RESCINDED
JANUARY 2024

This Recommended Change to the MUTCD was rescinded by the NCUTCD Council on January 12, 2024.

ATTACHMENT NO. 8

NOT APPROVED IN NCUTCD GENERAL SESSION ON JANUARY 20, 2006

Not Approved by NCUTCD Council

TECHNICAL COMMITTEE RECOMMENDATION

TECHNICAL COMMITTEE:	Temporary Traffic Control Committee
DATE OF ACTION:	June 22, 2005
TOPIC:	Section 6F.52 Portable Changeable Message Signs
ORIGIN OF REQUEST:	Conrad Dudek (chair) and Technical Committee Task Force Portable Changeable Message Signs
DISCUSSION:	The Task Force under the direction of Conrad Dudek and his research staff in Texas have spent several years working on improvement to section 6F.52 Portable Changeable Message Signs and their readability to the motorist. Mr. Dudek's report and proposed new language there review by the technical committee.
COMMITTEE ACTION:	The Temporary Traffic Control (TTC) Committee recommends that the National Committee submit the following proposed MUTCD change to sponsors for comments. **Next page is changes voted on**. .
VOTE:	**For** -25 **Opposed** - 1 **Abstentions** - 1
REFERENCE TO AFFECTED PAGE NUMBERS IN MUTCD:	Page 6F-25 Section 6F.55 in 2003 Edition MUTCD

PART 6. TEMPORARY TRAFFIC CONTROL:

CHAPTER 6F TEMPORARY TRAFFIC CONTROL ZONE DEVICES, SECTION 6F.55 IN 2000 MUTCD RECOMMENDED CHANGES

Section 6F.55 Portable Changeable Message Signs

Standard:

Portable Changeable Message signs shall be TTC devices with the flexibility to display a variety of messages. Typically, a Portable Changeable Message signs consists of up to three lines of eight characters per line.

Support:

Portable Changeable Message signs are used most frequently on high-density urban freeways, but have applications on all types of highways where highway alignment, road user routing problems, or other pertinent conditions require advance warning and information.

Portable Changeable Message signs have a wide variety of applications in TTC zones including: roadway, lane, or ramp closures, crash or emergency incident management, width restriction information, speed control or reductions, advisories on work scheduling, road user management and diversion, warning of adverse conditions or special events, and other operation control.

The primary purpose of Portable Changeable Message signs in TTC zones is to advise road users of unexpected situations. Some typical applications include the following:

A. Where the speed of vehicular traffic is expected to drop substantially;

B. Where significant queuing and delays are expected;

C. Where adverse environmental conditions are present;

D. Where there are changes in alignment or surface conditions;

E. Where advance notice of ramp, lane, or roadway closures is needed;

F. Where crash or incident management is needed; and

G. Where changes in the road use pattern occur.

Standard

Portable Changeable Message signs shall be Variable Changeable Message signs (Type 5) or Dynamic Changeable Message signs (Type 6) and shall conform to the principles established in this Manual, and to the extent practical, with the design prescribed in Part X and Sections XA.14 through XA.21.

Guidance

In order to have the capacity for a large variety of word messages, a Variable Changeable Message sign should have a matrix display where every pixel in a line or the entire display may be independently activated.

Support:

A Variable Changeable Message sign (Type 5) is capable of displaying a large variety of messages. ~~In order to have the capacity for a large variety of word messages, a Variable Changeable Message sign must have a matrix display where every pixel in a line or the entire display may be independently activated.~~ A Dynamic Changeable Message sign (Type 6) is a sign that contains a full-matrix screen and is capable of displaying a very large variety of messages that can be shown in full-color and full-motion. The Dynamic Changeable Message sign takes advantage of small size pixels that can show the whole spectrum of colors and the computational capability of controlling the combination of the colors and brightness. ~~This type of sign can present video images.~~

There are two primary types of matrices that are used on Variable Changeable Message signs:

A. Line matrix (character and continuous); and

B. Full matrix.

A line matrix sign has columns of pixels with constant horizontal pitch and provides the capability to display messages of a fixed character height. There is also blank space (no pixels present) between lines of characters to achieve inter-line spacing. Two types of line matrix signs are character and continuous. A character line matrix sign uses character matrices with a fixed amount of blank space (no pixels present) between character matrices to achieve the inter-character spacing. A continuous line matrix sign has no hardware defined blank spaces (no pixels) between characters. The entire line contains columns of pixels with constant horizontal pitch and provides the capability to display messages of a fixed character height.

