



# Economic and Social Council

Distr.: General  
8 December 2010

Original: English

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## Economic Commission for Europe

### Inland Transport Committee

#### Working Party on Inland Water Transport

##### Working Party on the Standardization of Technical and Safety Requirements in Inland Navigation

###### Thirty-eighth session

Geneva, 16–18 February 2011

Item 8 of the provisional agenda

###### Resolution No. 59, “Guidelines for Waterway Signs and Markings”

## Amendments to Resolution No. 59

### Note by the secretariat

#### I. Mandate

1. At its thirty-seventh session the Working Party on the Standardization of Technical and Safety Requirements in Inland Navigation (SC.3/WP.3) considered the “Rules for the waterway marking on the Sava River basin” and took note of the position of the International Sava River Basin Commission, according to which improvements could be made to the current text of Resolution No. 59 on Guidelines for Waterway Signs and Markings (TRANS/SC.3/169). The Working Party invited the Commission, in consultation with the secretariat, to prepare a proposal to amend Resolution No. 59 for the next SC.3/WP.3 session (ECE/TRANS/SC.3/WP.3/74, para. 20).

2. The Working Party may wish to consider the amendment proposal to Resolution No. 59, submitted by the International Sava River Basin Commission and the secretariat.

#### II. Amendments to Resolution No. 59 proposed by the International Sava River Basin Commission

3. *Add a new sentence at the end of paragraph 1.1<sup>1</sup>*

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<sup>1</sup> Reference is made to the paragraph numbering of in ECE/TRANS/SC.3/169. At this stage, changes in the paragraph numbering are not indicated.

The competent authorities from article 1.9 shall place kilometre markings along an inland waterway, and possibly mark off each hectometre to increase navigation safety.

4. In paragraph 1.6 *add* day and night *before* visibility.
5. *Delete* paragraph 2.4.
6. In paragraph 2.10 *add* a new subparagraph (e)

The marking plan shall contain information on the type of placed signs, bank/rim whereon placed, river kilometre of the set-up and recapitulation of all signs and signals on the water and bank signs used while marking.

7. In paragraph 3.3 *replace* Appendix with Annex 1.
8. *Delete* footnote 1.
9. *Add* a new paragraph *after* paragraph 3.5

Due to the proper orientation of the boatmaster, it is necessary to ensure the visibility of second and third degree. Accordingly, the type and dimensions of signs should be selected.

10. *Add* the following paragraphs *after* paragraph 3.6

3.7 In order to ensure the visibility of first degree, the sign shall be visible under 1' angle by day and under 10' angle by night. Detailed form and colour of the sign (visibility of second and third degree) are identified even under larger angles.

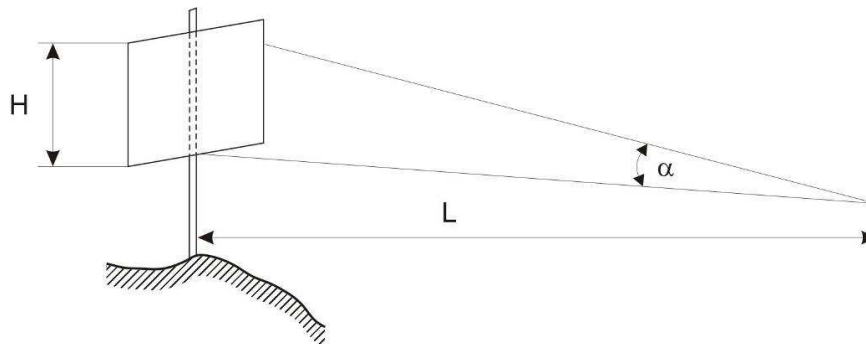
3.8 The largest angle of distinction by day for simple shapes (quadrant, triangle, circle, etc.) shall be within 3.5' – 5' scale, and for complex shapes (numbers, letters, etc.) within 5' – 8' scale. For boatmaster to be able to recognize (without any optical aids) the shape of the sign at appropriate distances and visibility, the above-mentioned implies that the following formula can be used for calculation of the sign's dimension:

$$H = L \cdot \operatorname{tg} \alpha \cong L \cdot \sin \alpha$$

H (m) – height of the sign;

L (m) – distance;

$\alpha$  (°) – viewing angle.



