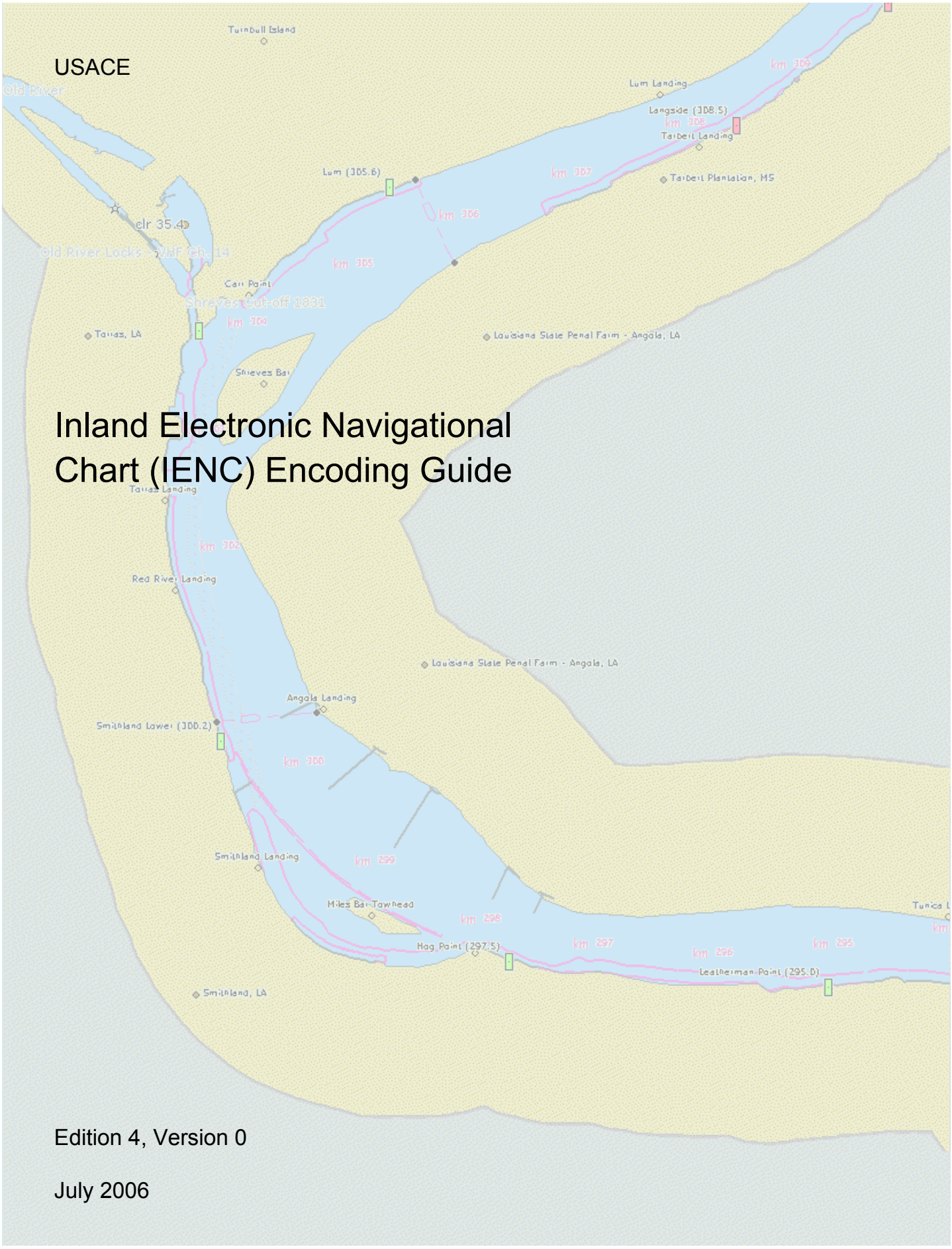
USACE



Inland Electronic Navigational Chart (IENC) Encoding Guide

Edition 4, Version 0

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A. Introduction

Background

Following a 1999 recommendation by the National Transportation Safety Board, the U.S. Army Corps of Engineers (USACE) initiated a program to facilitate the production and implementation of Inland ENCs on major river and inland waterway systems in the United States. To date, 66 Inland ENC cells covering over 4200 miles on the Mississippi, Ohio, Red, Atchafalaya, Illinois, Cumberland, Green, Kanawha, Tennessee Rivers and the Black Warrior/Tombigbee system have been produced and are available for public access via the Internet (http://www.tec.army.mil/echarts/). Several North American ECDIS and ECS equipment manufacturers now offer systems capable of using Inland ENC data.

