

Ayudas a la Navegación

CLASE N°2

Ayudas a la Navegación

CONTENIDOS

- Reglamento de Señalización Marítima
- Ayudas tradicionales- Estructuras
- Boyas
- Balizas
- Spar
- Conceptos de diseño

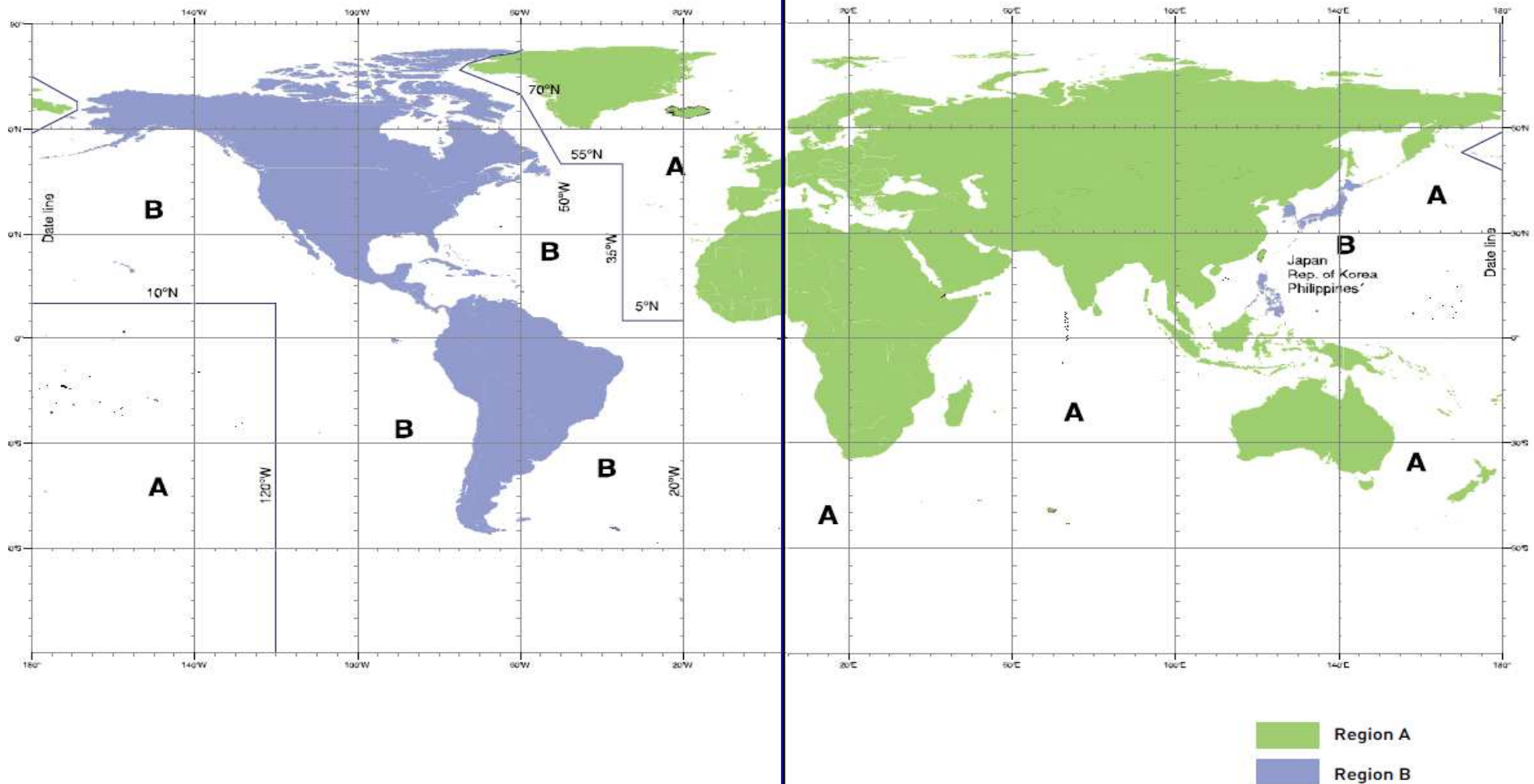
Sistema IALA

Historia

Principios Generales del Sistema

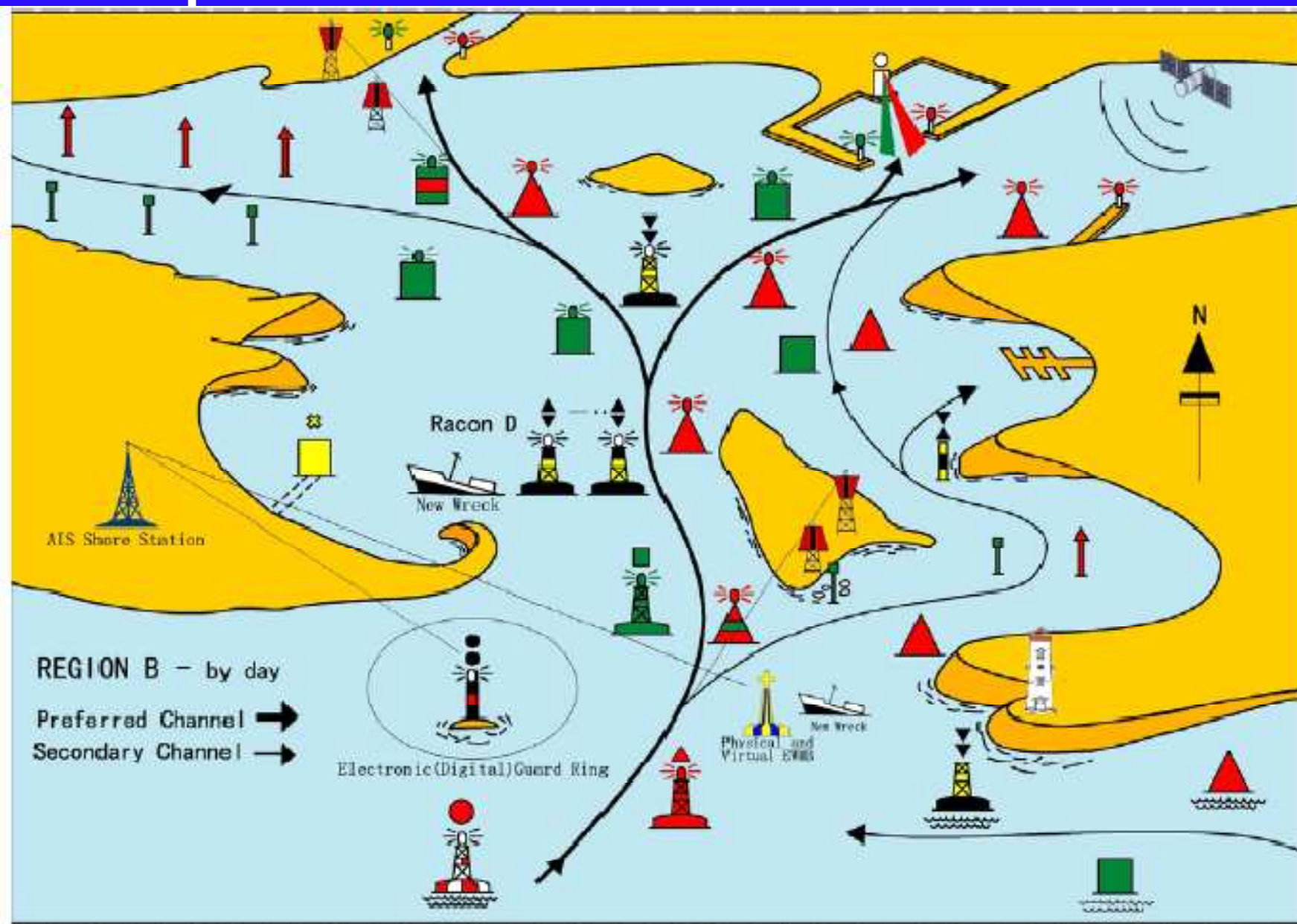
REGIONES

Buoyage Regions A and B



Sistema IALA región B

Tipo de señales- Sentido Convencional



Sentido Convencional de boyado

2.1. Definition of “conventional direction of buoyage”

The “conventional direction of buoyage”, which must be indicated in appropriate nautical documents, may be either:

2.1.1. The general direction taken by the mariner when approaching a harbour, river, estuary or other waterway from seaward, or

2.1.2. The direction determined by the proper authority in consultation, where appropriate, with neighbouring countries. In principle it should follow a clockwise direction around land masses.