Values for H (m) as a function of L (m) and  $\alpha$  (°) are presented in the Table 1.

Table 1

	$L (m)$			
	$\alpha (')$	500	1000	2000
For simple shapes (quadrant, triangle, circle, etc.)	3	0.44	0.87	1.74
	4	0.58	1.16	2.32
	5	0.73	1.45	2.90

Table 1 shows that shape of sign with dimension  $H = 0,5$  m is recognizable at distance  $L = 500$  m and viewing angle  $\alpha = 4'$ ; when  $L = 1000$  m then  $H = 1$  m, etc.

If there are simple drawings (dot, line, arrow) on the signs, a 15 per cent visibility reduction must be taken into account, while with complex drawings it shall be 30 per cent.

11. *Move* the last sentence in paragraph 3.7 to the end of paragraph 3.8 (in Russian only).

12. *Amend* paragraph 3.9 as follows

**Examples** of the minimum measurements for the signs **marks and buoys from Annexes 7 and 8 of the European Code for Inland Waterways (CEVNI)** are given in **Annex 1 Appendix** to these guidelines. Alphanumeric characters on traffic signs should intend to provide a standard for the various traffic signs.

13. *Add* the following two paragraphs *after* paragraph 3.9

The letters, figures and analogous symbols should be of a height not less than one five-hundredth of the maximum distance from which they must be read, and the thickness of the stroke should be not less than one seventh of that height.<sup>2</sup>

For bank marks and signs minimal height of the lower rim of board down-to the ground shall be 3 m. At high water-levels, height of the water level up-to the lower rim of board should not be less than 1.5 m.

14. *Amend* paragraph 3.11 as follows

The visibility of signs and signals **of Annex 7 of CEVNI** regulating navigation on the waterway shall be ensured at night by lighting them with fixed directional white lights, operating uninterruptedly and so positioned that the light does not incommode the boatmasters.

15. In paragraph 3.12 *delete* the first sentence.

16. In paragraph 3.14 for the existing text *substitute*

In certain cases lighting may be provided at night (e.g. lighting of the lower part of a bridge, of the piers of a bridge, of the approaches to a lock, of a section of a canal, etc.). Such lighting may be used to supplement the marks. Lighting shall be so designed as to avoid dazzle.<sup>3</sup>

<sup>2</sup> This text is from Resolution No. 22, "SIGNI – Signs and Signals on inland Waterways", hereafter SIGNI.

<sup>3</sup> This text is from SIGNI.

17. In paragraph 3.15 for the existing text *substitute*

It is recommended that the luminous intensity of a light should be determined according to appendix 7 to Resolution No. 61 on “Recommendations on Harmonized Europe-Wide Technical Requirements for Inland Navigation Vessels”.<sup>4</sup>

18. In paragraph 3.16 for the existing text *substitute*

Since intensity of lights should be bigger for the colour lights produced by application of filters, the stronger source of light is needed. Table 2 shows intensity of source of light calculated for conditions of atmosphere under light haze:

Table 2

Visibility (m)	Intensity of light (cd)		Intensity of source of light (cd)		
	White light	White light	White light	Red light	Green light
500	0.06	0.06	0.40	0.60	
1000	0.25	0.25	1.70	2.50	
2000	1.40	1.40	9.30	14.00	
3000	4.20	4.20	28.00	42.00	
4000	9.80	9.80	65.00	99.00	
5000	20.00	20.00	133.00	200.00	

19. *Delete* paragraph 3.17.

20. *Add* a new paragraph *after* paragraph 4.1.2

Bank marks, which are used in two-way navigation, shall be oriented as under (a). In some cases (better visibility) angle between the mark and the axis of the fairway can be 10° or less. (Figure 1, sign a).

