Section 4.30

National Ocean Service/Electronic Navigational Charts Object Specifications

[Hydrographic Object Classes]

REVISED AUGUST 25, 2000

Section 4.30

Preface

The information provided in the *NOS/ENC Object Specifications* represents the National Ocean Service's interpretation of the *IHO/S-57 Appendix B.1, ENC Product Specification, Annex A - Use of the Object Catalogue for ENC* encoding guidelines for all object classes. All information in the *NOS/ENC Object Specifications* is intended to assist the NOS nautical cartographer not only in the creation of an IHO/S-57 compliant ENC database but also in the application of all previously established but appropriate NOS charting standards and procedures.

The *NOS/ENC Object Specifications* are not intended to replace the *IHO/S-57 Appendix B.1, ENC Product Specification, Annex A - Use of the Object Catalogue for ENC* as the official document from which ENC encoding guidelines are to be obtained, but is only being provided to facilitate the NOS transition from a paper/raster chart production environment to an IHO/S-57 vector ENC production environment.

The *IHO/S-57 Appendix B.1, ENC Product Specification, Annex A - Use of the Object Catalogue for ENC* remains the official and final authority for the encoding of all NOS ENC information and for the resolution of any discrepancies which may arise between the two aforementioned documents.

Depth Areas
Section 4.30.12

Section 4.30.12----DEPTH AREAS

Table of Contents

Index of: - Depth Area Geometric Portrayal Examples
- Depth Area Depth Range Value Examples
- Correlating IHO/S-57 Sections

Objectives:

The objectives of the following index are:

1. To aid in the specific identification of those *NOS/ENC Object Specifications* pages containing graphic examples (and explanations) of the *geometric portrayal* of ENC Depth Areas.

2. To aid in the specific identification of those *NOS/ENC Object Specifications* pages containing examples (and explanations) of the methods used to determine the appropriate *depth range values* of ENC Depth Areas.

3. To provide a cross-reference with the specific *IHO/S-57 Appendix B.1, ENC Product Specification, Annex A - Use of the Object Catalogue for ENC* sections from which the National Ocean Service has interpreted all information presented in this document.

The *IHO/S-57 Appendix B.1, ENC Product Specification, Annex A - Use of the Object Catalogue for ENC* remains the official and final authority for the encoding of all ENC information, and for the resolution of any discrepancies which may arise between this document and the IHO/S-57.

Index of: - Depth Area Geometric Portrayal Examples,
- Depth Area Depth Range Value Examples
- Correlating IHO/S-57 Sections

Title of Example	**Geometric Portrayal** NOS/ENC Object Specifications Page No.	**Depth Range Value Convention** NOS/ENC Object Specifications Page No.	IHO/S-57 Appendix B.1, ENC Product Specification, Annex A-Use of the Object Catalogue for ENC **Section No.**
Depth Area (areas):			
✧ Depth Areas Formed From Depth Contours Charted At A Standard Interval	Go There	Go There	Section 5.4.3
✧ Depth Area Formed From One Enclosed Depth Contour	Go There	Go There	Section 5.4.3
✧ Depth Areas Formed From Two Enclosed Depth Contours	Go There	Go There	Section 5.4.3
✧ Depth Areas Which Contain Short Isolated Depth Contours	Go There	Go There	Section 5.4.2
✧ Low Water Areas (i.e. Zero [0] Value Depth Contours)	Go There	Go There	Section 5.4.3
✧ Isolated Low Water Areas (i.e. Zero [0] Value Depth Contours)	Go There	Go There	Section 5.4.3

Index of: - Depth Area Geometric Portrayal Examples
- Depth Area Depth Range Value Examples
- Correlating IHO/S-57 Sections

Title of Example	**Geometric Portrayal** NOS/ENC Object Specifications Page No.	**Depth Range Value Convention** NOS/ENC Object Specifications Page No.	IHO/S-57 Appendix B.1, ENC Product Specification, Annex A-Use of the Object Catalogue for ENC **Section No.**
Depth Area (lines):			
✧ When Two or More Depth Contours Merge To Form A Single Contour At The Scale Of The ENC	Go There	Go There	Section 5.4.3
✧ When A Depth Contour Merges With The Coastline	Go There	Go There	Section 5.4.3 and Section 5.4.4
✧ When The Low Water Line (i.e.Zero [0] Value Depth Contour) Merges With The Coastline	Go There	Go There	Section 5.4.3 and Section 5.4.4
✧ When Depth Areas Adjoin Non-Navigable Waterways	Go There	Go There	Section 5.4.4
✧ When Depth Areas Adjoin Man-Made Constructions	Go There	Go There	Section 5.4.5
✧ When Depth Areas Adjoin Dredged Areas (**And** A Discontinuous Succession Of Depth Range Values Exists)	Go There	Go There	Section 5.4.6
✧ When Dredged Areas Adjoin Dredged Areas (**And** A Discontinuous Succession Of Depth Range Values Exists)	Go There	Go There	Section 5.4.7

DEPTH AREAS

I. Definition: A water area whose depth is within a defined range of values.
[IHO/S-57 Appendix A, Edition 3.0, page 1.51]

II. Nautical Chart *Feature* vs. ENC S-57 *Object Class*

Nautical Chart Feature

The following categories of nautical chart features are synonymous to the *ENC Object*: ***Depth Area*** or may have a Depth Area object associated with all or part of its geometry.

Category: Hydrographic Areas	**Category: Obstructions** (*If they are to be collected as area objects)*	**Category: Other** (*If and only if they are navigable at compilation scale*)
1. The area between two depth contours.	1. Obstructions (not identified)	1. Basins
2. The area between the coastline and the low water line. (intertidal area)	2. Cribs	2. Canals
3. Areas of omitted bathymetry	3. Danger Curves (which outline an area of rocks or wrecks)	3. Lakes
4. Foul Areas	4. Diffusers	4. Locks
5. Foul Ground	5. Fish Havens	5. Rivers
6. Shoals defined by depth contours	6. Ground Tackle	6. Tunnels
7. Unsurveyed Areas	7. Ice Booms	7. Dock Area
8. Incompletely Surveyed Areas	8. Snags	
	9. Stumps	
	10. Wellheads	

One (1) or more limits of the following nautical features may also be collected as a Depth Area (line) due to the fact that a Depth Area may be collected as an *area object* or as a *linear object*.

Coastline (natural or man-made)	Floating Docks	Hulks
Dredged Areas	Gates	Pontoons

NOTE: A very important criteria which must be met by objects to be encoded as a Depth Area (area) is that the Depth Area (area) cannot overlap another Depth Area (area) or Group 1 (see Section III below) object , nor can the limits of the Depth Area (area) intersect (i.e. the area must be totally enclosed).

III. Group 1 (and Group 2) Area Objects:

Within the ENC environment, all *geo-feature objects belong to one of two (2) groups (duly named Group 1 or Group 2).

All ENC area objects which belong to Group 1 are said to be the "skin of the earth" objects. That is, these objects provide total and continuous coverage of the earth and therefore **must not**

1. intersect with themselves, or
2. overlap each other, or
3. have gaps in coverage

To not intersect with itself means that the Group 1 object must define the boundary of an area and be totally enclosed, with no overshoots or intersections of boundary lines (gaps between boundary lines also are not allowed). "To not overlap with each other" is a self explanatory term which also means that there can only be one (1) boundary line between two individual but adjoining Group 1 objects. The objects affected will have **"coincident geometry"**, representing the "sharing" of the same boundary line. To not have gaps in coverage means that all geographic areas affected by an ENC must be covered by a Group1 object.

A Depth Area (area) is a Group 1 object. A Depth Area (line) is a Group 2 object. The following list contains those ENC objects which are considered Group 1 objects:

1. Depth Area (area) (DEPARE)
2. Dredged Areas (DRGARE)
3. Floating Dock (area) (FLODOC)
4. Hulk (area) (HULKES)
5. Land Area (area) (LNDARE)
6. Pontoon (area) (PONTON)
7. Unsurveyed Area (UNSARE)

All other geo-feature objects are considered Group 2 objects.

*** A geo-feature object per the IHO/S-57 is a "feature object which carries the descriptive characteristics of a real world entity". It is the ENC object which is synonymous to a particular nautical feature.**

IV. Collection Criteria

All nautical features mentioned in Part II above shall be encoded as its ENC object class equivalent **and** shall also be encoded as the *ENC Object: Depth Area*. These objects will not however, in most circumstances, be the only two (2) ENC objects created from the geometry.

Please refer to the specific section of the *NOS/ENC Object Specifications* to identify all pertinent object associations of a particular ENC object class.

ENC Bulletin. RE: One (1) Nautical Chart Feature Equals Several ENC Objects.

Within the ENC environment, one (1) nautical feature may not only be encoded as the similarly named or equivalent *ENC Object*, its geometry may also be encoded as one or more additional objects. For example, in addition to a navigable river being collected as the *ENC Object: Depth Area*, the limits of the river may also be encoded as the *ENC Object: Coastline (COALNE_line)*, and as the *ENC Object: Sea Area (SEAARE_area)*. The attributes of each object would be populated with all appropriate attribute values.

.

ENC Bulletin. RE: Geometry Representing Several Different ENC Objects

Within the ENC environment, when the term "encoded" is used in reference to specific geometry representing several different ENC objects, the term DOES NOT mean that a different geometric element (s) will be created for **each** individual object affected. IHO/S-57 specifications do not allow two (2) or more separate geometric elements to possess the same geographic location.

IHO/S-57 specifications, however, do permit one (1) graphic element to be "identified" as one or more ENC Objects. The objects affected are said to have **"coincident geometry"**, that is they all share one (1) or more of the same boundary lines.

Therefore, when the word "encoded" is used in reference to several ENC objects being associated with a geometric element, it is actually referring to the geometry: (a) being created once, and (b) being identified as one (1) or more ENC objects.

V. Data Collection Guidelines

After identifying the document(s) to be used as the source of applying (or revising) a Depth Area to an ENC, the application (or revision) of all relevant data for ENC purposes will occur in 2 phases. The first phase involves the *portrayal of the geometry* and the geometry's *encoding* as a particular ENC object class. The geometry will define the boundaries of each depth area. The second phase involves the *encoding of the attributes* which pertain to the particular object class with information that is relevant to each depth area's specific navigational purpose.

1. Source Documents

The majority of ENC depth areas will be formed from the depth contours which are or will be encoded on NOS' ENCs. The primary source documents which may serve as the official source either for application or revision of these particular depth areas will include United States Army Corps of Engineer blueprints and National Ocean Service hydro sheets.

However, because the list of nautical features whose geometry may also be used to create a depth area is quite considerable, the list of official source documents is as numerous and as varied as the features identified.

In *Figure 4-ES22*, those source documents which may serve as an official source document for the application and revision of depth areas have been provided.

A. Revision of Depth Areas Without An Official Source Document

As new depth areas are revised or added to an ENC from official source documents, it will be the cartographer's responsibility not only to accurately portray and encode the limits of these new or revised depth areas, but to also ensure that all pre-existing depth areas which are **not** currently indicated on the source document as requiring addition or revision, are also revised as appropriate.

To be revised as appropriate refers to the modification of those depth areas which have or will have an indirect relationship to the new or revised ENC depth area(s) by the sharing of **"coincident geometry"**.

OFFICIAL SOURCE DOCUMENTS WHICH MAY BE USED IN THE APPLICATION OR REVISION OF DEPTH AREAS.

NOS Hydrographic Surveys	USACE Blueprints	Chart Evaluation Surveys (CES)
Side Scan Sonar / Multibeam Surveys	100% Multibeam Surveys	Echo Sounder (Single Beam Surveys
H-Surveys	Q-Surveys	D-Surveys
P-Surveys	Photo-bathymetry Surveys	Reconnaissance Surveys
LIDAR (**LI**ght **D**etection **A**nd **R**anging) Surveys	Revisory Surveys Track-Line Surveys	Bathymetric Surveys
Geophysical Surveys (Track-Line Surveys)	USACE Construction Permit Letters	Diver Investigations
Navigable Area Surveys (NAS)	Foreign Country Surveys	Miscellaneous Surveys
Special Surveys: - Field Examinations (FE) - Additional Work (Ad. Wk.) - Tag-Line Surveys	** State and Local Government Surveys *** NOS Wire Drag Surveys	Private Surveys *** NOS Wire Sweep Surveys
*** Area and Depth (A&D) Sheets	*** Leadline Surveys	*** T-Sheets
Remote Sensing Division (RSD) Digital Manuscripts (DMs)	Remote Sensing Division (RSD) Geographic Cells (GCs)	*** TP-Sheets U.S. Geological Survey (USGS) Maps
*** NANCIs (New Aeronautical and Nautical Charting Investigations)	U.S. Coast Guard Local Notice to Mariners	

Asterisk Key:

** Must be evaluated for quality of data before application to nautical charts

*** Although these type of surveys are no longer performed, their value as a source of historical information still remains.

Figure 4-ES22

2. Geometric Portrayal

The S-57 object class which is to be used when geometrically portraying a depth area is: **Depth Area (DEPARE)**.

The only *geometric primitives* allowed for the *Depth Area* ENC Object Class are: **area** and **line**. This means that the geometry of a depth area can only be portrayed (encoded) as an area object or as a linear object.

Within this document, depth areas whose geometry is to be portrayed (encoded) as *area* objects will be referred to as Depth Area (area). Depth Areas whose geometry is to be portrayed (encoded) as *linear* objects will be referred to as Depth Area (line) or linear depth area.

3. Encoding

IHO/S-57 encoding involves portraying the nautical feature as the appropriate geometric entity and S-57 object class, and assigning (to this object) the appropriate attributes and attribute values. For example, let's refer to Depth Area 1 in *Figure 4-ES23*. This particular depth area would be encoded as follows: [*NOTE: Depending on the type of information provided in the source document, other attributes (which are not listed below) may also be populated to fully encode the object.]*

ENC S-57 Object Class:	Depth Area..... (DEPARE)
Attribute *1*:	DRVAL1.....(Depth Range Value 1)
Attribute *1* Value:	6.....(feet)
Attribute *2*:	DRVAL2.....(Depth Range Value 2)
Attribute *2* Value:	12.....(feet)

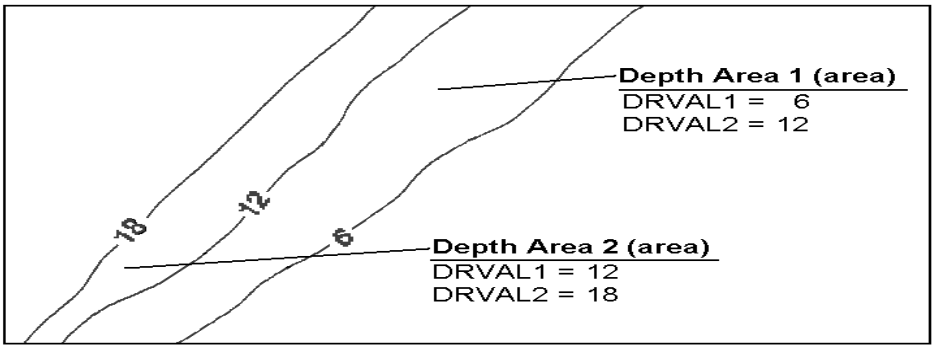


Figure 4-ES23

The attributes **DRVAL1** and **DRVAL2**:

(a) define the respective area's depth range. DRVAL1 generally represents the shallowest or *minimum* depth of the area. DRVAL2 generally represents the deepest or *maximum* depth of the area. These values are usually derived from the value of the bounding depth contours

(b) are the mandatory attributes of the *ENC Object: Depth Area*. (Mandatory attributes **must** be populated with an attribute value).

The ***IHO*/S-57 *Object Catalogue***, the official document containing the listing of all object classes, attributes, and attribute values, provides the following definitions:

> Object Class: *a generic description of features which can be categorized into a finite number of feature types* [e.g. DEPTH AREA, DREDGED AREA, LIGHT, WRECK, OBSTRUCTION].

Features falling into one of these categories (i.e. DEPTH AREA, DREDGED AREA, LIGHT, WRECK or OBSTRUCTION) will be more *precisely* identified by assigning the appropriate *attributes* of the respective object class.

> Attribute: *a category of characteristics about an object*.

For each instance of an object, there exists a list of allowable attributes. All allowable attributes are provided in the form of a six character acronym (e.g. DRVAL1 and DRVAL2); and may only be used **once** for the particular object (i.e. a depth area will never have two or more DRVAL1 and DRVAL2 attributes). However, to be assigned to each attribute will be *attribute values*, of which, in certain circumstances, a multiple selection is permitted.

> Attribute Value: *the unique and distinctive characteristic(s) of an object*

The ***IHO*/S-57 *Object Catalogue*** also provides the following information:

Attribute values (or "the expected input") may be of six (6) types:

1. enumerated
2. list
3. integer
4. coded string
5. free text
6. float

Enumerated - The expected input is a number selected from a list of predefined attribute values. Exactly one value must be chosen.

List - The expected input is a list of one or more numbers selected from a list of predefined attribute values. Where more than one value is used, they must normally be separated by commas but in special cases slashes ("/ ") may be used.

Integer - The expected input is an integer with defined range, units and format.

Coded String - The expected input is a string of ASCII characters in a predefined format.

Free Text - The expected input is a free-format alpha/numeric string. It may be a file name which points to a text or graphic file.

Float - The expected input is a floating point numeric value with defined range, resolution, units and format.

The IHO/S-57 list of attributes and attribute values pertaining to the object class: Depth Areas may be located in the back of this document. Mandatory attributes are indicated with an asterisk.

It must be noted that, if, after examining a source document for S-57 encoding purposes, a cartographer determines that ENC appropriate (but non-mandatory) information has *not* been provided to complete the value selection for all object attributes, **there is to be no research to obtain the additional information**.

ENC Bulletin. RE: The *" -H "* Factor **(All Geographic Areas Other Than The Great Lakes)**

If Coastline [COALNE] or Shoreline Construction [SLCONS] are one of the ENC objects forming a boundary or limit of a depth area, the depth range value assigned to the coastline is described in the ENC environment as ***" -H "***. "H" (no negative sign) is defined in the IHO/S-57 as "the height of the coastline datum above sounding datum". This value can be located for a general geographic area in the tide box for each nautical chart, under the heading: Mean High Water.

For Example:

Consider the following facts:

Objective: To determining the minimum depth range value of a depth area.

Geographic Area: Near San Francisco (Golden Gate)

Depth Area Boundary Objects: Coastline and the 0 foot depth contour (i.e. low water line)

TIDAL INFORMATION

Place		Height referred to datum of soundings (MLLW)			
Name	(LAT/LONG)	Mean Higher High Water	Mean High Water	Mean Low Water	Extreme Low Water
		feet	feet	feet	feet
Alcatraz Island	(37°50'N/122°25'W)	5.8	5.2	1.1	-2.5
San Francisco (Golden Gate)	(37°48'N/122°28'W)	5.8	5.2	1.1	-2.8
Rincon Point	(37°47'N/122°23'W)	6.3	5.7	1.1	-2.5
Oakland Pier	(37°48'N/122°20'W)	6.0	5.4	1.1	-2.5
Alameda	(37°46'N/122°18'W)	6.5	5.9	1.1	-2.5
San Leandro Channel	(37°42'N/122°12'W)	7.2	6.6	1.1	-2.5

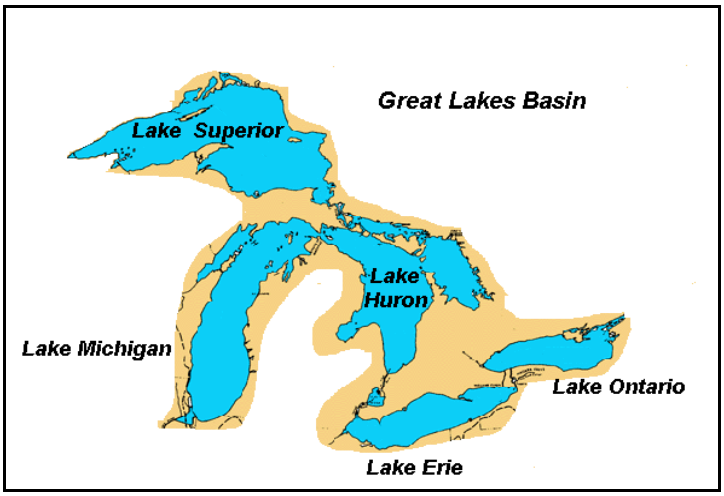
(498)

The *minimum depth range value* (DRVAL1) of the depth area would be **-5.2** the Mean High Water value for San Francisco (Golden Gate) as expressed in the tide box above.

The *maximum depth range value* (DRVAL2) of the depth area would be **0**, the value of the bounding depth contour.

ENC Bulletin. RE: The *" -H "* Factor **(The Great Lakes)**

When Coastline [COALNE] or Shoreline Construction [SLCONS] are one of the ENC objects forming a boundary or limit of a depth area, the depth range value assigned to the coastline is described within the ENC environment as ***" -H"***. "H" (no negative sign) is defined in the IHO/S-57 as "the height of the coastline datum above sounding datum". However, where the value of -H is determined in other geographic areas by applying a specific tidal value, the same method can not be employed for those depth areas falling within the Great Lake region.



In confined coastal waters of diminished tidal influence, the stabilizing impact a huge ocean reservoir may exert on the mean water level of coastal waters will not occur. When a mere two month record of water levels at a coastal location will generally provide sufficient tidal information to determine a reasonably accurate chart datum, **many** years of water level records are required to accurately determine the chart datum for inland or confined waters. This is because of the constant changing of water levels due to variations in supply and discharge or to meteorological disturbances.

Based on the arithmetic mean of the daily mean water levels as recorded, at Pointe-au-Pere, Quebec from 1970 to 1983, and then (due to the deterioration of the wharf at Pointe-au-Pere) from recordings at Rimouski, Quebec from 1984 to 1988, the reference zero for the International Great Lakes Datum 1985 (IGLD 85) was calculated. The International Great Lakes Datum 1985 (IGLD 85), which replaced the International Great Lakes Datum 1955 (IGLD 55) as the reference system used to define water level elevations in the Great Lakes, was implemented On all NOS Great Lake charts in 1992.

Because the coastline of interior waters is usually a line representing a specific elevation above a selected datum, and within the Great Lake region that specific elevation has been designated as zero (0) at Rimouski, Quebec per the IGLD 85 low water datum plane of reference, **H (the height of the coastline datum above sounding datum) shall equal the value of zero (0) when determining the depth range values of all affected depth areas within the Great Lake region.**

NOTE: The isolated areas charted with the low water symbol on NOS Great Lake charts, will be encoded as the ENC objects: Unsurveyed Area (area) [UNSARE] and Obstruction (area) [OBSTRN].

Jenkins, D. (1998, November). Chart Datum. (On-Line), Internet:http://www.trident-yc.on.ca/log17-03/datum.html

Canadian Hydrographic Service. Vertical Datums. (On-Line), Internet:http://www.ios.bc.ca/ios/chs/tides/datums/Datums.html

datums/Datums.html

4. Depth Area Examples

The purpose of this section is to provide a variety of examples and situations in which an ENC Depth Area is required and in which the primary boundaries are the standard depth contours for the particular ENC and/or high resolution source document. Each example or situation provided has been divided into two (2) parts----Part A and Part B. Part A describes the geometric portrayal of the Depth Area involved; Part B provides the convention to be used in the determination of the respective depth range values.

Please use the index located in the beginning of the *NOS/ENC Object Specifications* for Depth Areas to easily identify and promptly access an example which may closely resemble a depth area currently being encoded.

(The remainder of this page is intentionally blank.)

Depth Area (area) Examples

Example 1A--Geometric Portrayal

Depth Areas Formed From Depth Contours Charted At A Standard Interval

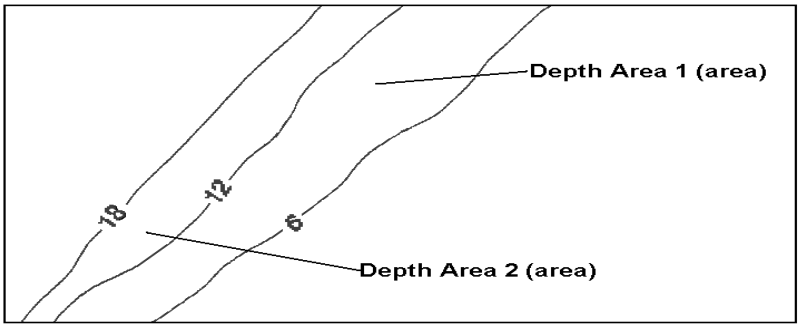


Figure 4-ES24

- The **ENC objects** involved in the portrayal of the above *Depth Area*s are:
  - Depth Area (DEPARE)
  - Depth Contour (DEPCNT)

- The **geometric primitives** of the affected objects are:
  - area (Depth Area)
  - line (Depth Contour)

- Comments:

1. Assume the border of *Figure 4-ES24* is the ENC cell boundary. That portion of a cell which bounds a depth area shall be encoded as a boundary line of the affected Depth Area (area) object.

2. The objects which make up the boundaries of Depth Area 1 are the 6' depth contour, the 12' depth contour and the appropriate portions of the northern and southern cell boundaries.

(continued)

Depth Area (area) Examples

Example 1A--Geometric Portrayal (continued)

Depth Areas Formed From Depth Contours Charted At A Standard Interval

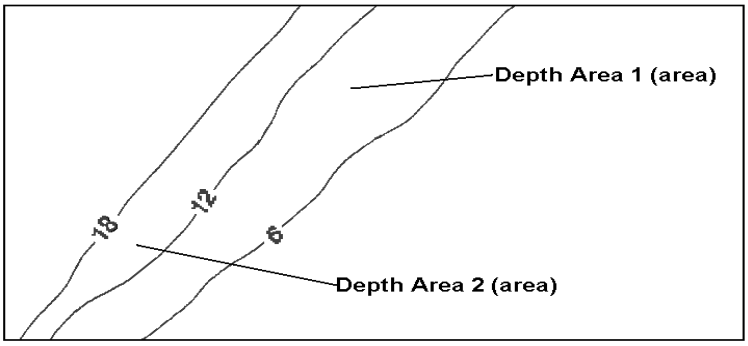


Figure 4-ES24

✧ Comments (continued):

3. The objects which make up the boundaries of Depth Area 2 are the 12' depth contour, the 18' depth contour and the appropriate portions of the northern and southern cell boundaries.

4. The depth contours will also be encoded as the ENC Object: Depth Contour (line). [DEPCNT]

Depth Area (area) Examples

Example 1B--Depth Range Value Convention

Depth Areas Formed From Depth Contours Charted At A Standard Interval

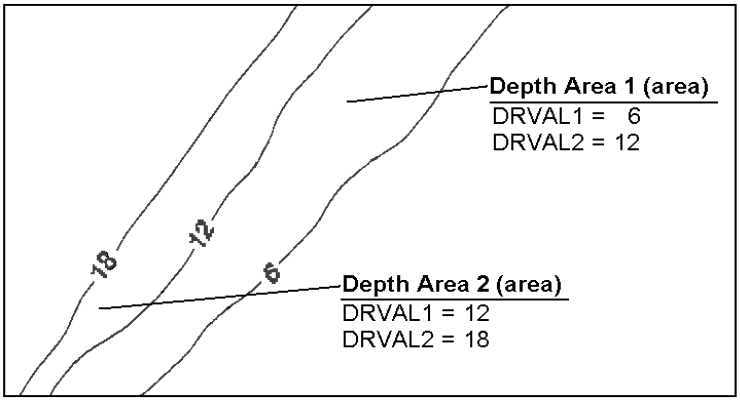


Figure 4-ES25

✧ *CONVENTION:*

Depth Areas 1 and 2:

The *convention* to be followed for the determination of the appropriate depth range values is:

DRVAL1 = the value of the depth contour which is the shoalest bounding depth contour of the two.

DRVAL2 = the value of the deepest bounding depth contour.

NOTE: It is assumed that the standard depth contour interval of the ENC portrayed in Figure 4-ES25 is 0', 6', 12', 18',... and that all depth contours representing this interval are (will be) charted.

Depth Area (area) Examples

Example 2A--Geometric Portrayal

Depth Area Formed From One Enclosed Depth Contour

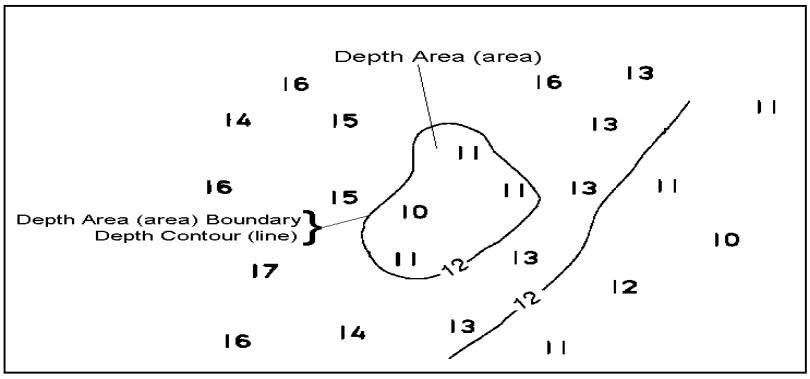


Figure 4-ES26

✧ The **ENC objects** involved in the portrayal of the above *Depth Area* are:

- Depth Area (DEPARE)
- Depth Contour (DEPCNT)

[The soundings will be collected as the ENC Object: Sounding (point) (SOUNDG)]

✧ The **geometric primitives** of the affected objects are:

- area (Depth Area)
- line (Depth Contour)

✧ Comments:

1. The depth contour will first be encoded as the ENC Object: Depth Contour (line). [DEPCNT]

2. The depth contour will also be encoded as a boundary of the ENC Object: Depth Area (area) [DEPARE].

Depth Area (area) Examples

Example 2B-1 -- Depth Range Value Convention

A **"Shoal"** Depth Area Formed From One Enclosed Depth Contour

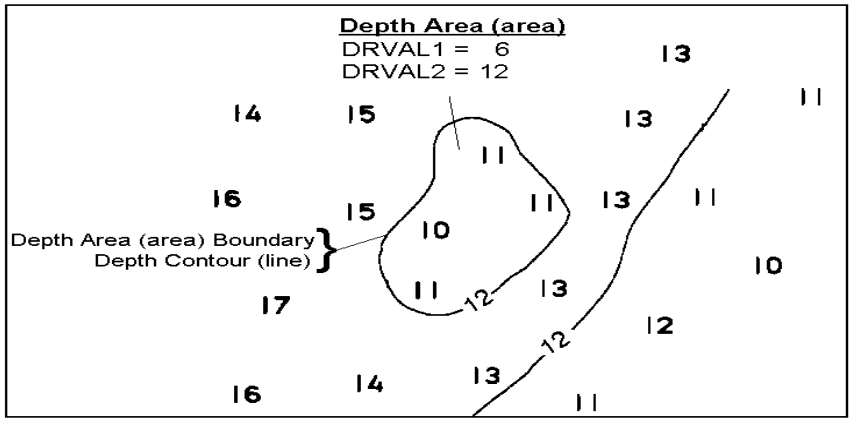


Figure 4-ES27

✧ *CONVENTION:*

Depth Area (area):

The *convention* to be followed for the determination of the appropriate depth range values is:

DRVAL1 = the value of the depth contour which is immediately shoaler than the shoalest sounding. The value should represent one of the values in the designated depth contour interval for the ENC. (i.e. 0', 6', 12', 18'....)

DRVAL2 = the value of the bounding depth contour.

NOTE: It has been brought to the attention of the Quality Assurance Plans and Standards Branch that shoals, charted without the accompanying depth contour, have been identified on several MCD charts by ENC personnel. SHOALS WHICH ARE CHARTED WITHOUT THE RESPECTIVE DEPTH CONTOUR ARE CARTOGRAPHICALLY INCORRECT, and should be brought to the attention of the appropriate compilation team for resolution. If a resolution has not been provided (by the compilation team) in a reasonable amount of time, the discrepancy is to be brought to the attention of QAPSB who will then issue an official discrepancy report recommending that the charting error be corrected.

Depth Area (area) Examples

Example 2B-2 -- Depth Range Value Convention (continued)

A **"Deep"** Depth Area Formed From One Enclosed Depth Contour

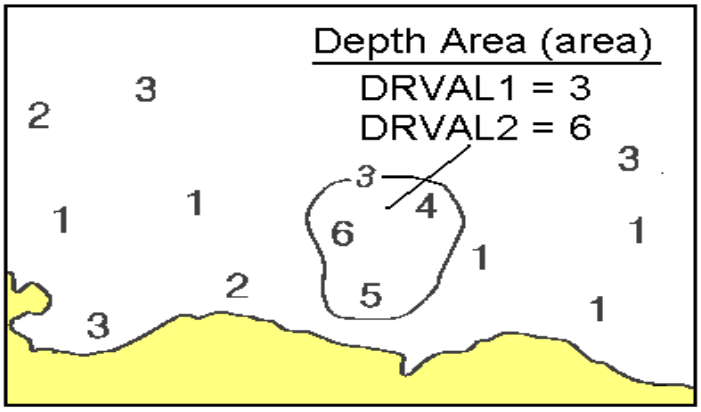


Figure 4-ES28

✧ *CONVENTION:*

Depth Area (area):

The *convention* to be followed for the determination of the appropriate depth range values is:

DRVAL1 = the value of the depth contour

DRVAL2 = the value of the depth contour which is immediately deeper than or equal to the value of the deepest sounding. The value should represent one of the values in the designated depth contour interval for the ENC. (i.e. 0', 6', 12', 18'....)

Depth Area (area) Examples

Example 3A--Geometric Portrayal

Depth Areas Formed From Two Enclosed Depth Contours

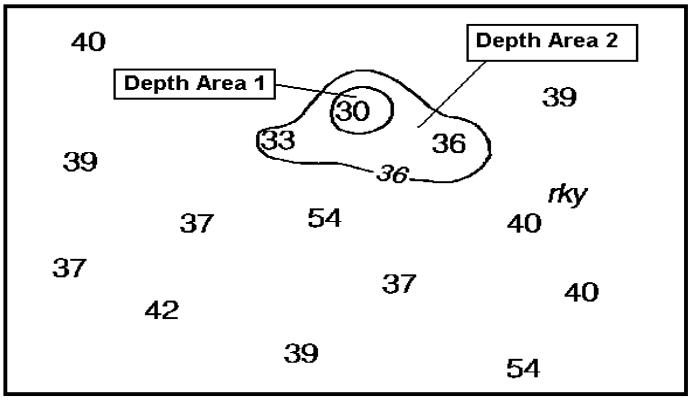


Figure 4-ES29

- The **ENC objects** involved in the portrayal of the above Depth Areas are:
  - Depth Area (DEPARE)
  - Depth Contour (DEPCNT)
- The **geometric primitives** of the affected objects are:
  - area [both Depth Areas]
  - line [Depth Contour]
- Comments:
  1. There will be two (2) individual Depth Areas formed.
  2. The depth contours will first be encoded as the linear object(s) Depth Contour [DEPCNT].
  3. The same spatial objects (which were first encoded as Depth Contour) will next be encoded as the boundary lines of each respective Depth Area (area).

Depth Area (area) Examples

Example 3B-1 -- Depth Range Value Convention

"Shoal" Depth Areas Formed From Two Enclosed Depth Contours

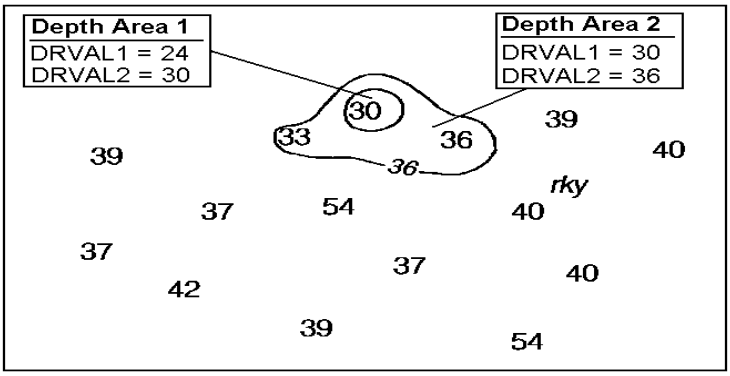


Figure 4-ES30

✧ *CONVENTION:*

Depth Area 1 and Depth Area 2:

The *convention* to be followed for the determination of the appropriate depth range values is:

DRVAL1 = the value of the depth contour which is immediately shoaler than the shoalest sounding. The value should represent one of the values in the designated depth contour interval for the ENC. (i.e. 0', 6', 12', 18'....)

DRVAL2 = the value of the bounding depth contour.

Depth Area (area) Examples

Example 3B-2 -- Depth Range Value Convention (continued)

"Deep" Depth Areas Formed From Two Enclosed Depth Contours

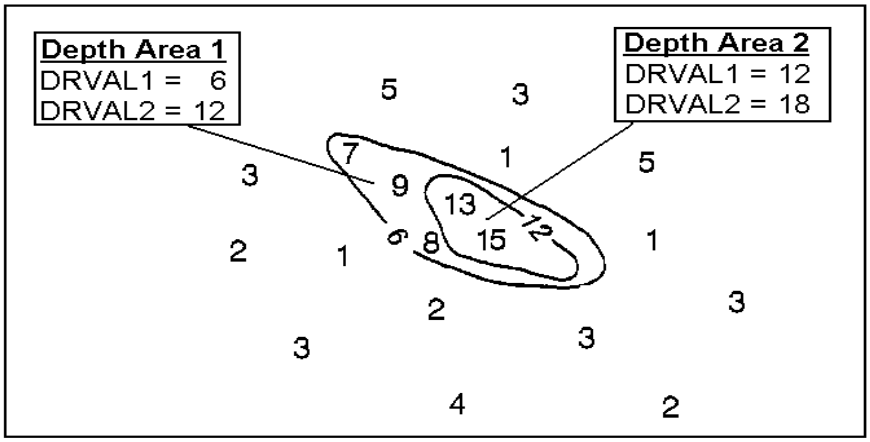


Figure 4-ES31

✧ *CONVENTION:*

Depth Areas 1and 2:

The *convention* to be followed for the determination of the appropriate depth range values is:

DRVAL1 = the value of the depth contour

DRVAL2 = the value of the depth contour which is immediately deeper than or equal to the value of the deepest sounding. The value should represent one of the values in the designated depth contour interval for the ENC. (i.e. 0', 6', 12', 18'....)

Depth Area (area) Examples

Example 4A--Geometric Portrayal

Depth Areas Which Contain Short Isolated Depth Contours

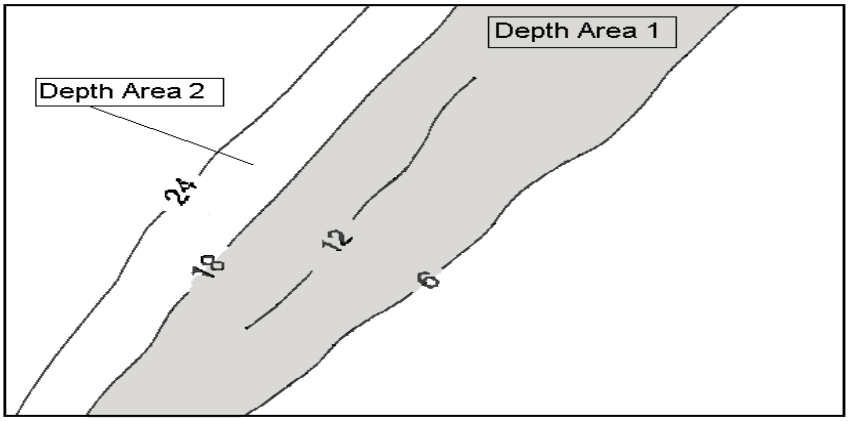


Figure 4-ES32

✧ The **ENC objects** involved in the portrayal of **Depth Area 1** are:

- Depth Area (DEPARE)
- Depth Contour (DEPCNT)

✧ The **geometric primitives** of the affected objects are:

- area (Depth Area 1)
- line (6' , 12' and 18' Depth Contours)

✧ Comments:

1. Assume the border of *Figure 4-ES32* is the ENC cell boundary. That portion of a cell which bounds a depth area, shall be collected as a boundary line of the affected Depth Area (area) object.

(continued)

Depth Area (area) Examples

Example 4A--Geometric Portrayal (continued)

Depth Areas Which Contain Short Isolated Depth Contours

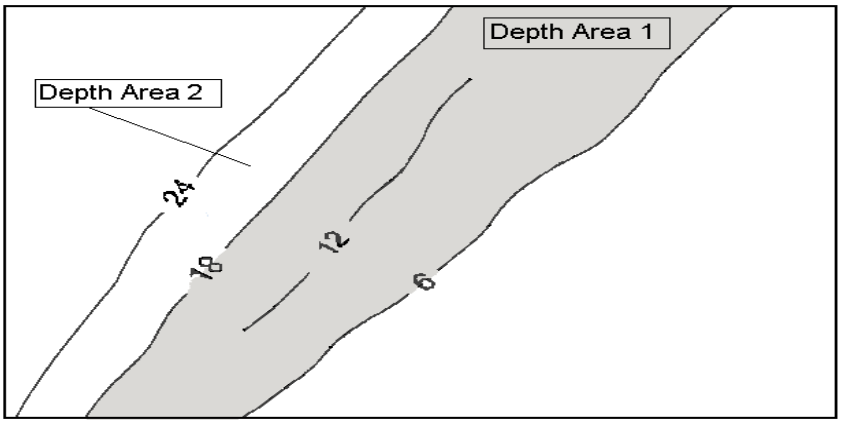


Figure 4-ES32

✧ Comments (continued)

2. The 6 foot depth contour, the 18 foot depth contour, and the appropriate portions of the cell boundary will be collected as the boundaries of Depth Area 1.

3. The 12 foot depth contour will only be collected as a Depth Contour (line) and will not become a limit of a depth area.

4. The 6 foot and 18 foot depth contours will also be collected as Depth Contour (line) [DEPCNT]

5. For a geometric description of depth areas similar to Depth Area 2 see Example 1A.

(continued)

Depth Area (area) Examples

Example 4A--Geometric Portrayal (continued)

Depth Areas Which Contain Short Isolated Depth Contours

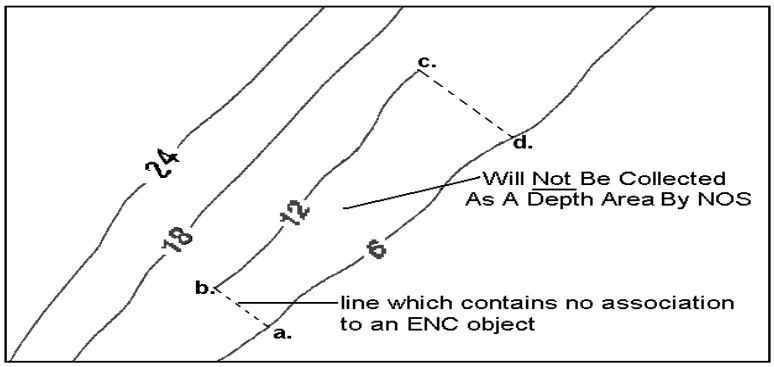


Figure 4-ES33

✧ Comments (continued):

6a. For short isolated sections of depth contours (line "abcd" in *Figure 4-ES33)* the IHO/S-57 has left the following choices up to each individual Hydrographic Office.

Either to:

(a) encode the small area formed between the 6 foot depth contour and the 12 foot depth contour as a depth area, or

(b) to encode *only* the 12 foot Depth Contour.

The National Ocean Service has made the decision **not** to encode such areas as Depth Areas **but to only encode the Depth Contour.**

*Those depth areas which **were** previously created for these small areas during the initial collection stage of ENC data, are **not** to be revised to meet the above specifications. However, these specifications should be applied for any future and subsequent formation of depth areas for any specific ENC.*

6b. Therefore, in *Figure 4-ES33* there will be no depth area having a depth range of 6-12 ft.

Depth Area (area) Examples

Example 4B--Depth Range Value Convention

Depth Areas Which Contain Short Isolated Depth Contours

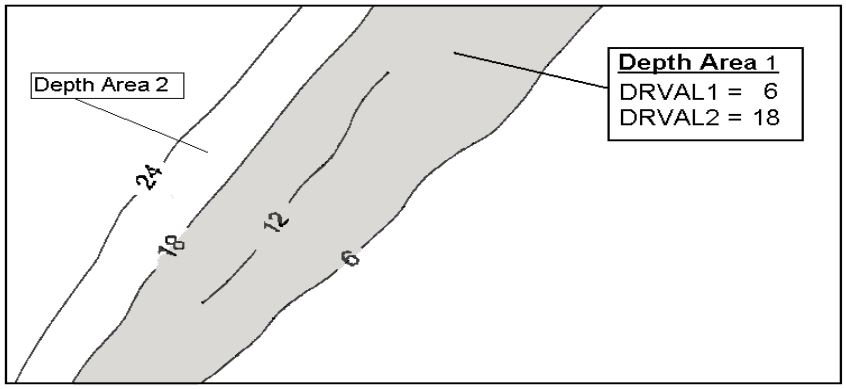


Figure 4-ES34

✧ *CONVENTION:*

Depth Area 1:

The *convention* to be followed for the determination of the appropriate depth range values is:

DRVAL1 = the value of the depth contour which is the shoalest bounding depth contour of the three depth contours involved..

DRVAL2 = the value of the deepest bounding depth contour of the three depth contours involved.

Comments:(RE: *Figure 4-ES34*)

1. There will be no depth area having a range of 6-12 feet.

2. See Example 1B for the convention to be used when determining the depth range values for depth areas similar to Depth Area 2. The depth range values for Depth Area 2 are: DRVAL1=18; DRVAL2=24.

Depth Area (area) Examples

Example 5A--Geometric Portrayal

Low Water Areas (i.e. Zero [0] Value Depth Contours)

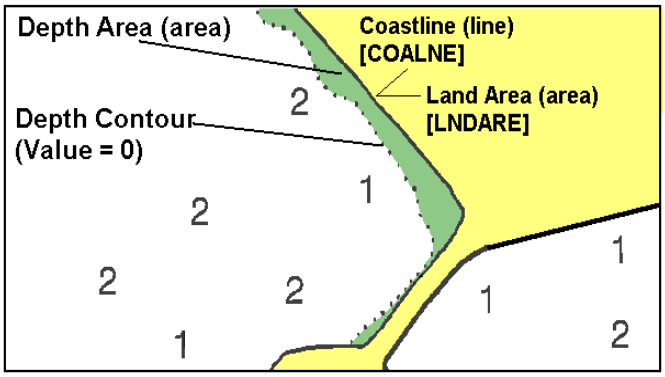


Figure 4-ES35

✧ The **ENC objects** involved in the portrayal of the above Depth Area are:

- Depth Area (DEPARE)
- Depth Contour (DEPCNT)
- Coastline (COALNE)
- Land Area (LNDARE)

✧ The **geometric primitives** of the affected objects are:

- area (Depth Area)
- line (Zero [0] Value Depth Contour/ Low Water Line)
- line (Coastline)
- area (Land Area)

✧ Comments:

1. Within the ENC environment, the low water line shall be collected and encoded as a depth contour which has a value of zero (0).

2. All low water areas (i.e. intertidal areas) are considered depth areas and therefore, shall be collected and encoded as such.

Depth Area (area) Examples

Example 5B--Depth Range Value Convention

Low Water Areas (i.e. Zero [0] Value Depth Contours)

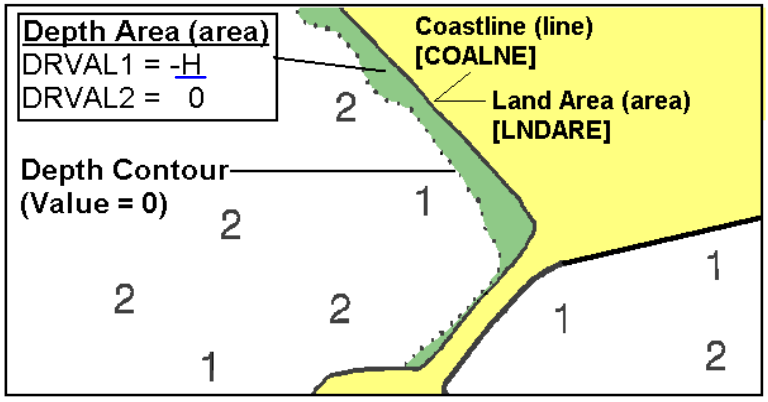


Figure 4-ES36

✧ *CONVENTION:*

Depth Area (area):

The *convention* to be followed for the determination of the appropriate depth range values is:

DRVAL1 = -H (the - height of the coastline datum above sounding datum)

DRVAL2 = the value of the bounding depth contour.

Depth Area (area) Examples

Example 6A--Geometric Portrayal

Isolated Low Water Areas (i.e. Zero [0] Value Depth Contours)

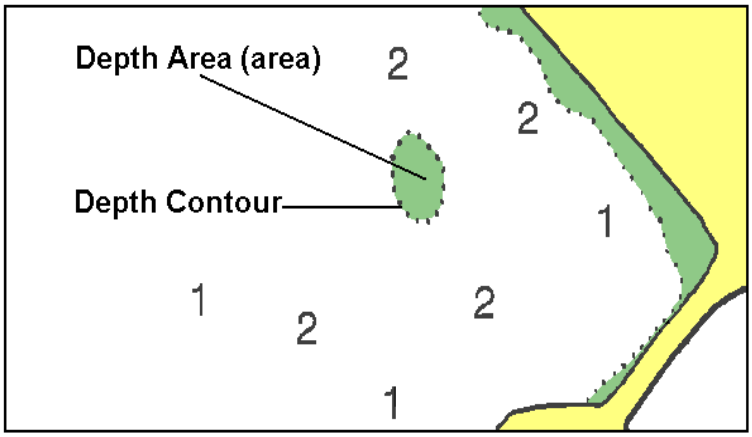


Figure 4-ES37

✧ The **ENC objects** involved in the portrayal of the above Depth Area are:

- Depth Area (DEPARE)
- Depth Contour (DEPCNT)

✧ The **geometric primitives** of the affected objects are:

- area (Depth Area)
- line (Zero [0] Value Depth Contour)

✧ Comments:

1. Within the ENC environment, the low water line shall be collected and encoded as a depth contour which has a value of zero (0).

2. All low water areas (i.e. intertidal areas) are considered depth areas and therefore, all *isolated* low water areas shall also be collected and encoded as such.

Depth Area (area) Examples

Example 6B--Depth Range Value Convention

Isolated Low Water Areas (i.e. Zero [0] Value Depth Contours)

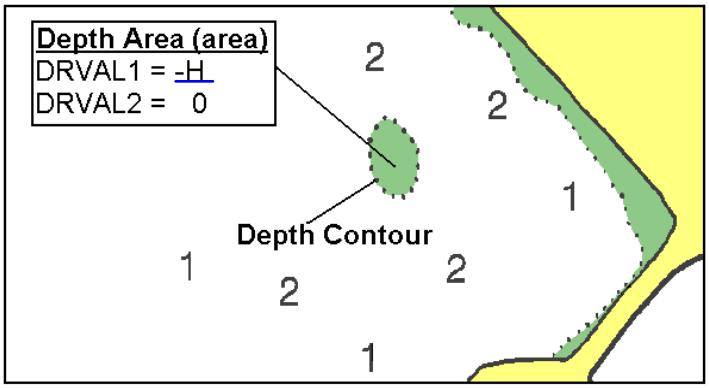


Figure 4-ES38

✧ *CONVENTION:*

Depth Area (area):

The *convention* to be followed for the determination of the appropriate depth range values is:

DRVAL1 = -H (the - height of the coastline datum above sounding datum)

DRVAL2 = the value of the bounding depth contour.

B. Linear Depth Areas [i.e. Depth Area (line)]

The most important concept about the formation of depth areas is that the overall succession of depth areas and their defined range values **must be continuous**. There can be no gaps, overlaps or discontinuity in the range values of connecting depth areas (i.e. the maximum value of one depth area must be the minimum value of the next deeper and successive (connecting) depth area.)

However, it is widely known that the ocean bottom is not a smooth and uniform setting. It has numerous hills, ridges, terraces, and canyons, and is considered to be made up of a number of more-or-less circular or oval depressions surrounded by walls or sills of lesser depth.

Within the ENC environment, this characteristic of an uneven ocean bottom must be taken into special consideration. To account for this discontinuity in the ocean floor, (and therefore, in the succession of ocean depths), a depth area of the type *line* must be created.

A linear depth area will be created in the following situations:

1. When two or more depth contours merge to form a single contour at the scale of the ENC;
2. When depth contours (including the zero value depth contour) merge with the coastline;
3. When depth areas adjoin man-made constructions which are always bare at the shoreline plane of reference (SPOR) (i.e. wharves, double-line piers);
4. When depth areas adjoin non navigable waterways.

An ENC *linear depth area* will be created in the following situations **only** when discontinuity in the succession of the depth range values exists:

5. When depth areas adjoin a dredged area;
6. When dredged areas adjoin dredged areas.

Graphic examples of the situations mentioned above can be found on the following pages.

Depth Areas (line) Situations
(i.e. Linear Depth Areas)

Situation 1A--Geometric Portrayal

When Two Or More Depth Contours Merge To Form A Single Contour At the Scale Of The ENC.

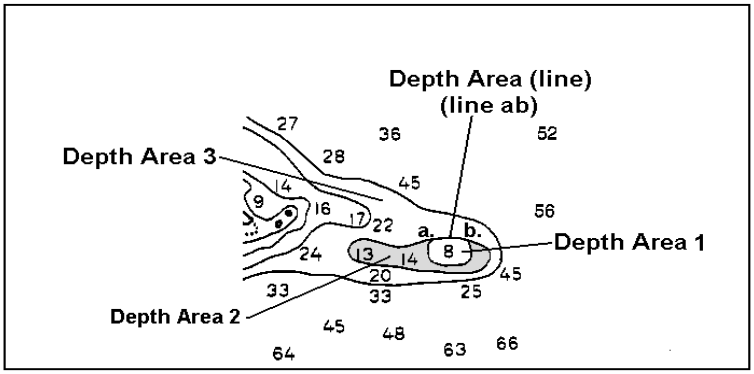


Figure 4-ES39

✧ The **ENC objects** involved in the portrayal of the above Depth Areas are:

- Depth Area (DEPARE)
- Depth Contour (DEPCNT)

✧ The **geometric primitives** of the affected objects are:

- line [Depth Area]
- area [Depth Area]
- line [Depth Contours]

✧ Comments:

1. For those situations in which two (2) or more depth contours are merged to form one depth contour due to the scale of the ENC, a *linear depth area* is created at the location of merging. (line "ab"--- *Figure 4-ES39*).