Intent of the Encoding Guide

The intent of this document is to provide detailed guidance on what is required to produce a consistent, uniform Inland ENC.

Framework for Inland ENC (IENC) Specifications

1. Use existing IHO S-57 Edition 3.1 standard. Specifically, the:
   a) [Maritime] ENC Product Specification (Appendix B1)
   b) IHO Object Catalogue (Appendix A)
   c) Use of Object Catalogue (Appendix B.1, Annex A)
2. A **Minimum** Inland ENC (IENC) Product Specification that includes mandatory requirements for safety-of-navigation on inland waterways.
3. Recommended object classes, attributes, and attribute values for encoding IENC data

For all object classes, attributes, and attribute values that are used in conjunction with an IENC, this document:

1. Provides a basis for its creation
2. Describes its relationship to the real-world entity
3. Provides criteria for its proper use
4. Gives specific encoding examples

A. Features & Attributes: Mandatory, Conditional, Optional

Each feature class and attribute class in the harmonization guide has been classified for encoding purposes as mandatory, conditional or optional.

- Mandatory (M) features or attributes must be encoded. For attributes, if the value is not known, it must be coded as UNKNOWN.
- Conditional (C) features or attributes are mandatory (must be encoded) if defined conditions are met (e.g. if a feature has multiple colors, a color pattern must be encoded).
- Optional (O) features or attributes should be encoded if the value is known.

B. Attribute Classes Associated With All Object Classes

The following attribute classes can be associated with all object classes in an IENC:

SORIND
The source indicator is a mandatory attribute and must be coded for all objects in the IENC.

The format is: 2 character country code, 2 character authority code, 5 character source code, identifier (no restriction on number of characters).

- Examples:
  - For navigation features that reference an authority such as the USCG Mississippi River System Light List, Volume 5: (US,U3,MS_LL,2004 No.808), where “MS_LL” refers to Mississippi River Light List; 2004 refers to Volume 5, and No.808 refers to the USCG assigned light number.
  - For hydrographic features reference appropriate survey: (US,U3,SURVY,2001 Hydro Survey)
  - For other features reference appropriate survey data: (US,U3,SURVY,1999 Aerial Survey) or (US,U3,SURVY,2005 Field Survey)

The cell's Chart History files should contain more information about the survey itself. (e.g. contract no. class, references to source data)

SORDAT
The SORDAT should be the production date of the source of the data (e.g. the date of measurement). The source date should be coded for those objects in an IENC, which are changing regularly, for example depth information.

The format is yearmonthday (YYYYMMDD).

- Example:
  - SORDAT coding for a feature with of source date of May 26, 2006 is 20060526.

SORDAT is a mandatory attribute and must be coded for all objects in the IENC. SORDAT should be set to the release date of the chart if the actual source dates of the data unavailable.

OBJNAM
Use to code feature's name (do not include information on characteristics of feature). Name must be in Title Case. Use abbreviations where possible. Use short names only to avoid clutter in the display.

INFORM
If INFORM is not already being used as part of the encoding instructions, use to code navigationally significant information about the feature that cannot be coded by attributes.

TXTDSC
Use to link textual descriptions or feature information in an ASCII file. Note that filename must be in UPPER CASE. Format is AARRMMMXNN.EXT where:

AA = 2-character Producer Code
RR = 2-character river code

MMM = 3-digit river mile or river km, 000-999
X = tenth of river mile; preceding decimal point implied; use zero if river mile/km known only to the nearest mile.
NN = 01-99; unique identifier for text file at the particular river mile/km.
For example, if three TXTDSC files exist at the same river mile/km, 01, 02, and 03 would be used.
EXT = 3-character file extension for Hypertext Metafile (HTM), ASCII text (TXT)
e.g. U3OH782101.TXT

PICREP

Use to link imagery related to feature. Note that the filename must be in UPPER CASE. Image should be 640 x 480 pixels in resolution.
Format is AARRMMMXNN.EXT, where:

AA = 2-character Producer Code
RR = 2-character river code
MMM = 3-digit river mile or river km, 000-999
X = tenth of river mile; preceding decimal point implied; use zero if river mile/km known only to the nearest mile.
NN = 01-99; unique identifier for image file at the particular river mile/km.
For example, if three PICREP files exist at the same river mile/km, 01, 02, and 03 would be used.
EXT = 3-character file extension for the image file format; most commonly TIFF (TIF) or JPEG (JPG) formats.
e.g. U3OH782101.TIF

C. Scale Minimum

The values for the scale minimum mentioned in the encoding guide should be used as the guideline for populating SCAMIN values.

