Paper for Consideration by TSMAD

Bridges in S-101

Submitted by:	UK
Executive Summary:	This paper proposes a revised structure for Bridges in S-101. This will provide improved modelling of the real world in order to support expanded ECDIS functionality and improved display. This paper originates from the work to review the Data Classification and Encoding Guide.
Related Documents:	1. S-101
Related Projects:	1. S-101 DCEG Review

Introduction / Background

1. In S-57 bridges are generally captured using a single object 'BRIDGE' this allows for the population of clearances and information about the bridge such as its appearance, name etc However bridges can consist of separate sections with different clearances and characteristics. One solution is to capture separate BRIDGE objects but this results in duplication of attributes and cluttered display. Therefore to accurately model the real world and support functionality such as checking vertical clearances as part of route checking S-101 ENC data should be structured accordingly. This paper lays out a proposal for a revised structure which would support enhanced functionality and improved display in S-100 ECDIS. This also improves the structure of ENC information when used outside of ECDIS in other applications.

Analysis/Discussion

2. From a vessels perspective a bridge can be thought of as a series of spans. The combination of these spans form the bridge itself. A bridge may have one or many spans, it may also consist other features such as Pylons and Towers. Features such as Lights may also form part of a Bridge or a Span. Both the bridge and the spans have characteristics. The bridge usually has a name, height; etc spans have clearances and may also have names or regulations which apply to them. Structuring ENC data to follow this model would allow ECDIS route checking to check clearances for bridge spans along the route against vessel parameters. The UML model at figure 1 shows the proposed revised structure for modeling bridges. This structure is also applicable to other features such as overhead pipeline etc following this structure for other features should be considered.

3. This new structure also supports improved display, currently for bridges with separate spans OBJNAM will display for each span if populated. In the revised structure OBJNAM would only be displayed for the BRIDGE feature and the SPAN feature could display the outline with fill and any clearance values. Furthermore, bridges could be added to ECDIS route checking and the system could detect a 'clearance contour' based on a vessels air draft. Annexe A provides a worked real-world example of this approach.

4. This approach will require 'full S-101' data to be encoded differently so there is an impact for HOs. But as there is a mapping between the current and proposed features it will be possible to use the converter to translate existing data to this structure initially. For example an existing bridge with multiple spans which is captured as a single BRIDGE object will become a Bridge aggregation feature and a single span feature until the data is amended to full S-101 form with multiple spans and a single Bridge feature. Figure 2 provides an example of current and proposed display.

