



**CONSTRUCTION SPECIFICATION FOR
TEMPORARY CONCRETE BARRIERS**

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741.01	SCOPE
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This specification covers the requirements for the construction of temporary concrete barriers.

This specification also covers the requirements for installation of restraint systems for temporary concrete barrier, Type M connection only, by the following three methods: pinning to asphalt pavement, strapping to concrete, or bolting through concrete.

741.01.01 Specification Significance and Use

This specification is written as a municipal-oriented specification. Municipal-oriented specifications are developed to reflect the administration, testing, and payment policies, procedures, and practices of many municipalities in Ontario.

Use of this specification or any other specification shall be according to the Contract Documents.

741.01.02 Appendices Significance and Use

Appendices are not for use in provincial contracts as they are developed for municipal use, and then, only when invoked by the Owner.

Appendices are developed for the Owner's use only.

Inclusion of an appendix as part of the Contract Documents is solely at the discretion of the Owner. Appendices are not a mandatory part of this specification and only become part of the Contract Documents as the Owner invokes them.

Invoking a particular appendix does not obligate an Owner to use all available appendices. Only invoked appendices form part of the Contract Documents.

The decision to use any appendix is determined by an Owner after considering their contract requirements and their administrative, payment, and testing procedures, policies, and practices. Depending on these considerations, an Owner may not wish to invoke some or any of the available appendices.

741.02 REFERENCES

When the Contract Documents indicate that municipal-oriented specifications are to be used and there is a municipal-oriented specification of the same number as those listed below, references within this specification to an OPSS shall be deemed to mean OPSS.MUNI, unless use of a provincial-oriented specification is specified in the Contract Documents. When there is not a corresponding municipal-oriented specification, the references below shall be considered to be the OPSS listed, unless use of a provincial-oriented specification is specified in the Contract Documents.

This specification refers to the following standards, specifications or publications:

Ontario Provincial Standard Specifications, Construction

OPSS 723 Energy Attenuators

Ontario Provincial Standard Specifications, Material

OPSS 1350 Concrete - Materials and Production
OPSS 1440 Steel Reinforcement for Concrete
OPSS 1504 Steel Beam Guide Rail
OPSS 1601 Wood, Preservative Treatment, and Shop Fabrication

Ontario Ministry of Transportation Publications

Designated Sources for Materials (DSM)

MTO Form:
PH-CC-876 Certification of Temporary Construction Barrier Installations

Ontario Traffic Manual (OTM):
Book 7 - Temporary Conditions
Book 11 - Pavement, Hazard and Delineation Markings

CSA Standards

G40.20-13/G40.21-13 (R2008) Rolled or Welded Structural Quality Steel/Structural Quality Steel
W59-18 Welded Steel Construction

ASTM International

A123/A123M-17 Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
D4956-19 Retroreflective Sheeting for Traffic Control

741.03 DEFINITIONS

For the purpose of this specification, the following definitions apply:

Relocation means the movement of a temporary concrete barrier system from one location to another, which typically occurs when construction operations move from one stage to the next.

Shift means the lateral displacement of a movable temporary concrete barrier system, which is typically completed to facilitate the opening or closing of traffic lane(s). The lateral displacement may vary throughout the length of a barrier installation.

741.04 DESIGN AND SUBMISSION REQUIREMENTS

741.04.01 Submission Requirements

Installation of the movable temporary concrete barrier shall not commence until the Working Drawings and a copy of the manufacturer's specifications and installation instructions have been submitted to the Contract Administrator.

741.05 MATERIALS

741.05.01 Concrete

Concrete shall be according to OPSS 1350, except that the restrictions on volume batching shall not apply. The Contractor shall assume the responsibility for the mix design. The following specific requirements shall apply:

- a) Class of concrete: Nominal minimum 28-Day compressive strength of 35 MPa
- b) Coarse aggregate: 19.0 mm nominal maximum size

741.05.02 Reinforcing Steel Bars

Reinforcing steel bars shall be according to OPSS 1440 and the Contract Documents.

741.05.03 Connection Assembly Components

Connection assembly components for proprietary temporary concrete barrier systems shall be according to manufacturer's specifications and the Contract Documents.

Connection assembly components for other non-proprietary temporary concrete barrier systems shall be according to the Contract Documents.

741.05.04 Restraint Systems, Type M Connection Only

All materials required for the restraint systems shall be according to the Contract Documents.