D. Numeric Precision

Numeric attributes indicating meters (e.g., depth contours and structure heights) should reflect the accuracy of the number. For example, a bridge height of thirty-five meters, accurate to one meter, would be 35, not 35.0. No more than one decimal place should be used. The S-57 standard only supports depth contour resolution to 0.1 meters.

E. Feature Naming and Text Display

Any important navigation notes that should always be shown on the IENC should be encoded as LNDRGN (P) on land or SEAARE (P) objects in the water.

F. Assigning Approximate Positions

To assign an approximate position ('PA') for charted features, the attribute Quality of Position [QUAPOS = 4 (approximate)] is assigned to the appropriate spatial object (point or line). It is not assigned to the feature object (e.g. WRECKS object), but to the spatial reference for the feature object. When correctly coded, the electronic chart system will display 'PA' adjacent to the feature object.

G. Local Notice to Mariners (LNM) Updates

In order to accommodate and recognize discrepancies, changes, and corrections to Aids to Navigation (ATONS) as reported in the Local Notice to Mariners (LNM), the following actions should be taken:

Discrepancies Reported

In the event that there is a discrepancy between the Federal ATON and what is presently published or charted, the discrepancy shall be noted in the OBJNAM, SORIND and SORDAT of the structure object (usually a BCNLAT).

- OBJNAM shall include the status, as reported in the NTM, added to the beginning of the structure object's name. For example, if the LNM indicates that the ATON has a status of "MISSING", the new (temporary) OBJNAM will be: MISSING - Richland Bend Lt. (169.8)

- SORDAT shall be changed to reflect the date of the NTM publication from which the discrepancy was noted.

- SORIND shall have the LNM edition number that dictated the change added at the end of the existing

SORIND. For example, if a discrepancy was reported in LNM edition 09/06, the new SORIND will be: US,U3,MS_LL,2004 No.808 LNM 09/06.

Discrepancies Corrected

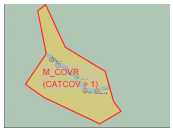
When an ATON has been announced repaired in the LNM, the OBJNAM of the structure object shall be returned to its original state. SORDAT and SORDAT shall be modified to indicate the date of the LNM publication from which the correction was made.

C - IENC Meta Information

C.1 Meta Features

C.1.1 Data Coverage (M)

A geographical area that describes the coverage and extent of the spatial objects. (S-57 Standard)

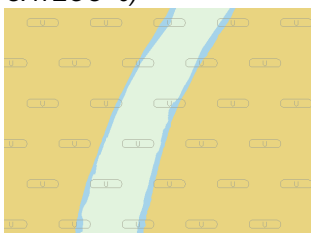
Graphics	Encoding Instructions	Object Encoding
IENC Symbolization 	A) All spatial objects in an IENC must be covered by a M_COVR, CATCOV=1 (coverage available) area object. B) All areas in the IENC not containing any spatial objects (normally the area outside the buffer) must be covered by a M_COVR, CATCOV=2 (no coverage available)	**Object Encoding** **Object Class =** M_COVR(A) (M) CATCOV = [1 (coverage available), 2 (no coverage available)] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

C - IENC Meta Information

C.1 Meta Features

C.1.2 Data Quality (M)

An area within which a uniform assessment of the quality of the data exists. (S-57 Standard)

Graphics	Encoding Instructions	Object Encoding
IENC Symbolization (for CATZOC=6) 	A) The M_QUAL polygons should only cover those areas that contain IENC data. B) Refer to ZOC table below for a description of categories.	**Object Encoding** **Object Class =** M_QUAL(A) (M) CATZOC = [1 (zone of confidence A1), 2 (zone of confidence A2), 3 (zone of confidence B), 4 (zone of confidence C), 5 (zone of confidence D), 6 (zone of confidence U (data not assessed)] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

