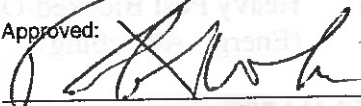


SUPERSEDED BY EB 15-031 EFFECTIVE 9/28/15		New York State Department of Transportation ENGINEERING INSTRUCTION	EI 12-017
Title: ENERGY-ABSORBING END TERMINALS FOR CORRUGATED BEAM SYSTEMS			
Target Audience: ☒ Manufacturers (18) ☒ Local Govt. (31) ☒ Agencies (32) ☐ Surveyors (33) ☒ Consultants (34) ☒ Contractors (39) ☐ _____ ()		Approved:  Richard W. Lee, P.E. Acting Deputy Chief Engineer (Design) Date <u>8/10/12</u>	

ADMINISTRATIVE INFORMATION:

- This Engineering Instruction (EI) is effective beginning with projects submitted for the letting of January 10, 2013.
- This EI does not supersede any other issuance.
- The revisions issued with this EI will be incorporated into the next update of the Standard Specifications.

PURPOSE: The purpose of this EI is to revise Standard Specifications section 606- Guide Railing.

TECHNICAL INFORMATION:

- This EI is being issued concurrently with EI 12-018 *Design Guidance for Use of Energy-Absorbing End Terminals for Corrugated Beam Systems*.
- Three new standard specifications for NCHRP350-compliant energy absorbing terminals for weak post corrugated beam, HPBO corrugated beam guide rail, and for HPBO median barrier are now available.
- All current energy-absorbing terminals are proprietary systems and are used on projects through special specifications. New approved lists have been created to allow quicker implementation of new systems and to make each item non-proprietary standard item. These approved lists are to meet the requirements of materials specifications 710-17 *Corrugated Beam Guide Railing End Terminal (Energy-Absorbing)*, 710-18 *HPBO Corrugated Beam Guide Railing End Terminal (Energy-Absorbing)*, or 710-19 *Heavy-Post, Blocked-Out Corrugated Beam Median Barrier End Terminal (Energy-Absorbing)*.
- No appreciable change in cost expected from established bid histories.

IMPLEMENTATION:

- Main Office Design Quality Assurance Bureau will insert the standard specification revisions into contract proposals beginning with projects submitted for the letting of January 10, 2013.
- Disapproved Specifications. The following special specifications have been disapproved as the coated options will no longer be available while the other items will be available as standard specifications.

606.3402 15	End Terminal for HPBO Corrugated Beam Guide Railing
606.3452 15	End Terminal for HPBO Corrugated Beam Guide Railing (Coated)
606.34020015	End Terminal for HPBO Corrugated Beam Guide Railing
606.34520015	End Terminal for HPBO Corrugated Beam Guide Railing (Coated)

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- Approved Specifications. The following standard specifications have been approved for use.
 - 606.26 Corrugated Beam Guide Railing End Terminal (Energy-Absorbing)
 - 606.27 Heavy Post Blocked-Out Corrugated Beam Guide Railing End Terminal (Energy-Absorbing)
 - 606.28 Heavy Post Blocked-Out Corrugated Beam Median Barrier End Terminal (Energy-Absorbing)

TRANSMITTED MATERIALS:

- Attached are both the USC and Metric standard specification revisions for the subject systems.
- The approved lists and submitted materials details will be available on the Technical Services – Materials – Approved List at:
<https://www.dot.ny.gov/divisions/engineering/technical-services/technical-services-repository/alme/bar.html>

BACKGROUND: Traditional, non-energy-absorbing terminals have remained acceptable for use when placed close to the limit of the clear zone. Terminals placed closer to the shoulder often need to be energy-absorbing. Until recently, there were only a couple of energy-absorbing terminals that the Department considered acceptable for use as HPBO terminals, and none that were directly usable for weak post corrugated beam guide rail. Recently, a new terminal option came onto the market. As all of the terminals are proprietary systems, it was decided to create items to permit designers to call out a standard item number without needing to be concerned about the proprietary nature of the specific terminals that would be installed. Each standard item relates to a specific approved list of the acceptable terminals.