21. *Add* a new paragraph *after* paragraph 4.1.3

Bank marks, which are used in one-way navigation, shall be oriented as under (b). In some cases (better visibility) angle between mark and the axis of the fairway cannot be less than 60° (Figure 1, sign c).

22. At the end of paragraph 4.1.7 *add* (Figure 1, sign b)

23. In paragraph 4.2.1.1 *for* B.1, B.2, B.3, B.4 *substitute* 4.C, 4.D, 5.C, 5D.

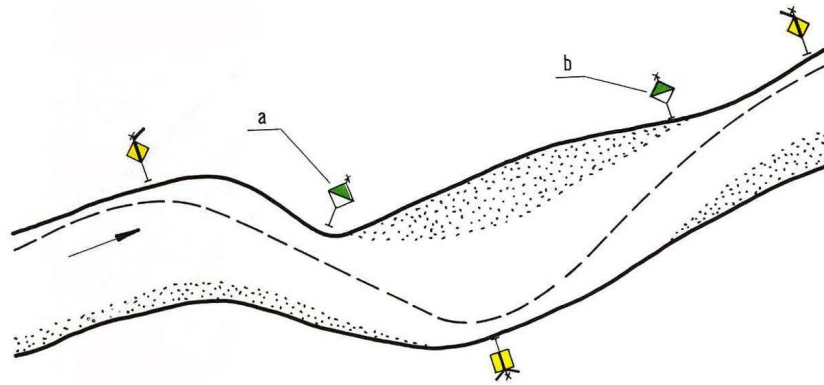
24. *After* paragraph 4.2.1.3 *add*

4.2.1.4 The cross-channel fairway signs and bank lights have best results on distances up-to 3 km. On such sections cross-channel fairway signs and bank lights (without signs on the water) can be placed under conditions when the disposable width for navigation is more than two times bigger than the minimum prescribed width of the fairway for particular sector. If disposable width for navigation is less than the minimum prescribed width of the fairway for a particular sector, cross-channel fairway signs and bank lights (without signs on the water) cannot be placed on distance larger than 1–1.5 km.

<sup>4</sup> The alternative proposal is to refer to Recommendation on the Determination of the Luminous Intensity of Marine Aid-to-navigation Lights, December 1977, published in the IALA Bulletin No. 75 – 1978–3, as this is done in SIGNI.

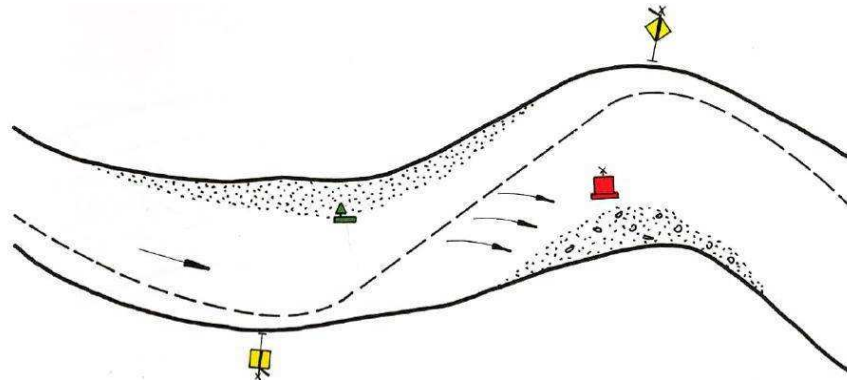
4.2.1.5 If the distance between two neighbouring cross-channel fairway signs is larger than calculated visibility, and when navigation line is passing nearby the bank, the bank lighted sign, which additionally marks the position of the navigation line, is placed between those two neighbouring cross-channel fairway signs (Figure 2, sign a). The bank lighted sign is also placed when the fairway passes near the bank (Figure 2, sign b).

Figure 2



4.2.1.6 In case when the direction of the current makes the angle with fairway, when strong side winds or something alike occurs, fairway can be additionally marked by navigation marks according to the local conditions (Figure 3).

