



National Committee on Uniform Traffic Control Devices

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Item No.: 19A-RW-02

NCUTCD Proposal for Changes to the Manual on Uniform Traffic Control Devices

TECHNICAL COMMITTEE: Regulatory and Warning Signs Committee
ITEM NUMBER: 19A-RW-02
TOPIC: HILL BLOCKS VIEW Sign
ORIGIN OF REQUEST: RWSTC Discussions
Task Force: Dan Paddick (Chair) Randy McCourt, Herman Hill, Dan Waddle, James Sullivan, Jeff Wolfe, Jim Pline
AFFECTED SECTIONS OF MUTCD: Section 2C.18, Figure 2C-4 and Figure 2C-12

DEVELOPMENT HISTORY: Task Force: 11-20-18, revised 1-10-19, updated 1-14-19

- Approved by RW Technical Committee: 01/10/2019
- Approved by RW Technical Committee Following Sponsor Comments: MM/DD/YYYY
- Approved by NCUTCD Council: MM/DD/YYYY

This is a proposal for recommended changes to the MUTCD that has been developed by a technical committee of the NCUTCD. The NCUTCD is distributing it to its sponsoring organizations for review and comment. Sponsor comments will be considered in revising the proposal prior to NCUTCD Council consideration. This proposal does not represent a revision of the MUTCD and does not constitute official MUTCD standards, guidance, or options. If approved by the NCUTCD Council, the recommended changes will be submitted to FHWA for consideration for inclusion in a future MUTCD revision. The MUTCD can be revised only through the federal rulemaking process.

SUMMARY:

In the late 1970's, Federal funding was made available for the first time to the States to perform, R&P, 3R or maintenance type paving projects. The LIMITED SIGHT DISTANCE (LSD) sign was developed to address the retention of non-standard vertical curves on these projects. The HILL BLOCKS VIEW sign first appeared in the 2003 MUTCD. Both of these signs have been the subject of controversy since they first appeared in the MUTCD. The existing research on these signs and various limited visibility symbol signs have had inconsistent results. This proposal will consider the possibility of replacing the HILL BLOCKS VIEW sign with a symbol sign.

32 **DISCUSSION:**

33 The LSD sign first appeared in the 1978 MUTCD. The LSD sign (W14-4) was omitted from the
34 1988 MUTCD and it has not been included in any of the subsequent MUTCD's. The HILL
35 BLOCKS VIEW sign (W7-6) first appeared in the 2003 MUTCD and is in 2009 MUTCD.

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37 In the late 1970's, Federal funding was made available for the first time to the States to perform,
38 R&P, 3R or maintenance type paving projects. These projects frequently involved the repaving
39 of older highways that were not built to modern standards. There were numerous locations on
40 these projects where the stopping sight distance was less than the modern design standard.
41 Generally, it was uneconomical or impractical to improve the alignment of these roadways to
42 attain the required sight distance standard. At these locations, the Federal Highway
43 Administration insisted that either the speed limit be lowered to a value consistent with the
44 available sight distance or that warning signs be installed to notify motorists of the substandard
45 sight distance. The LSD sign was developed to address this situation.

46
47 An unintended consequence of this policy was the use of a relatively large number of LSD signs
48 on isolated sections of highway that had recently been repaved. Adjacent to these repaved
49 segments were long sections of highway with similar geometric limitations where the LSD sign
50 was not being used. In New York State, the sign and its inconsistent use generated significant
51 public comment. There was also concern within the NYSDOT's Traffic and Safety Division that
52 the sign was not understood and that it was not performing its intended function. In February
53 1981, the NYSDOT released a study entitled "*Evaluation of Limited Sight Distance Warning*
54 *Signs*". The study concluded that:

- 55 1. At the LSD sign locations, the vehicle operating speeds were more closely related to the
56 speed limit than the advisory speed on the LSD sign.
- 57 2. At the LSD sign locations vehicle operating speeds were found to be either essentially the
58 same as, or significantly higher than when the LSD sign was not used. It was
59 hypothesized that at some locations the advisory speed actually emboldened some drivers
60 to go faster. Before, they were not able to see over the hill. Now they had some idea
61 how bad the sight distance was and being better than they thought, they went faster than
62 previously. The traditionally conservative method for setting the curve warning sign
63 advisory speed may have also been a factor.
- 64 3. The before and after accident analysis was inconclusive due to a short after period. It
65 was noted that only 3.3% of the accidents at the LSD sites had limited sight distance
66 listed as a contributing factor.
- 67 4. The policy resulted in a proliferation of LSD signs relative to other warning signs on the
68 R&P projects studied.
- 69 5. The LSD sign was the least understood sign on a motorist study conducted by the
70 NYSDOT

