Rail Items:

3 Strand Cable Barrier

<table>
<thead>
<tr>
<th></th>
<th>Normal Height: 29 in</th>
<th>Max. Height: 31 in</th>
<th>Min. Height: 27 in</th>
<th>Post Spacing*: 16 ft</th>
<th>Deflection Dist.: 11 ft</th>
</tr>
</thead>
</table>

Box Beam Barrier

<table>
<thead>
<tr>
<th></th>
<th>Normal Height: 27 in</th>
<th>Max. Height: 30 in</th>
<th>Min. Height: 24 in</th>
<th>Post Spacing*: 6 ft</th>
<th>Deflection Dist.: 5 ft</th>
</tr>
</thead>
</table>

W-Beam Barrier

<table>
<thead>
<tr>
<th></th>
<th>Normal Height: 32 in</th>
<th>Max. Height: 35 in</th>
<th>Min. Height: 29 in</th>
<th>Post Spacing*: 12.5 ft</th>
<th>Deflection Dist.: 8 ft</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Normal Height: 29 in</th>
<th>Max. Height: 30 in</th>
<th>Min. Height: 28 in</th>
<th>Post Spacing*: 6.25 ft</th>
<th>Deflection Dist.: 4 ft</th>
</tr>
</thead>
</table>

Weak Post

Heavy Post
Rail Items:

Box Beam Median Barrier

![Box Beam Median Barrier Image]

<table>
<thead>
<tr>
<th></th>
<th>Normal Height</th>
<th>Max. Height</th>
<th>Min. Height</th>
<th>Post Spacing*</th>
<th>Deflection Dist.:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>30 in</td>
<td>33 in</td>
<td>27 in</td>
<td>12.5 ft</td>
<td>3 ft</td>
</tr>
</tbody>
</table>

W-Beam Median Barrier

![W-Beam Median Barrier Image]

<table>
<thead>
<tr>
<th></th>
<th>Normal Height</th>
<th>Max. Height</th>
<th>Min. Height</th>
<th>Post Spacing*</th>
<th>Deflection Dist.:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>29 in</td>
<td>30 in</td>
<td>28 in</td>
<td>6 ft</td>
<td>3 ft</td>
</tr>
<tr>
<td>Weak</td>
<td>30 in</td>
<td>33 in</td>
<td>27 in</td>
<td>12.5 ft</td>
<td>7 ft</td>
</tr>
<tr>
<td>Heavy</td>
<td>29 in</td>
<td>30 in</td>
<td>28 in</td>
<td>6.25 ft</td>
<td>3 ft</td>
</tr>
</tbody>
</table>

Concrete NJ Shape & Single Slope Barrier

![Concrete NJ Shape & Single Slope Barrier Image]

* See page 24 for other post spacing/deflection distance combinations
Rail Items:

Thrie Beam Barrier

Timber Barrier

Steel-Backed Timber Barrier
Rail Items:

Rustic Box Beam Barrier

Painted/Powder Coated Box Beam Barrier

Shop Curve
Post Items:

Weak Post

Heavy Post

Heavy Post With Steel Block Out
Post Items:

Heavy Post With Wood & Synthetic Block Out

“S” Post

“C” Post
Post Items:

Wood Post

Concrete Post

Railroad Rail Post
End Treatments:

W-Beam Spade & Boxing Glove

W-Beam Classic Turndown

W-Beam Driveway Turndown
End Treatments:

SKT-350

ET-2000

ET-Plus
End Treatments:

Box Beam Type 0

Box Beam End Piece
(Known As Box Beam Type I Prior to 7/2/10)

Box Beam Type II (Disapproved 7/2/10)
End Treatments:

Box Beam Type I End Assembly

Includes 72’ shop curve and box beam end piece

Box Beam Modified Type I End Assembly

Box Beam Type IIA End Assembly

Includes 18’ shop curve and box beam end piece
End Treatments:

Box Beam Type III: WYBET

Box Beam Type III: BEAT

Cable Anchor Block
End Treatments:

Median Box Beam Type A

Median Box Beam Type B

Median Box Beam Type C
End Treatments:

Attenuator Device: React 350

Attenuator Device: Quadguard

Attenuator Device: Sand Barrels
Transitions:

Box Beam Pier Protection

Transition From Box Beam To Bridge Rail

Transition From Box Beam To Concrete Barrier
Transitions:

Transition From Box Beam To W-Beam

Transition From Box Beam To Cable
**Issues:**

External Box Beam Coupling — Installed Before 1975

2 Bolt Connection — Installed Before 1975

Box Beam Heat Number & Makers Mark

Imprinted heat number or makers mark indicate the rail was installed after June 12, 1975. Box beam guide rail or median barrier installed prior to June 12, 1975 are not to be reset and should be removed and replaced whenever practical.
Issues:

Damaged Type III WYBET & BEAT End Assembly

Wood Posts At Driveway Openings

No Flair To End Terminals
Issues:

More Than 3 Bent Adjacent Posts

Exposed Soil Plates

Leaning W-Beam
Issues:

Welded Repairs

Holes Or Rust Damage

Excessive Rips Or Tears
Issues:

Cables Protecting Deep Water

Inadequate Tension In Cable Barrier

Rail Splices Lapped Against The Flow of Traffic
**Issues:**

Fixed Objects In Deflection Distance

Trees Greater Than 4” Diameter In Deflection Distance

Short Runs Of Unnecessary Barrier
Table 10-7 Acceptable Barrier Heights When Upgrading Existing Facilities

<table>
<thead>
<tr>
<th>Barrier Type</th>
<th>Normal Height(^1) (in)</th>
<th>Acceptable Heights(^5)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Rail/Barrier Height</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Upper (in)</td>
</tr>
<tr>
<td>Roadside Barriers</td>
<td>Cable</td>
<td>29(^2)</td>
</tr>
<tr>
<td></td>
<td>W-beam(^9) (weak-post)</td>
<td>32(^3)</td>
</tr>
<tr>
<td></td>
<td>W-beam (Heavy-post)</td>
<td>29(^3)</td>
</tr>
<tr>
<td></td>
<td>Box beam</td>
<td>27(^3)</td>
</tr>
<tr>
<td></td>
<td>32(^°) Concrete (NJ&amp;F shapes)</td>
<td>32(^4)</td>
</tr>
<tr>
<td></td>
<td>42(^°) Concrete (F and Single Slope)</td>
<td>42(^4)</td>
</tr>
<tr>
<td>Median Barriers</td>
<td>Cable</td>
<td>28(^2)</td>
</tr>
<tr>
<td></td>
<td>W-beam (weak-post)</td>
<td>33(^3)</td>
</tr>
<tr>
<td></td>
<td>W-beam (Heavy-post)</td>
<td>29(^3)</td>
</tr>
<tr>
<td></td>
<td>Box beam</td>
<td>30(^3)</td>
</tr>
<tr>
<td></td>
<td>32(^°) Concrete (NJ&amp;F shapes)</td>
<td>32(^4)</td>
</tr>
<tr>
<td></td>
<td>42(^°) Concrete (F and Single Slope)</td>
<td>42(^4)</td>
</tr>
</tbody>
</table>

Notes:
1. Normally measured from the surface directly below the barrier. Measure from the pavement surface if curb is present within 12 inches of the railing.
2. Center of top cable at mounting point.
3. Top of rail at post.
4. Top of barrier.
5. Measured after resurfacing, when applicable.
6. The W-beam referred to is the Modified G2. Most weak post W-beam currently in service at the time of this publication is the older G2 system. The Modified G2 was developed to address vaulting problems with the G2. Among the changes was a two-inch increase in rail height from 30\(^°\) to 32\(^°\). The old height criteria for existing G2 systems previously allowed a minimum height of 27\(^°\) which is no longer permitted. Whether a weak post W-beam is the G2 or the Modified G2, the allowable height range for existing installations is 29\(^°\) to 35\(^°\). (In the G2, the rail splice was fastened to the post. In the Modified G2, the splice is between the mounting posts.)

