

MICHIGAN
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
MOVABLE CONCRETE TRAFFIC BARRIER

C&T:JKG

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C&T:APPR:JAR:EMB:02-10-04

a. Description. Furnish, install, operate, and maintain the Moveable Concrete Traffic Barrier (MCTB) at locations designated in the contract documents or as directed by the Engineer. Operating the MCTB includes relocating and adjusting the barrier system laterally and longitudinally as described in this special provision and as directed by the Engineer.

b. Materials and Equipment. The MCTB, ABSORB 350 system, and Barrier Transfer Machine (BTM) as specified herein may be obtained from Barrier Systems, Inc., 180 River Road, Rio Vista, California 94571, (888) 800-3691.

- 1. Moveable Concrete Traffic Barrier** - The MCTB must consist of reinforced precast concrete sections 32 inches high, 24 inches wide at the base and 37 inches long. The barrier length, pin-to-pin, must be 39 inches. The basic shape of the barrier shall be the New Jersey Shape modified at the top with the T-Head.

Fabricate the MCTB from materials conforming to the following.

Reinforcing Bars	Grade 40 or 60
Steel Hinges	ASTM A 36
Through Rods	ASTM A 36
Hinge Pins	AISI 4140 or 4142

Fabricate sections with four $\frac{7}{8}$ -inch threaded rods extending the length of each section to accommodate four steel hinges, two on each side, set into recesses formed in the barrier. Connect the sections with $1\frac{1}{8}$ -inch hinge pins through the barrier hinges, to form a continuous wall.

- 2. Barrier Reflector Markers** - Furnish the MCTB with the appropriate color for the traffic pattern (yellow or white) barrier reflector markers. Place barrier reflectors every 20 feet along the MCTB. The barrier reflectors shall be attached per the (barrier reflector) manufacture's recommendation. Barrier reflector markers may be placed in either of the following configurations.
 - A.** On each side of the barrier, no higher than 6 inches from the bottom on the sloped surface.
 - B.** Bi-directional barrier reflectors on top of the barrier positioned 10 degrees to parallel. These barrier markers must stay in place to accommodate to 2-inch height clearance for operation of the barrier transfer machine.

Paint is not an acceptable alternative to the required barrier reflectors; however, existing paint from previous use of the MCTB does not need to be removed, except directly

under the barrier reflector. A low profile flexible barrier reflector (similar to the Bunzl Extrusion PCBM T-12, phone 800-822-7528) or a low profile rigid barrier reflector (similar to the Astro Optics Curb Marker, CM-1, phone 847-428-3181) are acceptable.

3. **Barrier Transfer Machine** - Furnish and use a self propelled Barrier Transfer Machine (BTM) to move the wall. The BTM must be in good working condition and equipped and operable as follows.
 - A. Capable of lateral transfer of continuous lengths of MCTB from 4 feet to 18 feet in one inch increments at speeds up to 5 mph while lifting the barrier to accommodate differences in roadway elevation up to 12 inches.
 - B. Able to move the MCTB 12 feet in either direction from a neutral 1800 foot radius curve without disassembly.
 - C. Attain a maximum speed of 5 mph when transporting sections of barrier down the roadway.
 - D. Operate under all of the restrictions of the contract and site conditions (i.e. rough pavement).
 - E. Employ a capstan system to maintain the MCTB wall in a neutral longitudinal position when transferred on certain grades and curves.
 - F. Able to transfer the MCTB laterally up to 9 feet or more without causing any part of the equipment or barrier to extend into traffic.
 - G. Equipped with a tow fitting at each end to allow the BTM to be towed while continuing to make the necessary lateral transfer of the barrier, in the event of power plant malfunction or failure.
 - H. Equipped with an engine block heater.
4. **MCTB End Protection** - Furnish two ABSORB 350, non-redirective gating crash cushion systems and place one at each end of the MCTB. The ABSORB 350 system must consist of an end assembly, nine elements, and a transition barrier assembly. The ABSORB 350 system must meet NCHRP Report 350 Test Level 3 (TL-3) and the following.

Length	32 feet
Weight of Empty Element	110 pounds
Weight of Water Filled Element	717 pounds (Approx. 80 gallons per element)
Plastic Elements	Linear Low Density Polyethylene
Steel Components	ASTM A 36
Galvanized Structural Elements	ASTM A 123

Ensure that the water in the ABSORB 350 does not freeze at any time. When the ABSORB 350 is used in conditions where the ambient temperature may fall below 32 °F use an environmentally friendly additive, recommended by the manufacture, to prevent freezing.

5. **Obstacle Marker** - Furnish and place an obstacle marker at the end of each system. The marker must be made of prismatic sheeting, cover the surface of the end assembly under the T-top and be similar in configuration to MDOT Sign Standard OM-3L.

c. Construction. The entire MCTB system must be available for installation at the time of project need (per the progress schedule). No extension of time will be granted for the lack of availability of the MCTB system. Order the MCTB as soon as the project contract is awarded as it may take considerable time to have all the components delivered to the project site. Deletion of the MCTB is not an option that will be considered.

