

THE ILLINOIS STATE TOLL HIGHWAY AUTHORITY

June 23, 2014

DESIGN BULLETIN No. 14-08

SUBJECT: DESIGN GUIDE FOR REPAIRING TEMPORARY CONCRETE BARRIER

The Tollway has revised the Recurring Special Provision for Temporary Concrete Barrier to include repairs to spalled or delaminated concrete sections under the following conditions:

1. Concrete spalling and delamination of depths less than 1.5 inches will not require patching as long as the exposed cavity has side slopes of at least 1:3 (V:H) (i.e., directions parallel and perpendicular to face of wall, respectively). Grinding of the concrete cavity perimeter will be allowed to satisfy the required 1:3 (V:H) side slope.
2. Concrete spalling and delamination of a depth 1.5 inches to a depth of 2.5 inches shall be repaired utilizing approved material as describe herein.
3. Concrete spalling and delamination of depths greater than 2.5 inches will be considered for repair by methods proposed by the Contractor and approved by the Engineer.

Design Section Engineers (DSE) are hereby directed to utilize this special provision immediately for all contracts currently under design.



Paul D. Kovacs, P.E.
Chief Engineer



Date

TEMPORARY CONCRETE BARRIER (Tollway Recurring)

Effective: June 23, 2014

Description. This work shall consist of furnishing, placing, maintaining, repairing, relocating, and removing precast concrete barrier at temporary locations.

Materials. Materials shall be in accordance with Article 704.02 of the Standard Specifications except as described herein.

Nonshrink Grout: The prepackaged product shall be mixed and placed according to the manufacturer's instructions, except the addition of aggregate to the prepackaged product will not be permitted. Water shall not exceed the minimum needed for placement and finishing. Nonshrink grout shall be in accordance with Illinois Modified ASTM C 1107. The nonshrink grout shall have a water soluble chloride ion content of less than 0.40 lb/cy yd. The Department will maintain an "Approved List of Nonshrink Grouts".

Packaged Rapid Hardening Mortar or Concrete: The R1 or R2 Mortar shall be from the Illinois Department of Transportation approved list of Packaged, Dry, Rapid Hardening, Cementitious Materials for Concrete Repairs with coarse aggregate added. The amount of coarse aggregate added to the R1 or R2 Mortar shall be per the manufacturer's recommendations. The coarse aggregate gradation shall be CA 16 from an Aggregate Gradation Control System source or a packaged aggregate meeting Article 1004.02 with a maximum size of 1/2 inch. The R1 or R2 Mortar and coarse aggregate mixture shall comply with the air content and strength requirements for Class SI concrete, except the cement factor shall be a minimum 6.65 cwt/cu. Yd., the coarse aggregate shall be a CA 16, and the strength shall be a minimum 4000 psi compressive or 675 psi flexural at 14 days. Mixing shall be per the manufacturer's recommendations, except that the water/cement ratio shall not exceed the value specified for Class SI concrete as indicated above. A high range water-reducing admixture shall be used to obtain a 5-7 in. slump.

General. Precast concrete barrier shall be the F shape as detailed on the plans.

Installation. Installation shall be in accordance with Article 704.04 of the Standard Specifications except as described herein. Temporary concrete barrier that is damaged during placement or relocation and determined to be unacceptable by the Construction Manager will be required to be removed at the Contractor's expense.

Inspection. The Engineer is responsible for the inspection, documentation and acceptance of the temporary concrete barrier. The Engineer will inspect the temporary concrete barrier prior to the transport of the temporary concrete barrier to the job site. The Contractor may appeal to the Corridor Construction Manager or the Tollway Project Manager to resolve disagreements regarding the acceptability of temporary concrete barrier.

Repairs: Repairs on temporary concrete barrier prior to the transport to the job site shall be performed at an off-site location accessible to the Engineer. Repairs to temporary concrete barrier adjacent to a travel lane shall not be performed without prior approval of the Engineer. Materials used for repairs shall be in accordance with the materials

specified herein.

Spalled or Delaminated Concrete

1. Concrete spalling and delamination of depths less than 1.5 inches will not require patching as long as the exposed cavity has side slopes of at least 1:3 (V:H) (i.e., directions parallel and perpendicular to face of wall, respectively). Grinding of the concrete cavity perimeter will be allowed to satisfy the required 1:3 (V:H) side slope.
2. Concrete spalling and delamination of a depth 1.5 inches to a depth of 2.5 inches shall be repaired utilizing approved material as describe herein.
3. Concrete spalling and delamination of depths greater than 2.5 inches will be considered for repair by methods proposed by the Contractor and approved by the Engineer.

