Sand barrels shall resist deformation from dynamic loadings due to vibration in the placement area and long-term stresses induced by thermal expansion/contraction and fill settlement. Sand barrels shall be free draining with respect to residual moisture in the fill sand. Lids shall divert precipitation and prevent moisture from entering the module. Lids shall be fastened or otherwise secured to provide a closed, reasonably vandal-resistant barrel.

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

**BASIS OF APPROVAL.** Manufacturers or material suppliers desiring to have products considered for inclusion on the Approved List shall prepare and submit copies of drawings, specifications, test reports, and Federal Acceptance Letters to the Director of the Materials Bureau. The review process requires a minimum of 30 calendar days. Upon approval, the name of the manufacturer and the product will be placed on the Approved List.

**BASIS OF ACCEPTANCE.** Sand barrels will be accepted on the basis of the product appearing on the Approved List and a material certification that the product is the same as the one appearing on the Approved List and that it conforms to this specification.

**729-14 VEHICLE-ARRESTING SYSTEMS**

**SCOPE.** This specification covers the material and performance requirements for vehicle-arresting systems. Vehicle-arresting systems are defined by FHWA as a Category III device.

**MATERIAL REQUIREMENTS.** Vehicle-arresting systems shall be NCHRP 350 or MASH approved.

**BASIS OF APPROVAL.** Manufacturers or material suppliers desiring to have products considered for inclusion on the Approved List shall prepare and submit copies of drawings, specifications, test reports, and Federal Acceptance Letters to the Director of the Materials Bureau. The review process requires a minimum of 30 calendar days.

**BASIS OF ACCEPTANCE.** Vehicle-arresting systems will be accepted on the basis of the product appearing on the Approved List and a material certification that the product is the same as the one appearing on the Approved List and that it conforms to this specification.

**729-15 ARROW PANELS**

**SCOPE.** This specification covers the material and performance requirements for arrow panels. Arrow panels are defined by FHWA as a Category IV device.

**MATERIAL REQUIREMENTS.** Arrow panels shall be signs with a matrix of illuminated elements capable of either flashing or sequential arrow displays that meets the requirements of the MUTCD. Arrow panels shall be equipped with a sign control console, mounted in a lockable, weather-resistant compartment.

Arrow panels shall not bear any advertising message or any other message that is not related to traffic control. A non-reflective logo or name and telephone number of the contractor or supplier may be located on the back of the arrow panel or on the arrow panel trailer. The logo shall not exceed 0.1 m² | 1 ft². The name and telephone number shall not exceed 2 inches in height. The rear face of the arrow panel shall contain one or more clear lamp(s) to indicate that the arrow board is operating properly.
**Truck-Mounted Series B.** Arrow panels consist of a 60 x 30 inch rectangular panel mounted at a minimum of 5 feet above the roadway. The arrow display shall be legible at a minimum distance of 3/4 mile on a bright, sunny day or a clear night when the sight line is unobstructed.

**Trailer-Mounted or Truck-Mounted Series C.** Arrow panels consist of a 96 x 48 inch rectangular panel mounted at a minimum of 7 feet above the roadway for trailer mounted arrow panels and 5 feet above the roadway for truck mounted arrow panels. Arrow panels shall be powered by self-contained engine-driven generator systems, capable of energizing the arrow displays for 72 hours unattended and shall be capable of being powered by 110V AC supply; solar-powered, capable of energizing the arrow displays continuously for 21 days unattended; or powered by a truck. Arrow panel operation controls shall be mounted in a lockable enclosure. The arrow display shall be legible at a minimum distance of 1 mile on a bright, sunny day or a clear night when the sight line is unobstructed.

**TESTING.** Manufacturers or material suppliers desiring to have Truck-Mounted Series B arrow panels considered for inclusion on the Approved List shall submit a material certification that the arrow panel conforms to this specification and the requirements of the MUTCD, and provide an arrow panel to the Director, Materials Bureau in Albany for initial field testing. Field testing will include evaluation of arrow panel operation during various light conditions for brightness, legibility, and angularity. The review process requires a minimum of 30 calendar days.

Manufacturers or material suppliers desiring to have Trailer-Mounted or Truck-Mounted Series C arrow panels considered for inclusion on the Approved List shall submit test results from the AASHTO National Transportation Product Evaluation Program (NTPEP), a material certification that the arrow panel conforms to this specification and the requirements of the MUTCD, and provide an arrow panel to the Director of the Materials Bureau in Albany for initial field testing. Field testing will include evaluation of arrow panel operation during various light conditions for brightness, legibility, and angularity. The review process requires a minimum of 30 calendar days.

**BASIS OF APPROVAL.** Truck-Mounted Series B arrow panels meeting the requirements of this specification and having satisfactory initial field test results will be placed on the Approved List.

Trailer-Mounted or Truck-Mounted Series C arrow panels meeting the requirements of this specification and satisfactory initial field test results, as well as satisfactory NTPEP test results will be placed on the Approved List. Trailer-Mounted or Truck-Mounted Series C arrow panels for which NTPEP test results have not been submitted may be provisionally placed on the Approved List for a maximum of one year. After one year of provisional approval, the manufacturer may request an extension for one additional year based on a pending application filed with NTPEP for testing. No extensions of provisional approvals past two years will be granted. If satisfactory test results are not provided by the expiration date of the provisional approval, all units provided or in use shall be removed and replaced by the Contractor with approved units at no additional cost to the State. Arrow panels on the Approved List that have repeated poor evaluations will be removed from the Approved List.

**BASIS OF ACCEPTANCE.** Arrow panels will be accepted on the basis of the product appearing on the Approved List and a material certification that the product meets this specification and is the same as the one appearing on the Approved List.

**729-16 PORTABLE VARIABLE-MESSAGE SIGNS (PVMS)**

**SCOPE.** This specification covers the physical and performance requirements for Portable Variable-Message Signs (PVMS).

**GENERAL.** PVMS shall be tested by the AASHTO National Transportation Product Evaluation Program (NTPEP), demonstrating that the sign meets the requirements of this specification and the MUTCD.