2. The *linear depth area* is created to eliminate the discontinuity in depth range value succession created by the merging of the depth contours of Depth Area 1 and Depth Area 2.

(continued)

Depth Areas (line) Situations
(i.e. Linear Depth Areas)

Situation 1A--Geometric Portrayal (continued)

When Two Or More Depth Contours Merge To Form A Single Contour At The Scale Of The ENC.

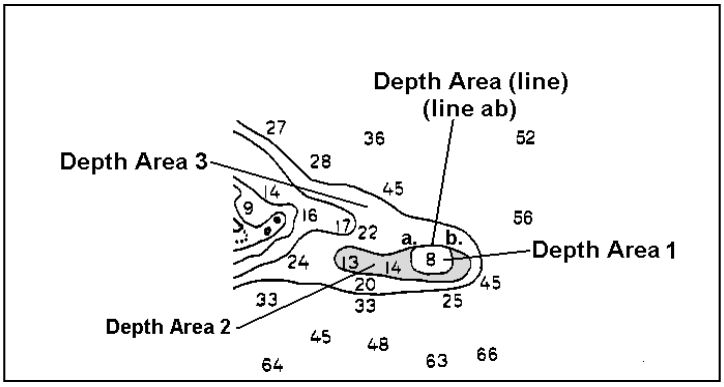


Figure 4-ES39

✧ Comments (continued):

3. **Depth Area (areas)** in *Figure 4-ES39*

The Depth Area (areas) which are created are:

Depth Area 1: The area bounded by the 12 foot depth contour.

Depth Area 2: The area bounded by the 12 foot depth contour and the 18 foot depth contour.

*NOTE: Line "ab" will **not** be collected as a boundary line of Depth Area 2. Only the boundary lines of the shaded portion will serve as the boundary lines of Depth Area 2.*

Depth Area 3: The area bounded by the 18 foot depth contour and the 24 foot depth contour.

4. The 12 foot depth contour, the 18 foot depth contour and the 24 foot depth contour will also be tagged as the ENC object: Depth Contour (line) [DEPCNT].

Depth Areas (line) Situations
(i.e. Linear Depth Areas)

Situation 1B--Depth Range Value Convention

When Two Or More Depth Contours Merge To Form A Single Contour At The Scale Of The ENC.

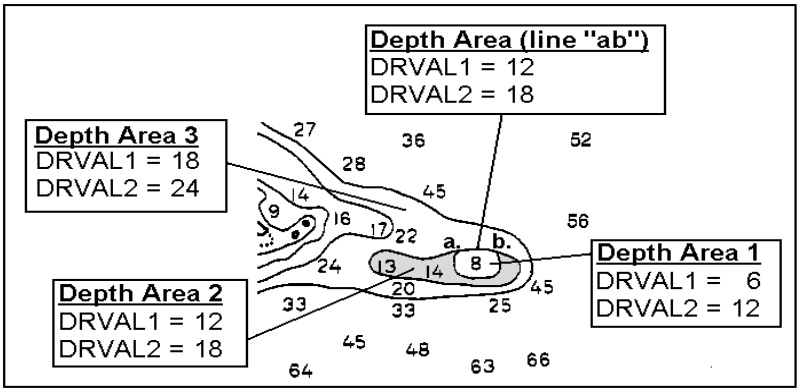


Figure 4-ES40

✧ *CONVENTION:*

Depth Area (line "ab"):

The *convention* to be followed for the determination of the appropriate depth range values is:

DRVAL1 = the value of the shallowest of the merged depth contours.

DRVAL2 = the value of the deepest of the merged depth contours.

Comment: (RE: *Figure 4-ES40*)

1. This linear depth area is created to eliminate the discontinuous succession of depth range values between Depth Area 1 which has a range value of 6-12 and Depth Area 3 which has a depth range value of 18-24.

(continued)

Depth Areas (line) Situations
(i.e. Linear Depth Areas)

Situation 1B--Depth Range Value Convention (continued)

When Two Or More Depth Contours Merge To Form A Single Contour At The Scale Of The ENC.

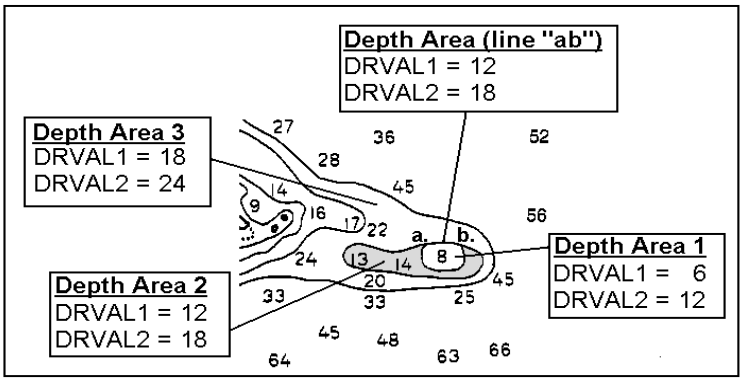


Figure 4-ES40

✧ *CONVENTION:*

Depth Area 1, Depth Area 2 and Depth Area 3 (areas):

The *convention* to be followed for the determination of the appropriate depth range values is:

DRVAL1 = the value of the depth contour which is immediately shoaler than the shoalest sounding. The value should represent one of the values in the designated depth contour interval for the ENC. (i.e. 0', 6', 12', 18'....)

DRVAL2 = the value of the bounding depth contour.

Depth Areas (line) Situations
(i.e. Linear Depth Areas)

Situation 2A--Geometric Portrayal

When A Depth Contour Merges With The Coastline.

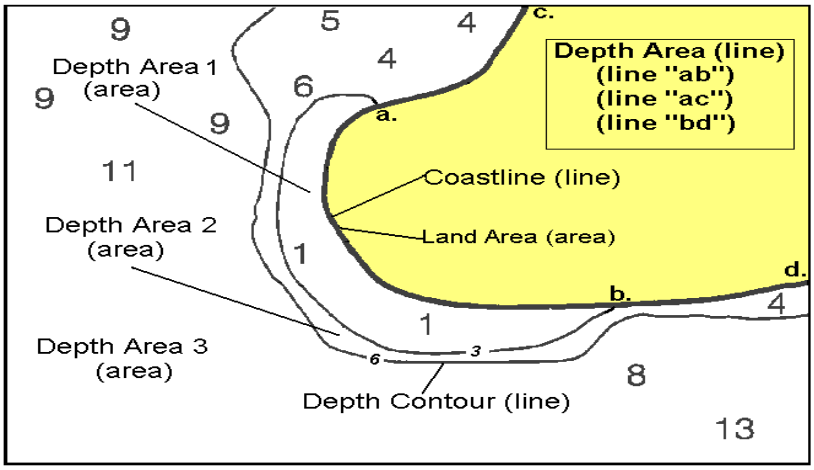


Figure 4-ES41

✧ The **ENC objects** involved in the portrayal of the above Depth Areas are:

- Depth Area (DEPARE)
- Depth Contour (DEPCNT)
- Coastline (COALNE)
- Land Area (LNDARE)

✧ The **geometric primitives** of the affected objects are:

- line (Depth Area)
- area (Depth Area))
- line (Depth Contours)
- line (Coastline)
- area (Land Area)

✧ Comments:

1. If one or more depth contours merge with the coastline, a linear depth area [i.e. Depth Area (line)] is created at the location of merging. (i.e. line "ab", line "ac" and line "bd").

(continued)

Depth Areas (line) Situations
(i.e. Linear Depth Areas)

Situation 2A--Geometric Portrayal (continued)

When A Depth Contour Merges With The Coastline.
(Refer to Figure 4-ES41)

✧ Comments (continued)

2. Assuming the depth contour interval for ENC in *Figure 4-ES41* is 0', 3', 6', 12',18', 24'..... a linear depth area is created at line "ab" because theoretically, the low water line (i.e. zero [0] value depth contour) has totally merged with the coastline, creating a discontinuous succession of depth range values between the coastline and the 3 foot depth contour.

   Because within the ENC environment, there can be no discontinuity in the succession of depth range values, the discontinuous succession will be eliminated by the creation of the linear depth area at line "ab". This linear depth area in effect is taking into account the *uncharted* depth area which is bounded by the low water line (i.e. zero [0] value depth contour) and the coastline.

3. Linear depth areas will also be created at lines "ac" and "bd" because theoretically, the low water line (i.e. zero [0] value depth contour) and the 3 foot contour have merged with the coastline, and there cannot be a discontinuous succession of depth range values between the coastline and the 6 foot depth contour. The range value of the depth areas bounded by the low water line (i.e. zero [0] value depth contour) and the 3 foot depth contour must be taken into account by the creation of the linear depth areas at lines "ac" and "bd"

4. The appropriate portions of the coastline and the 3 foot depth contour will be collected as the boundary lines of the Depth Area (area) object.

5. The same portions (from item 4) of the 3 foot depth contour will also be tagged as a Depth Contour (line).

6. The coastline limits and the appropriate portions of the northern and eastern cell boundaries will also be collected as the ENC object: Land Area (area) [LNDARE]

Depth Areas (line) Situations
(i.e. Linear Depth Areas)

Situation 2B–Depth Range Value Convention

When A Depth Contour Merges With The Coastline

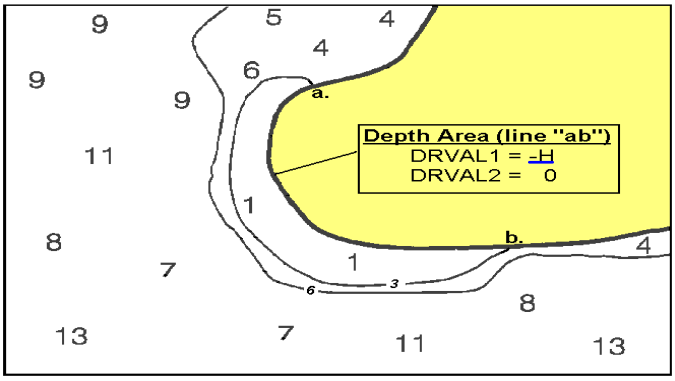


Figure 4-ES42

✧ *CONVENTION:*

Depth Area (line "ab"):

The *convention* to be followed for the determination of the appropriate depth range values is:

DRVAL1 = -H (the - height of the coastline datum above the sounding datum)

DRVAL2 = the value of the depth contour which is immediately shoaler than the bounding depth contour.

Comments: (RE: *Figure 4-ES42*)

1. This linear depth area is created to eliminate the discontinuous succession of depth range values between the coastline (-H) and the depth area having a range value of 0 - 3.

2. The value of the depth contour which is immediately shoaler than the bounding contour (3 ft) is the value of the 0 ft depth contour (i.e. the low water line).

(continued)

Depth Areas (line) Situations
(i.e. Linear Depth Areas)

Situation 2B–Depth Range Value Convention (continued)

When A Depth Contour Merges With The Coastline

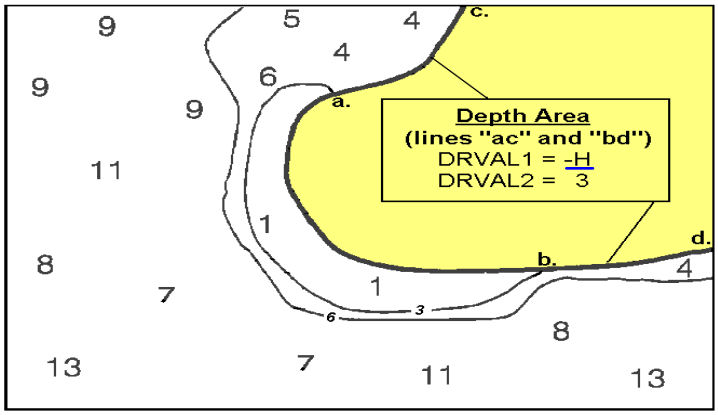


Figure 4-ES43

✧ *CONVENTION:*

Depth Area (lines "ac" and "bd"):

The *convention* to be followed for the determination of the appropriate depth range values is:

DRVAL1 = -H (the - height of the coastline datum above the sounding datum)

DRVAL2 = the value of the deepest of the merged depth contours.

Comments: (RE: *Figure 4-ES43*)

1. In theory, the 0 foot depth contour and the 3 foot depth contour have both merged into the coastline. The 3 foot contour is the deepest of the two.

2. These linear depth areas are created to eliminate the discontinuous succession of depth range values between the coastline (-H) and the depth area having a depth range of 3 to 6 feet.

(continued)

Depth Areas (line) Situations
(i.e. Linear Depth Areas)

Situation 2B–Depth Range Value Convention (continued)

When A Depth Contour Merges With The Coastline

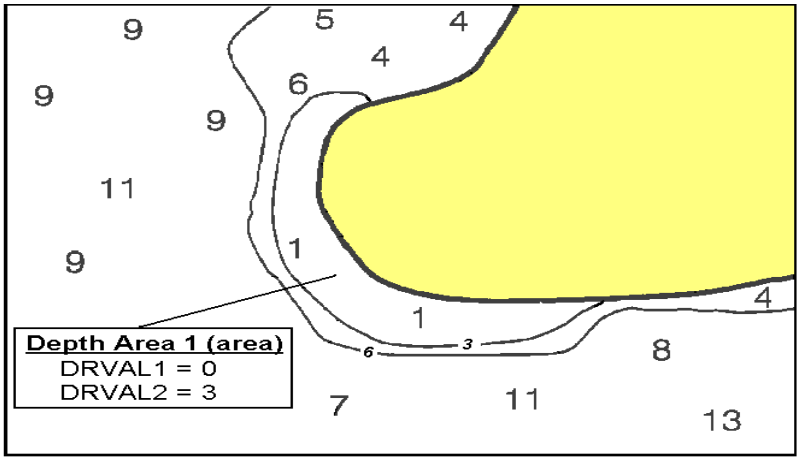


Figure 4-ES44

✧ *CONVENTION:*

Depth Area 1(area):

The *convention* to be followed for the determination of the appropriate depth range values is:

DRVAL1 = the value of the depth contour which is immediately shoaler than the bounding depth contour. The value should represent one of the values in the designated depth contour interval for the ENC. (i.e. 0', 3', 6', 12', 18'....)

DRVAL2 = the value of the bounding depth contour.

(continued)

Depth Areas (line) Situations
(i.e. Linear Depth Areas)

Situation 2B–Depth Range Value Convention (continued)

When A Depth Contour Merges With The Coastline

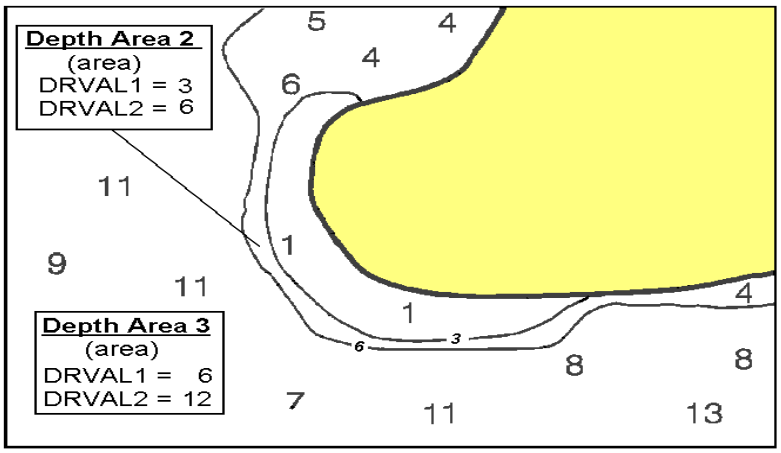


Figure 4-ES45

✧ *CONVENTIONS:*

The *conventions* to be followed for the determination of the appropriate depth range values are:

Depth Area 2 (area):

DRVAL1 = the value of the depth contour which is the shoalest bounding contour.

DRVAL2 = the value of the depth contour which is deepest bounding contour.

Depth Area 3 (area):

DRVAL1 = the value of the depth contour which is the shoalest bounding contour.

DRVAL2 = the value of the depth contour which is immediately deeper than the bounding depth contour. The value should represent one of the values in the designated depth contour interval for the ENC. (i.e. 0', 3', 6', 12', 18'....)

Depth Areas (line) Situations
(i.e. Linear Depth Areas)

Situation 3A– Geometric Portrayal

When The Low Water Line (i.e. Zero [0] Value Depth Contour) Merges With The Coastline

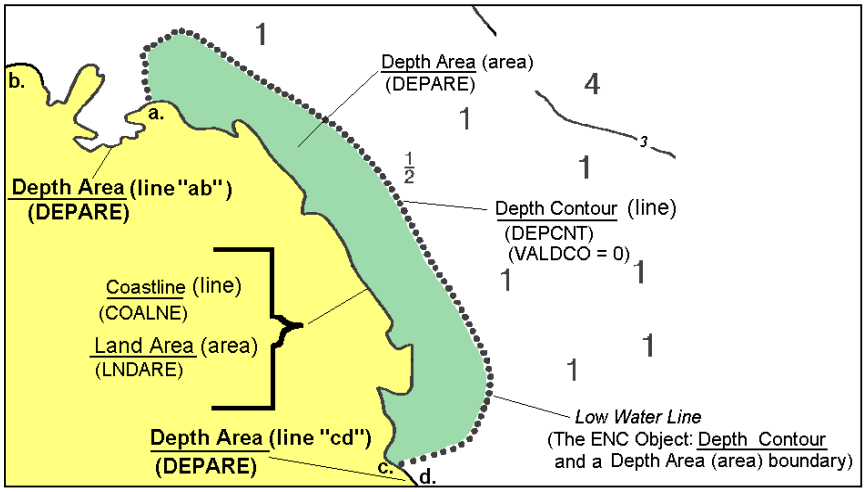


Figure 4-ES46

✧ The **ENC objects** involved in the portrayal of the above Depth Area are:

- Depth Area (DEPARE)
- Depth Contour (DEPCNT)
- Coastline (COALNE)
- Land Area (LNDARE)

✧ The **geometric primitives** of the affected objects are:

- line (Depth Area)
- area (Depth Area)
- line (Zero[0] Value Depth Contour/Low Water Line)
- line (Coastline)
- area (Land Area)

(continued)

Depth Areas (line) Situations
(i.e. Linear Depth Areas)

Situation 3A– Geometric Portrayal (continued)

When The Low Water Line (i.e. Zero [0] Value Depth Contour) Merges With The Coastline
(Refer to Figure 4-ES46)

✧ Comments:

1. If one or more depth contours merge with the coastline, a linear depth area [i.e. Depth Area (line)] is created at the location of merging (i.e. lines "ab" and "cd"). This situation is similar to Situation 2 in that the low water line is merely the zero depth contour on an ENC.

2. Assuming the depth contour interval for the ENC in *Figure 4-ES46* is 0', 3', 6', 12',18', 24'..... a linear depth area is created at line "ab" and line "cd" because theoretically, the low water line has merged with the coastline at these locations, forming a discontinuous succession of depth range values between the coastline (-H) and the 3 foot depth contour.

   Because within the ENC environment, there can be no discontinuity in the succession of depth range values, the discontinuous succession will be eliminated by the creation of the linear depth areas at lines "ab" and "cd". The creation of these linear depth areas is taking into account the area bounded by the low water line and the coastline.

3. A linear depth area is not needed for line "ac" because there is no discontinuous succession of depth range values. The depth area bounded by the low water curve (i.e. 0 value depth curve) *is* the next deeper and successive depth area after coastline for this ENC.

4. The low water line and the appropriate portion of the coastline will be collected as the boundary lines of the low water Depth Area (area) object.

5. The appropriate portion of the coastline will also be tagged as a Coastline (line) object and as a Land Area (area) object.

6. The low water line will also be tagged as a Depth Contour (line) object. The attribute value of zero (0) which will be populated in the attribute: *VALDCO (Value of Depth Curve)* will distinguish the object as the low water line.

Depth Areas (line) Situations
(i.e. Linear Depth Areas)

Situation 3B– Depth Range Value Convention

When The Low Water Line (i.e. Zero [0] Value Depth Contour) Merges With The Coastline

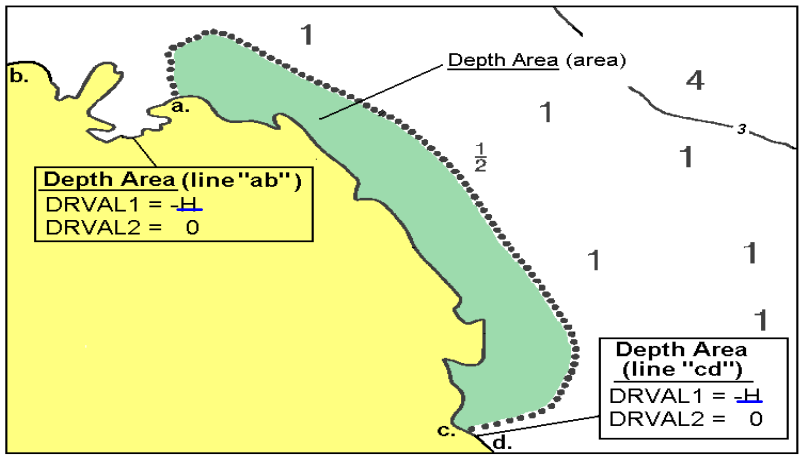


Figure 4-ES47

✧ *CONVENTION:*

Depth Area (lines "ab" and "cd"):

The *convention* to be followed for the determination of the appropriate depth range values is:

DRVAL1 = -H (the - height of the coastline datum above the sounding datum)

DRVAL2 = the value of the deepest of the merged depth contours.

Comments: (RE: *Figure 4-ES47*)

1. In theory, only the 0 foot depth contour has merged into the coastline. The 0 foot contour will be used as the deepest merged contour.

2. This linear depth area is created to the eliminate the discontinuous succession in depth range values between the coastline (-H) and the depth area having a range value of 3-6 ft.

(continued)

Situation 3B– Depth Range Value Convention (continued)

When The Low Water Line (i.e. Zero [0] Value Depth Contour) Merges With The Coastline

Note: The following conventions apply to the Depth Area (areas) which are formed when the low water line (i.e. zero [0] value depth contour) merges with the coastline

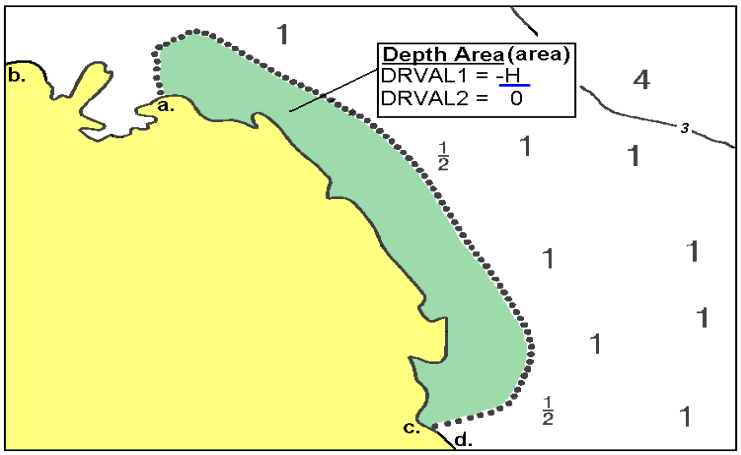


Figure 4-ES48

✧ *CONVENTION:*

Depth Area (area):

The *convention* to be followed for the determination of the appropriate depth range values is:

DRVAL1 = -H (the - height of the coastline datum above the sounding datum)

DRVAL2 = the value of the deepest bounding depth contour.

Depth Areas (line) Situations
(i.e. Linear Depth Areas)

Situation 4A– Geometric Portrayal

When Depth Areas Adjoin Non-Navigable Waterways

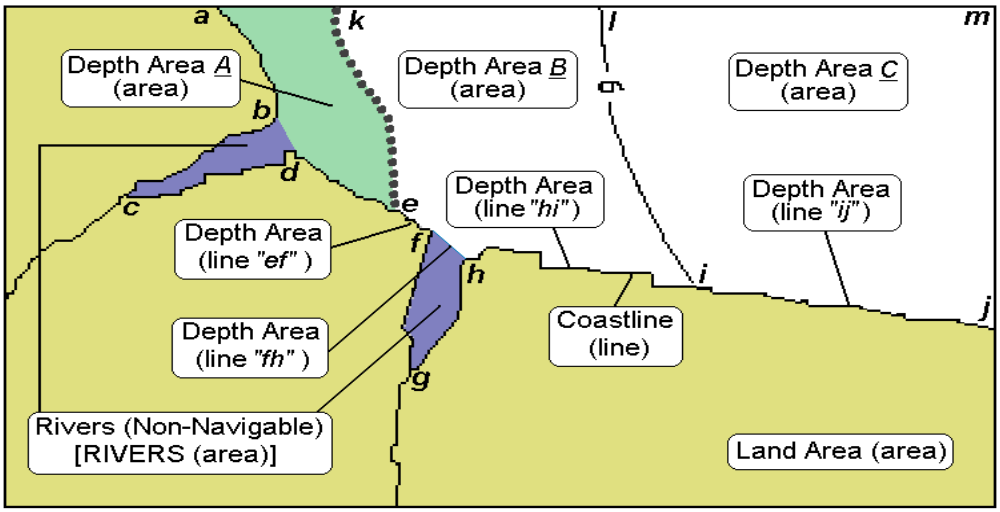


Figure 4-ES49 (Adapted from the IHO/S-57)

✧ The **ENC objects** involved in the portrayal of the above Depth Areas are:

- Depth Area (DEPARE)
- Depth Contour (DEPCNT)
- Coastline (COALNE)
- Land Area (LNDARE)
- River (RIVERS)

✧ The **geometric primitives** of the affected objects are:

- line (Depth Area)
- area (Depth Area)
- line (Depth Contour)
- line (Coastline)
- area (Land Area)
- area (Rivers)

(continued)

Depth Areas (line) Situations
(i.e. Linear Depth Areas)

Situation 4A– Geometric Portrayal (continued)

When Depth Areas Adjoin Non-Navigable Waterways
(Refer to Figure 4-ES49)

✧ **General Rules For The Creation of Linear Depth Areas--When Depth Areas Adjoin Non-Navigable Waterways**.

1. If one or more depth contours merge with the coastline, a linear depth area is created at the same location. [*Figure 4-ES49*----lines *"ef"* , *"hi"* and *"ij"*]

2. If a depth area is always submerged and adjacent to a non-navigable waterway, a linear depth area is created to close the non-navigable waterway. (This linear depth area may also be tagged as a mask.) [*Figure 4-ES49*-----line *"fh"*]

3. If an area is intertidal (low water) and adjacent to a non-navigable waterway, no linear depth area is required to close the non-navigable waterway.

✧ **Comments:**

1. Linear depth areas *"ef"* , *"fh"* and *"hi"* may all be encoded as one (1) linear depth area *"efhi"*.

2. A linear depth area would **not** be created for line *"bd"* because the non-navigable waterway falls within the intertidal (i.e. low water) area.

3. The linear depth areas must be created to eliminate the discontinuity in the succession of the maximum to minimum depth range values of adjoining Depth Area (area) objects.

(continued)

Depth Areas (line) Situations
(i.e. Linear Depth Areas)

Situation 4A– Geometric Portrayal (continued)

When Depth Areas Adjoin Non-Navigable Waterways
(Refer to Figure 4-ES49)

✧ **Comments (continued):**

4. The Depth Area (areas) which are created are:

   A: The area bounded by the low water line (i.e. zero [0] value depth contour), the appropriate portions of the coastline (lines *"ab"* and *"de"*), line *"bd"* of the ENC area object: RIVERS, and the appropriate portion of the northern cell boundary. **[i.e. area *"abdeka"*]**

   B: The area bounded by the low water line, the appropriate portions of the coastline (lines *"ef"* and *"hi"*), line *"fh"* of the ENC area object: RIVERS, the 6 foot depth contour, and the appropriate portion of the northern cell boundary. **[i.e. area *"efhilke"*]**

   C: The area bounded by the 6 foot depth contour, the appropriate portions of the coastline (line *"ij"*), and the appropriate portions of the northern and eastern cell boundaries. **[i.e. area *"ijmli"*]**

5. The low water line and the 6 foot depth contour will also be tagged as the ENC object: Depth Contour (line) [DEPCNT].

6. The coastline will also be tagged as the ENC object: Coastline (line) [COALNE].

7. The two (2) **non-navigable** rivers defined by lines *"bcdb"* and *"fghf"* will be encoded as the ENC object: Rivers (area) [RIVERS]. The single line river will be encoded as the ENC object: Rivers (line) [RIVERS].

   NOTE: If a river is **navigable**, the river banks will be encoded as Coastline (COALNE) or Shoreline Construction (SLCONS). The river banks will also be encoded as either a Depth Area (DEPARE) or Dredged Area (DRGARE). A navigable river is never encoded as the ENC Object: RIVERS. Please refer to the appropriate *NOS/ENC Object Specifications* section for the full encoding details..

(continued)

Depth Areas (line) Situations
(i.e. Linear Depth Areas)

Situation 4A– Geometric Portrayal (continued)

When Depth Areas Adjoin Non-Navigable Waterways
(Refer to Figure 4-ES49)

✧ **Comments (continued)**:

8. The coastline and the appropriate portions of the northern, western and eastern cell boundaries will also be collected as boundaries of the ENC object: Land Area (LNDARE)

9. Note that a non-navigable river (area) will be * **"on top of"** the ENC Object: Land Area [LNDARE]. This is because of a non-navigable river's classification as a Group 2 object.

10. For the following comments, please refer to the appropriate *NOS/ENC Object Specifications* section which will provide the full encoding details about the indicated ENC object.

    a. In accordance with the IHO/S-57, non-navigable waterways are encoded as a Canal (CANALS), Dock Area (DOCARE), or River (RIVERS) **and** either a Land Area (LNDARE) or Unsurveyed Area (UNSARE).

    Therefore, the two (2) non-navigable rivers defined by lines *"bcdb"* and *"fghf"* will not be tagged as depth areas and therefore, will not have depth range values.

* **To geographically place one ENC object "*on top of*" another ENC object means that the boundaries of the "*top*" ENC object graphically overlay and/or overlap (in any angle) a boundary or area of a Group 1 ("skin of the earth) or other Group 2 ENC object. "Top" objects may only be Group 2 objects and are never Group 1 objects.**

Depth Areas (line) Situations
(i.e. Linear Depth Areas)

Situation 4B– Depth Range Value Convention

When Depth Areas Adjoin Non-Navigable Waterways

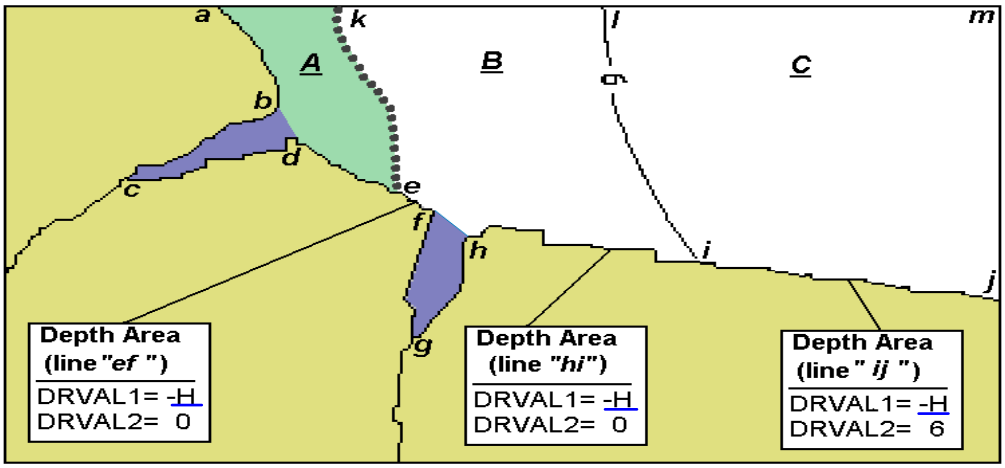


Figure 4-ES50 (Adapted from the IHO/S-57)

✧ *CONVENTION:*

Depth Area (lines "*ef*" , "*hi*", and "*ij*"):

The *convention* to be followed for the determination of the appropriate depth range values is:

DRVAL1 = -H (the -height of the coastline datum above the sounding datum)

DRVAL2 = the value of the deepest of the merged depth contours.

Comments:

1. These linear depth areas are created because of the rule which states if one or more depth contours merge with the coastline, a linear depth area is created at the same position.

(continued)

Depth Areas (line) Situations
(i.e. Linear Depth Areas)

Situation 4B– Depth Range Value Convention (continued)

When Depth Areas Adjoin Non-Navigable Waterways
(Refer to *Figure 4-ES50*)

✧ **Comments (continued):**

Depth Area (lines "*ef*" , "*hi*", and "*ij*"):

2. With regards to lines "*ef* "and *"hi"* ,only the 0 foot depth contour (low water line) has merged into the coastline. The 0 foot contour is used as the deepest merged contour.

3. With regards to line *" ij"*, the 6 foot depth contour has merged into the coastline. The 6 foot contour is used as the deepest merged contour.

Depth Areas (line) Situations
(i.e. Linear Depth Areas)

Situation 4B– Depth Range Value Convention (continued)

When Depth Areas Adjoin Non-Navigable Waterways

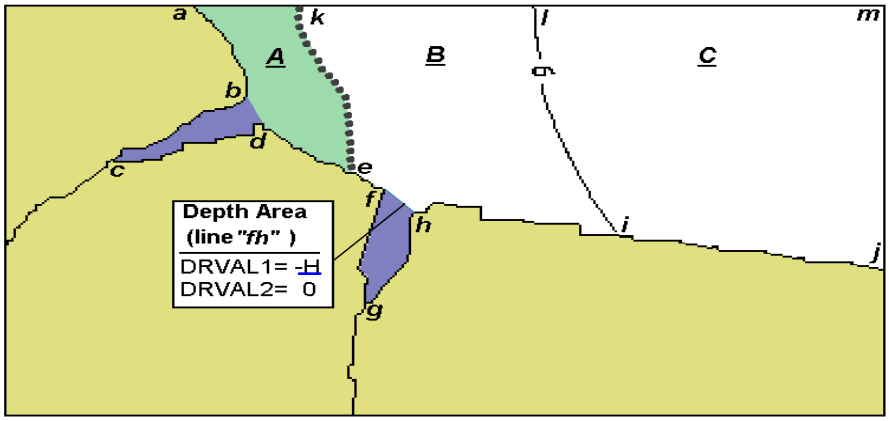


Figure 4-ES51 (Adapted from the IHO/S-57)

✧ *CONVENTION:*

Depth Area (line "*fh*"):

If a depth area is **always** submerged and adjacent to a non-navigable waterway, *a linear depth area* is created to close the non- navigable waterway (this linear depth area may also be tagged as a mask). The *convention* to be followed for the determination of the appropriate depth range values is:

DRVAL1 = -H (the -height of the coastline datum above the sounding datum)

DRVAL2 = the value of the deepest of the merged depth contours.

Comments:

1. With regards to line "*fh*" ,only the 0 foot depth contour (i.e. low water line) has merged into the coastline. The 0 foot contour is used as the deepest merged contour.

2. Linear depth areas *"ef", "fh"* and *"hi"* may all be encoded as one (1) depth area *"efhi"* .

Situation 4B– Depth Range Value Convention (continued)

When Depth Areas Adjoin Non-Navigable Waterways

Note: The following conventions apply to the Depth Area (areas) which are formed when a depth area adjoins a non-navigable waterway.

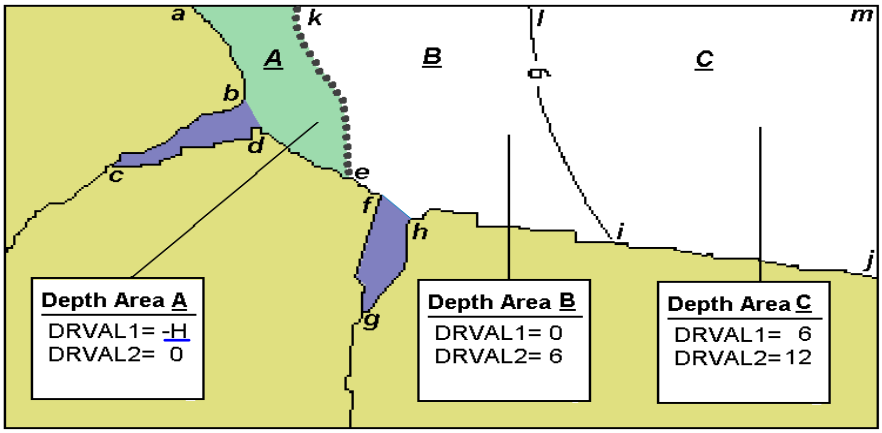


Figure 4-ES52 (Adapted from the IHO/S-57)

✧ *CONVENTIONS:*

Depth Area *A*: (low water area)
If an area is intertidal and adjacent to a non-navigable waterway (i.e. RIVERS, CANALS, DOCARE), the *convention* to be followed for the determination of the appropriate depth range values is:

DRVAL1 = -H (the -height of the coastline datum above the sounding datum)

DRVAL2 = the value of the bounding depth contour.

Depth Area *B*: (that area defined by *"kefhilk"*)
DRVAL1 = the value of the shoalest bounding depth contour.

DRVAL2 = the value of the deepest bounding depth contour

Depth Area *C*: (that area defined by *"lijml"*)
DRVAL1 = the value of the depth contour shown

DRVAL2 = the value of the depth contour which is immediately deeper than the value of the depth contour shown. The value should represent one of the values in the designated depth contour interval for the ENC. (i.e. 0', 6', 12', 18'....)

Depth Areas (line) Situations
(i.e. Linear Depth Areas)

Situation 5A– Geometric Portrayal

When Depth Areas Adjoin Man-Made Constructions

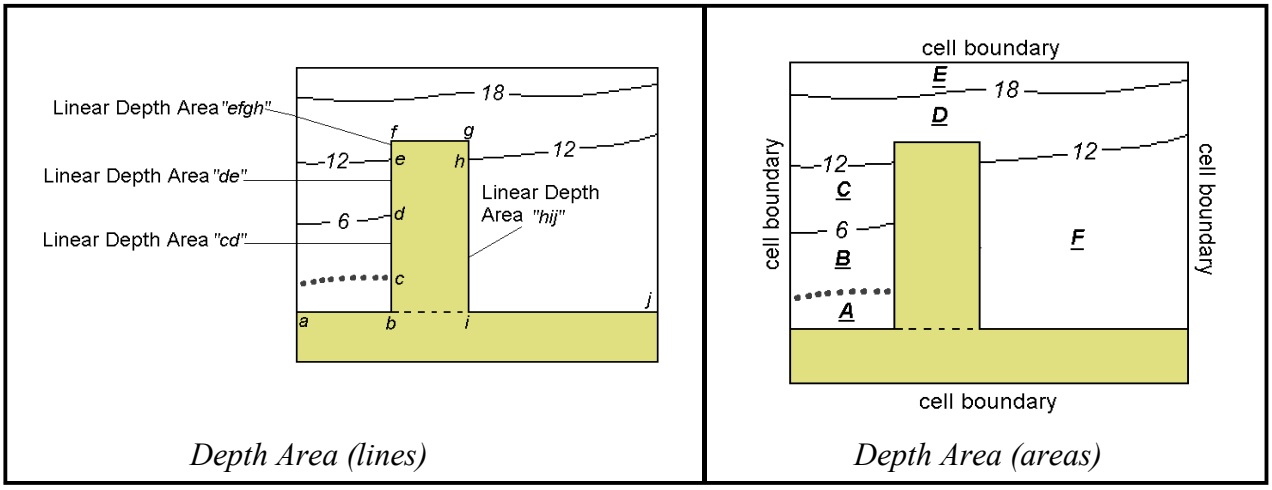


Figure 4-ES53 (Adapted from the IHO/S-57)

✧ The **ENC objects** involved in the portrayal of the above Depth Areas are:

- Depth Area (DEPARE)
- Depth Contour (DEPCNT)
- Shoreline Construction (SLCONS)
- Land Area (LNDARE)

✧ The **geometric primitives** of the affected objects are:

- line (Depth Area)
- area (Depth Area)
- line (Zero [0] Value Depth Contour/Low Water Line)
- line (Shoreline Construction / i.e. wharf/pier)
- area (Land Area)

(continued)

Depth Areas (line) Situations
(i.e. Linear Depth Areas)

Situation 5A– Geometric Portrayal (continued)

When Depth Areas Adjoin Man-Made Constructions
(Refer to Figure 4-ES53)

✧ Comments:

1. When depth areas adjoin those man-made constructions which are always bare at the shoreline plane of reference, a linear depth area will be created at the boundary of the two.

2. The four (4) Linear Depth Areas which are formed are indicated on the left side of *Figure 4-ES53* and are :

   Line *"cd"*

   Line *"de"*

   Line "*efgh*"

   Line *"hij"*

3. The linear depth areas must be created to fill the discontinuous succession of depth range values between the range value of the shoreline construction (-H) and each of the depth areas bounded by the 6, 12 and 18 foot depth contours.

4. The **Depth Area (areas)** will be created using the appropriate boundaries (i.e. depth contours, shoreline construction and cell boundaries).

5. The **Depth Area (areas)** formed are indicated on the right side of *Figure 4-ES53* and are :

   A: the area bounded by the zero depth contour (low water line) and the appropriate portions of the shoreline construction and the left cell boundary.

   B: the area bounded by the low water line, the 6 foot depth contour, and the appropriate portions of the left cell boundary and shoreline construction

(continued)

Depth Areas (line) Situations
(i.e. Linear Depth Areas)

Situation 5A– Geometric Portrayal (continued)

When Depth Areas Adjoin Man-Made Constructions
(Refer to Figure 4-ES53)

✧ Comments (continued):

5. The **Depth Area (areas)** formed (continued):

   C: the area bounded by the 6 foot depth contour, the 12 foot depth contour and the appropriate portions of the left cell boundary and shoreline construction.

   D: the area bounded by the 12 foot depth contour, the 18 foot depth contour, the appropriate portions of the left and right cell boundaries and shoreline construction.

   E: the area bounded by the 18 foot depth contour, the top cell boundary, and the appropriate portions of the left and right cell boundaries.

   F: the area bounded by the shoreline construction, the 12 foot depth contour , and the appropriate portion of the right cell boundary

6. The depth contours will also be tagged as the ENC object: Depth Contour (line) [DEPCNT].

7. The shoreline construction (i.e. pier, wharf, etc) will also be tagged as the ENC object: Shoreline Construction (line) or (area) [SLCONS].

8. The boundaries of the shoreline construction will also be used as boundaries for the ENC object: Land Area (area) [LNDARE]

Depth Areas (line) Situations
(i.e. Linear Depth Areas)

Situation 5B– Depth Range Value Convention

When Depth Areas Adjoin Man-Made Constructions

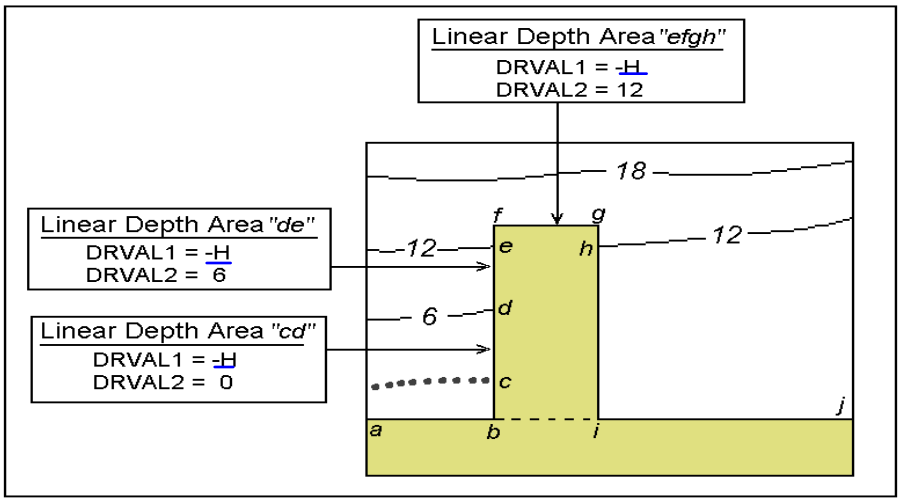


Figure 4-ES54 (Adapted from the IHO/S-57)

✧ *CONVENTION:*

Depth Area (lines "*cd*" , "*de*", and "*efgh*"):

The *convention* to be followed for the determination of the appropriate depth range values is:

DRVAL1 = -H (the - height of the coastline datum above the sounding datum)

DRVAL2 = the value of the merging depth contour.

Comments:

1. The depth contours which are considered to be the merging depth contours when encoding Depth Area (lines *"cd"* , *"de"* , *and "efgh"*) are respectively , the 0 foot, 6 foot, and 12 foot contours.

(continued)

Depth Areas (line) Situations
(i.e. Linear Depth Areas)

Situation 5B–Depth Range Value Convention (continued)

When Depth Areas Adjoin Man-Made Constructions

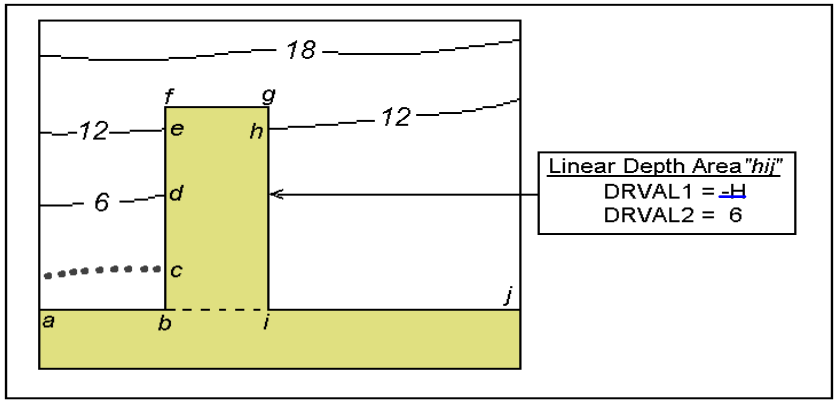


Figure 4-ES55 (Adapted from the IHO/S-57)

✧ *CONVENTION :*

Depth Area (line "*hij*"):

The *convention* to be followed for the determination of the appropriate depth range values is:

DRVAL1 = -H (the - height of the coastline datum above the sounding datum)

DRVAL2 = the value of the depth contour which is immediately shoaler than the bounding depth contour. The value should represent one of the values in the designated depth contour interval for the ENC (i.e. 0', 6', 12', 18'....)

Comment:

1. The 12 foot depth contour is considered to be the bounding depth contour for this situation.

(continued)

Situation 5B–Depth Range Value Convention (continued)

When Depth Areas Adjoin Man-Made Constructions

Note: The following conventions apply to the Depth Area (areas) which are formed when a depth area adjoins a man-made construction.

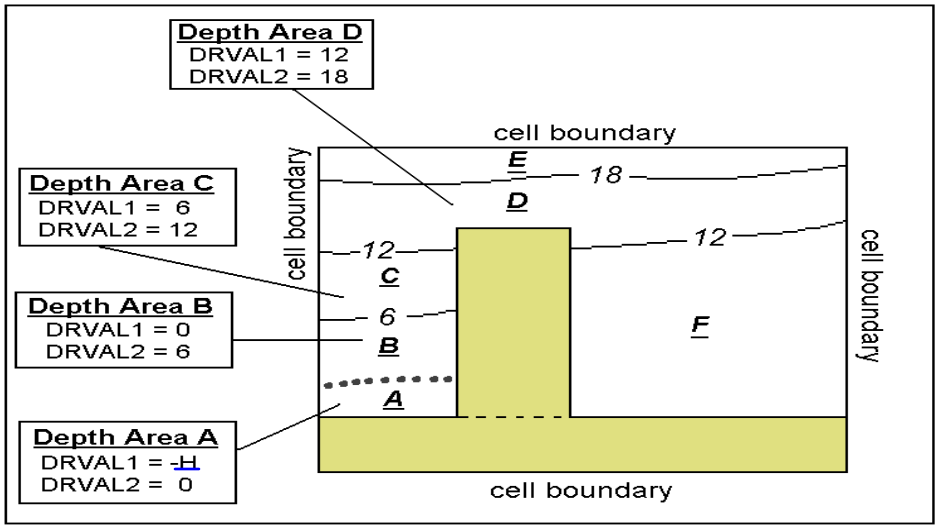


Figure 4-ES56 (Adapted from the IHO/S-57)

✧ *CONVENTIONS:*

The *conventions* to be followed for the determination of the appropriate depth range values are:

Depth Area *A* (area):

DRVAL1 = -H (the - height of the coastline datum above the sounding datum)

DRVAL2 = the value of the bounding depth contour.

Depth Areas B, C, and D (areas):

DRVAL1 = the value of the shoalest bounding depth contour

DRVAL2 = the value of the deepest bounding depth contour

(continued)

Situation 5B–Depth Range Value Convention (continued)

When Depth Areas Adjoin Man-Made Constructions

Note: The following conventions apply to the Depth Area (areas) which are formed when a depth area adjoins a man-made construction.

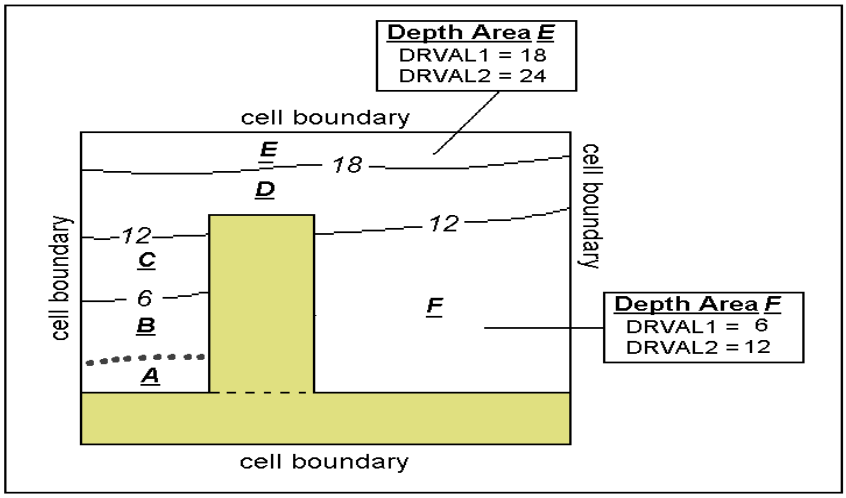


Figure 4-ES57 (Adapted from the IHO/S-57)

✧ *CONVENTIONS:*

The *conventions* to be followed for the determination of the appropriate depth range values are:

Depth Area *E*:

DRVAL1 = the value of the depth contour shown

DRVAL2 = the value of the depth contour which is immediately deeper than the value of the depth contour shown. The value should represent one of the values in the designated depth contour interval for the ENC (i.e. 0', 6', 12', 18'....)

Depth Area *F*:

DRVAL1 = the value of the depth contour which is immediately shoaler than the bounding depth contour. The value should represent one of the values in the designated depth contour interval for the ENC (i.e. 0', 6', 12', 18'...)

DRVAL2 = the value of the bounding depth contour

Depth Areas (line) Situations
(i.e. Linear Depth Areas)

Situation 6A– Geometric Portrayal

When Depth Areas Adjoin Dredged Areas
(**And** A Discontinuous Succession Of Depth Range Values Exists)

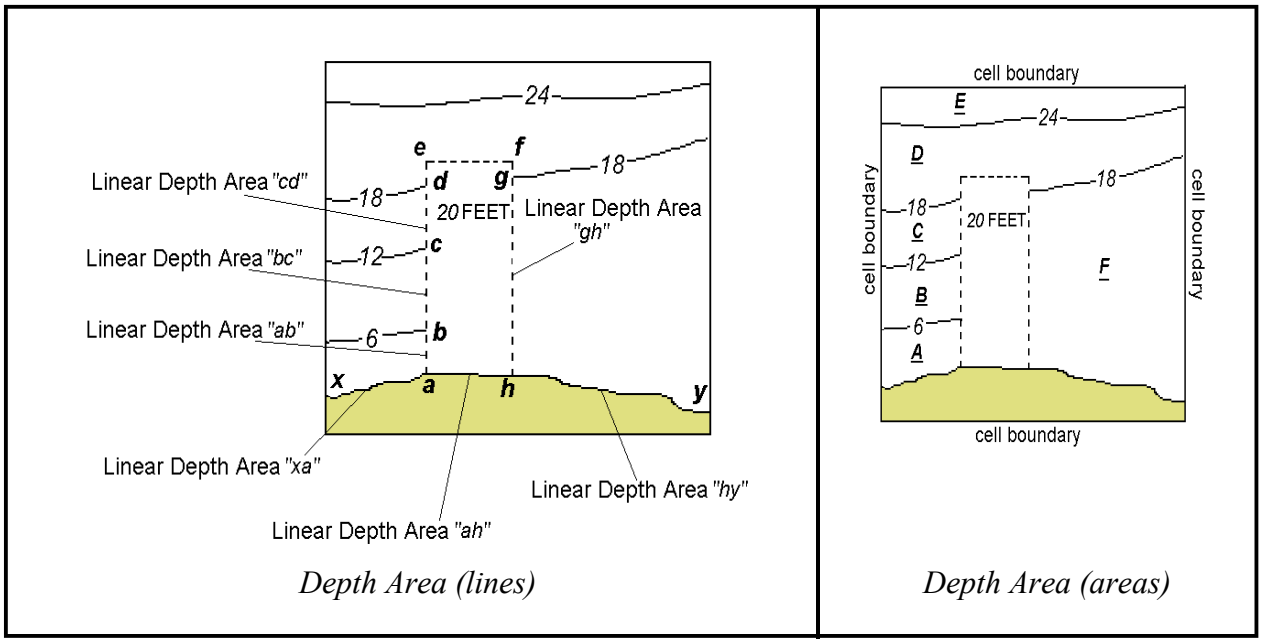


Figure 4-ES58 (Adapted from the IHO/S-57)

✧ The **ENC objects** involved in the portrayal of the above Depth Areas are:

- Depth Area (DEPARE)
- Depth Contour (DEPCNT)
- Dredged Area (DRGARE)
- Coastline (COALNE)
- Land Area (LNDARE)

✧ The **geometric primitives** of the affected objects are:

- line (Depth Area)
- area (Depth Area)
- line (Depth Contour)
- line (Coastline)
- area (Land Area)
- area (Dredged Area)

(continued)

Depth Areas (line) Situations (i.e. Linear Depth Areas)

Situation 6A– Geometric Portrayal (continued)

When Depth Areas Adjoin Dredged Areas
(**And** A Discontinuous Succession Of Depth Range Values Exists)
(*Refer to Figure 4-ES58*)

✧ Comments:

1. When a depth area adjoins a dredged area **and** a discontinuous succession of depth range values exists, those limits of the dredged area which fall between intersections with depth contours may be collected as a linear depth area.

