. 121, the MTO Errata Document replaces all of the Section 5.6 material on p. 121 with “On long-term freeway construction projects, TCB or other equivalent barrier systems should be installed to protect workers from vehicular traffic in accordance with Regulation 213/91, Section 67 of the OHSA. They may also be used to positively separate two-way, high-speed/high volume traffic flows. TCB shall be according to OPS or other standard when specified by a road authority. Factors to consider include:

1. TCB should only be used on a solid surface, such as asphalt or concrete pavement.
2. TCB can be laterally displaced when struck. On high speed roadways when TCB protection is required within 0.5 m of an

excavation or within 1.0 m of structures not designed for impacts (e.g., scaffolding), or within 1.0 m of the edge of a bridge deck, TCB restraint systems or reduced deflection TCB systems should be used."

3. For some reason, the references to NCHRP or other standards for TCBs, and the use of TC-54 barrels to smooth sharp changes in TCB alignment have been removed.

v. P. 122, the MTO Errata Document replaces bullets 1-4 with the following text (and deletes bullet 5 (which requires reflective devices on TCBs)):
   1. Lane closures are required to place a barrier. It should be constructed in the downstream direction.
   2. An offset distance of at least 0.5 m from the edge of a lane to the barrier is desirable.
   3. TCB and energy attenuators should be offset and installed according to OPS or as specified by the road authority.
   4. TCB can impact roadway drainage. Winter sand and other debris can block draining openings under the TCB. TCB drainage gaps should only be used when justified based on a hydraulic analysis at key drainage locations (sumps, catch basins, etc.)

vi. P. 122, the MTO Errata Document deletes the margin note next to the bottom paragraph. In the last paragraph on p. 122, the term 'flexible drums' is replaced with 'TC-54s'.

8. Section 6, Specifications for Channelizing, Information, and Guidance Devices

a. P. 123, why is the reference to "traffic control devices used on provincial highways and other roadways regulated by the MTO"? This is too MTO-centric. Why wouldn't it be to "traffic control devices used on Ontario highways", which includes municipalities? This also applies to the marginal note.

b. P. 126-129, Section 6.2, Temporary Pavement Markings
   i. P. 128, Section 6.2.1, Orange Temporary Pavement Markings: As noted above in 6.c above (p. 40): It would be helpful to list in Book 7 the criteria applied in the MTO Regions for their use.

c. P. 130-177, Section 6.3, Traffic Control Signs
   i. P. 131, Section 6.3.2, Sign Reflectivity Standards. In Table 7, Minimum Reflectivity Requirements, and elsewhere in Book 7, we recommend that after a specified date YYMMDD, TC-3 and the STOP side of the TC-22 (this would require a corresponding change to the OHSA regulation) be moved from High Intensity to High reflectivity micro-prismatic fluorescent sheeting. (This change has been made for TC-3, but not for TC-22. In Table 7 or in a note underneath it, it should be noted that the TC-3 requirement is effective January 1, 2016.). Also, a change has been made in the left column of Table 7, which could be confusing. Engineering grade is shown as Type I to Type III, High intensity is shown as Type III to Type VII, and High reflectivity micro-prismatic fluorescent as Type VII or greater. Type III is not EG and Type VII is not HI. Since the column heading is "Minimum Reflectivity", it would be clearer to show EG as Type I, HI as Type III, and HRMF as Type VII. The MTO Errata Document addresses this by adding: 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 Fluroescent (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.