A full matrix sign does not have fixed characters or lines. The entire message portion of the display area contains equally spaced pixels. The sign is capable of displaying multiple lines of any height or length, symbols, or graphics.

Guidance:

The components of a Portable Changeable Message sign should include: a message sign panel, control systems, a power source, and mounting and transporting equipment. The front face of the sign should be covered with protective material. The color of the pixels should be yellow or orange on a black background. The pixels on a Speed Display Changeable Message sign displaying variable speed limits should be white on a black background.

Portable Changeable Message signs should subscribe to the principles established in this Manual and, to the extent practical, with the design (that is, color, letter size and shape, and borders) and applications prescribed in this Manual, except that the reverse colors for the letters and the background are considered acceptable.

Support:

Road user reading times for typical messages displayed on Variable Changeable Message signs are longer than for messages on static guide signs.

Guidance:

The maximum length of a message should be dictated by the number of units of information contained in the message, in addition to the size of the Changeable Message sign.

Support

A *Unit of Information (Informational Unit)* refers to the answer to a question a road user might ask. Stated another way, a unit of information is each data item in a message that a

driver could use to make a decision. Each answer is one unit of information. A unit of information typically is one to three words, but at times can be up to four words. The message in the following table has four units of information and serves to illustrate the concept of units of information.

UNITS OF INFORMATION

Question	Answer	Info Unit
1. What happened?	MAJOR ACCIDENT	1 unit
2. Where?	NEAR EXIT 12	1 unit
3. Who is advisory for?	NEW YORK	1 unit
4. What is advised?	USE ROUTE 46	1 unit

The maximum allowable number of units of information in a Variable Changeable Message sign message is based on the above principles, current highway operating speed, legibility characteristics of the signs, and the lighting conditions.

Guidance

The maximum number of units of information that should be contained in a Variable Changeable Message sign message with 450-mm (18-in) characters is shown in Table 6F-1 and 6F-2.

~~**Table 6F-1. Maximum Number of Units of Information for Use in Message Design and Display on**~~
~~***Variable Changeable Message Signs with 450-mm (18-inch) High Characters***~~

	~~Light-Emitting Diode A~~			~~Fiber Optic~~			~~Incandescent Bulb~~			~~Flip Disk~~		
	~~0-56 km/h (0-35 mi/h)~~	~~57-88 km/h (36-55~~	~~89-112 km/h (56-70 mi/h)~~	~~0-56 km/h (0-35 mi/h)~~	~~57-88 km/h (36-55~~	~~89-112 km/h (56-70 mi/h)~~	~~0-56 km/h (0-35 mi/h)~~	~~57-88 km/h (36-55~~	~~89-112 km/h (56-70 mi/h)~~	~~0-56 km/h (0-35 mi/h)~~	~~57-88 km/h (36-55~~	~~89-112 km/h (56-70~~
~~Mid-Day~~	~~5 units~~	~~4 units~~	~~4 units~~	~~5 units~~	~~4 units~~	~~4 units~~	~~5 units~~	~~4 units~~	~~3 units~~	~~5 units~~	~~4 units~~	~~3 units~~
~~Washout~~	~~5 units~~	~~4 units~~	~~4 units~~	~~5 units~~	~~4 units~~	~~4 units~~	~~5 units~~	~~4 units~~	~~3 units~~	~~4 units~~	~~3 units~~	~~2 units~~
~~Backlight~~	~~4 units~~	~~4 units~~	~~3 units~~	~~4 units~~	~~3 units~~	~~2 units~~	~~4 units~~	~~3 units~~	~~2 units~~	~~2 units~~	~~1 unit~~	~~1 unit~~

~~Nighttime~~	~~4 units~~	~~4 units~~	~~3 units~~	~~4 units~~	~~4 units~~	~~3 units~~	~~4 units~~	~~3 units~~	~~3 units~~	~~3 units~~	~~2 units~~	~~1 unit~~