741.05.05 Thrie Beam Guide Rails, Bolts, and Nuts

Thrie beam guide rails shall be fabricated according to OPSS 1504 and the Contract Documents. Bolts and nuts shall be according to OPSS 1504.

741.05.06 Steel Plates, Bolts, and Nuts

Steel plates shall be fabricated according to CSA G40.20/G40.21 and the Contract Documents. Steel plates shall have minimum yield strength of 345 MPa. All steel plates shall be hot dip galvanized after fabrication according to ASTM A123. Bolts and nuts shall be according to OPSS 1504.

741.05.07 Wooden Block

Wooden blocks shall be according to OPSS 1601.

741.05.08 Delineators

Delineators shall be two-sided and each side shall have a minimum reflective surface of 100 x 100 mm; high intensity retroreflective sheeting according to ASTM D4956, Type VIII; orange colour; and flexibility to bend 90° from vertical and self restore.

741.05.09 Marking

All temporary concrete barrier units manufactured before March 1, 2008 shall be permanently and legibly marked by the manufacturer on the top or sides of each temporary concrete barrier as follows:

- a) Name or trademark of the manufacturer.
- b) Identification of plant if manufacturer has more than one plant.
- c) The date of manufacture identifying at minimum the year of manufacture with two digits.
- d) Markings shall be stencilled in indelible ink, stencilled in paint, or embossed.

All temporary concrete barrier units manufactured on or after March 1, 2008 shall be permanently and legibly marked by the manufacturer on each temporary concrete barrier as follows:

- a) Name or trademark of manufacturer on file with Owner including identification of plant if manufacturer has more than one plant and year of manufacture embossed on top of each temporary concrete barrier at one end.

- b) Owner approved three digit code of manufacturer and plant identification, and six digit code for date of manufacture (Year Month Day, example January 15, 2008 is 080115) stencilled in minimum 50 mm high digits with indelible ink or paint on top of each temporary concrete barrier at opposite end of embossed markings.
- c) Duplicate three digit code of manufacturer and plant identification, and six digit code for date of manufacture, stencilled in minimum 50 mm high digits with indelible ink or paint on the vertical face of one end elevation of each temporary concrete barrier.
- d) Markings are not permitted on traffic faces of temporary concrete barrier.

741.06 EQUIPMENT

741.06.01 Barrier Transfer Machine for Movable Temporary Concrete Barrier

Barrier transfer machines required to shift the movable temporary concrete barrier shall be supplied from a source named on the ministry's DSM.

741.07 CONSTRUCTION

741.07.01 Temporary Concrete Barrier

Temporary concrete barrier shall be installed at locations specified in the Contract Documents.

Construction of temporary concrete barrier shall be by use of precast concrete barrier units.

Temporary concrete barrier shall be installed with connections properly engaged.

It is acceptable to transition from one type of temporary concrete barrier to another type of temporary concrete barrier using the temporary concrete barrier transition detail according to the Contract Documents. The proportion of each type of approved temporary concrete barrier used for the Work shall be at the Contractor's discretion. However, a minimum continuous length of 100 m of any one type of temporary concrete barrier is required prior to transitioning to another type.

741.07.01.01 Restrictions on Use of Connections

Contractors shall use temporary concrete barriers with one of the following types of connections:

- a) Type J
- b) Type M
- c) Type T
- d) Type X

At locations where restrained temporary concrete barriers are specified in the Contract Documents, temporary concrete barriers with Type M connections shall be used.

At locations where reduced deflection temporary concrete barriers are specified in the Contract Documents, temporary concrete barriers with Type X connections shall be used.

741.07.01.02 Foundation Preparation

Temporary concrete barrier shall be installed on a paved surface having a slope of up to 6% maximum measured perpendicular to the installation. Two Days shall be allowed between the placement of final asphalt surface and placement of temporary concrete barrier. Temporary concrete barrier shall be in place prior to the opening of traffic operations.

Drainage shall be maintained under the temporary concrete barrier.

741.07.01.03 Tolerances

The horizontal and vertical alignment at the junction of each barrier section shall be within 15 mm. The minimum radius on which the barrier may be placed shall be as specified for each type of connection.

741.07.01.04 Construction Markers

Construction markers shall be placed in advance of the temporary precast concrete barrier installation to assist in directing the traffic away from the flared approach end treatment. Taper length for full lane closures and the maximum distance between markers shall be according to OTM Book 7.

