

## Paper for Consideration by S-100WG3

## Demonstration of no-go area with S-102 and S-104 data sets

<b>Submitted by:</b>	Republic of Korea (KHOA)
<b>Executive Summary:</b>	This paper introduces the demonstration of no-go area with S-102 and S-104 data sets
<b>Related Documents:</b>	S-102, S-104, S-129
<b>Related Projects:</b>	S-100 Test Bed Project

**Introduction / Background**

KHOA has been producing S-10X Test Data Sets (TDS) and validating S-100 based Product Specification (PS) and services with S-100 Viewer/Testbed ECDIS through the S-100 Test Bed project. KHOA produced TDS for S-102 Bathymetric Surface and S-104 Water Level Information for Surface Navigation to combine detailed bathymetry and dynamic hydrographic information in addition to S-101 ENC information and developed the prototype of no-go area function on S-100 Testbed ECDIS. This document introduces the outcome of developing the prototype of no-go area display function using S-102 and S-104 data developed by KHOA.

**Analysis/Discussion**Overview of no-go area

No-go area is defined as an area, especially in a town, where it is very dangerous to go, usually because a group of people who have weapons prevent the police, army, and other people from entering<sup>1</sup> and when it comes to maritime traffic, it indicates an area where vessels may run aground or navigational risks are prevalent or where it is designated as marine protected area.

S-57 ECDIS, which carries ENCs, has the following settings similar to no-go areas to prevent vessels from running aground:

- Safety Sounding: Designate safety sounding and display the safety using ENC soundings
- Safety Contour: Insert safety value and set safety depth contour

Figure 1 shows the concept of safety sounding. Soundings on charts are added according to chart datum so safety sounding can be calculated as Tide + Depth – Draught.

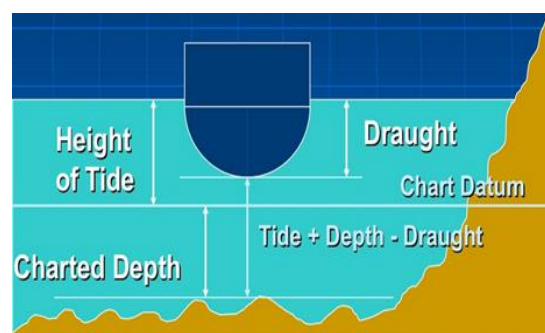


Fig. 1 Concept of Safety Sounding

Creation of S-102 and S-104 TDS

KHOA created prototypes of S-102 Bathymetric Surface and S-104 Water Level Information for Surface Navigation data through the S-100 Testbed project. The area was Busan Port and the data was created with the following procedure:

<sup>1</sup> Source: Cambridge Dictionary

Table 1. S-102 and S-104 Data sets

No.	Product Specification	Tools and Procedures
1	S-102 Bathymetric Surface	- Tools: KHOA S-102 Editor (developed using open source application from the Open Navigation Surface Working Group). - Procedures: Survey data → Upload to DEM Database → Convert and edit using the S-102 editor (BAG).
2	S-104 Water Level Information for Surface Navigation	- Tools: KHOA S-104 Editor - Procedures: Water level in grid (sourced by KHOA Tidal system) → created by S-104 Editor

**Demonstration of no-go area with S-102 and S-104 TDS**

S-102 Bathymetry data provides bathymetry information more detailed than soundings in ENCs and uncertainty information. S-104 Water Level data is useful for providing dynamic bathymetric information. KHOA research team developed a prototype of S-100 Testbed ECDIS shown in Figure 2 to demonstrate the no-go area function.