ii. P. 134, Section 6.3.4, Positioning and Installation of Signs and Figure 14: Figure 14, Typical Sign Placement, has been changed from Draft 1 to Draft 2, and again in the final Book 7. The rationale for different vertical requirements for one-post and two-post ground mounted signs has never been clear. Do they need to be different? Now in the final Book 7 they appear to have been made the same (1.5 m), but the note says that for diamond signs on two posts, this may be reduced to 1.0 m. This is actually a carryover from the 2001 Book 7, which was a carryover from the old MUTCD, but it doesn't appear helpful in explaining the rationale. Since this will be most work zone signs over 1200 mm, this essentially makes it the same as Figure 14 in Draft 1, but still doesn't explain the difference. We suggest making it 1.5 m, without inclusion of the note.. It would be helpful if more information were shown on Figure 14. Rather than have the heading at the top of Figure 14 say 'Ground Mounted', it would be preferable to make this heading 'Long Duration'. The two signs at the bottom would have the heading 'Very Short or Short Duration'. This would then match the text. The reason for the differences between Long Duration, and VSD & SD, are still not explained. Pp. 135 and 136, would it not be better to make the headings 'For Long Duration Operations' and 'For Very Short or Short Duration Operations'? In the final Book 7, Figure 14 has been changed again. Instead of the upper two signs being diamond-shaped, they are now square. It would be better to be consistent throughout the figure by showing diamond-shaped signs. Also the horizontal and vertical dimension lines now do not extend to the edge of these two square signs, but extends to some indeterminate point to the left of or below the sign. This is wrong and undesirable. 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.)

iii. P. 137, TC-1, TC-1A and TC-1B: Inconsistency: Table 6 says that the standard size sign may be used on two-lane and multi-lane roads (up to four lanes) with a NPRS of 80 km/h or less; but p. 137 says that the oversize sign must be used for NPRS of 70 km/h or higher. Similar

inconsistencies may be found for some other signs also. The MTO Errata Document, on p. 137, for these signs, at the bottom of the page, for 1200 mm x 1200 mm (oversized) replaces the text with “See Table 6”. This removes the inconsistency.

iv. P. 138, TC-2B and TC-2A, ROAD WORK signs, Purpose, first sentence: instead of stating that one of these signs must be used to inform road users that workers are present, it now says “that workers may be present.” We believe it is better to say “that workers are present.” This is to reinforce the credibility of these signs, that when the sign is there, workers are present, and when it is not there, workers are not present.

v. P. 143, Roadside Diversion Warning Signs, the MTO Errata Document replaces the label of the sign in the left column of the sign table to read TC-9R rather than TC-9.

vi. P. 147, TURN and CURVE signs: In the 2001 Book 7, the TC-16E variants had high reflectivity micro-prismatic fluorescent sheeting, all other TC-16 signs had engineering grade. In the final Book 7, all TC-16 variants have been designated as high reflectivity micro-prismatic fluorescent sheeting, after January 1, 2016. This effective date should also be stated in Table 7.

vii. P. 151, TC-22 Stop/Slow Paddle: We recommend that the reflectivity on the STOP side be upgraded to high reflectivity micro-prismatic fluorescent, based on complaints about lack of ‘visible punch’ of the STOP side, and the lower durability of high intensity sheeting. This would need agreement from MOL and revision to the OHSA Regulation, Section 68. A grandfather period would be required. (Even without the requirement, this would be an acceptable enhancement.)

viii. P. 154, TC-31 TRUCK ENTRANCE sign: Why has Table 10 (Table 11 in the 2001 Book 7) been removed in the final Book 7?

ix. P. 157, MAXIMUM SPEED ADVISORY Sign, TC-36. It would be useful to also specify an oversize sign, since these are often used.

x. P. 158, after the TC-40 PEDESTRIAN DIRECTION sign. This would be a good place to introduce, illustrate and describe the following signs: PEDESTRIANS USE OTHER SIDEWALK (for use under the TC-40), a CYCLISTS USE PEDESTRIAN PATH sign, a CYCLISTS DISMOUNT AND WALK sign (where cyclists are directed to use a pedestrian path), and a CYCLISTS MERGE WITH TRAFFIC sign. Also, after the Rb-90A and Rb-90B signs, a standard sign for “Speed Fines Doubled in Construction Zones when Workers Present” should be included. This has been partly addressed by introducing the TC-90 sign. However, since it is of the nature of a regulatory sign, we recommend that it be called Rb-90C. Also, the two sign sizes shown don’t have the same proportions, and the small square size doesn’t match the illustration. It would seem preferable to design a sign which would fit below a speed limit sign.