VENDOR: Vendors wishing to have their terminals appear on one of the subject Approved Lists will be required to submit their crash test data and video to the Materials Bureau for review. The information must also include a letter from FHWA stating that the terminal is judged to have passed the criteria of NCHRP-350 or, for systems tested after December 31, 2010, the MASH criteria. End terminals which can only be installed in a flared configuration will not be approved.

Previously approved terminals will be grandfathered onto the Approved Lists.

CONTACT: Direct questions regarding this issuance to Terry Hale of the Design Quality Assurance Bureau at (518) 485-7009 or via e-mail at Terry.Hale@dot.ny.gov.

ENERGY-ABSORBING END TERMINALS FOR CORRUGATED BEAM SYSTEMS

Make the following changes to the Standard Specifications dated May 4, 2006:

Page 499, **add** the following materials specifications to the list in §606-2 MATERIALS:

"Corrugated Beam Guide Railing End Terminal (Energy-Absorbing)	710-17
HPBO Corrugated Beam Guide Railing End Terminal (Energy-Absorbing)	710-18
Heavy-Post, Blocked-Out Corrugated Beam Median Barrier End Terminal (Energy-Absorbing)	710-19"

Page 503, at the start of §606-3.01 General, F. End Terminals and Assemblies, **insert** the following as the first sentence:

"Installation of all proprietary products shall follow the manufacturer's instructions."

Page 503, at the end of §606-3.01 General, F. End Terminals and Assemblies, **add** the following subsection:

"5. Reflective Sheeting. End terminals and assemblies which have a vertical face towards approaching traffic and are located on or closely adjacent to the shoulder shall be provided with reflective sheeting in accordance with Section 2C.65 of the MUTCD. The yellow and black stripe widths shall be 100 mm."

Page 511, at the end of §606-4.02 Anchorage Units, End Terminals and Transitions for Guide Railing or Median Barrier, **add** the following three paragraphs:

"The limits of payment for the Corrugated Beam Guide Railing End Terminal (Energy-Absorbing) will extend a distance of 30.5 meters from the outer end of the terminal. At that point, payment will begin for corrugated beam guide railing.

The limits of payment for HPBO Corrugated Beam Guide Railing End Terminal (Energy-Absorbing) will extend a distance of 15.25 meters from the outer end of the terminal. At that point, payment will begin for heavy post blocked-out corrugated beam guide railing.

The limits of payment for HPBO Corrugated Beam Median Barrier End Terminal (Energy-Absorbing) will extend a distance of 15.25 meters from the outer end of the terminal. At that point, payment will begin for heavy post blocked-out corrugated beam median barrier."

Page 516 **insert** the following payment items:

"606.26	Corrugated Beam Guide Railing End Terminal (Energy-Absorbing)	Each
606.27	Heavy Post, Blocked-Out Corrugated Beam Guide Railing End Terminal (Energy-Absorbing)	Each
606.28	Heavy Post, Blocked-Out Corrugated Beam Median Barrier End Terminal (Energy-Absorbing)	Each"

Page 816, **delete**:

"710-15 THRU 710-19 (VACANT)"

and **insert** the following:

"710-15 AND 710-16 (VACANT)"

ENERGY-ABSORBING END TERMINALS FOR CORRUGATED BEAM SYSTEMS

710-17 CORRUGATED BEAM GUIDE RAILING END TERMINAL (ENERGY-ABSORBING)

SCOPE. This specification covers the material and performance requirements for energy-absorbing corrugated beam end terminals.

MATERIALS REQUIREMENTS. All metal components and hardware shall be new and galvanized to meet or exceed the requirements of §719-01 *Galvanized Coatings and Repair Methods, Type I*.

BASIS OF APPROVAL. End Terminal systems tested before December 31, 2010 shall be either NCHRP 350 approved or MASH approved. Systems tested after December 31, 2010 shall be MASH approved. End terminals acceptable at TL-3 will also be acceptable at TL-2.

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. Upon approval, the name of the manufacturer and the product will be placed on the Approved List.

BASIS OF ACCEPTANCE. Corrugated Beam Guide Railing End Terminals (Energy-Absorbing) will be accepted at the contract site on the basis of the manufacturer's name and product brand name appearing on the Approved List, conformance to the appropriate Materials Details Sheets, and the manufacturer's certification that the product delivered is in conformance with these specifications.