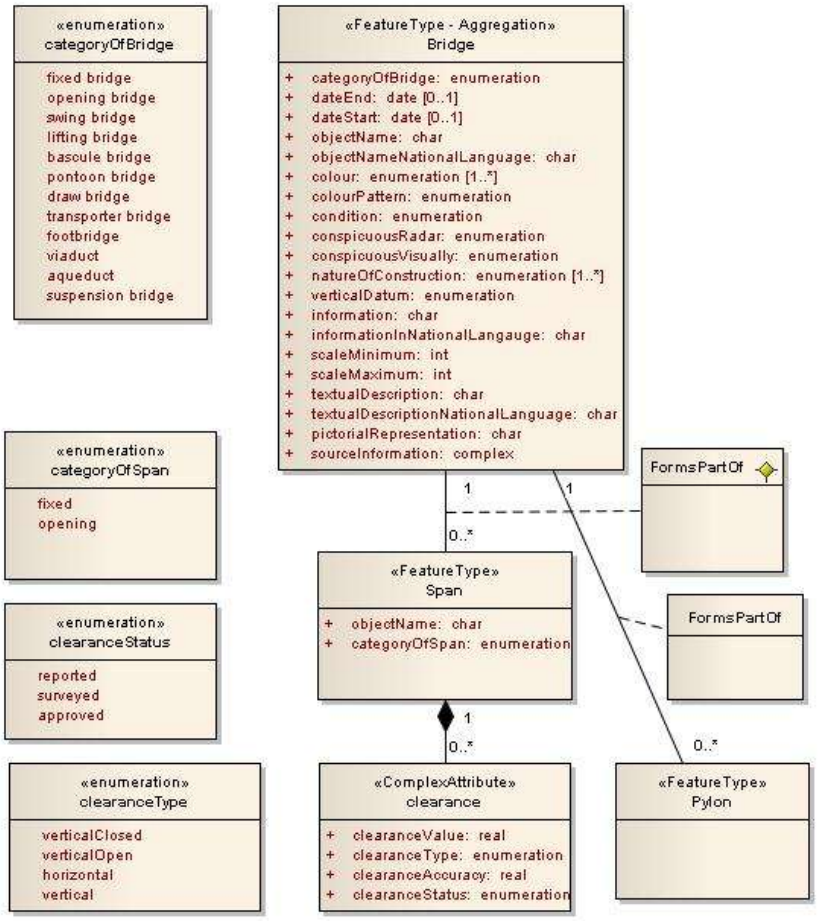


Figure 1 – UML model of proposed structure

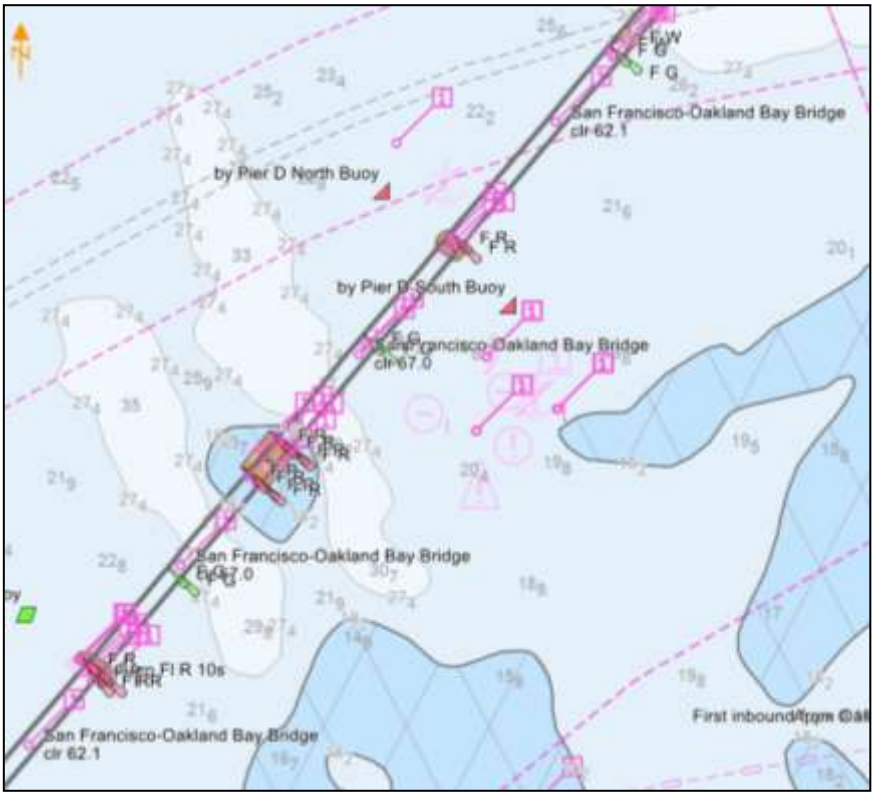


Figure 2 – Current display example

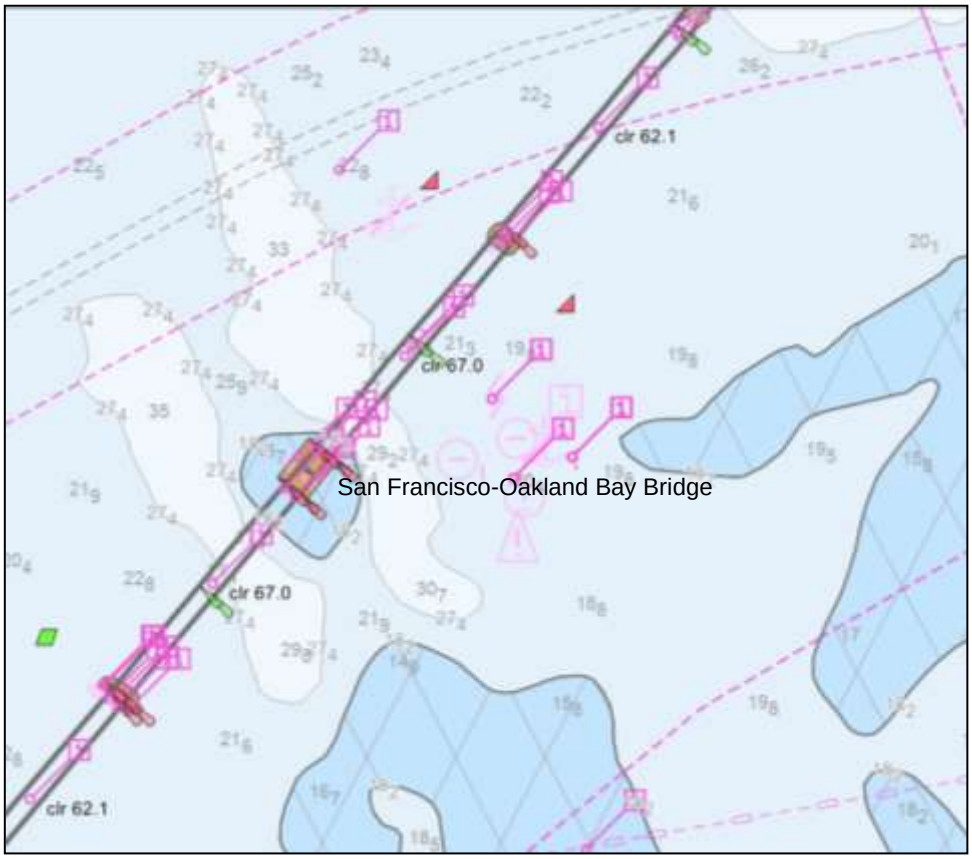


Figure 3 – Display based on proposed structure

Conclusion

5. This work outlines an alternative data structure for S-101 which improves display and the user experience. There is an impact for encoders but it is justified by the benefits and can be translated using the S-57/S-101 converter. However similar overhead clearance features exist