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72 The NYSDOT study recommended that the FHWA pursue a further evaluation of the sign. The
73 FHWA did conduct a study. It was entitled "*Limited Sight Distance Warning for Vertical*
74 *Curves*" Report No. FHWA/RD-85/046. This was a fairly comprehensive study of the issue. In
75 the preliminary stages, thirteen word message signs and ten symbol signs were considered. After
76 a review by 41 respondents, these signs were whittled down to three word message signs and
77 three symbol signs. The word signs were the LSD sign, a CAUTION HILL BLOCKS VIEW

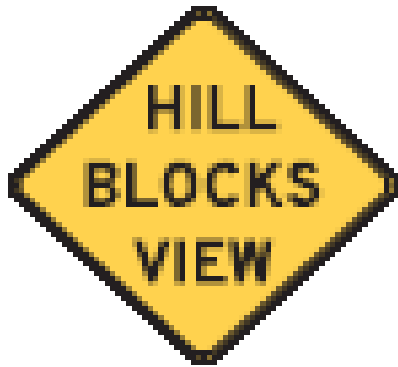
78 sign and a SLOW HILL BLOCKS VIEW sign. The symbol signs were side views. The first
79 depicted one vehicle approaching a hill crest. The second, a vehicle on both approaches of the
80 hill crest. The third a single vehicle approaching the hill crest with an obstruction in the road on
81 the opposite side of the hill crest. These signs were tested in the lab and the best symbol, the best
82 word sign and the LSD sign were tested in the field. In the lab, the SLOW HILL BLOCKS
83 VIEW sign was the best word sign and the LSD the worst. The two-vehicle sign was judged the
84 best symbol sign. The symbol signs were correctly identified 50% more often than the word
85 signs in the simulation test. In the field test, both the word sign and the symbol sign
86 outperformed the LSD sign but neither sign was very effective in influencing test subjects to
87 reduce speed. It was the recommendation of the study that none of the signs be used and that the
88 LSD sign be eliminated from the MUTCD. This study was completed a couple of years before
89 FHWA eliminated the LSD sign from the 1988 MUTCD.

90
91 In April 2010 Canada's Traffic Operations and Management Standing Committee (TOMSC)
92 published a paper entitled Final Report for Project No. 254 "*Vertical Visibility Constraint*
93 *Signs.*"

94
95 They found that many Jurisdictions were encountering situations where there was inadequate
96 sight distance provided on vertical crest curves. At that time, unlike the situation for horizontal
97 curves, there was no sign for such situations in the MUTCDC. Road designers were becoming
98 reluctant to stamp design drawings at locations where the road did not meet the minimum
99 standards.

100
101 In December 2003, a questionnaire was sent to all TOMSC members. Twenty-five (25)
102 responses were received. The results of the questionnaire showed that there was no clear choice
103 for the Vertical Visibility Constraint Sign. There was however, a clear recommendation for the
104 tab sign that should be used (i.e. "Limited Visibility"). Results indicated that a pictorial sign was
105 preferred over a text only sign as used in the MUTCD (US). (Figure 1) It was also clear that the
106 respondents wished to utilize a "Limited Visibility" tab in conjunction with whatever sign was
107 adopted.

108



W7-6

Figure 1



Figure 2



Figure 3

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115 Based on the questionnaire results, a comprehensive testing was undertaken by Professor Alison
116 Smiley of the University of Toronto. Participants were asked what they thought the sign meant
117 and what a driver should do in response to the sign. Their exact responses were recorded and an
118 explanation of the sign was provided if subjects did not answer correctly. The participants were
119 then shown both (Figure 2) and (Figure 3), with and without a supplementary tab, and were
120 asked to choose the alternative that best conveys the meaning of the sign.

121
 122 The study concluded that the Limited Visibility Sign with supplementary tab (Figure 2) was easy
 123 to understand. It was recommended that a Limited Visibility Sign (Figure 2) with supplementary
 124 tab be added to the MUTCDC.