~~A Valid only for the newer aluminum indium gallium phosphide (or equivalent) LEDs~~

Table 6F-1. Maximum Number of Units of Information for Use in Message Design and Display on Light Emitting Diode and Fiber Optic Portable Changeable Message Signs with 450-mm (18-inch) High Characters

	70-80 km/h (45-50 mi/h)	90-105 km/h (55-65 mi/h)	115 km/h (70 mi/h)
Mid-Day	4 units	4 units	3 units
Washout	4 units	4 units	3 units
Backlight	4 units	3 units	3 units
Nighttime	4 units	3 units	3 units

[A] Valid only for the newer aluminum indium gallium phosphide (or equivalent) LEDs

Table 6F-2. Maximum Number of Units of Information for Use in Message Design and Display on Flip Disk Portable Changeable Message Signs with 450-mm (18-inch) High Characters

	70-80 km/h (45-50 mi/h)	90-105 km/h (55-65 mi/h)	115 km/h (70 mi/h)
Mid-Day	4 units	3 units	3 units
Washout	3 units	2 units	2 units
Backlight	1 unit	1 unit	1 unit
Nighttime	1 unit	1 unit	1 unit

The minimum letter height for Portable Changeable Message signs should be 450 mm (18 in). Portable Changeable Message signs used on 90 km/h (55 mi/h) roadways or higher should be visible from 0.8 km (0.5 mi) under both day and night conditions and legible from a minimum distance of 244 m (800 ft) under optimum viewing conditions. If a Portable Changeable Message sign cannot achieve this legibility distance because of environmental or other conditions, the number of units of information ~~must~~ should be reduced to values less than that shown in Table 6F-1. The maximum number of units of information in a message should be limited to that shown in Table ~~6F-2~~ 6F-3.

Table ~~6F-2~~ 6F-3. Maximum Number of Units of Information for Display on Variable Changeable Message Signs with 450-mm (18-inch) High Characters

Condition And Operating Speed	Maximum Number of Units of Information			
	Light-Emitting Diode[A]	Fiber Optic	~~Incandescent Bulb~~	Flip Disk
Sun: Mid-Day				
115 km/h (70 mi/h)	3 units	3 units	~~3 units~~	3 units
105 km/h (65 mi/h)	4 units	4 units	~~3 units~~	3 units
100 km/h (60 mi/h)	4 units	4 units	~~4 units~~	3 units
90 km/h (55 mi/h)	4 units	4 units	~~4 units~~	3 units
80 km/h (50 mi/h)	4 units	4 units	~~4 units~~	4 units
70 km/h (45 mi/h)	4 units	4 units	~~4 units~~	4 units
Sun: Washout				
115 km/h (70 mi/h)	3 units	3 units	~~3 units~~	2 units
105 km/h (65 mi/h)	4 units	4 units	~~3 units~~	2 units
100 km/h (60 mi/h)	4 units	4 units	~~4 units~~	2 units
90 km/h (55 mi/h)	4 units	4 units	~~4 units~~	2 units
80 km/h (50 mi/h)	4 units	4 units	~~4 units~~	2 units
70 km/h (45 mi/h)	4 units	4 units	~~4 units~~	3 units
Sun: Backlight				
115 km/h (70 mi/h)	3 units	3 units	~~2 units~~	1 unit
105 km/h (65 mi/h)	3 units	3 units	~~2 units~~	1 unit
100 km/h (60 mi/h)	3 units	3 units	~~2 units~~	1 unit
90 km/h (55 mi/h)	3 units	3 units	~~2 units~~	1 unit
80 km/h (50 mi/h)	4 units	4 units	~~3 units~~	1 unit
70 km/h (45 mi/h)	4 units	4 units	~~3 units~~	1 unit
Nighttime				
115 km/h (70 mi/h)	3 units	3 units	~~3 units~~	1 unit
105 km/h (65 mi/h)	3 units	3 units	~~3 units~~	1 unit
100 km/h (60 mi/h)	3 units	3 units	~~3 units~~	1 unit
90 km/h (55 mi/h)	3 units	3 units	~~3 units~~	1 unit
80 km/h (50 mi/h)	4 units	4 units	~~4 units~~	1 unit
70 km/h (45 mi/h)	4 units	4 units	~~4 units~~	1 unit

[A] Valid only for the newer aluminum indium gallium phosphide (or equivalent) LED

The minimum letter height for Portable Changeable Message Signs mounted on trailers or large trucks should be 265 mm (10.6 in). The maximum number of units of information on LED signs with character heights smaller than 450 mm (18 in) should be limited to that shown in Tables 6F-4 and 6F-5.