The Engineer will inspect the MCTB upon delivery to the project site and periodically throughout the life of the project. Any barrier sections delivered to the project site having damage or defects that will affect the performance of the system, as determined by the Engineer, must be replaced with a suitable unit. Any unit that is damaged or rendered unsuitable by the Contractor's operations or adjacent traffic during the life of the project, as determined by the Engineer, must be replaced with a suitable unit. All costs associated with removing damaged or defective barrier sections (caused by the Contractor) and replacing them as specified in this paragraph will be borne by the Contractor.

Place the MCTB at the location(s) indicated in the contract documents, or as directed by the Engineer. Connect the individual units of the barrier, as specified by the manufacturer, to form a continuous chain to facilitate lateral and longitudinal movement by the Barrier Transfer Machine.

Place MCTB before diverting traffic or beginning the associated construction work. During installation of the MCTB, protect traffic by the use or installation of standard warning and channelizing devices. Place MCTB in the direction of traffic flow. Remove MCTB in the direction opposite to the traffic flow. When the MCTB is placed on pavement, clean the pavement of all material (sand, gravel, dirt, ice, snow, etc.) that would reduce the friction between the MCTB section and the underlying pavement. During each movement of the MCTB, remove debris accumulated next to the wall, which may hinder traffic, once the MCTB is moved. Dispose of all debris as required by the standard specifications.

Conform to Standard Plan R-126 Series for temporary concrete barrier, or as directed by the Engineer, to ensure that all incomplete MCTB installations or removals which result in barrier blunt ends exposed to traffic inside the clear zone are made crash-safe.

When the MCTB is relocated, adjusted, or placed back in operation, or as directed by the Engineer, clean and replace all damaged reflector markers. Completely remove barrier markers damaged after the MCTB has been placed in initial operation and replace with new markers. Position the replacement markers directly in front of the damaged marker.

All costs associated with replacing markers damaged by the Contractor's equipment (including the BTM) will be borne by the Contractor.

Identify a storage area for the BTM and that is acceptable to the Engineer. Perform all maintenance operations recommended by the manufacture of the BTM. Complete repairs expeditiously to ensure the BTM is available for use on the project as required. Furnish and maintain a sufficient supply of spare parts and trained personnel to ensure that the specified lane configurations are available at the required times.

Before the MCTB is put into use on the project, the Engineer will determine the schedule that the MCTB is to be moved each week.

During winter months, store the entire MCTB on the project in a manner acceptable to the Engineer. Store the BTM in a location approved by the Engineer.

d. Measurement and Payment. The completed work as measured will be paid for at the contract unit price for the following contract items (pay item).

Contract Item (Pay Item)	Pay Unit
Moveable Conc Traf Barrier.....	Foot
Moveable Conc Traf Barrier, Add Adj.....	Foot
Moveable Conc Traf Barrier, Add Relocate.....	Foot
Impact Attenuator, Temp, Furn.....	Each
Impact Attenuator, Temp, Oper.....	Each

Movable Conc Traf Barrier will be measured for the maximum length required by the Engineer at one time during the life of the contract. This pay item includes all costs to:

- furnish, and install the concrete barrier at the initial location with barrier reflector markers attached;
- furnish, operate and maintain the Transfer and Transport Machine;
- provide training for BTM operators by the manufacture or its representative;
- move the barrier back into proper configuration if it is hit by vehicular traffic, including any additional traffic control necessary.
- operate the concrete barrier, including moving the barrier up to 14 feet laterally, two times per week;
- store the concrete barrier and BTM during the winter;
- relocate the concrete barrier from northbound I-75 to southbound I-75 (roadbed relocation), remove and properly dispose of debris from the roadway during each move;
- maintain the concrete barrier; and
- remove the concrete barrier from the project when it is no longer needed.

All costs associated with any adjustments made to move the wall back to its proper alignment due to being hit by Contractor’s equipment will be borne by the Contractor. If barrier reflectors are damaged by other than the Contractor, they must be replaced and will be paid as Conc Barrier Reflector Replacement, according to section 812.04 of the standard specification. All costs associated with replacing barrier reflectors damaged by the Contractor will be borne by the Contractor.

Movable Conc Traf Barrier, Add Adj will be paid when more than two lateral moves per week of the concrete barrier system, as described herein, are required by the Engineer. This contract item will be measured for the maximum length, including the length of the ABSORB 350 systems, required by the Engineer at one time during the life of the contract.

Movable Conc Traf Barrier, Add Relocate will be paid when more than one roadbed relocation (one bound of I-75 to the other bound) of the concrete barrier and ABSORB 350 systems is required by the Engineer. This pay item will be measured for the maximum length, including the length of the ABSORB 350 systems, required by the Engineer at one time during the life of the contract.

Impact Attenuator, Temp, Furn will be measured as the maximum number of units required by the Engineer on the project at one time during the life of the project. This pay item includes all cost to furnish and initially install the ABSORB 350 system in operable condition (including an attached object marker, water, and environmentally friendly additive to prevent freezing) and to replace any ABSORB 350 system damaged by vehicular traffic. Replacement of the ABSORB 350 damaged by the Contractor's equipment will be at the Contractor's expense.

Impact Attenuator, Temp, Oper will be measured as the maximum number of units required by the Engineer on the project at one time during the life of the project. This pay item includes all costs to operate the ABSORB 350 system including moving it up to 14 feet laterally, two times per week and relocating it from one roadway to another; and inspecting, cleaning, maintaining (including maintaining the proper level of environmentally friendly additive to prevent freezing), and removing it from the project.