710-18 HEAVY POST BLOCKED-OUT CORRUGATED BEAM GUIDE RAILING END TERMINAL (ENERGY-ABSORBING)

SCOPE. This specification covers the material and performance requirements for energy-absorbing end terminals for HPBO corrugated beam end terminals.

MATERIALS REQUIREMENTS. All metal components and hardware shall be new and galvanized to meet or exceed the requirements of §719-01 *Galvanized Coatings and Repair Methods, Type I*.

BASIS OF APPROVAL. End Terminal systems tested before December 31, 2010 shall be either NCHRP 350 approved or MASH approved. Systems tested after December 31, 2010 shall be MASH approved. End terminals acceptable at TL-3 will also be acceptable at TL-2.

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. Upon approval, the name of the manufacturer and the product will be placed on the Approved List.

BASIS OF ACCEPTANCE. Corrugated Beam End Terminals (Energy-Absorbing) will be accepted at the contract site on the basis of the manufacturer's name and product brand name appearing on the Approved List, conformance to the appropriate Materials Details Sheets, and the manufacturer's certification that the product delivered is in conformance with these specifications.

710-19 HEAVY POST BLOCKED-OUT CORRUGATED BEAM MEDIAN BARRIER END TERMINAL (ENERGY-ABSORBING)

SCOPE. This specification covers the material and performance requirements for energy-absorbing end terminals for HPBO corrugated beam median barriers.

ENERGY-ABSORBING END TERMINALS FOR CORRUGATED BEAM SYSTEMS

MATERIALS REQUIREMENTS. All metal components and hardware shall be new and galvanized to meet or exceed the requirements of §719-01 *Galvanized Coatings and Repair Methods, Type I*.

BASIS OF APPROVAL. End Terminal systems tested before December 31, 2010 shall be either NCHRP 350 approved or MASH approved. Systems tested after December 31, 2010 shall be MASH approved. End terminals acceptable at TL-3 will also be acceptable at TL-2.

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. Upon approval, the name of the manufacturer and the product will be placed on the Approved List.

BASIS OF ACCEPTANCE. Corrugated Beam End Terminals (Energy-Absorbing) will be accepted at the contract site on the basis of the manufacturer's name and product brand name appearing on the Approved List, conformance to the appropriate Materials Details Sheets, and the manufacturer's certification that the product delivered is in conformance with these specifications."

ENERGY-ABSORBING END TERMINALS FOR CORRUGATED BEAM SYSTEMS

Make the following changes to the Standard Specifications dated May 1, 2008.

Page 503, **add** the following materials specifications to the list in §606-2 MATERIALS:

"Corrugated Beam Guide Railing End Terminal (Energy-Absorbing)	710-17
Heavy Post Blocked-Out Corrugated Beam Guide Railing End Terminal (Energy-Absorbing)	710-18
Heavy-Post, Blocked-Out Corrugated Beam Median Barrier End Terminal (Energy-Absorbing)	710-19"

Page 507, at the start of §606-3.01 General, F. End Terminals and Assemblies, **insert** the following as the first sentence:

"Installation of all proprietary products shall follow the manufacturer's instructions."

Page 507, at the end of §606-3.01 General, F. End Terminals and Assemblies, **add** the following subsection:

"5. Reflective Sheeting. End terminals and assemblies which have a vertical face towards approaching traffic and are located on or closely adjacent to the shoulder shall be provided with reflective sheeting in accordance with Section 2C.65 of the MUTCD. The yellow and black stripe widths shall be 4 inches."

Page 515, at the end of §606-4.02 Anchorage Units, End Terminals and Transitions for Guide Railing or Median Barrier, **add** the following three paragraphs:

"The limits of payment for the Corrugated Beam Guide Railing End Terminal (Energy-Absorbing) will extend a distance of 100 feet from the outer end of the terminal. At that point, payment will begin for corrugated beam guide railing.

The limits of payment for Heavy Post Blocked-Out Corrugated Beam Guide Railing End Terminal (Energy-Absorbing) will extend a distance of 50 feet from the outer end of the terminal. At that point, payment will begin for heavy post blocked-out corrugated beam guide railing.