Sistema IALA

Caracterización de las señales

- **De día**
- **De noche**
- **Ayudas electronicas**

Caracterización de las señales

1.3. Method of characterising marks

The significance of the mark depends upon one or more of the following features:

1.3.1. By night, colour and rhythm of light.

1.3.2. By day, colour, shape, top-mark, with or without light (including colour and rhythm).

1.3.3. By electronic (digital) symbol.

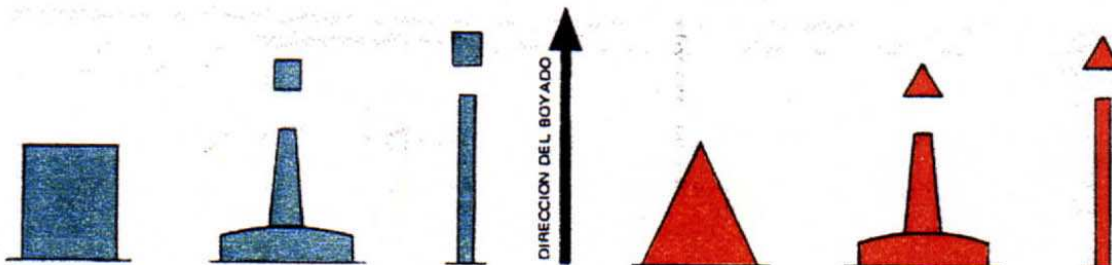
2.2. Descripción de las señales Laterales (Región B)

2.2.1. Señales de Babor:

Color: Verde
Forma (Boyas): Cilíndrica (tambor), castillete, espeque (spar).
Marca de tope (cuando se use): Un cilindro verde.
Luz (cuando la tenga):
Color: Verde
Ritmo: Cualquiera, excepto el descrito en la sección 2.2.3

2.2.2. Señales de Estribor:

Color: Rojo
Forma (Boyas): Cónica, castillete, espeque (spar).
Marca de tope (cuando se use): Un cono rojo, punta hacia arriba.
Luz (cuando la tenga):
Color: Rojo
Ritmo: Cualquiera, excepto el descrito en la sección 2.2.3



2.2.3. En el punto en que el canal se bifurca, siguiendo el "sentido convencional del boyado", el canal preferido puede indicarse modificando las señales laterales de Babor o Estribor como sigue:

2.2.3.1. Canal Preferido a Estribor:

Color: Verde, con una ancha franja horizontal roja.
Forma (Boyas): Cilíndrica (tambor), castillete, espeque (spar).
Marca de tope (cuando se use): Un cilindro verde.
Luz (cuando la tenga):
Color: Verde
Ritmo: Luz de destellos en grupos compuestos (2 + 1)

2.2.3.2. Canal preferido a Babor:

Color: Rojo, con una ancha franja horizontal verde.
Forma (Boyas): Cónica, castillete, espeque (spar).
Marca de tope (cuando se use): Un cono rojo, punta hacia arriba.
Luz (cuando la tenga):
Color: Rojo
Ritmo: Luz de destellos en grupos compuestos (2 + 1)



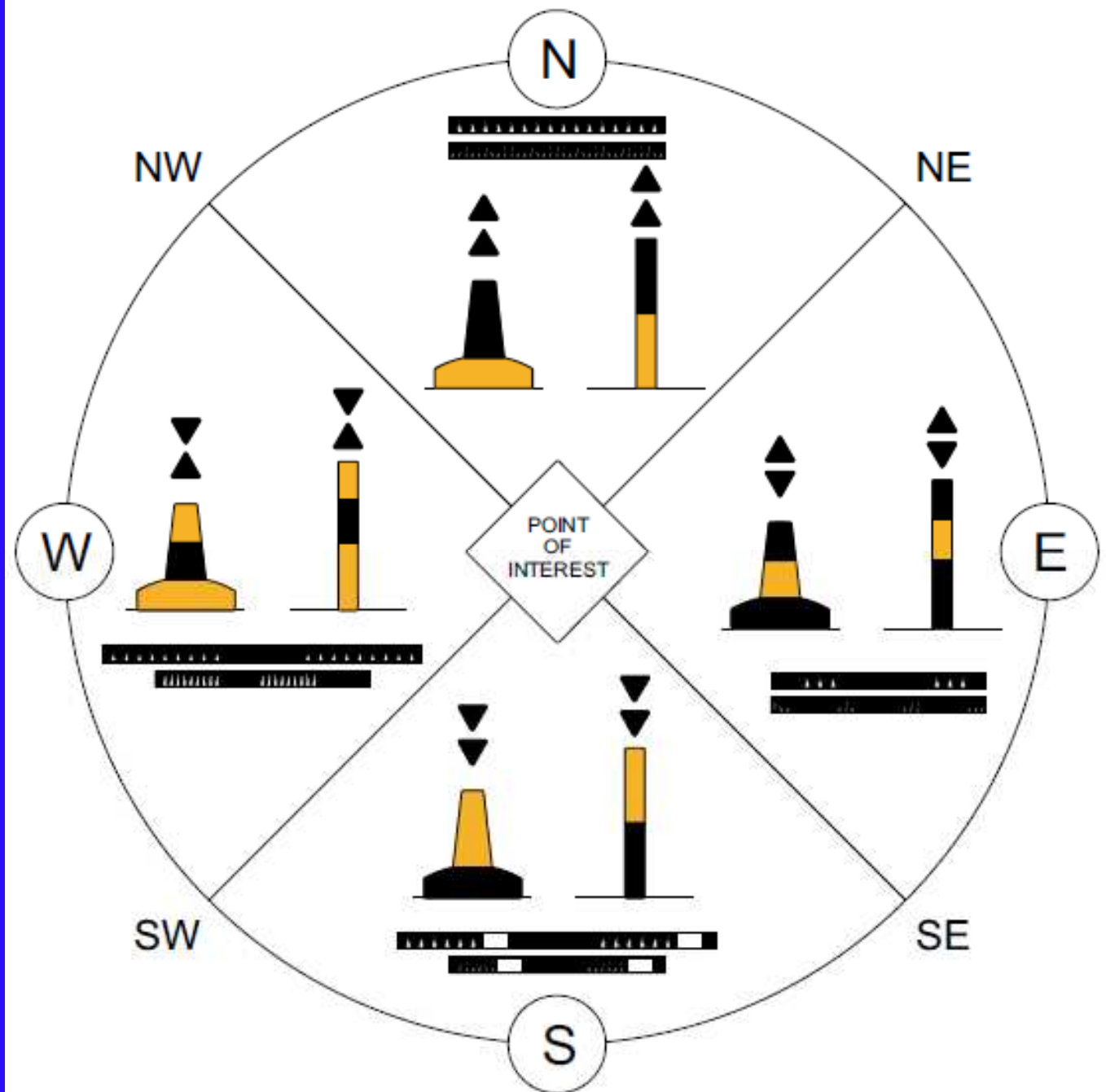
Sistema IALA

SEÑALES LATERALES

SEÑALES DE CANAL PREFERIDO

Sistema IALA

SEÑALES CARDINALES



Sistema IALA

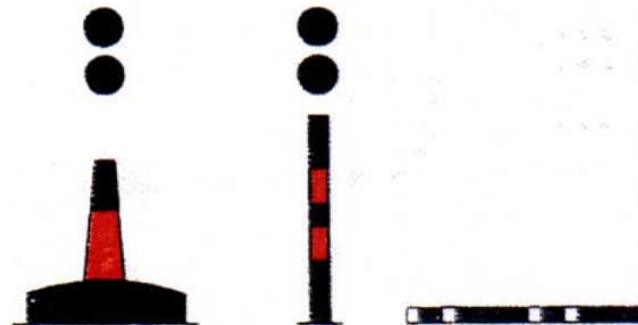
4. SEÑALES DE PELIGRO AISLADO

4.1. Definición de las Señales de Peligro Aislado

Una señal de peligro aislado es una marca erigida sobre, o amarrada a, o encima de, un peligro aislado, que tiene aguas navegables a todo su alrededor.

4.2. Descripción de las Señales de Peligro Aislado

Marca de tope (b):	2 esferas negras superpuestas
Color:	Negro, con una o más franjas anchas horizontales rojas
Forma:	Optativa, pero sin prestarse a confusión con las señales laterales, prefiriéndose las de castillete o espeque
Luz (cuando la tenga):	
Color:	Blanca
Ritmo:	Grupo de destellos (2)



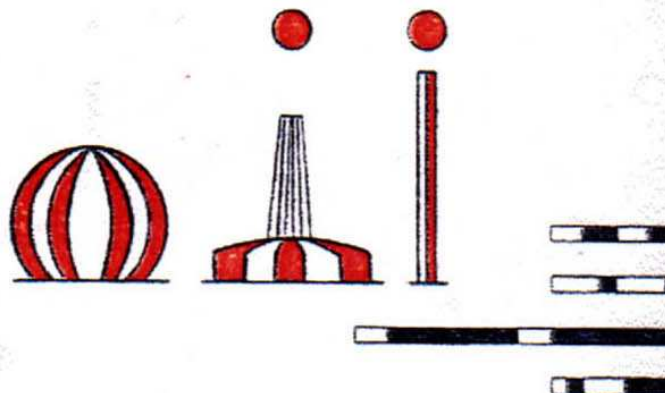
5. SEÑALES DE AGUAS SEGURAS

5.1. Definición de las Señales de Aguas Seguras

Estas señales sirven para indicar que hay aguas navegables en todas partes alrededor de la señal; incluyéndose aquí las señales de eje del canal y las de medio canal. Pueden utilizarse como alternativa a las señales Cardinales o Laterales, para indicar una recalada.

