Paper for Consideration by TSMAD 29
Update Proposal for S-100 Section 7-5.3

Submitted by:	United States (SPAWAR Atlantic)
Executive Summary:	This paper proposes a material change to S-100 7-5.3 to make it more robust and consistent
Related Documents:	S-100 2.0.0 Section 7 draft
Related Projects:	S-101 Specification

Type of Change Requested:

This paper proposes a material change to S-100 7-5.3 to make it more robust and consistent, and to correct some errors in the accompanying diagrams.

Proposed change:

A summary of the following changes from the current version of the text are:

- Items highlighted in yellow are either added or modified from the original text.
- One diagram, originally labelled 7-4b, has been removed because it was an invalid example of a self-intersecting curve.
- One diagram, original Figure 12 in the S-101 specification, was added as a valid example of self-intersecting curves.

7-5.3 Geometry configurations

Figure 7-3 depicts a one size fits all geometry model which can be further constrained in both dimensionality and complexity. This is broken down into 5 basic levels.

Level 1 – 0-, 1-Dimension (no constraints)

A set of isolated point and curve primitives. Curves do not reference points (no boundary), points and curves may be coincident. Areas are represented by a closed loop of curves.

Level 2a – 0-, 1-Dimension

A set of point and curve primitives with the following constraints:

1) Each curve must reference a start and end point (they may be the same).
2) Curves must not self-intersect, as shown in Figure 7-4.
3) Areas are represented by a closed loop of curves beginning and ending at a common point.
4) In the case of areas with holes, all internal boundaries must be completely contained within the external boundary and the internal boundaries must not intersect each other or the external boundary. Internal boundaries may touch other internal boundaries or the external boundary tangentially (i.e. at one point) as shown in Figure 7-5.
5) The outer boundary of a surface must be in a clockwise direction (surface to the right of the curve) and the curve orientation positive. The inner boundary of a surface must be in a counter-clockwise direction (surface to the right of the curve) and the curve orientation negative as shown in Figure 7-6.