Table 6F-4. Maximum Number of Units of Information for Vehicle-Mounted Light-Emitting Diode[A] Portable Changeable Message Signs with 305 mm (12 in) Character Heights

	50 km/h (30 mi/h)	55 km/h (35 mi/h)	65 km/h (40 mi/h)	70-90 km/h (45-55 mi/h)	100 km/h (60 mi/h)	105-115 km/h (65-70 mi/h)
Mid-Day	5 units	4 units	4 units	3 units	2 units	2 units
Washout	5 units	4 units	4 units	3 units	2 units	2 units
Backlight	3 units	3 units	2 units	2 units	2 units	1 unit
Nighttime	3 units	3 units	2 units	2 units	2 units	1 unit

[A] Valid only for the newer aluminum indium gallium phosphide (or equivalent) LEDs

Table 6F-5. Maximum Number of Units of Information for Vehicle-Mounted Light-Emitting Diode[A] Portable Changeable Message Signs with 265 mm (10.6 in) Character Heights

	50 km/h (30 mi/h)	55 km/h (35 mi/h)	65 km/h (40 mi/h)	70 km/h (45 mi/h)	90-115 km/h (55-70 mi/h)
Mid-Day	4 units	3 units	3 units	2 units	2 units
Washout	4 units	3 units	3 units	2 units	2 units
Backlight	2 units	2 units	2 units	2 units	1unit
Nighttime	2 units	2 units	2 units	2 units	1 unit

[A] Valid only for the newer aluminum indium gallium phosphide (or equivalent) LEDs

Table 6F-3. Maximum Number of Units of Information for Vehicle-Mounted Light-Emitting Diode[A] Portable Changeable Message Signs with Character Heights of 260 mm (10.6 in) and 305 mm (12 in)

Condition And Operating Speed	Maximum Number of Units of Information	
	265 mm (10.6 in)	305 mm (12 in)
Sun: Mid-Day		
115 km/h (70 mi/h)	2 units	2 units
105 km/h (65 mi/h)	2 units	2 units
100 km/h (60 mi/h)	2 units	2 units
90 km/h (55 mi/h)	2 units	3 units
80 km/h (50 mi/h)	2 units	3 units
70 km/h (45 mi/h)	2 units	3 units
65 km/h (40 mi/h)	3 units	4 units
55 km/h (35 mi/h)	3 units	4 units
50 km/h (30 mi/h)	4 units	5 units
Sun: Washout		
115 km/h (70 mi/h)	2 units	2 units
105 km/h (65 mi/h)	2 units	2 units
100 km/h (60 mi/h)	2 units	2 units
90 km/h (55 mi/h)	2 units	3 units
80 km/h (50 mi/h)	2 units	3 units
70 km/h (45 mi/h)	2 units	3 units
65 km/h (40 mi/h)	3 units	4 units
55 km/h (35 mi/h)	3 units	4 units
50 km/h (30 mi/h)	4 units	5 units
Sun: Backlight		
115 km/h (70 mi/h)	1 unit	1 unit
105 km/h (65 mi/h)	1 unit	1 unit
100 km/h (60 mi/h)	1 unit	2 units
90 km/h (55 mi/h)	1 unit	2 units
80 km/h (50 mi/h)	1 unit	2 units
70 km/h (45 mi/h)	2 units	2 units
65 km/h (40 mi/h)	2 units	2 units
55 km/h (35 mi/h)	2 units	3 units
50 km/h (30 mi/h))	2 units	3 units
Nighttime		
115 km/h (70 mi/h)	1 unit	1 unit
105 km/h (65 mi/h)	1 unit	1 unit
100 km/h (60 mi/h)	1 unit	2 units
90 km/h (55 mi/h)	1 unit	2 units
80 km/h (50 mi/h)	1 unit	2 units