2. The seven (7) **Linear Depth Areas** which are formed are indicated on the left side of *Figure 4-ES58* and are :

   Line *"ab"* Line *"bc"*

   Line *"cd"* Line *"gh"*

   Line *"xa"* Line *"ah"*

   Line *"hy"*

3. A linear depth area is not required for line *"defg"* because the depth of the dredged area (i.e. 20 feet) falls within the range value of the Depth Area (area) [i.e. 18 to 24 feet].

4. The **Depth Area (areas)** will be created using the appropriate boundaries (i.e. depth contours, dredged area and cell boundaries).

5. The **Depth Area (areas)** formed are indicated on the right side of *Figure 4-ES58* and are :

   A: the area bounded by the 6 foot contour and the appropriate portions of the coastline, left cell boundary and dredged area.

   B: the area bounded by the 6 foot depth contour, the 12 foot depth contour and the appropriate portions of the left cell boundary and dredged area

(continued)

Depth Areas (line) Situations
(i.e. Linear Depth Areas)

Situation 6A– Geometric Portrayal (continued)

When Depth Areas Adjoin Dredged Areas
(**And** A Discontinuous Succession Of Depth Range Values Exists)
(*Refer to Figure 4-ES58*)

✧ Comments (continued)**:**

Depth Area (areas) formed (continued):

C: the area bounded by the 12 foot depth contour, the 18 foot depth contour, and the appropriate portions of the left cell boundary and the dredged area.

D: the area bounded by the 18 foot depth contour, the 24 foot depth contour, and the appropriate portions of the left and right cell boundaries and dredged area.

E: the area bounded by the 24 foot depth contour, the top cell boundary and the appropriate portions of the left and right cell boundaries

F: the area bounded by the coastline , the 18 foot depth contour , and the appropriate portions of the dredged area and the right cell boundary

6. The depth contours will also be tagged as the ENC object: Depth Contour (line) [DEPCNT].

7. The boundaries of the shoreline will also be encoded as the ENC objects: Coastline (line) [COALNE] and Land Area (area) [LNDARE].

Depth Areas (line) Situations
(i.e. Linear Depth Areas)

Situation 6B– Depth Range Value Convention

When Depth Areas Adjoin Dredged Areas
(**And** A Discontinuous Succession Of Depth Range Values Exists)

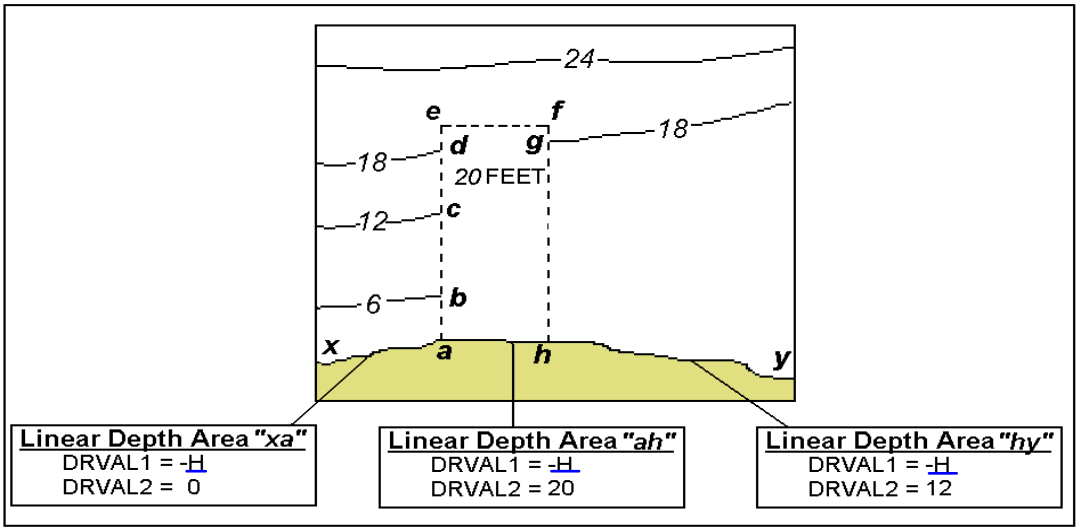


Figure 4-ES59 (Adapted from the IHO/S-57)

✧ *CONVENTION:*

Depth Area (lines "*xa*" and "*hy*"):

The *convention* to be followed for the determination of the appropriate depth range values is:

DRVAL1 = -H (the - height of the coastline datum above the sounding datum)

DRVAL2 = the value of the depth contour which is immediately shoaler than the bounding depth contour. The value should represent one of the values in the designated depth contour interval for the ENC (i.e. 0', 6', 12', 18'...)

(continued)

Depth Areas (line) Situations
(i.e. Linear Depth Areas)

Situation 6B– Depth Range Value Convention (continued)

When Depth Areas Adjoin Dredged Areas
(**And** A Discontinuous Succession Of Depth Range Values Exists)

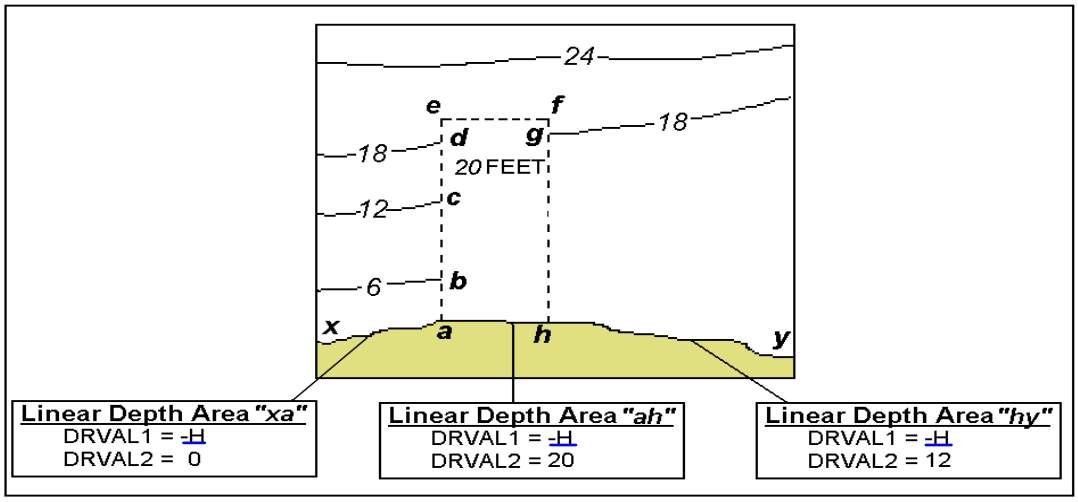


Figure 4-ES59 (Adapted from the IHO/S-57)

✧ *CONVENTION:*

Depth Area (line "*ah*"):

The *convention* to be followed for the determination of the appropriate depth range values is:

DRVAL1 = -H (the - height of the coastline datum above the sounding datum)

DRVAL2 = the controlling depth of the dredged area

(continued)

Depth Areas (line) Situations
(i.e. Linear Depth Areas)

Situation 6B– Depth Range Value Convention (continued)

When Depth Areas Adjoin Dredged Areas
(**And** A Discontinuous Succession Of Depth Range Values Exists)

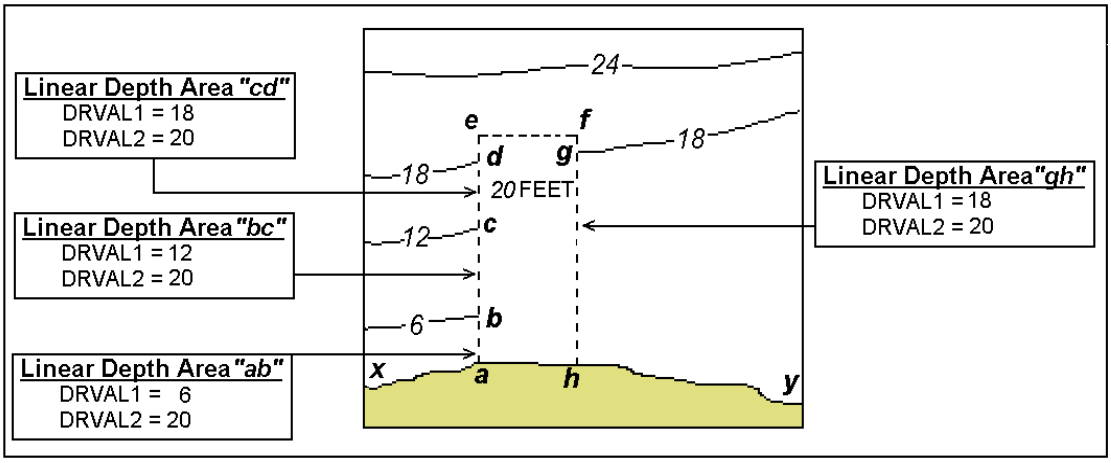


Figure 4-ES60 (Adapted from the IHO/S-57)

✧ *CONVENTION:*

Depth Area (lines "*ab*", "*bc*", "*cd*" and "*gh*"):

The *convention* to be followed for the determination of the appropriate depth range values is:

DRVAL1 = the maximum depth (i.e. DRVAL2) of the adjoining depth area.

DRVAL2 = the controlling depth of the dredged area.

Comment:

1. A linear depth area is not needed for line *"defg"* because the controlling depth of the dredged area (20 feet is within the range (18 feet to 24 feet) of the depth area (area).

(continued)

Situation 6B– Depth Range Value Convention (continued)

When Depth Areas Adjoin Dredged Areas
(**And** A Discontinuous Succession Of Depth Range Values Exists)

Note: The following conventions apply to the Depth Area (areas) which are formed when a depth area adjoins a dredged area.

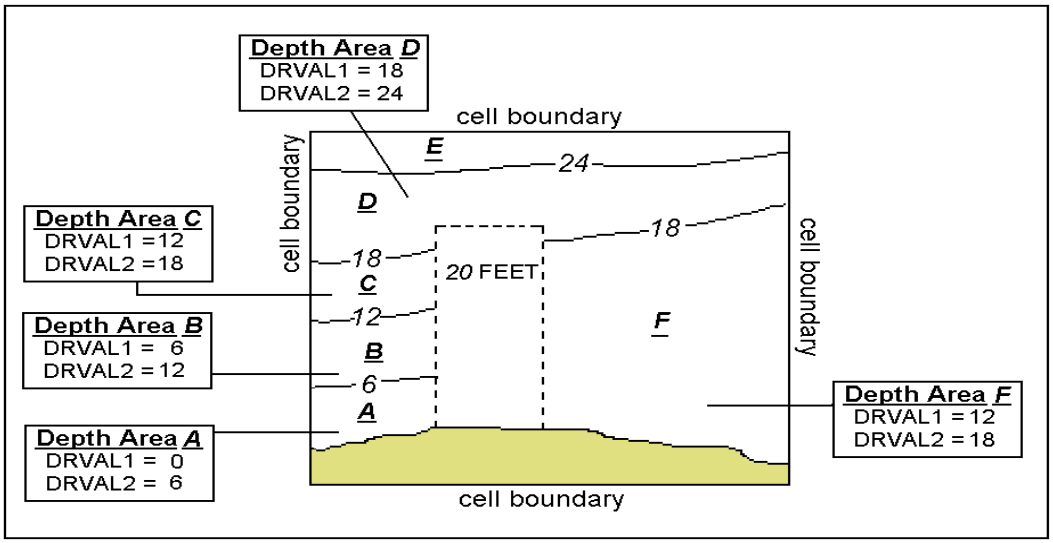


Figure 4-ES61 (Adapted from the IHO/S-57)

✧ *CONVENTIONS:*

The *conventions* to be followed for the determination of the appropriate depth range values are:

Depth Areas ***A*** and ***F*** **:**

DRVAL1 = the value of the depth contour which is immediately shoaler than the bounding depth contour. The value should represent one of the values in the designated depth contour interval for the ENC (i.e. 0', 6', 12', 18'....)

DRVAL2 = the value of the bounding depth contour

Depth Areas ***B***, ***C,*** and ***D*****:**

DRVAL1 = the value of the shoalest bounding depth contour

DRVAL2 = the value of the deepest bounding depth contour

(continued)

Situation 6B– Depth Range Value Convention (continued)

When Depth Areas Adjoin Dredged Areas
(**And** A Discontinuous Succession Of Depth Range Values Exists)

Note: The following conventions apply to the Depth Area (areas) which are formed when a depth area adjoins a dredged area.

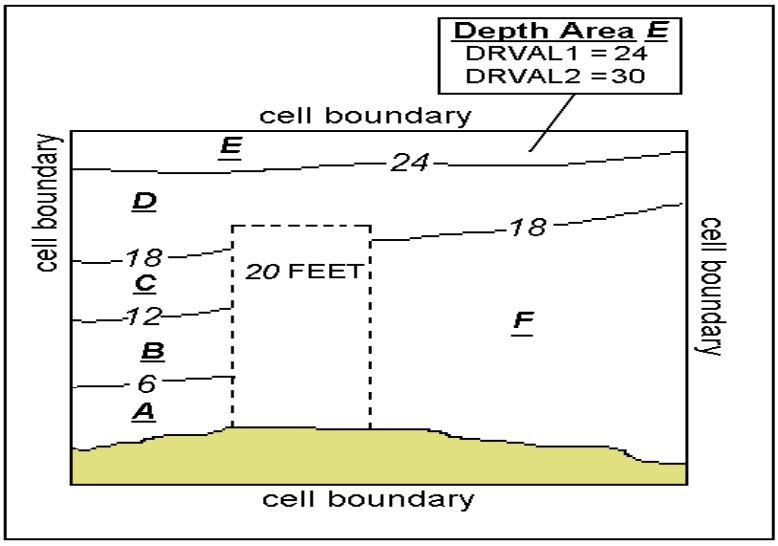


Figure 4-ES62 (Adapted from the IHO/S-57)

✧ *CONVENTION:*

Depth Area *E*:

The *convention* to be followed for the determination of the appropriate depth range values is:

DRVAL1 = the value of the depth contour shown

DRVAL2 = the value of the standard depth contour which is immediately deeper than the value of the depth contour shown. The value should represent one of the values in the designated depth contour interval for the ENC (i.e. 0', 6', 12', 18'....)

Depth Areas (line) Situations
(i.e. Linear Depth Areas)

Situation 7A–Geometric Portrayal

When Dredged Areas Adjoin Dredged Areas
(**And** A Discontinuous Succession Of Depth Range Values Exists)

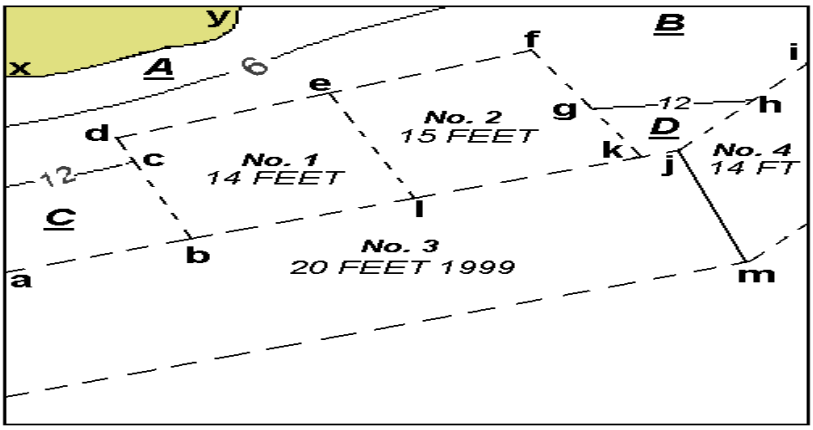


Figure 4-ES63 (Adapted from the IHO/S-57)

✧ The **ENC objects** involved in the portrayal of the above Depth Areas are:

- Depth Area (DEPARE)
- Depth Contour (DEPCNT)
- Dredged Area (DRGARE)
- Coastline (COALNE)
- Land Area (LNDARE)

✧ The **geometric primitives** of the affected objects are:

- line (Depth Area)
- area (Depth Area)
- line (Depth Contour)
- line (Coastline)
- area (Land Area)
- area (Dredged Area)

(continued)

Depth Areas (line) Situations
(i.e. Linear Depth Areas)

Situation 7A–Geometric Portrayal (continued)

When Dredged Areas Adjoin Dredged Areas
(**And** A Discontinuous Succession Of Depth Range Values Exists)
(Refer to Figure 4-ES63)

✧ Comments:

1. The *IHO/S-57 Appendix B.1, ENC Product Specification, Annex A - Use of the Object Catalogue for ENC* section 5.4.7 states the following: [**"Rule 1"** (for NOS purposes and for the purpose of this situation only.)]

> "**When a dredged area is deeper than the adjoining * Group 1 area object, the boundary of the dredged area is encoded as a DEPARE of type line (i.e. linear depth area).**"

Therefore, because the controlling depths of the 4 dredged areas in *Figure 4-ES63* are deeper than the depth range values of the adjoining depth areas *(see Table below),* the adjoining dredged area boundaries (i.e. the ENC object: DRGARE) must also be encoded as a Depth Area (line) [DEPARE].

Dredged Area	Controlling Depth	Adjoining Depth Area	Depth Range Value
No. 1	14 FEET	*B*	6-12 feet
No. 2	15 FEET	*B*	6-12 feet
No. 3	20 FEET	*C*	12-18 feet
No. 4	14 FEET	*B*	6-12 feet

[NOTE: Further details on determining the depth range values of the depth areas portrayed in *Figure 4-ES63* are provided in Part B of this situation. The main purpose of Situation 7A is to only identify and explain those situations which may require a linear depth area when a dredged area adjoins a dredged area.]

* For an explanation of Group 1 objects, see part **III** of this document.

(continued)

Depth Areas (line) Situations
(i.e. Linear Depth Areas)

Situation 7A–Geometric Portrayal (continued)

When Dredged Areas Adjoin Dredged Areas
(**And** A Discontinuous Succession Of Depth Range Values Exists)
(Refer to Figure 4-ES63)

✧ Comments (continued):

2. The **linear depth areas** which are formed because of the S-57 concept mentioned in item 1. are:

   a. Line **"ab"**

      Explanation: Line **"ab"** is a boundary of a dredged area whose controlling depth (20 FT) is deeper than the depth range value of depth area ***C*** (12-18 ft) to which the boundary adjoins.

   b. Line **"cde"**

      Explanation: Line **"cde"** is a boundary of a dredged area whose controlling depth (14 FT) is deeper than the depth range value of depth area ***B*** (6-12 ft) to which the boundary adjoins.

   c. Line **"efg"**

      Explanation: Line **"efg"** is a boundary of a dredged area whose controlling depth (15 FT) is deeper than the depth range value of depth area ***B*** (6-12 ft) to which the boundary adjoins.

   d. Line **"hi"**

      Explanation: Line **"hi"** is a boundary of a dredged area whose controlling depth (14 FT) is deeper than the depth range value of depth area ***B*** (6-12 ft) to which the boundary adjoins.

(continued)

Depth Areas (line) Situations
(i.e. Linear Depth Areas)

Situation 7A–Geometric Portrayal (continued)

When Dredged Areas Adjoin Dredged Areas
(**And** A Discontinuous Succession Of Depth Range Values Exists)
(Refer to Figure 4-ES63)

✧ Comments (continued):

2. (continued):

Linear Depth Areas (continued):

e. Line **"jk"**

Explanation: Line **"jk"** is a boundary of a dredged area whose controlling depth (20 FT) is deeper than the depth range value of depth area ***D*** (12-18 ft) to which the boundary adjoins.

3. **"Rule 2"** [As designated for NOS purposes and for the purpose of this situation only.] Per the IHO/S-57,

"A *linear depth area* is also created on the boundary of two adjoining dredged areas if the controlling depths of the two adjoining dredged areas are on either side of one or more standard depth contours."

For example:

Dredged Areas No. 1 and No. 2 which have controlling depths respectively of 14 FEET and 15 FEET can be said to be on one side of the 18 ft depth contour, and the adjoining dredged area (No. 3), having a controlling depth of 20 FEET can be said to be on the other side of the 18 FT depth contour. A Depth Area (line) would then be created on their joint boundary line (i.e. lines **"bl"**and **" lk"**). A Depth Area (line) would also be created at line **"jm"** because of the same concept.

(continued)

Depth Areas (line) Situations
(i.e. Linear Depth Areas)

Situation 7A–Geometric Portrayal (continued)

When Dredged Areas Adjoin Dredged Areas
(**And** A Discontinuous Succession Of Depth Range Values Exists)
(Refer to Figure 4-ES63)

✧ Comments (continued):

4. **"Rule 3"** [As designated for NOS purposes and for the purpose of this situation only.] Per the IHO/S-57,

"A linear depth area is not required for a dredged area boundary if the controlling depth of the affected dredged area is within the depth range value of the adjoining depth area."

For example:

a.) A linear depth area is not required for dredged area boundary line **"bc"** because the controlling depth of the affected dredged area (14 FT) is within the depth range of the adjoining depth area ***C*** (12-18 ft).

b.) A linear depth area is not required for dredged area boundary line **"gk"** because the controlling depth of the affected dredged area (15 FT) is within the depth range of the adjoining depth area ***D*** (12-18 ft).

c.) A linear depth area is not required for dredged area boundary line **"hj"** because the controlling depth of the affected dredged area (14 FT) is within the depth range of the adjoining depth area ***D*** (12-18 ft).

(continued)

Depth Areas (line) Situations
(i.e. Linear Depth Areas)

Situation 7A–Geometric Portrayal (continued)

When Dredged Areas Adjoin Dredged Areas
(**And** A Discontinuous Succession Of Depth Range Values Exists)
(Refer to Figure 4-ES63)

✧ Comments (continued):

5. Assuming the depth contour interval for this ENC is (0', 6', 12', 18'.....), a linear depth area will also be created at line **"xy"**. The depth range values for line **"xy"** are: DRVAL1 = -H; DRVAL2 = 0.

6. The **Depth Area (areas)** formed are:

   A: the area bounded by the 6 foot depth contour and the appropriate portions of the coastline, and the northern and western cell boundaries.

   B: the area bounded by the 6 foot depth contour, the 12 foot depth contour, the appropriate portions of the northern, eastern and western cell boundaries, dredged area line **"cdefg"** and dredged area line **"hi"**.

   C: the area bounded by the 12 foot depth contour , the appropriate portion of the western cell boundary, and the dredged area line **"abc"** .

   D: the area bounded by the 12 foot depth contour, and dredged area lines **"hj"** , **" jk"** and **"kg"**.

Depth Areas (line) Situations
(i.e. Linear Depth Areas)

Situation 7B–Depth Range Value Convention

When Dredged Areas Adjoin Dredged Areas
(**And** A Discontinuous Succession Of Depth Range Values Exists)

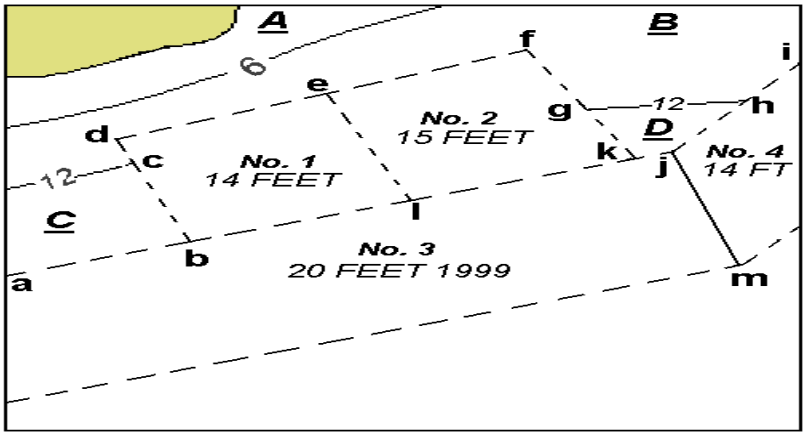


Figure 4-ES64 (Adapted from the IHO/S-57)

✧ **Depth Area (lines "ab", "cde" , "efg" , "hi" , and "jk"):**
(Reference: "Rule 1")

CONVENTION:
The *convention* to be followed for the determination of the appropriate depth range values is:

DRVAL1 = the maximum depth (i.e. DRVAL2) of the adjoining depth area.

DRVAL2 = the controlling depth of the dredged area.

DEPTH RANGE VALUES:

Depth Area (line)	DRVAL1	DRVAL2
"ab"	18	20
"cde"	12	14
"efg"	12	15
"hi"	12	14
"jk"	18	20

Depth Areas (line) Situations
(i.e. Linear Depth Areas)

Situation 7B–Depth Range Value Convention (continued)

When Dredged Areas Adjoin Dredged Areas
(**And** A Discontinuous Succession Of Depth Range Values Exists)

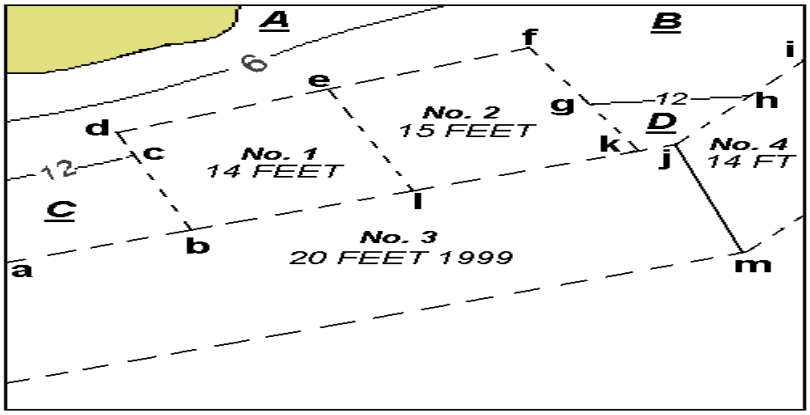


Figure 4-ES64 (Adapted from the IHO/S-57)

✧ **Depth Area (lines "bl" , "lk" and "jm"):** (Reference: "Rule 2")

CONVENTION:

The *convention* to be followed for the determination of the appropriate depth range values is:

DRVAL1 = the value of the controlling depth of the shoalest dredged area

DRVAL2 = the value of the controlling depth of the deepest dredged area.

DEPTH RANGE VALUES:

Depth Area (line)	DRVAL1	DRVAL2
"bl"	14	20
"lk"	15	20
"jm"	14	20

(continued)

Situation 7B–Depth Range Value Convention (continued)

When Dredged Areas Adjoin Dredged Areas
(**And** A Discontinuous Succession Of Depth Range Values Exists)

Note: The following conventions apply to the Depth Area (areas) which are formed when a dredged area adjoins a dredged area.

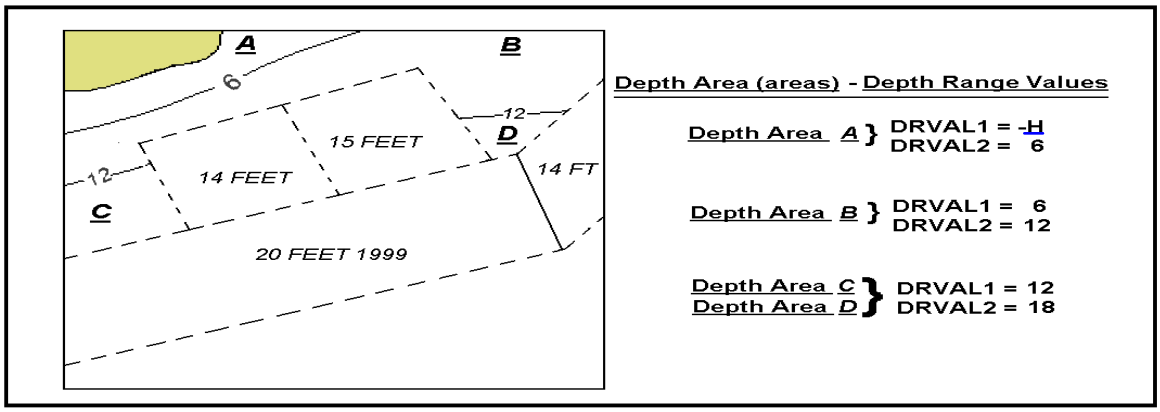


Figure 4-ES65 (Adapted from the IHO/S-57)

✧ *CONVENTIONS:*

The *conventions* to be followed for the determination of the appropriate depth range values are:

Depth Area *A* (area):

DRVAL1 = -H (the -height of the coastline datum above the sounding datum)

DRVAL2 = the value of the deepest of the merged depth contours.

Depth Area *B* (area):

DRVAL1 = the value of the shoalest bounding depth contour.

DRVAL2 = the value of the deepest bounding depth contour.

Depth Areas *C* and *D* (areas):

DRVAL1 = the value of the depth contour shown.

DRVAL2 = the value of the standard depth contour which is immediately deeper than the shown depth contour.

VI. LIST OF ATTRIBUTES AND ATTRIBUTES VALUES FOR DEPTH AREAS

Note: All Attributes and Values were provided by the IHO/S-57

S-57 Object Acronym: DEPARE

ENC Allowed Geometric Primitives
Area
Line

Attribute Acronym	Values OR <*type*>	Attribute	Comments
*** DRVAL1**	<*numeric*>	**Depth Range Value 1**	- The minimum (shoalest) depth value of a depth range. - Entries for DRVAL1 shall be in charted units
*** DRVAL2**	<*numeric*>	**Depth Range Value 2**	- The maximum (deepest) depth value of a depth range. - Entries for DRVAL2 shall be in charted units
QUAPOS		**Quality of Position**	- Default = null
	1	surveyed	
	2	unsurveyed	
	3	inadequately surveyed	
	4	approximate	
	5	position doubtful	
	6	unreliable	
	7	reported (not surveyed)	
	8	reported (not confirmed)	
	9	estimated	
	10	precisely known	
	11	calculated	

* Indicates a mandatory attribute (i.e. that the designated attribute must be populated with a value).

VI. LIST OF ATTRIBUTES AND ATTRIBUTES VALUES (continued) FOR DEPTH AREAS (DEPARE)

Note: All Attributes and Values were provided by the IHO/S-57

Attribute Acronym	Values OR <*format*>	Attribute	Comments
QUASOU		**Quality of Sounding Measurement**	- encodes the reliability of the value of the sounding
	1	depth known	
	2	depth unknown	
	3	doubtful sounding	
	4	unreliable sounding	
	5	no bottom found at value shown	
	6	least depth known	
	7	least depth unknown, safe clearance at value shown	
	8	value reported (not surveyed)	
	9	value reported (not confirmed)	
	10	maintained depth	
	11	not regularly maintained	
SOUACC		Sounding Accuracy	**DISREGARD—Attribute is PROHIBITED**
VERDAT		Vertical Datum	**DISREGARD—Attribute is PROHIBITED**
INFORM	<*free text*>	**Information**	1. Contains textual information about the feature. 2. Entries are to be taken from a cautionary or explanatory note which is shown on the paper chart. 3. Additional text may be added, up to 240 characters. Longer or standard notes should be logged with TXTDSC.

VI. LIST OF ATTRIBUTES AND ATTRIBUTES VALUES (continued) FOR DEPTH AREAS (DEPARE)

Note: All Attributes and Values were provided by the IHO/S-57

Attribute Acronym	Values OR <*format*>	Attribute	Comments
SCAMAX	< integer>	**Scale Maximum**	**DISREGARD—PROHIBITED for ENCs**
SCAMIN	<integer>	**Scale Minimum**	**DISREGARD–Prohibited for Group 1 Objects**
TXTDSC	<*free text*>	**Textual Description**	- Will identify the name of an external file which is to be included in the final data set. - Will contain any textual information that will not fit into a 240 character attribute field length. - Examples of textual information includes standard or extremely long notes.
RECDAT	<*coded string*>	**Recording Date**	- The **date** when the specific feature was collected**,** edited or deleted**.** - **Format:** YYYYMMDD (YYYY=Calendar Year/MM=Month/DD=Day) - If certain date values are not available, use one of the following formats: No specific year: - -MMDD No specific month: YYYY No specific day: YYYYMM No specific year and day: - -MM

VI. LIST OF ATTRIBUTES AND ATTRIBUTES VALUES (continued) FOR DEPTH AREAS (DEPARE)

Note: All Attributes and Values were provided by the IHO/S-57

Attribute Acronym	Values OR <*format*>	Attribute	Comments
RECIND	<*coded string*>	**Recording Indication**	- The **procedure** used to collect the data. - **(Mandatory)Format:** US,US,???? where ???? is one of the following values: digi = digitized scan = scanned (Not currently being used) alph = alpha/numeric input (precision input) (US,US,????) Procedure Authority Country
SORDAT	<*coded string*>	**Source Date**	- The **production date** of the source. (e.g. the survey date, the date of measurement, the date of locality) - **(Mandatory)Format:** YYYYMMDD (YYYY=Calendar Year/MM=Month/DD=Day) - If certain date values are not available, use one of the following formats. No specific year: - -MMDD No specific month: YYYY No specific day: YYYYMM No specific year and day: - -MM If two dates are listed for the source, enter the earlier date.

VI. LIST OF ATTRIBUTES AND ATTRIBUTES VALUES (continued) FOR DEPTH AREAS (DEPARE)

Note: All Attributes and Values were provided by the IHO/S-57

Attribute Acronym	Values OR *<format>*	Attribute	Comments
SORIND	<coded string>	**Source Indication**	- Contains information about the **source** of the feature. - **Format:** US,aa,sssss,dddddd..... US = country (always US for United States) aa = authority sssss = source type dddd..... = the document number (up to 240 alpha/numeric characters) *Authorities (United States):* US–NOS U1–NIMA (not valid for NOS use) U2-Naval Oceanographic Command (not valid for NOS use) *Source types:* graph (graphic) [e.g. Hydro sheets, T-sheets] reprt (text) [e.g. Letters, LNMs] [*Examples of format*: US,US,graph,H-10357 US,US,reprt,L-111/99 US,US,reprt,LNM2/99]

NATIONAL OCEAN SERVICE
Office of Coast Survey
Marine Chart Division

CARTOGRAPHIC ORDER 004/01 JANUARY 31, 2001

FILE WITH NAUTICAL CHART MANUAL VOLUME 1, SECTION 4.30.13

TO: All Cartographers
Marine Chart Division

SUBJECT: Nautical Chart Manual Incorporation of ENC Object **Depth Contour** - NOS/ENC Object Specifications Pages

APPLICATION: All Nautical Charts

Effective immediately, the following attachment adds to the Nautical Chart Manual, Volume 1, Part I, Seventh (1992) Edition, Section 4.30.13 pages 4-DC1 to 4-DC116.

The attachment contains the NOS/ENC Object Specifications pages for the Depth Contour ENC object, and is to be inserted immediately after page 4-DA94.

Nicholas E. Perugini
Captain, NOAA
Chief, Marine Chart Division

Depth Contours
Section 4.30.13

Section 4.30.13----DEPTH CONTOURS

Table of Contents

Section 4.30.13----DEPTH CONTOURS

Index of: - Unique Data Collection and Encoding Situations
- The Correlating IHO/S-57 Section

Objectives:

The objectives of the following index are:

1. To aid in the specific identification of those *NOS/ENC Object Specifications* pages containing graphic examples (and explanations) of those ENC Depth Contours charted in unique situations

2. To provide a cross-reference with the specific *IHO/S-57 Appendix B.1, ENC Product Specification, Annex A - Use of the Object Catalogue for ENC* section from which the National Ocean Service has interpreted all information presented in this document.

The *IHO/S-57 Appendix B.1, ENC Product Specification, Annex A - Use of the Object Catalogue for ENC* remains the official and final authority for the encoding of all ENC information, and for the resolution of any discrepancies which may arise between this document and the IHO/S-57.

Section 4.30.13----DEPTH CONTOURS

Index of: - Unique Data Collection and Encoding Situations
- The Correlating IHO/S-57 Section

Situation Number	Title of Situation	NOS/ENC Object Specifications Page No.	IHO/S-57 Appendix B.1, ENC Product Specification, Annex A-Use of the Object Catalogue for ENC Section No.
	Portraying and Encoding Those Depth Contours In Which:		
1	✧ Two or More Depth Contours Have Merged to Form a Single Depth Contour at the Scale of the ENC.	Go There	Section 5.2
2	✧ An Approximate Depth Contour is to be Encoded.	Go There	Section 5.2
3	✧ The Boundary of a Ledge or Reef (Which Covers and Uncovers) is Coincident with the Zero [0] Value Depth Contour (i.e., Low Water Line).	Go There	Section 5.2
4	✧ The Depth Contour Intervals Between an Inset and the Main Panel Do Not Agree.	Go There	Section 5.2
5	✧ The Depth Contour Intervals Between Overlapping and Same Scale Charts Do Not Agree.	Go There	Section 5.2
6	**When To Continue (Or Not Continue) A Depth Contour Through Another Nautical Feature or ENC Object.**	Go There	Section 5.2
	✧ **PART I: Depth Contours ARE Continued Through.....**	Go There	Section 5.2

Section 4.30.13----DEPTH CONTOURS

Index of: - Unique Data Collection and Encoding Situations
- The Correlating IHO/S-57 Section

Situation Number	Title of Unique Situation	NOS/ENC Object Specifications Page No.	IHO/S-57 Appendix B.1, ENC Product Specification, Annex A-Use of the Object Catalogue for ENC **Section No.**
6 (cont.)	✧ **PART II: Depth Contours ARE NOT Continued Through.....**		
	A: Obstructions Charted as Area Objects	Go There	Section 5.2
	B: Dumping Grounds (Which **Do Not** Contain Depth Contours and Soundings)	Go There	Section 5.2
	C: Foul Areas	Go There	Section 5.2
	D: Sediment Traps	Go There	Section 5.2
	E: Low Water Tint	Go There	Section 5.2
	F: A Ruins Area	Go There	Section 5.2
	G: Short Isolated Depth Contours	Go There	Section 5.2
	H: Short Sections of Broken Depth Contours	Go There	Section 5.2
	I: Spoil Areas	Go There	Section 5.2
	J: Wharves, et. al.	Go There	Section 5.2

Section 4.30.13----DEPTH CONTOURS

Index of: - Unique Data Collection and Encoding Situations
- The Correlating IHO/S-57 Section

Situation Number	Title of Unique Situation	NOS/ENC Object Specifications Page No.	IHO/S-57 Appendix B.1, ENC Product Specification, Annex A- Use of the Object Catalogue for ENC Section No.
	✧ **PART III: Depth Contours and ENC Dredged Areas**	Go There	Section 5.2
	A: Depth Contours Which ARE To Be Continued Through ENC Dredged Areas.		
	Example 1: How To Depict Depth Contours Which Bound Encroaching Shoals (Non-Tabulated Channels)	Go There	Section 5.2
	Example 2: How To Depict A Depth Contour Which Bounds A Shoal and Is Wholly Contained Within A Dredged Area	Go There	Section 5.2
	Example 3: How To Depict Depth Contours Which Continue Through An ENC Fairway.	Go There	Section 5.2
	Example 4: How To Depict Depth Contours Which Encroach Upon a Tabulated and Quartered Channel	Go There	Section 5.2
	B: Depth Contours Which ARE NOT To Be Continued Through ENC Dredged Areas.	Go There	Section 5.2

Section 4.30.13----DEPTH CONTOURS

Index of: - Unique Data Collection and Encoding Situations
- The Correlating IHO/S-57 Section

Situation Number	Title of Unique Situation	NOS/ENC Object Specifications Page No.	IHO/S-57 Appendix B.1, ENC Product Specification, Annex A- Use of the Object Catalogue for ENC Section No.
	Miscellaneous Depth Contour Situations		
7	✧ Depth Contours Which Approach A 3E Area	Go There	Section 5.2
8	✧ Depth Contours Which "Hang"	Go There	Section 5.2
9	✧ Depth Contours Charted With The Old MCD Symbology	Go There	Section 5.2

DEPTH CONTOURS

I. Definition: A line connecting points of equal water depth which is sometimes significantly displaced outside of soundings, symbols, and other chart detail for clarity as well as generalization. Depth contours, therefore, often represent an approximate location of the line of equal depth as related to the surveyed line delineated on the source. Also referred to as a depth curve. **[IHO Dictionary, S-32, 5th Edition]**

II. Nautical Chart *Feature* vs. ENC S-57 *Object Class*

Nautical Chart Feature	ENC S-57 Object Class
Depth Curve	Depth Contour
Depth Contour	
Low Water Line	
Ledges and Reefs (which are coincident with the low water line)	

NOTE: Within the ENC environment, there is to be no differentiation between a depth contour and a depth curve. Depth contours and depth curves are considered to be the same object.

III. Collection Criteria

All depth contours indicated on the appropriate source document are to be collected and encoded for ENC purposes. This includes the low water line which is considered to be a depth contour having a value of zero (0).

If contours are to be collected and encoded from a MCD chart, ensure that the chart to be used represents the **largest scale coverage for the particular geographic region**.

If depth contours are to be collected and encoded from large scale analog source documents and the generalization of depth contours is to be performed by the cartographer, the depth contour interval of the chart which represents the largest scale coverage shall be followed.

All depth contours provided to MCD in a digital format will be processed for the respective ENC regardless of the depth contour interval indicated on the largest scale chart. Processing refers to those tasks involved in the encoding and addition of the depth contours (to the ENC database) in accordance with S-57 standards.

IV. Data Collection Guidelines

After identifying the document(s) to be used as the source of applying (or revising) depth contours to an ENC, the application (or revision) of all relevant data for ENC purposes will occur in 2 phases. The first phase involves *the identification of a nautical feature's appropriate ENC object class* (i.e. Depth Contour-DEPCNT) *and the subsequent portrayal of its geometry*. (The geometry will define the boundary of each depth contour.) The second phase involves the *encoding of the associated attributes* with information that is relevant to each depth contour's specific navigational purpose.

1. Source Documents

The source documents which normally serve as the primary source either for the application or revision of depth contours to MCD nautical charts include United States Army Corps of Engineer (USACE) blueprints and National Ocean Service hydro sheets.

In ***Figure 4-ES66***, those source documents which may also serve as a source for the application and revision of depth contours to MCD nautical charts have been provided.

A. Current MCD Policy: Source Documents for ENC Depth Contours

During the (ENC) *initial data collection stage*, the most recently published edition of the largest scale nautical chart will serve as the primary source for the collection and encoding of depth contours.

OFFICIAL SOURCE DOCUMENTS WHICH MAY BE USED IN THE APPLICATION OR REVISION OF DEPTH CONTOURS.

NOS Hydrographic Surveys	USACE Blueprints	Chart Evaluation Surveys (CES)
Side Scan Sonar / Multibeam Surveys	100% Multibeam Surveys	Echo Sounder (Single Beam Surveys
H-Surveys	Q-Surveys	D-Surveys
LIDAR (**LI**ght **D**etection **A**nd **R**anging) Surveys	Revisory Surveys	Bathymetric Surveys
	Track-Line Surveys	
Geophysical Surveys (Track-Line Surveys)	USACE Construction Permit Letters	Diver Investigations
Navigable Area Surveys (NAS)	Foreign Country Surveys	Miscellaneous Surveys
Special Surveys: - Field Examinations (FE/F) - Additional Work (Ad. Wk.) - Tag-Line Surveys	** State and Local Government Surveys	Private Surveys
	*** NOS Wire Drag Surveys	*** NOS Wire Sweep Surveys
*** Area and Depth (A&D) Sheets	*** Leadline Surveys	Reconnaissance Surveys

Asterisk Key:

** Must be evaluated for quality of data before application to nautical charts

*** Although these type of surveys are no longer performed, their value as a source of historical information still remains.

Figure 4-ES66

During the *update and revision stage*, the largest scale raster currently in maintenance by the raster production branches shall serve as the primary source document for the revision and application of all new hydrography. Current MCD policy dictates that ENC branch personnel are **not** to revise or apply new hydrography from the actual source document (i.e., USACE analog or digital blueprints; NOS hydrographic surveys, et. al), but are to access the current and largest scale raster affected by the hydrographic document **after** the document is evaluated, applied and reviewed by the appropriate raster production branch. It is currently the responsibility of the raster production branch to notify the ENC branch of all hydrographic revisions to affected Electronic Navigational Charts.

B. Revision of Depth Contours and Corresponding Depth Areas

As new depth contours are revised or added to an ENC, it will be the cartographer's responsibility not only to accurately portray and encode the geometry of these new or revised depth contours, but to also ensure that all corresponding depth areas (see Section 4.30.12) are created and or revised as appropriate.

To be revised as appropriate refers to the modification of the limits of those depth areas which:

(1) originally had as a boundary line, a newly deleted depth contour, or
(2) will now use as a boundary the new or revised ENC depth contour (s).

The depth contour geometry which will also serve as the boundary line of a depth area will only be entered into the ENC database once, but will be encoded as both an ENC Depth Contour and an ENC Depth Area (and as any other ENC object if the geometry is to be used as a boundary).

When one (1) or more ENC objects share the same boundary line, the objects are said to have **"coincident geometry"** [see the ENC Bulletins in Section 4.30.12. (page 510)

2. Geometric Portrayal

The S-57 object class which is to be used when geometrically portraying and encoding a depth contour is: **Depth Contour (DEPCNT)**.

The only *geometric primitive* allowed for the *Depth Contour* ENC Object Class is **line**. This means that a depth contour can only be portrayed (encoded) as a linear object.

3. Encoding

IHO/S-57 encoding involves portraying the nautical feature as the appropriate geometric entity and S-57 object class, and assigning (to this object) the appropriate attributes and attribute values. For example, let's refer to the six (6) foot depth contour in ***Figure 4-ES67***. This depth contour would be geometrically portrayed exactly as presented in the Figure (i.e., as a linear object) and would be encoded as follows: [*NOTE: Depending on the type of information provided in the source document, other attributes (which are not listed below) may also be populated to fully encode the object.]*

ENC S-57 Object Class: Depth Contour..... (DEPCNT)
Attribute *1*: VALDCO.....(**Va**lue of **D**epth **Co**ntour)
Attribute *1* Value: 6.....(feet)

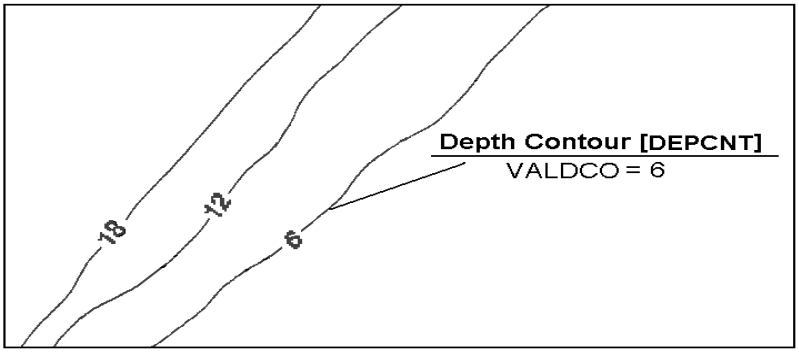


Figure 4-ES67

The VALDCO attribute of the twelve (12) and eighteen (18) foot depth contours would respectively be populated as 12 and 18.

Assuming the border of ***Figure 4-ES67*** is the ENC cell boundary, three (3) Depth Areas will also be formed from each of the depth contours and the appropriate portions of the cell boundary. See Section 4.30.12 for more information on the encoding of ENC Depth Areas.

The attribute **VALDCO:**

(a) defines the value of the depth contour, and

(b) is the mandatory attribute of the *ENC Object: Depth Contour*. (Mandatory attributes **must** be populated with an attribute value).

The ***IHO*/S-57 *Object Catalogue***, the official document containing the listing of all object classes, attributes, and attribute values, provides the following definitions:

> Object Class: *a generic description of features which can be categorized into a finite number of feature types* [e.g., DEPTH CONTOUR, DEPTH AREA, LIGHT, WRECK, DREDGED AREA, OBSTRUCTION].

Features falling into one of these categories (i.e. DEPTH CONTOUR, DEPTH AREA, LIGHT, WRECK, DREDGED AREA, or OBSTRUCTION) will be more *precisely* identified by assigning the appropriate *attributes* of the respective object class.

> Attribute: *a category of characteristics about an object*.

For each instance of an object, there exists a list of allowable attributes. All allowable attributes are provided in the form of a six character acronym (e.g. VALDCO); and may only be used **once** for the particular object (i.e. a depth contour will never have two or more VALDCO attributes). However, to be assigned to each attribute will be *attribute values*, of which, in certain circumstances, a multiple selection is permitted.

> Attribute Value: *the unique and distinctive characteristic(s) of an object*

The ***IHO*/S-57 *Object Catalogue*** also provides the following information:

Attribute values (or "the expected input") may be of six (6) types:

1. enumerated
2. list
3. integer
4. coded string
5. free text
6. float

Enumerated - The expected input is a number selected from a list of predefined attribute values. Exactly one value must be chosen.

List - The expected input is a list of one or more numbers selected from a list of predefined attribute values. Where more than one value is used, they must normally be separated by commas but in special cases slashes ("/ ") may be used.

Integer - The expected input is an integer with defined range, units and format.

Coded String - The expected input is a string of ASCII characters in a predefined format.

Free Text - The expected input is a free-format alpha/numeric string. It may be a file name which points to a text or graphic file.

Float - The expected input is a floating point numeric value with defined range, resolution, units and format.

The IHO/S-57 list of attributes and attribute values pertaining to the object class: Depth Contours are located in the back of this document. Mandatory attributes are indicated with an asterisk.

It must be noted that, if, after examining a source document for S-57 encoding purposes, a cartographer determines that ENC appropriate (but non-mandatory) information has *not* been provided to complete the value selection for all object attributes, **there is to be no research to obtain the additional information**.

4. Other General Data Collection and Encoding Rules, Facts and Guidelines

A. Depth Areas

All ENC Depth Areas [DEPARE] which are formed from the geometry of depth contours shall always be created and encoded accordingly.

(Refer to Section 4.30.12 of the NOS/ENC Object Specifications for a complete explanation of Depth Areas.).

B. Depth Contour Interval Designators

When collecting (i.e.,digitizing) a depth contour, always continue the contour through the associated interval designator. The value of the interval designator is to be entered as a value in the attribute: *VALDCO (Value of Depth Contour)*. (See ***Figure 4-ES68*** on the following page.)

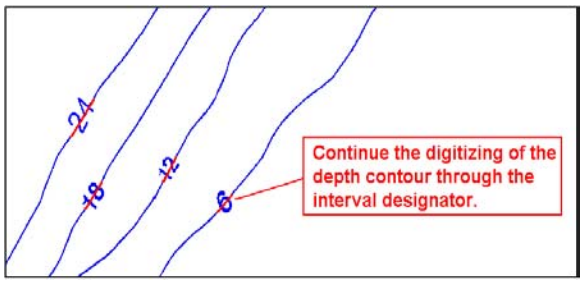


Figure 4-ES68

C. The Low Water Line

The low water line is considered and shall be collected and encoded as the zero (0) value depth contour. It is to be digitized as a continuous line.

D. The Approximate Low Water and Depth Contour Tint Lines

The cartographer shall **not** create and encode an approximate depth contour symbol where a symbol was not previously charted. This guideline **does not** apply to **the low water tint line**. (See Situation No. 2 on pages 618 - 621.)

E. Topological Structure

Always ensure the correct topological structure of all depth contours. Correct topological structure ensures:

- that there are no gaps between a depth contour and other objects which the depth contour may approach, (e.g., a cell boundary, coastline, shoreline construction, dredged area, etc.) and,

- that there is no linear overlapping of depth contours with other linear objects

(Refer to Section 2.30.7 of the NOS/ENC Object Specifications for a complete explanation of topological structure and its relevance to the collection and encoding of ENC objects.).

F. Current Encoding Policy: The MCD Nautical Chart Will Always Be the Source of ENC Depth Contours

During the *initial data collection stage*, the raster of the most recently published edition of the largest scale chart available shall serve as the source of the depth contours.

During the *update and revision stage*, the largest scale raster which is currently in maintenance by the raster production branches will serve as the primary source document for the revision and application of all new hydrography.

However, upon identifying the largest scale chart available, ENSURE THAT THIS CHART ACTUALLY CONTAINS LARGER SCALE COVERAGE OF THE DESIRED DETAIL. A chart may in some circumstances, have omitted the desired charted detail due to the placement of the Title Block Information, notes, or a 3E area. When this situation occurs, the desired data may have to be collected from an overlapping, but same scale chart; from a smaller scale chart; or possibly from the actual source document which originally reported the information.

G. Identify All Tint Areas

When using the raster to collect and encode depth contours, be sure to attach all appropriate tint files. This will ensure that all associated tint boundaries will be properly identified and encoded.

H. Depth Contours Charted At the Edge of a Chart

[This guideline applies only if the depth contour interval and the chart scale between the affected and adjoining chart(s) agree.]