125
 126 The fourth and final research study was the Pooled Fund Study. The results were presented in
 127 the
 128 December 2017, Final Report of the Traffic Control Devices Pooled Fund Study entitled
 129 “*Comprehension and Legibility of Selected Symbol Signs, Phase IV.*”

130
 131 The study states “Though vertical curves can obscure key roadway features or activity that might
 132 lie ahead of an unaware driver and therefore represent a critical safety event, there is no well-
 133 accepted traffic control device for warning drivers of vertical curvature. The HILL BLOCKS
 134 VIEW sign and LIMITED SIGHT DISTANCE sign have demonstrated limited success in
 135 conveying messages related to limited sight distance.”

136
 137 The following alternative blind hill warning signs were evaluated.
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Alt. 1	Alt. 2	Alt. 3	Alt. 4
			

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 141 Participants were posed an open-ended question to assess comprehension of these blind hill
 142 warning signs. The sign was placed in-context near the crest of a hill. They were asked “Imagine
 143 you are driving and encounter this sign. What does this sign mean?” Participant responses were
 144 coded based on the following:

- 145 A. Mention of a sight obstruction and a hill/mountain/similar
- 146 B. Mention of a hill (but no sight obstruction)
- 147 C. Mention of a sight obstruction (but no hill)
- 148 D. Use caution (but no specifics as to why)
- 149 E. Other

150
 151 A summary of the responses are presented in the following table. The percentage of participant
 152 responses within each coded category for each alternative.

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 154
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Sign Alternative	A Sight Obstruction + Hill %	B. Hill%	C. Sight Distance Obstruction %	D. Use Caution %	E. Other %
Alt. 1	58.0	2.0	28.0	8.0	4.0
Alt. 2	14.0	84.0	0.0	0.0	2.0
Alt. 3	50.0	16.0	12.0	18.0	4.0
Alt. 4	34.0	38.0	6.0	10.0	12.0

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 158 Next, participants were told the intended meaning of the blind hill warning sign. The four sign
 159 alternatives were presented and the participants were asked to rank them in terms of perceived
 160 effectiveness. When considering only the top choice indicated by the participants (Ranking = 1),
 161 Alternative 1 was selected as the top choice by the majority of participants (65.5 percent). The
 162 data helps support that the blind hill warning signs were usually preferred by the participants in
 163 the following order: Alternative 1, Alternative 3, Alternative 2, Alternative 4.

164
 165 Legibility was also studied. The results are shown in the following table:
 166

Alternative	Mean Distance (ft)
Alt. 1	439.14
Alt. 2	424.89
Alt. 3	371.71
Alt. 4	367.29

167
 168 Alternate 1, the HILL BLOCKS VIEW sign had the best legibility distance. Alternate 3 had the
 169 had the third best legibility distance.

170
 171 Answers A and C in the first table identified a sight distance obstruction as being the problem.
 172 In eighty-six percent of the responses to Alternate 1 either A or C was chosen. This indicates that
 173 the responders got the message that there was a sight distance restriction. Alternate 3 was the
 174 next best with 62%. Alternate 4 had 40%. Alternate 1 was the best for comprehension and for
 175 legibility distance. Alternate 3 was second for understanding and had the third best legibility
 176 distance.

177
 178 The Pooled Fund Study did not consider the use of a supplemental plaque. In the Canadian study
 179 the symbol signs with a supplement plaque were favored over the symbol signs without the
 180 supplemental plaque.

181
 182 In summary, the four studies concluded:

- 183 1. The NYSDOT concluded that the LSD sign was not understood and its use did not result
184 in lower vehicles speeds.
185 2. In the FHWA study, the symbol signs were correctly identified 50% more often than the
186 word signs in the simulation test. In the field test, both the word sign and the symbol sign
187 outperformed the LSD sign but none of the signs were very effective in influencing test
188 subjects to reduce speed.
189 3. Canadian study concluded that the Limited Visibility sign (symbol) with supplementary
190 tab (Figure 2) was easy to understand and should be used.
191 4. The Pooled Fund Study concluded that the HILL BLOCK VIEW sign had the best
192 comprehension and legibility distance. The comprehension of the most effective symbol
193 sign was 24% worse than the legend sign and its legibility distance was 14 % shorter.
194 Symbol signs with a supplemental plaque were not considered.
195