741.07.01.05 Quality Control

Temporary precast units shall be certified that they meet the acceptance criteria listed under the Acceptance Criteria for Temporary Precast Concrete Barrier clause. Each installation and relocation of units shall be certified by submitting to the Contract Administrator a completed MTO Form PH-CC-876 within 24 hours of installation or relocation of the units. Units shall be inspected pre- and post-installation. When the installed or relocated units do not meet the acceptance criteria, they shall be removed and replaced with units that meet the acceptance criteria. Certification shall be done by an authorized representative of the Contractor.

While in-service on the Contract and when units have been damaged or alignment discontinuity is beyond that allowable by the acceptance criteria, the affected units shall be reinstalled or replaced as necessary. The repair shall be performed within a 48 hour period, starting at the occurrence or first awareness.

Repaired precast concrete barrier units may be used provided that the structural integrity of the unit is maintained. An Engineer's seal and signature shall be affixed to documentation certifying that the repair method used shall not impact the structural integrity of the unit.

741.07.01.05.01 Acceptance Criteria for Temporary Precast Concrete Barrier

For all applications, any unit that fails one or more of the following acceptance criteria shall be rejected:

- a) Dimensions of each unit shall not deviate from those specified by more than the following tolerance:
 - i. Specified dimensions up to 300 mm \pm 5 mm
 - ii. Specified dimensions greater than 300 mm \pm 10 mm
- b) Steel elements of each connecting device shall be free of visible fracture, distortion, and perforation.
- c) Concrete within 200 mm of a connecting device shall be free of visible cracks that exceed 0.3 mm in width, measured at the widest point of the crack.
- d) All cracks wider than 0.3 mm, other than addressed in c), shall neither extend through the precast unit nor be longer than 300 mm.
- e) The unit shall be free of honeycombing.

- f) The end of any unit shall not be located further than 50 mm from the horizontal alignment of the installation.

In addition to the above criteria, when the precast units are used on facilities with a posted regulatory speed limit of 80 km/h or higher, any unit that fails one or more of the following acceptance criteria shall be rejected:

- a) Damage to edges shall not extend more than 100 mm onto any adjacent face. When edge damage extends more than 50 mm onto such a face, damage to the opposite side of that edge shall not extend more than 50 mm onto the opposite face.
- b) The total length of concrete breakout damage to edges flanking the connecting devices, whether repaired or not, shall not exceed 25% of the respective connecting device length on each side of each connecting device.
- c) The concrete damage in the area of the drainage recess shall not reach higher than one third of the lower sloped surface containing the recess.
- d) Concrete breakouts on the traffic faces or on the top of the precast unit other than addressed in a) to c) above shall not be greater than 150 mm in any direction measured on the surface, nor shall the breakout depth at any point exceed 25 mm measured perpendicularly to the face.
- e) Accumulated total concrete breakouts addressed in d) on the traffic sides of the unit shall not exceed 10% of the total surface area of the respective side.
- f) Drilled holes into the barrier shall not have diameter greater than 40 mm.
- g) The horizontal and vertical alignment discontinuity between adjacent units shall not exceed 20 mm, as measured with a 1 m straightedge.

741.07.02 Drainage Gaps for Temporary Concrete Barrier

Gaps for drainage shall be installed according to the Contract Documents and at locations specified in the Contract Documents.

741.07.03 Temporary Concrete Barrier Restraint Systems, Type M Connection Only

741.07.03.01 General

Type M temporary concrete barrier used for temporary concrete barrier restraint systems shall have been manufactured after October 2011, as verified by the markings.

Restraint systems shall be installed at locations specified in the Contract Documents.

Mechanical and adhesive anchoring systems shall be installed according to the manufacturer's specifications to the minimum embedment depth specified in the Contract Documents.

All welds shall be according to CSA W59.

741.07.03.02 Restoration of Asphalt and Concrete Surfaces

Restoration of asphalt and concrete disturbed during the installation and removal of restrained temporary concrete barrier shall be as specified in the Contract Documents.

741.07.03.03 Transitions

Transitions between restrained temporary concrete barrier and unrestrained temporary concrete barrier shall be as specified in the Contract Documents.

Transitions between unrestrained temporary concrete barrier and permanent concrete barrier shall be as specified in the Contract Documents.