xi. P. 159, LANE DESIGNATION DIRECTION SIGN, TC-25. The background reflectivity is shown as high-reflectivity micro-prismatic fluorescent, Type VII. This is not consistent with Table 7, p. 132. This needs to be corrected. The MTO Errata Document revises the figure to state “Minimum Background Reflectivity: Engineering Grade (Type I).”

xii. P. 159, Speed Fines Doubled Sign: The MTO Errata Document, in the Conditions paragraph, changes all references to RB-90 to read TC-90.

xiii. P. 160, YIELD TO ONCOMING TRAFFIC sign, Rb-91 and YIELD AHEAD sign, Wb-1A. We would suggest that, in keeping with colour coding, the sign background on the YIELD AHEAD sign be orange rather than yellow.

xiv. P. 162, Rb-92 ROAD CLOSED sign. On p. 161, the sign reflectivity for the Rb-92 is shown as high reflectivity micro-prismatic fluorescent, but also as Type III, which is high intensity. The 2001 Book 7 shows the Rb-92 as high intensity. We recommend that the Rb-92 remain as high intensity. The final Book 7 contains an inconsistency in that on p. 162, the Rb-92 sheeting is shown as high reflectivity micro-prismatic fluorescent, but Table 7 (p. 132) still shows it as high intensity.

xv. P. 168-171, Section 6.3.6, TC-12 Flashing Arrow Board sign.

1. P. 167, we recommend that all versions of the TC-12 be shown (freeway, urban, and striper).
2. P. 168, Conditions: In practice over the past few years, the number of TC-12s to be used for a lane closure has varied widely. The final Book 7 states that one TC-12 FAB in arrow mode should be used at the end of each taper to indicate that one lane shift is required. However, the situation becomes confused by further stating that one TC-12 FAB in arow mode may also be used as an advance warning sign on the shoulder. This makes the shoulder TC-12 in arrow mode optional, so the driver isn't quite sure how many lane shifts are required. Agreement is required on the convention for number of TC-12s used for a lane closure, and on the convention for use of arrow vs bar. We have heard many comments about the confusion caused by this ambiguity. Also, in the final Book 7, MTO has changed from all arrows for multilane mobile operations to arrow(s) on the upstream vehicle(s), and bar mode on the work vehicle at the downstream end, but not consistently. The MTO Errata Document replaces the third paragraph text under Multi-lane Roads in Section 6.3.6 on p. 168 with: "In mobile work operations a TC-12 in arrow mode is used to indicate the direction in which the traffic is permitted to pass. When a sign truck/buffer vehicle is moving immediately behind a work vehicle, at a distance of LIDG, the TC-12 on the work vehicle shall be in bar mode indicating a lane closure as illustrated in TL-25, TL-27 and TL-68. When there is no sign truck/buffer vehicle moving immediately behind the work vehicle, the TC-12 on the work vehicle shall be in arrow mode as illustrated in TL-22 revised. The TC-12 on all sign truck/buffer vehicle(s) upstream of the work vehicle shall be in arrow mode for multi-lane roads mobile work operations. We believe it should be arrows on all vehicles in a multilane mobile situation. (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.)

xvi. P. 171, Section 6.3.7, PVMSs
   1. In list of bullet points where PVMSs may be used on MTO highways: a previously accepted and advocated use for PVMSs on MTO highways was notification of reduced speed limits in construction zones. Is this no longer the case?
   2. P. 174, Section 6.3.8, Message Guidelines. We have always felt that the message guidelines/examples in the 2001 Book 7 in Table 5 (pp 58 and 59) (which came from MTO) were very good, and we recommend that they be included in the 2013 Book7. If users recommend messages based on these guidelines/examples, they are more likely to receive MTO approval and less likely to need revision. Also, they provide useful information for non-MTO users.

d. Section 6, at the end: It would be useful to introduce some new signs for roundabout application, for some special situations.