5.2. Descripción de las Señales de Aguas Seguras

Color:	Franjas verticales rojas y blancas
Forma:	Esférica, castillete o espeque con marca de tope esférica
Marca de tope (cuando se use):	Una esfera roja
Luz (cuando la tenga):	
Color:	Blanco
Ritmo:	Isofásica, de ocultaciones, un destello largo cada 10 s o Morse "A"



SEÑALES
DE
PELIGRO
AISLADO

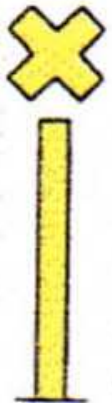
SEÑALES
DE AGUAS
SEGURAS

Sistema IALA

SEÑALES ESPECIALES

6.2. Descripción de las Señales Especiales.

Color:	Amarillo
Forma:	Optativa, pero sin entrar en conflicto con las señales destinadas a la navegación
Marca de tope (cuando se use)	Una sola, amarilla, en forma de "X"
Luz (cuando la tenga):	
Color:	Amarillo
Ritmo:	Cualquiera, menos las descritas en las secciones 3, 4 ó 5



Sistema IALA

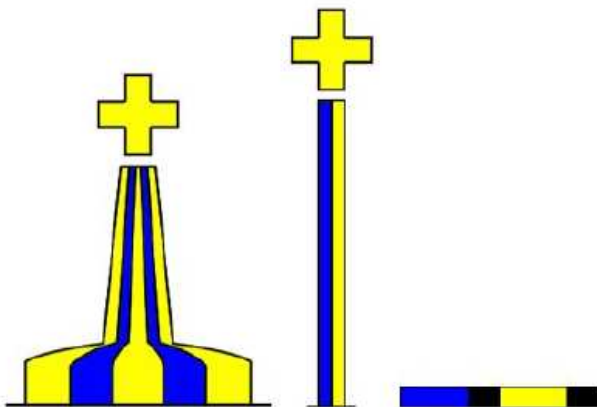
4.1 Characteristics

The buoy has the following characteristics:

- A pillar or spar buoy, with size dependant on location.
- Coloured in equal number and dimensions of blue and yellow vertical stripes (minimum of 4 stripes and maximum of 8 stripes).
- Fitted with an alternating blue* and yellow flashing light with a nominal range of 4 nautical miles (authorities may wish to alter the range depending on local conditions) where the blue and yellow 1 second flashes are alternated with an interval of 0.5 seconds.

$$B1.0s + \underline{0.5s} + Y1.0s + \underline{0.5s} = 3.0s$$

- If multiple buoys are deployed then the lights should be synchronised.
- Consideration should be given to the use of a racon Morse Code “D” and/or AIS transponder.
- The top mark, if fitted, is to be a standing/upright yellow cross.



**The light characteristic was chosen to eliminate confusion with blue lights to identify law enforcement, security and emergency services.*

Emergency Reck Marking



Otras Señales 1

8.1. LEADING LINES / RANGES

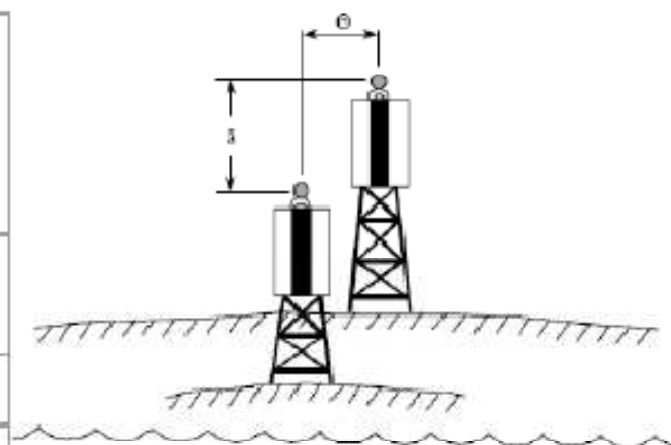
8.1.1. Definition of Leading Lines

A group of two or more marks or lights, in the same vertical plane such that the navigator can follow the leading line at the same bearing.

8.1.2. Description of Leading Lines

Leading Line structures can be any colour or shape that provide a distinctive mark that cannot be confused with adjacent structures.

Colour	No colour significance. Competent authority determines the optimum colours to contrast with the dominant background colour at the location.
Shape	No shape significance. Square geometrical figures are recommended.
Light (when fitted)	
Colour	Any colour. Competent authority determines the optimum colour to contrast with the dominant background colour at the location.
Rhythm	Any, however fixed characteristics should be used sparingly.



Otras Señales 2

8.2. SECTOR LIGHTS

8.2.1. Definition of Sector Lights

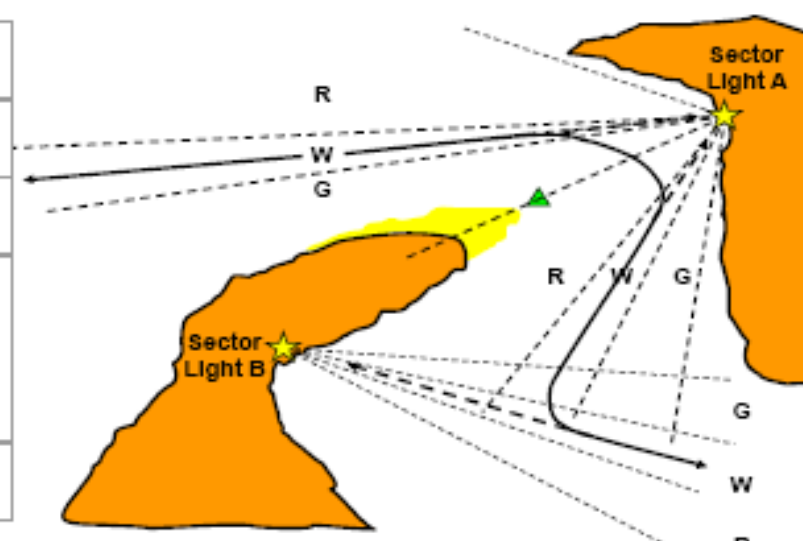
A sector light is a fixed aid to navigation that displays a light of different colours and/or rhythms over designated arcs. The colour of the light provides directional information to the mariner.

8.2.2. Description of Sector Lights

A sector light may be used:

- To provide directional information in a fairway
- To indicate a turning point, a junction with other channels, a hazard or other items of navigational importance

Colour	Not applicable
Shape	None, light only
Light	
Colour	If using to mark channel limits follow convention for IALA region indicated in Section 2
Rhythm	As appropriate



Otras Señales 3

8.3. LIGHTHOUSES

8.3.1. Definition of a Lighthouse

A lighthouse is a fixed mark providing a light of a distinctive character and to mark a known geographical location in order to assist navigation. May display different light colours and/or rhythms over designated arcs as well as serve as a significant daymark.

8.3.2. Description of Lighthouses

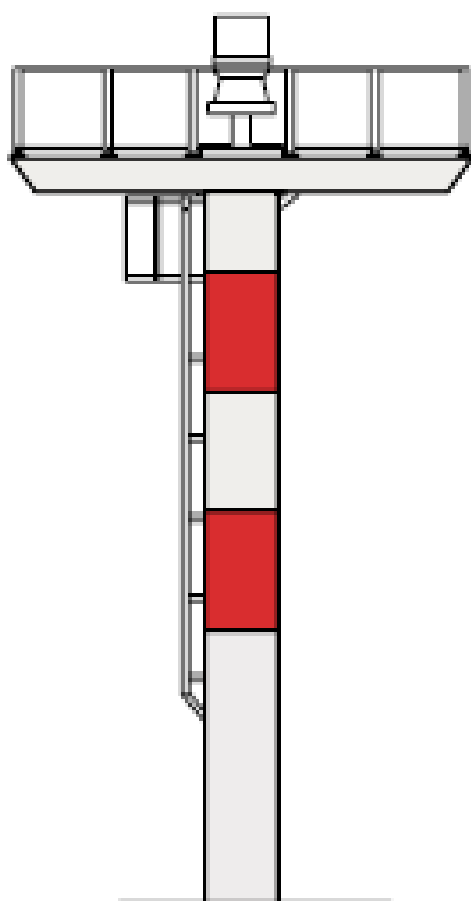
A lighthouse is a structure that provides a long or medium range light for identification by night and may provide a day mark for identification by day. A sector light may be used:

Colour	Any specifically utilized elsewhere in the MBS, to allow readily identifiable
Shape (Buoys)	Lighthouse structures can be any shape or colour, generally designed to provide a distinctive day mark that cannot be confused with an adjacent structures
Light (when fitted)	
Colour	White, Red, or Green
Rhythm	Any not specified elsewhere to allow light to be readily identifiable.



Otras Señales 4

8.4 Beacons



8.4.1 Definition of a Beacon

A fixed man-made navigation mark that can be recognised by its shape, colour, pattern, topmark, or light character, or a combination of these.

8.4.2 Description of a Beacon

- Can carry a signal light and in this case is termed a light beacon or lighted beacon;
- If not fitted with a light it is termed an unlighted or unlit beacon and provides only a day mark;
- As a leading line/range or conspicuous radar mark;
- It may also carry a topmark.

Description	
Colour	Any
Shape	As appropriate, including cardinal mark
Topmark (if any)	As appropriate
Light (when fitted)	
Colour	White, Red, or Green
Rhythm	As appropriate

Otras Señales 5

8.5. MAJOR FLOATING AIDS

8.5.1. Definition of Major Floating Aids

Major floating aids include light vessels, light floats and large navigational buoys.

