TABLE OF CONTENTS

741.01  SCOPE
741.02  REFERENCES
741.03  DEFINITIONS - Not Used
741.04  DESIGN AND SUBMISSION REQUIREMENTS - Not Used
741.05  MATERIALS
741.06  EQUIPMENT - Not Used
741.07  CONSTRUCTION
741.08  QUALITY ASSURANCE
741.09  MEASUREMENT FOR PAYMENT
741.10  BASIS OF PAYMENT

APPENDICES

741-A  Commentary

741.01  SCOPE

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 has been developed for use in provincial- and municipal-oriented Contracts. The administration, testing, and payment policies, procedures, and practices reflected in this specification correspond to those used by many municipalities and the Ontario Ministry of Transportation.
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 provincial-oriented specifications are to be used and there is a provincial-oriented specification of the same number as those listed below, references within this specification to an OPSS shall be deemed to mean OPSS.PROV, unless use of a municipal-oriented specification is specified in the Contract Documents. When there is not a corresponding provincial-oriented specification, the references below shall be considered to be to the OPSS listed, unless use of a municipal-oriented specification is specified in the Contract Documents.

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, 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**

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

MTO Form:  
PH-CC-876  Certification of Temporary Precast Concrete Barrier Installations
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 including steel shapes and hollow sections for the I-Lock connection shall be Grade 350W according to CSA G40.20/G40.21 and the Contract Documents. Connection assembly components for other non-proprietary temporary concrete barrier systems shall be according to the Contract Documents.

Connection assembly components for proprietary temporary concrete barrier systems shall be according to manufacturer’s specifications and 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 A 123. 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 D 4956, 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.

741.07  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

For Contracts advertised on or before December 31, 2013, Contractors shall use temporary concrete barriers with one of the following types of connections at locations when restraining is not specified in the Contract Documents:

a) I-Lock  
b) Type J  
c) Type M  
d) Type T

For contracts advertised after December 31, 2013, Contractors may continue to use temporary concrete barriers with one of the above types of connections on roadways with posted speeds less than 70 km/h. On roadways with posted speeds of 70 km/h and greater, Contractors shall use temporary concrete barriers with one of the following types of connections:

a) Type J  
b) Type M  
c) Type T

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

741.07.01.02 Foundation Preparation

Temporary concrete barrier shall be installed on a solid foundation 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.
The Contractor is responsible to supply and install the temporary precast units and certify that they meet the acceptance criteria listed under the Acceptance Criteria for Temporary Precast Concrete Barrier clause. The Contractor shall do an initial inspection of the units prior to installation and a further inspection of the units after each installation. When the installed or relocated units do not meet the acceptance criteria, the Contractor shall remove such units and replace them with units that meet the acceptance criteria. Each installation and relocation of units shall be certified by submitting to the Contract Administrator a completed MTO Form PH-CC-876 Certification of Temporary Precast Concrete Barrier Installations within 24 hours of installation or relocation of the units. 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 Contractor shall perform the repair 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.

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 ± 5 mm
   ii. Specified dimensions greater than 300 mm ± 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.

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 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

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

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, 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.
Designer Action/Considerations

The designer should specify the following in the Contract Documents:

- Locations where temporary concrete barriers are required. (741.07.01.01)

- Drainage gap locations. (741.07.02)

- Locations where temporary concrete barriers are restrained. Temporary concrete barrier restraint systems should be considered for use on a high speed roadway, typically with a posted speed of 70 km/h or more, when barrier protection is required within 0.5 m of an excavation, 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. (741.07.03.01)

- 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)

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 911.140 to OPSD 911.430 Guide Rail System, Concrete Barrier Drawings