When a depth contour is charted at the edge of a chart being used as the source document, **AND**, the depth contour interval between the affected and adjoining chart(s) agree, check to see if the **entire** depth contour is charted on the adjoining chart.

When the entire depth contour is charted on the adjoining chart, it will be more efficient to collect and encode the depth contour in its entirety from the adjoining chart. This procedure would ensure a more accurate delineation of the depth contour and would eliminate the performance of the "edge-matching" task.

I. "Edge-Matching"

Always perform the "edge-matching" processes if warranted. "Edge-Matching" involves the alignment of the edges or ends of a line whose geometry is partially portrayed on each of two (2) adjoining charts. "Edge-Matching" ensures the proper topological structure of the data being digitized.

5. Unique Data Collection Situations

This section and the accompanying graphic examples will provide the recommended procedures for portraying and encoding depth contours which are charted in the following unique situations.

- Two or more depth contours have merged to form a single depth contour at the scale of the ENC.
- An approximate depth contour is to be encoded.
- The boundary of a ledge or reef (which covers and uncovers), is coincident with the zero [0] value depth contour (i.e. low water line).
- The depth contour intervals between an inset and the main panel do not agree.
- The depth contour intervals between overlapping and same scale charts do not agree.
- Continuing (or not continuing) a depth contour through another nautical feature or ENC object.
- Depth contours which approach a 3E area
- Depth contours which "hang".
- Depth contours charted with the old MCD symbology.

Please use the index located in the beginning of this section to easily identify and promptly access an example which may closely resemble a depth contour currently being encoded.

SITUATION No. 1: **Portraying and Encoding Those Depth Contours In Which:**
Two or More Depth Contours Have Merged to Form a Single Depth Contour at the Scale of the ENC

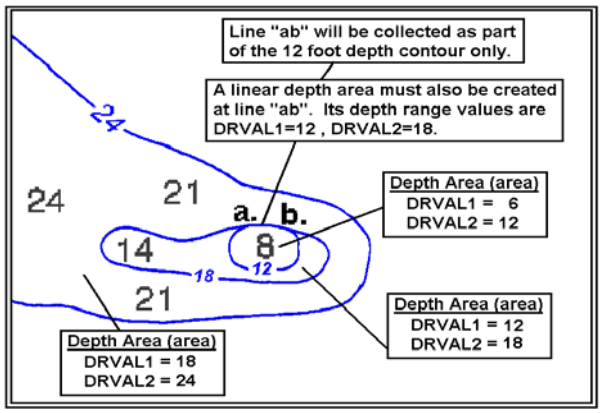


Figure 4-ES69

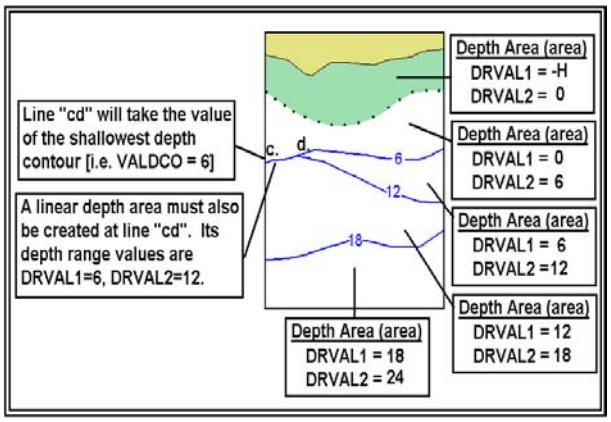


Figure 4-ES70 *(Adapted from the IHO/S-57)*

✧ The **ENC objects** associated with the portrayal of the above depth contours are:

- Depth Contours (DEPCNT)
- Depth Area (DEPARE)

✧ The **geometric primitives** of each object are:

- line (Depth Contour)
- area (Depth Area)
- line (Depth Area)

✧ **Comments:**

1. ***Figures 4-ES69*** and ***4-ES70*** contain the most common representations of merging depth contours.

   Figure 4-ES69 represents a shoal in which the 18 foot depth contour has merged into the 12 foot depth contour to form a single line (**line "ab"**).

   In ***Figure 4-ES70*** the 6 foot and 12 foot depth contours have merged into each other to form a single line at **line "cd"**.

SITUATION No. 1 (continued): **Portraying and Encoding Those Depth Contours In Which:** Two or More Depth Contours Have Merged to Form a Single Depth Contour at the Scale of the ENC (Or Source Document)

(Refer to ***Figures*** *4-ES69 and 4-ES70)*

✧ **Comments** (continued):

2. **In accordance with S-57, when two or more depth contours have merged to form a single depth contour at the scale of the ENC, the single line formed must be encoded with the value of the shallowest depth contour.**

3. Therefore, in accordance with the S-57 standard mentioned in comment no. 2:

   a. the curve around the 8 foot sounding in ***Figure 4-ES69***, shall be collected in its entirety and encoded with a value of 12 feet. [e.g., VALDCO (Value of Depth Contour)]

   b. **line "cd"** in ***Figure 4-ES70*** shall be collected and encoded as part of the 6 foot depth contour

4. If digitizing clockwise, the 18 foot depth contour in ***Figure 4-ES69*** shall have its beginning point at **point b.** and ending point at **point a.**.

   Line "ab" shall not be collected twice, once as part of the 12 foot depth contour; and once as part of the 18 foot depth contour.

5. Linear depth areas in addition to the Depth Area (areas) must also be encoded at **lines "ab"** (***Figure 4-ES69***) and **"cd"** (***Figure 4-ES70***). The purpose of the linear depth areas is to eliminate the discontinuity in depth range value succession created by the merging of the depth contours. (See Section 4.30.12 for more information on ENC linear Depth Areas.)

SITUATION No. 2: **Portraying and Encoding Those Depth Contours In Which:**
An Approximate Depth Contour Is To Be Encoded

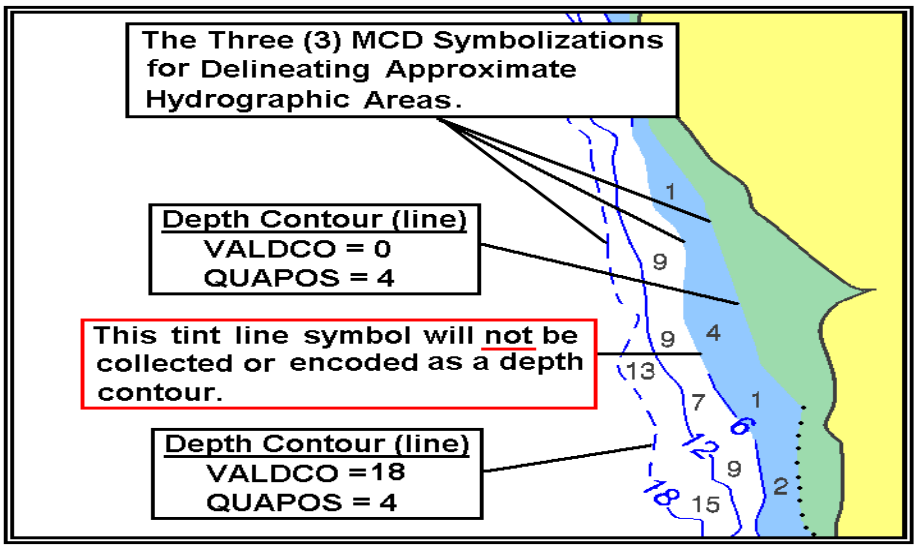


Figure 4-ES71

✧ The **ENC objects** associated with the portrayal of the above depth contours are:

– Depth Contour (DEPCNT)
– Depth Area (DEPARE)

✧ The **geometric primitives** of each object are:

– line (Depth Contour)
– area (Depth Area)

SITUATION No. 2 (continued): **Portraying and Encoding Those Depth Contours In Which:**
An Approximate Depth Contour is to be Encoded

*(Refer to **Figure 4-ES71**)*

✧ **Comments:**

1. An ENC Depth Contour shall be encoded as approximate for only two (2) of the three (3) aforementioned MCD symbolizations. These two (2) symbolizations are:

   – the low water tint line, and,
   – the dashed depth contour symbol

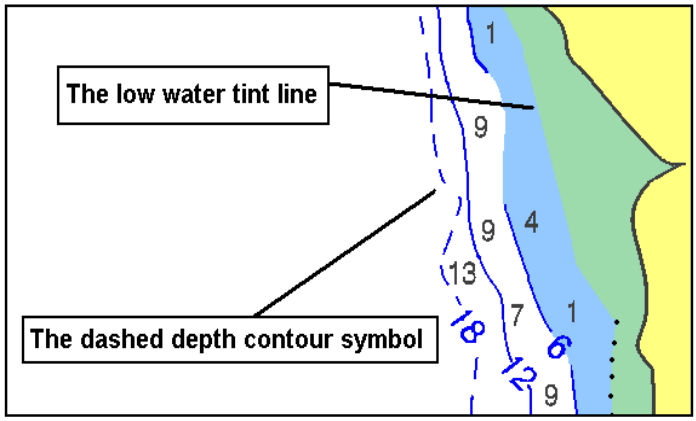


Figure 4-ES71a

2. For ENC purposes, the MCD approximate hydrographic areas which are indicated by blue tint only shall not require the creation and encoding of a depth contour to delineate their boundary. The blue tint boundary line, however, shall be used in the delineation of the associated depth area.

SITUATION No. 2 (continued): **Portraying and Encoding Those Depth Contours In Which:**
An Approximate Depth Contour is to be Encoded

*(Refer to **Figure 4-ES71**)*

✧ **Comments** (continued):

3. The attributes used in ***Figure 4-ES71*** are:

   - VALDCO = the Value of the Depth Contour, and,
   - QUAPOS - the Quality of the Position of the depth contour

4. The value of the depth contour is the value of the respective depth contour interval. Depth contours charted with the modern symbology will have their value interspersed throughout the chart; in the middle of the depth contour.

   Depth contours which are still charted with the old symbology shall require the extrapolation of the depth contour value either from the symbology itself or from the surrounding soundings. *(See Situation No. 9 for examples of the old MCD depth contour symbology.)*

5. *QUAPOS* (*Quality of Position*) is the ENC attribute which will identify the low water tint symbol and the dashed depth contour symbol as approximate.

6. The value (provided in the IHO/S-57) which will be populated in the *QUAPOS* attribute to represent a position quality of "approximate" is four (4). **Any other ENC objects which may share the boundaries of an approximate depth contour shall also have a *QUAPOS = 4 (approximate).***

SITUATION No. 2 (continued): **Portraying and Encoding Those Depth Contours In Which:**
An Approximate Depth Contour Is To Be Encoded

*(Refer to **Figure 4-ES71**)*

✧ **Comment**s (continued):

7. The approximate portion of each depth contour and the portion delineated with an actual MCD line symbol shall be digitized and encoded as two separate ENC Depth Contour objects. The approximate (tint) portion(s) will have the *QUAPOS* attribute value of four (4) [i.e. approximate]; and the portion(s) depicted with an actual MCD line symbol will have a *QUAPOS* attribute value of ten (10) [*precisely known*].

8. When an MCD approximate depth contour is depicted on a chart as a tint line, use the outer limits of the associated tint area as a guide for portraying the correct location of the depth contour (and/or depth area limit). This will require the cartographer to access and attach the appropriate tint raster.

9. The ENC Depth Areas (and associated depth range values) which are bounded by the MCD approximate depth contours are identified in ***Figure 4-ES72*** below.

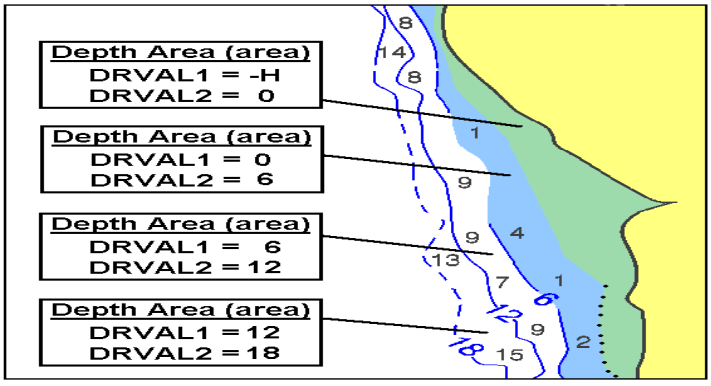


Figure 4-ES72

SITUATION No. 3:

Portraying and Encoding Those Depth Contours When:
The Boundary of a Ledge, Reef or Rocky Area
(Which Covers and Uncovers)
Is Coincident with the Zero [0] Value Depth Contour

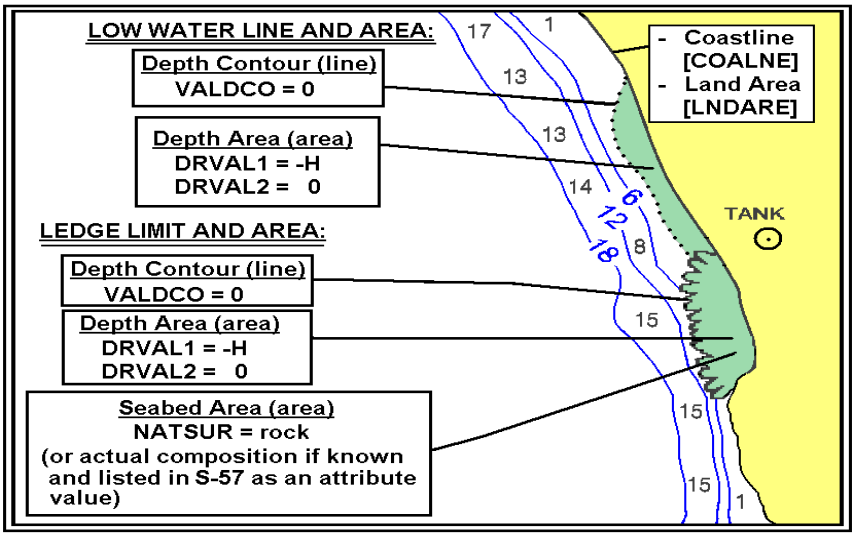


Figure 4-ES73

✧ The **ENC objects** involved in the portrayal of the low water line and the ledge in ***Figure 4-ES73*** are:

- Depth Contour (DEPCNT)
- Depth Area (DEPARE)
- Seabed Area (SBDARE)
- Coastline (COALNE)
- Land Area (LNDARE)

✧ The **geometric primitives** of each object are:

- line (Depth Contour)
- area (Depth Area)
- line (Seabed Area)
- line (Coastline)
- area (Land Area)

SITUATION No. 3 (continued):

Portraying and Encoding Those Depth Contours When:
The Boundary of a Ledge, Reef or Rocky Area
(Which Covers and Uncovers)
Is Coincident with the Zero [0] Value Depth Contour

(Refer to ***Figure 4-ES73***)

✧ **Comments:**

1. When a ledge, reef or rocky area is coincident with the zero (0) value depth contour (i.e., low water line), the ledge will also be encoded as a depth contour having a value of zero (0).

2. **(RE: *Figure 4-ES73a* below)** If the low water line is to be digitized before the ledge symbol, then the digitizing should be performed in a southerly direction. As the ledge symbol is reached, the digitizing is to continue around the ledge symbology; collecting points only at the tips of the MCD ledge symbology.

   If the ledge symbol is to be digitized first, it should be digitized in a northerly direction. As the low water line is reached, the digitizing is to continue around the low water line.

   The above two (2) methods of digitizing will ensure that there is only one zero (0) value depth contour around both the low water line and the ledge symbol.

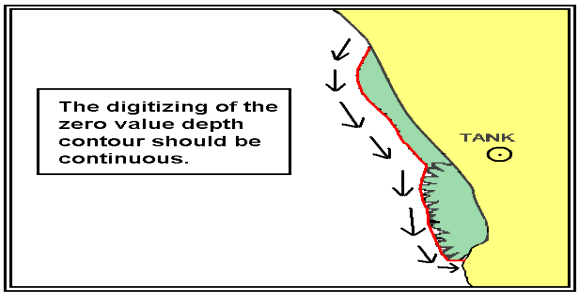


Figure 4-ES73a

3. If a ledge is not coincident with the zero (0) value depth contour, there is no need to encode the ledge with a depth contour. However, the ledge will be encoded with a depth area having a depth range of -H to 0.

4. **(RE: *Figure 4-ES73*)** A **Seabed Area [SBDARE]** is also formed from the limits of the ledge and appropriate portion of the coastline. Be sure to populate the attribute *Nature of Surface (NATSUR)* with the component rock (or coral, et. al. if the nature of the rocky composition is known and listed as an attribute value).

SITUATION No. 4:

Portraying and Encoding Those Depth Contours In Which:
The Depth Contour Intervals Between An Inset
And The Main Panel Do Not Agree

INSET (Scale 1:10000)

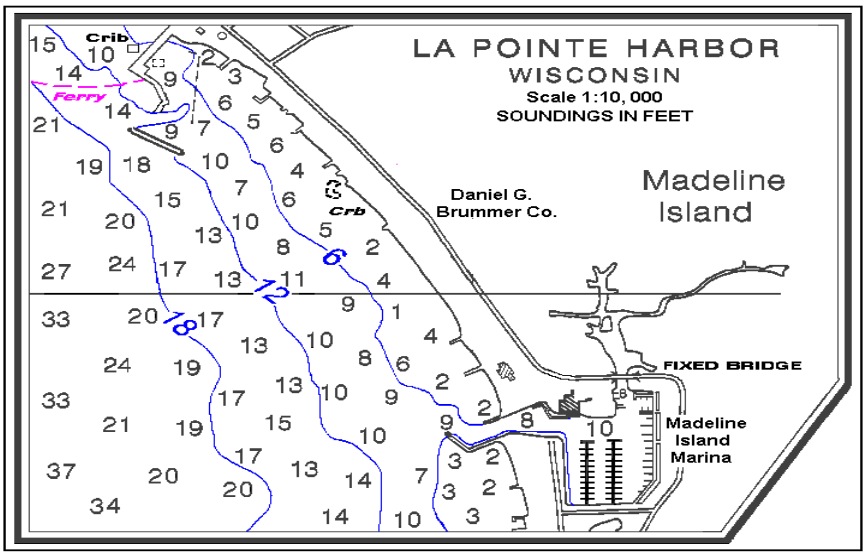


Figure 4-ES74

MAIN PANEL (Scale 1:60000)

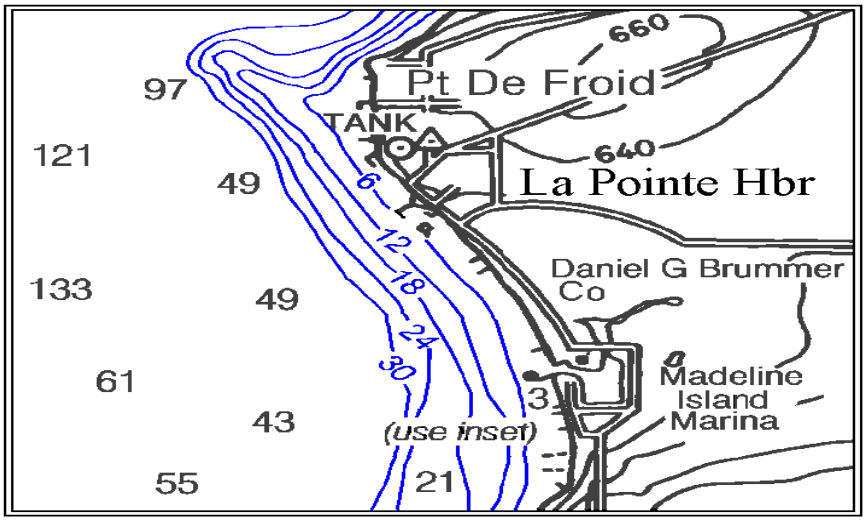


Figure 4-ES75

NOTE: Both Figures have been enlarged for demonstration purposes and are not true to scale.

SITUATION No. 4 (continued): **Portraying and Encoding Those Depth Contours In Which:**
The Depth Contour Intervals Between An Inset
And The Main Panel Do Not Agree

*(Refer to **Figures** 4-ES74 and 4-ES75)*

✧ **Comments:**

1. The two (2) chart extractions on the previous page both represent the geographic area of La Pointe Harbor, Wisconsin. However, the inset at a scale of 1:10,000 has a depth contour interval of 6, 12, 18 (feet) and the main panel, at a scale of 1:60,000 has a depth contour interval of 6, 12, 18, 24, 30 (feet).
THIS SITUATION IS CARTOGRAPHICALLY INCORRECT.

   In accordance with MCD charting policies and procedures, (see Nautical Chart Manual, Section 4.1) insets or other large scale charts portray more detailed information about a particular geographic area than do their smaller scale counterparts. As the scale of a chart is reduced, information from the larger scale portrayal is eliminated and generalized. Therefore, by MCD charting policy, **more** information should be portrayed in on the inset ***(Figure 4-ES74)*** than is portrayed on the main panel ***(Figure 4-ES75)*.**

2. If during the ENC portrayal and encoding of depth contours, the above situation is discovered:

   The situation should immediately be brought to the attention of the appropriate raster production team for resolution. If a resolution has not been provided (by the raster production team) in a reasonable amount of time, the discrepancy shall be brought to the attention of the Quality Assurance Plans and Standards Branch (QAPSB) who shall then issue an official MCD discrepancy report identifying the charting error to be corrected.

SITUATION No. 4 (continued): **Portraying and Encoding Those Depth Contours In Which:**
The Depth Contour Intervals Between An Inset
And The Main Panel Do Not Agree

*(Refer to **Figures** 4-ES74 and 4-ES75)*

✧ **Comments** (continued):

3. *" A Tactical Recommendation During the * Interim ":*
(** Interim refers to the period between the time the cartographic error is brought to the attention of the appropriate raster production team and the time a resolution is delivered to the ENC project.*)

Continue with the data collection and encoding of all depth contours up to and excluding the depth contours in question. When a resolution has been received from the raster production team, proceed accordingly.

4. *" A Little Deductive Reasoning ":*

For this particular chart, the 24 and 30 foot depth contours were charted throughout the entire main panel. Research also provided proof that the 24 and 30 foot depth contours had at one time been charted on this particular inset. Therefore, it can probably be concluded that during a subsequent hydro compilation session, for the inset, the 24 and 30 foot depth contours were erroneously omitted. The collection and encoding of the 24 and 30 foot depth contours from the main panel can probably continue during the *interim; and the collection of the omitted curves (for the inset) can be completed when a resolution from the raster production team has been received.

SITUATION No. 5:

Portraying and Encoding Those Depth Contours In Which:

The Depth Contour Intervals Between Overlapping and Same Scale Charts Do Not Agree

✧ Introduction:

If the depth contour intervals between overlapping and same scale charts do not agree, this means:

1. there are more (or less) depth contours on one chart than the other, or

2. the depths units are different for each overlapping chart (e.g. feet versus fathoms etc.)

When confronted with either of these situations during the ENC collection and encoding processes, the chart which shall be designated the primary (official) source of the overlapping data must first be determined to properly encode the additional (or not encode the omitted) depth contours in the overlap area. *(Please refer to Section 2.30.4.2 of the NOS/ENC Object Specifications for the full procedures on determining a primary chart from overlapping and same scale charts.)*

By determining the primary chart, the chart from which the depth contours shall be collected exactly *"as charted"* has been identified. To be collected exactly *"as charted"* means that the only depth contours to be digitized in the overlapping area shall be those that are actually charted on the primary chart. Those which may fall in the overlapping area solely because they exist on an adjoining and overlapping chart **are not** to be digitized.

(The remainder of this page is intentionally blank.)

SITUATION No. 5 (continued): **Portraying and Encoding Those Depth Contours In Which:** The Depth Contour Intervals Between Overlapping and Same Scale Charts Do Not Agree

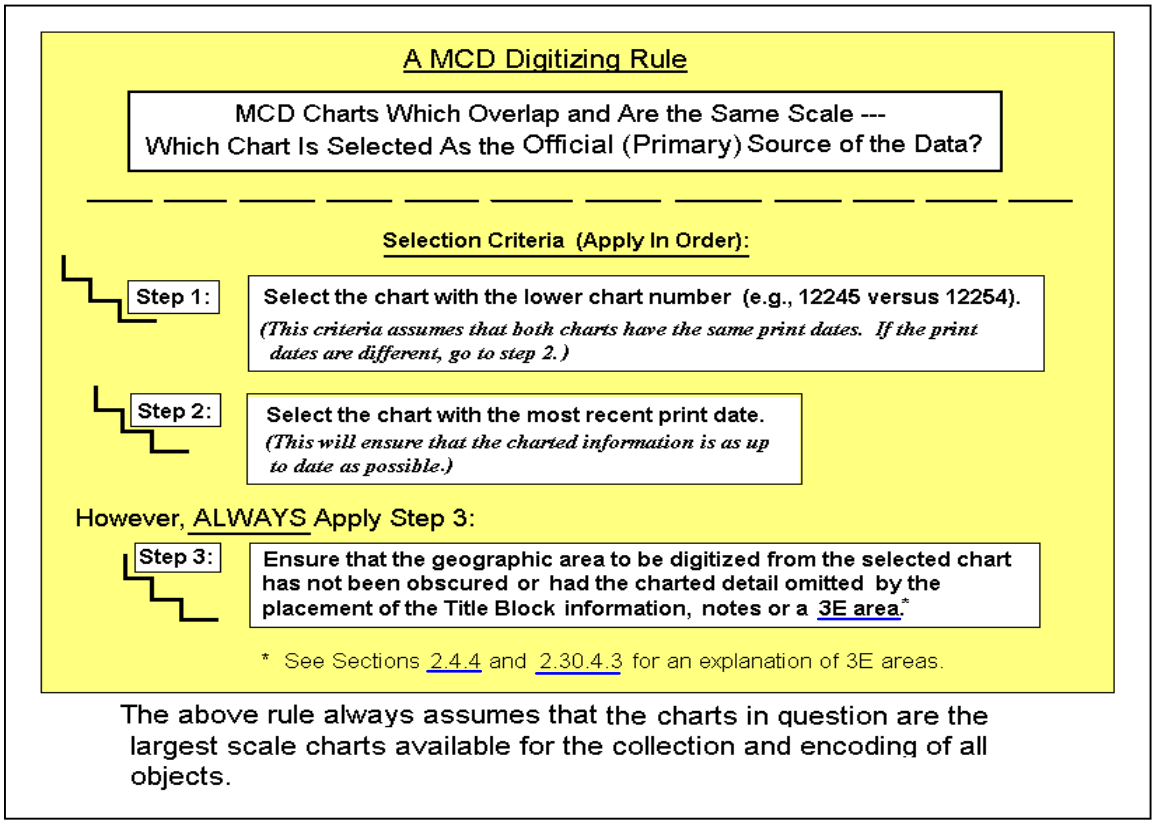


Figure 4-ES76

Note: If during step 3, the geographic area to be digitized from the selected chart **has** been obscured or had charted detail omitted by the placement of the Title Block information, notes or a 3E area, then that specific area may have to be collected and encoded from the alternate chart.

Note: These steps would not only apply in the selection of the appropriate chart for the collection and encoding of depth contours, but also for the collection and encoding of **all** ENC objects which shall have a nautical chart as its source.

SITUATION No. 5 (continued): **Portraying and Encoding Those Depth Contours In Which:**
The Depth Contour Intervals Between Overlapping and Same Scale Charts Do Not Agree

Example: Which Additional Depth Contours Shall Be Digitized or Omitted in the Overlap Area?

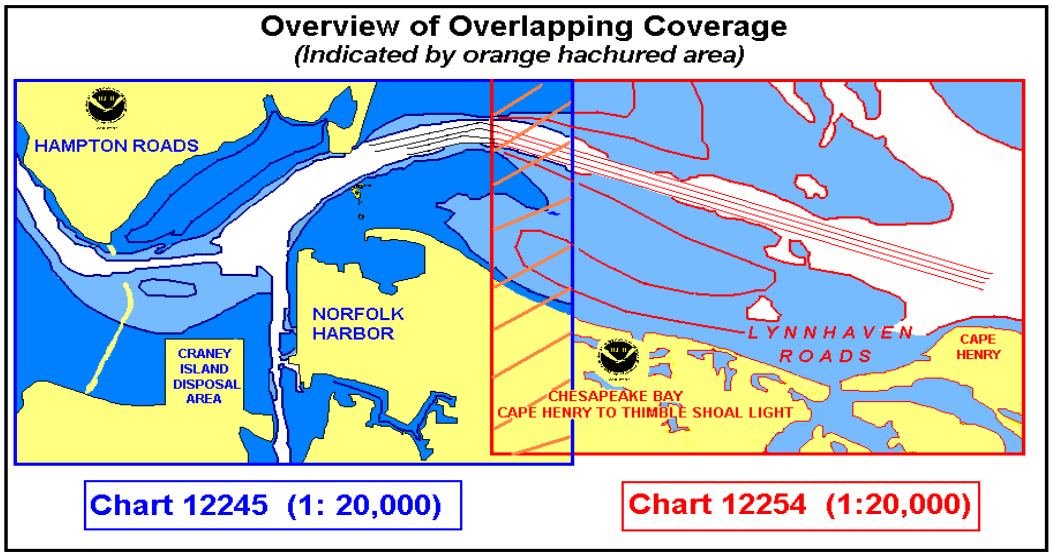


Figure 4-ES77

1. ***Figure 4-ES77*** presents two (2) MCD charts, chart 12245 and chart 12254. Assume the following facts:

   - these are the only two MCD charts which affect the geographic area of Hampton Roads to Cape Henry,
   - these charts represent the largest scale chart coverage available, and
   - both charts have the same print date

   As indicated by the orange hachured lines, the two (2) charts overlap in the center of the Figure

   Chart 12245 is outlined with a blue border and has information charted primarily in blue; chart 12254 is outlined with a red border and has its information charted primarily in red.

SITUATION No. 5 (continued): **Portraying and Encoding Those Depth Contours In Which:** The Depth Contour Intervals Between Overlapping and Same Scale Charts Do Not Agree

Example (continued): Which Additional Depth Contours Shall Be Digitized or Omitted in the Overlap Area?

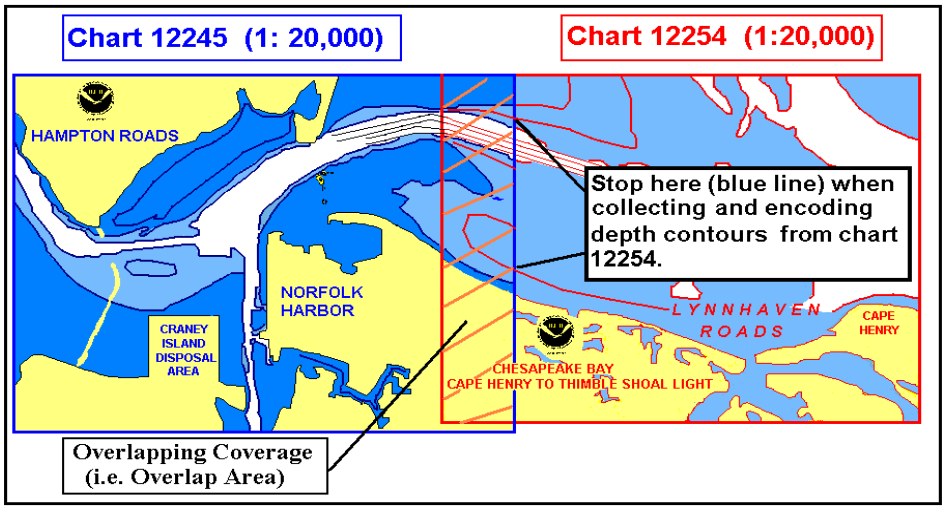


Figure 4-ES78

2. By following the steps listed in ***Figure 4-ES76***, **chart 12245 shall be designated the primary source document.** This means that the depth contours in the overlap area shall be collected and encoded from chart 12245 exactly *"as charted"* . The depth contours which are charted on the alternate chart (chart 12254) shall only be collected and encoded up to the boundary of the primary chart---chart 12245. See ***Figure 4-ES78*** above.

"As Charted" Demonstrated (Refer to ***Figure 4-ES79*** on the following page.)

3. If we were to enlarge a section of the overlapping area, as illustrated in ***Figure 4-ES79***, we will notice that in Illustration No. 2, the primary chart (12245) does **not** have a 24 foot depth contour charted, whereas, the alternate chart (12254) does. We shall also notice in Illustration No. 2, that a portion of the 24 foot depth contour extends from chart 12254 onto the overlap area.

4. To collect and encode the depth contours from chart 12245 (our primary chart) exactly *"as charted"*, would mean to **not** collect the portion of the 24 foot depth contour which extends onto the overlap area. This is because the 24 foot depth contour is **not** a current depth contour interval on chart 12245 (i.e., chart 12245 as currently charted does not include the 24 depth contour interval).

SITUATION No. 5 (continued): **Portraying and Encoding Those Depth Contours In Which:** The Depth Contour Intervals Between Overlapping and Same Scale Charts Do Not Agree

Example (continued): Which Additional Depth Contours Shall Be Digitized or Omitted in the Overlap Area?

Illustration No. 1

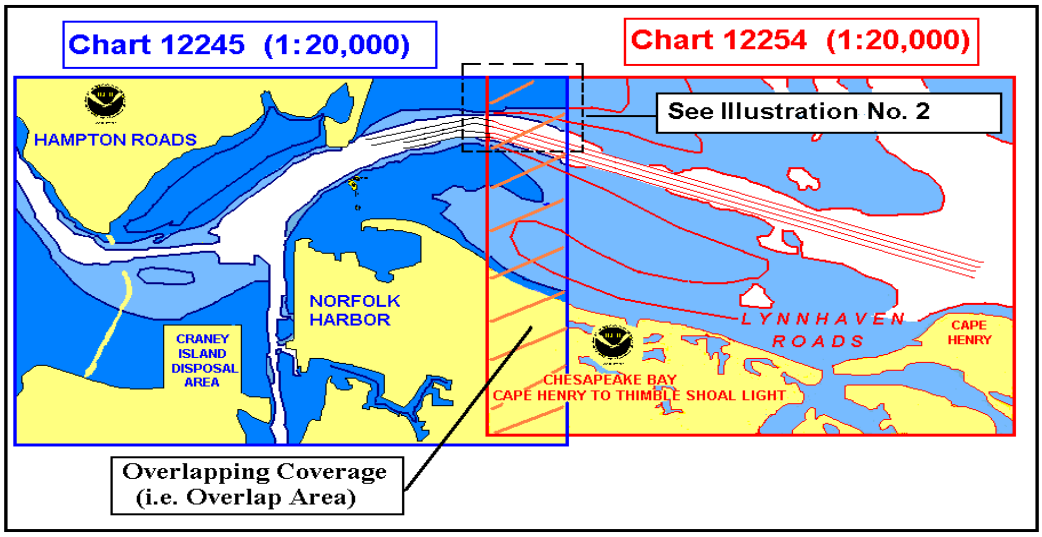
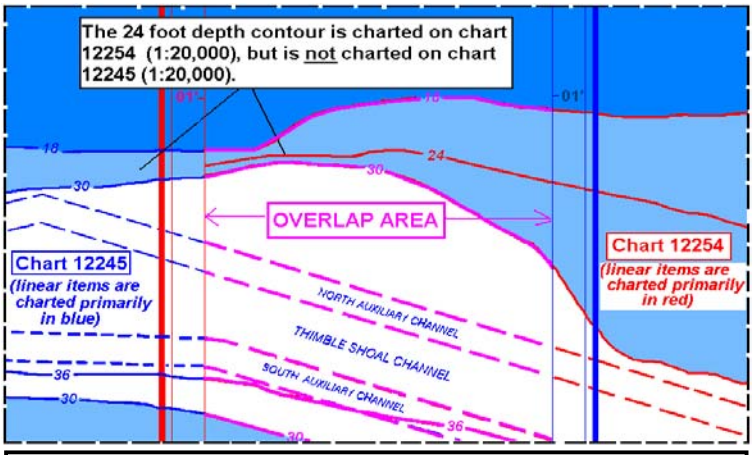


Illustration No. 2



Enlargement of Outlined Area from Illustration No. 1. Objects charted on both 12245 and 12254 appear in magenta.

Figure 4-ES79

SITUATION No. 5 (continued): **Portraying and Encoding Those Depth Contours In Which:** The Depth Contour Intervals Between Overlapping and Same Scale Charts Do Not Agree

Example (continued): Which Additional Depth Contours Shall Be Digitized or Omitted in the Overlap Area?

5. ***(RE: Figure 4-ES80** below.)* The 24 foot depth contour **shall** be collected and encoded from chart 12254, but only up to the boundary of chart 12245.

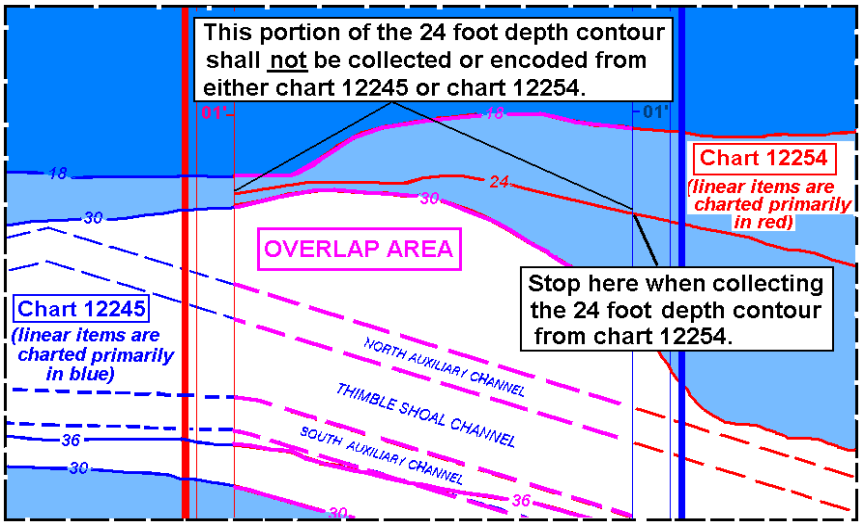


Figure 4-ES80

(The remainder of this page is intentionally blank.)

SITUATION No. 5 (continued): **Portraying and Encoding Those Depth Contours In Which:** The Depth Contour Intervals Between Overlapping and Same Scale Charts Do Not Agree

Example (continued): Which Additional Depth Contours Shall Be Digitized or Omitted in the Overlap Area?

6. **SUMMARY:**

Portraying depth contours which are charted on overlapping charts and which have different depth contour intervals:

A. Overlapping Charts/Same Depth Units

1. Determine the primary chart. *[Reference: **Figure 4-ES76**]*

2. Collect and encode all depth contours from the primary chart exactly *"as charted"*.

   a. If the primary chart has the additional depth contours, and the alternate chart does not, collect and encode **all** of the depth contours from the primary chart.

   b. If the primary chart does **not** have the additional depth contours, do **not** collect the portion of the additional depth contours which may fall in the overlap area solely because of their existence on an adjoining and overlapping chart.

3. If the alternate chart is the chart which contains the additional depth contours, collect the additional depth contours from the alternate chart, **but only up to the boundary of the primary chart involved.** *[Reference: **Figure 4-ES80**]*

B. Overlapping Charts/Different Depth Units

1. Determine the primary chart. *[Reference: **Figure 4-ES76**]*

2. Collect and encode all depth contours from the primary chart exactly *"as charted"*.

3. Only collect the depth contours from the alternate chart up to the boundary of the overlapping primary chart involved.

SITUATION No. 6: **When to Continue (or Not Continue) a Depth Contour Through Another Nautical Feature or ENC Object**

✧ **Introduction:**

Several *Figures* follow which represent a cross-section of situations in which a depth contour shall or shall not be continued through another nautical feature or ENC object.

The examples provided are not by any means, a comprehensive list, and are only being presented to serve as a guide when a similar or identical situation is encountered. The red lines which are drawn on several of the *Figures* indicate the recommended path for connecting a depth contour which has been disjoined because of the placement of type and/or symbology.

✧ **Parts of Situation No. 6**

Situation No. 6 has been divided into three (parts).

Part I will provide examples of nautical features through which depth contours shall **always** be continued when digitizing.

Part II will provide example of nautical features through which depth contours shall not be continued when digitizing.

Part III will provide examples of the appropriate depictions of depth contours when they are associated with channels (i.e. dredged areas).

SITUATION No. 6 (continued): **When to Continue (or Not Continue) a Depth Contour Through Another Nautical Feature or ENC Object**

✧ **When To Connect A Disjoined Depth Contour With A Short Line Or To A Boundary of An Adjoining ENC Object**

The standard which has been established by the Quality Assurance Plans and Standards Branch (QAPSB) for use as a criterion in the determination of whether to connect a disjoined depth contour **with** a short line segment or **to** a boundary of an adjoining ENC object has been entitled the *Maximum Line Specification*.

This standard shall not apply to those nautical features which have been identified in PART I as always having the depth contour continued through its geometry.

This *Maximum Line Specification* states the following:

When two disjoined ends of a depth contour can be connected with a line segment measuring **5.0 mm or less** in its maximum dimension at chart scale, the depth contour shall be *continued* directly through the ENC object and encoded as a depth contour. (See ***Figure 4-ES81***)

When the connection of two disjoined ends of a depth contour will require a line segment measuring **5.0 mm or greater** in its maximum dimension at chart scale, then the ends of the depth contour shall be *connected* to the nearest ENC object limits which most closely follow the pattern of the depth contour.[See ***Figures 4-ES82 and 4-ES83***]. These limits shall also form a boundary of the associated Depth Area. *(See Section 4.30.12 for more information on the encoding of Depth Areas.)*

(The remainder of this page is intentionally blank.)

SITUATION No. 6 (continued): **When to Continue (or Not Continue) a Depth Contour Through Another Nautical Feature or ENC Object**

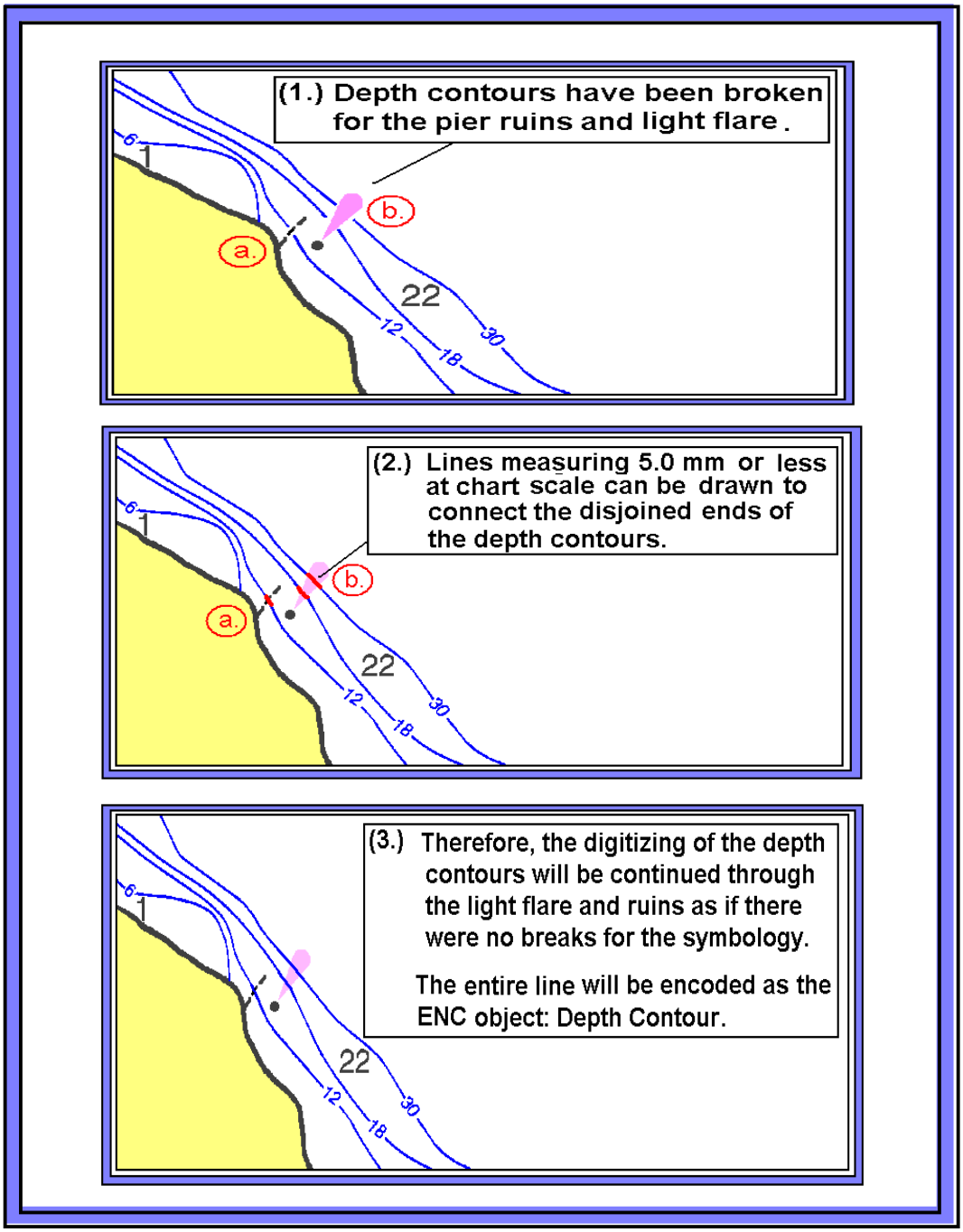


Figure 4-ES81

SITUATION No. 6 (continued): **When to Continue (or Not Continue) a Depth Contour Through Another Nautical Feature or ENC Object**

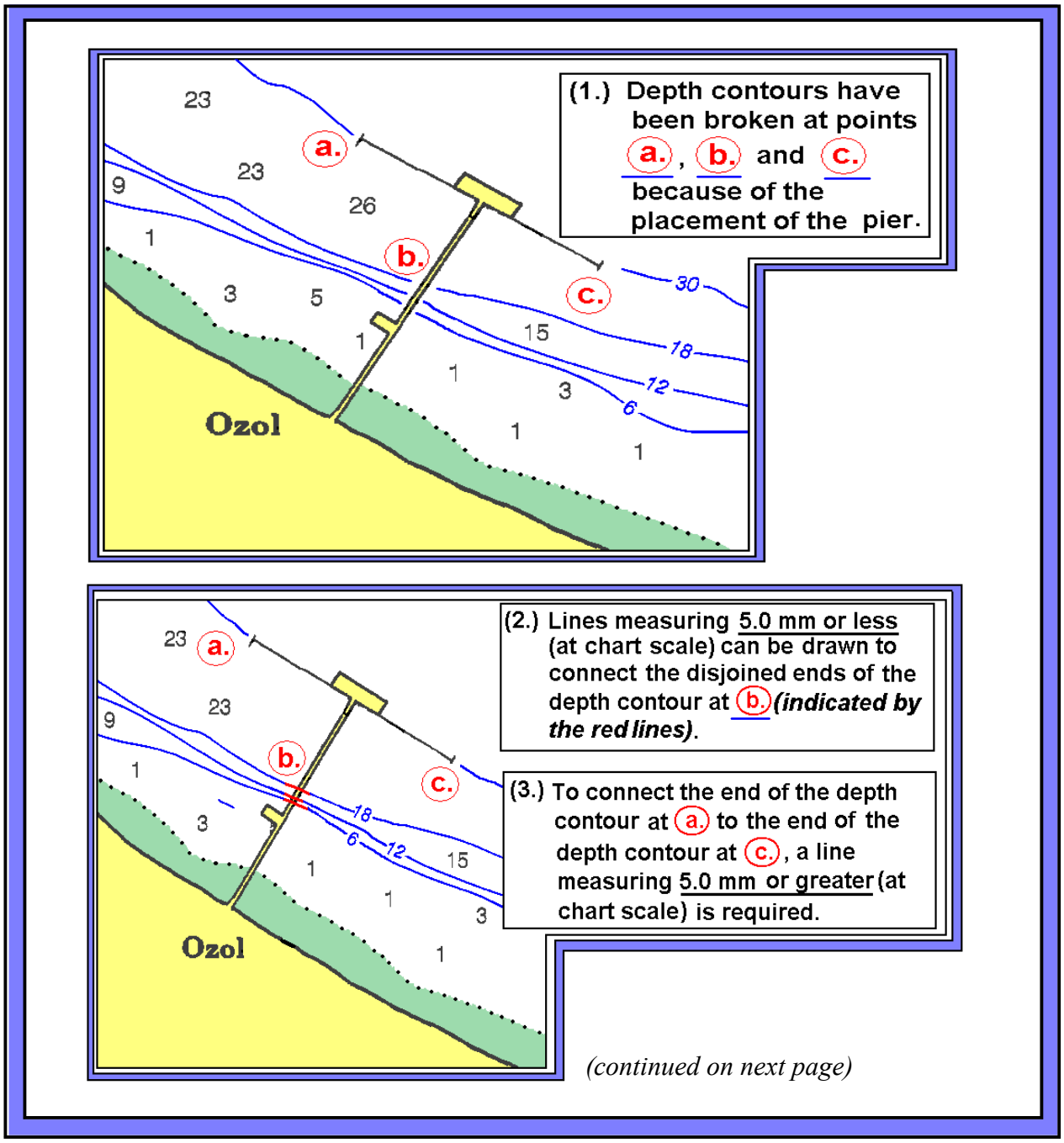


Figure 4-ES82

SITUATION No. 6 (continued): When to Continue (Or Not Continue) a Depth Contour Through Another Nautical Feature or ENC Object

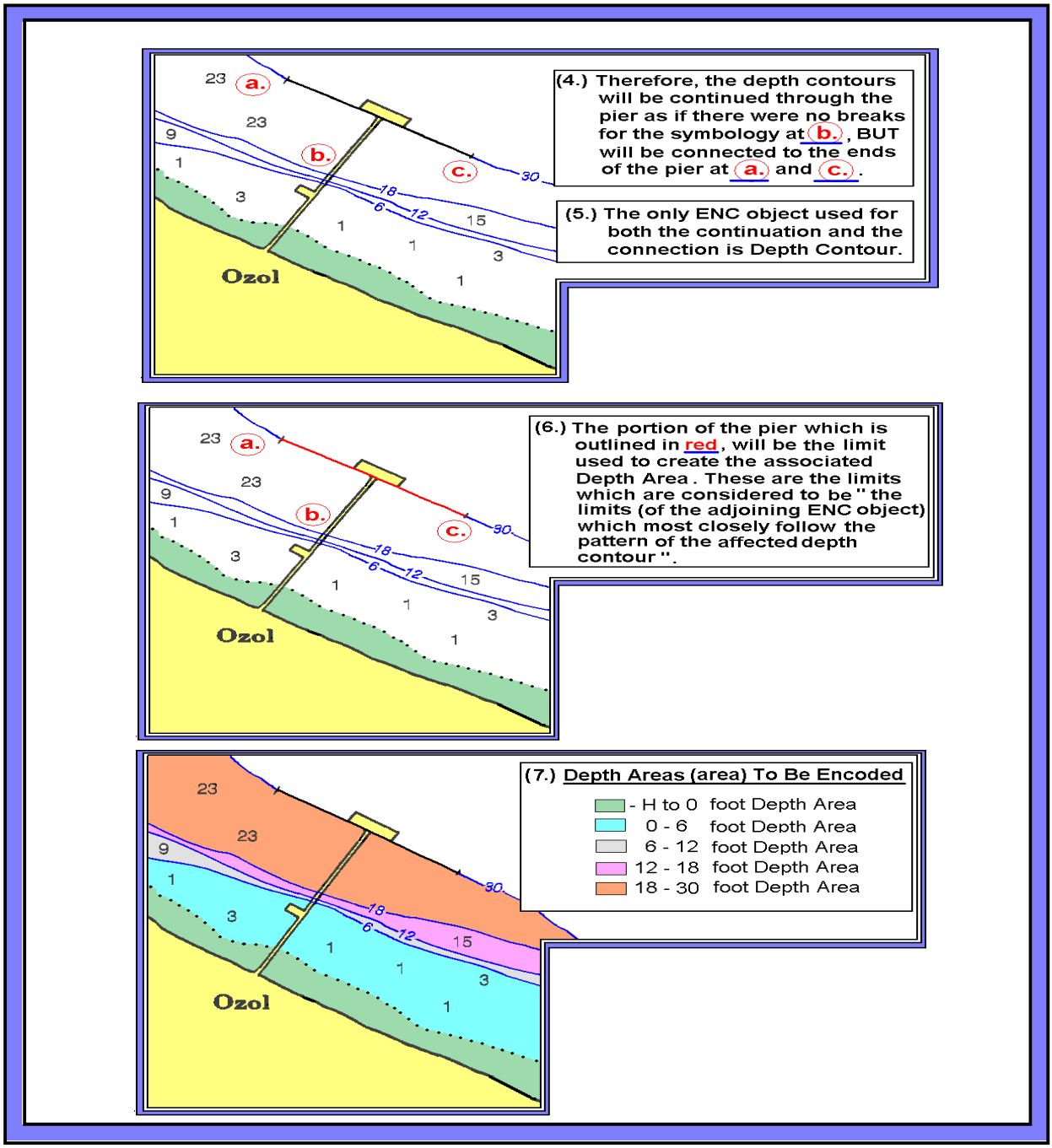
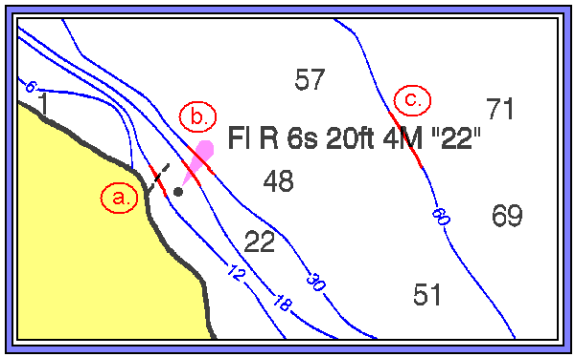


Figure 4-ES83

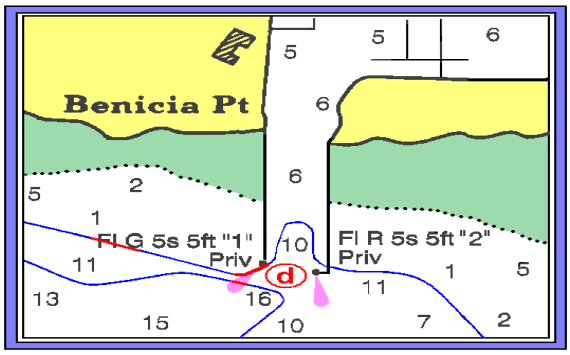
SITUATION No. 6 (continued): **When to Continue (or Not Continue a) Depth Contour Through Another Nautical Feature or ENC Object**

PART I: **Depth Contours ARE Continued Through.....**

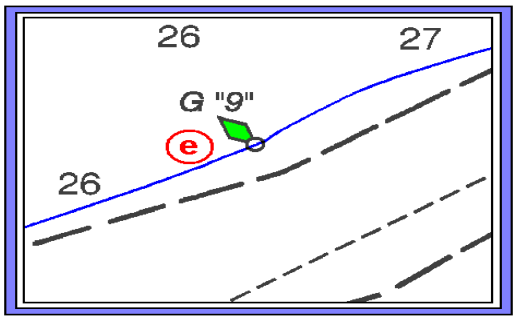
Single Line Piers, Light Flares and Text



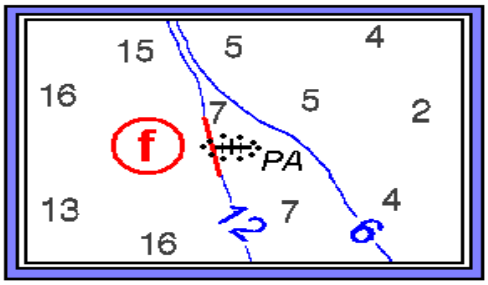
The Positional Dot of a Light



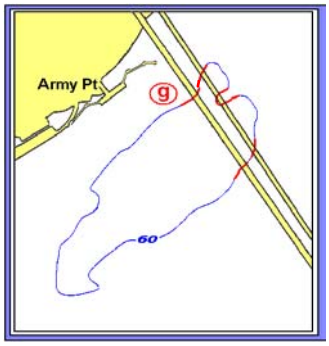
The Positional Circle of a Buoy



Dangerous, Non-Dangerous and Visible Wrecks



Bridge Symbology



Platforms, Cribs and MCD Low Water Symbology

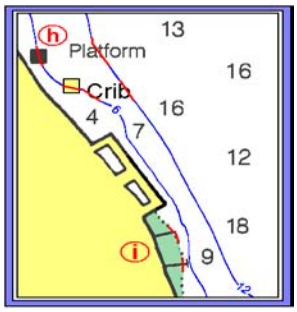
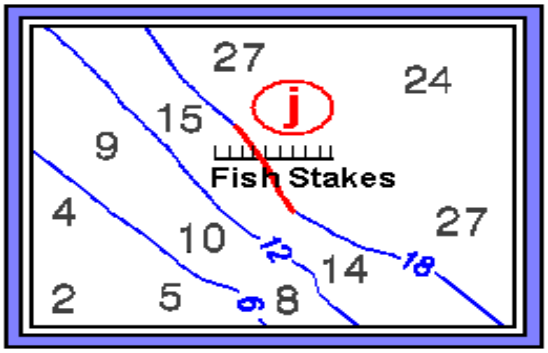


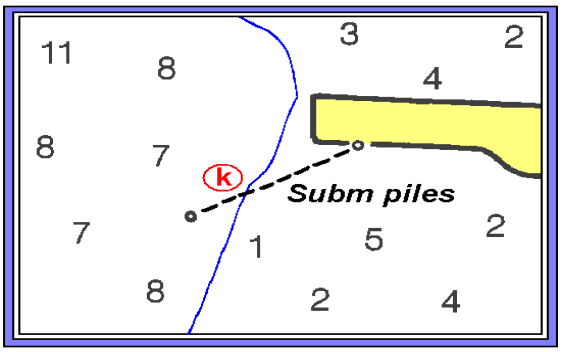
Figure 4-ES84

SITUATION No. 6 (continued): When to Continue (or Not Continue) a Depth Contour Through Another Nautical Feature or ENC Object

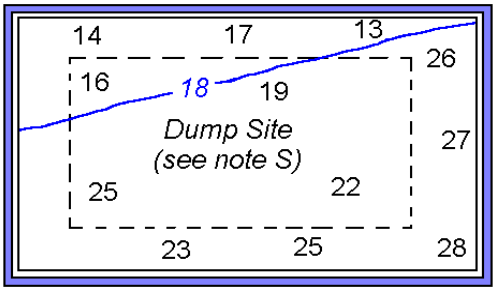
PART I (continued): Depth Contours ARE Continued Through.....