8.5.2. Description of Major Floating Aids

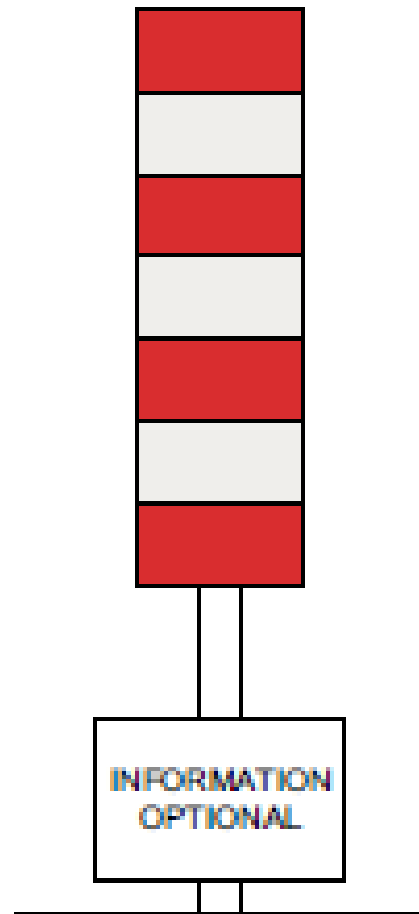
Major floating aids are generally deployed at critical locations, intended to mark approaches from off shore areas, where shipping traffic concentrations are high. May carry a Racon or other radio transmission device

Colour	As appropriate - predominantly red
Shape (Buoys)	Vessel or buoy shape with light tower
Light (when fitted)	
Colour	As appropriate
Rhythm	As appropriate



Otras Señales 6

8.6 Auxiliary Marks



8.6.1 Definition of Auxiliary Marks

Minor aids that have not been previously described.

8.6.2 Description of Auxiliary Marks

These marks are usually outside of defined channels and generally do not indicate the port and starboard sides of the route to be followed or obstructions to be avoided. They also include those marks used to convey information related to navigation safety. These marks shall not conflict with other navigational marks and shall be promulgated in appropriate nautical charts and documents. Should not generally be used if a more appropriate mark is available within the MBS.

Otras Señales 7

8.7 Port or Harbour Marks

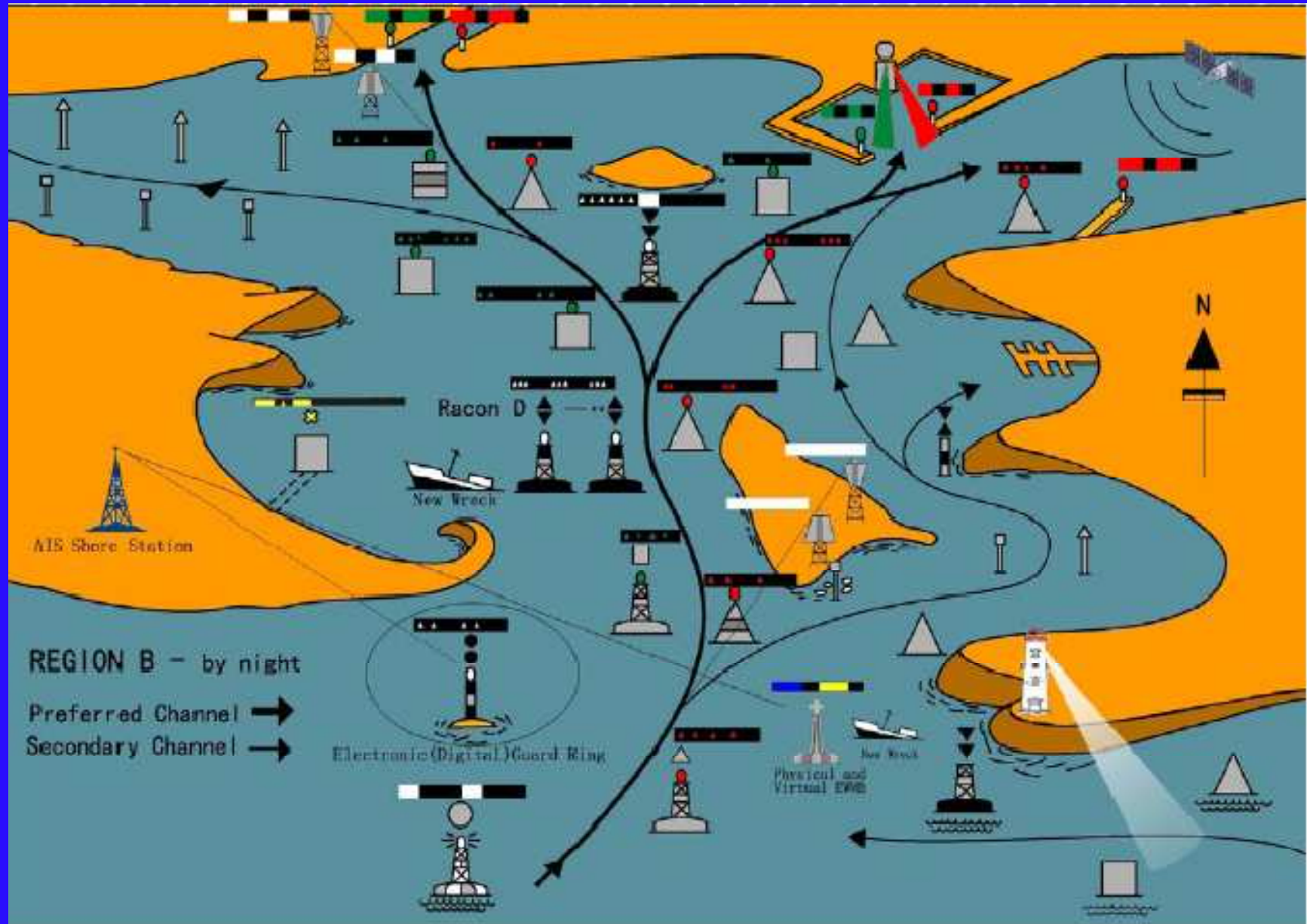
Mariners should be careful to take account of any local marking measures that may be in place and will often be covered by Local Regulations or by-laws. Before transiting an area for the first time, mariners should make themselves aware of local marking arrangements.

Local Aids to Navigation may include, but not be restricted to, marking of:

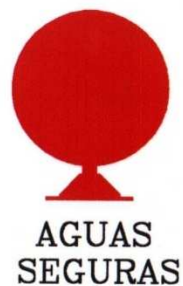
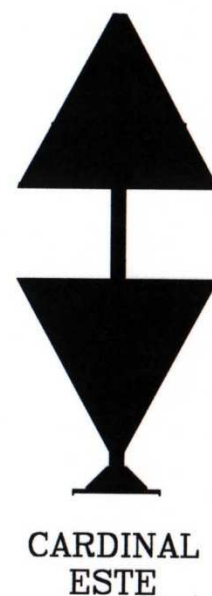
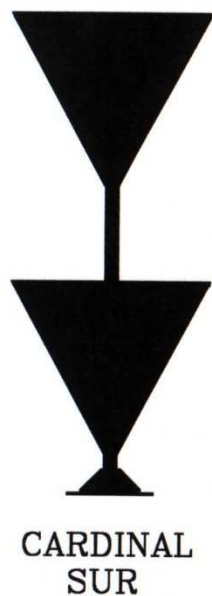
- breakwaters, quays and jetties;
- bridges and traffic signals;
- leisure areas.

and other rivers, channels, canals, locks and waterways marked within the responsibilities of competent authorities.