Transitions between reduced deflection temporary concrete barriers and unrestrained temporary concrete barriers shall be as specified in the Contract Documents.

741.07.04 Delineators

Delineators according to OTM Book 11 shall be installed at 4 m intervals.

Delineators shall be securely fastened to the top of the temporary concrete barrier with reflective surfaces clearly visible.

Delineators shall be maintained at all times.

741.07.05 Movable Temporary Concrete Barrier System

The movable temporary concrete barrier system shall be installed and relocated at the locations specified and according to the Contract Documents, the Working Drawings, and the manufacturer's installation instructions and specifications.

Movable temporary concrete barrier shall be installed on a paved surface having a maximum crossfall of 6% measured perpendicular to the installation and shall be in place prior to the opening of traffic operations.

Gaps between barriers shall be kept clear of debris at all times.

The movable temporary concrete barrier system shall be removed from the Working Area when no longer required.

741.07.05.01 Shifting of Movable Temporary Concrete Barrier

The shift of movable temporary concrete barrier, including the shift of energy attenuators, shall be at the locations specified in the Contract Documents. The method and procedure for the shift shall be according to the manufacturer's installation instructions. The movable temporary concrete barrier and energy attenuators shall be shifted back to the original location when required. Shifting of the movable temporary concrete barrier and energy attenuators at the locations specified in the Contract Documents shall be completed as many times as is necessary to complete the work requiring the shift.

741.07.05.02 End Treatment

One end or both ends, as specified in the Contract Documents, of the movable temporary concrete barrier installation shall be protected with ABSORB 350 energy attenuator according to OPSS 723.

741.07.05.03 Quality Control

Movable temporary concrete barrier units shall be certified that they meet the acceptance criteria listed under the Acceptance Criteria for Movable Temporary Concrete Barrier clause. Every installation and relocation of units shall be certified by submitting to the Contract Administrator a completed Owner Standard Form PH-CC-876 within 24 hours of installation or relocation of the units. Units shall be inspected pre- and post-installation. Certification shall be by an authorized representative of the Contractor.

Installed or relocated units that do not meet the acceptance criteria for movable temporary concrete barrier shall be removed and replaced with units that meet the acceptance criteria within 48 hours.

Units damaged while in service shall be replaced within 48 hours of the damage occurrence or awareness of the damage.

741.07.05.04 Acceptance Criteria for Movable Temporary Concrete Barrier

Any movable temporary concrete barrier unit that fails one or more of the following acceptance criteria shall be rejected:

- a) Dimensions of each unit shall not deviate from those specified by more than the following tolerances:
 - i. For specified dimensions up to 300 mm, the tolerance shall be ± 5 mm.
 - ii. For specified dimensions greater than 300 mm, the tolerance shall be ± 10 mm.
- b) Steel elements of each connecting device shall be free of visible fracture, distortion, and perforation.
- c) Top or head of each unit shall not expose mesh or rebar nor have damage greater than 75 mm deep.
- d) Bottom or foot of each unit shall not have:
 - i. Damage greater than 250 mm long measured parallel to roadway.
 - ii. Damage greater than 75 mm wide measured perpendicular to roadway.
 - iii. Damage greater than 150 mm high.
- e) All cracks wider than 0.3 mm shall neither extend through the unit nor be longer than 300 mm.
- f) The unit shall be free of honeycombing.

741.07.06 Management of Excess Material

Management of excess material shall be according to the Contract Documents.

741.08 QUALITY ASSURANCE

741.08.01 General

The Owner may conduct random Quality Assurance checks on units that have been supplied and installed or relocated to verify the Contractor's ability to ensure compliance with the acceptance criteria. Units that are identified by the Owner's representative as not meeting the acceptance criteria or those units that have been repaired and do not have documentation certifying the method of repair must be removed and replaced with units that meet the acceptance criteria for temporary precast concrete barrier. This shall be done within a 48 hour period of notice to the Contractor, unless agreed otherwise in writing.

741.09 MEASUREMENT FOR PAYMENT

741.09.01 Actual Measurement

**741.09.01.01 Temporary Concrete Barrier
Temporary Concrete Barrier, Reduced Deflection
Movable Temporary Concrete Barrier**

Measurement of barriers shall be by length in metres along the centreline of the barrier, from end to end, including temporary end sections installed and removed, up to the maximum length of barriers required to be placed at any one time during the Contract.

