

**TECHNICAL
BRIEF**

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**Concrete Reactive Tension System-Quickchange Moveable Barrier
(CRTS-QMB) NCHRP350 TL 4 and EN1317 H2 Approved**

Specification

The Concrete Reactive Tension System-Quickchange Moveable Barrier (CRTS-QMB) is designed to meet the rigid requirements of deployment in moveable barrier applications where positive separation technology is required and where lane widths and lateral space are limited.

Description

Each barrier element of the CRTS-QMB shall be 810 mm (32") high, 460 mm (18") wide and 1000 mm (39") long (Attachment, Figure 1, C050234). The individual elements shall weigh approximately 680 kg (1500 pounds) and rest on four rubber feet to increase the coefficient of friction between the barrier element and the road surface.

The barrier elements are connected in an end-to-end fashion with tensioning hinge mechanisms and steel pins that are at least 33 mm (1.3") in diameter. The minimum length of CRTS-QMB to create a longitudinal barrier is 30 m (100 ft). Each end of the CRTS-QMB must be anchored to the roadway with an anchorage that is capable of reacting a 450,000 Newton (100,000-pound) tensile load in the barrier for NCHRP TL-3 installations or capable of at least a 225,000 Newton (50,000 pound) tensile load in the barrier for an NCHRP TL-2 installation, in order to perform with the minimum deflection characteristics. If the end of the CRTS-QMB is not anchored to the roadway a minimum length of 80 sections must be deployed upstream of the point where minimum deflection is required for a TL-3 system, or 40 sections must be deployed upstream of the point where minimum deflection is required for a TL-2 system. Minimum deflection characteristics for the CRTS-QMB system are shown in the attached RTS-QMB Deflection Curve.

Materials

The primary elements of the CRTS-QMB shall be constructed of ASTM, A-36 steel and high strength concrete. All external steel shall be stainless steel or hot dipped galvanized in accordance with ASTM, A 123 or ASTM B 695, except miscellaneous hardware which may be stainless steel, brass, or zinc plated. All structural welds shall be continuous.

The TL4 version of the barrier has an additional lower rebar and mesh cage to contain concrete during a test level 4 impact. The TL 3 does not have this additional reinforcement.

CONSTRUCTION METHODS: Barriers will be manufactured by either the wetcast or drycast methods. Minimum concrete 28-day compressive strength shall be 276 bar (4,000 psi). All surface voids or rock pockets shall be repaired. Surface “bugholes” caused by trapped air bubbles shall be permitted. Air entrainment shall be as specified by the ordering agency,
+/- 1.50 %.