Figure 3

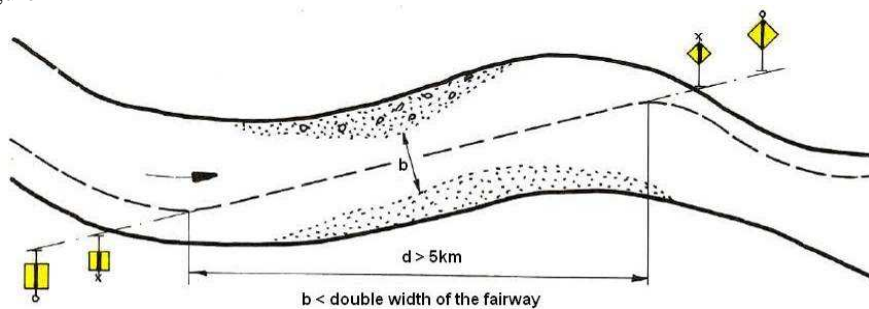


4.2.1.7 If the fairway at longer transitions goes through the river centre or stingingly crosses from one to another bank, then two cross-channel fairway signs on each side of the fairway, which better mark the transition, can be placed as shown on Figure 4.

The advantage is given to two cross-channel fairway signs on each side of the fairway in case of straight-line sections longer than 5 km, where disposable width for navigation is less than double width of the minimum prescribed width of the fairway for particular sector. In that case and when the bank configuration allows so, the cross-channel fairway signs are placed on both margins of transition (Figure 4).

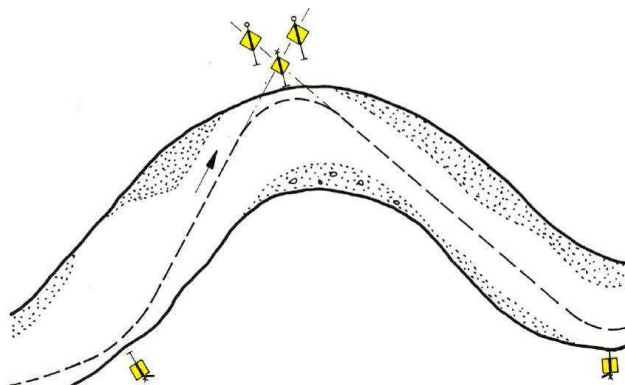
Two cross-channel fairway signs on each side of the fairway are also placed when certain obstacles to navigation or other hazards narrowing the fairway occur.

Figure 4



4.2.1.8 On section where the navigation line re-crosses to the opposite bank immediately after transition to the opposite bank, three cross-channel fairway signs (the front should have two boards) are mandatory placed (Figure 5). In that case, lights of the back cross-channel fairway signs should be strictly directed to the fairway axis: one to upstream and other one to downstream.

Figure 5



4.1.2.9 Interrelation of the front and back signs at hidden routes shorter than 4 km is presented in Table 3.

Table 3

$L(m)$	$d(m)$	$h_o(m)$	$A(m)$	$2a(m)$
200	17	8.50	2.6	5.0
300	25	8.70	4.0	8.0
400	33	8.85	5.2	10.5
500	42	9.00	6.5	13.0
600	50	9.10	8.0	16.0
700	58	9.20	9.0	18.0
800	67	9.35	10.0	20.0
900	75	9.50	12.0	24.0
1000	83	9.60	13.0	26.0
1500	125	10.25	19.0	38.0
2000	166	10.90	26.0	52.0
2500	207	11.50	33.0	66.0
3000	250	12.15	39.0	78.0
3500	290	12.75	46.0	92.0
4000	330	13.40	52.0	104.0
> 4000	760	14.20	25.0	50.0

$L$  (m) – maximal distance when cross-channel fairway signs can be used;