9. Section 8, Typical Layouts for Signing Temporary Work Zone Conditions, pp 185-240.

a. 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. 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.)

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

c. Section 8.1, General Notes to Typical Layouts, pp. 197-199.
   i. In Note 4, third sentence, the “4WF/360 Beacon or TC-12” in Draft 2 has been changed to “4WF plus 360 Beacon or TC-12” in the final Book 7. The final version is ambiguous. Does it mean 4WF/360 together or TC-12, or does it mean 4WF plus either 360 Beacon or TC-12? The last sentence in para 1 is also ambiguous.
   ii. 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 operation.

iii. Note 12: first sentence should say "...Temporary Concrete Barriers (TCBs) must be used, where feasible, for stationary operations on freeways,...."

iv. Note 13: Non-Freeways, para 2, should read: "A CT is always preferred over a BT."

d. P. 186, Table A. Note **: The sentence in Draft 2 has been deleted in the final Book 7: "When the 85th percentile speed is known, it may be used instead of the normal regulatory speed limit." Why? This is a principle of long standing. Note **** This should read, "LBAs are optional at speeds of 60 km/h or lower, but should be used for closed lanes on multi-lane roads if space permits. If used at 50 or 60 km/h, they should be of the length shown. LBAs are not required on two-lane roads." Note *****, should add at the end, "..., and for daytime operations on freeways." Regarding dimension 4*, we recommend that the progression of distances be revised to: 30/40/60/70/80 for the speeds 50/60/70/80/90 respectively, as such a graduated progression makes more sense. Similarly, regarding dimension 5*, we recommend that the progression of distances be revised to 20-30/30-40/50-60/60-70/70-80 for the five columns, for the same reason.

e. P. 187, Table B. See comments above on the notes for Table A; the same comments apply here. There are so few cells in the table where values differ for LV and HV, that it may not be necessary to distinguish them. For instance, dimension 1a* at 50 km/h could be shown as 25-50 m, and dimension 1b* for 50 km/h could be 8-15 m. Regarding dimension 1b*, we recommend that the progression of distances be revised to 8-15/10-15/15-20/20-25/30-40 for the five speeds respectively.

f. P. 188, Table C. It would be useful to add the LIDG to Table C as dimension 6*.

g. Pp. 193-196, Table G:

i. P. 194, Intersections, Multi Lane Road, Near-side right-turn lane open and adjacent through lane closed, TL-54: Why is this not also considered suitable for VSD? It's not clear whether the concern is that there is too much here to be done in 30 minutes? But TL-30 has been extended to VSD (previously SD and LD), yet there is more to set up in TL-30 than in TL-54.

ii. P. 195, Intersections – Roundabouts, Multi-Lane Roundabout, TL-92 and TL-93: The titles shown in Table G don't seem to match the titles shown on the TLs themselves.

iii. P. 195: Also, for Vehicle encroachment onto road/sidewalk, Table G shows TL-66 for SD and LD, whereas TL-66 shows it as VSD and SD. We recommend the latter, and that Table G be changed to match TL-66.

iv. P. 196, note at bottom of Table G: toward the end of the second line to the end of the note: the required distances for the three speed ranges are addressed rather ambiguously: Does 60 km/h require 200 m or 150 m? Does 80 km/h require 250 m or 200 m or is this speed not covered? The MTO Errata Document corrects this ambiguity by replacing 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:

1. Exceed 250 m where NPRS is greater than 80 km/h,
2. 200 m where the NPRS is greater than 60 km/h and less than or equal to 80 km/h, or
3. 150 m where the NPRS is 60 km/h or less.