Borrador del Nuevo Sistema de boyado marítimo



TIPOS DE MARCA DE TOPE

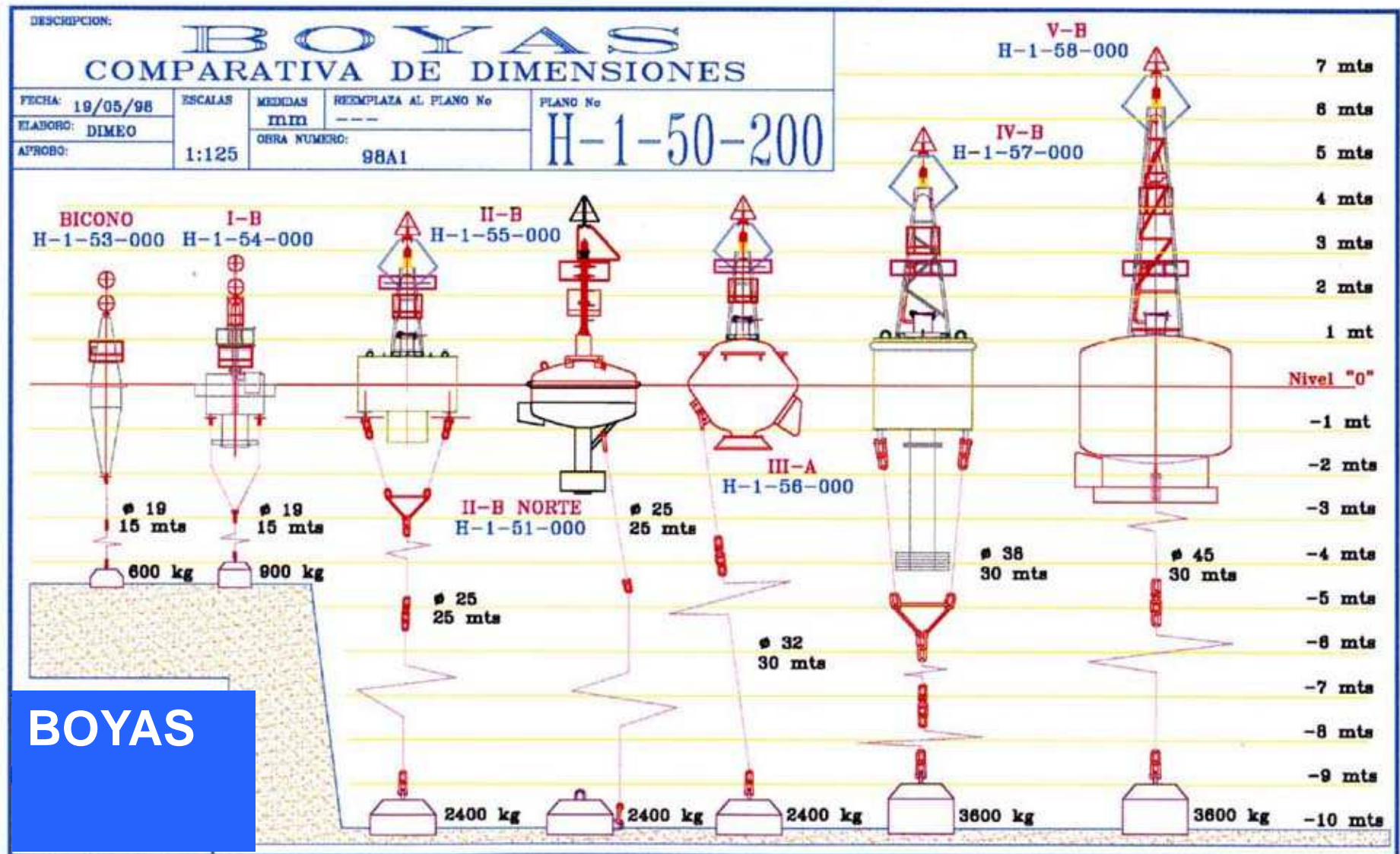


MARCAS DE TOPE

MATERIAL: AC. SAE 1010
PINTURA: POLIURETANICA

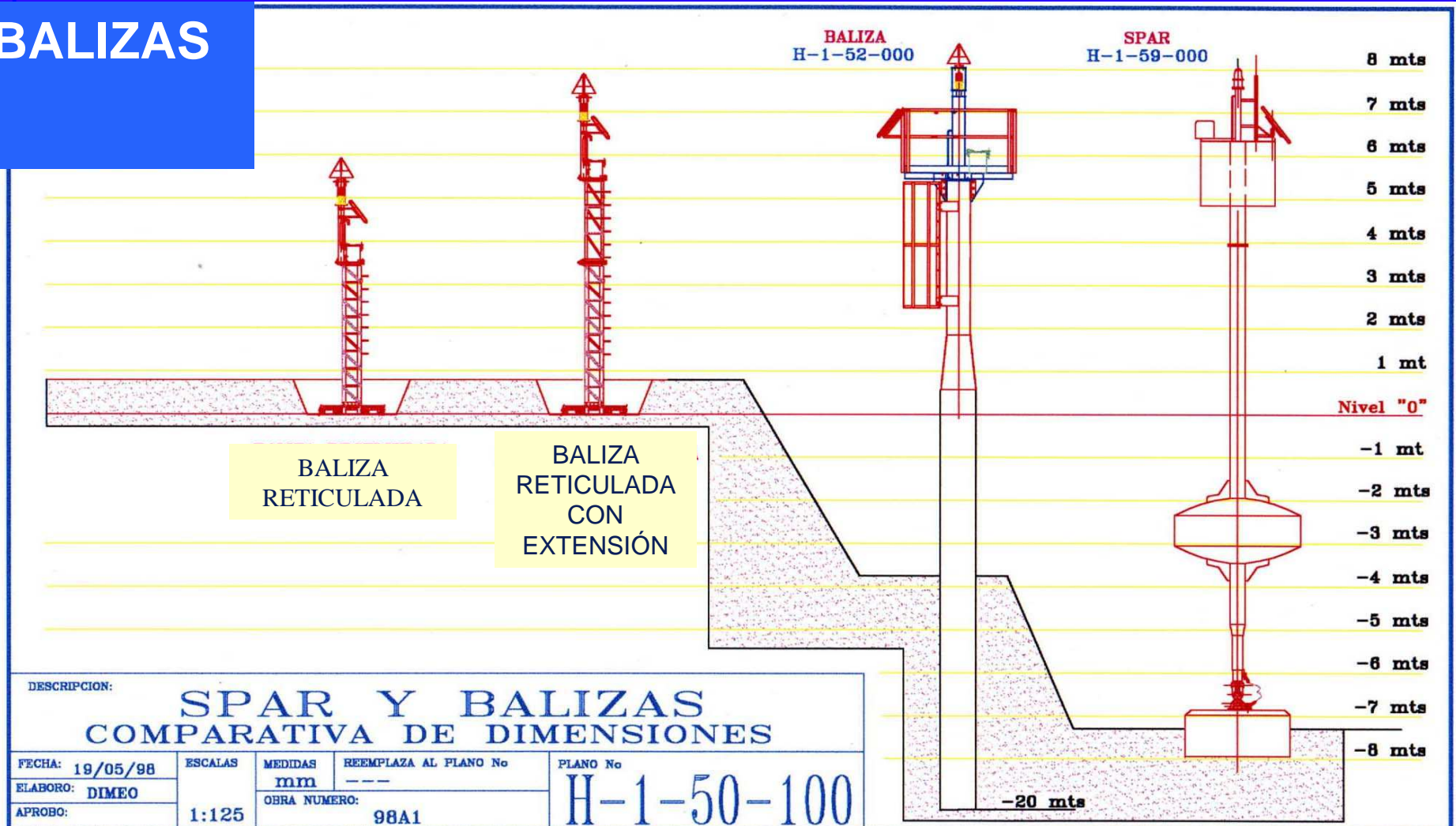
**MARCAS
DE TOPE**

ALGUNOS TIPOS DE BOYAS USADAS EN ARGENTINA



ALGUNOS TIPOS DE BALIZAS USADAS EN ARGENTINA

BALIZAS



BOYAS



BOYAS



BOYAS



BOYAS





BALIZAS

BALIZAS



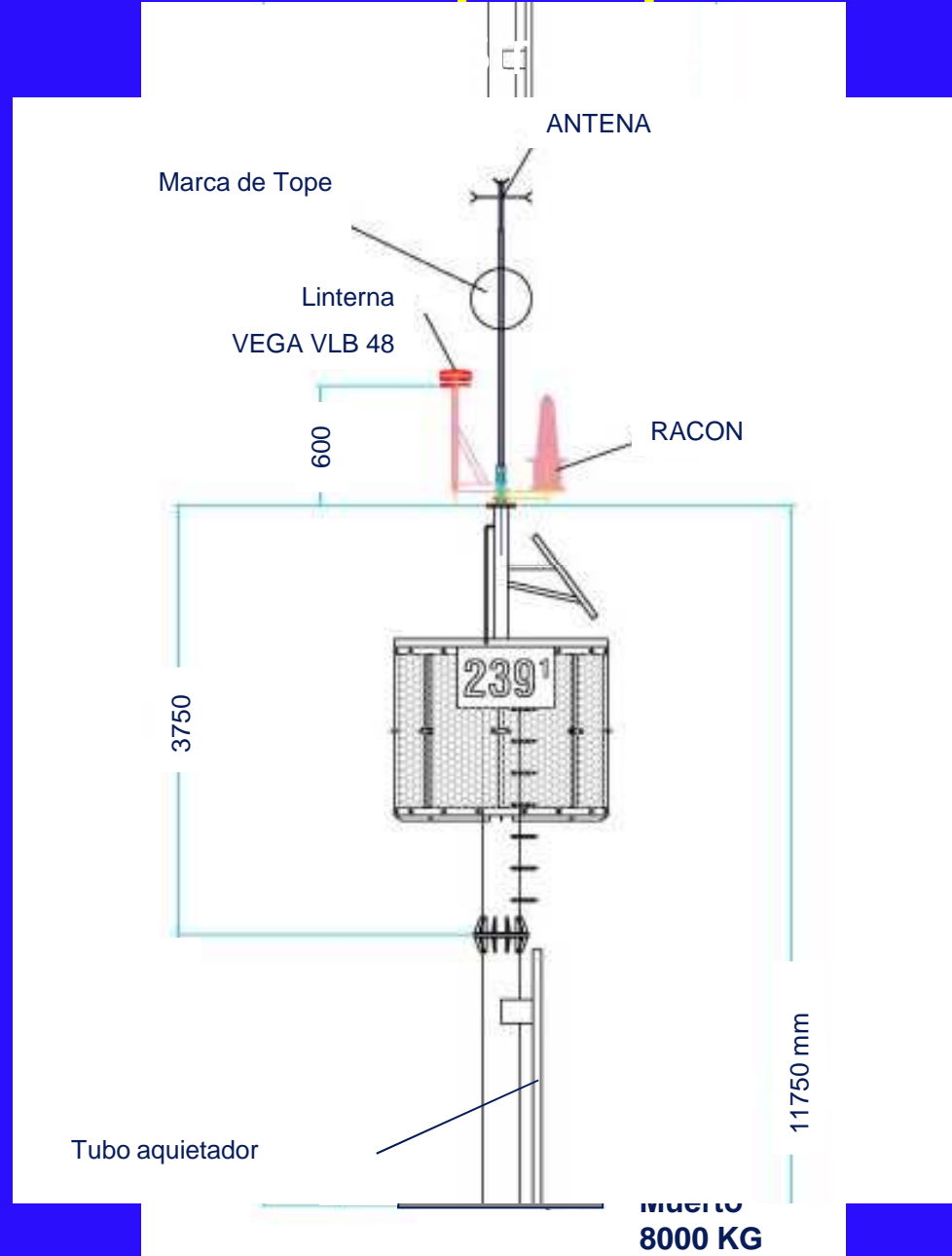
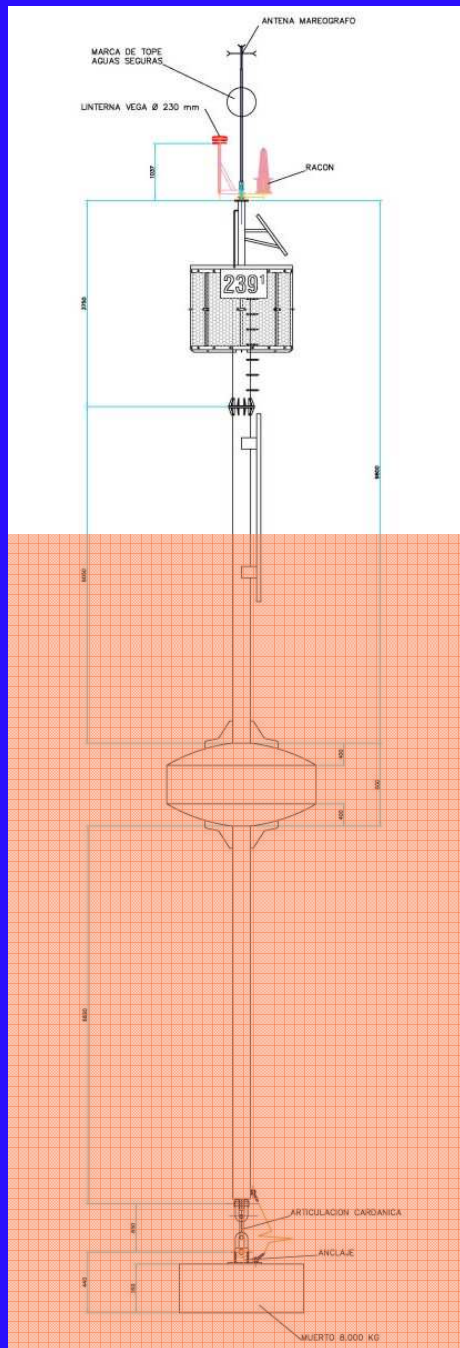
BOYAS SPAR



Señal tipo Spar – Río de la Plata



Señal tipo Spar



CONCEPTOS DE DISEÑO

The primary goal of the design of waterway aids to navigation systems is to facilitate safe, economic and efficient movement of vessels. Aids to navigation systems are designed to assist navigation and not to replace normal prudent navigational practices or the use of onboard navigational equipment. The responsible provision of aids to navigation systems requires that systems be designed to meet the essential minimum requirements for safe and expeditious navigation through specific waters in accordance with the type and volume of traffic.

The aids to navigation provided are normally intended to function in systems and therefore mariners should make use of the full information provided. These systems are intended to be used by the prudent mariner who knows and understands the functioning of aids to navigation, uses them in conjunction with charts and other published information, and conforms to the applicable rules of the waterway.

CONCEPTOS DE DISEÑO

Whether designing a new waterway system or evaluating an existing one, there are many factors that must be considered. The identification of these factors allows National Authorities to develop a greater understanding of the risks and threats that are present within a particular waterway. Section 7 of this guideline provides guidance for completing this analysis. Recognizing that waterways are different, the *site analysis*, *needs analysis*, *simulation*, and *operational analysis* provide the necessary framework to generically evaluate the overall risks that may be present and provide mitigation measures..

These factors include the consideration of

- user “needs”,
- shoreside characteristics,
- physical and environmental condition of the waterway and
- significant traffic types and density using the waterway.

CONCEPTOS DE DISEÑO