such as overhead pipelines etc if agreed consideration should be given to extending the 'span' approach to these features.

Action Required of TSMAD

- To consider the proposed revised structure for Bridges in S-101 and discuss
- If agreed to consider the use of this structure for other features

Annexe A

Real world example;

Figure 4 – The Second Severn Crossing, UK

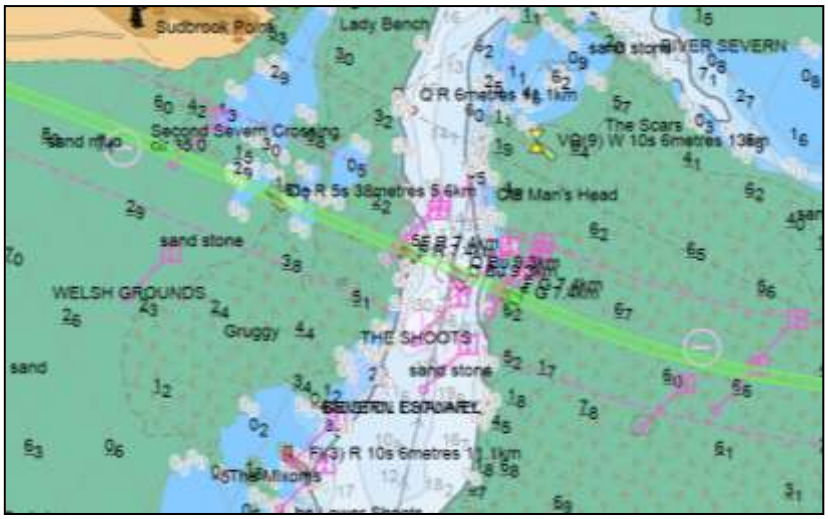


Figure 5 – Second Severn crossing as captured

This example is currently captured as a single BRIDGE object with the following attributes;

