Roadside Post and Beam Rail Element

January 5, 2016

NOTE: No barriers should be placed on any slope steeper than 1V:6H, unless it has been crash tested in accordance with NCHRP 350 or MASH evaluation criteria.

If a barrier is to be placed on a slope steeper than 1V:10H, a flexible or semi-rigid type should be used.

NAME	ILLUSTRATION	TEST LEVEL		POST	BLOCKOUT	DISTINGUISHING CHARACTERISTICS
		NCHRP 350	MASH			
SEMI-RIGID SYSTEMS						
W-beam (strong post) https://www.aashtotf13.org/Files/Drawings/sgr04a-c.pdf Generic		TL-3	TL-3	W6 x 9 or W6 x 8.5 x 6 ft. Steel post. Timber post 5 ft. 4 in. or 6 ft. Post spacing 6 ft. 3 in.	6 in.wide x 8 in. x 14 in. blockouts Routed (w/steel posts) timber or composite blockout Double blockouts can be used	Top height of rail 27.75 in. FHWA recommends new applications to have 29 in. +/-1 in. rail height. Strong post barrier systems usually remain functional after moderate to low speed impact, thereby minimizing the need for immediate repair Dynamic lateral deflection 2.6 ft. (wood post), 3.3 ft. (steel post) for NCHRP 350 impact condition Dynamic lateral deflection 3.9 ft. MASH
		TL-2		Steel post	Steel Blockout	Uses 12-gauge panels. Specific applications may use 10 -gauge panels.
Nu-Guard 27 http://nucorhighway.com/nu-guard-27.html Nucor Steel Marion, Inc.		TL-3		6 ft. 6 in. RIB-BAK U-channel 2 in. deep and 3-1/2" wide Post weight 5 lbs.per foot 3/4-in. wide x 7 in. long slot is located 1 in. down from the top of the posts in the middle cross section Post spacing 6 ft. 3 in.	3-5/8 in. x 8 in. x 14 in. plastic blockouts W-beam is held with 5/8"x 12" post bolt and standard guardrail splice nut	Top rail height 27 in to 31 in. Uses standard 12-gauge panels Can be used to repair sections within an existing run of wood or I-beam posts Dynamic lateral deflection 3.8 ft.
Midwest Guardrail System (MGS) http://engineering.unl.edu/specialty-units/mwrsf/Newsletter-MidwestGuardrail.shtml Generic		TL-3	TL-3	W6 x 9 or W6 x 8.5 x 6-ft long steel posts Post spacing 6 ft. 3 in. Rectangular or round timber posts allowable	12" (recommended), 8", or no block. Backup plate needed with non-blocked option. When steel posts are used, timber or plastic blockouts may be routed or toenailed.	Top height of rail between 27-3/4" and 32 in. Uses standard 12-gauge panels. One-half and one-quarter standard post spacing allowable Rail splices are located at midspan between adjacent posts Dynamic lateral deflection 3 ft. 7 in. (NCHRP 350) and 3 ft. 8 in. (MASH) Long-span (25 ft.) installation without intermediate post to conflict with underground structures allowable **Applications**: use on curbs, over long span culvert, at slope break point, approach to slopes, varying flare rates, with 8 in. blockouts, at wire-faced MSE wall, without a blockout, approach transition. Deflection values varies by applications. **NOTE:** MGS adjacent to 2:1 slope: Crash test report noted fuel tank (or surrotgate) heat shield damage reported in one crash test.