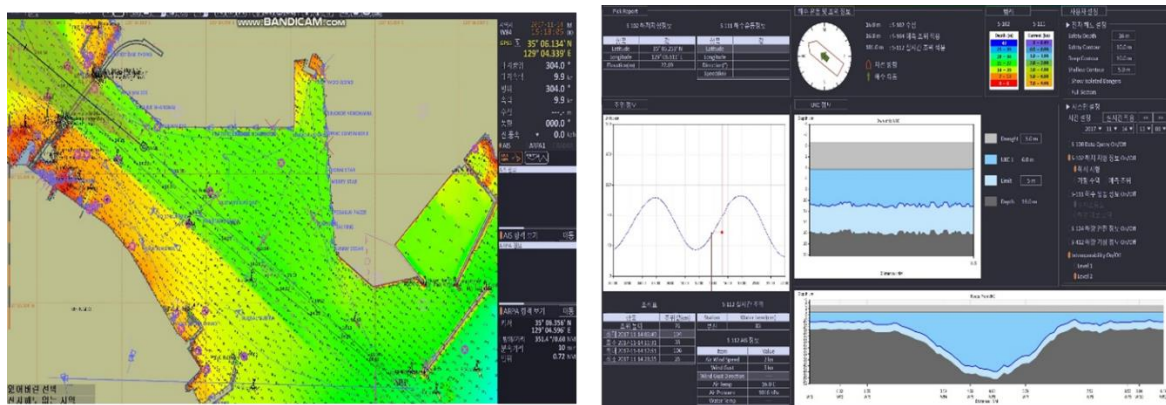


Fig. 2 Preparing S-100 Testbed ECDIS

As mentioned earlier, safety sounding is calculated as Tide + Depth – Draught but as for this case we used safety depth which is used as parameter variable of ECDIS and defined the following no-go area presentation methods:

- Safety Depth (Tide + Depth – Draught): Users type it in
- No-go area presentation method (1): if (Depth of S-102 Cell < Safety Depth) then display the cell in red
- No-go area presentation method (2): if ((Depth of S-102 Cell + S-104 Water Level) < Safety Depth) then display the cell in red

Figure 3 shows the distribution of no-go area if safety depth is 10m at the Busan Port. Figure 4 shows the expansion of no-go area distribution if safety depth is 16m.

KHOA research team validated the no-go area presentation function by applying S-102 and S-104 TDS on S-100 Testbed ECDIS and confirmed the function performs as planned.

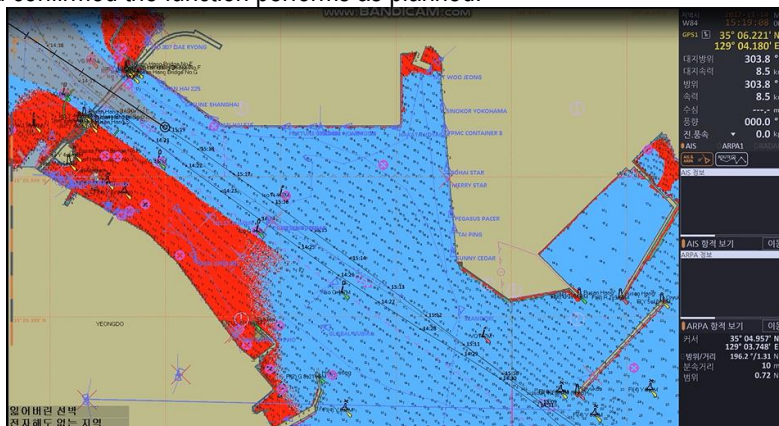


Fig. 3 No-go area in 10m safety depth

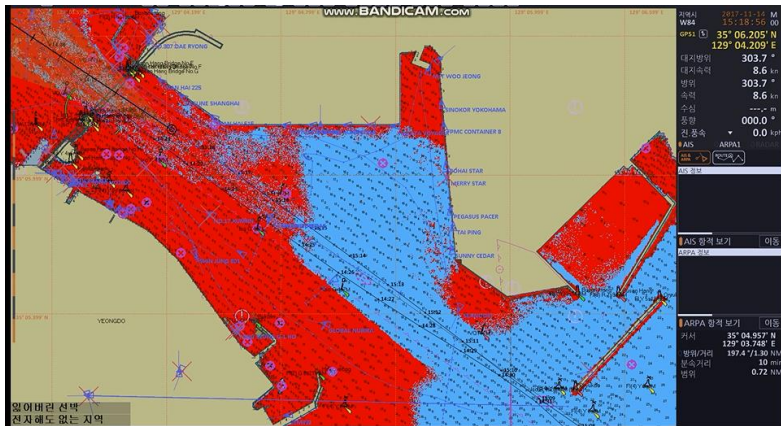


Fig. 4 No-go area in 16m safety depth

## Conclusions

KHOA created S-102 and S-104 test data sets through the S-100 Testbed project and applied them on S-100 ECDIS to test the no-go area function. As maritime traffic increases and the size of vessels becomes larger, it was confirmed we were able to run the no-go area function which prevents vessels from running around by combining detailed S-102 Bathymetry and dynamic S-104 Water Level data.

## Recommendations

S-102 PT is revising S-102 and TWCWG is developing S-104. KHOA has demonstrated the no-go area function using S-102 and S-104 data. Meanwhile S-129 PT is developing Under Keel Clearance Management (UKCM) Information Product Specification for encoding information about a vessel's under keel clearance for use in managing the safe passage through shallow waters and the Application Schema of UKCM includes NoGoArea as a feature type. It is considered S-129 PT can refer to this document when considering portrayal of S-129 PT.

## Action Required of S-100WG

The S-100WG3 is invited to:

- a. **Note** this paper