CATBRG (Category of bridge) = fixed bridge
OBJNAM (Object name) = Second Severn Crossing
SCAMIN (Scale minimum) = 89999
VERCLR (Vertical clearance) = 35
VERDAT (Vertical datum) = Highest astronomical tide (HAT)

The problem with this approach is that the data conveys that the clearance is 35m across the entire bridge which it is not. Capturing three separate BRIDGE objects would address this but the proposed solution offers a better approach overall.

Proposed Capture and Display

Following the approach proposed in this paper this bridge would be encoded as follows;

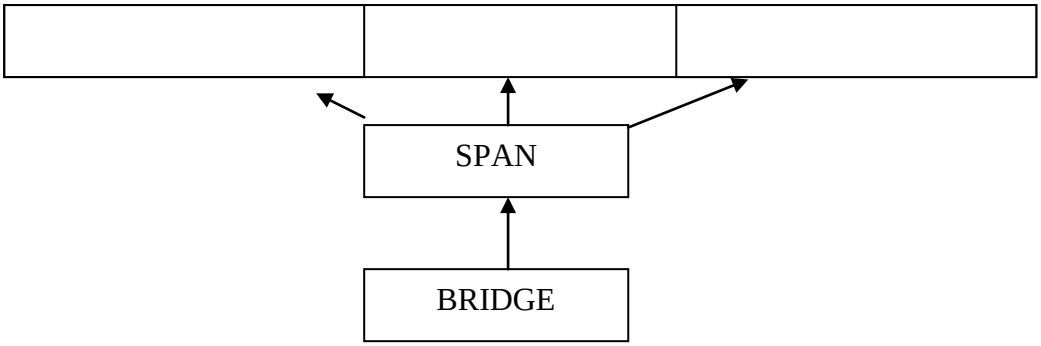
Bridge
categoryOfBridge = fixed bridge
objectName = Second Severn crossing
verticalDatum = Highest astronomical tide (HAT)

Associations etc Role =? Role =?

Span
(no attributes)
Span
Clearance
ClearanceType= verticalClearance
clearanceValue = 35
Span
(no attributes)

Original

Proposed



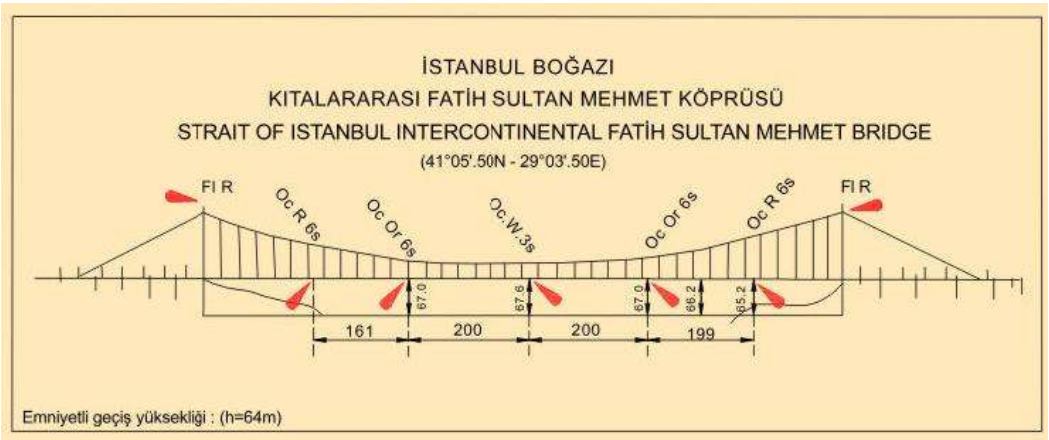


Figure – 6 A good example of a PICREP currently encoded which could be encoded in an improved way using the proposed structure.