See page 25 for instruction on how to measure rail height when there is a drop off at the edge of shoulder.
<table>
<thead>
<tr>
<th>Barrier Type</th>
<th>Post Type (Deflection Category)</th>
<th>Post Spacing (feet)</th>
<th>Standard Deflection (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable Guide Rail and Cable Median Barrier²</td>
<td>Weak Post (Flexible)</td>
<td>16</td>
<td>11⁶</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12</td>
<td>9'6&quot; ⁶</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8¹⁰</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4¹⁰</td>
<td>7</td>
</tr>
<tr>
<td>Corrugated W-Beam Guide Rail³</td>
<td>Weak Post (Flexible)</td>
<td>12'6&quot;</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Heavy Post (Semi-rigid)</td>
<td>6'3&quot;⁷</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3'1½&quot;²¹¹</td>
<td>1⁷</td>
</tr>
<tr>
<td>Box Beam Guide Rail⁵</td>
<td>Weak Post (Semi-rigid)</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3¹¹</td>
<td>4</td>
</tr>
<tr>
<td>Corrugated Median⁵</td>
<td>Weak Post (Flexible)</td>
<td>12'6&quot;</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Heavy Post (Semi-Rigid)</td>
<td>6'3&quot;²¹¹</td>
<td>5</td>
</tr>
<tr>
<td>Box Beam Median⁵</td>
<td>Weak Post (Semi-Rigid)</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Concrete Safety Shapes</td>
<td>9 inch Embedment (Rigid)</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Temporary, Key-Joined (Rigid)</td>
<td>Ends Pinned ⁸⁸</td>
<td>3'3&quot;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Box Stiffened ⁸⁸</td>
<td>2'2&quot;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fully ⁸¹⁸ Pinned</td>
<td>0'8&quot;</td>
</tr>
</tbody>
</table>

1. Standard Impacts is produced when a 2000P (pickup, 2000 kg) test vehicle traveling at 60 mph impacts the barrier at a 25° angle.
2. Must be properly tensioned and anchored to limit deflection to values shown.
3. Must be properly anchored to limit deflections to values shown.
4. With backup channel (for connection to rigid objects). Categorized as a rigid system. Deflection varies from 2ft at start of channel to 8 in immediately prior to connection to rigid structure.
5. To develop beam strength, must be a minimum length of 125 ft, measured toe-to-toe (extreme ends of rail).
6. To minimize rollover problems, barrier systems with deflections of more than 8 ft should not be used adjacent to slopes steeper than 1:2.
7. Measured from outside face of post.
8A. End pieces should always be pinned, unless at least six pieces are present between end and first point where deflection is a concern. TCB Deflections are based on a 2270 kg (5000 lb) pickup truck.
8B. As in 8A, but box beam fastened across joints on worker's side. Areas where these deflection-limiting measures are desired should be clearly shown on the Work Zone Traffic Control Plan
9. All pieces pinned with four pins per piece, on worker's side only. Areas where these deflection-limiting measures are desired should be clearly shown on the Work Zone Traffic Control Plan.
10. Split spacing achieved by use of backup posts bolted to cable.
11. Split spacing achieved by use of backup posts driven behind the rail, but not fastened to it.
How To Measure Rail Height:
(With Drop Off @ Edge Of Shoulder)

3 Strand Cable Barrier

Box Beam Barrier

W-Beam Barrier

Note: In all cases where there is no drop off measure height from the surface directly below the barrier. Measure from the pavement surface if curb is present within 12 inches of the railing.
The Guide Rail Inspection & Inventory Manual is a reference booklet and is intended to identify existing guide rail systems. This manual is a supplement to Chapter 10 of the Highway Design Manual. The Highway Design Manual should be consulted to verify current design criteria.