Method of Measurement. This work will be measured for payment in feet in place along the centerline of the barrier. When the barrier is relocated within the limits of the jobsite, the relocated barrier will be measured for payment in feet in place along the centerline of the barrier.

Basis of Payment. This work will be paid for at the contract unit price per foot for TEMPORARY CONCRETE BARRIER or RELOCATE TEMPORARY CONCRETE BARRIER. All repairs shall be included in the contract unit price.

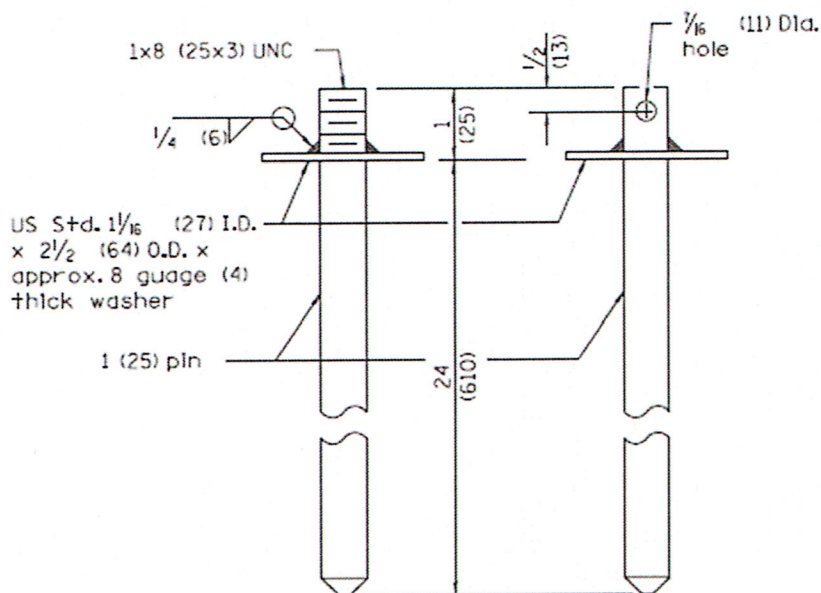
Pay Item Number	Designation	Unit of Measure
J1704000	TEMPORARY CONCRETE BARRIER	FOOT
J1704005	RELOCATE TEMPORARY CONCRETE BARRIER	FOOT

SECTION 7.0 QUALITY STANDARD FOR TEMPORARY CONCRETE BARRIER

This standard applies to temporary concrete barrier furnished by a supplier, subcontractor, or contractor for traffic control in work zones. The Temporary Concrete Barrier shall conform to Section 704 of the Standard Specifications and IDOT Highway Standard 704001. Temporary concrete barrier shall meet NCHRP Report 350, or MASH 2009 Category 3, Test Level 3 requirements and have the F shape.

The barrier unit at each end of the installation shall be secured to the pavement or paved shoulder using six anchoring pins as shown on Standard 704001, and protected with an accepted NCHRP 350, or MASH 2009, Test Level 3, crashworthy device as shown on the plans.

Connecting pins and anchor pins shall be according to Standard 704001.



CONNECTING AND ANCHOR PINS

(End may be beveled $\frac{1}{4}$ (6) max.)

The Evaluation Guide provided in this section shall be used to evaluate the general appearance of temporary concrete barrier. The CM and Contractors QC shall verify that temporary concrete barriers are in compliance with these guidelines.