The limits of payment for Heavy-Post, Blocked-Out Corrugated Beam Median Barrier End Terminal (Energy-Absorbing) will extend a distance of 50 feet from the outer end of the terminal. At that point, payment will begin for heavy post blocked-out corrugated beam median barrier."

Page 520 **insert** the following payment items:

"606.26	Corrugated Beam Guide Railing End Terminal (Energy-Absorbing)	Each
606.27	Heavy Post Blocked-Out Corrugated Beam Guide Railing End Terminal (Energy-Absorbing)	Each
606.28	Heavy-Post, Blocked-Out Corrugated Beam Median Barrier End Terminal (Energy-Absorbing)	Each"

Page 858, **delete**:

"710-15 THRU 710-19 (VACANT)"

and **insert** the following:

ENERGY-ABSORBING END TERMINALS FOR CORRUGATED BEAM SYSTEMS

710-15 AND 710-16 (VACANT)

710-17 CORRUGATED BEAM GUIDE RAILING END TERMINAL (ENERGY-ABSORBING)

SCOPE. This specification covers the material and performance requirements for energy-absorbing corrugated beam end terminals.

MATERIALS REQUIREMENTS. All metal components and hardware shall be new and galvanized to meet or exceed the requirements of §719-01 *Galvanized Coatings and Repair Methods, Type I*.

BASIS OF APPROVAL. End Terminal systems tested before December 31, 2010 shall be either NCHRP 350 approved or MASH approved. Systems tested after December 31, 2010 shall be MASH approved. End terminals acceptable at TL-3 will also be acceptable at TL-2.

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. Upon approval, the name of the manufacturer and the product will be placed on the Approved List.

BASIS OF ACCEPTANCE. Corrugated Beam End Terminals (Energy-Absorbing) will be accepted at the contract site on the basis of the manufacturer's name and product brand name appearing on the Approved List, conformance to the appropriate Materials Details Sheets, and the manufacturer's certification that the product delivered is in conformance with these specifications.

710-18 HEAVY POST BLOCKED-OUT CORRUGATED BEAM GUIDE RAILING END TERMINAL (ENERGY-ABSORBING)

SCOPE. This specification covers the material and performance requirements for energy-absorbing end terminals for HPBO corrugated beam end terminals.

MATERIALS REQUIREMENTS. All metal components and hardware shall be new and galvanized to meet or exceed the requirements of §719-01 *Galvanized Coatings and Repair Methods, Type I*.

BASIS OF APPROVAL. End Terminal systems tested before December 31, 2010 shall be either NCHRP 350 approved or MASH approved. Systems tested after December 31, 2010 shall be MASH approved. End terminals acceptable at TL-3 will also be acceptable at TL-2.

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. Upon approval, the name of the manufacturer and the product will be placed on the Approved List.

BASIS OF ACCEPTANCE. Corrugated Beam End Terminals (Energy-Absorbing) will be accepted at the contract site on the basis of the manufacturer's name and product brand name appearing on the Approved List, conformance to the appropriate Materials Details Sheets, and the manufacturer's certification that the product delivered is in conformance with these specifications.

710-19 HEAVY POST BLOCKED-OUT CORRUGATED BEAM MEDIAN BARRIER END TERMINAL (ENERGY-ABSORBING)

ENERGY-ABSORBING END TERMINALS FOR CORRUGATED BEAM SYSTEMS

SCOPE. This specification covers the material and performance requirements for energy-absorbing end terminals for HPBO corrugated beam median barriers.

MATERIALS REQUIREMENTS. All metal components and hardware shall be new and be galvanized to meet or exceed the requirements of §719-01 *Galvanized Coatings and Repair Methods, Type I*.

BASIS OF APPROVAL. End Terminal systems tested before December 31, 2010 shall be either NCHRP 350 approved or MASH approved. Systems tested after December 31, 2010 shall be MASH approved. End terminals acceptable at TL-3 will also be acceptable at TL-2.

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. Upon approval, the name of the manufacturer and the product will be placed on the Approved List.

BASIS OF ACCEPTANCE. Corrugated Beam End Terminals (Energy-Absorbing) will be accepted at the contract site on the basis of the manufacturer's name and product brand name appearing on the Approved List, conformance to the appropriate Materials Details Sheets, and the manufacturer's certification that the product delivered is in conformance with these specifications."