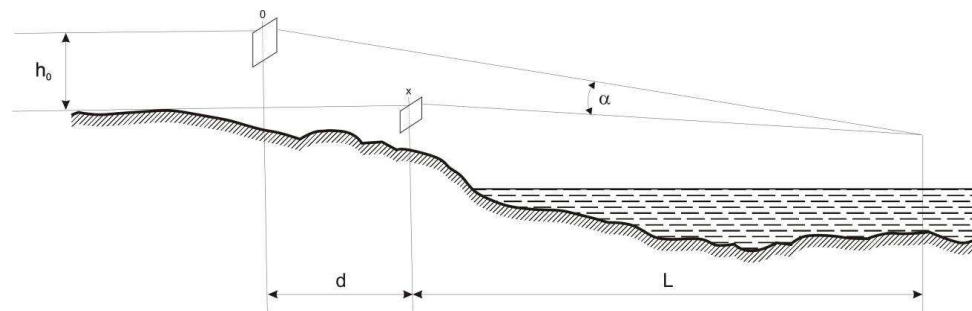
$d$  (m) – distance between front and back signs (is approximately  $\frac{1}{12}L$ );

$h_0$  (m) – height between lights of front and back sign;

$a$  (m) – distance necessary for vessel to adjust the course if doesn't go along the cross-channel fairway;

$\alpha$  (°) – viewing angle.

Table 3 also assumes that the observer's sight is 5 m above water level, and light of the lower (front) sign is 8 m above the water level.



Value “a” describes accuracy of the route and it's of significance while navigating through a narrow fairway. Accuracy is, in principle, increased by approaching the cross-channel fairway signs.

Due to good recognition of cross-channel fairway signs and their lights by night, the viewing angle  $\alpha$  (°) cannot be less than 4'.

25. In paragraph 4.2.2.1 at the end *add* (Figure 6)

26. *Move* the text from paragraph 4.2.2.2. to the end of paragraph 4.2.2.1

27. In paragraph 4.2.2.2 at the end *add* (Figure 7)

28. *Add* a new section 4.3

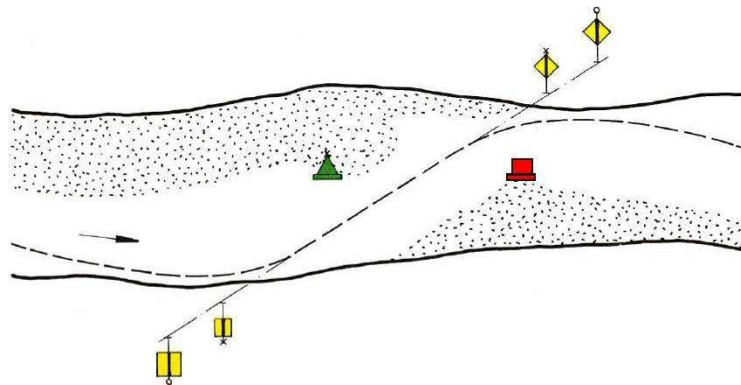
#### 4.3 Shallow water marking

4.3.1 Same principle, as to other sections, according to which set of marks must ensure continuous marking of the fairway, shall apply to shallow water.

Fairway in shallow water can be marked by cross-channel fairway signs, bank marks and signs and signals on the water.

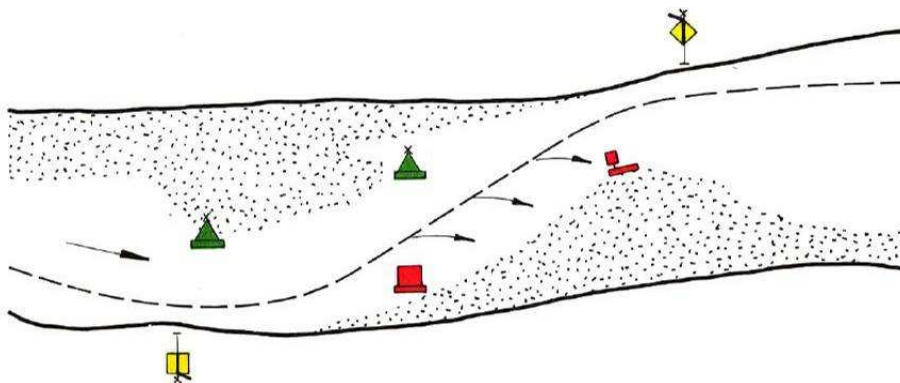
4.3.2 Alternately placed shallow water may also be marked by cross-channel fairway signs, with sufficient disposable width for navigation in which vessels are passing in straight-line (Figure 8).