Zone of Confidence (ZOC) Table

1	2	3		4	5
ZOC [1]	Position Accuracy [5]	Depth Accuracy [3]		Seafloor Coverage	Typical Survey Characteristics [5]
A1	∀ 5 m	a = 0.5 b = 1		Full seafloor ensonification or sweep. All significant seafloor features detected [4] and depths measured.	Controlled, systematic high accuracy Survey on WGS 84 datum; using DGPS or a minimum three lines of position (LOP) with multibeam, channel or mechanical sweep system.
		Depth (m)	Accuracy (m)		
		10 30 100 1000	∀ 0.6 ∀ 0.8 ∀ 1.5 ∀ 10.5		
A2	∀ 20 m	a = 1.0 b = 2		Full seafloor ensonification or sweep. All significant seafloor features detected [4] and depths measured.	Controlled, systematic survey to standard accuracy; using modern survey echosounder with sonar or mechanical sweep.
		Depth (m)	Accuracy (m)		
		10 30 100 1000	∀ 1.2 ∀ 1.6 ∀ 3.0 ∀ 21.0		
B	∀ 50 m	a = 1.0 b = 2		Full seafloor coverage not achieved; uncharted features, hazardous to surface navigation are not expected but may exist.	Controlled, systematic survey to standard accuracy.
		Depth (m)	Accuracy (m)		
		10 30 100 1000	∀ 1.2 ∀ 1.6 ∀ 3.0 ∀ 21.0		
C	∀ 500 m	a = 2.0 b = 5		Full seafloor coverage not achieved, depth anomalies may be expected.	Low accuracy survey or data collected on an opportunity basis such as soundings on passage.
		Depth (m)	Accuracy (m)		
		10 30 100 1000	∀ 2.5 ∀ 3.5 ∀ 7.0 ∀ 52.0		
D	worse than ZOC C	worse than ZOC C		Full seafloor coverage not achieved, large depth anomalies may be expected.	Poor quality data or data that cannot be quality assessed due to lack of information.

Note: The CATZOC attribute definitions are currently the subject of review and the results of this review will be promulgated as soon as possible in the S-57 Corrections Document.

Remarks:

To decide on a ZOC Category, all conditions outlined in columns 2 to 4 of the table must be met.

Footnote numbers quoted in the table have the following meanings:

[1] The allocation of a ZOC indicates that particular data meets minimum criteria for position and depth accuracy and seafloor coverage defined in this Table. Data may be further qualified by Object Class AQuality of Data≅ (M_QUAL) sub-attributes as follows:

a) Positional Accuracy (POSACC) and Sounding Accuracy (SOUACC) may be used to indicate that a higher position or depth accuracy has been achieved than defined in this Table (e.g. a survey where full seafloor coverage was not achieved could not be classified higher that ZOC B; however, if the position accuracy was, for instance, ∀ 15 metres, the sub-attribute POSACC could be used to indicate this).

b) Swept areas where the clearance depth is accurately known but the actual seabed depth is not accurately known may be accorded a Ahigher≅ ZOC (i.e. A1 or A2) providing positional and depth accuracies of the swept depth meets the criteria in this Table. In this instance, Depth Range Value 1 (DRVAL1) may be used to specify the swept depth. The position accuracy criteria apply to the boundaries of swept areas.

c) SURSTA, SUREND and TECSOU may be used to indicate the start and end dates of the survey and the technique of sounding measurement.

[2] Position Accuracy of depicted soundings at 95% CI (2.45 sigma) with respect to the given datum. It is the cumulative error and includes survey, transformation and digitizing errors etc. Position accuracy need not be rigorously computed for ZOCs B, C and D but may be estimated based on type of equipment, calibration regime, historical accuracy etc.

[3] Depth accuracy of depicted soundings = a + (b%d)/100 at 95% CI (2.00 sigma), where d = depth in metres at the critical depth. Depth accuracy need not be rigorously computed for ZOCs B, C and D but may be estimated based on type of equipment, calibration regime, historical accuracy etc.

[4] Significant seafloor features are defined as those rising above depicted depths by more than:

	Depth	Significant Feature
a.	<10 metres	>0.1%depth,
b.	10 to 30 metres	>1.0 metre,
c.	>30 metres	>(0.1%depth) minus 2.0 metres

[5] Controlled, systematic (high accuracy) survey (ZOC A1, A2 and B) - a survey comprising planned survey lines, on a geodetic datum that can be transformed to WGS 84.

Position fixing (ZOC A1) must be strong with at least three high quality Lines of Position (LOP) or Differential GPS.