h. In all the TLs, the fonts used are very small and difficult to read. **See the ATC Website posting, Part 1 for details on the changes to the TLs. Comments on TLs for Roundabouts are included here.**

i. P. 238, TL-86: Roundabout: Quadrant Closed (TCPs). This seems to be a partial, but incomplete solution, in that it appears that not all movements can be easily accommodated. The movements that can be accommodated are: from NE to NW, SW and SE; from NW to SW and SE; from SW to SE. The movements that apparently can be accommodated with this set-up with some difficulty, violating drivers' expectations, are: NW to NE; SW to NE and NW; and SE to NE, NW and SW. The notes now clarify how this operation is to be carried out, and it looks workable, except for the following: there is nothing to indicate to some drivers which move to make. For example, do drivers approaching from the southeast, and wanting to turn left or go straight ahead use the 'wrong' direction approach to the roundabout to exit, or do they make the awkward angle move to use the 'right' direction exit from the roundabout? The same applies to drivers approaching from the southwest and wanting to turn left. Orange and black versions of the Rb-25 signs are used side by side, one for KEEP RIGHT and one for KEEP LEFT of the bullnose. This may take some getting used to. These signs should show the assigned sign numbers TC-25L and TC-25R, as shown at the beginning of Book 7. We also suggest that the three TC-7s in TL-86 be oriented to face the oncoming traffic head-on; this will also help avoid a situation where drivers in the other direction seeing it might conclude that they were travelling the wrong way.) No explanation is given for the use of the ½ 1a* taper. 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.)

j. P. 239, TL-88, Roundabout: Inside Lane Closed: We suggest "Roundabout: Inside Lane Closed or Occupied". There no longer appears to be a TL for Mobile Operations in the inside lane (TL-83 in Draft 1). Shouldn't there be one, or alternatively, shouldn't TL-88 accommodate both?

k. P. 240, TL-89, Roundabout: Inside Lane Closed: What happens if the work area does not extend around the full circle of the roundabout? Is it intended that the whole inner lane must be closed off anyway, or could only part of the inner lane circle be closed off?

l. P. 240, TL-90, Roundabout: Outside Lane Closed (VSD). We suggest: "Roundabout: Outside Entry and Exit Lane Closed or Occupied". If the title is Outside Lane Closed, this might be interpreted as meaning the outside lane of the roundabout.

m. P. 241, TL-91, Roundabout: Outside Lane Closed: We suggest the title: "Roundabout: Outside Entry and Exit Lane Closed". If the title is Outside Lane Closed, this might be interpreted as meaning the outside lane of the roundabout. Again, should a note state that if work vehicles are present, 360/4WF or TC-12 is required? (This is partially addressed, in that the 360/4WF or TC-12 is shown; however, it is not clear whether this is required whether or not a work vehicle is present. What is intended?) The note 2 states that "All entrances and exits must be reduced to one lane." Why is this required? There still remain short sections of two-lane roadway within the roundabout itself. Most of the other entrances and exits would be largely unaffected by the closure shown. A TC-3R, on each side of the roadway, on the roundabout itself leading to the closed lane would be useful, and would appear to be all that's required, plus, on the other approaches, the TC-2B or TC-2A, and the TC-1 in LD.

n. P. 241, TL-92, Roundabout: Outside Lane Closed at Island or Exit (VSD) (partially corresponds to TL-87 in Draft 1, Roundabout: Outbound Lane Closed). We suggest a title revision as follows: "Roundabout: Outside Lane at Island or Outbound Lane at Exit Closed or Occupied". The term "outside" appropriately applies to the lane in the roundabout at the island, but the outbound lane closed is actually the inside, not the outside, lane. Hence the existing title is misleading. Might it not be better to address these two situations separately, in separate TLs? What if only one of these situations is being done? Is the intent that the closures shown for both situations are still required? This would appear unnecessary. Also, shouldn't there be a TC-2B or TC-2A on each approach to the roundabout? Also, existing title doesn't match Table G.