Fish Stakes and Other Linear Obstructions

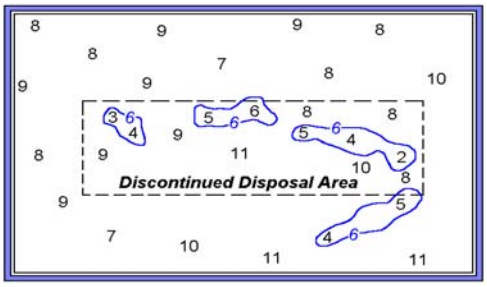




EPA Dump Sites



Disposal Areas (USACE)



Dumping Grounds (USACE)
(containing soundings and depth contours)

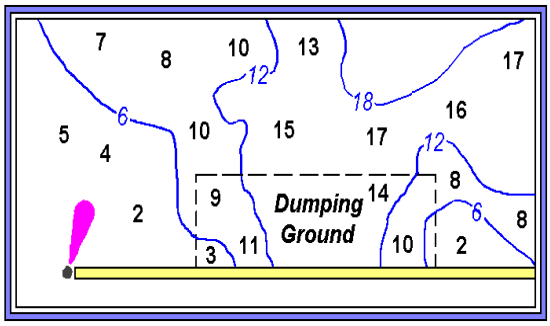


Figure 4-ES85

SITUATION No. 6 (continued): **When to Continue (or Not Continue) a Depth Contour Through Another Nautical Feature or ENC Object**

PART I (continued): **Depth Contours ARE Continued Through.....**

*(Refer to **Figures** 4-ES84 and 4-ES85)*

✧ **Comments:**

1. **Single Line Piers, Light Flares and Text**

   a. Depth contours shall always be continued through single line piers. This includes single line piers which are bare at the shoreline plane of reference and which are (shall be) charted in ruins.

   b. Depth contours shall always be continued through light flares, buoy fills and daybeacons.

   c. Depth contours shall always be continued through charted text.

2. **The Positional Dot of a Light**

   d. Depth contours shall always be continued through the positional dot of a light.

3. **The Positional Circle of a Buoy**

   e. Depth contours shall always be continued through the positional circle of a buoy.

4. **Dangerous, Non-Dangerous and Visible Wrecks**

   f. Depth contours shall be continued through dangerous, non-dangerous and visible wreck symbols **only if these features are to be portrayed as point objects.** Depth contours are **not** to be continued if the actual delineation of these features is to be portrayed (i.e., as an area object).

SITUATION No. 6 (continued): **When to Continue (or Not Continue) a Depth Contour Through Another Nautical Feature or ENC Object**

PART I (continued): **Depth Contours ARE Continued Through.....**

*(Refer to **Figures** 4-ES84 and 4-ES85)*

✧ **Comments** (continued):

5. **Bridge Symbology**

g. The *maximum line specification* (see page 635) shall also apply when deciding whether or not to continue a depth contour through a bridge symbol.

In the (*Figure 4-ES84*) graphic containing the bridge symbology, a line measuring 5.0 mm or less can be drawn through the bridge to connect all disjoined portions of the 60' depth contour. Therefore, the depth contour will be continued through all affected areas of the bridge; and will not be connected to a bridge boundary.

6. **Platforms, Cribs and MCD Low Water Symbology**

h. Depth contours shall be continued through platform and crib symbols which are to be encoded as point objects only. This includes platforms and cribs which are active, in ruins, bare or submerged.

i. The MCD low water symbol shall be continued through single line piers if and only if the low water symbol has obviously been disjoined for the charting of another object. Do not connect a disjoined zero (0) value depth contour if a low water tint area is the intended object. The low water tint line will be collected as a individual depth contour, and will have a *Quality of Position* attribute value equal to "approximate". (Also see Situation No. 2)

7. **Fish Stakes and Other Obstructions Portrayed with a Single Line**

j., k. Generally depth contours shall be continued through Fish Stake symbols and other obstructions charted with a linear symbol (e.g., piling, ruins). An example of a situation in which a depth contour may not be continued through a linear object is when the linear object is used to define a depth area.

SITUATION No. 6 (continued): **When to Continue (or Not Continue) a Depth Contour Through Another Nautical Feature or ENC Object**

PART I (continued): **Depth Contours ARE Continued Through.....**

*(Refer to **Figure 4-ES85**)*

✧ **Comments** (continued):

8. **Dumping Areas: EPA Dump Sites, USACE Disposal Areas and USACE Dumping Grounds**

Please refer to Nautical Chart Manual Section 4.14.5 for a complete explanation of all dumping areas shown on NOS charts.

Generally, if depth contours are charted (or to be charted) as going through a dumping area, then for ENC purposes these depth contours shall also be collected as such.

The three types of dumping areas in which depth contours (and soundings) are retained within the limits (and therefore are affected by the procedure mentioned in the above paragraph) are EPA Dump Sites, USACE Disposal Areas and *some* USACE Dumping Grounds. In accordance with existing MCD policy, USACE Dumping Grounds shall be charted with soundings and depth contours within their boundaries only "when existing depths in the dumping grounds indicate that future dumping will not cause sufficient shoaling to create a danger to navigation..."

Therefore, during the ENC encoding processes, the cartographer may encounter:

a. some USACE Dumping Grounds which contain soundings and depth contours within their limits; and

b. some USACE Dumping Grounds which only contain blue tint.

(See Situation No. 6-PART II-B of Section 4.30.13 for an example of how to encode depth contours which approach a USACE Dumping Ground which does not contain soundings and depth contours within its limits.)

SITUATION No. 6 (continued): **When to Continue or Not Continue A Depth Contour Through Another Nautical Feature or ENC Object**

PART II - A: **Depth Contours ARE NOT Continued Through Obstructions Charted As Area Objects**

Illustration No. 1

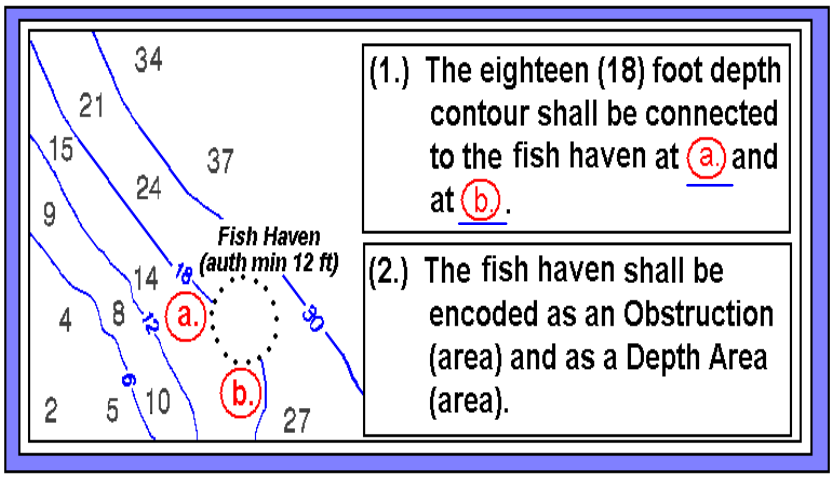


Illustration No. 2

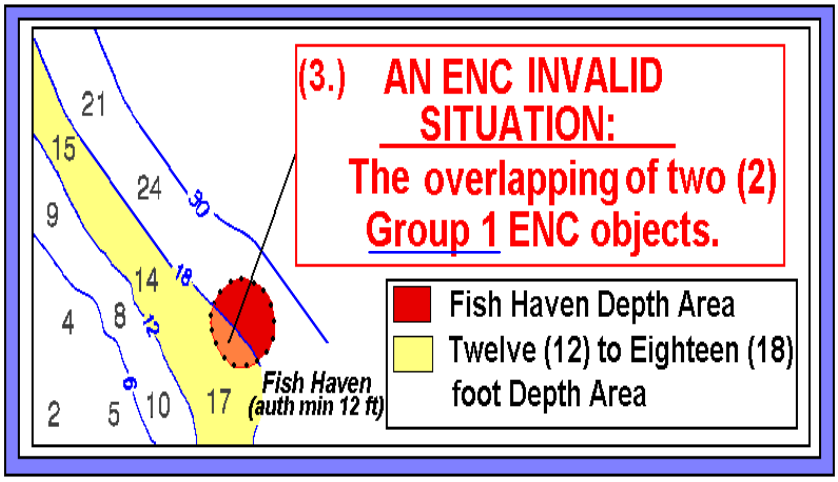


Figure 4-ES86 (PART I)

SITUATION No. 6 (continued): **When to Continue or Not Continue A Depth Contour Through Another Nautical Feature or ENC Object**

PART II - A (continued): **Depth Contours ARE NOT Continued Through Obstructions Charted As Area Objects**

Illustration No. 3

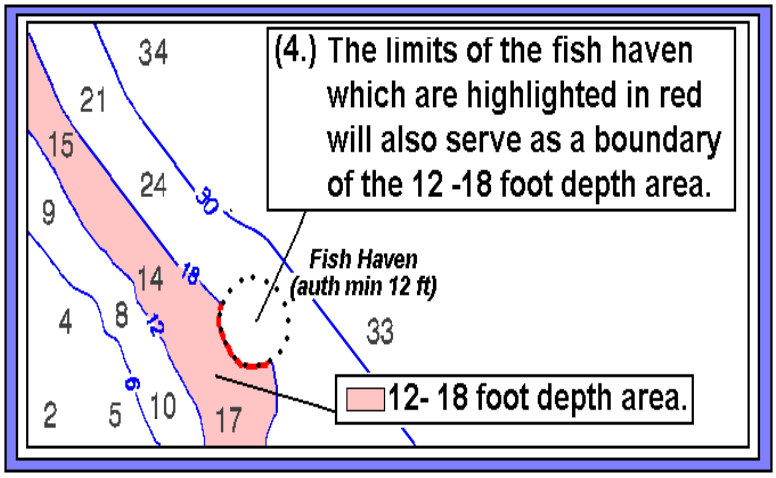


Illustration No. 4

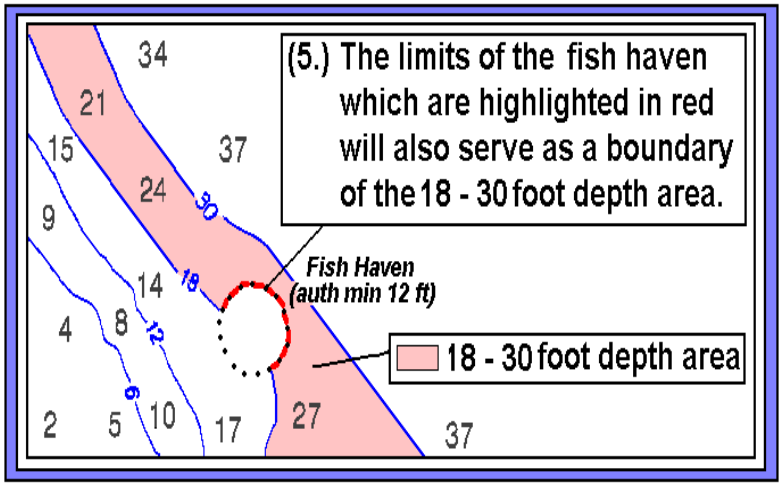


Figure 4-ES86 (PART II)

SITUATION No. 6 (continued): **When to Continue or Not Continue A Depth Contour Through Another Nautical Feature or ENC Object**

PART II - A (continued): **Depth Contours ARE NOT Continued Through Obstructions Charted As Area Objects**

*(Refer to the **Figure 4-ES86 -Parts I and II**)*

✧ The **ENC objects** associated with the portrayal of the depth contours in ***Figure 4-ES86 - Parts I and II*** are:

- Depth Contours (DEPCNT)
- Depth Area (DEPARE)
- Obstruction (OBSTRN)

✧ The **geometric primitives** of each affected object are:

- line (Depth Contour)
- area (Depth Area)
- area (Obstruction)

✧ **Comments:**

1. **(RE: Illustration No. 1)** Depth contours shall be *connected* to, and never *continued* through all obstructions which are to be collected as area objects.

   Depth contours are connected to all area obstructions in compliance with the S-57, Group 1 - "Skin of the Earth" specification. This specification states that all objects falling into the Group 1 category must provide total and continuous coverage of the earth and must not:

   - intersect with themselves
   - overlap each other, or
   - have gaps in coverage

   (NOTE: Although a depth contour is not a Group 1 object, its geometry will be used as a limit in the formation of the (required and associated) Group 1 object: Depth Area.

SITUATION No. 6 (continued): **When to Continue or Not Continue A Depth Contour Through Another Nautical Feature or ENC Object**

PART II - A (continued): **Depth Contours ARE NOT Continued Through Obstructions Charted As Area Objects**

*(Refer to the **Figure 4-ES86 -Parts I and II**)*

✧ **Comments** (continued):

2. If the 18 foot depth contour was to be continued through the area obstruction, (as indicated in Illustration No. 2), this would create an overlap of two Group 1 Depth Area objects ---- the depth area created for the fish haven and the depth area created between the 12 and 18 foot depth contours. This situation would directly contradict the S-57 Group 1- "Skin of the Earth" "no overlapping" requirement and is considered an invalid situation within the ENC environment.

3. To form the proper boundaries of all depth areas affected by the existence of the fish haven and the 18 and 30 foot depth contours, one (1) limit of the fish haven shall also be encoded as a limit of the 12-18 foot depth area (the shaded portion in Illustration No. 3), and one (1) limit shall also be encoded as a limit of the 18-30 foot depth area. (the shaded portion in Illustration No. 4). *[Refer to the LAMPS2 User's Guide for information on splitting the limits (i.e. working with the primitives) of an area object.]* See Section 4.30.12 of this document for more information on the encoding of ENC Depth Areas.

SITUATION No. 6 (continued): When to Continue (or Not Continue) A Depth Contour Through Another Nautical Feature or ENC Object

PART II - B: Depth Contours ARE NOT Continued Through Dumping Grounds (Which Do Not Contain Soundings and Depth Contours)

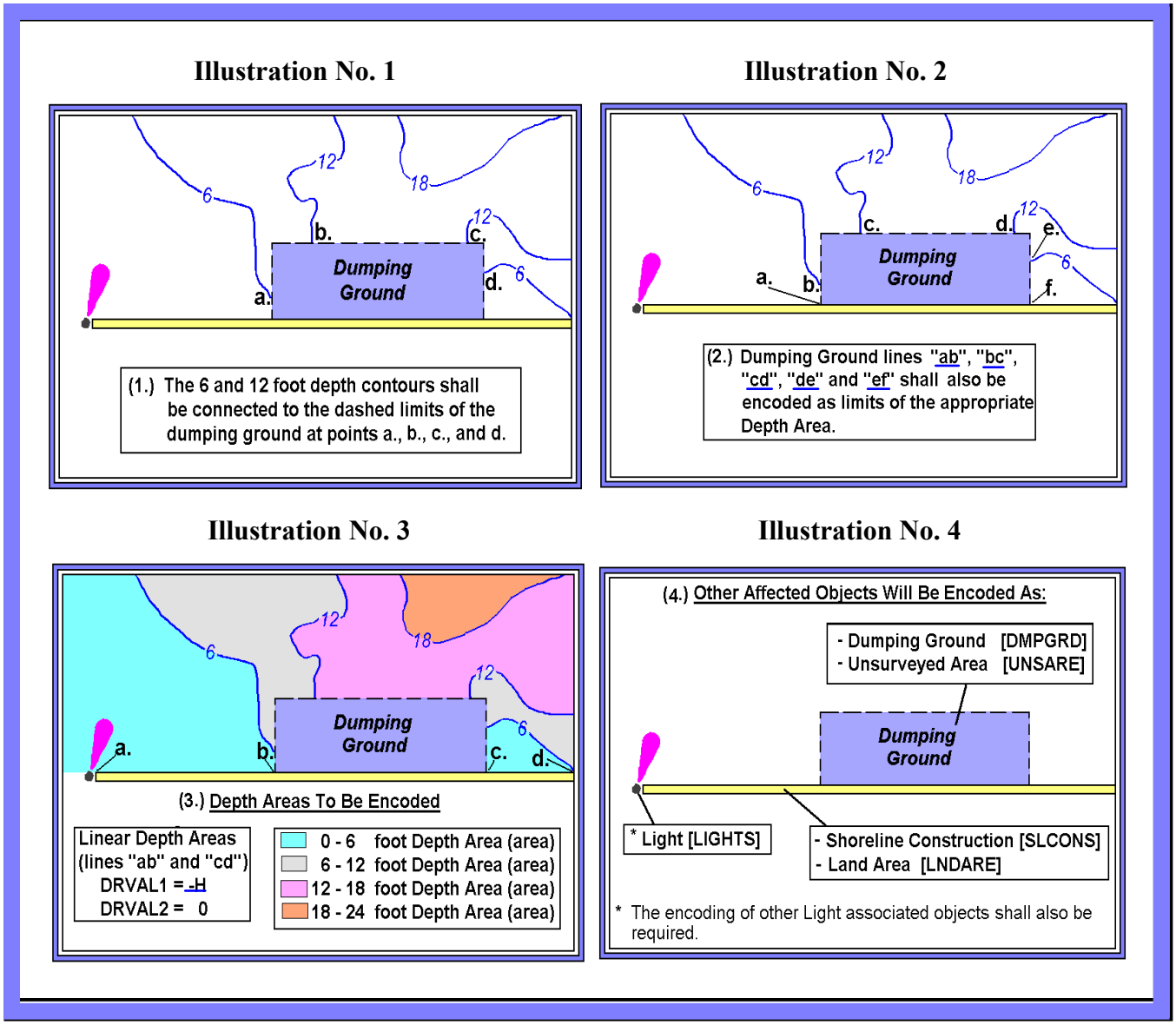


Figure 4-ES87

SITUATION No. 6 (continued): **When to Continue (or Not Continue) A Depth Contour Through Another Nautical Feature or ENC Object**

PART II - B (continued): **Depth Contours ARE NOT Continued Through Dumping Grounds Which Do Not Contain Soundings and Depth Contours)**

*(Refer to **Figure 4-ES87**)*

✧ The **ENC objects** associated with the portrayal of the depth contours in ***Figure 4-ES87*** are:

- Depth Contour (DEPCNT)
- Depth Area (DEPARE)
- Dumping Ground (DMPGRD)
- Unsurveyed Area (UNSARE)
- Shoreline Construction (SLCONS)
- Land Area (LNDARE)
- Lights (LIGHTS)
- *The appropriate light structure*

✧ The **geometric primitives** of each affected object are:

- line (Depth Contour)
- area (Depth Area)
- line (Depth Area)
- area (Dumping Ground)
- area (Unsurveyed Area)
- line (Shoreline Construction)
- area (Land Area)
- point (Light)
- point (*The appropriate light structure*)

SITUATION No. 6 (continued): **When to Continue (or Not Continue) A Depth Contour Through Another Nautical Feature or ENC Object**

PART II - B (continued): **Depth Contours ARE NOT Continued Through Dumping Grounds (Which Do Not Contain Soundings and Depth Contours)**

*(Refer to **Figure 4-ES87**)*

✧ **Comments:**

1. Dumping Grounds which do not contain soundings and depth contours are considered to be a danger to navigation because of the possibility of future dumping within its limits.. (See also Situation No. 6, Part I -Comment No. 8)

2. **(RE: Illustration No. 1)** Depth contours adjoining a dumping ground (which does not contain soundings and depth contours) shall not be continued through the dumping ground, but shall be digitized as having been connected to the dumping ground limits.

3. **(RE: Illustration No. 2)** The line segments which are formed by connecting the depth contours to the dumping ground boundaries are also to be encoded as boundaries of the associated ENC Depth Area (areas).

RE: Illustration No. 3 :

4. Assuming the border of the illustration is the cell boundary, the appropriate (cell boundary) portions will also be encoded as Depth Area (areas).

5. Portions of the breakwater (in addition to being encoded as Shoreline Construction) will also be encoded as linear depth areas [i.e. Depth Area (line)]. The purpose of these linear depth areas is to eliminate the discontinuity in depth range values between the breakwater (having a depth range value of -H) and the 6 foot depth contour. Please refer to Section 4.30.12 of the *NOS/ENC Object Specifications* for the complete details on encoding ENC Depth Areas.

SITUATION No. 6 (continued): **When to Continue (or Not Continue) A Depth Contour Through Another Nautical Feature or ENC Object**

PART II - B (continued): **Depth Contours ARE NOT Continued Through Dumping Grounds Which Do Not Contain Soundings and Depth Contours)**

*(Refer to **Figure 4-ES87**)*

✧ **Comments** (continued)**:**

RE: Illustration No. 4:

6. When encoding a light object, the cartographer is to also encode all objects which are "co-located" with the light (e.g. fog signal, topmark, buoy, etc.), or which support the light (e.g., daymark, tower, beacon). If the supporting structure is unknown, then the ENC object Pile [PILPNT] shall be encoded as the supporting structure and given the same geographic location as the light. Please refer to the appropriate section(s) of the *NOS/ENC Object Specifications* for the complete details on encoding ENC Lights and their respective co-located or supporting structures.

7. In accordance with IHO/S-57 requirements, the Discontinued Dumping Ground must also be encoded with the Group 1 object Unsurveyed Area to ensure the ENC's continuous coverage of all associated Group 1 objects.

8. Also refer to the appropriate section of the *NOS/ENC Object Specifications* for the complete details on encoding ENC Shoreline Construction objects.

SITUATION No. 6 (continued): When to Continue (or Not Continue) A Depth Contour Through Another Nautical Feature or ENC Object

PART II - C: Depth Contours ARE NOT Continued Through Foul Areas

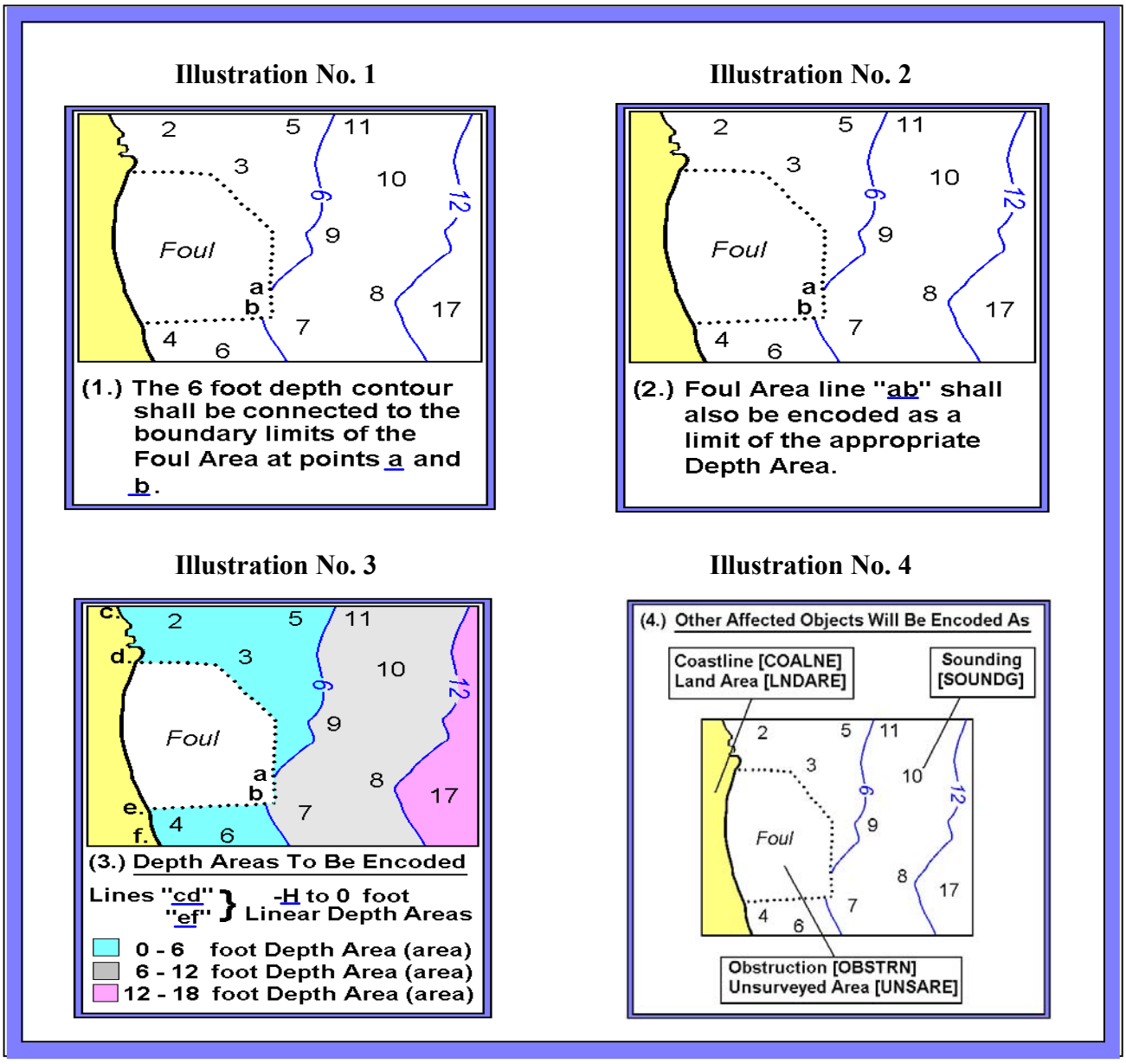


Figure 4-ES88

SITUATION No. 6 (continued): **When to Continue (or Not Continue) A Depth Contour Through Another Nautical Feature or ENC Object**

PART II - C (continued): **Depth Contours ARE NOT Continued Through Foul Areas**

*(Refer to **Figure 4-ES88**)*

✧ The **ENC objects** associated with the portrayal of the depth contours in ***Figure 4-ES88*** are:

–	Depth Contour	(DEPCNT)
–	Depth Area	(DEPARE)
–	Obstruction	(OBSTRN)
–	Unsurveyed Area	(UNSARE)
–	Coastline	(COALNE)
–	Land Area	(LNDARE)
–	Sounding	(SOUNDG)

✧ The **geometric primitives** of each affected object area:

–	line	(Depth Contour)
–	area	(Depth Area)
–	line	(Depth Area)
–	area	(Obstruction /i.e. Foul Area)
–	area	(Unsurveyed Area)
–	line	(Coastline)
–	area	(Land Area)
–	point	(Sounding)

✧ **Comments:**

1. **(RE: Illustration No. 1)** Depth contours which adjoin a foul area shall not be continued through the foul area, but shall be digitized as having been connected to the foul area.

2. **(RE: Illustration No. 2)** Line segment "ab" which is formed by connecting the 6 foot depth contour to the southeastern limits of the foul area, is also to be encoded as a limit of the 0-6 foot depth area [i.e. Depth Area (area)]

SITUATION No. 6 (continued): **When to Continue (or Not Continue) A Depth Contour Through Another Nautical Feature or ENC Object**

PART II - C (continued): **Depth Contours ARE NOT Continued Through Foul Areas**

*(Refer to **Figure 4-ES88**)*

✧ **Comments** (continued):

RE: Illustration No. 3:

3. Assuming the border of the illustration is the cell boundary, the appropriate portions (of the cell boundary) shall also be encoded as Depth Area (areas).

4. Two (2) linear depth areas [i.e., Depth Area (line)] shall also be encoded along the coastline at line segments "cd" and "ef". The purpose of these linear depth areas is to eliminate the discontinuity (in depth range values) between the coastline (having a depth range value of -H), and the 6 foot depth contour. The 0 value depth contour **must** be taken into account when encoding the depth areas for this particular ENC cell.

   Therefore, the depth range values of the two (2) linear depth areas formed at lines segments "cd" and "ef" are: DRVAL1 = -H
   DRVAL2 = 0

RE: Illustration No. 4:

5. Foul Areas, because they may contain rocks, boulders, coral, unidentified obstructions, heavy concentrations of kelp, or other navigation-impeding clutter are considered hazardous area objects and are not intended to be navigated by the mariner.

6. A foul area is charted on NOS charts with a dotted danger curve and labeled *"Foul"*. All foul areas are to be digitized as area features and are to be encoded as the ENC object Obstruction [OBSTRN].

SITUATION No. 6 (continued): **When to Continue (or Not Continue) A Depth Contour Through Another Nautical Feature or ENC Object**

PART II - C (continued): **Depth Contours ARE NOT Continued Through Foul Areas**

*(Refer to **Figure 4-ES88**)*

✧ **Comments** (continued):

(RE: Illustration No. 4):

7. The attribute *Category of Obstruction [CATOBS]* differentiates a foul area from other members of the obstruction class and shall be populated with the attribute value 6 (six) to properly identify the geometry.

8. A foul area shall also have its limits encoded as an Unsurveyed Area [UNSARE].

9. Please refer to the appropriate sections of the *NOS/ENC Object Specifications* for the full encoding details concerning Depth Areas, Obstructions, Coastline, Land Areas, Unsurveyed Areas and Soundings.

NATIONAL OCEAN SERVICE
Office of Coast Survey
Marine Chart Division

CARTOGRAPHIC ORDER 015/01 JUNE 18, 2001

FILE WITH NAUTICAL CHART MANUAL VOLUME 1, PART 1, SECTIONS 4.30.13, 4.30.14 AND 4.30.15

TO: All Cartographers
Marine Chart Division

SUBJECT: ENC Encoding of Sediment Traps

APPLICATION: All Nautical Charts

Effective immediately, the following attachment:

a. replaces pages 4-DC61 through 4-DC66,
b. replaces pages 4-DG7 through 4-DG8
c. adds pages 4-DG22.1 and 4-DG22.2
d. adds pages 4-DU1 through 4-DU20

in the Nautical Chart Manual, Volume 1, Part 1, Seventh (1992) Edition.

The attachment:

1. updates the pages in Section 4.30.13-Depth Contours affecting the ENC object Sediment Trap.

2. updates the "Index of Dredged Area Geometric Portrayals" (Section 4.30.14) to include the object Sediment Trap,

3. provides the appropriate NOS/ENC Sediment Trap encoding specification pages for Section 4.30.14 and (new) Section 4.30.15.

Pages 4-DC61 through 4-DC66 are to be inserted into the Nautical Chart Manual, Volume 1, Part 1, Chapter 4,(NOS/ENC Object Specifications-Section 4.30.13-Depth Contours), immediately after page 4-DC60.

Pages 4-DG7 through 4-DG8 are to be inserted into the Nautical Chart Manual, Volume 1, Part 1, Chapter 4,(NOS/ENC Object Specifications-Section 4.30.14-Dredged Areas), immediately after page 4-DG6.

Page 4-DG22.1 is to be inserted into the Nautical Chart Manual, Volume 1, Part 1, Chapter 4,(NOS/ENC Object Specifications-Section 4.30.14-Dredged Areas), immediately after page 4-DG22.

Pages 4-DU1 through 4-DU20 are to be inserted into the Nautical Chart Manual, Volume 1, Part 1, Chapter 4,(NOS/ENC Object Specifications)immediately after page 4-DG44.

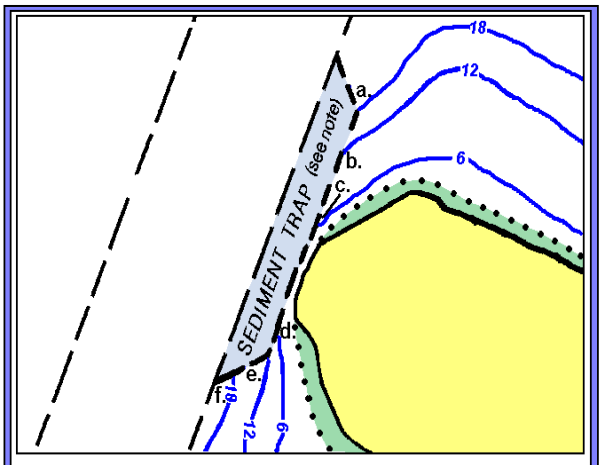
Attachment

Nicholas E. Perugini
Captain, NOAA
Chief, Marine Chart Division

SITUATION No. 6 (continued): **When to Continue (or Not Continue) A Depth Contour Through Another Nautical Feature or ENC Object**

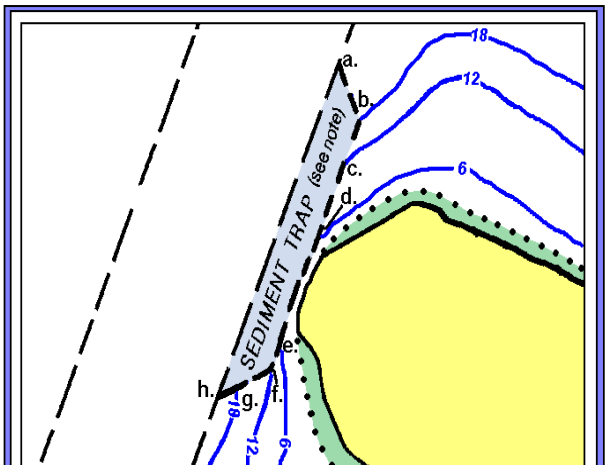
PART II - D: **Depth Contours ARE NOT Continued Through Sediment Traps**

Illustration No. 1



(1.) The 6, 12, and 18 foot depth contours shall be connected to the dashed boundary limits of the sediment trap at points a., b., c., d., e., and f.

Illustration No. 2



(2.) Sediment trap line segments "ab", "bc", "cd", "de", "ef", "fg" and "gh" shall also be encoded as limit lines of the appropriate depth areas.

Illustration No. 3

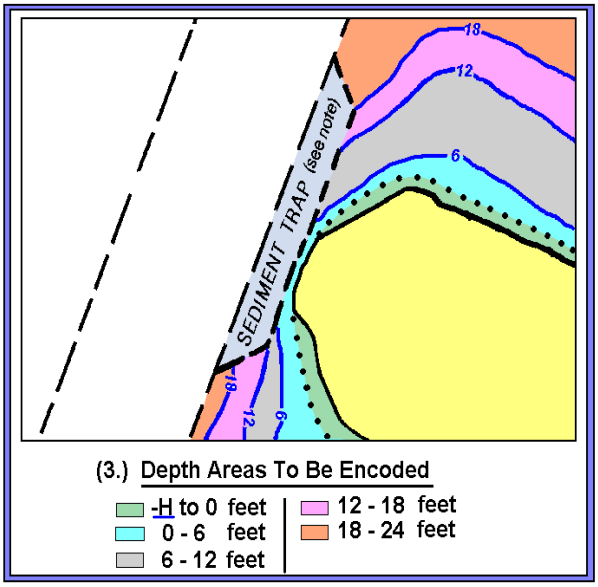


Illustration No. 4

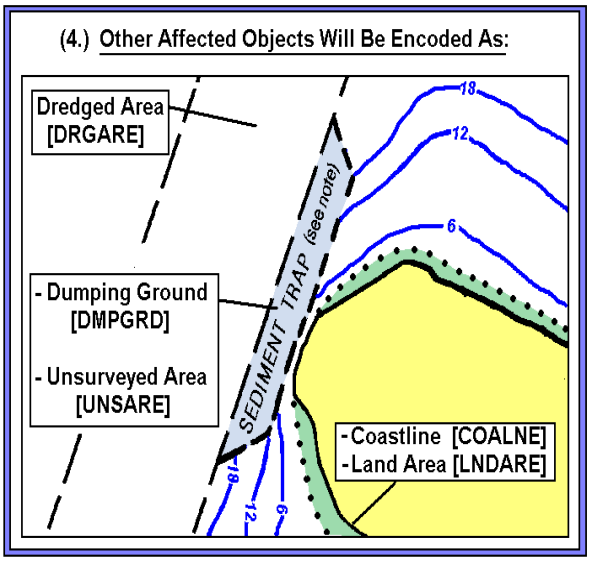


Figure 4-ES89

SITUATION No. 6 (continued): **When to Continue (or Not Continue) A Depth Contour Through Another Nautical Feature or ENC Object**

PART II - D (continued): **Depth Contours ARE NOT Continued Through Sediment Traps**

*(Refer to **Figure 4-ES89**)*

✧ The **ENC objects** associated with the portrayal of the depth contours in ***Figure 4-ES89*** are:

–	Depth Contours	(DEPCNT)
–	Depth Areas	(DEPARE)
–	Dredged Area	(DRGARE)
–	Dumping Ground	(DMPGRD)
–	Unsurveyed Area	(UNSARE)
–	Coastline	(COALNE)
–	Land Area	(LNDARE)

✧ The **geometric primitives** of each affected object are:

–	line	(Depth Contours)
–	area	(Depth Area)
–	area	(Dredged Area)
–	area	(Dumping Ground)
–	area	(Unsurveyed Area)
–	line	(Coastline)
–	area	(Land Area)

✧ **Comments:**

1. **(RE: Illustration No. 1)** Charted depth contours which adjoin a sediment trap shall not be continued through the sediment trap, but shall be digitized as having been connected to the sediment trap.

SITUATION No. 6 (continued): **When to Continue (or Not Continue) A Depth Contour Through Another Nautical Feature or ENC Object**

PART II - D (continued): **Depth Contours ARE NOT Continued Through Sediment Traps**

✧ **Comments** (continued):

2. **(RE: Illustrations No. 2 and No. 3)** The line segments which are formed by connecting the depth contours to the sediment trap boundaries are also to be encoded as boundaries of the associated Depth Areas.

RE: Illustration No. 4:

3. **Definition:** A sediment trap is a dredged area (within a federally maintained navigation project) that is designed as a catch basin to capture shifting sediment and silt. The primary purpose of a sediment trap is to prevent excessive shoaling in an adjacent channel.

4. Although sediment traps are considered to be USACE dredged areas, they are **not intended for navigation** (due to their rapid and severe shoaling), and therefore **shall be encoded for ENC purposes as a Dumping Ground [DMPGRD] and as an Unsurveyed Area [UNSARE].**

5. All guidance previously mentioned concerning the attribution of specific Depth Contour, Depth Area, Dredged Area, Dumping Ground, Unsurveyed Area, Coastline, and Land Area attributes does not exclude the population of other attributes where appropriate. Please refer to each object's respective *List of Attributes and Attribute Values* for the complete listing of all attributes which may tentatively be affected.

6. Refer to the appropriate section of the *NOS/ENC Object Specifications* for the full encoding details concerning all affected ENC objects.

SITUATION No. 6 (continued): **When to Continue or Not Continue A Depth Contour Through Another Nautical Feature or ENC Object**

PART II - E: **Depth Contours ARE NOT Continued Through Low Water Tint**

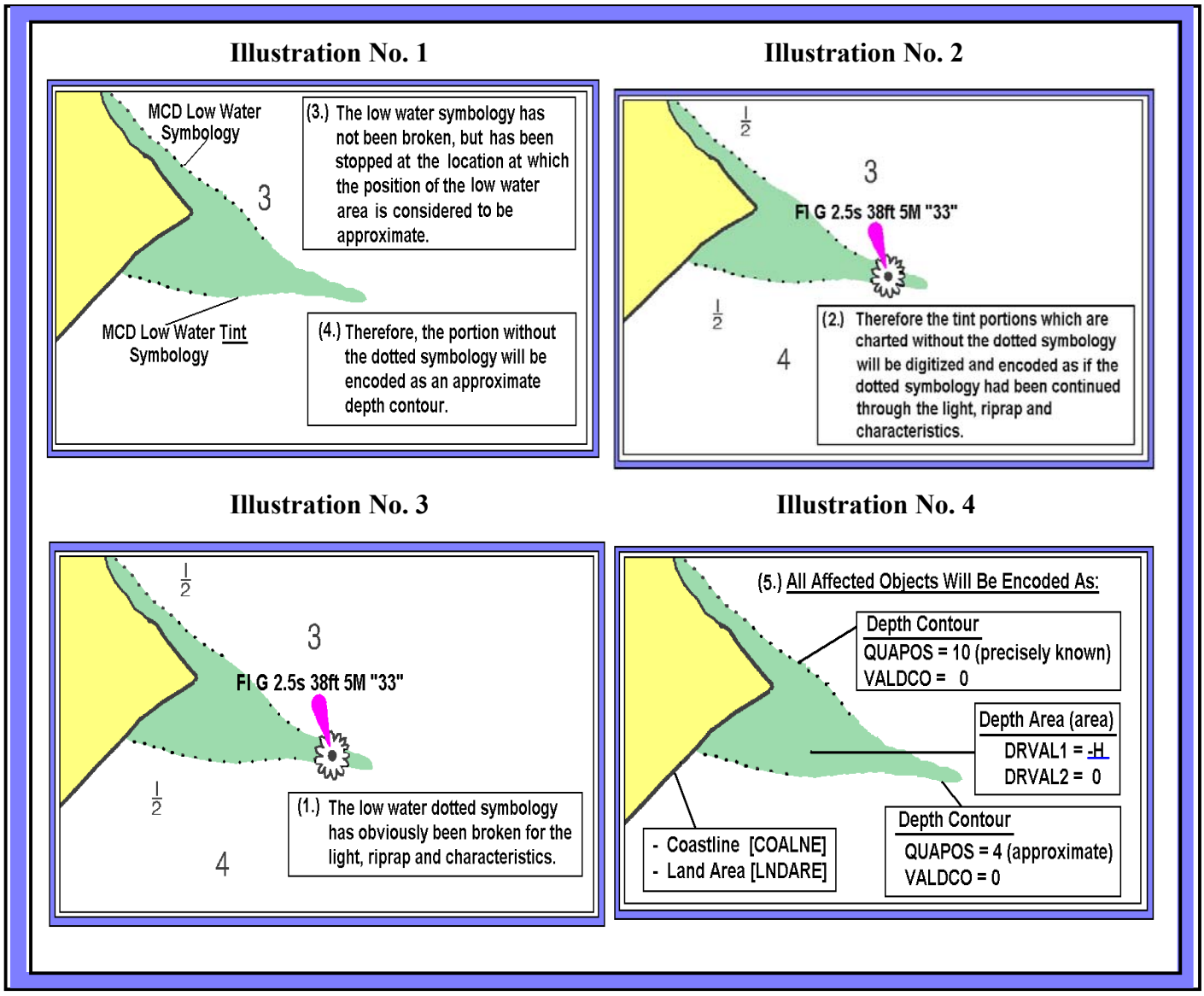


Figure 4-ES90

SITUATION No. 6 (continued): **When to Continue or Not Continue A Depth Contour Through Another Nautical Feature or ENC Object**

PART II - E (continued): **Depth Contours ARE NOT Continued Through Low Water Tint**

*(Refer to **Figure 4-ES90**)*

✧ The **ENC objects** associated with the portrayal of the depth contours in ***Figure 4-ES90*** are:

- Depth Contour (DEPCNT)
- Depth Area (DEPARE)
- Coastline (COALNE)
- Land Area (LNDARE)

✧ The **geometric primitives** of each object are:

- line (Depth Contour)
- area (Depth Area)
- line (Coastline)
- area (Land Area)

✧ **Comments:**

1. **(RE: Illustrations No. 1 and No. 2)** If the low water line has been disjoined (broken) because of the placement of text or symbology, then the entire line shall be collected and encoded as low water (i.e. the zero [0] value depth contour).

2. **(RE: Illustration No. 3)** If low water tint symbology has been charted to indicate the *approximate* location of low water, then this tint line shall be collected and encoded as a separate depth contour object.

3. **(RE: Illustration No. 4)** The ENC object attribute which will distinguish the dotted low water object from the low water tint object is *Quality of Position (QUAPOS)*. The dotted (accurate) low water object has a QUAPOS = 10 (precisely known); the low water tint object has a QUAPOS = 4 (approximate).

4. Please refer to the appropriate sections of the *NOS/ENC Object Specifications* for the full encoding details on Depth Areas, Coastline and Land Areas.

SITUATION No. 6 (continued): **When to Continue (or Not Continue) A Depth Contour Through Another Nautical Feature or ENC Object**

PART II - F: **Depth Contours ARE NOT Continued Through A Ruins Area**

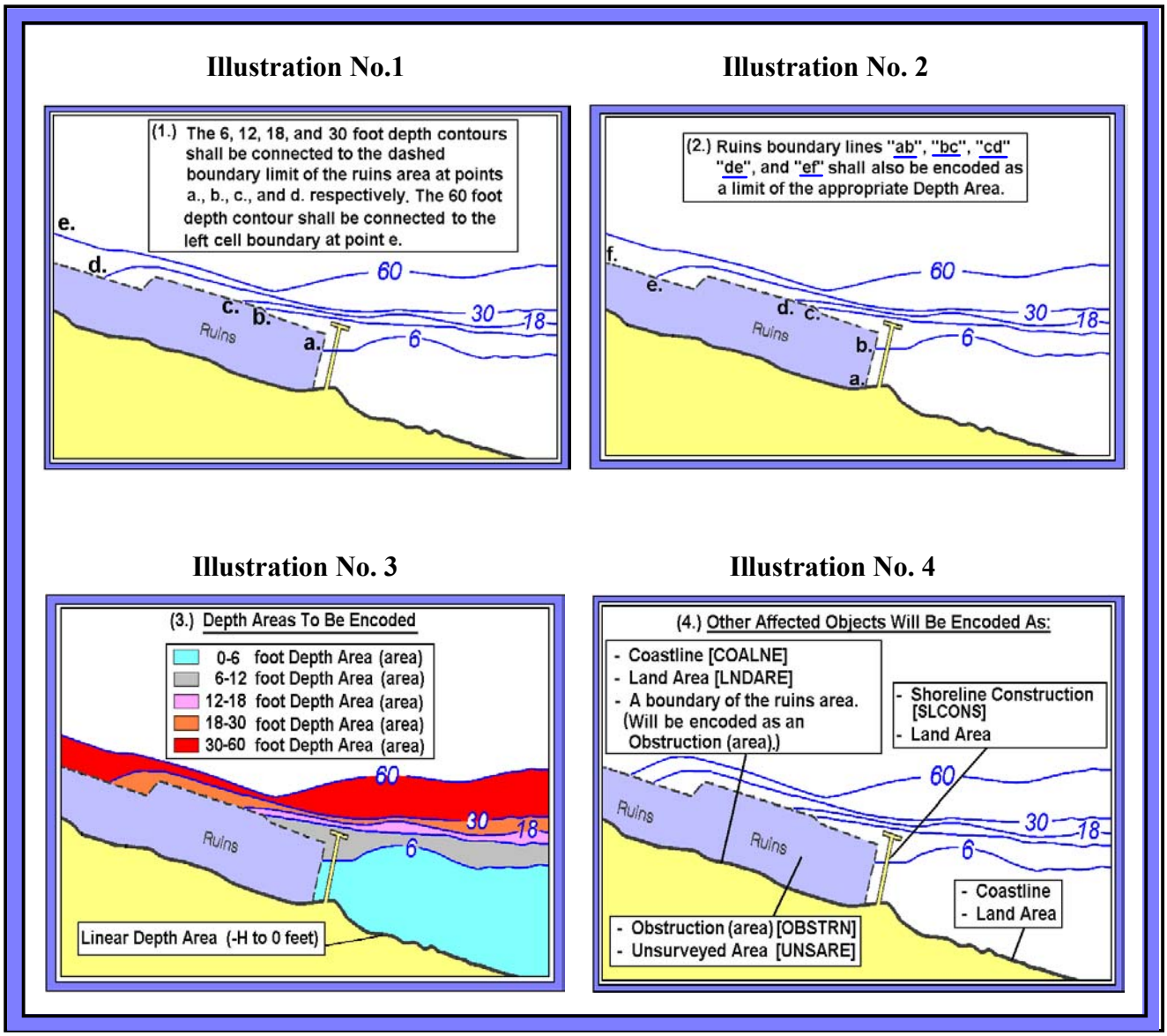


Figure 4-ES91

SITUATION No. 6 (continued): **When to Continue (or Not Continue) A Depth Contour Through Another Nautical Feature or ENC Object**

PART II - F (continued): **Depth Contours ARE NOT Continued Through A Ruins Area**

*(Refer to **Figure 4-ES91**)*

✧ The **ENC objects** associated with the portrayal of the depth contours in ***Figure 4-ES91*** are:

- Depth Contour (DEPCNT)
- Depth Area (DEPARE)
- Obstruction (OBSTRN)
- Unsurveyed Area (UNSARE)
- Coastline (COALNE)
- Shoreline Construction (SLCONS)
- Land Area (LNDARE)

✧ The **geometric primitives** of each affected object are:

- line (Depth Contour)
- area (Depth Area)
- line (Depth Area)
- area (Obstruction)
- area (Unsurveyed Area)
- line (Coastline)
- line (Shoreline Construction)
- area (Land Area)

✧ **Comments:**

1. **(RE: Illustration No. 1)** Contours which adjoin a ruins area shall not be continued through the ruins object, but shall be digitized as having been connected to the ruins object.

SITUATION No. 6 (continued): **When to Continue (or Not Continue) A Depth Contour Through Another Nautical Feature or ENC Object**

PART II - F (continued): **Depth Contours ARE NOT Continued Through A Ruins Area**

*(Refer to **Figure 4-ES91**)*

✧ **Comments** (continued):

2. **(RE: Illustrations No. 2 and No. 3)** The line segments which are formed from the intersection of the depth contours and the ruins boundaries are also to be encoded as a boundary of the associated Depth Areas.

3. **(RE: Illustration No. 3)** Assuming the border of the illustration is the ENC cell boundary, the appropriate portions (of the cell boundary) will also be encoded as limit lines of the associated Depth Areas (areas).