Figure 8



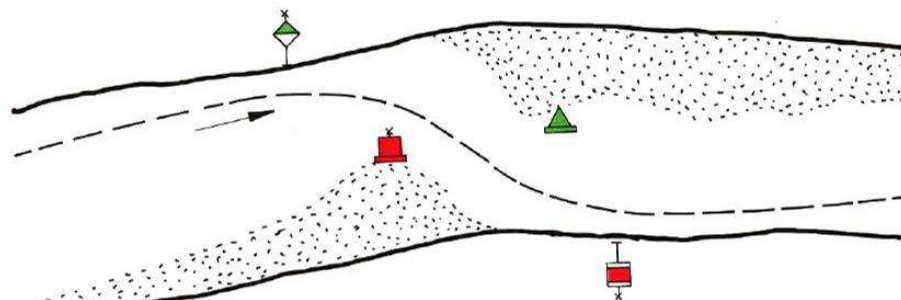
4.3.3 Fairway passing over the shallow water is usually marked by signs and signals on the water (Figures 8 and 9).

Figure 9



4.3.4 If the fairway is passing between sandbars, which get deeply into the riverbed, in straight-line, it is necessary to place at least two signs on the water on the entry and exit of such section: one on the top of the upstream and other one on the top of the downstream sandbar (Figure 10).

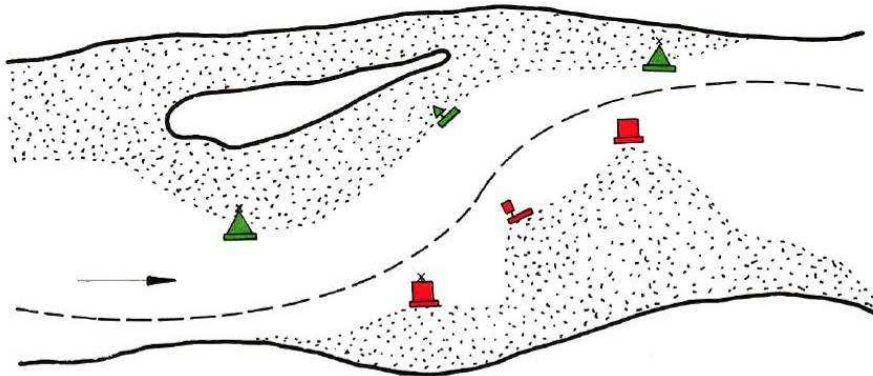
Figure 10



4.3.5 If the fairway is curved in the section between sandbars, it's necessary to place additional signs on the water (Figure 11).



Figure 11



4.3.6 The additional signs on the water shall be placed on the entry and exit of gurgled sections with sandbars, which also characterize the side streams.

4.3.7 In case when application of cross-channel fairway signs is impossible, the fairway may be marked by signs or signals on the water, on one or both sides, depending on width of the fairway and hydrological conditions.

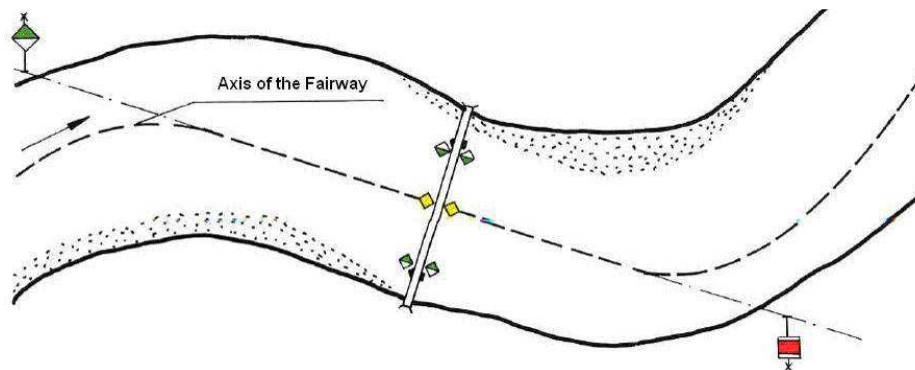
29. In paragraph 4.3.1 in the first sentence *delete* towed or pushed