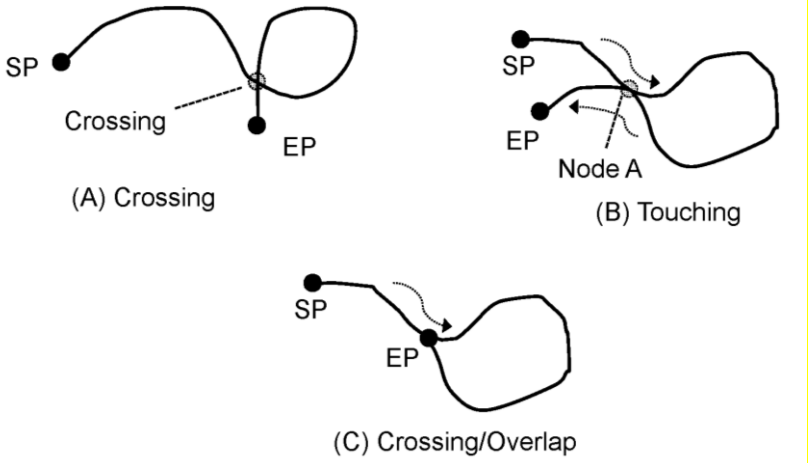

Figure 7-4 — Self – Intersect Examples

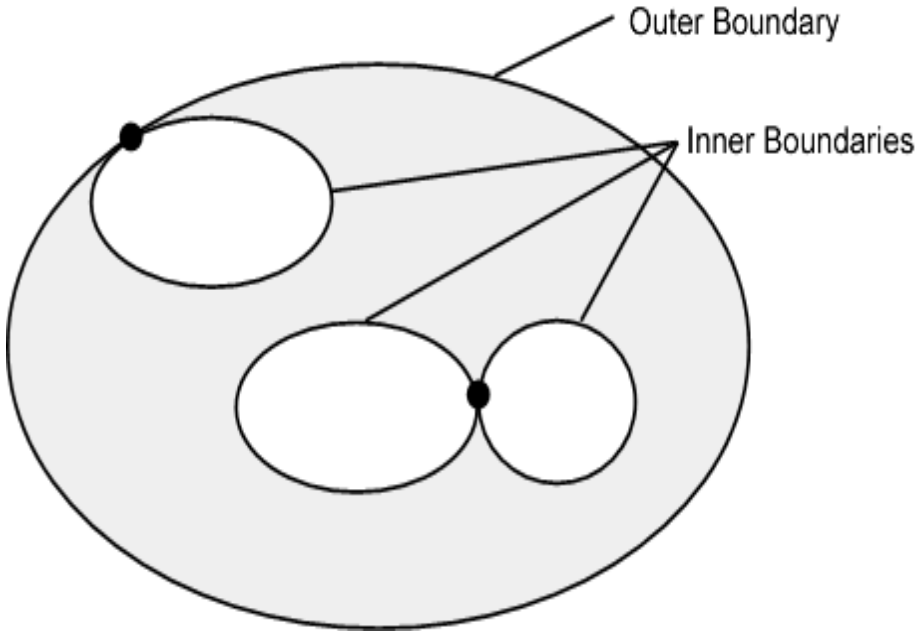

Figure 7-5 — Area Holes

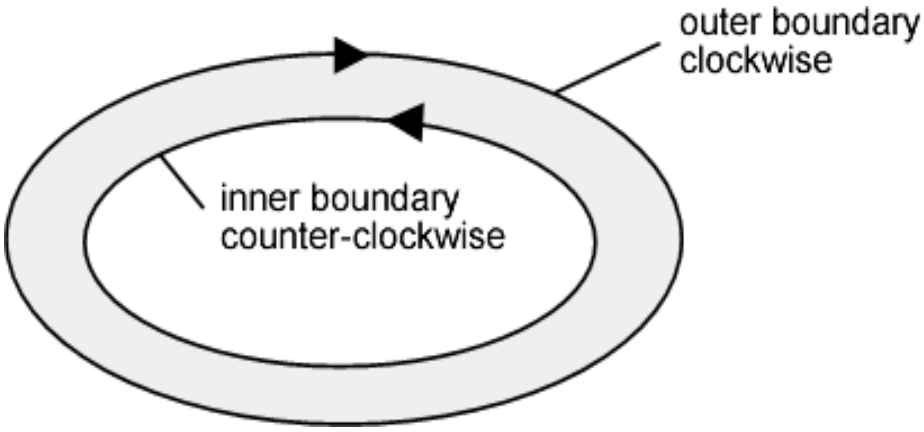

Figure 7-6 — Boundary Direction

Level 2b – 0-, 1-Dimension

A set of point and curve primitives. The constraints for Level 2a apply plus the following:

1) Each set of primitives must form a geometric complex.
2) Curves must not intersect without referencing a point at the intersection.
3) Duplication of coincident geometry is prohibited.

Level 3a – 0-, 1- and 2-Dimension

A set of point, curve and surface primitives. The constraints for Level 2a applies.

Level 3b – 0-, 1- and 2-Dimension

A set of point, curve and surface primitives. The constraints for Levels 2a and 2b apply plus the following:

Surfaces must be mutually exclusive and provide exhaustive cover.

Justification for proposed action:

This proposed change better aligns the content of the S-100 7-5.3 text with the provided diagrams. This change does not impact the interpretation of the specification. It will however, allow the S-101 specification to be slightly simplified (also without impacting interpretation).

To summarize, in the above revised text for 7-5.3, the following changes from the current version of the text are:

- Items highlighted in yellow are either added or modified from the original text.
- One diagram, originally labelled 7-4b, has been removed because it was an invalid example of a self-intersecting curve.
- One diagram, original Figure 12 in the S-101 specification, was added as a valid example of self-intersecting curves.

The TSMAD is invited to endorse and accept the revised text and diagrams for S-100 7-5.3 and incorporate the changes into the S-100 Universal Hydrographic Data Model.