Modern survey echosounder - a high precision surveying depth measuring equipment, generally including all survey echosounders designed post 1970.

C.1.3 Navigation System of Marks (M)

An area within which a specific system of navigational marks applies and/or a common direction of buoyage. (S-57 Standard)

Graphics	Encoding Instructions	Object Encoding
	A) The M_NSYS polygons should only cover those areas that contain IENC data. B) All inland waterways in the United States use 2 (IALA B).	**Object Encoding** **Object Class =** M_NSYS(A) (M) MARSYS = [2 (IALA B)] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

D - Natural Features

D.1 Topography

D.1.1 Land Area (M)

The solid portion of the Earth's surface, as opposed to navigable river and water. (IHO Dictionary, S-32, 5th Edition, 2635)

Graphics	Encoding Instructions	Object Encoding
Chart Symbol *IENC Symbolization* 	A) A Group I (SOTE) object. B) Encode the land area up to the defined 1000 meter buffer zone from the shoreline.	**Object Encoding** **Object Class =** LNDARE(A) (O) OBJNAM = [Name of Land Area] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

D.1.2 Land Region (M)

Land Areas adjacent to the waterway that are significant for navigation reference.

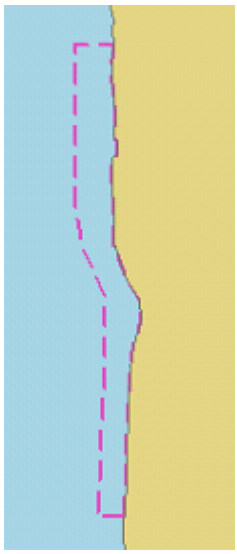
Graphics	Encoding Instructions	Object Encoding
Chart Symbol  *IENC Symbolization*  	A) Use LNDRGN for landings, islands, points, bends, and any land location that should have a label readily displayed for users of the IENC. B) Use state and county abbreviations in OBJNAM, where applicable. C) LNDARE has to be coded underneath Land Region	**Object Encoding** **Object Class =** LNDRGN(P, A) (M) OBJNAM = [location name] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

D - Natural Features

D.1 Topography

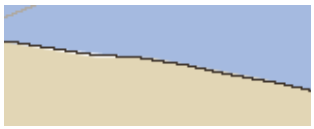
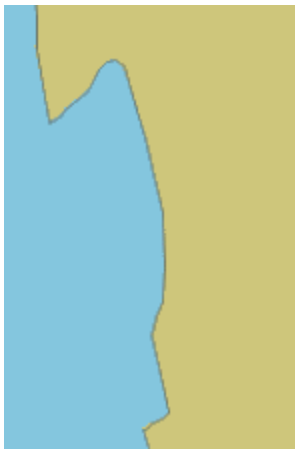
D.1.3 Rock Wall (M)

The delineation of a natural rock wall that could be a hazard to navigation.

Graphics	Encoding Instructions	Object Encoding
Chart Symbol  *IENC Symbolization* 	A) Delineate outline of known structure, below the waterline with an area feature. B) Buffer between waterline and limit of CTNARE should be a minimum of 35’ or 12m.	**Object Encoding** **Object Class =** CTNARE(A) (M) INFORM = "Natural Rock Wall" (M) SCAMIN = [60000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

D.1.4 Shoreline (M)

The line where shore and water meet. Although the terminology of coasts and shores is rather confused, shoreline and coastline are generally used as synonyms. (IHO Dictionary, S-32, 5th Edition, 858,4695)

Graphics	Encoding Instructions	Object Encoding
Chart Symbol  *IENC Symbolization* 	A) Shoreline is project specific: • in pool areas, project pool is used • in open water areas, shoreline should be extracted at low water conditions • in some instances, LWRP or LWRP +10 are used	**Object Encoding** **Object Class =** COALNE(L) (M) SCAMIN = [300000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