4. **(RE: Illustration No. 4)** Due to the fact that the object "Ruins" is not an ENC object class, all ruins for which the composition is not specifically known are to be encoded as the ENC object Obstruction [OBSTRN]. Its geometric primitive will either be linear or area depending on how the "ruins"object is presented on/in the source document.

5. Please refer to the appropriate sections of the *NOS/ENC Object Specifications* for the full encoding details concerning Depth Areas, Obstructions, Unsurveyed Areas, Coastline, Land Areas and Shoreline Construction objects.

SITUATION No. 6 (continued): When to Continue (or Not Continue) A Depth Contour Through Another Nautical Feature or ENC Object

PART II - G: Depth Contours ARE NOT Continued Between Short Isolated Depth Contours

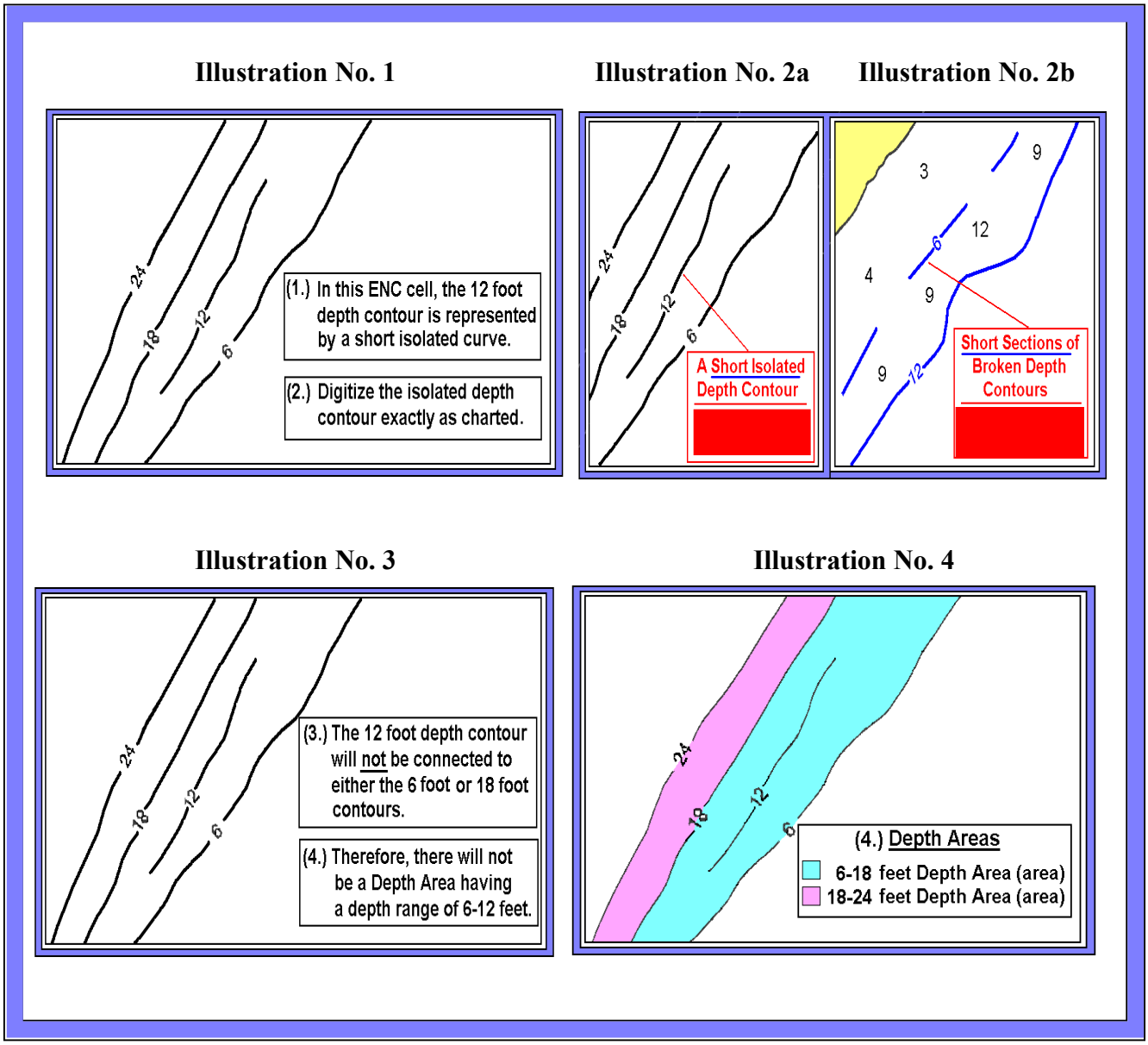


Figure 4-ES92

SITUATION No. 6 (continued): **When to Continue (or Not Continue) A Depth Contour Through Another Nautical Feature or ENC Object**

PART II - G (continued): **Depth Contours ARE NOT Continued Between Short Isolated Depth Contours**

(*Refer to **Figure 4-ES92***)

✧ The **ENC objects** associated with the portrayal of the depth contours in ***Figure 4-ES92*** are:

- Depth Contour (DEPCNT)
- Depth Area (DEPARE)

✧ The **geometric primitives** of each affected object are:

- line (Depth Contour)
- area (Depth Area)

✧ **Comments:**

1. **(RE: Illustration No. 1)** Short *isolated* depth contours shall be digitized exactly as they are charted. They are not to be connected to surrounding depth contours or objects, nor are they to be extended to the cell boundary.

2. What is the difference between **"short isolated depth contours"** as portrayed in Illustration No. 2a and **"short sections of broken contours"** as portrayed in Illustration No. 2b?

   A *short isolated depth contour* may be charted by a cartographer:

   a. when the scale of a chart does not allow the full interval of depth contours to be charted (i.e., 6, 12, 18, ...)

   b. when depth contours fall in congested areas;

   c. when depth contours are located in areas having a steep slope and/or

   d. when there is a lack of sufficient horizontal distance between depth contours "to adequately portray the character of the bottom clearly and adequately".

SITUATION No. 6 (continued): **When to Continue (or Not Continue) A Depth Contour Through Another Nautical Feature or ENC Object**

PART II - G(continued): **Depth Contours ARE NOT Continued Between Short Isolated Depth Contours**

(*Refer to* ***Figure 4-ES92***)

✧ **Comments** (continued):

2.(continued.)

Short sections of broken contours are usually charted in inshore areas and are indicative of an undeveloped hydrographic area (i.e. an area which may have an insufficient amount of soundings with which to accurately delineate a full depth contour.)

3. For *short isolated sections of depth contours* (line "abcd" in ***Figure 4-ES93*** *below)* the IHO/S-57 has left the following choices up to each individual Hydrographic Office.

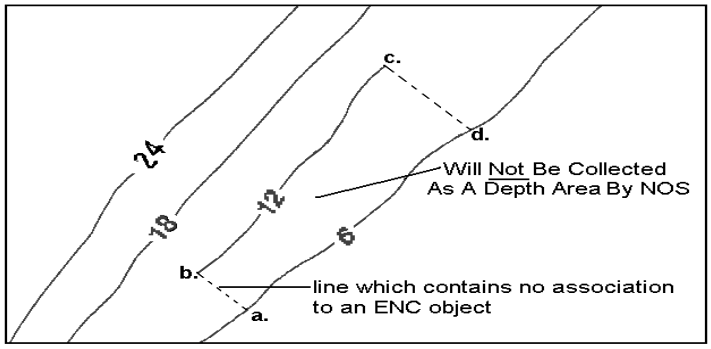


Figure 4-ES93

Either to:

(a) encode the small area formed between the 6 foot depth contour and the 12 foot depth contour as a depth area, or

(b) to encode *only* the 12 foot Depth Contour.

The National Ocean Service has made the decision not to encode such areas as Depth Areas but to only encode the Depth Contour.

SITUATION No. 6 (continued): **When to Continue (or Not Continue) A Depth Contour Through Another Nautical Feature or ENC Object**

PART II - G (continued): **Depth Contours ARE NOT Continued Between Short Isolated Depth Contours**

✧ **Comments** (continued):

3. (continued)

(RE: Figure 4-ES93)

> ***Those depth areas which were previously created for these small areas during the initial collection stage of ENC data, are not to be revised to meet the above specifications. However, these specifications should be applied for any future and subsequent formation of depth areas for any specific ENC.***

4. **(RE: *Figure 4-ES92-* Illustration No. 3)** Due to the fact that the National Ocean Service has made the decision not to encode the small area which is bounded by the short isolated section of the 12 foot depth contour as a depth area, but to only encode the depth contour, there will be no depth area having a depth range of 6-12 feet.

RE: *Figure 4-ES92-* Illustration No. 4:

5. There shall only be two (2) depth areas encoded from the depth contours portrayed in Illustration No. 4. The first (shoalest) depth area will have a depth range value of 6-18 feet; the next (deepest) depth area will have a depth range value of 18-24 feet.

6. Assuming the border of the illustration is the cell boundary, the appropriate portions (of the cell boundary) shall also be encoded as boundaries of the associated ENC Depth Area (areas).

7. Please refer to Section 4.30.12 of the *NOS/ENC Object Specifications* for the full encoding details concerning Depth Areas.

SITUATION No. 6 (continued): When to Continue (or Not Continue) A Depth Contour Through Another Nautical Feature or ENC Object

PART II - H: Depth Contours ARE NOT Continued Between Short Sections of Broken Depth Contours

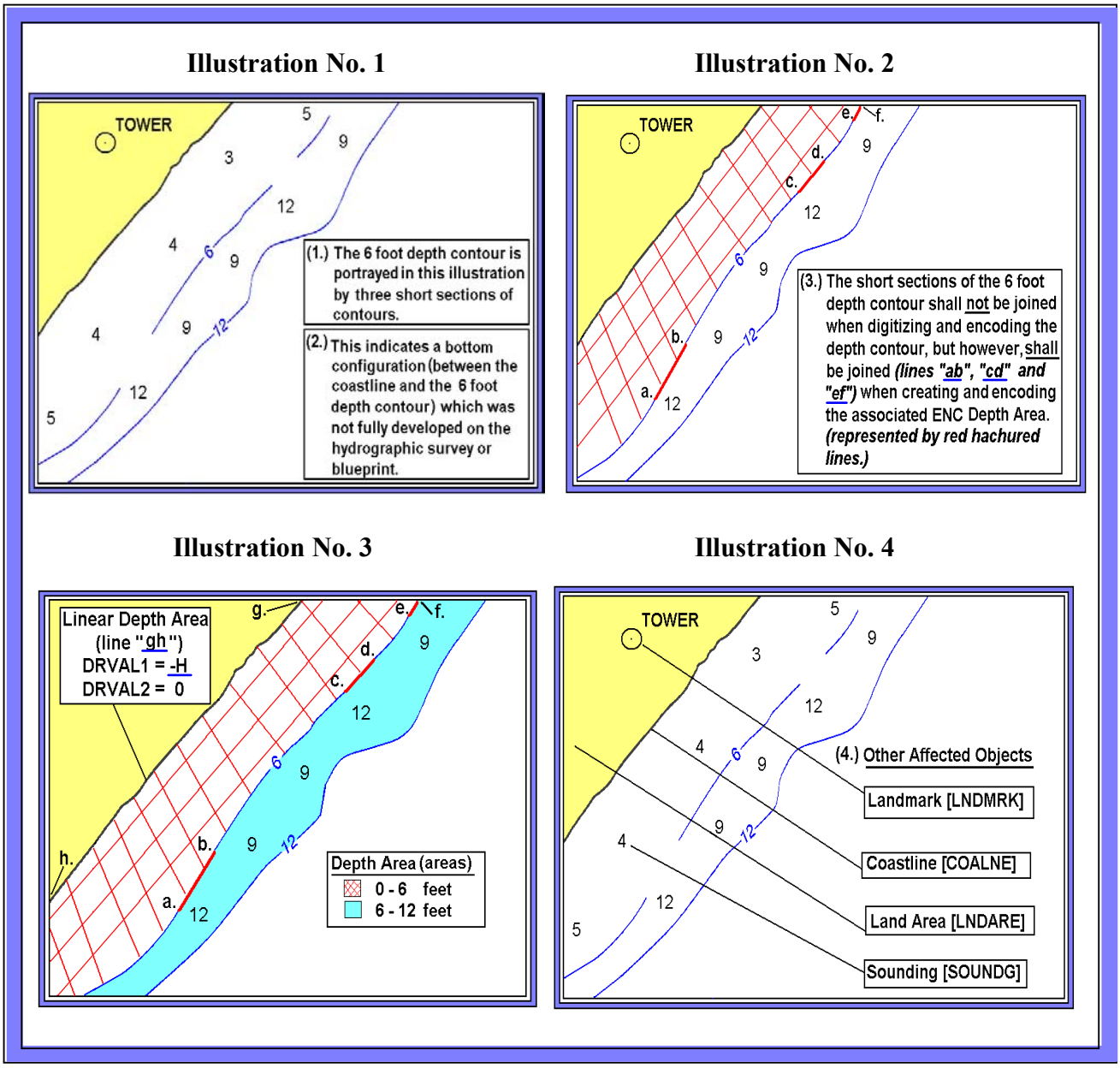


Figure 4-ES94

SITUATION No. 6 (continued): **When to Continue (or Not Continue) A Depth Contour Through Another Nautical Feature or ENC Object**

PART II - H (continued): **Depth Contours ARE NOT Continued Between Short Sections of Broken Contours**

(*Refer to* ***Figure 4-ES94***)

✧ The **ENC objects** associated with the portrayal of the depth contours in ***Figure 4-ES94*** are:

- Depth Contour (DEPCNT)
- Depth Area (DEPARE)
- Coastline (COALNE)
- Land Area (LNDARE)
- Landmark (LNDMRK)
- Sounding (SOUNDG)

✧ The **geometric primitives** of each affected object are:

- line (Depth Contour)
- area (Depth Area)
- line (Depth Area)
- line (Coastline)
- area (Land Area)
- point (Landmark / i.e., Tower)
- point (Sounding)

✧ **Comments:**

1. Refer also to **Situation No. 6, Part II-G, Comment No. 2** for an explanation of the differences between *short sections of broken contours* and a *short isolated depth contour*.

SITUATION No. 6 (continued): **When to Continue (or Not Continue) A Depth Contour Through Another Nautical Feature or ENC Object**

PART II - H (continued): **Depth Contours ARE NOT Continued Between Short Sections of Broken Contours**

(*Refer to **Figure 4-ES94***)

✧ **Comments** (continued):

2. **(RE: Illustration No. 1)** Although depth contours which appear on a hydrographic survey as *short broken sections of lines* may be connected during their application to a nautical chart ("if the bottom configuration portrayed by the surrounding contours indicates that the connection would be logical"), the depth contours shall not be connected and encoded as the ENC object Depth Contour [DEPCNT] if portrayed on the nautical chart as disjoined.

RE: Illustration No. 2:

3. The *short broken sections* of the 6 foot depth contour shall however, be joined for the purpose of encoding the associated ENC Depth Area [DEPARE].

4. Line segments "ab", "cd" and "ef"(indicated in red) shall only be encoded as a boundary of the 0-6 feet and 6-12 feet ENC Depth Areas, whereas the short sections of the 6 foot depth contour (indicated in blue) shall be encoded as both:

   – ENC Depth Contours, **and**
   – boundaries of the 0-6 feet and 6-12 feet ENC Depth Areas (area).

SITUATION No. 6 (continued): **When to Continue (or Not Continue) A Depth Contour Through Another Nautical Feature or ENC Object**

PART II - H (continued): **Depth Contours ARE NOT Continued Between Short Sections of Broken Contours**

(*Refer to **Figure 4-ES94***)

✧ **Comments** (continued):

RE: Illustration No. 3:

5. A linear depth area [i.e., Depth Area (line)] shall be encoded along the coastline at line segment "gh". The purpose of this linear depth area is to eliminate the discontinuity which exists in the depth range values between the coastline (having a depth range value of -H) and the 6 foot depth contour. That is, the zero (0) value depth contour must be taken into account when encoding the depth areas for this particular ENC cell.

   Therefore, the depth range values of the linear depth area formed from line "gh" are:

   DRVAL1 = -H
   DRVAL2 = 0

6. Assuming the border of the illustration is the cell boundary, the appropriate portions (of the cell boundary) shall also be encoded as boundaries of the appropriate ENC Depth Area (areas).

SITUATION No. 6 (continued): **When to Continue (or Not Continue) A Depth Contour Through Another Nautical Feature or ENC Object**

PART II - H (continued): **Depth Contours ARE NOT Continued Between Short Sections of Broken Contours**

(*Refer to* ***Figure 4-ES94***)

✧ **Comments** (continued)

7. Summary of objects in Illustration No. 3 which shall be used to create ENC **Depth Areas**:

a. coastline (line "gh") } -H to 0 Linear Depth Area

a. the short sections of the 6 foot depth contour
b. lines "ab", "cd", and "ef"
c. coastline (line "gh")
d. the appropriate portions of the cell boundary. } 0-6 feet Depth Area (area)

a. the short sections of the 6 foot depth contour
b. lines "ab", "cd", and "ef"
c. the 12 foot depth contour
d. the appropriate portions of the cell boundary } 6-12 feet Depth Area (area)

SITUATION No. 6 (continued): **When to Continue (or Not Continue) A Depth Contour Through Another Nautical Feature or ENC Object**

PART II - H (continued): **Depth Contours ARE NOT Continued Between Short Sections of Broken Contours**

(*Refer to **Figure 4-ES94***)

✧ **Comments** (continued):

RE: Illustration No. 4:

8. A tower is a member of the ENC object class **Landmark** [LNDMRK]. It shall be collected as a point object and will be distinguished from other members of this object class by the attribute *Category of Landmark [CATLMK]*.

9. The ENC object **Land Area** [LNDARE] shall be collected as an area object and will also use as its limits the coastline geometry and the appropriate portions of the cell boundary.

10. Please refer to the appropriate sections of the *NOS/ENC Objects Specifications* for the full encoding details concerning Depth Areas, Coastline, Land Areas, Soundings and Landmarks.

SITUATION No. 6 (continued): When to Continue (or Not Continue) A Depth Contour Through Another Nautical Feature or ENC Object

PART II - I: Depth Contours ARE NOT Continued Through Spoil Areas

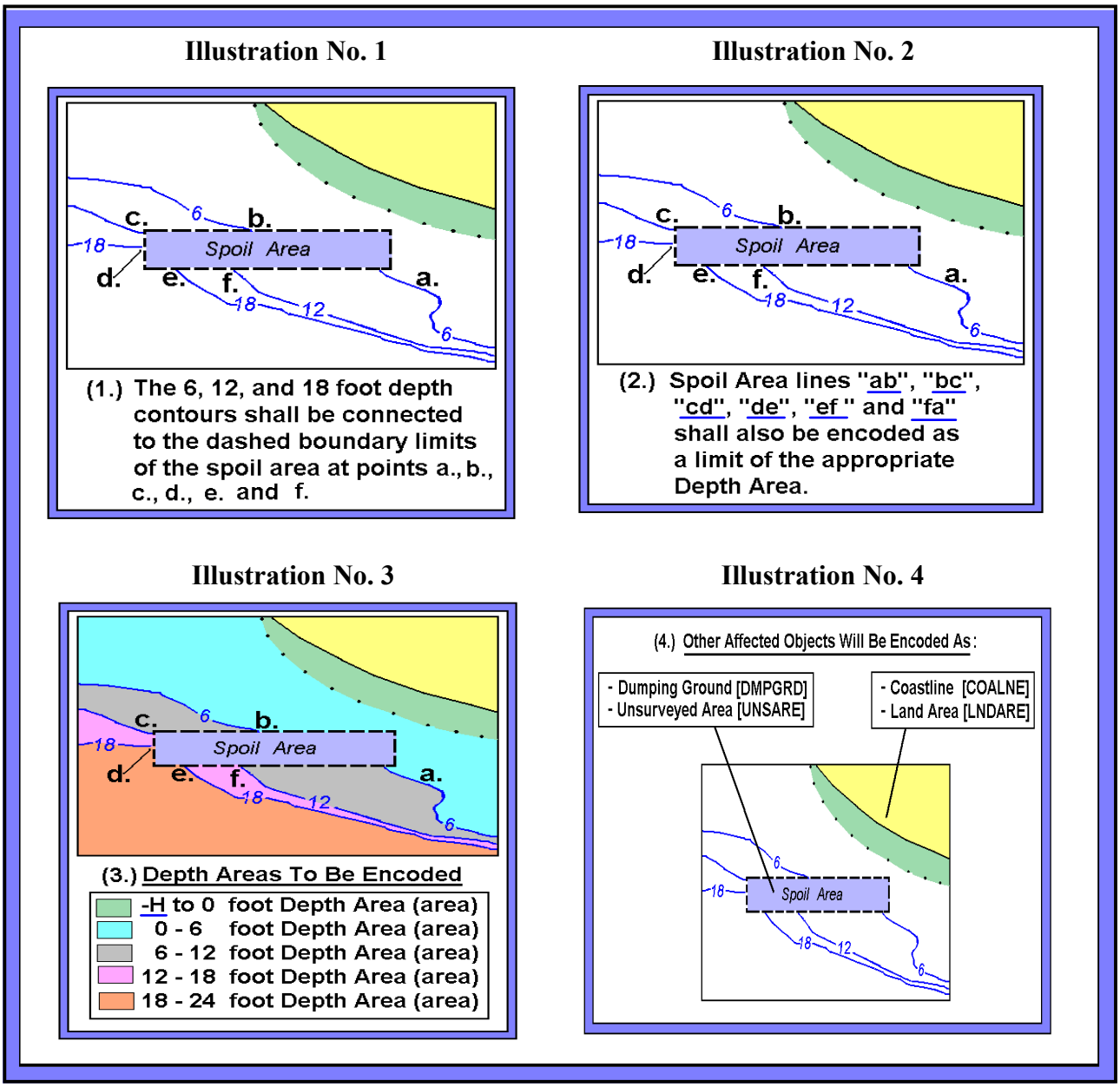


Figure 4-ES95

SITUATION No. 6 (continued): **When to Continue (or Not Continue) A Depth Contour Through Another Nautical Feature or ENC Object**

PART II - I (continued): **Depth Contours ARE NOT Continued Through Spoil Areas**

*(Refer to **Figure 4-ES95**)*

✧ The **ENC objects** associated with the portrayal of the depth contours in ***Figure 4-ES95*** are:

–	Depth Contours	(DEPCNT)
–	Depth Areas	(DEPARE)
–	Dumping Ground	(DMPGRD)
–	Unsurveyed Area	(UNSARE)
–	Coastline	(COALNE)
–	Land Area	(LNDARE)

✧ The **geometric primitives** of each affected object are:

–	line	(Depth Contours)
–	area	(Depth Area)
–	area	(Dumping Ground)
–	area	(Unsurveyed Area)
–	line	(Coastline)
–	area	(Land Area)

✧ **Comments:**

1. **(RE: Illustration No. 1)** Charted depth contours which adjoin a spoil area shall not be continued through the spoil area, but shall be digitized as having been connected to the spoil area.

SITUATION No. 6 (continued): **When to Continue (or Not Continue) A Depth Contour Through Another Nautical Feature or ENC Object**

PART II - I (continued): **Depth Contours ARE NOT Continued Through Spoil Areas**

*(Refer to **Figure 4-ES95**)*

✧ **Comments** (continued):

2. **(RE: Illustrations No. 2 and No. 3)** The line segments which are formed by connecting the depth contours to the spoil area boundaries are also to be encoded as boundaries of the associated Depth Areas.

RE: Illustration No. 4:

3. Within the ENC environment, a Spoil Area is considered a member of the ENC object class Dumping Ground [DMPGRD]. The attribute *Category of Dumping Ground* (*CATDPG*) is the attribute used to distinguish a spoil area from other members of the Dumping Ground class.

4. In accordance with IHO/S-57 requirements, and to ensure the continuous coverage of Group 1 objects, a spoil area must also be encoded as the (Group 1) object Unsurveyed Area [UNSARE]

5. Please refer to the appropriate sections of the *NOS/ENC Object Specifications* for the full encoding details concerning Depth Areas, Dumping Grounds, Unsurveyed Areas, Coastline and Land Area.

SITUATION No. 6 (continued): **When to Continue or Not Continue A Depth Contour Through Another Nautical Feature or ENC Object**

PART II - J: **Depth Contours ARE NOT Continued Through Wharves, et. al.**

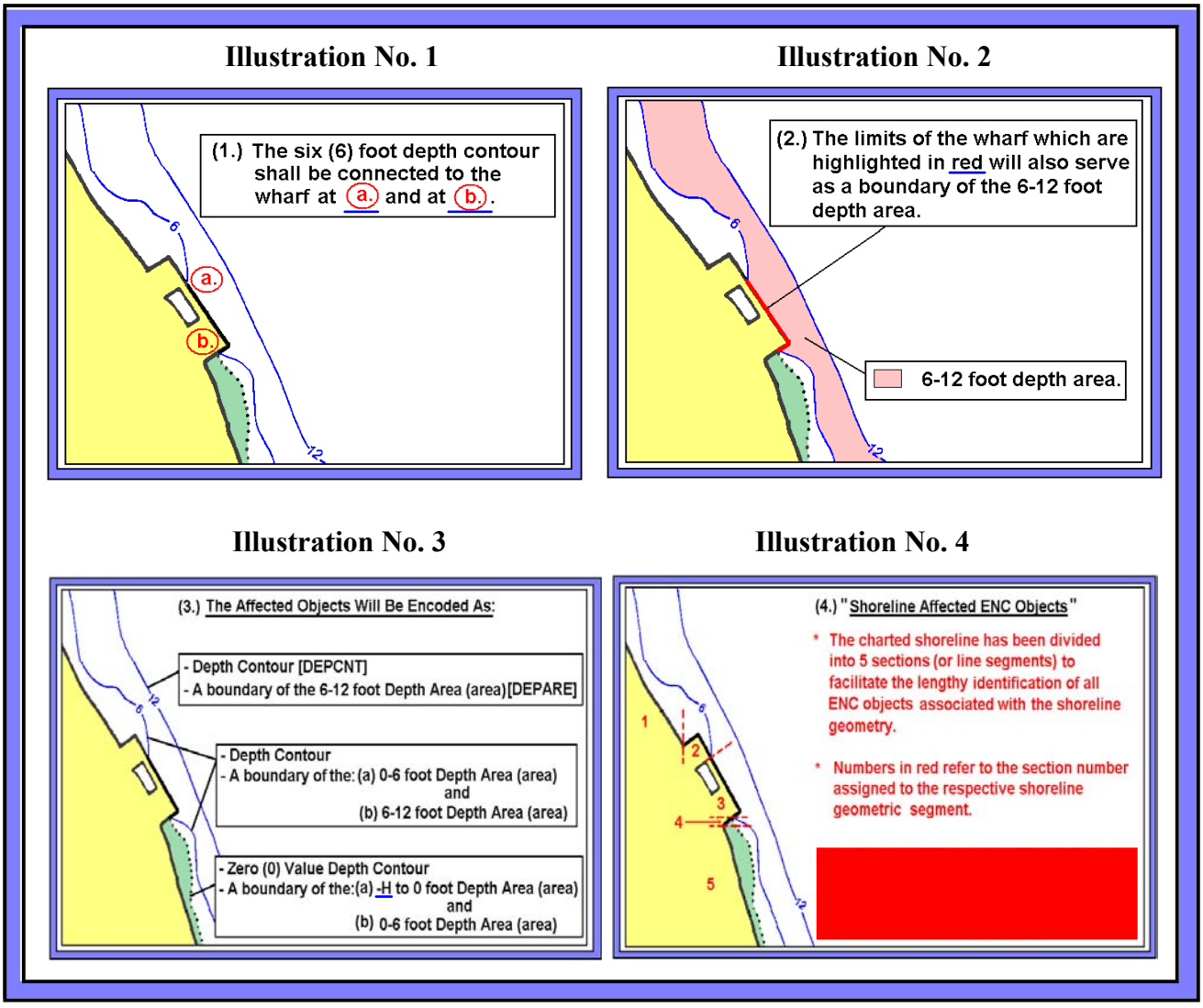


Figure 4-ES96

SITUATION No. 6 (continued): **When to Continue or Not Continue A Depth Contour Through Another Nautical Feature or ENC Object**

PART II - J (continued): **Depth Contours ARE NOT Continued Through Wharves, et. al.**

*(Refer to **Figure 4-ES96**)*

✧ The **ENC objects** associated with the portrayal of the Depth Contours in ***Figure 4-ES96*** are:

–	Depth Contours	(DEPCNT)
–	Depth Area	(DEPARE)
–	Shoreline Construction	(SLCONS)
–	Coastline	(COALNE)
–	Land Area	(LNDARE)

✧ The **geometric primitives** of each affected object are:

–	line	(Depth Contour)
–	area	(Depth Area)
–	line	(Depth Area)
–	line	(Shoreline Construction)
–	line	(Coastline)
–	area	(Land Area)

✧ **Comments:**

1. **(RE: Illustration No. 1)** A disjoined depth contour which is near the edge of a wharf, bulkhead or other true to scale shoreline construction, shall be connected to the edge of the shoreline object "which most closely follows the pattern of the depth contour".

SITUATION No. 6 (continued): **When to Continue or Not Continue A Depth Contour Through Another Nautical Feature or ENC Object**

PART II - J (continued): **Depth Contours ARE NOT Continued Through Wharves, et. al.**

*(Refer to **Figure 4-ES96**)*

✧ **Comments** (continued):

2. As shown in Illustration No. 1, the 6 foot depth contour shall be connected to the wharf at points a. and b.. This is to ensure the formation of a totally enclosed area object whose boundaries will also be used to encode the associated ENC Depth Area.

RE: Illustration No. 2:

3. As portrayed in the illustration, the line highlighted in red is considered that portion of the wharf " which most closely follows the pattern of the depth contour". This is the portion which, along with the 6 and 12 foot depth contours will form the boundaries of the 6 - 12 foot depth area.

4. Please note that the portion of the wharf which will also serve as a boundary of the 6-12 foot depth area will **not** be encoded as a six (6) foot depth contour. The 6 foot depth contour stops at both intersections with the wharf. This line segment will only be encoded as the following three (3) ENC objects:

   a. Shoreline Construction [SLCONS]
   b. Depth Area [DEPARE], and
   c. Land Area [LNDARE].

SITUATION No. 6 (continued): **When to Continue or Not Continue A Depth Contour Through Another Nautical Feature or ENC Object**

PART II - J (continued): **Depth Contours ARE NOT Continued Through Wharves, et. al.**

*(Refer to **Figure 4-ES96**)*

✧ **Comments** (continued):

5. The five (5)shoreline segments portrayed in Illustration No. 4 shall be encoded as each of the ENC objects identified in the following table: (The table is continued on the following page.)

Section Number	ENC Object
1	- Coastline [COALNE]
	- A boundary of Land Area (area) [LNDARE]
	- A boundary of the 0-6 foot Depth Area (area)
	- A *-H to 0 foot* linear Depth Area [DEPARE]
2	- Shoreline Construction [SLCONS]
	- A boundary of Land Area (area)
	- A boundary of the 0-6 foot Depth Area (area)
	- A *-H to 0 foot* linear Depth Area
3	- Shoreline Construction
	- A boundary of Land Area (area)
	- A boundary of the 6-12 foot Depth Area (area)
	- A *-H to 6 foot* linear Depth Area

SITUATION No. 6 (continued): **When to Continue or Not Continue A Depth Contour Through Another Nautical Feature or ENC Object**

PART II - J (continued): **Depth Contours ARE NOT Continued Through Wharves, et. al.**

*(Refer to **Figure 4-ES96**)*

✧ **Comments** (continued):

5. (continued)

Section Number	ENC Object
4	- Shoreline Construction [SLCONS]
	- A boundary of Land Area (area) [LNDARE]
	- A boundary of the -H to 0 foot Depth Area (area) [DEPARE]
5	- Coastline [COALNE]
	- A boundary of Land Area (area)
	- A boundary of the -H to 0 foot Depth Area (area)

6. Please refer to the appropriate sections of the *NOS/ENC Object Specifications* for the full encoding details on Depth Areas, Coastline, Shoreline Construction objects and Land Areas.

SITUATION No. 6 (continued): **When to Continue (or Not Continue) A Depth Contour Through Another Nautical Feature or ENC Object**

PART III : **Depth Contours and ENC Dredged Areas**

This section cites various situations in which a depth contour shall or shall not be continued through the limits of an ENC Dredged Area. Within the ENC environment, a dredged area may be a channel (and all of its divisional parts–left outside quarter, left inside quarter, etc.), a turning basin, channel wideners and sediment traps.

As a general rule, depth contours shall be digitized exactly as charted. If a depth contour is charted as continuing through a dredged area, the depth contour shall be digitized as such. If the depth contour is charted as not continuing through a dredged area, then the depth contour shall not be continued through the dredged area.

Please refer to the respective sections of the *NOS/ENC Object Specifications* for the full encoding details concerning ENC Dredged Areas and other ENC objects which may be identified in the following illustrations.

SITUATION No. 6 (continued): **When to Continue (or Not Continue) A Depth Contour Through Another Nautical Feature or ENC Object**

PART III - A: **Depth Contours and ENC Dredged Areas**

Depth Contours Which **ARE** To Be Continued Through ENC Dredged Areas

Example 1: How To Depict Depth Contours Which Bound Encroaching Shoals (Non-tabulated Channels)

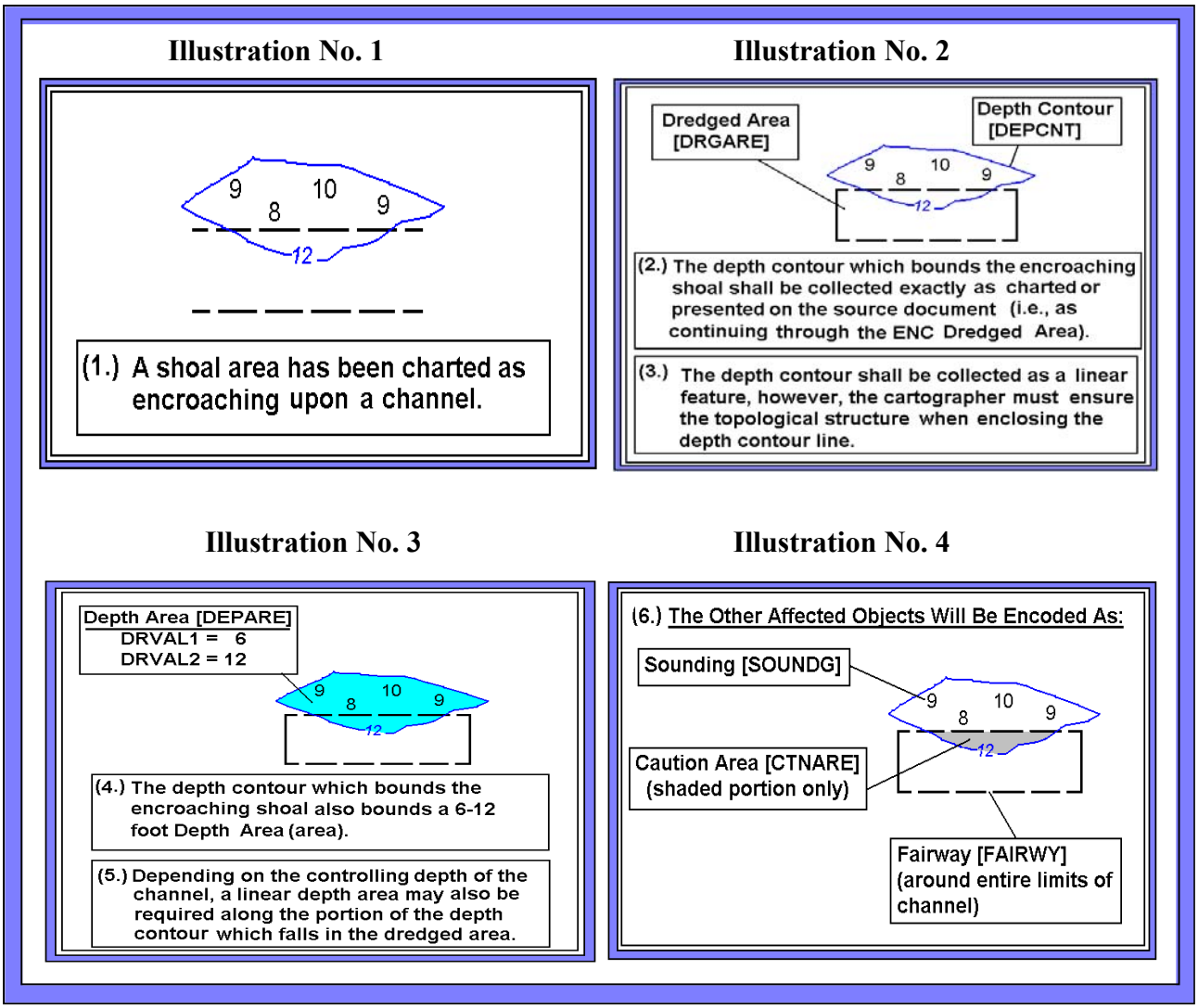


Figure 4-ES97

SITUATION No. 6 (continued): When to Continue (or Not Continue) A Depth Contour Through Another Nautical Feature or ENC Object

PART III - A (continued): **Depth Contours and ENC Dredged Areas**

Depth Contours Which **ARE** To Be Continued Through ENC Dredged Areas

Example 2: How To Depict A Depth Contour Which Bounds A Shoal And Is Wholly Contained Within A Dredged Area

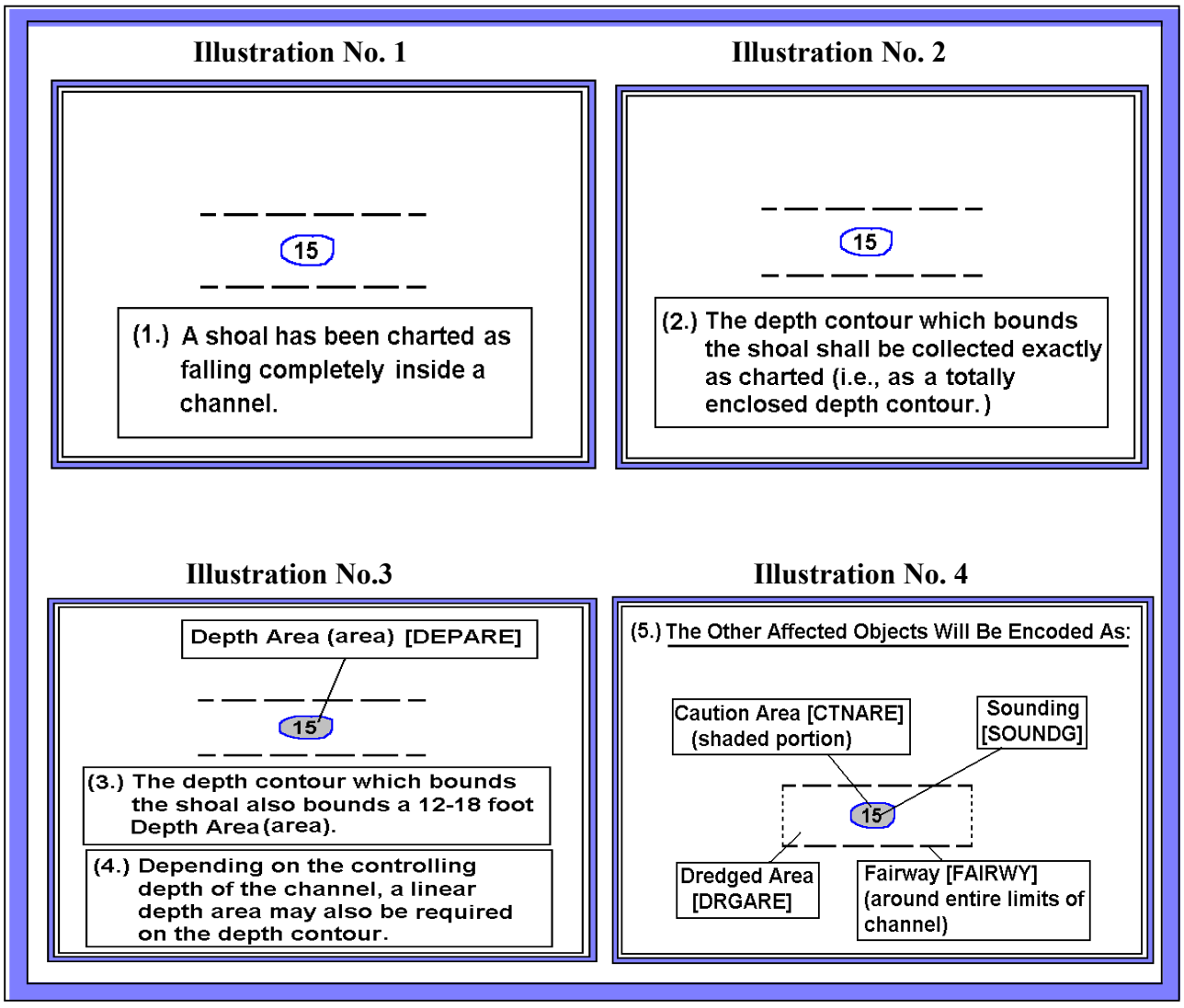


Figure 4-ES98

SITUATION No. 6 (continued): **When to Continue (or Not Continue) A Depth Contour Through Another Nautical Feature or ENC Object**

PART III - A (continued): **Depth Contours and ENC Dredged Areas**

Depth Contours Which **ARE** To Be Continued Through ENC Dredged Areas

Example 3: How To Depict Depth Contours Which Continue Through an ENC Fairway (i.e. A Channel Which Is Completely Filled with Soundings)

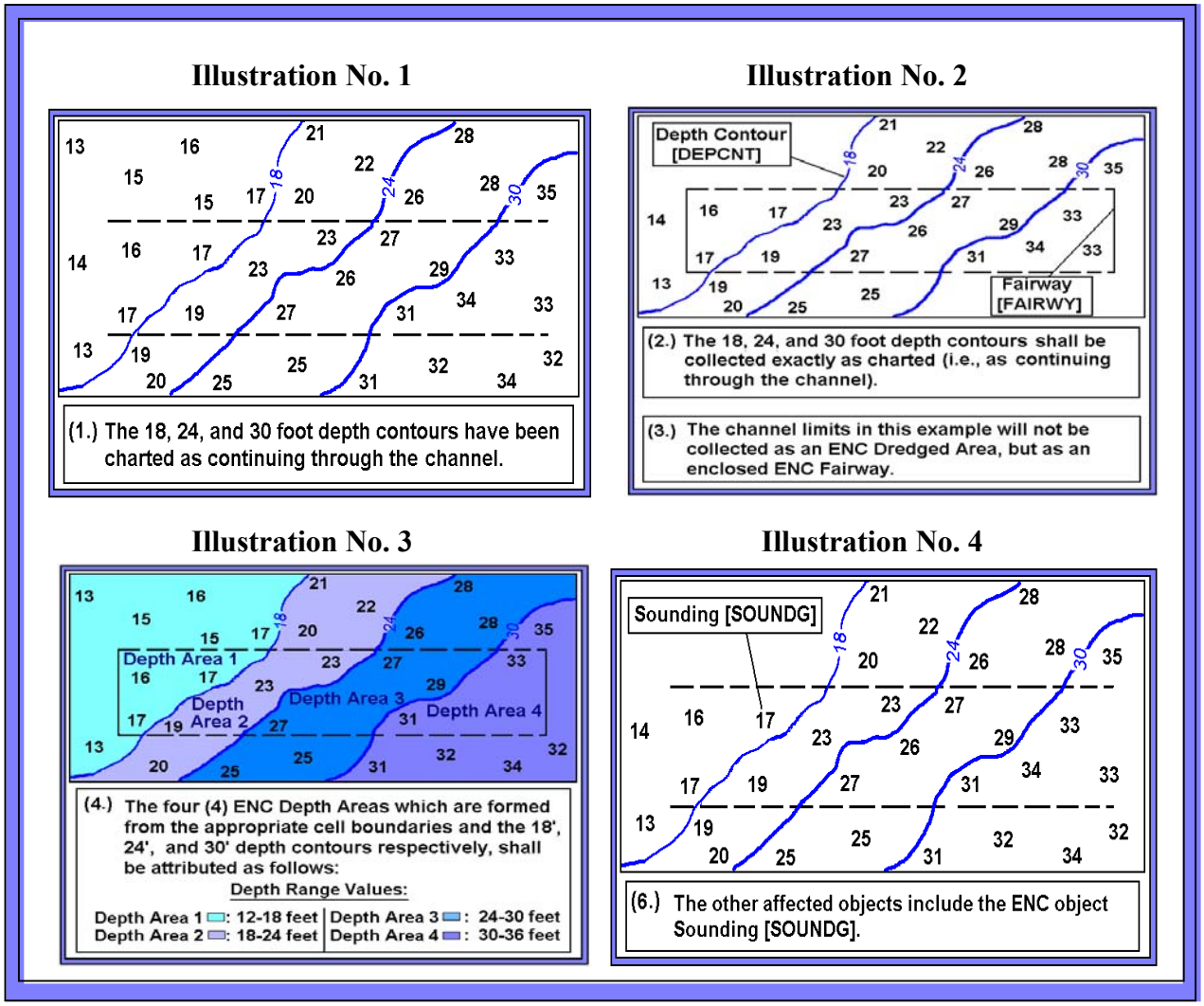


Figure 4-ES99

SITUATION No. 6 (continued): **When to Continue (or Not Continue) A Depth Contour Through Another Nautical Feature or ENC Object**

PART III - A (continued): **Depth Contours and ENC Dredged Areas**

Depth Contours Which **ARE** To Be Continued Through ENC Dredged Areas

Example 4: How To Depict Depth Contours Which Encroach Upon a Tabulated and Quartered Channel

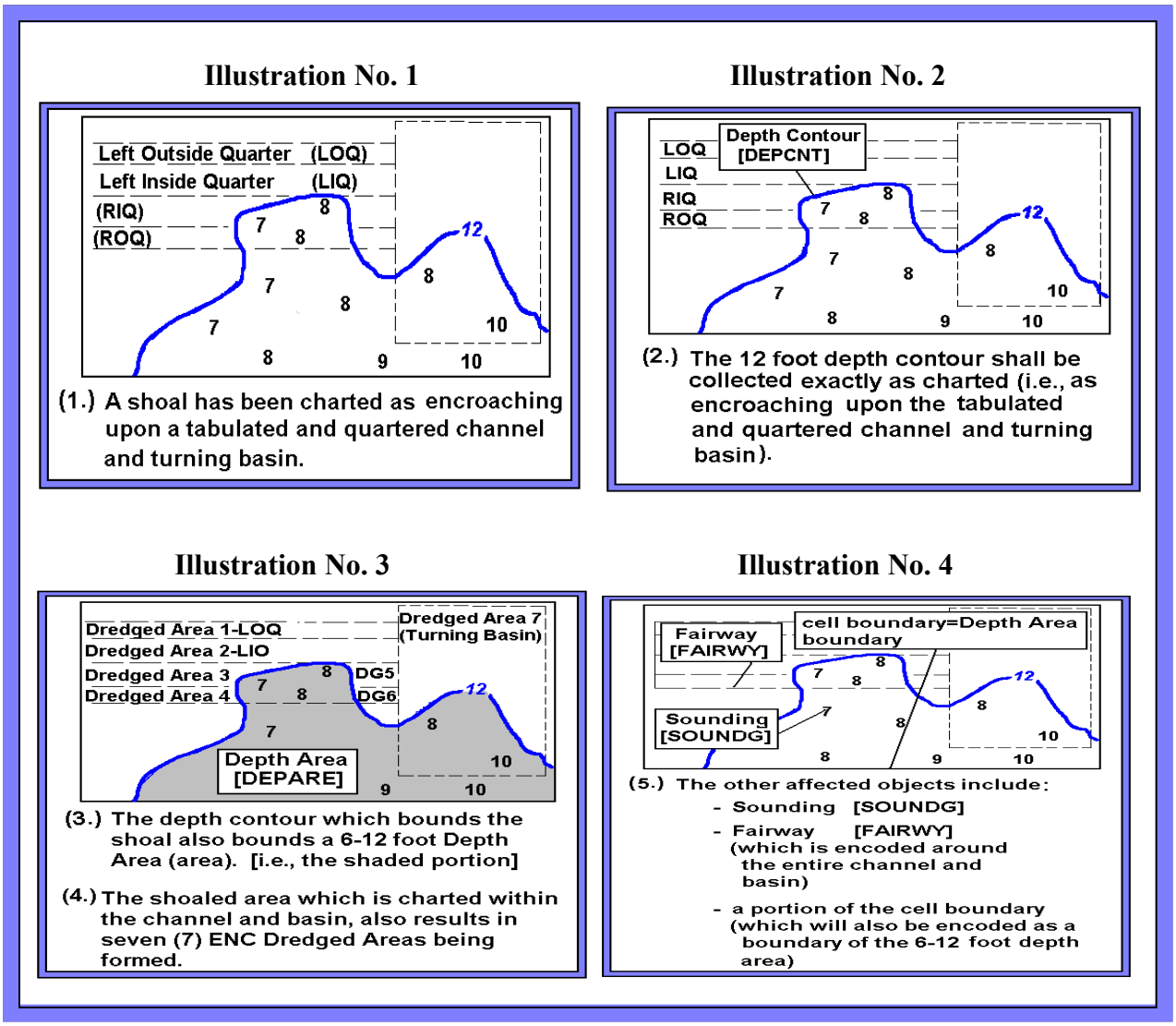


Figure No. ES100

SITUATION No. 6 (continued): **When to Continue (or Not Continue) A Depth Contour Through Another Nautical Feature or ENC Object**

PART III - B: **Depth Contours and ENC Dredged Areas**

Depth Contours Which **ARE NOT** To Be Continued Through ENC Dredged Areas

Illustration No. 1

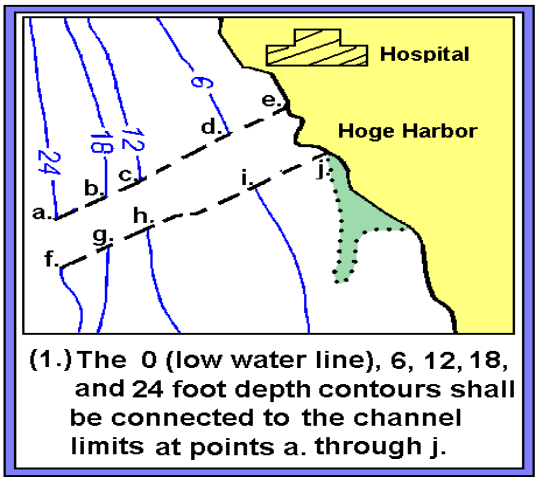


Illustration No. 2

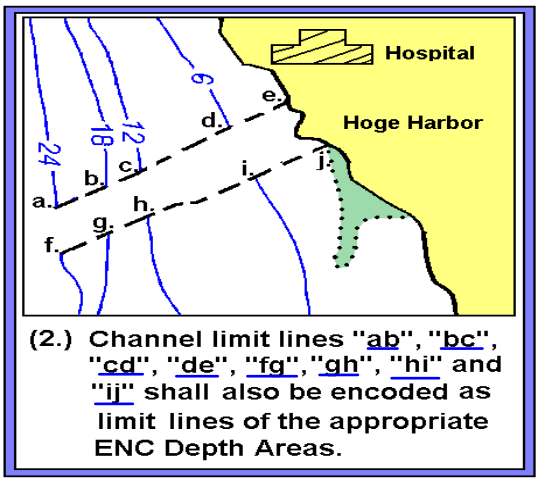


Illustration No. 3

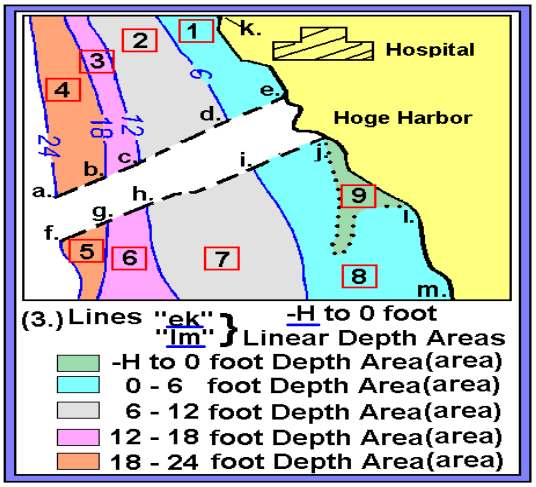


Illustration No. 4

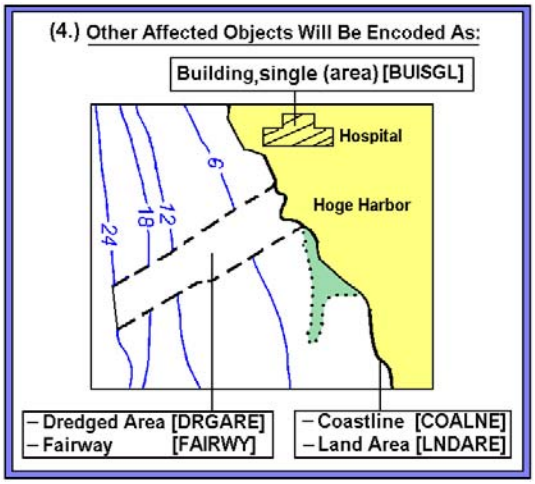


Figure 4-ES101

SITUATION No. 6 (continued): **When to Continue (or Not Continue) A Depth Contour Through Another Nautical Feature or ENC Object**

PART III - B (continued): **Depth Contours and ENC Dredged Areas**

Depth Contours Which **ARE NOT** To Be Continued Through ENC Dredged Areas

*(Refer to **Figure 4-ES101**)*

✧ The **ENC objects** associated with the portrayal of the depth contours in ***Figure 4-ES101*** are:

- Depth Contour (DEPCNT)
- Depth Area (DEPARE)
- Dredged Area (DRGARE)
- Fairway (FAIRWY)
- Coastline (COALNE)
- Land Area (LNDARE)
- Building, single (BUISGL)

✧ The **geometric primitives** of each affected object are:

- line (Depth Contour)
- area (Depth Area)
- line (Depth Area)
- area (Dredged Area)
- area (Fairway)
- line (Coastline)
- area (Land Area)
- area (Building, single)

✧ **Comments:**

1. **(RE: Illustration No. 1)** Depth contours which adjoin channel limits shall not be continued through the channel, but shall be digitized as having been connected to the channel limits.