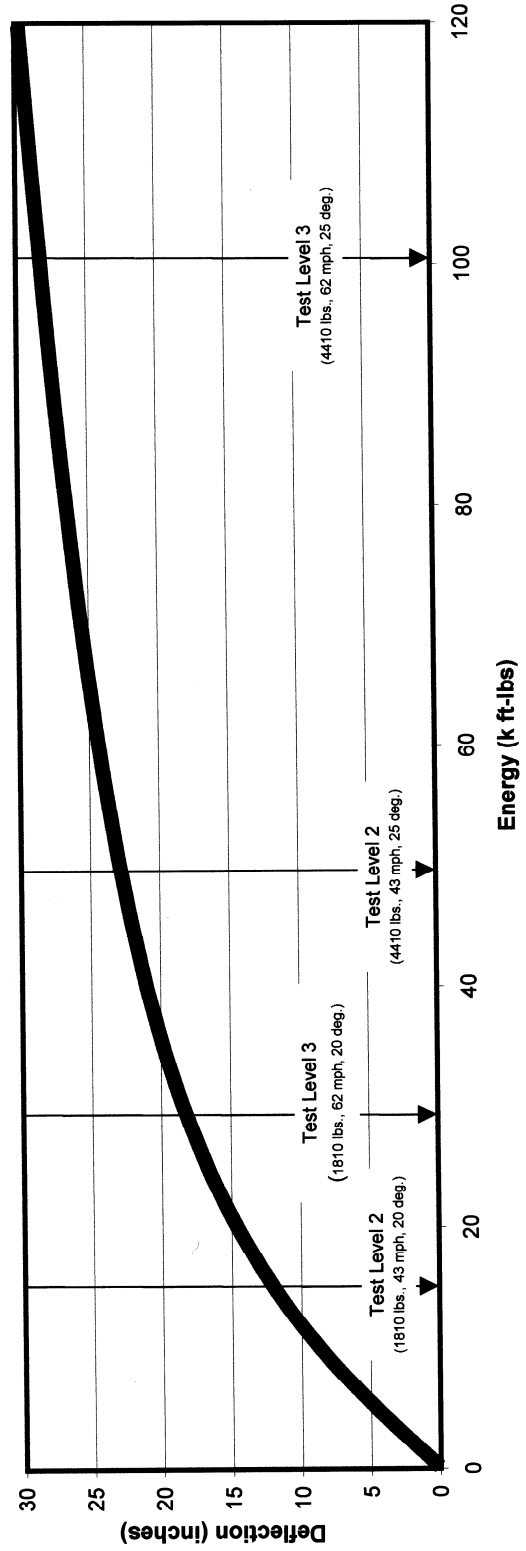
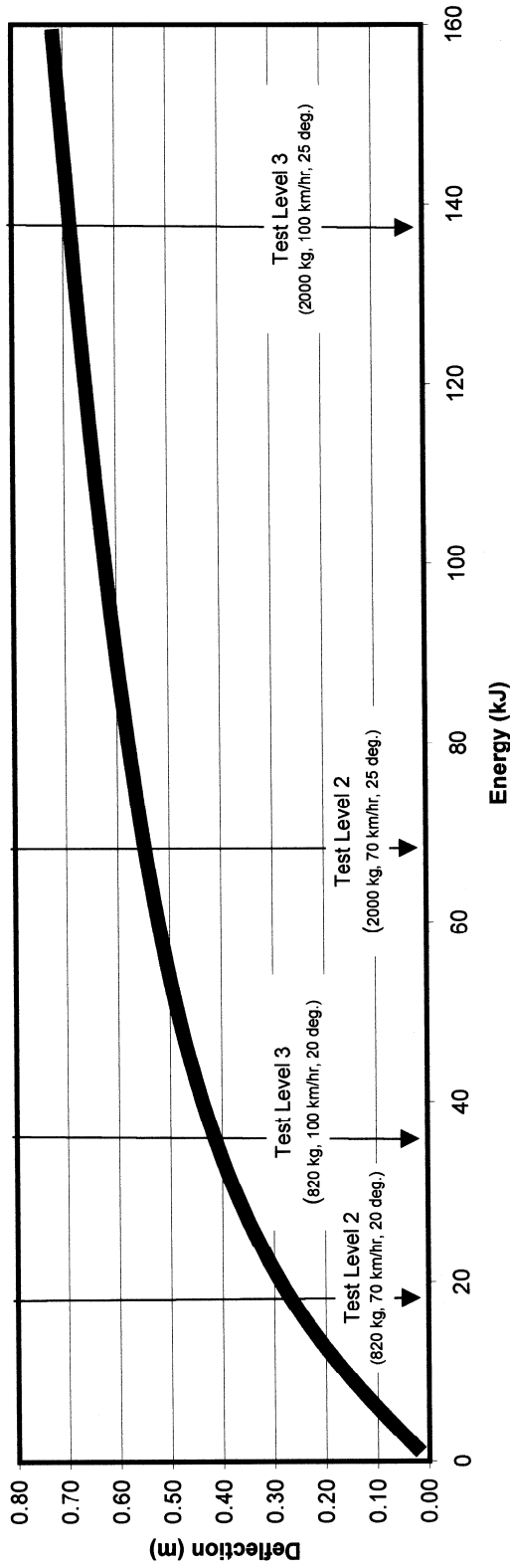
System Requirements

The CRTS-QMB system, when installed in accordance with the manufacturer’s instructions, shall function as a longitudinal barrier and be able to resist the impact of vehicles in accordance with the National Cooperative Highway Research Program Report 350 (NCHRP 350) Test Level 4 and EN 1317 H2. .

The system shall minimize lateral displacement upon impact. The system shall minimize clearance between barrier hinges, resulting in a nominal metal to metal connection. During impact by an errant vehicle, the tension in the barrier system resists the penetration of the vehicle and limits the lateral displacement of the barrier.

Reactive Tension System Variable Length Barriers (RTS-VLBs) shall be added to the length of the CRTS-QMB installation in order to allow a smooth lateral transfer through the Barrier Transfer Machine. The number and location of QVLB units that shall be required will vary depending on specifics of the application, number and degree of curves, changes in elevation, etc.

RTS - QMB Deflection Curve



Based on NCHRP Report 350 testing for Reactive Tension QMB system with foundation or mass anchorage