o. P. 242, TL-93, Roundabout: Outside Lane Closed at Island or Exit (SD & LD) (appears to correspond in part to TL-88, Roundabout: Outbound Lane Closed). The title is misleading and should be adjusted according to the intent. On TL-88, there are 4 inbound lanes closed and the inner roundabout lane is closed, but only one outbound lane is closed. If everything shown here is to be included on the same TL, we suggest a title as follows: Roundabout: Outside Lane at Island or Inbound Lane on Approach Closed or Occupied". Again, might it not be better to address these two situations separately, in separate TLs? What if only one of these situations is being done? Is the intent that the closures shown for both situations are still required? This would appear unnecessary. Also, the note 2 states that "All entrances must be reduced to one lane." Why is this required? There still remain short sections of two-lane roadway within the roundabout itself. Most of the other entrances and exits would be largely unaffected by the closure shown. A TC-3R, on each side of the roadway, on the roundabout itself leading to the closed roundabout lane next to the island would be useful, and would appear to be all that's required, plus, on the other approaches, the TC-2B or TC-2A, and the TC-1 in LD. This is a confusing TL. Table G should be harmonized with whatever is decided.

p. For some reason, TLs 83, 85, and the Mobile Operations of TL-89 in Draft 1 have been deleted. Why is that? Are they no longer needed?

10. We recommend that sections be added, Section 9 (Manual Revisions since 2001 Edition) and Section 10 (Renumbered or Added Signs), as in the 2001 Book 7. These were identified early on in the development of the OTM as important features of each Book.

11. We recommend that Book 7 contain a Subject Index. Because the list of devices is included in the Table of Contents, a Sign Name Index and Sign Number Index, as in the 2001 Book 7, are probably not required.

12. Appendix A1: Temporary Traffic Control for Unplanned Events

a. In general, these guidelines seem reasonable.
b. Some questions are as follows:
    i. Do all relevant associations/communities of first responders agree on the guidelines and procedures?
    ii. By what time must full Book 7 work zone traffic control be implemented after identification of the incident? Appendix A1 appears inconsistent; Table A1-2, item 12, suggests that this should be implemented within half an hour of the incident identification. Section A1-2.2 suggests that this time period should be two hours. This should be clarified.
    iii. Section A1.1.4, p. 247: Unified Command is essential to good event management, and effective incident command protocols are extremely important, especially as command may shift from one responder to another. Problems in such circumstances and relationships are reported from time to time. The recommendation at the end is that first responder organizations within a jurisdiction develop an incident command protocol. Are there "model" incident command protocols that could be included, as a good example of how things should be organized? This could be of benefit to many jurisdictions.
    iv. Section A1-3.1, p. 249:
        1. Do all first responders, including police, agree that they should wear high visibility safety apparel?
        2. It would be worth clarifying whether Class 1 HVSA meets the requirements of Section 69.1 in Reg 213/91 of the OHSA, or whether Class 2 is required. Since road authority personnel or agents are identified as possible first responders in Table A1-1, is Book 7 recommending that all road authority personnel or agents use at least Class 2 HVSA, even if Class 1 might meet the requirements of OHSA?
    v. Section A1-3.3, p. 251, Emergency Signs.
        1. We recommend that the signs shown be given names and numbers, and be included and described in Section 6.3.5 along with other signs, and be included in the list of depicted signs ending on p. xviii.
    vi. Section A1-3.5, p. 253, Manual Traffic Direction. Since Bill 169 gave firefighters the authority to use the TCP's STOP/SLOW PADDLE (TC-22) on roads, including freeways, this section should provide guidance as how this work is to be done, especially since the OHSA Construction Regulations do not allow TCPs on freeways, or their control of more than one lane of traffic.
    vii. Section A1-3.6 Other Available Traffic Control Devices,
        1. Crash Trucks, p. 254. It would be worth making a comment that rather than use a costly fire truck as a CT, it would be better to use a conventional CT for that purpose, reducing the risk of

damage to the expensive fire truck. Also, a CT will have a TMA, but a fire truck won't, so it better protects motorists as well. However, an alternative view is put forward on p. 258, where it is proposed that the emergency vehicle be used. It is claimed on p. 258 that the apparatus remains functional for firefighting operations if the fire truck is struck. This would seem debatable. This should be discussed.

