

April 24, 2001

HAS-10/B-83

Mr. Douglas J. Weiszhar
Deputy Commissioner/Chief Engineer
Minnesota Department of Transportation
395 John Ireland Blvd.
St. Paul, Minnesota 55155-1899

Dear Mr. Weiszhar:

In your March 14 letter, you requested the Federal Highway Administration's acceptance of your agency's designs for transitions from w-beam guardrail to an F-shaped concrete bridge rail and to a New Jersey ("J"-shape) concrete bridge rail. To support this request, you also sent copies of a Texas Transportation Institute (TTI) report entitled "NCHRP Report 350 Evaluation of the Minnesota DOT Transitions," dated December 2000, which described both designs and the results of the tests that were run on each of them. A video tape of the crash tests was provided as well. In reviewing this information, it was noted that neither original design met all NCHRP Report 350 evaluation criteria and that both designs were then modified and retested. The transition designs described below are the final designs which the FHWA considers acceptable for use on the National Highway System as test level 3 (TL-3) transitions.

The first transition design is intended primarily for new construction and consists of 3810 mm of blocked-out, nested w-beam attached directly to an 810-mm high F-shape concrete parapet. The top of the concrete parapet is tapered down 125 mm over a distance of 300 mm to match the top of the w-beam to reduce the likelihood of hood snagging. The first two posts adjacent to the parapet are 254 mm x 254 mm x 2438-mm long wood posts and the next four are 150 mm x 200 mm x 2134-mm long wood posts. The first post is centered 290 mm from the parapet and the remaining five posts are on 475 mm centers. Posts 7, 8, and 9 are standard 150 mm x 200 mm x 1830-mm long wood posts on 950-mm centers. The remaining posts are also the standard size and installed with the normal 1900-mm spacing. To minimize the snagging potential on the toe of the F-shape, approximately 9 meters of curb are used. Immediately adjacent to the parapet, this curb is 330-mm tall and matches the lower sloped portion of the F-shape. It then transitions to a 100-mm high curb over the next 2100 mm and remains at that height to post 11.

The second transition design is intended primarily for retrofit applications where a crashworthy transition is attached to a New Jersey ("J") shaped concrete parapet. A blocked-out, nested w-beam is attached at the top of the 815-mm high concrete parapet and held at this constant height throughout its 3810-mm length. The top rail height is then decreased linearly over the next 7600 mm to its standard height of 686 mm. A blocked-out C150 x 12.2 rubrail is also attached to the concrete parapet and is installed just below the bottom edge of the w-beam for a distance of approximately 7600 mm. The first two posts adjacent to the parapet are again 254 mm x 254 mm x 2438-mm long wood posts and the next three posts are 150 mm x 200 mm x 2134-mm long. The first

post is centered 195 mm from the parapet and the remaining four posts are on 475 mm centers. Posts 6 through 11 are standard 150 mm x 200 mm x 1830-mm long wood posts on 950-mm centers. The remaining posts are the standard size and spacing. Curbing was also used in this design. Starting with a 204-mm high profile at the parapet, the curbing transitioned to a 150-mm height over the next 915 mm and continued at that height throughout the length of the 7.6 m transition.

The TTI researchers also concluded, through an analysis using the Barrier VII computer simulation program, that comparable performance (based on predicted wheel snagging) would likely occur if the two 254 mm x 254 mm x 2438-mm long wood posts adjacent to the concrete parapets for both designs were replaced with W200 x 31.3 (W8 x 21) steel posts of the same length and the remaining wood posts were replaced with standard W150 x 13 steel posts 1830-mm long. All steel post spacings would be the same as the wood post spacings noted above for the two tested designs. I consider these alternative steel post transition designs to be equally acceptable at NCHRP Report 350 TL-3.

Anyone wanting detailed drawings for any of these transition designs should contact Mr. Andrew D. Halverson, Mn/DOT Assistant Design Standards Engineer, at (651) 296-3023.

Sincerely yours,

(original signed by Frederick G. Wright, Jr.)

Frederick G. Wright, Jr.
Program Manager, Safety