



To:  <b>SUPERSEDED BY</b> <b>EB 10-021</b> <b>EFFECTIVE 1/6/11</b>		New York State Department of Transportation <b>ENGINEERING          INSTRUCTION</b>	<b>EI</b>  <b>06-015</b>
<b>Title: CULVERT-END SAFETY GRATES (DESIGN GUIDANCE)</b>			
<b>Distribution:</b> <input checked="" type="checkbox"/> Manufacturers (18) <input checked="" type="checkbox"/> Local Govt. (31) <input checked="" type="checkbox"/> Agencies (32) <input type="checkbox"/> Surveyors (33) <input checked="" type="checkbox"/> Consultants (34) <input checked="" type="checkbox"/> Contractors (39) <input type="checkbox"/> _____ ( )	<b>Approved:</b>  Philip J. Clark, P.E. Deputy Chief Engineer, Design		06/06/06 Date

**ADMINISTRATIVE INFORMATION:**

- This Engineering Instruction (EI) is effective beginning with projects submitted for the letting of 01/11/07.
- This EI does not supersede any issuances.
- These revisions will be incorporated into a future update of Chapter 10 of the Highway Design Manual (HDM).

**PURPOSE:** The purpose of this EI is to transmit design guidance for culvert-end safety grates.

**TECHNICAL INFORMATION:**

- These culvert-end safety grates enhance roadside safety by improving traversability for errant vehicles and mowing machines. Designers should consider using culvert-end safety grates for unprotected, roadside pipe culverts that meet the following criteria:
  1. The culvert end is accessible to errant vehicles.
  2. The culvert end is a sideslope end or an approach end for pipes parallel to the direction of travel.
  3. The culvert end falls within the clear zone. (Note: If the clear zone has not been determined, then, for purposes of this instruction, it is assumed to be the lesser of the clear area or 9.2 m.)
  4. Pipe culvert is larger than 450 mm in diameter and less than or equal to 1200 mm in diameter (for Corrugated Metal Pipe Arch use the rise dimension).
  5. The drainage area of the stream bed or watercourse is judged likely to not contain sufficient debris to accumulate on the grate and significantly restrict flow.
- For pipe culvert-end sections in highway embankment sideslopes, safety grates protect vehicles from the drop-off created by the end section. Standard rebar safety grates are strong enough to allow the typical vehicle to traverse the opening. The standard item for "Culvert-End Safety Grate" should be used.
- For pipe culvert-end sections in slopes exposed to errant vehicles, safety grates are intended to protect the vehicle from impacting the end of the pipes and to redirect the vehicle vertically. The standard item "Culvert-End Safety Grate (Heavy-Duty)" or special specifications for safety-end sections with integral safety bars should be used (see EI 06-014). The sideslope of the embankment should be graded flat to provide a platform for the grate and to create an acceptable slope to make it traversable (see HDM Chapter 5, Section 5A.4.5.1).
- The end sections with integral safety bars are built to a designated foreslope of 1:4 or 1:6. They are typically more expensive than end sections with rebar grates, but provide adequate redirection for a broader range of vehicle weights and speeds. Additionally, they provide a better fit to flatter slopes and may be preferred for residential lawn areas for aesthetic and maintenance reasons.

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- The end sections with integral safety bars are designated/paid under one of the special specifications “Galvanized Steel End Sections-Pipe (or Pipe Arch) with Bars for 1:6 (or 1:4)”, as listed on EI 06-014. Detailed drawings to be included in the Plans for these items can be obtained from the Regional Special Specifications Coordinator.
- Cost Estimate – Historically the price of the standard rebar grate has been about \$200/m<sup>2</sup>. The price of the heavy-duty rebar grate is estimated to be about \$300/m<sup>2</sup>, in proportion to the increase in weight of the horizontal bars.
- This EI will be issued concurrently with EB 06-025, which announces the availability of the new Standard Sheet entitled “Culvert-End Safety Grates,” and EI 06-014, which issues a shelf note.
- Additional guidance is available in the HDM, see Chapter 10, Sections 10.2.1.2 and 10.3.2.2.

**TRANSMITTED MATERIALS:** None.

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