D - Natural Features

D.2 Hydrology

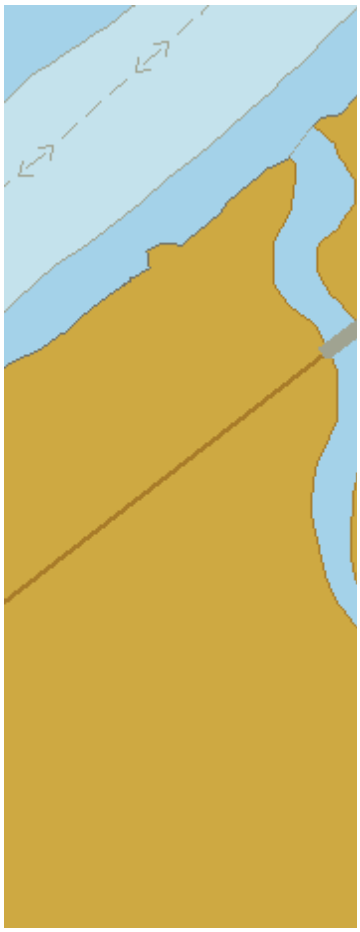
D.2.1 Canal (non-navigable) (O)

An artificial tributary of the main waterway that may be used for positioning information and for navigation by private, recreational, or commercial vessels.

Graphics	Encoding Instructions	Object Encoding
	A) CANALS of type area should be coded on LDNARE objects. B) OBJNAM should be encoded if known.	**Object Encoding** **Object Class =** CANALS() (O) OBJNAM = [Canal Name] (M) SCAMIN = [45000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

D.2.2 River (non-navigable) (O)

Mainly free flowing water courses that are typically tributaries of the main waterway. The river, however, may still be used as positioning information and for navigation by private, recreational, or commercial vessels.

Graphics	Encoding Instructions	Object Encoding
Real World  *Chart Symbol*  *IENC Symbolization* 	A) RIVERS of type area should be coded on LNDARE objects. B) Area features should not extend into line features as the river narrows; end where area designation ends. C) OBJNAM should be encoded if known.	**Object Encoding** **Object Class =** RIVERS(L, A) (O) OBJNAM = [River Name] (M) SCAMIN = [60000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

D.2.3 Lake (O)

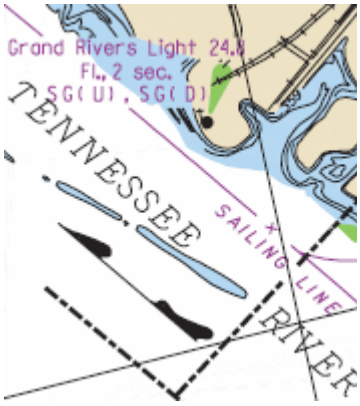
A large body of water entirely surrounded by land.

Graphics	Encoding Instructions	Object Encoding
Chart Symbol  *IENC Symbolization* 	A) Lakes not navigable at compilation scale are encoded by LAKARE on LNDARE objects.	**Object Encoding** **Object Class =** LAKARE(A) (O) OBJNAM = [Lake Name] (M) SCAMIN = [300000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

D.2 Hydrology

D.2.4 River or Canal Name (M)

Label feature to identify navigable rivers and canals at their confluence.

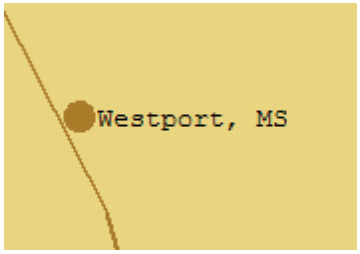
Graphics	Encoding Instructions	Object Encoding
Chart Symbol  *IENC Symbolization*  	A) Place the point object at or near confluences where a river label is needed to distinguish adjoining waterways. B) An area object may be used if its usage will aid in reducing clutter.	**Object Encoding** **Object Class =** SEAARE(P, A) (M) OBJNAM = [River Name] (M) CATSEA = [51 (canal), 53 (river)] (M) SCAMIN = [60000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

E - Cultural Features

E.1 Settlements, Buildings, Political Boundaries

E.1.1 Built-up Areas (M)

An area containing a concentration of buildings and the supporting road or rail infrastructure (S-57 Standard)