SITUATION No. 6 (continued): **When to Continue (or Not Continue) A Depth Contour Through Another Nautical Feature or ENC Object**

PART III - B (continued): **Depth Contours and ENC Dredged Areas**

Depth Contours Which **ARE NOT** To Be Continued Through ENC Dredged Areas

*(Refer to **Figure 4-ES101**)*

✧ **Comments** (continued):

2. **(RE: Illustration No. 2)** The line segments which are formed by adjoining the depth contours to the channel limits shall be encoded as all of the following:

- limits of the associated ENC **Depth Area**
- limits of an ENC **Dredged Area**,
- limits of an ENC **Fairway**

RE: Illustration No. 3:

3. Disregarding the controlling depth of the channel, there will be a minimum of 11 ENC Depth Areas formed --- 9 Depth Area (areas) [**Note:** Within the illustration, the depth area identification numbers are indicated in the red boxes] and 2 Linear Depth Areas (lines "ek" and "lm"). Depending on the controlling depth and the number of dredged areas created for the channel, a linear depth area(s) may also be required at (coastline) line "ej".

4. Linear depth areas are required at lines "ek" and "lm" for the purpose of eliminating the discontinuity (in depth range values) which exists between the coastline (having a depth range value of -H) and the 6 foot depth contour. The zero (0) value depth contour (although not charted at these locations), must still be taken into account when encoding the depth areas for this particular ENC cell. A depth range of DRVAL1 = -H / DRVAL2 = 6 is **invalid**, and therefore the creation of a linear depth area at this location, will allow the cartographer to encode a **valid** range. The corresponding depth range values (of the valid range) are: DRVAL1 = -H
DRVAL2 = 0.)

SITUATION No. 6 (continued): **When to Continue (or Not Continue) A Depth Contour Through Another Nautical Feature or ENC Object**

PART III - B (continued): **Depth Contours and ENC Dredged Areas**

Depth Contours Which **ARE NOT** To Be Continued Through ENC Dredged Areas

*(Refer to **Figure 4-ES101**)*

✧ **Comments** (continued):

RE: Illustration No. 3:

5. A linear depth area is not needed at coastline line "jl" because there is no discontinuity in depth range values. The DRVAL1 (the coastline) = -H and DRVAL2 (low water boundary) = 0 is a valid depth value range.

6. Assuming the border of the illustration is the cell boundary, the appropriate portions (of the cell boundary) will also be encoded as boundaries of the appropriate ENC Depth Area (areas), Coastline, and/or Land Area.

RE: Illustration No. 4

7. A hospital is a member of the Building, single [BUISGL] object class. A hospital will be distinguished from other members of this class by the population of the appropriate value in the attribute *Function [FUNCTN]*.

8. Buildings which are (or to be) charted to scale shall be digitized as area objects. Buildings which are (or to be) charted with the minimum size symbol shall be digitized as point objects.

9. Please refer to the appropriate sections of the *NOS/ENC Object Specifications* for the full encoding details concerning Dredged Areas, Fairways, Depth Areas, Coastline, Land Areas, and Buildings.

SITUATION No. 7: **Miscellaneous Depth Contour Situations**
Depth Contours Which Approach a 3E Area

✧ **NOTE:** For in-depth explanations of a 3E area see sections 2.4.4 and 2.30.4.3 of the Nautical Chart Manual.

✧ **General Statement:** Charting detail which has been omitted in a 3E area, will have been charted on a larger scale chart. Perform the following preliminary steps to identify the limits of the larger scale coverage; then disregard this area (of the larger scale coverage) during the digitizing and encoding processes of the smaller scale chart.

✧ **Procedures Prior To Digitizing**

Before digitizing depth contours which may approach a 3E, area certain preliminary procedures should be performed.

1. **Determine all larger scale chart coverage.**

   This first preliminary procedure adheres to the MCD standard of always using as the primary source of data (either for digitizing purposes or charting purposes), the largest scale (and most current) existing source document.

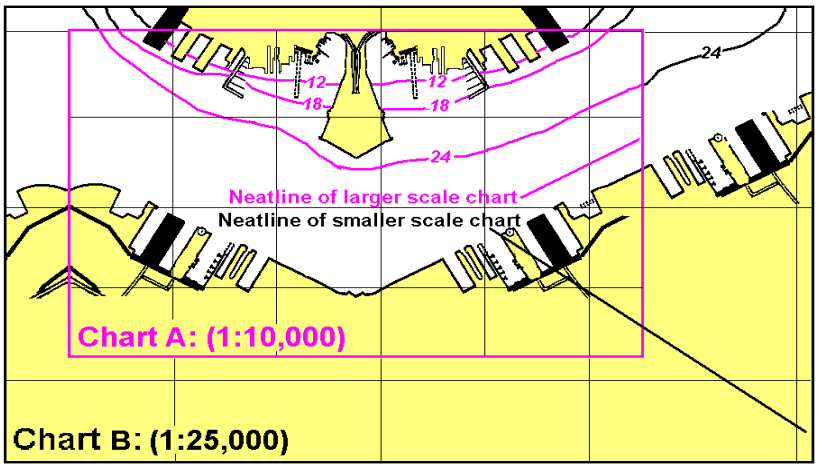
2. **Determine the neatline coordinates of all larger scale chart coverage in relationship to the smaller scale chart in question**.(i.e. *"Blocking Out"*)

   By determining the larger scale chart's neatline coordinates in relationship to the limits of the smaller scale chart in question, the depth contours which are only to be collected from the larger scale chart will be identified, and those which are only to be collected from the smaller scale chart in question will be identified. *(See **Figure 4-ES102*** on the following page.)

SITUATION No. 7 (continued):

Miscellaneous Depth Contour Situations
Depth Contours Which Approach a 3E Area

Which Depth Contours And From Where?



Depth Contours which are charted on both a large scale chart and its smaller scale counterpart **shall only be collected once**. The chart which presents the depth contour at its largest available scale shall be encoded as its official source document.

For example:

Consider the depth contours in the above graphic. The magenta portions of the 12, 18 and 24 foot depth contours are charted on both Chart A (the larger scale)and Chart B (the smaller scale). Several other portions of these same depth contours (indicated in black) extend only onto Chart B.

The magenta depth contours will only be collected from Chart A (and will have Chart A as their official source; the black depth contours will only be collected from Chart B (and will have Chart B as their official source).

Figure 4-ES102

SITUATION No. 8:

Miscellaneous Depth Contour Situations

Depth Contours Which "Hang"

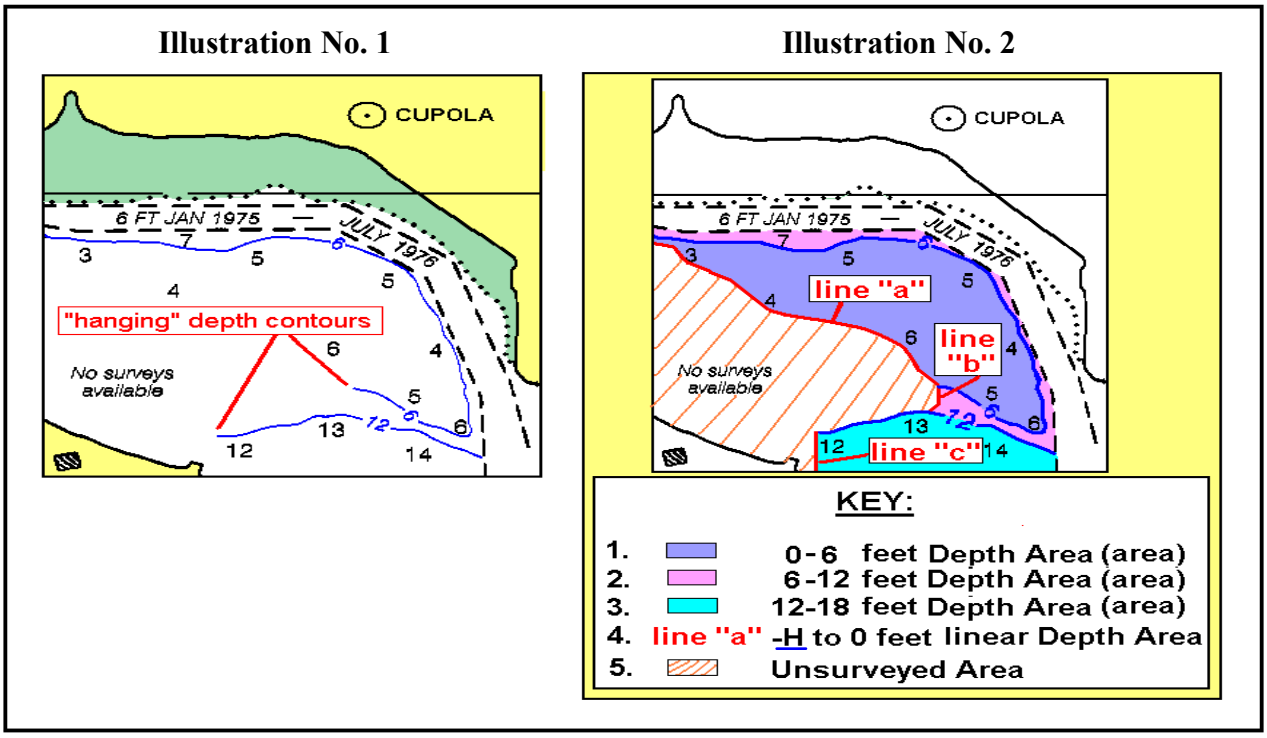


Figure 4-ES103

✧ **Comments:**

1. Depth contours which "hang" are similar to the "short sections of broken contours" mentioned in Situation No. 6, Part II-G in that they are generally charted in areas of undeveloped hydrography.

2. However, short sections of broken contours are just that---short sections. "Hanging" depth contours are contours which have initially been drawn in a hydrographic area containing a sufficient amount of soundings for their accurate delineation, but have extended into an undeveloped area thus preventing the further delineation of the depth contour.

SITUATION No. 8 (continued):

Miscellaneous Depth Contour Situations
Depth Contours Which "Hang"

*(Refer to **Figure 4-ES103**)*

✧ **Comments** (continued)**:**

3. In **Illustration No. 1**, the 6 foot depth contour and the 12 foot depth contour have been portrayed as "hanging". These depth contours are to be collected and encoded exactly as portrayed on the chart. Although additional lines will be connected to these contours for the purpose of creating the associated Group 1 area objects, these additional lines will **not** be encoded as ENC Depth Contours.

   The additional lines are only be created for the purpose of encoding the area boundaries of the required the ENC Group 1 objects Depth Area [DEPARE] and Unsurveyed Area [UNSARE].

RE: Illustration No. 2:

4. Lines "a" and "c" have been drawn and connected to the 6 and 12 foot depth contours, respectively. By connecting these lines, the 0-6 foot and the 12-18 foot depth areas have been formed. To create the 6-12 foot depth area, an additional line (line "b") has been drawn at the location indicated in the illustration.

5. It must be noted that lines "a" and "c" were drawn at locations which were estimated to be the continued path of the affected depth contour. In the specific circumstance of line "c", this line was drawn at the end of the area where the 6-12 foot depth area could be accurately portrayed. This location is assumed because of the proximity of the more accurately portrayed 6 and 12 foot depth contours.

6. **The cartographer must always, when required to estimate the location of these lines, be cognizant of the safest navigational route The depth areas formed by using these lines as boundaries must be as accurately portrayed as possible.**

SITUATION No. 8 (continued): **Miscellaneous Depth Contour Situations**
Depth Contours Which "Hang"

*(Refer to **Figure 4-ES103**)*

✧ **Comments** (continued):

7. **The use of the original hydrographic source document as a reference in extrapolating the position of these lines is always recommended.** Using the source document which originally applied the depth contours will provide the reassurance that indeed the most accurate information available has been encoded.

8. The Unsurveyed Area in Illustration No. 2 will be bounded by (in clockwise order):

- line "a"
- line "b"
- a portion of the 12 foot depth contour
- line "c"
- a portion of the southern cell boundary
- the shoreline construction object in the lower left hand corner of the drawing , and
- a portion of the left cell boundary.

SITUATION No. 9:

Miscellaneous Depth Contour Situations

Depth Contours Charted With The Old MCD Symbology

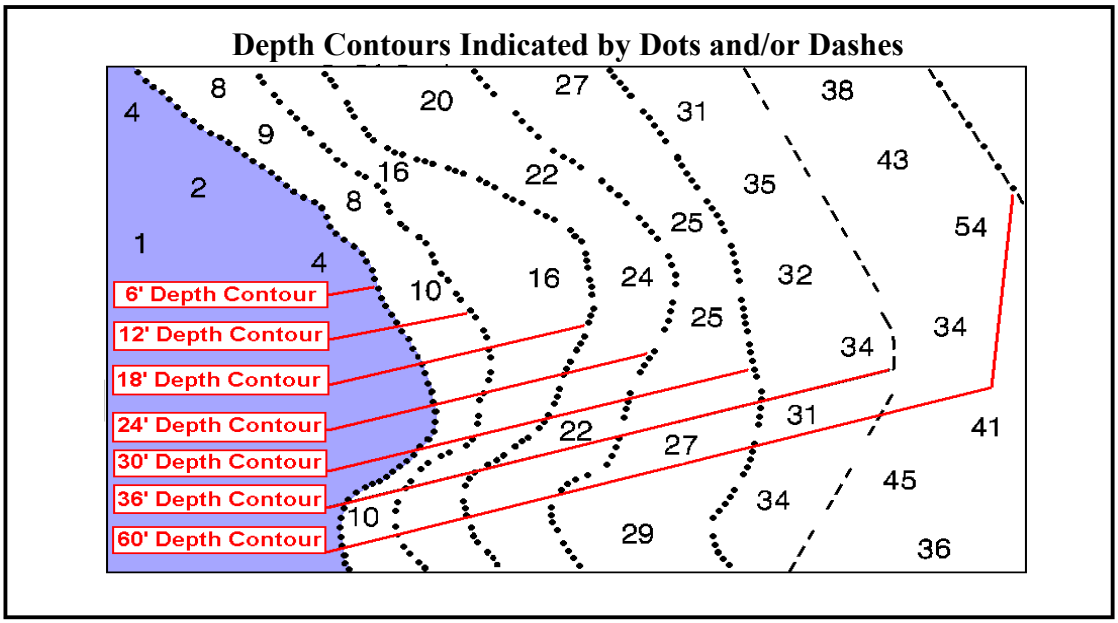


Figure 4-ES104

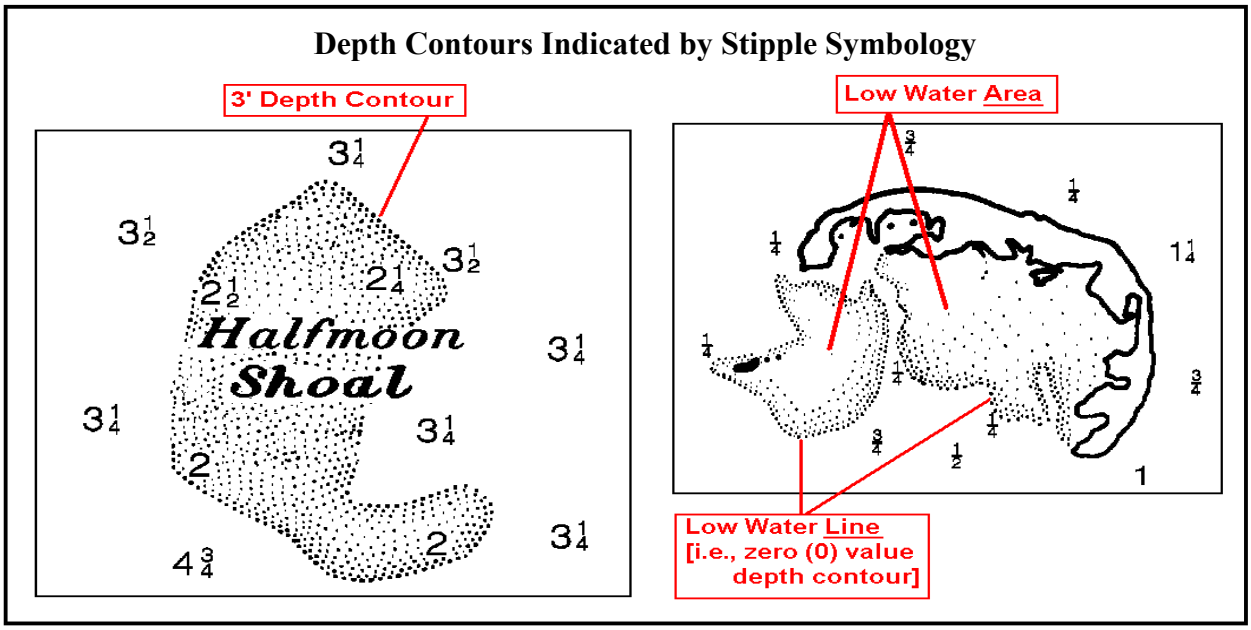


Figure 4-ES105

SITUATION No. 9 (continued):

Miscellaneous Depth Contour Situations
Depth Contours Charted With The Old MCD Symbology

*(Refer to **Figure 4-ES104** and **Figure 4-ES105**)*

✧ **Comments:**

1. Although a majority of the MCD nautical charts have had the depth contours revised to the modern symbology, the cartographer may on rare occasions have to digitize and encode depth contours from a chart on which the old MCD symbology still appears.

2. There is to be no difference in the digitizing of the old depth contour symbology than in the digitizing of the modern symbology. The cartographer is to follow as a continuous line, the pattern of the affected depth contour. All concepts, rules and procedures which have been previously mentioned in Section 4.30.13 are to be complied with.

3. Please note that the old depth contour symbology does not contain the label indicating the value of the depth contour, and will involve the cartographer either extrapolating the value from the symbology itself (***Figure 4-ES104***), or from the surrounding soundings (***Figure 4-ES105***).

4. (RE: ***Figure 4-ES104***) Extrapolating from the Symbology.

"A Partial Guide to the Extrapolation:

Number of Dots	**Times (x) 6 feet**	equals	Depth Contour Value **(in feet)**
continuous	N/A	=	6
two		=	12
three		=	18
four		=	24

Number of Dots	Depth Contour Value **(in fathoms)**
continuous	1
two	2
three	3
four	4

SITUATION No. 9 (continued): **Miscellaneous Depth Contour Situations**
Depth Contours Charted With The Old MCD Symbology

✧ **Comments** (continued):

5. **(RE: *Figure 4-ES106*** below) To delineate the appropriate depth contour when the *stipple* symbology is charted, the cartographer is to follow along the outside boundary of the stipple area (as indicated in ***Figure 4-ES106*** by the red lines); and is to adhere to the correct topological structure where warranted.

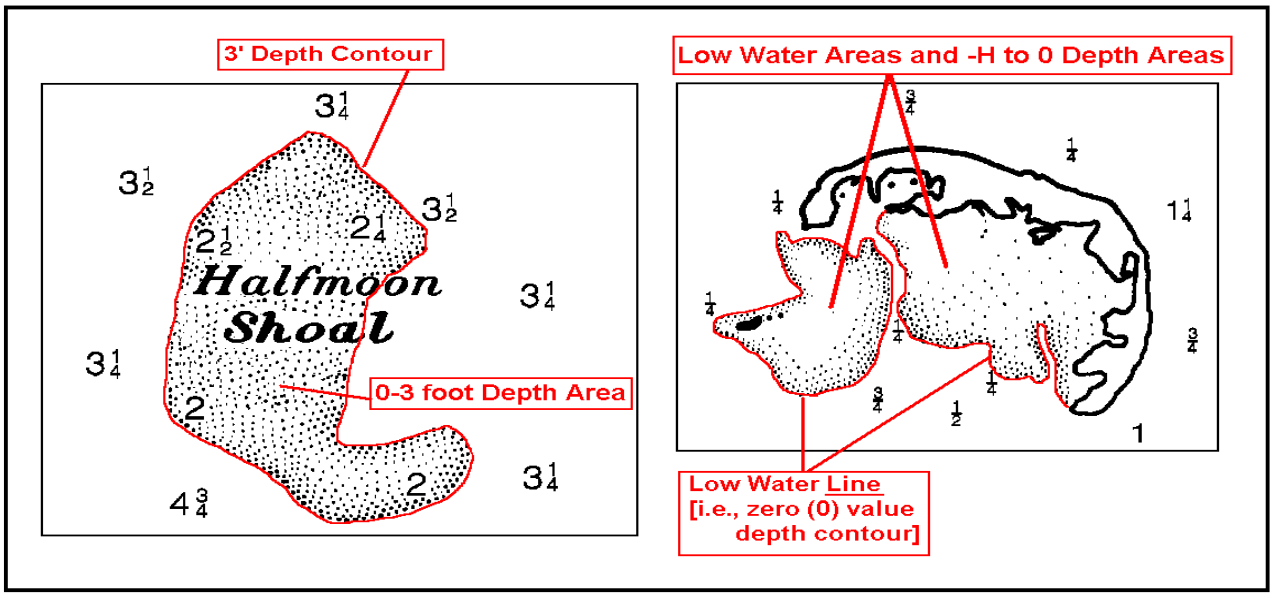


Figure 4-ES106

6. Refer also to Chart No. 1, United States of America, Nautical Chart Symbols Abbreviations and Terms, Section I-30, page 39.

V. LIST OF ATTRIBUTES AND ATTRIBUTES VALUES FOR DEPTH CONTOURS

Note: All Attributes and Values were provided by the IHO/S-57

ENC Allowed Geometric Primitives
Line

S-57 Object Acronym: DEPCNT

Attribute Acronym	Values OR <*type*>	Attribute	Comments
*** VALDCO**	<*numeric*>	**Value of Depth Contour**	The value of the depth contour
INFORM	<*free text*>	**Information**	1. Contains textual information about the feature. 2. Entries are to be taken from a cautionary or explanatory note which is shown on the paper chart. 3. Additional text may be added, up to 240 characters. Longer or standard notes should be logged with TXTDSC.
QUAPOS		**Quality of Position**	Default = null
	1	surveyed	**NOT USED FOR NOS ENCODING OF DEPTH CONTOURS**
	2	unsurveyed	**NOT USED FOR NOS ENCODING OF DEPTH CONTOURS**
	3	inadequately surveyed	**NOT USED FOR NOS ENCODING OF DEPTH CONTOURS**
	4	approximate	1. Represents depth contours which **could not adequately be delineated** by the surrounding soundings. 2. Represented on a nautical chart or source document by a dashed black line or green tint line. 3. The blue tint line shall not be encoded as an approximate depth contour for ENC purposes.

* Indicates a mandatory attribute (i.e. that the designated attribute must be populated with a value).

V. LIST OF ATTRIBUTES AND ATTRIBUTES VALUES (continued)
DEPTH CONTOURS (DEPCNT)

Note: All Attributes and Values were provided by the IHO/S-57

Attribute Acronym	Values OR <*type*>	Attribute	Comments
QUAPOS		**Quality of Position**	Default = null
	5	position doubtful	This attribute shall only be used when a depth contour delineates a submerged object (e.g., wreck, shoal, rock, obstruction, etc.) and the geographic position of the object is in question.
	6	unreliable	**NOT USED FOR NOS ENCODING OF DEPTH CONTOURS**
	7	reported (not surveyed)	**NOT USED FOR NOS ENCODING OF DEPTH CONTOURS**
	8	reported (not confirmed)	Used when a depth contour delineates a submerged object (e.g., wreck, shoal, rock, obstruction, etc.) which is considered dangerous to navigation but has not been confirmed by an authoritative field observation or survey party.
	9	estimated	**NOT USED FOR NOS ENCODING OF DEPTH CONTOURS**
	10	precisely known	1. Represents the **most accurate** hydrographic data provided on a source document. The data is the result of a hydrographic survey performed by NOS, USACE or other official organizations. 2. Represented on a nautical chart or source document by a continuous black or dotted (low water) line.
	11	calculated	**NOT USED FOR NOS ENCODING OF DEPTH CONTOURS**

V. LIST OF ATTRIBUTES AND ATTRIBUTES VALUES (continued) FOR DEPTH CONTOURS (DEPCNT)

Note: All Attributes and Values were provided by the IHO/S-57

Attribute Acronym	Values OR <*format*>	Attribute	Comments
RECDAT	<*coded string*>	**Recording Date**	1. The **date** when the specific feature was collected**,** edited or deleted**.** 2. The **mandatory** format shall be**:** YYYYMMDD where: YYYY = Calendar Year MM = Month DD = Day 3. If certain date values are not available, use one of the following formats: No specific year: - -MMDD No specific month: YYYY No specific day: YYYYMM No specific year and day: - -MM
RECIND	<*coded string*>	**Recording Indication**	1. The **procedure** used to collect the data. 2. The **mandatory** format shall be: US,US,???? where: (US,US,????) Procedure Authority Country 3. The procedure (????) shall be one of the following values: - digi = digitized - scan = scanned (Not currently being used) - alph = alpha/numeric precision input
SCAMAX	< integer>	**Scale Maximum**	**DISREGARD—PROHIBITED for ENCs**
SCAMIN	<integer>	**Scale Minimum**	The minimum scale at which the ENC object may be used for ECDIS. Scale should be less than the compilation scale.

V. LIST OF ATTRIBUTES AND ATTRIBUTES VALUES (continued) FOR DEPTH CONTOURS (DEPCNT)

Attribute Acronym	Values OR <*format*>	Attribute	Comments
SORDAT	<*coded string*>	**Source Date**	1. The **production date** of the source. (e.g. the survey date, the date of measurement, the date of locality) 2. The **mandatory** format shall be**:** YYYYMMDD where: YYYY = Calendar Year MM = Month DD = Day 3. If certain date values are not available, use one of the following formats: No specific year: - -MMDD No specific month: YYYY No specific day: YYYYMM No specific year and day: - -MM If two dates are listed for the source, enter the earlier date.
SORIND	<coded string>	**Source Indication**	1. Contains information about the **source** of the feature. 2. The **mandatory** format shall be**:** US,aa,sssss,dddddd... where: US = country (always US for United States) aa = authority sssss = source type dddd..... = the document number (up to 240 alpha/numeric characters) 3. Allowed authority ("aa") values: - US–NOS - U1–NIMA - U2-Naval Oceanographic Command 4. Allowed source ("sssss") types: - graph (graphic) [e.g., Hydro sheets, T-sheets] - reprt (text) [e.g. Letters, LNMs] 5. Examples of format: US,US,graph,H-10357 US,US,reprt,L-111/99 US,US,reprt,LNM 2/99

V. LIST OF ATTRIBUTES AND ATTRIBUTES VALUES (continued) FOR DEPTH CONTOURS (DEPCNT)

Note: All Attributes and Values were provided by the IHO/S-57

Attribute Acronym	Values OR <*format*>	Attribute	Comments
TXTDSC	<*free text*>	**Textual Description**	1. Will identify the name of an external file which is to be included in the final data set. 2. Will contain any textual information that will not fit into a 240 character attribute field length. 3. Examples of textual information includes standard or extremely long notes.
VERDAT		Vertical Datum	**DISREGARD—Attribute is PROHIBITED for individual objects.**

Dredged Areas
Section 4.30.14

Section 4.30.14----Dredged Areas

Table of Contents

Index of: - Dredged Area Geometric Portrayals
- Correlating IHO/S-57 Sections

Objectives:

The objectives of the following index are:

1. To aid in the specific identification of those *NOS/ENC Object Specifications* pages containing graphic examples (and explanations) of the *geometric portrayal* of ENC Dredged Areas.

2. To provide a cross-reference with the specific *IHO/S-57 Appendix B.1, ENC Product Specification, Annex A - Use of the Object Catalogue for ENC* sections from which the National Ocean Service has interpreted all information presented in this document.

The *IHO/S-57 Appendix B.1, ENC Product Specification, Annex A - Use of the Object Catalogue for ENC* remains the official and final authority for the encoding of all ENC information, and for the resolution of any discrepancies which may arise between this document and the IHO/S-57.

Index of: - Dredged Area Geometric Portrayals
- Correlating IHO/S-57 Sections

Title of Example	**Geometric Portrayal** NOS/ENC Object Specifications Page No.	IHO/S-57 Appendix B.1, ENC Product Specification, Annex A-Use of the Object Catalogue for ENC **Section No.**
✧ Enclosing All Dredged Areas For ENC Purposes	Go There	Sections 5.4.6 5.4.7 5.5
Portraying and Encoding Those Dredged Areas for Which:		
✧ The Controlling Depth Provided Is For the Centerline Only.	Go There	Sections 5.4.6 5.4.7 5.5
✧ Shoaling Is Indicated By Means of a Footnote or Graphic (No Soundings)	Go There	Sections 5.4.6 5.4.7 5.5
✧ The Dredged Area Represents the Intracoastal Waterway	Go There	Sections 5.4.6 5.4.7 5.5
✧ The Dredged Area Represents a Sediment Trap	Go There	Sections 5.4.6 5.4.7 5.5
Portraying and Encoding Those Dredged Areas In Which the Following (Or Similar) Notes Appear in a TAB:		
✧ "FOR THE LEFT OUTSIDE AND RIGHT OUTSIDE QUARTERS, DEPTHS GIVEN REPRESENT CONDITIONS 75 FEET INSIDE THE CHANNEL LIMITS."	Go There	Sections 5.4.6 5.4.7 5.5
✧ "TURNING BASIN CONTROLLING DEPTH 39.5 FT, 31.5 FT FROM BACKSIDE."	Go There	Sections 5.4.6 5.4.7 5.5

Index of: - Dredged Area Geometric Portrayals
- Correlating IHO/S-57 Sections

Title of Example	**Geometric Portrayal** NOS/ENC Object Specifications Page No.	IHO/S-57 Appendix B.1, ENC Product Specification, Annex A-Use of the Object Catalogue for ENC **Section No.**
Portraying and Encoding Those Dredged Areas In Which Soundings and Depth Contours are Charted:		
✧ Example 1: Portraying A Dredged Area Containing A Spot Sounding	Go There	Sections 5.4.6 5.4.7 5.5
✧ Example 2: Portraying A Dredged Area Containing An Encroaching Shoal Area **(Part I-The Shoal Area)**	Go There	Sections 5.4.6 5.4.7 5.5
✧ Example 2: Portraying A Dredged Area Containing An Encroaching Shoal Area **(Part II-The Dredged Area)**	Go There	Sections 5.4.6 5.4.7 5.5
✧ Example 3: Portraying A Dredged Area Containing A Wholly Enclosed Shoal **(Part I-The Shoal Area)**	Go There	Sections 5.4.6 5.4.7 5.5
✧ Example 3: Portraying A Dredged Area Containing A Wholly Enclosed Shoal **(Part II-The Dredged Area)**	Go There	Sections 5.4.6 5.4.7 5.5
✧ Example 4: Portraying A Tabulated and Quartered Dredged Area Containing Encroaching Soundings and Depth Contours.	Go There	Sections 5.4.6 5.4.7 5.5
✧ Miscellaneous Situation A: Portraying A Channel Without A Controlling Depth But Completely Filled with Soundings and Depth Contours	Go There	Sections 5.4.6 5.4.7 5.5
✧ Miscellaneous Situation B: Portraying A Channel Without A Controlling Depth And Depth Contours But Completely Filled with Soundings	Go There	Sections 5.4.6 5.4.7 5.5

DREDGED AREAS

I. Definition: An area of the bottom of a body of water which has been deepened by dredging. **[IHO Dictionary, SP32, 4th Edition]**

II. Nautical Chart *Feature* vs. ENC S-57 *Object Class*

Nautical Chart Feature	ENC S-57 Object Class
Improved Channels (and all divisional parts)	Dredged Area
Turning Basins	
Channel Wideners	

III. Collection Criteria

Generally, for those improved channels which do not contain spot shoals, soundings, or depth curves, every divisional part (i.e. quarter, middle half, greatest available width) within every improved channel reach shall be delineated as a dredged area, the number of dredged areas a particular reach will have will depend on the type of channel affected.

Example:

Channel Type	Width	Number of Quarters/Halves	Number of Dredged Areas
1	400 feet or more	4 quarters	4
2	100 feet to 399 feet	2 outside quarters; 1 middle half	3
3	less than 100 feet	Full width	1

The above rule also applies to channels whose controlling depth is provided in a legend or note. A controlling depth reported to the greatest available width will have 3 dredged areas -- the 2 outside quarters and the area of the specified width.

Turning basins and wideners of federally maintained or non-federally maintained channels will also be collected as dredged areas. The number of dredged areas in the turning basin and/or widener will also depend on the method of division (i.e. quartered, middle half, full width, greatest available width).

Improved channels in which: 1. the controlling depths are not indicated in a TAB or legend,

AND,

2. which have the actual soundings and depth curves charted,

shall **not** be collected as dredged areas. These channels limits, soundings and depth curves are to be collected, respectively as the ENC Objects: **Fairway (FAIRWY)**, **Sounding (SOUNDG)** and **Depth Contour (DEPCNT**). The ENC Object: **Depth Area (DEPARE)** must also be created.

IV. Data Collection Guidelines

After identifying the document(s) to be used as the source for converting a channel into an ENC object, the application (or revision) of all relevant data for ENC purposes will occur in 2 phases. The first phase involves *the identification of a nautical feature's appropriate ENC object class* (i.e. Dredged Area -DRGARE) *and the subsequent portrayal of its geometry*. (The geometry will define the boundaries of each dredged area.) The second phase involves the *encoding of the object class attributes* with information that is relevant to each dredged area's specific navigational purpose.

1. Source Documents

Documents which may serve as the source of federally maintained dredged area geometry and/or attribution include United States Corps of Engineer Surveys, Monthly Reports, Annual Reports and letters. To determine the full extent of all federally maintained dredged areas, refer to the Corp of Engineers Project Books, which are maintained in the Source Data Unit. Letters from state governments, local governments and private authorities may provide graphic and attribution information for non-federally maintained dredged areas.

When digital source data is not available, all documents are first to be examined for any geographic coordinates which may be used to create the limits of the particular channel. These geographic coordinates can be directly entered (by a key-in procedure) into the ENC database, to produce a highly accurate ENC *digital* boundary. [*Refer to the LAMPS2 User Guide for precision key-in operating instructions*]. However, if after exhaustive research, geographic coordinates are not available, the geometry may be collected from a scanned image of a USACE blueprint, or it may be digitized directly from the nautical chart.

Attention also must be given to source documents identified by the Source Data Unit as reference only. These documents usually do not contain "chartable" information for raster purposes, but may contain appropriate information for ENC purposes.

2. Geometric Portrayal

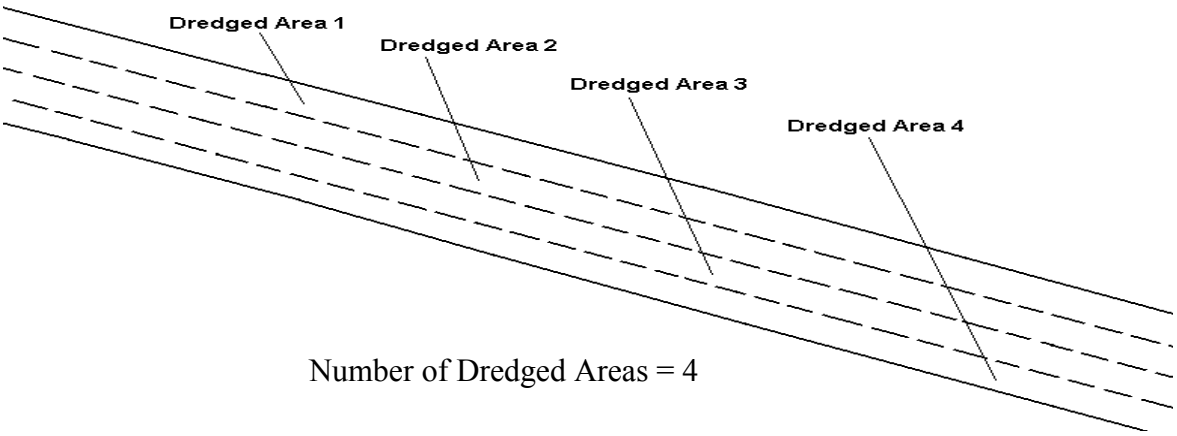
Determine the proper division of the channel to be collected by examining the associated TAB or legend. Each divisional portion (i.e. quarters, middle half, full width, or greatest available width) is to be considered a dredged area. *(See Figures 4-ES1 and 4-ES2)*

The *S-57 object* class which is to be used when collecting all dredged areas is: **DRGARE**

The only *geometric primitive* allowed for the *Dredged Area* ENC Object Class is: ***area***. This means that a dredged area can only be collected as an area object. Therefore, all ENC dredged areas are to be collected as totally enclosed objects. (*See Example*)

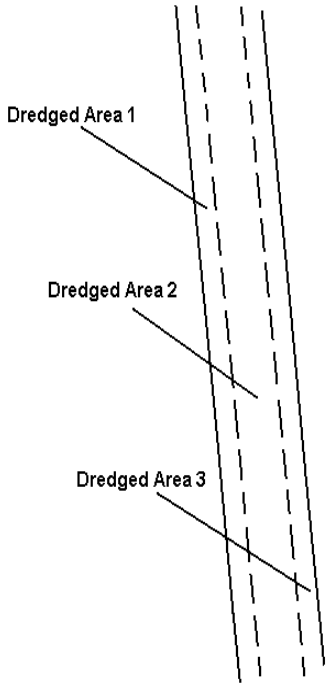
(The remainder of this page is intentionally blank)

Method of Division:
Quartered



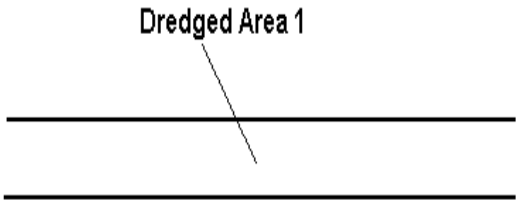
Number of Dredged Areas = 4

Method Of Division:
Outer Quarters and Middle Half *OR*
Outer Quarters and Greatest Available Width



Number of Dredged Areas = 3

Method Of Division:
Full Width



Number of Dredged Areas = 1

Figure 4-ES1

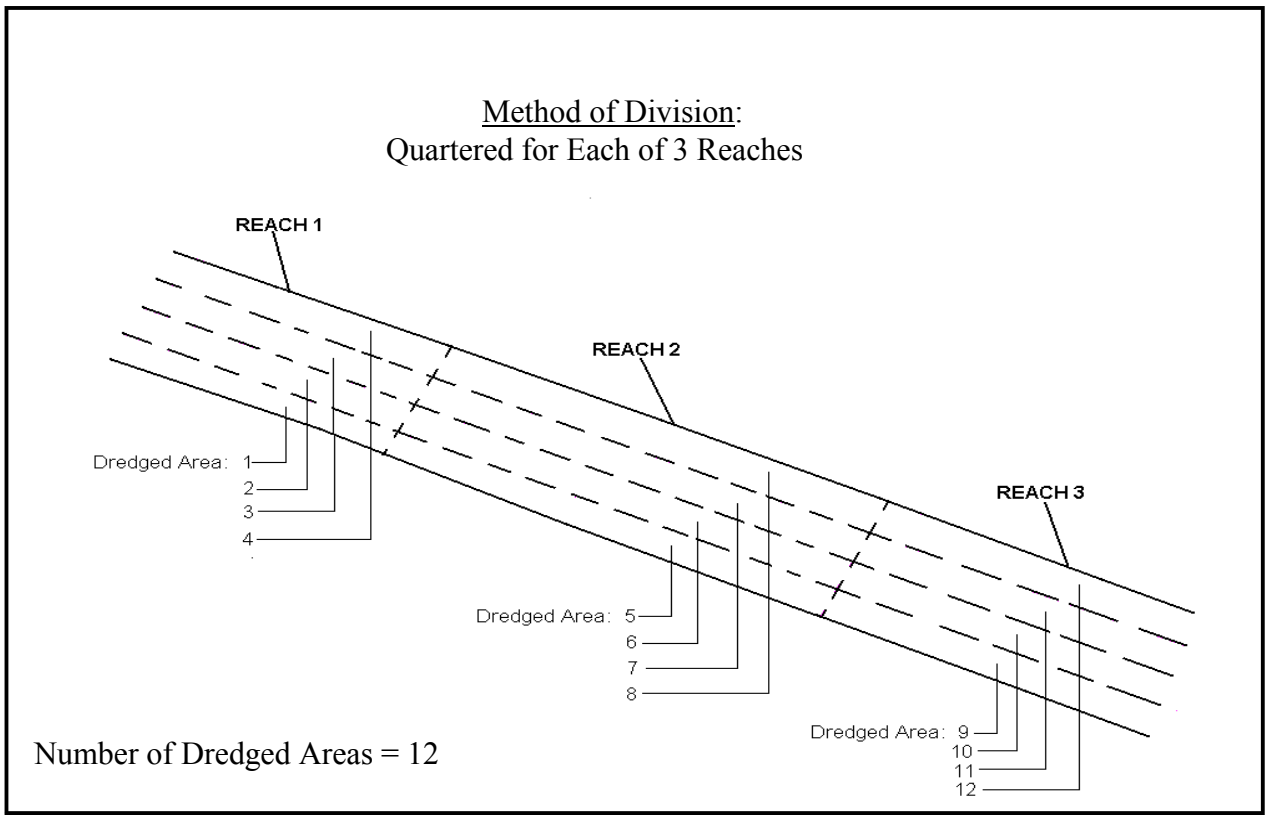


Figure 4-ES2

Important Notes: For demonstration purposes, and **continuing throughout the remaining pages of the *Dredged Area NOS/ENC Object Specifications***, all ENC Dredged Areas presented in *NOS/ENC Object Specifications Figures*, will show the outside limits of a *channel* as **solid** lines. Those limits which will be created because of ENC requirements, (e.g. a quarter boundary line, an uncharted reach separator, lines which enclose the ends of a channel) will be presented as **dashed** lines.

All labels for ENC objects will be written in the *Figures* as follows: **DRGARE (area)** [i.e. the S-57 acronym for the object; and the **required** * geometric primitive].

* geometric primitive - the method of collection and representation. A primitive may be a point, line, or area.

EXAMPLE: Enclosing All Dredged Areas For ENC Purposes

Description of Channel:

A. Width = 500 ft
B. Method of Division = Quartered
C. Number of Reaches = 3
D. Reach Separators Are **Not** Charted on Paper Chart
E. Limits of Channel Are Provided in the Form of State Plane Coordinates.

Note: The procedures for quartering a channel; and or creating a line representing a quarter boundary or reach separator are not provided in this example or manual. The purpose of this example is to show those **basic** elements which may form the **general** boundaries of a dredged area. More complex examples will be presented throughout this document. Refer to the LAMPS2 User Manual for the specific quartering and/or line creation processes.

1. **Creating the Channel Boundaries**

Points ***A. , B. , C. , and D.*** (*Figure 4-ES3* below) are points provided by a blueprint in the form of state plane coordinates. These points will be directly entered into the database to create the outer boundaries of the channel.

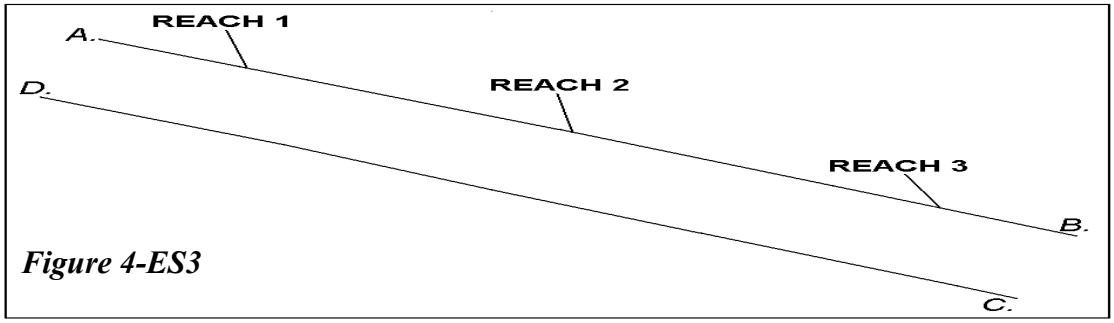


Figure 4-ES3

2. **Creating the Channel End Lines**

By entering points ***A. , B. , C. , and D.*** (in this order), line ***A-D*** and line ***B-C*** (*Figure 4-ES4* below) will automatically be created as the closing ends of the entire channel.

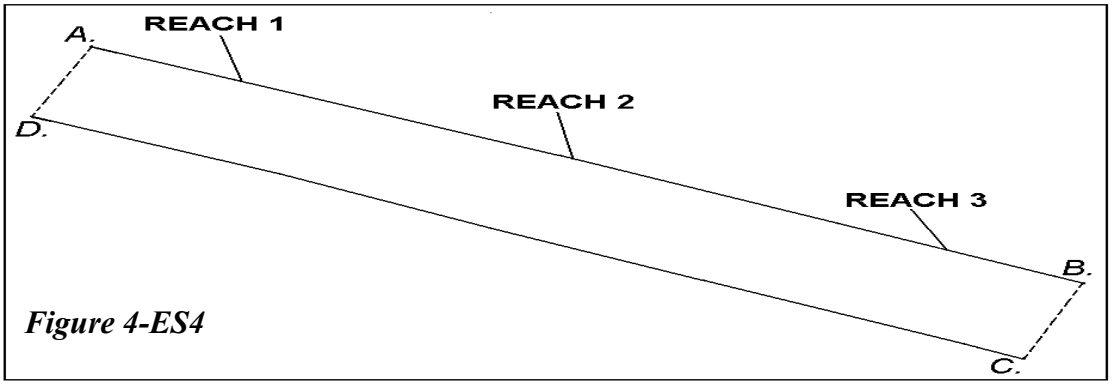


Figure 4-ES4

EXAMPLE: Enclosing All Dredged Areas For ENC Purposes (continued)

3. Determining the Location of All Uncharted Reach Separators

To determine the position of uncharted reach separators, inspect the TAB/and or Project Books to determine the project length of each reach. The separator lines can then be created at their respective locations, by measuring from either a channel end or previously established separator, (which ever is appropriate) the provided length value. The newly created separators will now serve as the beginning (or closing lines) of a dredged area. (Charted reach separators will serve the same purpose, but ensure each separator is charted in the correct location) ***[****Figure 4-ES5 below****]***

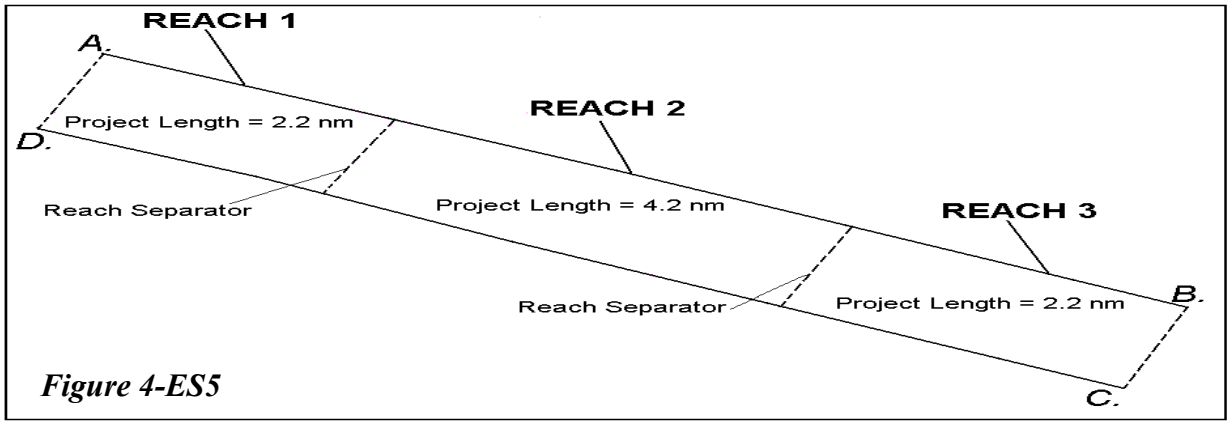


Figure 4-ES5

4. Quartering the Channel Into 12 Distinctive Dredged Areas.

By quartering the channel, we have now completed the formation of 12 distinctive and enclosed dredged areas. **[***Figure 4-ES6* below**]**

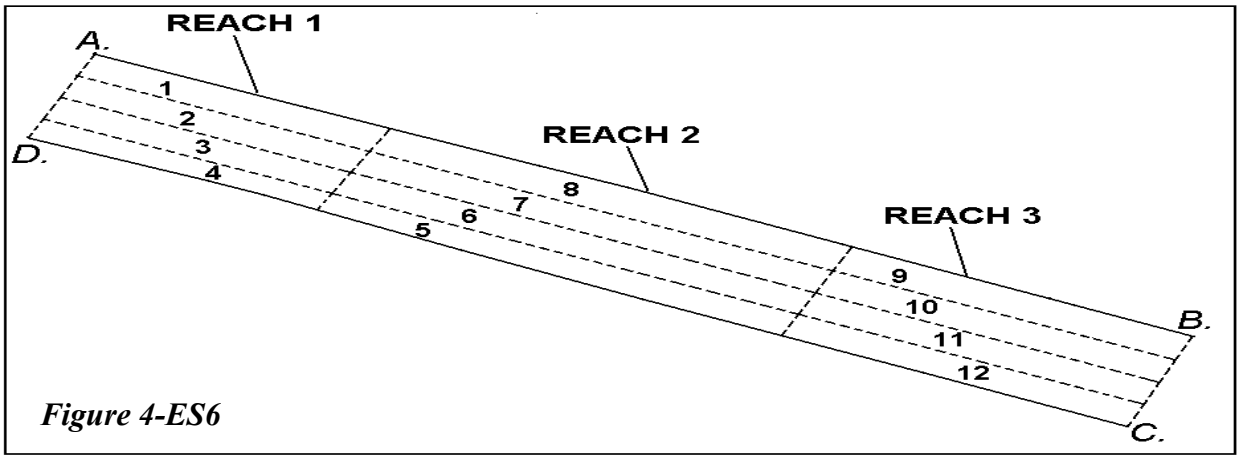


Figure 4-ES6

3. Encoding

IHO/S-57 encoding involves portraying the nautical feature as the appropriate geometric entity and S-57 object class, and assigning (to this object) the appropriate attributes and attribute values. For example, a channel, whose controlling depth is reported to the full width, would be encoded as follows:

ENC S-57 Object Class:	Dredged Area.....[DRGARE]
Attribute:	DRVAL1.....**D**epth **R**ange **Val**ue **1**] (The controlling depth)
Attribute Value:	30.....(feet)

Depending on the type of information provided in the source document, other attributes may also be populated to fully encode the object.

The ***IHO*/S-57 *Object Catalogue***, the official document containing the listing of all object classes, attributes, and attribute values, provides the following definitions:

> Object Class: *a generic description of features which can be categorized into a finite number of feature types* [e.g. DREDGED AREA, LIGHT, WRECK, OBSTRUCTION].

Features falling into one of these categories (i.e. DREDGED AREA, LIGHT, WRECK or OBSTRUCTION) would be more *precisely* identified by assigning the appropriate *attributes* of the respective object class.

> Attribute: *a category of characteristics about an object*.

For each instance of an object, there exists a list of allowable attributes. All allowable attributes are provided in the form of a six character acronym (e.g. DRVAL1); and, may only be used **once** for the particular object (i.e. a dredged area will never have two or more DRVAL1 attributes). However, to be assigned to each attribute will be *attribute values*, of which, in certain circumstances, a multiple selection is permitted.

> Attribute Value: *the unique and distinctive characteristic(s) of an object*

The ***IHO*/S-57 *Object Catalogue*** also provides the following information:

Attribute values (or "the expected input") may be of six (6) types:

1. enumerated
2. list
3. integer
4. coded string
5. free text
6. float

Enumerated - The expected input is a number selected from a list of predefined attribute values. Exactly one value must be chosen.

List - The expected input is a list of one or more numbers selected from a list of predefined attribute values. Where more than one value is used, they must normally be separated by commas but in special cases slashes ("/ ") may be used.

Integer - The expected input is an integer with defined range, units and format.

Coded String - The expected input is a string of ASCII characters in a predefined format.

Free Text - The expected input is a free-format alpha/numeric string. It may be a file name which points to a text or graphic file.

Float - The expected input is a floating point numeric value with defined range, resolution, units and format.

The IHO/S-57 list of attributes and attribute values pertaining to the object class: Dredged Areas are located in the back of this document.

It must be noted that, if, after examining a source document for S-57 encoding purposes, a cartographer determines that ENC appropriate (but non-mandatory) information has *not* been provided to complete the value selection for all object attributes, **there is to be no research to obtain the additional information**.

(The remainder of this page is intentionally blank.)

4. ENC Updating of Tabs and Legends

It is the ultimate goal of the Marine Chart Division to incorporate the LAMPS2 system throughout the Division, and have each cartographer produce from this one technical system, both an ENC and its raster counterpart. However, current practice dictates that the 2 chart products be produced on 2 independent systems and by 2 different cartographers, until the integration of the LAMPS2 system is tested and fully functioning.

However, to avoid the dual examination (by both raster personnel and ENC personnel) of source documents which may update a TAB or legend, there currently exists a mechanism in which the examination and application of blueprints and controlling depth letters are performed once by raster personnel, who then forward all necessary information to the ENC Branch by interfacing with the *MCD Legends Database* and/or forwarding copies of the respective *Tab Update Form*. **[***See Figure 4-ES7***]**

Upon receiving the updated TAB or legend information, ENC personnel will then extract the information to update the appropriate ENC object. As new channel/dredged areas are established and charted by the raster production branches, the new information is to be provided to the ENC Branch by the above mentioned procedures.