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		NCHRP 350	MASH			
Gregory Mini Spacer (GMS) http://www.gregorycorp.com/highway_gms.cfm Gregory Highway Products		TL-3	TL-3	W6 x 9 or W6 x 8.5 x 6-ft Steel posts 6 x 8 in. rectangular or 7 in diameter round timber posts Post spacing 6 ft. 3 in. or 12 ft. 6 in. or 3 ft. 1.5 in.	No blockouts or backup plates Rail is attached to post using a 5/16-in diameter standard hex head bolt incorporated with the GMS	Top height of rail between 27 and 32 inches Splices can be at mid span or at the post Uses standard 12-gauge or 10-gauge panels and standard post. Can be used with Thrie-beam at 39 in. tall GMS fastener may be used in place of a standard guardrail bolt on any non-proprietary strong or weak post W-beam guardrail design Dynamic lateral deflection 2.9 ft. (6ft 3in spacing); 5ft (12ft 6 in spacing) MASH.
Nu-Guard 31 http://nucorhighway.com/nu-guard-31.html Nucor Steel Marion, Inc.		TL-4	TL-3	6 ft. 6 in. RIB-BAK U-channel 2 in. deep and 3.5 in. wide Post weight 5 lbs.per foot 3/4-in. wide x 7 in. long slot is located 1 in. down from the top of the posts in the middle cross section Post spacing 6 ft. 3 in.	No blockouts Round spacer washers are installed between the guardrail and the legs of the posts Spacers are 3.5 in outer diameter, with a 1 in diameter hole Washer is placed with 5/8 in. x 3.5 in. post bolt and standard guardrail splice nut	Top height of rail 31 in. Uses standard 12-gauge panels Dynamic lateral deflection TL-3: 3.4 ft. Dynamic lateral deflection TL-4: 4 ft. (NCHRP 350)
Trinity T-31 Guardrail System http://www.highwayguardrail.com/products/grT31.html Trinity Highways, LLC		TL-3	TL-3	W6 x 9 or W6 x 8.5 x 6 ft. Steel post 6 ft. long Steel Yielding Line Posts (SYLP) Each post has four 13/16-in. diameter holes in the flanges at ground line Post spaced at 6 ft. 3 in.	No Blockouts Uses a 6-inch long flange protector at each post (W-beam)	Top of rail height 31 in. Rail is attached to the post using a 5/8 in. diameter x 1.75 in. long special bolt with a slotted countersunk head Uses standard 12-gauge panels All splices in the W-beam rail element fall midspan, between adjacent posts Dynamic lateral deflection 3.2 ft. (NCHRP 350) and 3.4 ft. MASH

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		NCHRP 350	MASH			
Thrie-Beam https://www.aashtotf13.org/guide_display.php Generic		TL-3		Wood or steel strong post W6 x 9 or W6 x 8.5 x 6 ft. 6 in. Steel post Post spacing 6 ft. 3 in.	6 in. wide x 8 in. x 21.75 in. blockouts Wood or composite routed blocks with steel posts.	Mounting height 32 in. Stronger version of the blocked-out W-beam barrier Additional corrugation in the Thrie-beam rail element stiffens the system Dynamic lateral deflection 2.2 ft. wood post and blockouts Dynamic lateral deflection 1.9 ft. steel post and routed timber or composite blockouts.
Modified Thrie-beam https://www.aashtotf13.org/guide_display.php Generic		TL-3 and TL-4		W6 x 9 or W6 x 8.5 x 6 ft. 9 in. Steel post. Post spaced at 6 ft. 3 in.	Steel block with a triangular notch cut from its web W14x22x17" long steel block	Mounting height 34 in. Dynamic deflection TL-4: 3 ft., TL-3: 2 ft. Requires a backup plate at non-spliced post.
Trinity T-39 (Thrie-beam) http://highwayguardrail.com/products/grT39.html Trinity Highways, LLC		TL-4	TL-3	W6 x 9 or W6 x 8.5 x 6 ft. Steel post. 6 ft. long Steel Yielding Line Posts (SYLP) Each post has four 13/16-in. diameter holes in the flanges at ground line Post spacing 6 ft. 3 in.	No Blockouts Uses a 6 in. long flange protector at each post (W-beam)	Mounting height 39 in. Uses 12-gauge panels Rail is attached to the post using a 5/8 in. diameter x 1.75 in. long special bolt with a slotted countersunk head Rail splices are located at midspan between adjacent posts Dynamic lateral deflection TL-3: 2.1 ft. (MASH) and TL-4: 2.6 ft. (NCHRP 350)
Gregory Mini Spacer (GMS-TB) http://www.gregorycorp.com/highway_gms.cfm Gregory Highway Products		TL-3		W6 x 9 or W6 x 8.5 x 6 ft. Steel post. Post spacing 6 ft. 3 in.	No blockouts or backup plates Thrie-beam is attached with the GMS fastener at each post, attached to the lower post-bolt slot of the Thrie-beam	Top height of rail 39 in. Uses standard 12-gauge or 10-gauge panels and standard post. The rail is mounted with the top corrugation protruding above the post and only one post bolt is used per post All splices are at the post Dynamic lateral deflection 4.33 ft.

