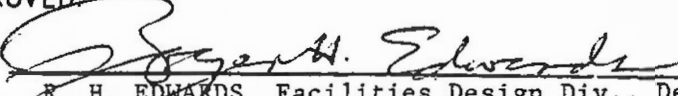


TO: SUPERSEDED BY EI 95-013 EFFECTIVE 3/7/95	<h2 style="text-align: center;">ENGINEERING INSTRUCTION</h2> <p style="text-align: center;">NEW YORK STATE DEPARTMENT OF TRANSPORTATION</p> <p>SUBJECT: INERTIAL BARRIER MODULES</p> <p>Subject Code: 7.27-1-654 & 7.27-1-619</p>
Distribution: 30 Main Office 32 Regions 34 Special	Code: <u> EI 86-31 </u>
APPROVED:  R. H. EDWARDS, Facilities Design Div., Deputy Chief Engr.	Date: <u> 9/8/86 </u> Supersedes: EI 85-040

Recently, FHWA conducted full-scale crash tests on inertial barriers filled with bagged sand. These tests were conducted to ascertain the acceptability of the use of bagged sand. Some States reputedly have used sacked sand to facilitate clean up operations after vehicle impact and also to ease the filling operations. Separate tests were conducted with an 1800-pound car and 4500 pound car, each impacting the inertial barrier array at 60 mph.

The test results from the 4500 pound car's test showed acceptable results. However, the test results from the 1800 pound car's test indicated unsatisfactory performance when evaluated in accordance with NCHRP Report 230 criteria. In addition to the failure to conform with the deceleration criteria of NCHRP Report 230, elements of the test vehicle and debris from the inertial barrier module array penetrated the passenger compartment through the windshield, presenting a hazard to the vehicle occupants.

Therefore we have modified the construction details of the following items:

- 15619.6801 - TEMPORARY INERTIAL BARRIER MODULE (200 POUNDS)
- 15619.6802 - TEMPORARY INERTIAL BARRIER MODULE (400 POUNDS)
- 15619.6803 - TEMPORARY INERTIAL BARRIER MODULE (700 POUNDS)
- 15619.6804 - TEMPORARY INERTIAL BARRIER MODULE (1400 POUNDS)
- 15619.6805 - TEMPORARY INERTIAL BARRIER MODULE (2100 POUNDS)
- 15654.6801 - INERTIAL BARRIER MODULE (200 POUNDS)
- 15654.6802 - INERTIAL BARRIER MODULE (400 POUNDS)
- 15654.6803 - INERTIAL BARRIER MODULE (700 POUNDS)
- 15654.6804 - INERTIAL BARRIER MODULE (1400 POUNDS)
- 15654.6805 - INERTIAL BARRIER MODULE (2100 POUNDS)

This modification adds the following as the third sentence of the first paragraph of the construction details: "The sand and salt mixture shall be placed loose, not in bags or sacks, in the plastic barrels (inertial barrier modules)."

This modification takes effect immediately.

- 15654.6801 - INERTIAL BARRIER MODULE (200 POUNDS)
- 15654.6802 - INERTIAL BARRIER MODULE (400 POUNDS)
- 15654.6803 - INERTIAL BARRIER MODULE (700 POUNDS)
- 15654.6804 - INERTIAL BARRIER MODULE (1400 POUNDS)
- 15654.6805 - INERTIAL BARRIER MODULE (2100 POUNDS)

DESCRIPTION. The Contractor shall furnish and install Inertial Barrier Modules at locations and in configurations shown on the plans, in accordance with the manufacturer's specifications and as approved by the Engineer.

MATERIALS. The materials shall meet the requirements specified in the following:

Sodium Chloride	712-03
Inertial Barrier Modules	712-07
White Pavement Marking Paints (Type I)	727-03
Aluminum Sign Panels	730-01

CONSTRUCTION DETAILS. The unit weight of the fill sand, as supplied, shall result in the desired module sand weight, plus or minus 10 percent. Sodium chloride, as dry rock salt, equal to 3-5 percent by weight of the sand, shall be thoroughly mixed into the sand. The sand and salt mixture shall be placed loose, not in bags or sacks, in the plastic barrels (inertial barrier modules). When called for in the plans, reflectorized aluminum clearance marker panels shall be suitably attached to the front face of the nose module of the completed installation.

The Contractor shall paint a layout pattern on the site to indicate the location and weight of each module as recommended by the manufacturer and approved by the Engineer. Glass beads will not be required in the paint.

If the plans indicate that the site necessitates securing of the modules, the work shall be performed as recommended by the manufacturer and approved by the Engineer. If an overall covering for the debris is called for, a device shall be provided and installed as recommended by the manufacturer and approved by the Engineer. Maintenance and protection of traffic shall be carried out in accordance with the traffic plan shown in the plans. Traffic protection devices, which may include cones, signs, barricades, etc., shall be provided under their respective items. These devices shall not be removed until the Inertial Barrier Module Installation is fully operational.

METHOD OF MEASUREMENT. Inertial Barrier Modules shall be measured by the number of each type properly installed.

BASIS OF PAYMENT. The unit price of each type of Inertial Barrier Module shall include the cost of furnishing all labor, materials, and equipment necessary to complete the module installation. Payment shall be made only after approval by the Engineer of the completed Inertial Barrier Module Installation which is comprised of a specified number of Inertial Barrier Modules as shown on the contract plans. Necessary site preparation, traffic protection devices and reflectorized clearance marker panels shall be paid under their respective items.