30. *After* paragraph 4.3.5 *add*

4.4.6 Examples of placement of the mentioned signs on the water or bank marks marking the section nearby the bridges:

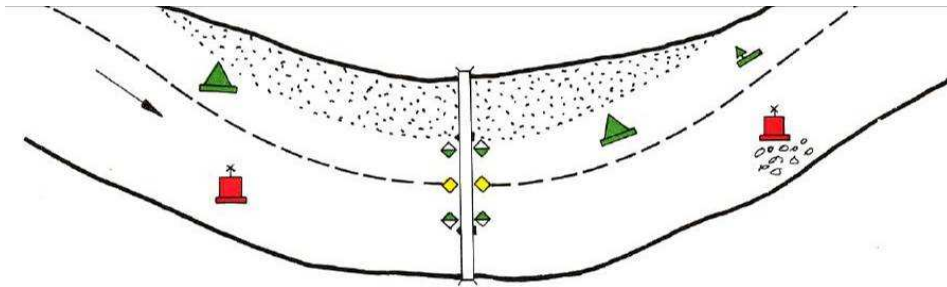
(a) If bridge is in inflexion, the direction of vessels passing through the bridge passages may be marked by signs on the water (B.1, B.2 Annex 8 to CEVNI) (Figure 12).

Figure 12



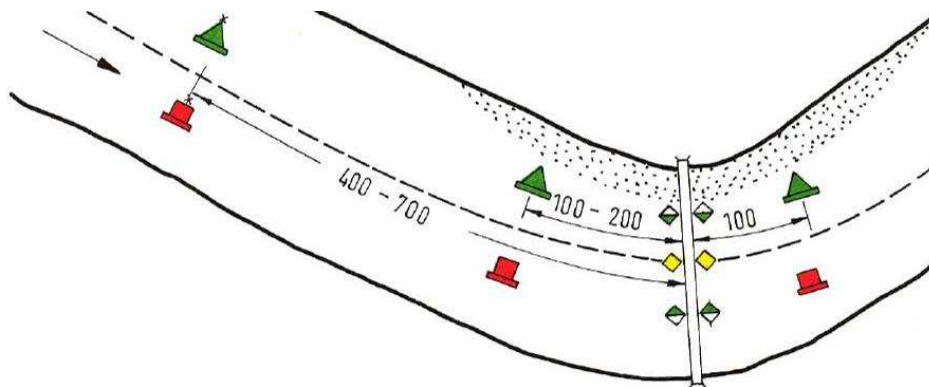
(b) If, due to larger curvature of the fairway or some other reasons, marking by the aforementioned signs is not possible, signs and signals on the water (buoys, etc.), placed in order to follow the current, may be used (Figure 13).

Figure 13



(c) If the bridge is positioned on the section where the current makes an angle with the fairway, marking may be done by two pairs of buoys upstream of the bridge. Pair of buoys closer to the bridge are placed on 100 m – 200 m distance upstream of bridge, and second pair of 400 m – 700 m upstream of bridge. Buoys more distant from the bridge are placed in order to follow the river flow jointly with the closer pair of buoys. Another pair of buoys may be placed downstream of bridge on 100 m distance from the bridge (Figure 14).