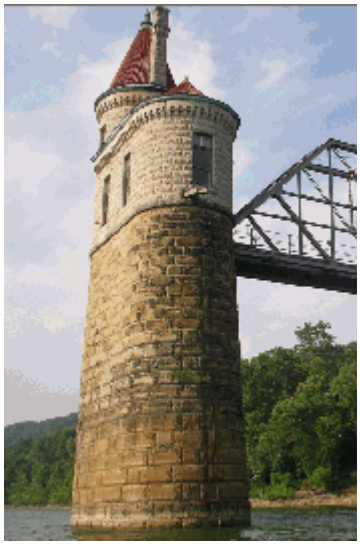
Graphics	Encoding Instructions	Object Encoding
Real World  *Chart Symbol*  *IENC Symbolization (area)*  *IENC Symbolization (point)*  	A) Outline of BUAARE should be the political boundary. B) CATBUA may be encoded according to the following definitions based on inhabitants: Urban area (more than 100.000) City (20.000 – 100.000) Town (5.000 – 20.000) Village (100 - 5000) Settlement (few houses/farms) C) BUAARE should be represented as point object for towns and small communities and in cases where the limits are not known. Points should be oriented on the town centers. D) Built-up areas that use the riverbank as a limit must share the same geometry. E) If a name is available, it has to be encoded as OBJNAM. Use name and state abbreviation, e.g., Westport, MS.	**Object Encoding** **Object Class =** BUAARE(P, A) (M) OBJNAM = [urban or settlement name] (O) CATBUA = [1 (urban area), 2 (settlement), 3 (village), 4 (town), 5 (city)] (M) SCAMIN = [75000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

E - Cultural Features

E.1 Settlements, Buildings, Political Boundaries

E.1.2 Buildings of Navigational Significance (M)

Buildings with a special function, that may be of interest to navigation.

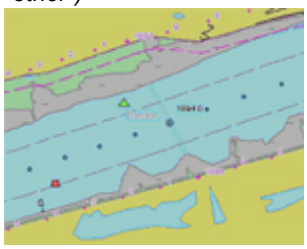
Graphics	Encoding Instructions	Object Encoding
Real World  *Chart Symbol*  *IENC Symbolization* 	A) Buildings that are visible from the water and that may be used as landmarks shall be collected as Conspicuous Landmarks, if possible. B) Buildings or structures with specialized functions must be attributed with the appropriate FUNCTN value. C) Buildings that extend into water should be encoded as Dock/Wharf (SLCONS) with appropriate CATSLC attribute. Then the building should be placed on that dock.	**Object Encoding** **Object Class =** BUISGL(P, A) (O) OBJNAM = [building name or owner] (O) FUNCTN = [2 (harbour master's office), 5 (hospital), 6 (post office), 7 (hotel), 8 (railway station), 9 (police station), 13 (bank office), 16 (factory), 17 (power station), 19 (educational facility), 20 (church), 22 (temple), 29 (communication), 30 (television), 31 (radio), 32 (radar), 33 (light support), 34 (microwave), 35 (cooling), 36 (observation), 38 (clock), 41 (stadium), 42 (bus station)] (M) SCAMIN = [18750] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

E - Cultural Features

E.1 Settlements, Buildings, Political Boundaries

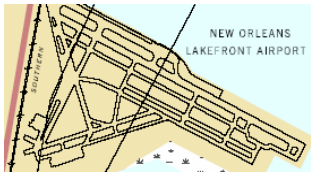
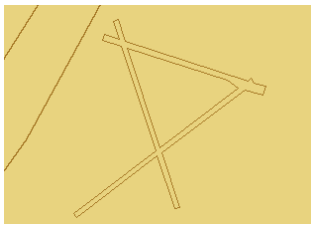
E.1.3 Political & USACE Boundaries (O)

A defined and named administrative area (e.g. county, state, district)

Graphics	Encoding Instructions	Object Encoding
Chart Symbol  *IENC Symbolization (only visible in display mode "other")* 	A) Boundary of the ADMARE should be the recognized political boundary of the county or the accepted Corps district boundary. B) OBJNAM should be populated with the county and state name (e.g. Clark County, IN) or with the Corps district name (e.g. New Orleans District).	**Object Encoding** **Object Class =** ADMARE(A) (M) JRSDTN = [3 (national sub-division)] (M) OBJNAM = (Refer to B) (M) SCAMIN = [90000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

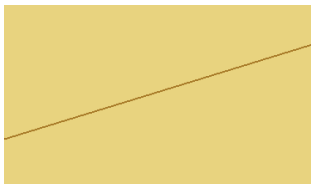
E.2.1 Airport (M)

An area containing at least one runway, used for landing, take-off, and movement of aircraft. (S-57 Standard)

Graphics	Encoding Instructions	Object Encoding
Real World  *Chart Symbol*  *IENC Symbolization* 	A) Code outline of runways. Include taxiways and tarmacs, if the information is available. B) Runways where lights can be seen from passing vessels should be encoded.	**Object Encoding** **Object Class =** AIRARE(A) (O) CATAIR = [1 (military airport), 2 (civil airport – used by commercial airlines with services for the public), 6 (small planes airfield)] (O) OBJNAM = [(Name) + “Airport” or (Name) + “Airfield”] (M) SCAMIN = [45000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

