

**ENGINEERING DIRECTIVE**  
CHIEF ENGINEER**IMPACT ATTENUATOR TERMINALS**

Effective immediately, any project location requiring an attenuating terminal will be designed, bid, and constructed using Section 628 of the Supplemental Standard Specifications. **This directive applies to all projects not yet submitted for advertising.** MELBCT'S will no longer be the standard end treatment for guardrail requiring an exposed end treatment. This change is due to the MELBCT and its variations not meeting the crash test requirements of NCHRP 350.

Guard rail buried in the back slope, or terminated outside the clear zone remain the preferred guard rail end treatments where feasible. Buried ends are acceptable for use on low speed roadways. Roadway with speeds less than 80 km/h (49.7 mph) will be considered low speed. Roadways with speeds 80 km/h (49.7 mph) and greater will be considered high speed. This is based on the definitions of high and low speed in the 1994 AASHTO "Green Book" and on recent discussions with the FHWA.

For the purposes of this directive, to determine whether a roadway is high or low speed, **posted speed** may be used for all projects consisting of less than full reconstruction or less than construction on new alignment. Where the project involves full reconstruction or construction on a new alignment, a **design speed** determined with the Massachusetts Highway Design Manual and the AASHTO "Green Book" must be used. Operating speed is considered to be a matter of enforcement of posted speed.

Use of the Section 628 Standard Specifications and associated bid items for attenuating terminals requires a Special Provision which includes, but is not limited to the following elements:

1. The item number and location of each attenuator,

628.701      Capable of Redirection      Station 126+50 N.B. Median.

[Include here any specific limitations which may be imposed by the individual site (bi-directional i.e. able to safely sustain a hit from either side including the opposite direction along its length, length of barrier to fixed object, width, etc.) As more limitations are imposed, the effectiveness of this item in obtaining competitively bids is reduced.]

2. The speed for which the attenuators should be designed. This is normally the design speed of the road or some greater speed designated by the recommended by the manufacturer.

3. A requirement that the Contractor furnish copies of the Manufacturer documents indicating satisfactory testing in accordance with NCHRP 350 and/or its subsequent revisions, and approval by the FHWA (not experimental) for use of the attenuator as intended (redirecting, or non-redirecting, shoulder, or median, bi-directional, i.e. able to accept hits from the opposite direction on the other side of the barrier).

4. A requirement that the contractor provide copies of the manufacturer's calculations and plans for the installations, stamped by a P.E. registered in Massachusetts.

Attached is a sample copy of a Special Provision which may be used as a guide.

Att: Sample Copy of Special Provision for Items in Section 628 of the Supplementary Standard Specifications

# ALL ITALICS ARE TO BE FILLED IN BY THE ENGINEER

<u>ITEM 628.31X</u> <u>THRU</u> <u>ITEM 628.31Y</u>	<u>IMPACT ATTENUATOR BARRIER FOR SHOULDER</u> <u>INCAPABLE OF REDIRECTION</u>	<u>EACH</u>
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<u>ITEM 628.32X</u> <u>THRU</u> <u>ITEM 628.32Y</u>	<u>IMPACT ATTENUATOR BARRIER FOR SHOULDER</u> <u>CAPABLE OF REDIRECTION</u>	<u>EACH</u>
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<u>ITEM 628.33X</u> <u>THRU</u> <u>ITEM 628.33Y</u>	<u>IMPACT ATTENUATOR BARRIER FOR MEDIAN</u> <u>INCAPABLE OF REDIRECTION</u>	<u>EACH</u>
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<u>ITEM 628.34X</u> <u>THRU</u> <u>ITEM 628.34Y</u>	<u>IMPACT ATTENUATOR BARRIER FOR MEDIAN</u> <u>CAPABLE OF REDIRECTION</u>	<u>EACH</u>
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N.B. Add additional numbers as needed.

Work done under this item shall conform to the relevant provisions of Section 600 of the Standard Specifications and the following.

The location of the impact attenuator ends shall be as follows:

## SAMPLE ITEMIZATION

628.101      *Incapable of Redirection*                      *Station 125 + 36 N.B. Shoulder*

*Include here any specific limitations imposed by this site (bi-directional i.e. able to safely sustain a hit from either side including the opposite direction along its length, length of barrier to fixed object, width, etc.)*

628.102      *Incapable of Redirection*                      *Station 135 + 18 S.B. Shoulder*

*Include here any specific limitations imposed by this site (bi-directional i.e. able to safely sustain a hit from either side including the opposite direction along its length, length of barrier to fixed object, etc.)*

628.701      *Capable of Redirection*                      *Station 126 + 50 N.B. Median*

*Include here any specific limitations imposed by this site (bi-directional i.e. able to safely sustain a hit from either side including the opposite direction along its length, length of barrier to fixed object, etc.)*

Each attenuator shall be designed to safely accommodate the design (*or some greater speed based on the engineering judgement of the designer*) speed of the road, **XX** miles per hour, or other such greater additional speed as the manufacturer recommends. [OPTIONAL FOR INDIVIDUAL LOCATIONS The attenuator Item 628.102 at Station 135+18 S.B. (*shoulder*) shall be designed for **ZZ** miles per hour, or other such greater additional speed as the manufacturer recommends. OPTIONAL]

Before installation, the Contractor shall provide the Engineer with copies of the Manufacturer's documents indicating satisfactory testing in accordance with NCHRP 350 and/or its subsequent revisions, and of the approval by the FHWA for use of the attenuator as intended (redirecting, non-redirecting) and in the location intended (median, shoulder.)

In addition, before installation, the Contractor shall provide the Engineer with design calculations for the impact attenuators as well as design drawings for the attenuators both of which must be stamped by a Professional Engineer registered in Massachusetts. These documents are to become part of the Department's permanent project file.

For Maintenance purposes the Contractor shall provide a list of component parts which shall be forwarded to the District Maintenance Office. {OPTIONAL In addition the Contractor shall also deliver a set of repair parts for each attenuator installed, *to location designated* OPTIONAL}

No work shall commence under these items until all documents have been received by the Engineer.

Payment will be as stipulated in Section 628 of the Standard Specifications for Highways and Bridges and its supplements and addenda. Payment for this item includes all work to furnish and install the guard rail terminal including, but not limited to, excavation, embankment, grading, seeding, and erosion control. All work involving relocation, reconstruction or adjustment of drainage structures, or relocation of pipe will be paid for under their respective items.