- 15619.6801 - TEMPORARY INERTIAL BARRIER MODULE (200 POUNDS)
- 15619.6802 - TEMPORARY INERTIAL BARRIER MODULE (400 POUNDS)
- 15619.6803 - TEMPORARY INERTIAL BARRIER MODULE (700 POUNDS)
- 15619.6804 - TEMPORARY INERTIAL BARRIER MODULE (1400 POUNDS)
- 15619.6805 - TEMPORARY INERTIAL BARRIER MODULE (2100 POUNDS)

DESCRIPTION. The Contractor shall furnish, install, maintain, relocate and remove Temporary Inertial Barrier Modules at locations and in configurations shown on the plans, in accordance with the manufacturer's specifications and as approved by the Engineer.

MATERIALS. The materials shall meet the requirements specified in the following:

Sodium Chloride	712-03
Inertial Barrier Modules	712-07
Aluminum Sign Panels	730-01

CONSTRUCTION DETAILS. The unit weight of the fill sand, as supplied, shall result in the desired module sand weight, plus or minus 10 percent. Sodium chloride, as dry rock salt, equal to 3-5 percent by weight of the sand, shall be thoroughly mixed into the sand. The sand and salt mixture shall be placed loose, not in bags or sacks, in the plastic barrels (inertial barrier modules). When called for in the plans, reflectorized aluminum clearance marker panels shall be suitably attached to the front face of the nose module of the completed installation.

If the plans indicate that the site necessitates securing of the modules, the work shall be performed as recommended by the manufacturer and approved by the Engineer. If an overall covering for the debris is called for, a device shall be provided and installed as recommended by the manufacturer and approved by the Engineer. Modules or components damaged by public traffic shall be repaired or replaced in a manner approved by the Engineer and within a time limit stated in writing by the Engineer. Maintenance and protection of traffic shall be carried out in accordance with the traffic plan shown in the plans. Traffic protection devices, which may include cones, signs, barricades, etc., shall be provided under their respective items. These devices shall not be removed until the Temporary Inertial Barrier Module Installation is fully operational.

METHOD OF MEASUREMENT. Temporary Inertial Barrier Modules shall be measured by the number of each type properly installed.

BASIS OF PAYMENT. The unit price of each type of Temporary Inertial Barrier Module shall include the cost of furnishing all labor, materials, and equipment necessary to complete the module installation. Replacement of individual modules damaged by public traffic will be paid for at the unit price bid for each Temporary Inertial Barrier Module. Payment will be made for each module in its first instance installation as follows:

Ninety percent (90%) upon installation of the complete array.

Ten percent (10%) upon the final removal of the array. Relocation of modules to a new array will be paid for as a new installation.

Necessary site preparation, traffic protection devices and reflectorized clearance marker panels shall be paid under their respective items.

EI 86-31
 EI 85-40
 9-8-88
 8-2-85

712-07 INERTIAL BARRIER MODULES

SCOPE: This specification covers the material and performance requirements for sand-filled inertial barrier systems used for site hazard protection.

GENERAL: Modules composing the array shall be free-draining with respect to residual moisture in the fill sand. Their lids shall be such that they divert precipitation and stop moisture from seeping into the shell. Lids shall be fastened with a minimum of six equally spaced pop rivets or secured by other approved fasteners so as to provide a closed barrel reasonably vandal resistant.

MATERIAL REQUIREMENTS: The modules shall be federal yellow or as shown on the plans. They shall be durable, waterproof, resistant to deterioration from ultra-violet rays, deformation from dynamic loadings due to vibration in the placement area and long-term stresses induced by thermal expansion and contraction and fill settlement.

The fill sand shall conform to the requirements of either \$703-06, Cushion Sand, or \$703-07, Concrete Sand, of the Standard Specifications. Sodium chloride, as dry rock salt, equal to 3-5 percent by weight of the sand, shall be thoroughly mixed into the sand. Sodium chloride shall meet the requirements of \$712-03, Sodium Chloride.

TESTS: To determine the crash worthiness of inertial barrier modules not on the NYSDOT's Approved List, an array containing each size module must be subjected to crash tests to verify that the barrier system can safely decelerate an impacting vehicle. These tests shall be done in accordance with the National Cooperative Highway Research Program Report 230, test numbers 50, 52 and 53.

Crash cushion arrays shall be designed to conform to the occupant risk values found in NCHRP Report 230, Table 8, as shown below:

	Longitudinal	Lateral
Occupant Impact Velocity (V) Limit, fps	30	20
10ms Occupant Ridedown Acceleration, (a) Limit, g's	15	15

Any values deviating from these must be justified by site and/or shape limitations, or cost, and approved by the Director, Materials Bureau.

BASIS OF ACCEPTANCE: The Department requires the submission of Materials Details as defined in §101-34.1. The manufacturer or supplier shall prepare and submit the appropriate material in accordance with the procedural directives of the Materials Bureau. Upon approval by the Materials Bureau, the name of the product and/or supplier, and the reference number assigned to the approved Materials Details will be placed on the Approved List. Such products shall then be accepted on the basis of their brand name and conformance to the approved Materials Details.

712-07

INERTIAL BARRIER MODULES

The supplier shall provide two copies of the approved Materials Details through the Contractor to the Engineer as part of the evidence of acceptability for the material at least 10 days prior to the use of the product.