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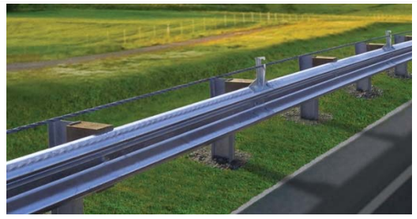
Box Beam weak Post https://www.aashtotf13.org/Files/Drawings/sgr03.pdf Generic		TL-3	TL-3	S3 x 5.7 post 5 ft. 3 in. long with soil plate Post spacing 6 ft.	No blockouts	Top height of rail 27 in. Post near the point of impact are designed to break or tear away, distributing impact forces to adjacent post Dynamic lateral deflection 3.75 ft. (NCHRP 350) Dynamic lateral deflection 4.8 ft. (MASH)
Trinity Guardrail System (TGS) http://www.highwayguardrail.com/products/gr.html Trinity Highways, LLC		TL-3	TL-3	W6 x 9 or W6x8.5 x 6ft Steel post. Post spacing 6'-3"	No blockouts	Mounting height 31" Uses standard 12 gauge W-beam panels and standard post. Rail is attached to the post using a 5/8 in. diameter x 1.75 in. long special bolt with a slotted countersunk head Dynamic lateral deflection 3.2 ft. (MASH); 2000P Test not run (NCHRP)
Retro-Rail™ Guardrail Retrofit http://www.highwayguardrail.com/products/gr.html Trinity Highways, LLC			TL-3	N/A Can be used with both wood and steel post w-beam installations.	N/A Can be used with 8" wood or composite blocks.	Mounting height 31" to 35" The Retro-rail™ is a guardrail retrofit system that is effective for use on 25" to 29" high strong post guardrail. It consists of two cable end brackets, a single wire rope and cable mid brackets to support the cable along the length of the installation. The Retro-rail™ elevates the effective height of exisitng guardrail by 6". The cable mid bracklets are installed at 12.5' intervals, maximizing the use of existing splice bolt holes in the rail for these attachments.
FLEXIBLE SYSTEMS						
W-beam (weak post) https://www.aashtotf13.org/Files/Drawings/sgr02a.pdf Generic		TL-2		S3 x 5.7 post 5 ft. 3 in. long with soil plate Post spacing 12 ft. 6 in.	No blockouts	Mounting height 28 in. Dynamic lateral deflection 4 ft.7 in. for TL-2 System was redesigned for TL-3 as shown below and called "Modified W-beam (weak post)"

U.S.Department of Transportation
Federal Highway Administration

The safety systems shown on this chart are eligible for reimbursement under the Federal-Aid Highway Program. This reference is for informational purposes only, and was created by KLS Engineering under FHWA Contract, DTFH61-10-D-00021, Roadside Safety Systems Installers and Designers Mentor Program. For further information on an individual systems please refer to the manufacturers' website.

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Modified W-beam (weak post) https://www.aashtotf13.org/guide_display.php Generic		TL-3	TL-3	S3 x 5.7 post 5 ft. 5 in. long with soil plate Post spacing 12 ft. 6 in.	No blockouts Backup plates at each post	Mounting height 32.3 in. Rail splices are centered mid-span between posts Dynamic lateral deflection 7 ft. (NCHRP 350) Dynamic lateral deflection 8.6 ft. (MASH)

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