~~70 km/h (45 mi/h)~~	~~2 units~~	~~2 units~~
~~65 km/h (40 mi/h)~~	~~2 units~~	~~2 units~~
~~55 km/h (35 mi/h)~~	~~2 units~~	~~3 units~~
~~50 km/h (30 mi/h)~~	~~2 units~~	~~3 units~~

~~[A] Valid only for the newer aluminum indium gallium phosphide (or equivalent) LEDs~~

The message panel should have adjustable display rates, so that a two-phase message can be read at least twice at the posted speed, the off-peak 85th-percentile speed prior to work starting, or the anticipated operating speed.

Option:

The message sign panel may vary in size.

Standard

Each message on a Portable Changeable Message sign shall consist of either one or two phases. A phase shall consist of up to three lines of text.

Support:

For the typical three-line Changeable Message sign, road users have difficulties in reading messages displayed on more than two phases.

Guidance

When a message is divided into two phases, the cycle time for the message should be 8.0 seconds with each phase displayed for 4.0 seconds.

Option

When a message is divided into two phases, a cycle time of 4.0 seconds may be used with each phase displayed for 2.0 seconds in a cycle.

Guidance:

When it is necessary to divide a message and display it on two phases, messages should be designed and displayed taking into account the principles below.

A. Principle 1— Each message phase ~~must~~ should be understood by itself.

B. Principle 2— Compatible units of information should be displayed on the same message phase.

C. Principle 3—A message line should not contain portions of two different units of information.

D. Principle 4—No more than 3 units of information should be displayed on a message phase.

Messages should be designed with consideration given to the principles above and the principles presented in Sections XA.18 through XA.21. Messages for incident and work zone situations should be in accordance to Chapter XB, taking into account the following:

A. If the message can be displayed in one phase, the top line should present the problem, the centerline should present the location or distance ahead, and the bottom line should present the recommended action.

B. The message should be as brief as possible.

C. When a message is longer than two phases, additional Portable Changeable Message signs should be used.

D. When abbreviations are needed, the provisions specified in Section 1A.14 should be used.

Standard:

Portable Changeable Message signs shall automatically adjust their brightness under varying light conditions to maintain legibility.

The control system shall include a display screen upon which messages can be reviewed before being displayed on the message sign. The control system shall be capable of maintaining memory when power is unavailable.

Portable Changeable Message signs shall be equipped with a power source and a battery backup to provide continuous operation when failure of the primary power source occurs.

The mounting of Portable Changeable Message signs on a trailer, a large truck, or a service patrol truck shall be such that the bottom of the message sign panel shall be a minimum of 2.1 m (7 ft) above the roadway when it is in the operating mode.

Techniques of message display such as fading, exploding, dissolving, or moving messages shall not be used. The text of the message shall not scroll or travel horizontally or vertically across the face of the sign.

Guidance:

Portable Changeable Message signs should be used as a supplement to and not as a substitute for conventional signs and pavement markings.

When Portable Changeable Message signs are used for route diversion, they should be placed far enough in advance of the diversion to allow road users ample opportunity to perform necessary lane changes, to adjust their speed, or to exit the affected highway. The Portable Changeable Message signs should be sited and aligned to ensure legibility. When multiple Portable Changeable Message signs are needed, they should be placed on the same side of the roadway, separated from each other at a distance no less than 300 m (1,000ft) on freeways and expressways and no less than 150 m (500 ft) on conventional roadways.

Portable Changeable Message signs should be placed on the shoulder of the roadway or, if practical, further from the traveled lane. They should be delineated with retroreflective TTC devices when in the clear zone, or shielded with a barrier or crash cushion. When Portable Changeable Message signs are not being used, they should be removed; if not removed, they should be shielded; or if the previous two options are not feasible, they should be delineated with retroreflective TTC devices.

Portable Changeable Message sign trailers should be delineated on a permanent basis by affixing retroreflective material, known as conspicuity material, in a continuous line on the face of the trailer as seen by oncoming road users.