Once the evaluation has been completed, National Authorities should use this information to design the aids to navigation system that mitigates the risk to safe transit or reduces it to an acceptable level. In completing the design it is important to note that the entire waterway must be viewed using a systematic approach, recognizing that each individual element of the waterway design by itself will not reduce transit risk. So while individual regions of the waterway must be considered, the overall aids to navigation system must support a smooth transit of the waterway as a whole. This way, the waterway must be examined “end-to-end” to ensure that an acceptable and uniform level of risk is present throughout the waterway. While the analysis process is a tool for the assessment of risk, it should be the National Authorities objective to design an aid to navigation system best able to manage those risks.

CONCEPTOS DE DISEÑO

The specific aids to navigation system implemented should enable waterway users to transit an area safely and efficiently, while avoiding groundings, obstructions to navigation, and collisions with other vessels. Therefore, in order to satisfy the information requirement of the user, a system of aids to navigation must:

- Be available at the time it is needed
- Provide timely warning of danger from channel limits and fixed obstructions to navigation
- To enable the mariner to determine quickly their location within the channel, relative to fixed obstructions to navigation, and relative to other vessels
- Enable a safe course for the vessel to be determined

CONCEPTOS DE DISEÑO

Once the system has been established, maintaining the availability of this system is critical to controlling overall risks. Please refer to IALA Recommendation O-130 on short range AtoNs for additional information related to the categorization of individual aids to navigation, the calculation of availability targets, and recommended availability objectives.

Duplication in function of an AtoN may be appropriate and necessary to provide a degree of safety in the event of a discrepancy and to avoid excessive costs of emergency repairs. Moreover temporary duplication may be provided when new or alternative types of aids are being introduced in order to allow a safe transitional period.

CONCEPTOS DE DISEÑO

Elementos importantes para el Diseño

- Tipo de Vía navegable:
 - Marítima, canal de aproximación, fluvial
 - Una mano, dos manos
- Tráfico
- Navegación nocturna/ diurna
- Velocidad y Sentido de navegación (a-arr, a-ab)
- Condiciones medioambientales
- Características físicas de la Vía Navegable (geometría)
- Practicaje o no
- Velocidad de navegación