196 Based on these studies it is not conclusive that the HILL BLOCKS VIEW sign should be
197 replaced with a symbol sign. Three of the studies (NYSDOT, FHWA and Canadian) concluded
198 that the legend signs were ineffective. One study (Canadian) concluded that the symbol sign
199 should be used. One study (FHWA) concluded that none of the signs should be used. One study
200 (Pooled Fund) concluded that the legend sign was the best understood and had the best legibility
201 distance. But, symbol signs with a supplemental plaque were not considered in this study.
202

203 These results were discussed at the RWSTC meeting on June 20, 2018. It was the general
204 consensus that the Task Force prepare a proposal for a symbol sign similar to Figure 2 of the
205 Canadian study. The consensus was that the LIMITED VISIBILITY plaque should be replaced
206 with a HILL BLOCKS VIEW plaque or an OBSTRUCTED VIEW plaque.
207

208 It was also the consensus of the RWSTC that a paragraph be added stating that it was preferable
209 to sign for the specific potential hazard beyond the crest (i.e. Curve Warning, Intersection, STOP
210 AHEAD, etc.) rather than using the general blind hill sign.
211

212 **RECOMMENDATIONS**

- 213
- 214 1. Delete the existing HILL BLOCKS VIEW (W7-6) sign.
 - 215 2. Replace the existing HILL BLOCKS VIEW (W7-6) sign with a symbol sign similar to
216 Figure 2 in the 2010 Canadian study.
 - 217 3. Supplement the sign with an OBSTRUCTED VIEW plaque.
 - 218 4. Downgrade the use of the Advisory Speed plaque to an Option from a Guidance. The
219 original NYSDOT study found that the use of the Advisory Speed plaque was
220 counterproductive. Approach speeds actually increased when the plaque was used. Since
221 Section 2C.08 already allows the optional use of an Advisory Speed plaque with any
222 warning sign delete any mention of the Advisory Speed plaque in this Section.
 - 223 5. Add a Guidance paragraph stating that the sign for specific potential hazard beyond the
224 crest (i.e. Curve Warning, Intersection, STOP AHEAD, etc.) should be used rather than
225 the general OBSTRUCTED VIEW sign
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229 **RECOMMENDED MUTCD CHANGES**

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The following present the proposed changes to the current MUTCD within the context of the current MUTCD language. Proposed additions to the MUTCD are shown in blue underline and proposed deletions from the MUTCD are shown in ~~red strikethrough~~. Changes previously approved by NCUTCD Council (but not yet adopted by FHWA) are shown in green double underline for additions and ~~green double strikethrough~~ for deletions. In some cases, background comments may be provided with the MUTCD text. These comments are indicated by **[highlighted light blue in brackets]**.

Section 2C.18 ~~HILL BLOCKS VIEW Sign (W7-6)~~ Limited View Sign (WX-Y)

Option:

~~01—A HILL BLOCKS VIEW (W7-6) sign (see Figure 2C-4) may be used in advance of a crest vertical curve to advise road users to reduce speed as they approach and traverse the hill as only limited stopping sight distance is available.~~

Guidance:

~~02—When a HILL BLOCKS VIEW sign is used, it should be supplemented by an Advisory Speed (W13-1P) plaque indicating the recommended speed for traveling over the hillcrest based on available stopping sight distance.~~

01a A Limited View (WX-Y) sign (see Figure 2C-4) may be used on the approach to a crest vertical curve where stopping sight distance is limited advising road users that their view is obstructed.

01b A Limited View sign may be supplemented by a LIMITED VIEW (W13-ZP) plaque.

Guidance:

01c The LIMITED VIEW (W13-ZP) plaque should not be used to supplement any other sign.

01d When a vertical curve results in a sight distance obstruction to a specific potential hazard (i.e. horizontal curve, intersection, stop ahead, railroad crossing, crosswalk, school bus stop, etc.) beyond the crest of the vertical curve, the sign (i.e. Curve Warning W1 series, Intersection W2 series, STOP AHEAD W3 series, RR Crossing W10 series, Crosswalk/Crossings W11 series etc.) for the specific hazard beyond the vertical crest should be used in place of the general Limited View (WX-Y) sign.

Delete W 7-6 from Figure 2C-4

267 Add to Figure 2C-4



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Figure 2C-12 Add:



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C: NCUTCD/January 2019/19A-RW-02 HILL BLOCKS VIEW, revised 1-14-19 READY FOR SPONSORS