[Note: The Tab update procedure described in the previous two paragraphs is to remain in effect only until the *MCD Tabs Database* is placed "on line" throughout the Division. It will then be the *MCD Tabs Database* where all updated information affecting all Tabs on ENCs will be logged by raster personnel for subsequent extraction by cartographers in the ENC Branch.]

(The remainder of this page is intentionally blank.)

Example of Tab Update Form to be Forwarded to ENC Project

CHART 11301

BROWNSVILLE AND PORT ISABEL HARBORS CHANNEL DEPTHS

TABULATED FROM SURVEYS BY THE CORPS OF ENGINEERS - REPORT OF FEB 2000

	CONTROLLING DEPTHS FROM SEAWARD IN FEET AT MEAN LOWER LOW WATER (MLLW)				PROJECT DIMENSIONS		
NAME OF CHANNEL	LEFT OUTSIDE QUARTER	MIDDLE HALF OF CHANNEL	RIGHT OUTSIDE QUARTER	DATE OF SURVEY	WIDTH (FEET)	LENGTH (NAUT. MILES)	DEPTH MLLW (FEET)
ENTRANCE CHANNEL	46	46	46	2-00	300	1.9	44-42
LAGUNA MADRE CHANNEL	42.0	42.0	42.0	1-99	250	2.2	42
BROWNSVILLE SHIP CHANNEL:							
JUNCTION BASIN TO BOCA CHICA PASSING BASIN	42.0	42.0	42.0	1-99	250	3.4	42
BOCA CHICA PASSING BASIN TO GOOSE I. PASSING BASIN	42.0	42.0	42.0	1-99	250	4.5	42
GOOSE I. PASSING BASIN TO BROWNSVILLE TURNING BASIN	42.0	42.0	42.0	1-99	300	2.8	42
BROWNSVILLE TURNING BASIN	35.0	36.0	35.0	1-99	500-1000	1.65	42-36
PORT ISABEL CHANNEL:							
JUNCTION TO TURNING BASIN (INCLUDING WIDENER AT JUNCTION)	38	33	33	2-00	200	1.2	36
PORT ISABEL TURNING BASIN	33	34	33	2-00	1000	0.2	36
CUT OFF CHANNEL	33	33	34	2-00	200	0.7	36

NOTE - CONSULT THE CORPS OF ENGINEERS FOR CHANGES SUBSEQUENT TO THE ABOVE INFORMATION

Source: CL-xxx/00 dated 02/01/00

Figure 4-ES7

All *new* information to be updated:

- will be provided by raster production personnel on a copy of the respective *Tabulation Update Form* (above) after examination and application of the appropriate source document(s).
- will always be indicated on the *Tabulation Update Form* in **red**
- will be the new revisions to be applied (by ENC personnel) to the ENC database. The source document which is identified at the bottom of the form will be entered in the appropriate attribute field.

5. Unique Data Collection Situations

This section and the following examples will provide the recommended procedures for portraying and encoding those dredged areas for which:

- the controlling depth provided is for the centerline only
- shoaling is indicated by means of a footnote or graphic
- the dredged area represents the Intracoastal Waterway
- the following or similar notes appear in a tab:

  a. **"FOR THE LEFT OUTSIDE AND RIGHT OUTSIDE QUARTERS, DEPTHS GIVEN REPRESENT CONDITIONS 75 FEET INSIDE THE CHANNEL LIMITS."**

  b. **"TURNING BASIN CONTROLLING DEPTH 39.5 FT, 31.5 FT FROM BACKSIDE."**

- soundings and/or depth curves are charted

Please use the index located in the beginning of the Dredged Area *NOS/ENC Object Specifications* to easily identify and promptly access an example which may closely resemble a dredged area currently being encoded.

(The remainder of this page is intentionally blank

Portraying and Encoding Those Dredged Areas for Which:

The Controlling Depth Provided Is for the Centerline Only

Example: 24 Feet on Centerline 1992

✧ The **ENC objects** involved in the portrayal of the dredged area are:

- Dredged Area (DRGARE)
- Caution Area (CTNARE)
- Fairway (FAIRWY)

✧ The **geometric primitives** of the affected objects are:

- area (Dredged Area)
- area (Caution Area)
- area (Fairway)

✧ Comments:

1. Encode all channel limit lines as boundaries of the ENC object Dredged Area (area) [DRGARE] and Fairway [FAIRWY].

2. Specifically populate the following Dredged Area attributes as indicated:

DRVAL1:	24
INFORM:	Depth value for centerline only

3. Also encode the dredged area boundaries as a Caution Area (area) [CTNARE].

4. Specifically populate the following Caution Area attributes as indicated:

INFORM:	Depth in Dredged Area is 24 Feet for the Centerline Only

5. The above attribution does not exclude the population of other Dredged Area, Fairway and Caution Area attributes where appropriate.

6. Refer to the appropriate *NOS/ENC Object Specifications* section which will provide the full encoding details and the respective list of attributes and attribute values.

Portraying and Encoding Those Dredged Areas for Which:

- **Shoaling Is Indicated by Means of a Footnote or Graphic (No Soundings)**

For ENC purposes, a geographic position for all shoaling must be provided by the raster production branches. IHO/S-57 specifications require that the **actual location and/or limits** of any shoaling within a dredged area be graphically depicted. All shoaling, whether reported by the source document as being a *spot shoaling* or as *extending for a specified length*, will be collected as a **Caution Area (area)**,or as a **Caution Area (point)**, [CTNARE] whichever is appropriate, and as the object: **Depth Area (area)** [DEPARE- See Section 4.30.12]

- **The Dredged Area Represents the Intracoastal Waterway**

There are areas along the Intracoastal Waterway in which the limits of the IWW are represented only with natural shoreline (i.e. no dashed symbol).

For those limits of the IWW represented by natural shoreline, and **not** containing blue tint, the object class, **Dredged Area (area)** is to follow along the limits of the shoreline. *(See Figure 4-ES8)* [DRGARE]

For those limits of the IWW represented by natural shoreline, and **containing blue tint**, the object class: **Dredged Area (area)** is to follow along the outer extremes of the blue tint areas. *(see Figure 4-ES8)* [DRGARE]

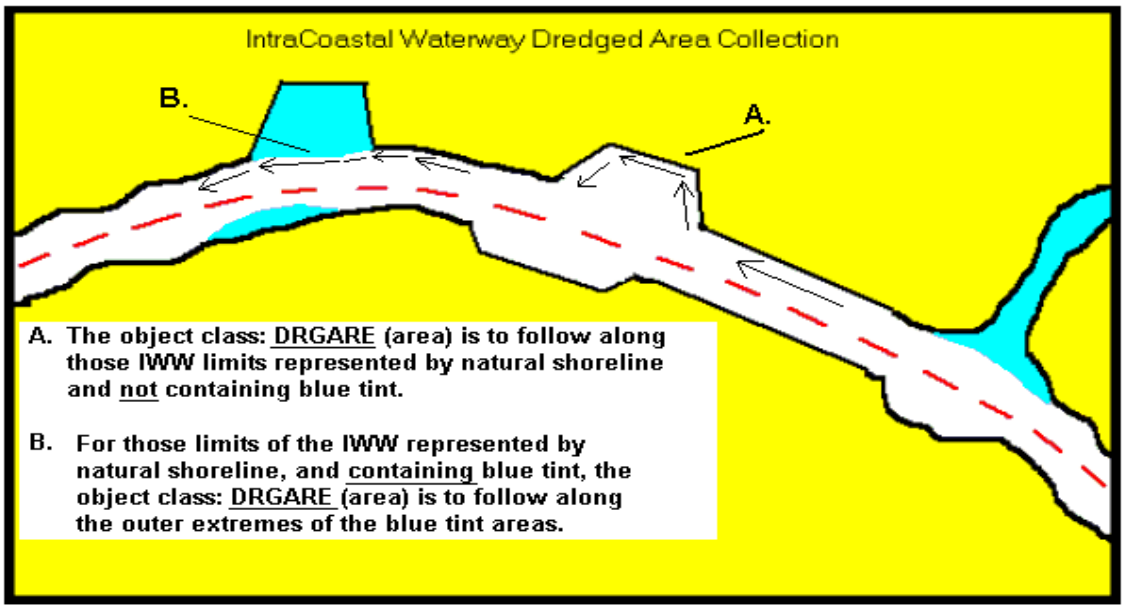


Figure 4-ES8

Portraying and Encoding those Dredged Areas for Which:

The Dredged Area Represents a Sediment Trap

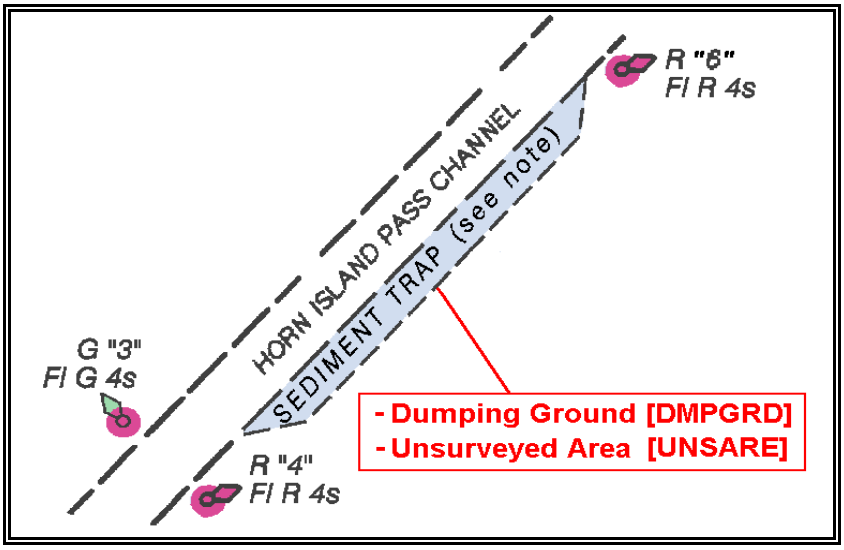


Figure 4-ES8a

✧ See Section 4.30.15, Dumping Grounds.

Portraying and Encoding Those Dredged Areas In Which The Following (Or Similar) Note Appears in a TAB:

"FOR THE LEFT OUTSIDE AND RIGHT OUTSIDE QUARTERS, DEPTHS GIVEN REPRESENT CONDITIONS 75 FEET INSIDE THE CHANNEL LIMITS."

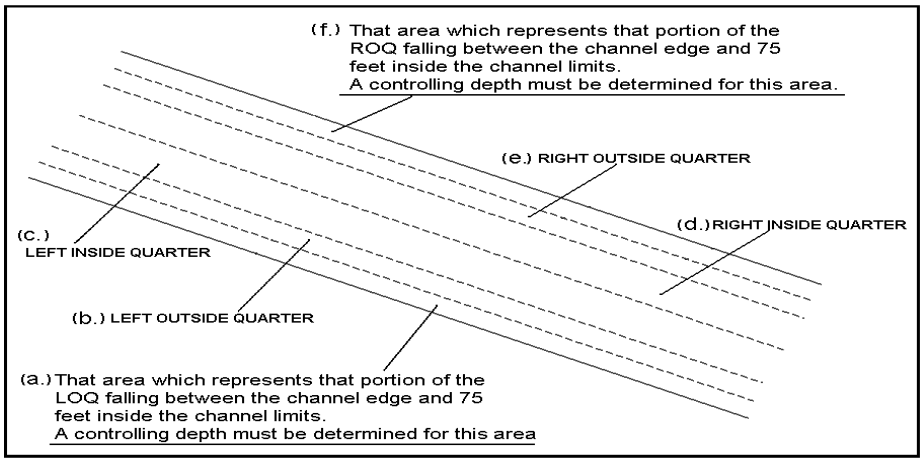


Figure 4-ES9

✧ The **ENC objects** involved in the portrayal of the above dredged areas are:

- Dredged Area (DRGARE)
- Fairway (FAIRWY)

✧ The **geometric primitives** of the affected objects are:

- area (Dredged Area)
- area (Fairway)

(continued)

Portraying and Encoding Those Dredged Areas In Which The Following (Or Similar) Note Appears in a TAB:

"FOR THE LEFT OUTSIDE AND RIGHT OUTSIDE QUARTERS, DEPTHS GIVEN REPRESENT CONDITIONS 75 FEET INSIDE THE CHANNEL LIMITS."

(continued)

[Refer to Figure 4-ES9]

✧ Comments:

1. The following six (6) dredged areas are formed from this channel (and therefore six (6) controlling depths must be determined):

   a. That area which represents that portion of the ROQ falling between the channel edge and 75 feet inside the channel limits.

   b. The portion of the Left Outside Quarter (LOQ) not included in a. above

   c. The Left Inside Quarter (LIQ)

   d. The Right Inside Quarter (RIQ)

   e. The portion of the Right Outside Quarter (ROQ) not included in f. below.

   f. That area which represents that portion of the LOQ falling between the channel edge and 75 feet inside the channel limits.

2. The entire limits of the channel will also be encoded as the ENC object Fairway (FAIRWY).

Portraying and Encoding Those Dredged Areas In Which The Following (Or Similar) Note Appears in a TAB:

"TURNING BASIN CONTROLLING DEPTH 39.5 FT, 31.5 FT FROM BACKSIDE."

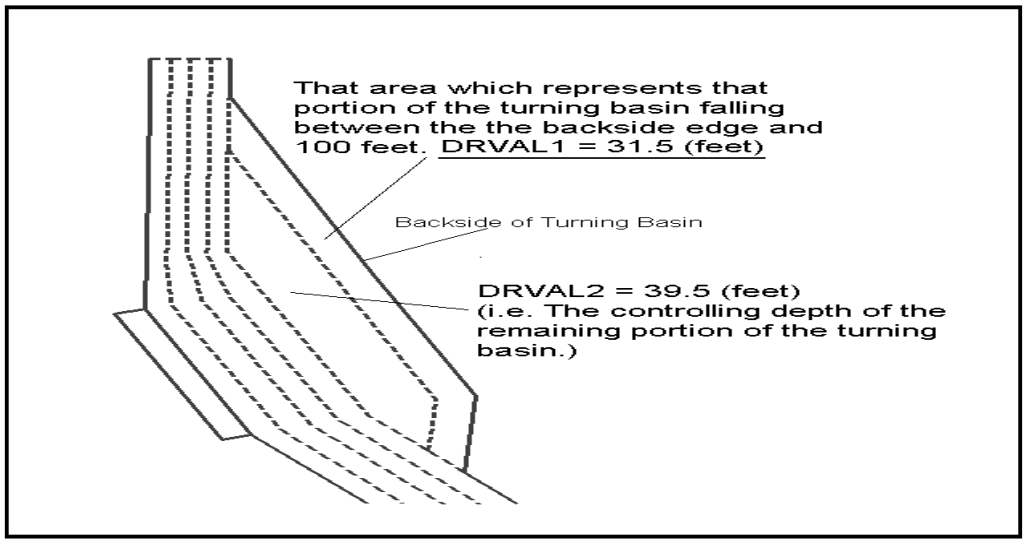


Figure 4-ES10

- The **ENC objects** involved in the portrayal of the dredged areas formed from the turning basin are:
  - Dredged Area (DRGARE)
  - Fairway (FAIRWY)

- The **geometric primitives** of the affected objects are:
  - area (Dredged Area)
  - area (Fairway)

(continued)

Portraying and Encoding Those Dredged Areas In Which The Following (Or Similar) Note Appears in a TAB:

"TURNING BASIN CONTROLLING DEPTH 39.5 FT, 31.5 FT FROM BACKSIDE."

(continued)

[Refer to Figure 4-ES10]

✧ Comments:

1. The following two (2) dredged areas are formed from this turning basin (and therefore two (2) controlling depths must be determined):

   a. That area which represents that portion of the turning basin falling between the backside edge and 100 feet. DRVAL1 = 31.5

   b. The remaining portion of the turning basin.

2. The entire limits of the channel and basin will also be encoded as the ENC object Fairway (FAIRWY).

Portraying and Encoding Those Dredged Areas for Which: Soundings and/or Depth Curves are Charted.

Example 1: **Portraying A Dredged Area Containing a Spot Sounding**
(No depth curve)

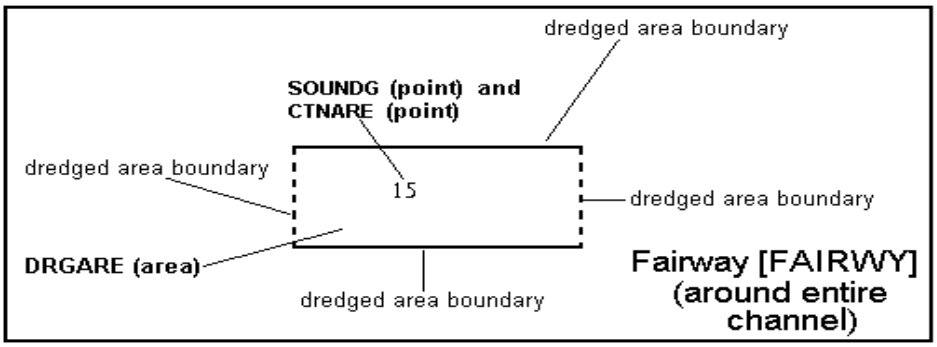


Figure 4-ES11

✧ The **ENC objects** involved in the portrayal of the above dredged area are:

- Dredged Area (DRGARE)
- Sounding (SOUNDG)
- Caution Area (CTNARE)
- Fairway (FAIRWY)

✧ The **geometric primitives** of the affected objects are:

- area (Dredged Area)
- point (Sounding)
- point (Caution Area)
- area (Fairway)

(continued)

Portraying and Encoding Those Dredged Areas for Which: Soundings and/or Depth Curves are Charted.

Example 1: **Portraying A Dredged Area Containing a Spot Sounding**
(No depth curve)

(continued)

[Refer to Figure 4-ES11]

✧ Comments:

1. Encode all channel limit lines as a Dredged Area (area) [DRGARE]. (This includes those limit lines created to enclose the channel reach.

2. Encode the sounding as a Sounding (point) [SOUNDG].

3. Also encode the sounding as a Caution Area (point) [CTNARE]
   * **IF AND ONLY IF THE SOUNDING REPRESENTS A SHOAL.**
   The purpose of the Caution Area will be to specifically highlight the designated object which it is displayed on a ship's ECDIS.

4. The entire limits of the channel will also be encoded as the ENC object Fairway (FAIRWY).

5. Specifically populate the following Caution Area attributes as indicated:

INFORM:	Shoal
SORDAT:	the date of location of the spot sounding (in S-57 format)
SORIND :	the source of the spot sounding (in S-57 format)

(continued)

Portraying and Encoding Those Dredged Areas for Which: Soundings and/or Depth Curves are Charted.

Example 1: **Portraying A Dredged Area Containing a Spot Sounding**
(No depth curve)

(continued)

[Refer to Figure 4-ES11]

✧ Comments (continued):

6. The controlling depth (DRVAL1) of the dredged area will be the value stated in the Tab (if the dredged area is tabulated), or the value stated in the respective legend.

7. The above attribution does not exclude the population of other Dredged Area, Caution Area, Fairway or Sounding attributes where appropriate.

8. Refer to the Caution Area, Fairway and Sounding *NOS/ENC Object Specifications* sections which will provide the full encoding details about each respective object.

Portraying and Encoding Those Dredged Areas for Which: Soundings and/or Depth Curves are Charted.

EXAMPLE 2: Portraying A Dredged Area Containing An Encroaching Shoal Area

[Part I - Portraying The Encroaching Shoal Area (grey shaded area in Figure 4-ES12)**]**

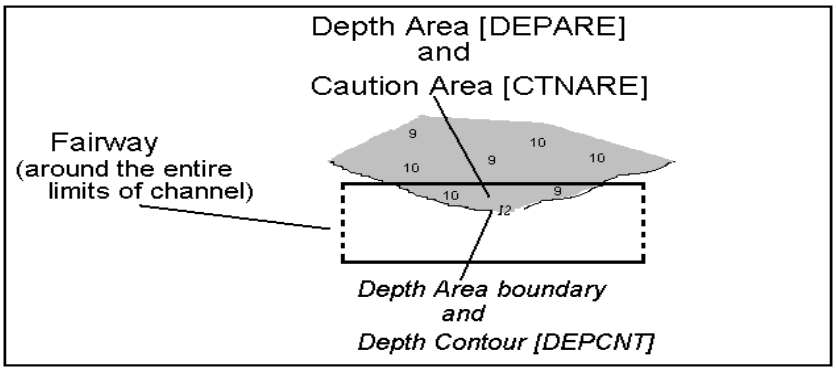


Figure 4-ES12

✧ The **ENC objects** involved in the portrayal of the **grey shaded shoal area** of the dredged area are:

– Depth Area (DEPARE)
– Caution Area (CTNARE)
– Depth Contour (DEPCNT)
– Sounding (SOUNDG)
– Fairway (FAIRWY)

✧ The **geometric primitives** of the affected objects are:

– area (Depth Area)
– area (Caution Area)
– line (Depth Contour)
– point (Soundings)
– area (Fairway)

(continued)

Portraying and Encoding Those Dredged Areas for Which: Soundings and/or Depth Curves are Charted.

EXAMPLE 2: Portraying A Dredged Area Containing An Encroaching Shoal Area

[Part I - Portraying The Encroaching Shoal Area (grey shaded area in Figure 4-ES12)**]**

(continued)

✧ Comments:

1. The depth contour which bounds the entire encroaching shoal area (i.e. that area falling both inside and outside the channel limits) will be encoded as the limits of the ENC *area* object Depth Area. [DEPARE].

2. That portion of the shoal area which only falls inside the channel limits will also be encoded as the ENC object Caution Area. [CTNARE]. The purpose of the Caution Area will be to specifically highlight the designated object when it is displayed on a ship's ECDIS.

3. The depth range values for the depth area are: DRVAL1= 6
   DRVAL2 = 12

   See Section 4.30.12 (Depth Areas) of the *NOS/ENC Object Specifications* for more information on determining the appropriate depth range values of Depth Areas.

4. A linear depth area may also be required along the portion of the 12' depth contour falling inside the channel A linear depth area would be required if there is discontinuity in the succession of depth range values between the dredged areas and the depth areas.

   See Section 4.30.12 of the *NOS/ENC Object Specifications* for more information on situations requiring a linear depth area.

(continued)

Portraying and Encoding Those Dredged Areas for Which: Soundings and/or Depth Curves are Charted.

EXAMPLE 2: Portraying A Dredged Area Containing An Encroaching Shoal Area

[Part I - Portraying The Encroaching Shoal Area (grey shaded area in Figure 4-ES12)**]**

(continued)

✧ Comments (continued):

5. If the encroaching shoal area does not contain soundings, the same procedures provided in this example are to be followed.

6. The controlling depth (DRVAL1) of the dredged area will be the value stated in Tab (if the dredged area is tabulated), or the value stated in the respective legend.

7. The entire limits of the channel will also be encoded as the ENC object Fairway (FAIRWY).

8. The above attribution **does not** exclude the population of other Dredged Area, Depth Area, Caution Area, Depth Contour and Sounding attributes where appropriate.

9. Please refer to the appropriate *NOS/ENC Object Specifications* section which will provide the full encoding details and the respective list of attributes and attribute values.

**Portraying and Encoding Those Dredged Areas for Which:
Soundings and/or Depth Curves are Charted**.

EXAMPLE 2: Portraying A Dredged Area Containing An Encroaching Shoal Area

[Part II - Portraying the Dredged Area (white area in Figure 4-ES13)**]**

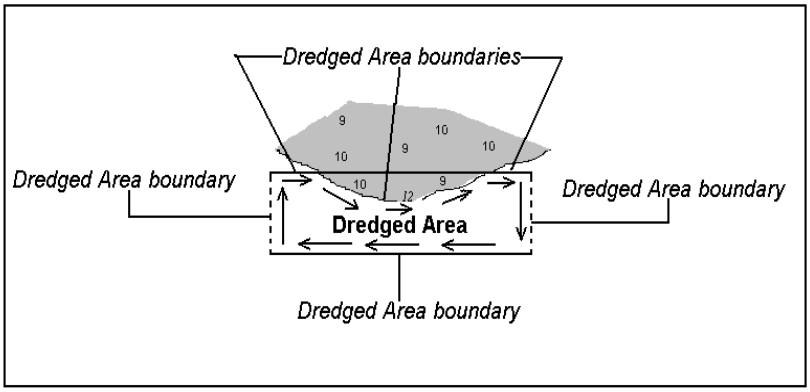


Figure 4-ES13

✧ The **ENC object** involved in the portrayal of the dredged area is:

– Dredged Area (DRGARE)

✧ The **geometric primitive** of the affected object is:

– area (Dredged Area)

(continued)

Portraying and Encoding Those Dredged Areas for Which: Soundings and/or Depth Curves are Charted.

EXAMPLE 2: Portraying A Dredged Area Containing An Encroaching Shoal Area

[Part II - Portraying the Dredged Area (white area in Figure 4-ES13)**]**

(continued)

✧ Comments:

1. The area defined by the clockwise flow of the arrows is the area to be collected as the ENC object Dredged Area [DRGARE].

2. From Part 1 of this example:

   (a) the depth contour which also serves as a boundary of the dredged area will have been previously encoded as the ENC objects Depth Contour and Depth Area. Therefore, the geometry which represents the depth contour will be encoded as three (3) unique ENC objects—Depth Contour, Depth Area and Dredged Area.

   (b) The entire limits of the channel will have been encoded as the ENC object Fairway (FAIRWY)

   (See Figure 4-ES12)

3. The controlling depth (DRVAL1) of the dredged area will be the value stated in the Tab (if the dredged area is tabulated), or the value stated in the respective legend.

Portraying and Encoding Those Dredged Areas for Which: Soundings and/or Depth Curves are Charted.

EXAMPLE 3: Portraying A Dredged Area Containing A Wholly Enclosed Shoal

[Part I - Portraying the Shoal Area (grey shaded area) in Figure 4-ES14)**]**

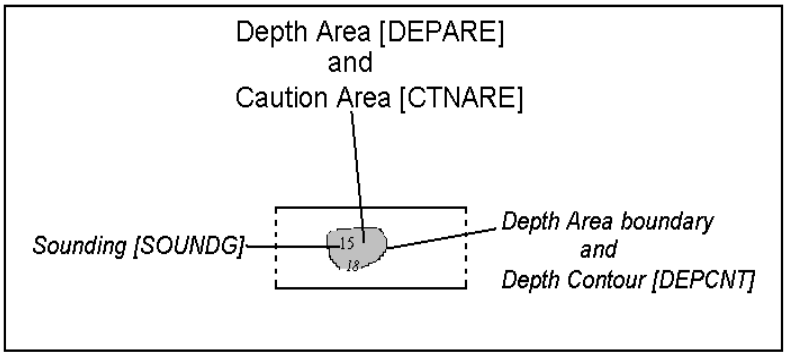


Figure 4-ES14

✧ The **ENC objects** involved in the portrayal of the depth area are:

- Depth Area (DEPARE)
- Depth Contour (DEPCNT)
- Caution Area (CTNARE)
- Sounding (SOUNDG)

✧ The **geometric primitives** of the affected objects are:

- area (Depth Area)
- line (Depth Contour)
- area (Caution Area)
- point (Sounding)

(continued)

Portraying and Encoding Those Dredged Areas for Which: Soundings and/or Depth Curves are Charted.

EXAMPLE 3: Portraying A Dredged Area Containing A Wholly Enclosed Shoal

[Part I - Portraying the Shoal Area (grey shaded area) in Figure 4-ES14**]**

(continued)

✧ Comments:

1. In addition to encoding the depth contour as its similarly named ENC object Depth Contour, the geometry will also form the boundary and be encoded as the ENC objects Depth Area and Caution Area.

2. The depth range values for the depth area are: DRVAL1 = 12
   DRVAL2 = 18

   See Section 4.30.12 of the *NOS/ENC Object Specifications* for more information on Depth Areas and the determination of the appropriate depth range values.

3. A linear depth area may also be required along the 18' depth contour A linear depth area would be required if there is discontinuity in the succession of depth range values between the dredged areas and the depth areas.

   See Section 4.30.12 of the *NOS/ENC Object Specifications* for more information on situations requiring a linear depth area.

4. The above attribution **does not** exclude the population of other Dredged Area, Depth Contour, Caution Area and Sounding attributes where appropriate. Please refer to the applicable *NOS/ENC Object Specifications* section which will provide the list of all respective attributes and attribute values for each affected ENC object.

Portraying and Encoding Those Dredged Areas for Which: Soundings and/or Depth Curves are Charted.

EXAMPLE 3: Portraying A Dredged Area Containing A Wholly Enclosed Shoal

[Part II - Portraying the Dredged Area (white area) in Figure 4-ES15)**]**

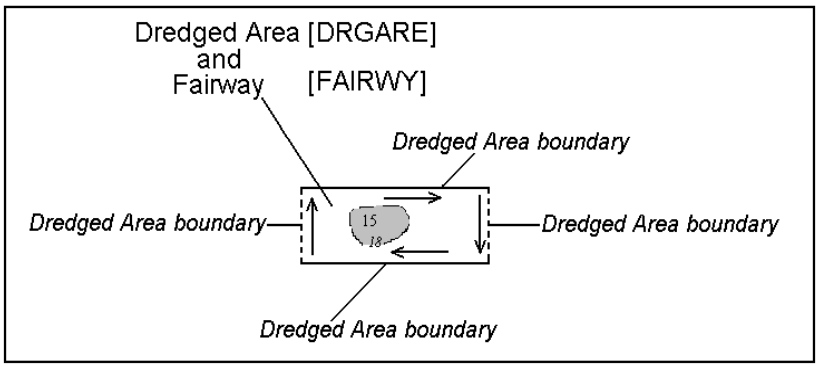


Figure 4-ES15

✧ The **ENC objectss** involved in the portrayal of the above dredged area are:

- Dredged Area (DRGARE)
- Fairway (FAIRWY)

✧ The **geometric primitives** of the affected objects are:

- area (Dredged Area)
- area (Fairway)

✧ Comments:

1. The area defined by the clockwise flow of the arrows is the area to be collected as the ENC object Dredged Area.

2. The entire limits of the channel will also be encoded as the ENC object Fairway (FAIRWY).

3. From Part 1 of this example, the depth contour and the sounding will have been encoded as the ENC objects Depth Contour, Depth Area and Sounding.

4. The controlling depth (DRVAL1) of the dredged area will be the value stated in the Tab (if the dredged area is tabulated), or the value stated in the respective legend.

Portraying and Encoding Those Dredged Areas for Which: Soundings and/or Depth Curves are Charted.

EXAMPLE 4: Portraying a Tabulated and Quartered Dredged Area(s) Containing Encroaching Soundings and Depth Curves

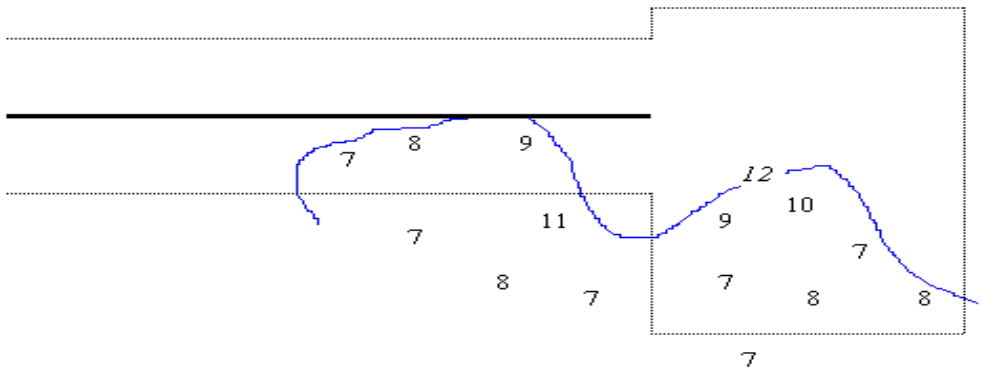


Diagram 4a

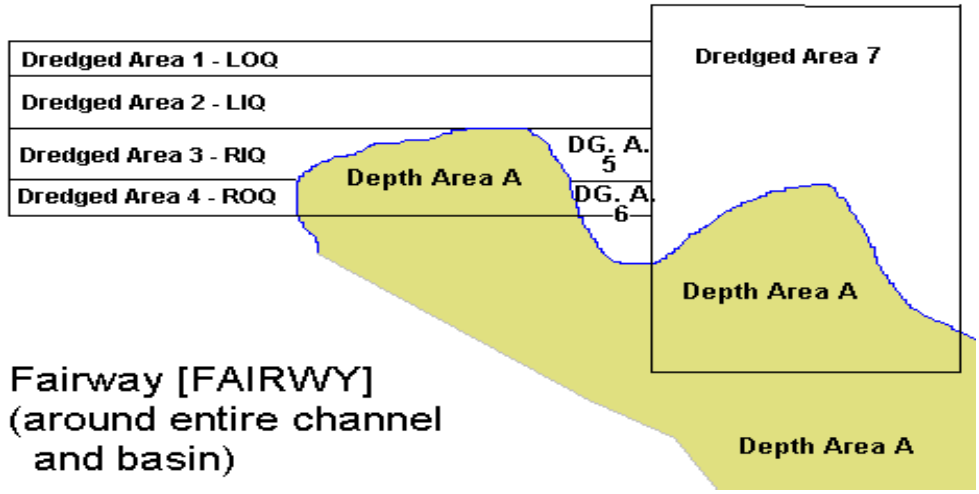


Diagram 4b

Figure 4-ES16

Portraying and Encoding Those Dredged Areas for Which:

Soundings and/or Depth Curves are Charted.

EXAMPLE 4 (continued): Portraying a Tabulated and Quartered Dredged Area(s) Containing Encroaching Soundings and Depth Curves

Refer to Figure 4-ES16

✧ The **ENC objects** involved in the portrayal of these dredged areas are:

- Dredged Area (DRGARE)
- Depth Area (DEPARE)
- Caution Area (CTNARE)
- Depth Contour (DEPCNT)
- Soundings (SOUNDG)
- Fairway (FAIRWY)

✧ The **geometric primitives** of the affected objects are:

- area (Dredged Area)
- area (Depth Area)
- line (Depth Area) *tentatively*
- area (Caution Area)
- line (Depth Contour)
- point (Soundings)
- area (Fairway)

✧ Comments:

1. The shoaled areas, charted within the channel and basin *(Diagram 4a)* result in seven (7) Dredged Areas and two (1) Depth Area being formed. *(see Diagram 4b)*.

2. The Depth Area geometry falling inside the dredgded areas would also be encoded with the ENC object Caution Area [CTNARE].

(continued)

**Portraying and Encoding Those Dredged Areas for Which:
Soundings and/or Depth Curves are Charted**.

EXAMPLE 4 (continued): Portraying a Tabulated and Quartered Dredged Area(s) Containing Encroaching Soundings and Depth Curves

Refer to Figure 4-ES16

✧ Comments (continued)

1. The DRVAL1 (i.e. controlling depth) for the Dredged Areas will be taken from the channel Tab.

2. The depth range values for Depth Area A are:

DRVAL1 = 6
DRVAL2 = 12

See Section 4.30.12 of the *NOS/ENC Object Specifications* for more information on Depth Areas and the determination of the appropriate depth range values.

4. Linear depth areas may be required along the line which serves as a coincident boundary of Depth Area A and Dredged Areas 2-7. A linear depth area would be required if there is discontinuity in the succession of depth range values between the dredged areas and the depth areas.

See Section 4.30.12 of the *NOS/ENC Object Specifications* for more information on situations requiring a linear depth area.

5. The entire limits of the channel will also be encoded as the ENC object Fairway (FAIRWY).

6. The above attribution **does not** exclude the population of other Dredged Area, Depth Area, Caution Area, Depth Contour and Sounding attributes where appropriate. Please refer to the respective *NOS/ENC Object Specifications* sections which will provide the list of all attributes and attribute values for each affected ENC object.

Portraying and Encoding Those Dredged Areas for Which: Soundings and/or Depth Curves are Charted.

MISCELLANEOUS SITUATIONS

Situation A: A Channel Without A Controlling Depth But **Completely** Filled With Soundings and Depth Contours

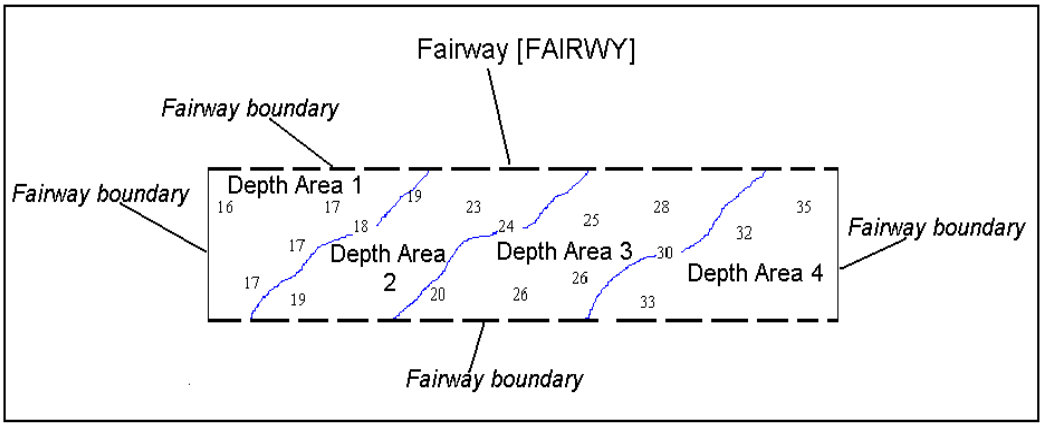


Figure 4-ES17

✧ **Comments:**

1. The above channel limits will **not** be encoded as the object Dredged Area, but will be encoded as the boundaries of the ENC object Fairway (area) [FAIRWY].

2. The soundings and depth contours will be encoded as their similarly named ENC objects.(i.e. Sounding [SOUNDG], Depth Contour [DEPCNT]).

3. The four (4) individual areas formed from the boundaries of the channel and the depth contours will also be encoded as Depth Areas (area) [DEPARE].

4. Please refer to the appropriate *NOS/ENC Object Specifications* sections which will provide the full encoding details about Depth Areas, Depth Contours, Soundings and Fairways.

5. Do not confuse a regularly dredged channel which contains one (1) or two (2) soundings with a channel that is not regularly dredged and is **totally** filled with soundings and depth contours. The former is collected as an ENC Dredged Area, the latter, a Fairway.

Portraying and Encoding Those Dredged Areas for Which: Soundings and/or Depth Curves are Charted.

MISCELLANEOUS SITUATIONS

Situation B: A Channel Without A Controlling Depth And Depth Contours, But Completely Filled With Soundings

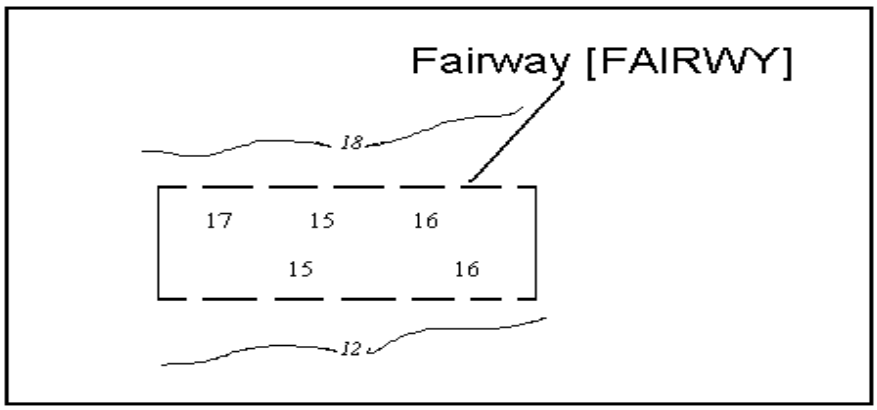


Figure 4-ES18

✧ **Comments:**

1. The above channel limits will not be encoded as the object Dredged Area, but will be encoded as the boundaries of the ENC object Fairway (area) [FAIRWY].

2. The soundings and depth contours will be encoded as their similarly named ENC objects.(i.e. Sounding [SOUNDG], Depth Contour [DEPCNT]).

3. The limits of this Fairway will **not** be encoded as a Depth Area (area) [DEPARE]. because the soundings within the Fairway fall within the depth value range of the two charted depth contours (12-18 feet).

4. Please refer to the appropriate *NOS/ENC Object Specifications* sections which will provide the full encoding details about Depth Areas, Depth Contours, Soundings and Fairways.

5. Do not confuse a regularly dredged channel which contains one (1) or two (2) soundings with a channel that is not regularly dredged and is **totally** filled with soundings and depth contours. The former is collected as an ENC Dredged Area, the latter, a Fairway

---

LIST OF ATTRIBUTES AND ATTRIBUTES VALUES FOR DREDGED AREAS

Note: All Attributes and Values were provided by the IHO/S-57

S-57 Object Acronym: DRGARE

ENC Allowed Geometric Primitive
Area

Attribute Acronym	Values OR <*type*>	Attribute	Comments
*** DRVAL1**	<*numeric*>	**Depth Range Value 1**	- The minimum controlling depth of a dredged area. - Entries for DRVAL1 shall be in charted units
DRVAL2	<*numeric*>	**Depth Range Value 2**	- The maximum controlling depth of a dredged area. - Entries for DRVAL2 shall be in charted units
OBJNAM	<*free text*>	**Object Name**	- The proper name of the dredged area - Name format:dredged area name, reach name, quarter
QUAPOS		**Quality of Position**	- Default = null
	1	surveyed	
	2	unsurveyed	
	3	inadequately surveyed	
	4	approximate	
	5	position doubtful	
	6	unreliable	
	7	reported (not surveyed)	
	8	reported (not confirmed)	
	9	estimated	
	10	precisely known	
	11	calculated	

* Indicates a mandatory attribute (i.e. that the designated attribute must be populated with a value)

LIST OF ATTRIBUTES AND ATTRIBUTE VALUES FOR DREDGED AREAS (DRGARE)

Note: All Attributes and Values were provided by the IHO/S-57

Attribute Acronym	Values OR <*format*>	Attribute	Comments
QUASOU		**Quality of Sounding Measurement**	- encodes the reliability of the value of the controlling depth
	1	depth known	
	2	depth unknown	
	3	doubtful sounding	
	4	unreliable sounding	
	5	no bottom found at value shown	
	6	least depth known,	
	7	least depth unknown, safe clearance at value shown	
	8	value reported (not surveyed)	
	9	value reported (not confirmed)	
	10	maintained depth	
	11	not regularly maintained	
RESTRN		**Restriction**	Encodes restrictions
	1	anchoring prohibited	
	2	anchoring restricted	
	3	fishing prohibited	
	4	fishing restricted	
	5	trawling prohibited	
	6	trawling restricted	
	7	entry prohibited	
	8	entry restricted	
	9	dredging prohibited	

LIST OF ATTRIBUTES AND ATTRIBUTES VALUES FOR DREDGED AREAS (DRGARE)

Note: All Attributes and Values were provided by the IHO/S-57

Attribute Acronym	Values OR <*format*>	Attribute	Comments
RESTRN	(continued)	**Restriction**	Encodes restrictions
	10	dredging restricted	
	11	diving prohibited	
	12	diving restricted	
	13	no wake	
	14	area to be avoided	
	15	construction prohibited	
TECSOU		**Technique of Sounding Measurement**	- Encodes the methods of sounding measurement - one or more attribute values may be selected, separated by a comma.
	1	found by echo-sounder	
	2	found by side scan sonar	
	3	found by multi-beam	
	4	found by diver	
	5	found by lead-line	
	6	swept by wire-drag	
	7	found by laser	
	8	swept by vertical acoustic system	
	9	found by electromagnetic sensor	
	10	photogrammetry	
	11	satellite imagery	
	12	found by leveling	
	13	swept by side scan sonar	
	14	computer generated	

LIST OF ATTRIBUTES AND ATTRIBUTES VALUES FOR DREDGED AREAS (DRGARE)

Note: All Attributes and Values were provided by the IHO/S-57

Attribute Acronym	Values OR <*format*>	Attribute	Comments
INFORM	<*free text*>	**Information**	1. Examples of entries in this field include: - Depth reported - Depth value for centerline only. - Depth from Report of ??? and Surveys to ??? 2. Entries are to be taken from a channel note, legend or TAB 3. Additional text may be added, up to 240 characters. Longer or standard notes should be logged with TXTDSC.
SCAMAX	< integer>	**Scale Maximum**	**DISREGARD----Prohibited for ENCs**
SCAMIN	<integer>	**Scale Minimum**	**DISREGARD-- Prohibited For Group 1 Objects.**.
TXTDSC	<*free text*>	**Textual Description**	- Will identify the name of an external file which is to be included in the final data set. - Will contain any textual information that will not fit into a 240 character attribute field length. - Examples of textual information includes standard or extremely long notes.
RECDAT	<*coded string*>	**Recording Date**	- The **date** when the specific feature was collected**,** edited or deleted**.** - **Format:** YYYYMMDD (YYYY=Calendar Year/MM=Month/DD=Day) - If certain date values are not available, use one of the following formats: No specific year: - -MMDD No specific month: YYYY No specific day: YYYYMM No specific year and day: - -MM

LIST OF ATTRIBUTES AND ATTRIBUTES VALUES
FOR
DREDGED AREAS (DRGARE)

Note: All Attributes and Values were provided by the IHO/S-57

Attribute Acronym	Values OR <*format*>	Attribute	Comments
RECIND	<*coded string*>	**Recording Indication**	- The **procedure** used to collect the data. - **(Mandatory)Format:** US,US,???? where ???? is one of the following values: digi = digitized scan = scanned (Not currently being used) alph = alpha/numeric input (precision input) (US,US,????) Procedure Authority Country
SORDAT	<*coded string*>	**Source Date**	- The **production date** of the source. (e.g. the survey date, the date of measurement, the date of locality) - **(Mandatory)Format:** YYYYMMDD (YYYY=Calendar Year/MM=Month/DD=Day) - If certain date values are not available, use one of the following formats. No specific year: - -MMDD No specific month: YYYY No specific day: YYYYMM No specific year and day: - -MM If two dates are listed for the source, enter the earlier date.

LIST OF ATTRIBUTES AND ATTRIBUTES VALUES FOR DREDGED AREAS (DRGARE)

Note: All Attributes and Values were provided by the IHO/S-57

Attribute Acronym	Values OR <*format*>	Attribute	Comments
SORIND	<coded string>	**Source Indication**	- Contains information about the **source** of the feature. - **Format:** US,aa,sssss,dddddd..... US = country (always US for United States) aa = authority sssss = source type dddd..... = the document number (up to 240 alpha/numeric characters) *Authorities (United States):* US–NOS U1–NIMA (not valid for NOS use) U2-Naval Oceanographic Command (not valid for NOS use) *Source types:* graph (graphic) [Ex.Hydro sheets,T-sheets] reprt (text) [Ex. Letters, LNMs] [*Examples of format*: US,US,graph,H-10357 US,US.reprt,L-111/99 US,US,reprt,LNM 2/99]

Dumping Grounds
Section 4.30.15

Section 4.30.15----DUMPING GROUNDS

Table of Contents

TO BE COMPLETED AT A FUTURE DATE

Index of: - Dumping Ground Geometric Portrayal Examples
- Correlating IHO/S-57 Section

Section 4.30.15—DUMPING GROUNDS

Index of: - Unique Data Collection and Encoding Situations
- The Correlating IHO/S-57 Section

TO BE COMPLETED AT A FUTURE DATE

Objectives:

The objectives of the following index are:

1. To aid in the specific identification of those *NOS/ENC Object Specifications* pages containing graphic examples (and explanations) of those ENC Dumping Grounds charted in unique situations

2. To provide a cross-reference with the specific *IHO/S-57 Appendix B.1, ENC Product Specification, Annex A - Use of the Object Catalogue for ENC* section from which the National Ocean Service has interpreted all information presented in this document.

The *IHO/S-57 Appendix B.1, ENC Product Specification, Annex A - Use of the Object Catalogue for ENC* remains the official and final authority for the encoding of all ENC information, and for the resolution of any discrepancies which may arise between this document and the IHO/S-57.

Portraying and Encoding Dumping Grounds

Sediment Traps

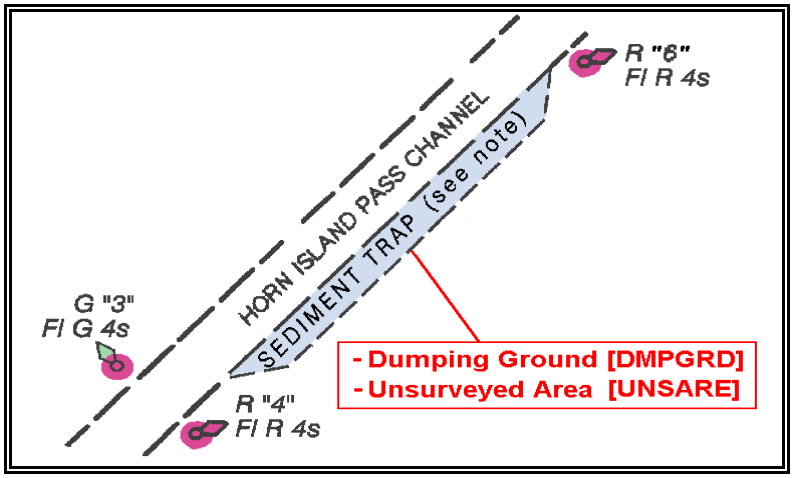


Figure 4-ES107

✧ The **ENC objects** involved in the portrayal of the above Sediment Trap are:

- Dumping Ground (DMPGRD)
- Unsurveyed Area (UNSARE)

✧ The **geometric portrayal** of the affected objects are:

- area (Dumping Ground)
- area (Unsurveyed Area)

✧ Comments:

1. **Definition:** A sediment trap is a dredged area (within a federally maintained navigation project) that is designed as a catch basin to capture shifting sediment and silt. The primary purpose of a sediment trap is to prevent excessive shoaling in an adjacent channel.

(continued)

Portraying and Encoding Dumping Grounds

Sediment Traps

(continued)

[Refer to Figure 4-ES107]

✧ Comments (continued):

2. Sediment Traps may also be identified or labeled on a source document as the following:

- Impoundment Areas
- Impoundment Basins
- Settling Basins

3. Regardless of the alternate name *(see comment 2)* indicated on the source document, all shall be encoded in accordance with the following sediment trap ENC specifications.

4. Although sediment traps are considered to be USACE dredged areas, they are **not intended for navigation** (due to their rapid and severe shoaling), and therefore **shall be encoded for ENC purposes as a Dumping Ground [DMPGRD] and as an Unsurveyed Area [UNSARE].**

5. To properly encode the attributes of the affected Dumping Ground object, the following attributes shall be populated as indicated:

CATDPG (Category of Dumping Ground)...= spoil ground
OBJNAM (Object Name).....= Sediment Trap
RESTRN (Restriction).....= 7 (entry prohibited)
STATUS (Status).....= 1 (permanent)

(continued)

Portraying and Encoding Dumping Grounds

Sediment Traps

(continued)

[Refer to Figure 4-ES107]

✧ Comments (continued):

6. The *INFORM (Information)* attribute of both the Dumping Ground [DMPGRD] and Unsurveyed Area [UNSARE] objects, shall be encoded with the following note:

CAUTION. This area is not intended for navigation, and is subject to rapid and severe shoaling.

The Marine Chart Division Sediment Trap Note. *(Comments 7 and 8)*

7. The MCD Sediment Trap Note is the note which is placed on all NOS nautical (raster/paper) charts containing a sediment trap(s).

8. For ENC encoding purposes, the MCD Sediment Trap Note shall be placed in the *TXTDSC (Textual Description)* attribute of both the Dumping Ground and Unsurveyed Area objects.

Example of the MCD Sediment Trap Note:

SEDIMENT TRAPS
Sediment traps are designed to delay shoaling of the navigable portion of a channel by trapping advancing littoral material. Sediment traps may shoal at a rapid rate spilling over into the adjacent navigation channel, therefore, mariners should exercise caution when operating near them.

(continued)

Portraying and Encoding Dumping Grounds

Sediment Traps

(continued)

[Refer to Figure 4-ES107]

✧ Comments (continued):

Inactive Sediment Traps. *(Comments 9 through 12)*

9. **Definition:** Inactive sediment traps are sediment traps which are no longer a component of a federal project and will not be periodically dredged.

10. To encode an inactive sediment trap, the term "inactive" and the date of inactivity shall be entered into the *INFORM (Information)* attribute of both the Dumping Ground [DMPGRD] and Unsurveyed Area [UNSARE] objects. *(See comment no. 11 for the proper format.)*

11. The term "inactive" and the date of inactivity shall be entered into the INFORM attribute **after** the Caution note *(see comment no. 6)* and in the following format:

"inactive-YYYYMMDD"

where YYYY = the year the sediment trap is determined to be inactive
MM = the month the sediment trap is determined to be inactive
DD = the day the sediment trap is determined to be inactive

12. The Dumping Ground [DMPGRD] attribute *Status (STATUS)* shall be revised **from** the value of one (1) indicating a "permanent" status **to** the value of seven (7) [i.e., "not in use"].

(continued)

Portraying and Encoding Dumping Grounds

Sediment Traps

(continued)

[Refer to Figure 4-ES107]

✧ Comments (continued):

Feature Removal from an ENC. *(Comment 13)*

13. The limits of a sediment trap shall not be removed from the ENC database until the sediment trap has been determined inactive **and** a new hydrographic survey (i.e., a survey which was performed and verified **after** the date the sediment trap is determined to be inactive) is received in MCD. It is only at this time can soundings and depth contours be added and the sediment trap limits removed.

14. All guidance previously mentioned concerning the attribution of specific Dumping Ground and Unsurveyed Area attributes does not exclude the population of other Dumping Ground and Unsurveyed Area attributes where appropriate. Please refer to each object's respective *List of Attributes and Attribute Values* for the complete listing of all tentatively affected attributes.