CONCEPTOS DE DISEÑO

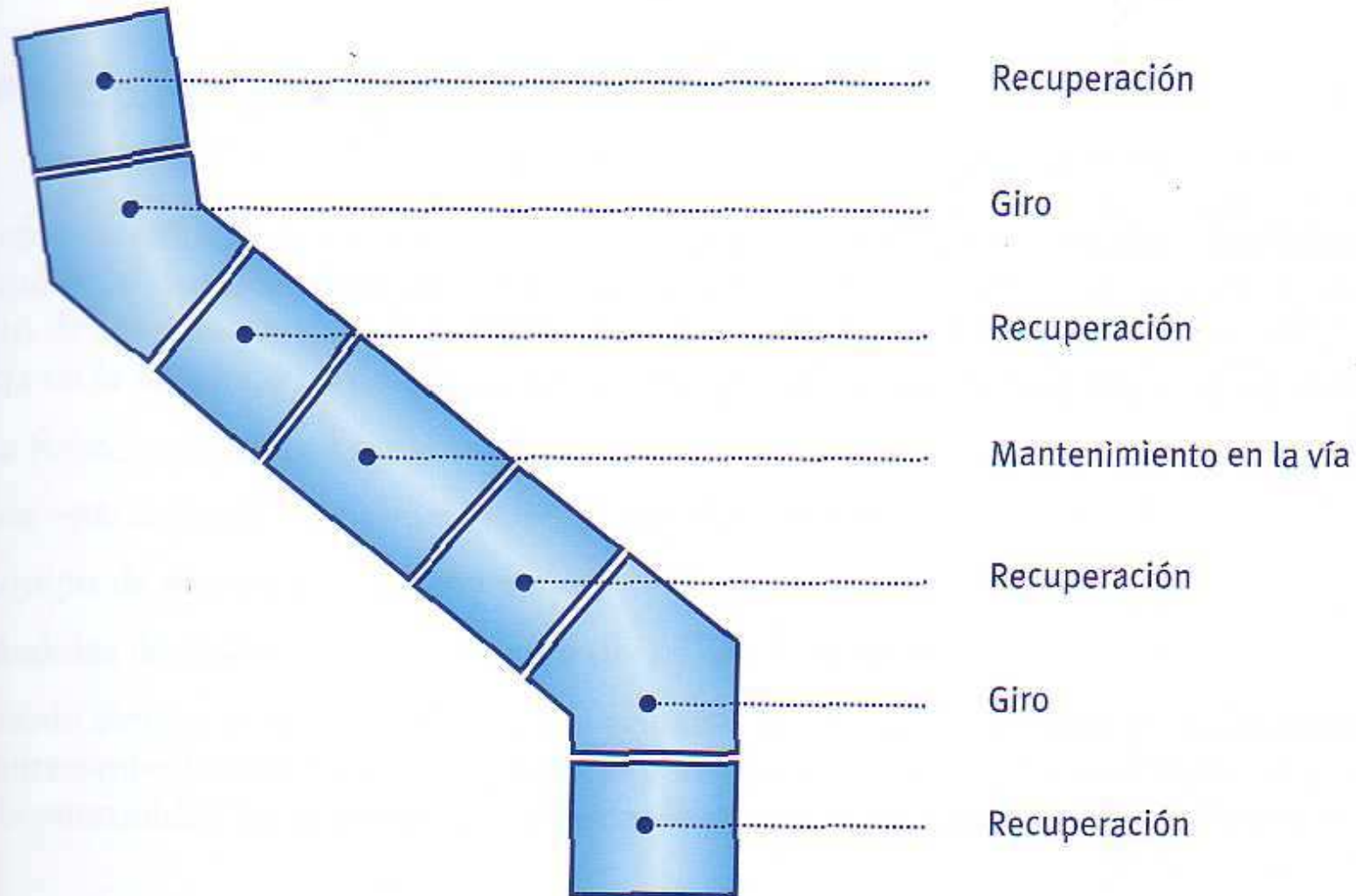


Fig. 9.1. Fases de maniobra de un buque

CONCEPTOS DE DISEÑO

Herramientas de diseño

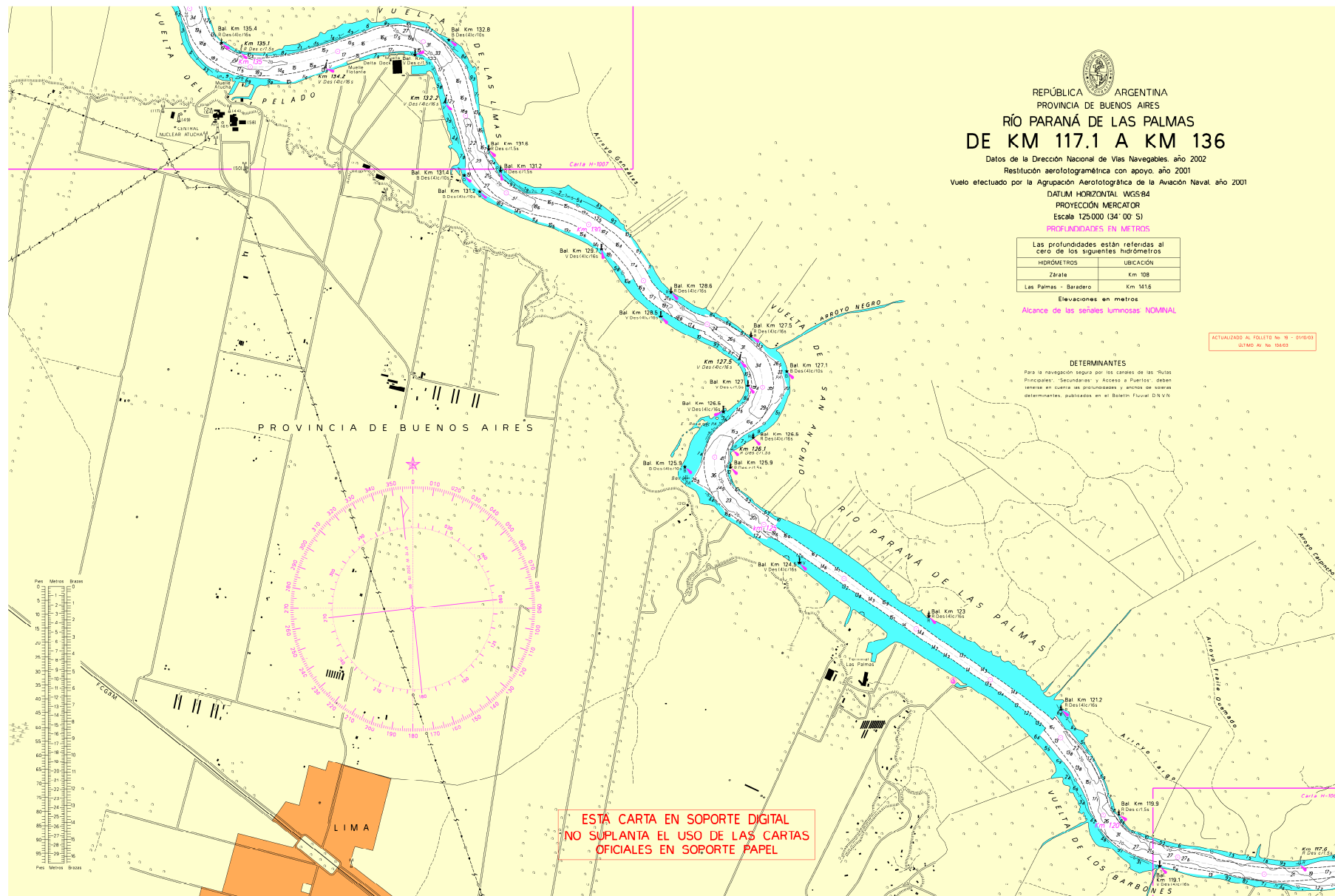
- Manual: ROM, PIANC, IALA +Disposición en planta
- Modelos matemáticos (Fast, a tiempo real)
- Simuladores de maniobra marítima
- Modelos físicos

PROFUNDIDADES EN METROS

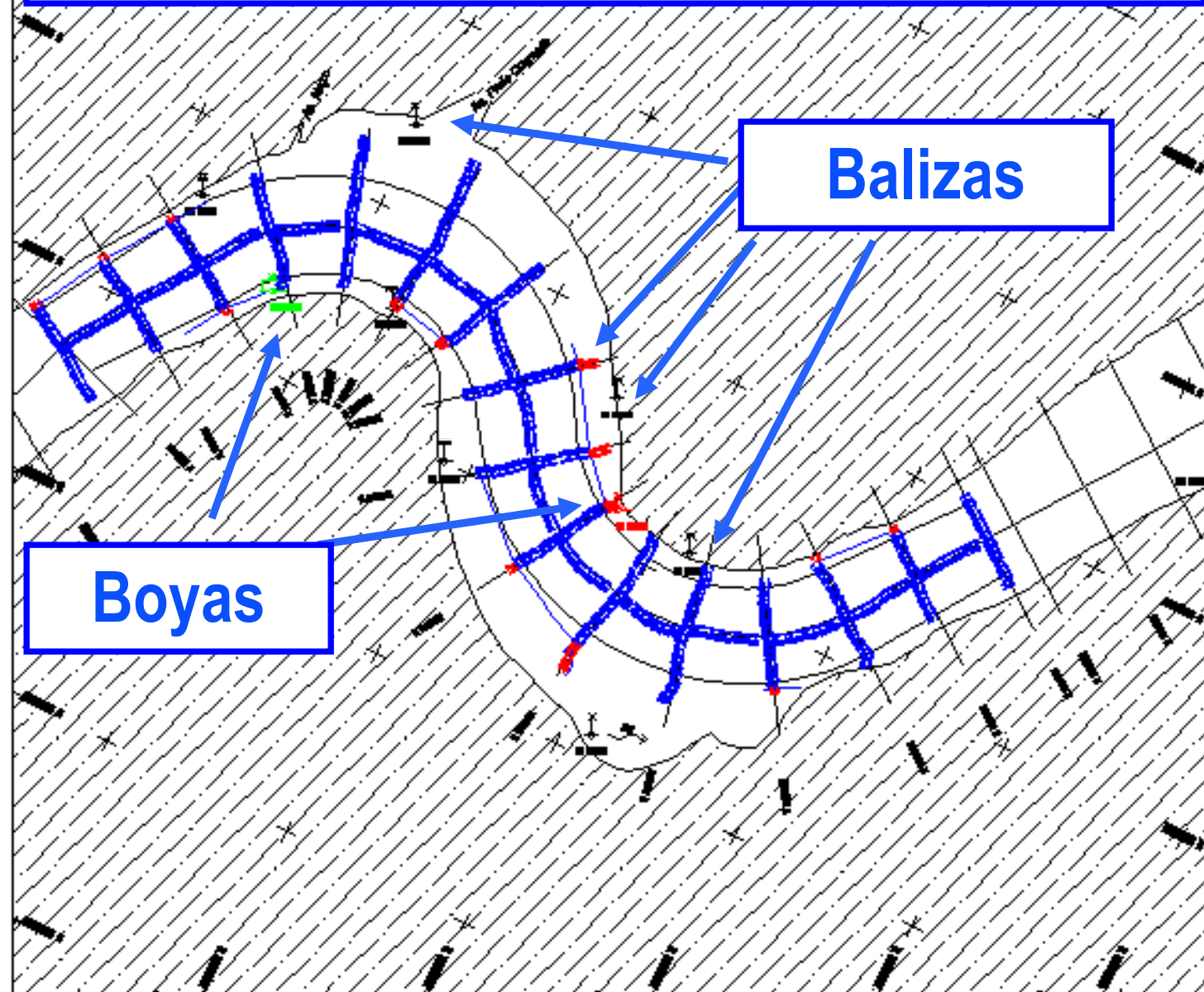
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La información contenida en esta carta se complementa con las existentes en los Derroteros, Pases y Señales, Hidrográficas para la Navegación, Tablas de Mareas y Puertos a los Navegantes. Para una correcta interpretación de símbolos y abreviaturas ver H-5000 (NT 1) - Patron de Signos Abreviados y Símbolos.