Figure 14



31. Amend paragraph 5.1.1 as follows

~~New image display techniques have come onto the market. These may be used subject to a number of conditions. It is generally recommended that when these new image display techniques are used:~~ **New image display techniques may be used subject to the following conditions:**

- (a) the technique must comply with the provisions of CEVNI;
- (b) deviation from the original colours is possible for some signs when implementing a new technique. This is dealt with in the descriptions of the relevant signs;
- (c) because new display techniques sometimes make use of images composed of many pixels, special consideration needs to be given to image design;
- (d) a general characteristic of the new display techniques is that the text and images can be controlled remotely; variable images are possible within a single display. Phantom effects, i.e. reflective effects and illusions caused by the incidence of sunlight, can be controlled.

**Examples of the new Image Display Techniques are given in the Annex 2.**

32. Delete paragraphs 5.2 to 5.6.

33. *Delete* paragraph 6.1.
34. *Delete* the first sentence in paragraph 6.2.
35. *Rename* Appendix Annex 1.
36. *Add* the following text *before* Table 1

Annex 1

Minimal measurements of boards for signs (example)

In principle, boards may be surrounded with a white strip 2.5 to 4.5 cm broad or a black strip 1.0 cm broad in order to improve the visibility of the symbols appearing on special bank signs.

In special cases, where the field conditions allow or demand it, the dimensions of the marking signs can be increased for max. 50 per cent or decreased for max. 50 per cent (locking aspect ratio).

Table 1: examples of marking signs showing their size and codes of the marking signs with the same size and complying with the provisions of CEVNI.

37. *Renumber* the signs in the appendix in accordance with CEVNI.
38. *Add* a new annex 2 based on the text proposed in the annex.

## Annex

### Examples of the new Image Display Techniques

#### Light guide technology

Light guide technology, is mostly familiar from the matrix signalling devices positioned above roads. The images are displayed on lens arrays, linked by means of fibre optics (glass or plastic cable) to an optical device with, usually, a main and a back-up light. Every image is controlled from one or more optical devices. By switching the different optical devices on and off, different images, and therefore variable information, can be displayed.

##### Advantages:

- (a) no mechanical/moving parts;
- (b) low maintenance;
- (c) high luminous intensity (adjustable);
- (d) high-fidelity imaging;
- (e) all-weather;
- (f) socket can be located accessibly.

##### Disadvantages:

- (a) relatively costly;
- (b) limited number of images.

#### Light emitting diode (LED)

A LED is a small low voltage light source. Its visibility is limited by its angular aperture and the luminance of the LEDs. Images are made up of a large number of LEDs, each controlled separately. In other respects its properties are very similar to those of light guide technology.

##### Advantages:

- (a) no mechanical/moving parts;
- (b) low maintenance;
- (c) simple control;
- (d) high-fidelity imaging.

##### Disadvantages:

- (a) limited range of display colours;
- (b) light output affected by ambient temperature.

#### Electromagnetic segmented display

Any desired image can be displayed by reversing electromagnetic segments, one side of which is light and the other dark in colour. The angular aperture on these displays is wide, both horizontally and vertically.

**Advantages:**

- (a) presentational flexibility;
- (b) displays in all colours;
- (c) easy to read;
- (d) low energy usage;
- (e) continues to display last image if power fails.

**Disadvantages:**

- (a) displays must normally be kept in a conditioned cabinet because of moving parts;
- (b) lighting required when dark.

**Rotary drum display**

Rotary drum displays are suitable for displaying regularly changing configurations.

**Advantages:**

- (a) Inland Waterways Police Regulations (IWPR) configuration can be accurately reproduced;
- (b) displays in all colours;
- (c) good visibility.

**Disadvantages:**

- (a) mechanical parts, so maintenance facilities are necessary;
- (b) number of images limited;
- (c) lighting required when dark.

**Moving screens**

Moving screens can consist of a display with a large number of light dots (LED or bipolar segments), switched so as to form the arbitrary texts or diagrams. The text can also move, allowing a message of virtually unlimited length to be displayed.

**Advantages:**

- (a) flexible, unlimited displays;
- (b) no moving parts;
- (c) all-weather.

**Disadvantages:**

- (a) monochrome;
- (b) relatively expensive.

Application: information on waiting times, operating times, etc.

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