viii. Section A1-4, p. 255, Placement of Cones/Flares.
    1. In the third paragraph, where a minimum of six to eight traffic cones is recommended, this would be OK for non-freeways, but for freeways, the minimum should be 12 cones.
    2. P. 256, The title "Upstream Buffer Space (Longitudinal)" doesn't match the figure A1-1 on p. 254. We suggest "Longitudinal Buffer Area (upstream of Incident Area)", and changing Figure A1-1 accordingly. Why introduce another term, when 'Longitudinal Buffer Area' already exists?

ix. Section A1-5, p. 258, Positioning of Emergency Response Vehicles. A decision needs to be made as to whether to use 'Longitudinal Buffer Space' or 'Longitudinal Buffer Area'. We prefer LBA (area). We also suggest that Figure A1-2 be changed accordingly.

x. Section A1-6, pl 257, Situations that Require Special Attention, Traffic Control on High-Speed Highways. There should be some discussion here as to how firefighters, with their recent authorization to do so, are to use the TC-22 STOP/SLOW paddle on multi-lane highways, including freeways (where TC-22s are not normally permitted to be used). See note above on Manual Traffic Direction, p. 253.

13. We recommend adding an appendix A2 on Low-Volume Roads, as identified above in these comments.

14. Appendix A2, Glossary (if above point is accepted, this would become Appendix A3.)
    a. In the 2001 Book 7, in the Definitions, if terms used in a specific definition were also definitions in Appendix A, they were given initial capital letters, so that readers would know immediately if they could look up another relevant definition. For some reason, this feature has been abandoned in the 2012 Book 7. Automated Flagger Assistance Device. This term should be in the Glossary, as well as its acronym?
    b. Freeway, p. 271. We suggest that this be updated, either by using 80 km/h rather than 90 km/h, or by saying, "A freeway is <u>typically</u> defined as a multi-lane divided highway ..... and a posted speed of 90 km/h or greater, <u>although in some rare cases, the posted speed may be lower</u>."
    c. Portable Lane Control Signal, p. 281. There should be a definition for this.
    d. Portable Temporary Traffic Signals, p. 281. There should be a definition for this.
    e. Roundabout, p. 285. There should be a definition of roundabout.
    f. Unplanned Event, p. 291. There should be a definition for this.

15. Appendix 3: References.

a. We suggest addition of a Transportation Association of Canada report: "Synthesis of Practices for Work Zone Speed Management", Arges Training & Consulting, 2005.