H-1006



Señalización de una curva del P. Palmas



Balizas

Boyas

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Viento: San Andrew
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NO SE CONSIDERA EN USO



HIDROVIA[®] S.A.
JAN DENUL N.V. BNEPA



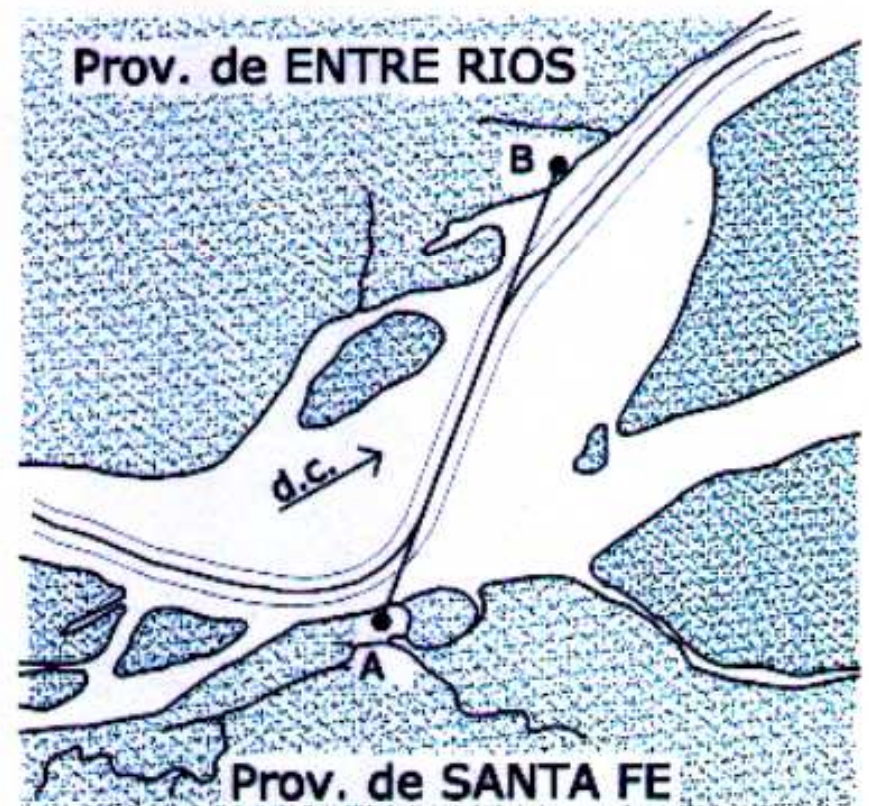
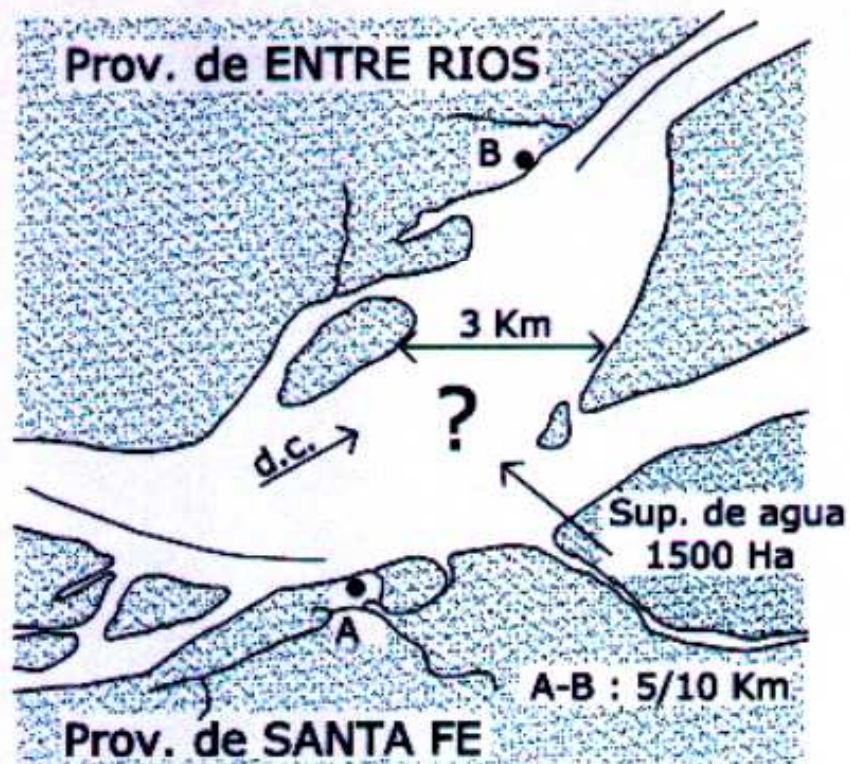
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Otros ejemplos

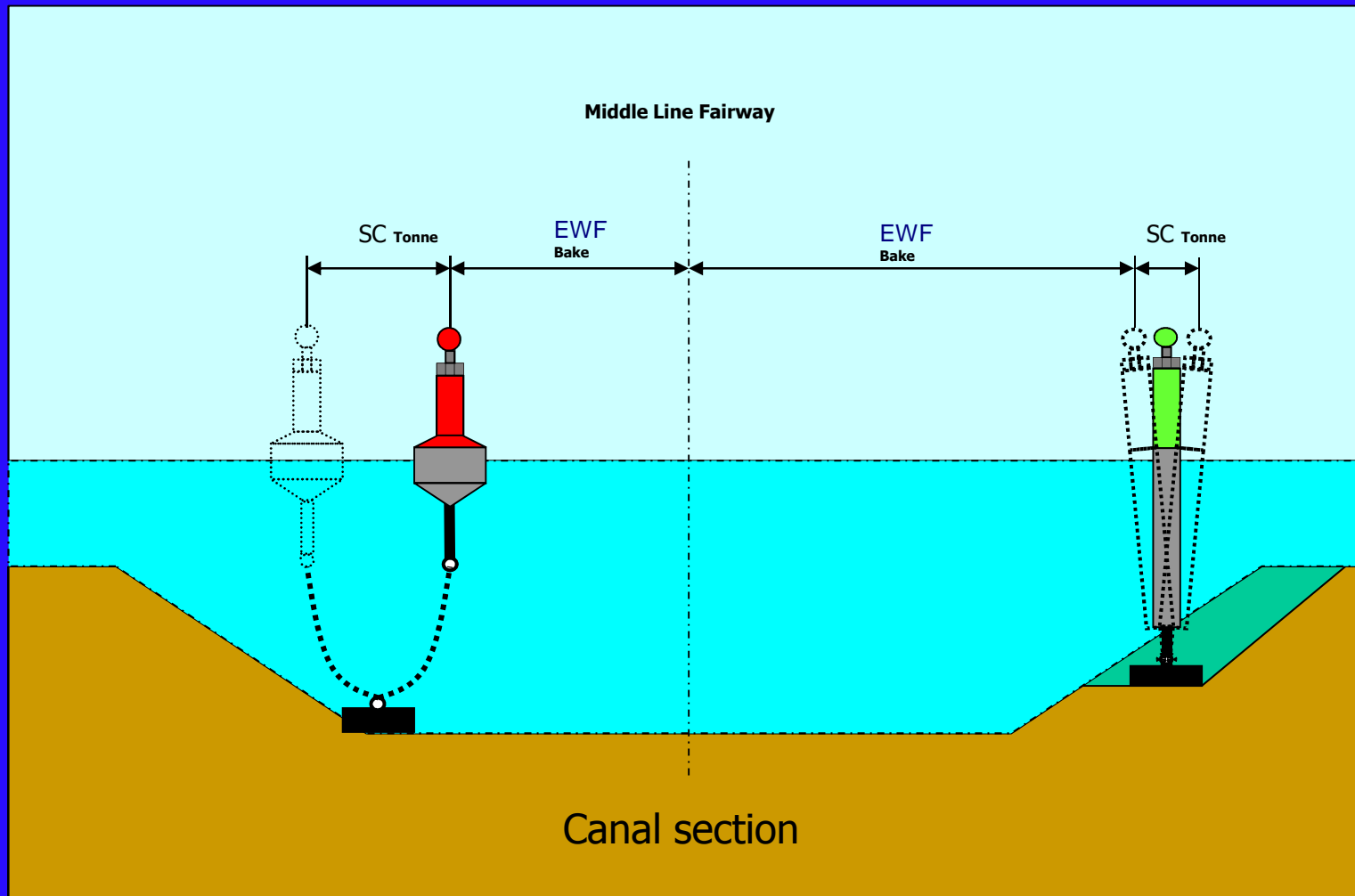
Travesías

Pares de boyas- Boyas alternadas

CARACTERÍSTICAS TÍPICAS DE UNA TRAVESÍA



Pares de boyas- Boyas alternadas



CONCEPTOS DE DISEÑO

Elementos

- Linternas sectorizadas
- Enfilaciones
- Boyas-Bz
 - Ubicación
 - Alcance

CONCEPTOS DE DISEÑO

IALA Region A