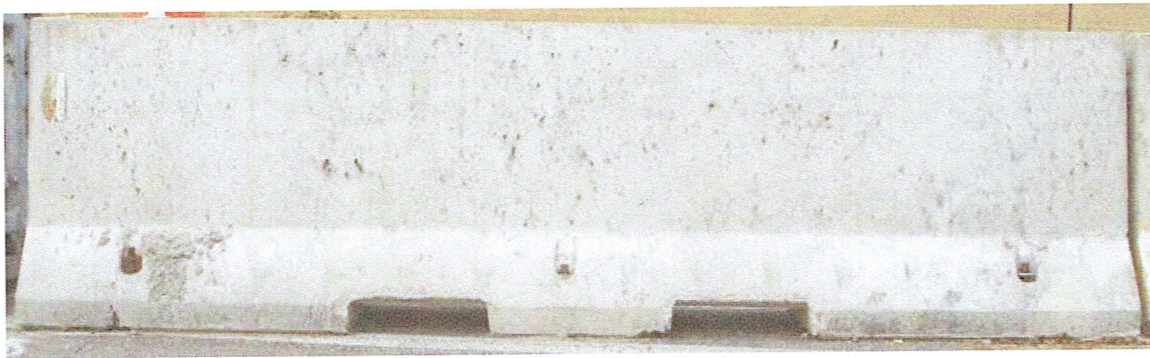
EVALUATION GUIDE - TEMPORARY CONCRETE BARRIER

Acceptable – These are examples of acceptable temporary barrier wall. The walls appear new with few minor blemishes. Wall repaired according to Tollway Recurring Special Provision, TEMPORARY CONCRETE BARRIER is acceptable. The connecting loop bars are in place and in good condition.

Concrete spalling, chipping and delamination not greater than 1.5 inches in depth and 4.0 inches in length measured horizontally, vertically, or diagonally will not require patching as long as the exposed cavity has side slopes of at least 1:3 (V:H).

Cracks are tightly compressed, exhibiting no displacement and do not compromise the structural integrity of the wall.

Most importantly, the wall is structurally sound and none of the spalling or chipping compromises the overall safety shape profile of the barrier or causes a potential snag point on the barrier system during an impact.



EVALUATION GUIDE- TEMPORARY CONCRETE BARRIER

Marginal – These are examples of temporary barrier wall which are marginal. The walls have minor spalls with hairline cracks and minor imperfections along the base but are still structurally sound. The connecting loops are all in place and in good condition.

Concrete spalling, chipping and delamination greater than 1.5 inches and up to and including a depth of 2.5 inches shall be repaired according to Tollway Recurring Special Provision, TEMPORARY CONCRETE BARRIER.

Concrete spalling, chipping and delamination greater than 2.5 inches in depth shall be repaired by methods proposed by the Contractor and approved by the Engineer.

Cracks are tightly compressed, exhibiting no displacement and do not compromise the structural integrity of the wall.

Most importantly, the wall is structurally sound and none of the spalling or chipping compromises the overall safety shape profile of the barrier or causes a potential snag point on the barrier system during an impact.



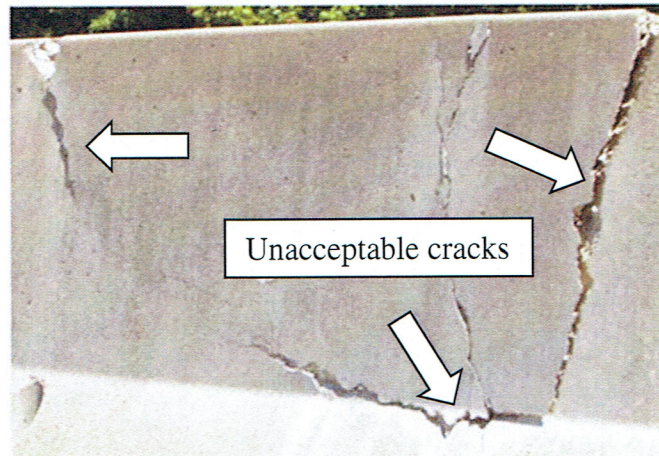
EVALUATION GUIDE - TEMPORARY CONCRETE BARRIER

Unacceptable – These are examples of unacceptable temporary concrete barrier walls. The barrier walls have large spalls and cracks, with unsound concrete that could be easily removed when hit, and the connecting loop bars may be broken or damaged.