3. Grammatical and Typographical Errors

1. P. xiii, TC-7 depiction should show complete sign with amber flasher.
2. P. xvii, YIELD TO ONCOMING TRAFFIC sign, should be Rb-91 rather than RB-91.
3. Section 1 Introduction, p. 1, para 1, line 2: should say '2014 version', not '2013 version'. The MTO Errata Document corrects this date. Line 3: should say 'an update' rather than 'a update'.
4. Section 1 Introduction, p.1, para 2, line 2: should be work zones, without quotation marks.
5. Section 1 Introduction, p. 1, para 2, line 3, p. 45: should say 'surveying' rather than 'surverying'.
6. P. 37, Section 3.1, first sentence, delete one of the two 'devices'. (used twice)
7. Section 3.1.8.3, Speed Display, para 1, line 2: should say 'have been shown' rather than 'have shown'.
8. P. 39, Section 3.1.5, Barriers, para 2, grammatical point, margin note: This should read, "The use of barriers should be determined by the protective requirements of the location, and they should not be considered....."
9. P. 45, Section 3.1.8.3, Speed Display, sentence 1, should read, "...driver on a VMS, have been shown in some applications...."
10. Many acronym plurals have now been correctly shown, by addition of an 's', but a few plurals remain without the 's'. For example, P. 49, Section 3.2.2.2, PLCSs, p. 50, Section 3.2.2.3, PTTSs, and p. 51, Section 3.2.2.4, TTSs. Throughout Book 7, the proper format for plural forms for acronyms should be used. Book 7 is all over the map in this regard. Throughout this section 3.2.2.2, section 3.2.2.3 and section 3.2.2.4, the wrong form is used. Also, replace "onto" with "on" in both sections.
11. P. 56, Section 3.3.3.3, Ballast Filled Barriers, para 2, second last sentence should read, "Barriers must be filled in accordance with manufacturers' specifications..."
12. P. 75, Section 4.2.1.2, Step C, third bullet point, we recommend the wording: "After detaching the TC-12, the sign truck must ensure its 4WF/360° are activated."
13. P. 96, Section 5.2.1, bullet points should have a common format, either all nouns or all verbs. The last bullet point is out of step.
14. P. 98, Section 5.2.2, para 2, Text says "A contractor must not turn off signals themself..." 'Themself' is not a word, and is itself a contradiction, since them is plural and self is singular. It would be better to say "Contractors must not turn off signals....")
15. P. 102, Section 5.3.2, Throughout this section, the plural of PLCS should PLCSs.
16. P. 104, Section 5.3.3, PTTSs. Again, plural acronyms should be used correctly.
17. P. 105, Section 5.3.3, Portable Temporary Traffic Signals, second last full paragraph: This should read: "PTTSs should only ~~to~~ be used on long duration work...."
18. P. 115, Section 5.4, Use of Paid Duty Police Officers, last paragraph in section, last sentence. This should read "Paid duty officers must comply with MOL's (not MOLs, which is plural) requirements to wear appropriate .... (PPE)."
19. P. 142, TC-7 Figure, para 2 under Conditions, sentence 1: should say "An amber beacon visible...." rather than "A amber beacon..."
20. P. 143, TC-9 Figure, The label in the top row for the left sign should read 'TC-9R', not 'TC-9'.

21. P. 144, TC-10, DETOUR DESIGNATION signs: It would seem logical to put the signs shown in alphanumeric order.
22. P. 147, TURN and CURVE signs, TC-16 signs: Typo: the last parenthesis in the note should be added: '(Type VII)'
23. P. 148, TC-17t, ADVISORY SPEED TAB sign: Purpose: we recommend changing 'advised' to 'advisory'.
24. P. 156, RAMP CLOSED AHEAD sign, TC-35, Conditions. A consistency check of the document format should be carried out. For example, why is SD used here, but 'long duration' is spelled out?
25. P. 160, YIELD TO ONCOMING TRAFFIC sign, Rb-91 and YIELD AHEAD sign, Wb-1A. In the box, just above the YIELD TO ONCOMING TRAFFIC sign image, typo, 'YEILD' should be 'YIELD'. Under Conditions, bullet point two, the plural of TCP is TCPs, not TCP's.
26. P. 170, TC-12s, second bullet point, line 1: should be a hyphen between TC and 12 (TC-12) rather than an x-box.
27. P. 180, Section 7.1, Quality Guidelines, The three bullet points toward the top of the page. Why is bullet point 2 not in the same format as bullet points 1 and 3 (changing the common format in the 2001 Book 7)? We suggest that the bullet point be revised as follows: "Marginally acceptable devices, which are at or near...."
28. P. 192, Table F, Column heading for Construction Markers: word in Parentheses should be 'Barrels', not 'Barrier'.
29. P. 195, 196: no page numbers.
30. P. 210, TL-20B, reference to signs in note ii should be Rb-25, not RB-25.
31. P. 213, TL-27, note 2, line 2: "maybe" should be "may be".
32. P. 233, TL-66, Pedestrian Accommodation: Vehicle Encroachment on Road/Sidewalk. In Table G, change "onto" to "on".

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