**741.09.01.02 Temporary Concrete Barrier, Relocation
Temporary Concrete Barrier, Reduced Deflection, Relocation
Movable Temporary Concrete Barrier, Relocation**

Measurement of barriers shall be by length in metres along the centreline of the barrier, from end to end, including temporary end sections relocated.

Barriers that are temporarily surplus, but are required for future stages shall be paid for as one relocation for the combined moves into and out of storage, including any off-site storage required due to on-site restrictions.

741.09.01.03 Temporary Concrete Barrier, Drainage Gap

For measurement purposes, a count shall be made of the number of temporary concrete barrier drainage gaps delivered and accepted.

**741.09.01.04 Temporary Concrete Barrier Restraint System, Pinned
Temporary Concrete Barrier Restraint System, Strapped
Temporary Concrete Barrier Restraint System, Bolted**

Measurement of barrier restraint systems shall be by length in metres along the centreline of the barrier restraint system, from end to end, installed and removed. Transitions shall be included with the appropriate restraint system.

741.09.02 Plan Quantity Measurement

When measurement is by Plan Quantity, such measurement shall be based on the units shown in the clause under Actual Measurement.

741.10 BASIS OF PAYMENT

- 741.10.01 Temporary Concrete Barrier - Item**
- Temporary Concrete Barrier, Relocation - Item**
- Temporary Concrete Barrier, Reduced Deflection - Item**
- Temporary Concrete Barrier, Reduced Deflection, Relocation - Item**
- Movable Temporary Concrete Barrier - Item**
- Movable Temporary Concrete Barrier, Relocation - Item**
- Temporary Concrete Barrier, Drainage Gap - Item**
- Temporary Concrete Barrier Restraint System, Pinned - Item**
- Temporary Concrete Barrier Restraint System, Strapped - Item**
- Temporary Concrete Barrier Restraint System, Bolted - Item**

Payment at the Contract price for the above tender items shall be full compensation for all labour, Equipment, and Material to do the Work.

Costs associated with any required removals and replacements of defective workmanship or materials shall be the Contractor's responsibility at no cost to the Owner.

741.10.02 Movable Temporary Concrete Barrier, Shift - Item

Payment at the Contract price for the above tender items shall be full compensation for all labour, Equipment, and Material to do the work.

Payment shall be prorated over the time requiring shifting of movable temporary concrete barrier.

Appendix 741-A, November 2021 FOR USE WHILE DESIGNING MUNICIPAL CONTRACTS

Note: This is a non-mandatory Commentary Appendix intended to provide information to a designer, during the design stage of a contract, on the use of the OPS specification in a municipal contract. This appendix does not form part of the standard specification. Actions and considerations discussed in this appendix are for information purposes only and do not supersede an Owner's design decisions and methodology.

Designer Action/Considerations

The designer should specify the following in the Contract Documents:

- Locations where temporary concrete barriers are required. (741.07.01)
- Locations where restrained temporary concrete barriers are required. (741.07.01.01)
- Locations where reduced deflection temporary concrete barriers are required. (741.07.01.01)
- Drainage gap locations. (741.07.02)
- Details should be provided to cover the method and payment for the restoration of asphalt and concrete surfaces that are disturbed during the installation and removal of temporary concrete barrier restraint systems. (741.07.03.02)
- Locations where transitions are required between unrestrained temporary concrete barrier and restrained temporary concrete barrier and between unrestrained temporary concrete barrier and permanent concrete barrier. (741.07.03.03)
- Locations of movable temporary concrete barrier system to be installed and relocated. (741.07.05)
- Locations of movable temporary concrete barrier to be shifted, including the shift of energy attenuators. (741.07.05.01)
- Locations of movable temporary concrete barrier installation to be protected with ABSORB 350 energy attenuators. (741.07.05.02)

The designer should refer to the MTO Roadside Design Manual when installing temporary concrete barrier within 1 m of excavation.

The designer should ensure that the General Conditions of Contract and the 100 Series General Specifications are included in the Contract Documents.

Related Ontario Provincial Standard Drawings

OPSD 911.150 to 911.610	Guide Rail System, Temporary Concrete Barrier Drawings
OPSD 924.130	Energy Attenuator, Crash Cushion, ABSORB 350 System, Movable Temporary Concrete Barrier, Installation