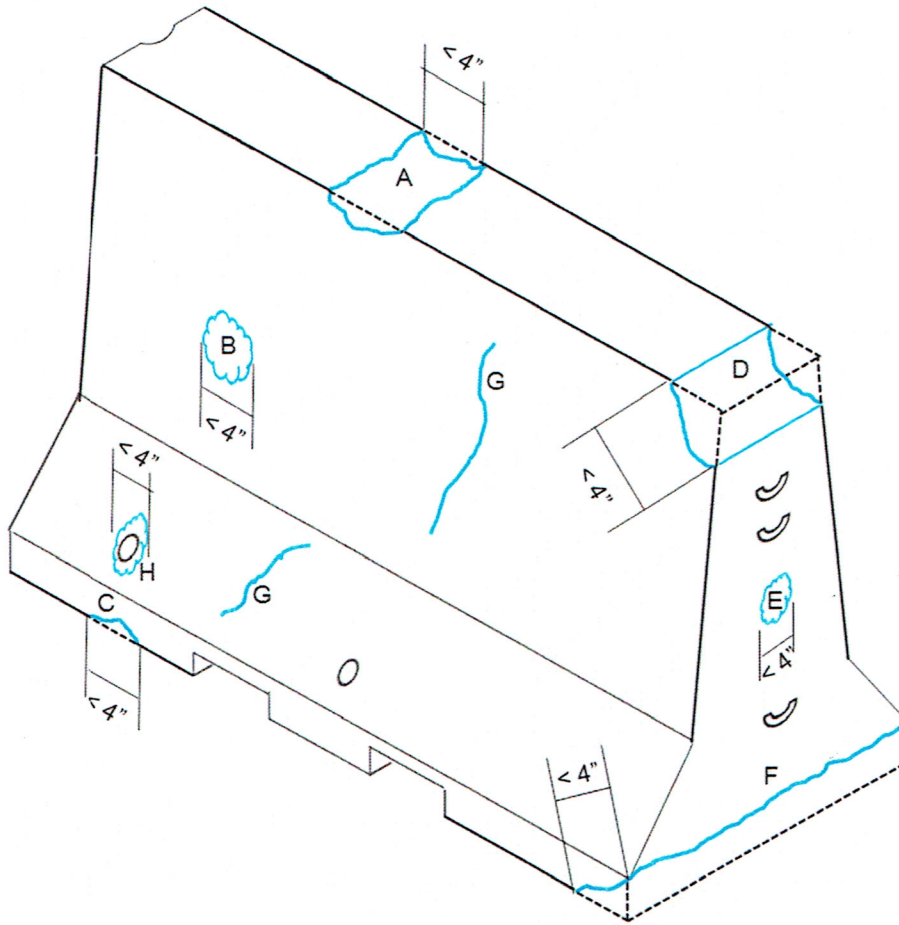
Concrete spalling, chipping and delamination greater than 2.5 inches in depth with any cracks exhibiting displacement or multiple defects which combine to make the barrier structurally unsound per engineering judgment, is cause for rejection.

Barriers that have open cracks with the cracks extending completely through the barrier shall not be accepted. Barrier with cracks that extend from the edge of the wall base to the pinholes shall not be accepted.

A wall is deemed unacceptable if the overall safety shape profile of the barrier is compromised, there may be a potential snag point on the barrier system during an impact, or the wall is not structurally sound.



TYPICAL SAFETY SHAPE DEFECTS (NOT ALL INCLUSIVE)



Above is a diagram of a temporary concrete barrier with some typical defects that may be acceptable. Below are the descriptions of defects that may be deemed acceptable.

- A. Spall on top of barrier, less than 4" measured horizontally, vertically, or diagonally and less than 1.5" depth.
- B. Spall on surface of barrier, less than 4" measured horizontally, vertically, or diagonally and less than 1.5" depth.
- C. Spall on bottom of barrier, less than 4" measured horizontally, vertically, or diagonally. Does not create a snag point or compromise the safety shape.
- D. Spall on top corner of barrier, less than 4" measured horizontally, vertically, or diagonally. Does not create a snag point or compromise the safety shape.
- E. Spall on end face of barrier, less than 4" measured horizontally, vertically, or diagonally and 1.5" depth. Does not interfere with connecting loop bars.
- F. Spall on bottom corner of barrier, less than 4" measured horizontally, vertically, or diagonally. Does not create a snag point or compromise the safety shape.
- G. Crack tightly compressed, exhibiting no surface displacement and not combined with other defects.
- H. Spall around pin hole, less than 4" measured horizontally, vertically, or diagonally.

QUALITY STANDARD FOR WORK ZONE TRAFFIC CONTROL DEVICES

It is important to note that the barrier may still be deemed unacceptable if the CM determines that it is not structurally sound.

NOTE: Temporary Concrete Barrier must be in accordance with standards. This drawing is a sketch (not to scale) intended to discuss defects, not the shape of the wall.