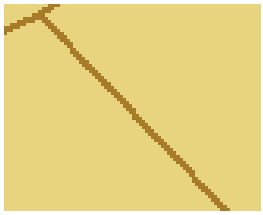
E.2.2 Railway (M)

A rail or set of parallel rails on which a train or tram runs. (Digital Geographic Information Working Group, Oct.87)

Graphics	Encoding Instructions	Object Encoding
Chart Symbol  *IENC Symbolization* 	A) Switching yards and groups of spur lines should be coded as LNDRGN (P) objects, with OBJNAM = Switching yard. B) It is recommended that minimal RAILWY objects be collected in a BUAARE.	**Object Encoding** **Object Class =** RAILWY(L) (O) OBJNAM = [Railroad Name] (M) SCAMIN = [15000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

E.2.3 Road (M)

A road is an open way for the passage of vehicles. (United States Geological Survey, Jan.89)

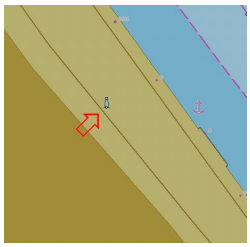
Graphics	Encoding Instructions	Object Encoding
Real World  *Chart Symbol*  *IENC Symbolization* 	A) Only interstates, highways, major roads and roads providing access to the river should be collected. B) In BUAAREs, with exception to roads providing access to the waterfront, ROADWYs should be restricted to a set of routes representative of the urban layout. C) Roads should be collected to the limits of the IENC buffer. D) Unless the feature represents an access route useful to vessels, ROADWY features need not have complete or accurate topology. E) Road fragments clipped by the IENC Buffer Zone should be removed.	**Object Encoding** **Object Class =** ROADWY(L) (O) CATROD = [1 (motorway), 2(major road), 3(minor road), 4(track/path)] (O) OBJNAM = [highway, interstate, road name] (M) SCAMIN = [15000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

E - Cultural Features

E.3 Other Cultural Features

E.3.1 Conspicuous Landmark (M)

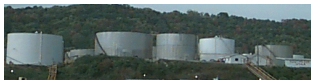
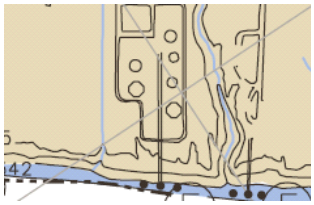
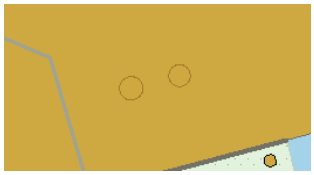
A prominent object at a fixed location which can be used in determining a location or a direction (adapted from IHO Dictionary, S-32, 5th Edition, 2643).

Graphics	Encoding Instructions	Object Encoding
Real World  *IENC Symbolization (point)* 	A) Only visually conspicuous landmarks shall be encoded as landmarks. As a result the mandatory attribute CONVIS shall always be 1 (visually conspicuous). B) Castles, churches, chapels and transmitters can be encoded as CATLMK = 17 (tower), but then the type must be further made clear within the object name and with the use of FUNCTN if applicable. C) Smokestacks should be encoded using CATLMK = 3 (chimney). D) Cooling Towers should be encoded using CATLMK = 3 (chimney) with FUNCTN = 35 (cooling) E) Flare Stacks should be encoded using CATLMK = 6 (flare stack) F) Clock Towers should be encoded using CATLMK = 17 (tower) with FUNCTN = 38 (clock) G) If the landmark has a navigational function it has to be encoded as a building of navigational significance.	**Object Encoding** **Object Class =** LNDMRK(P) (M) CONVIS = [1 (visually conspicuous)] (M) CATLMK = [1 (cairn), 2 (cemetery), 3 (chimney), 4 (dish aerial), 5 (flagstaff/flagpole), 6 (flare stack), 7 (mast), 8 (wind sock), 9 (monuments), 10 (column/pillar), 11 (memorial plaque), 12 (obelisk), 13 (statue), 14 (cross), 15 (dome), 16 (radar scanner), 17 (tower), 18 (windmill), 19 (windmotor), 20 (spire/minaret), 21 (large rock or boulder on land), 22 (rock pinnacle)] (O) OBJNAM = [landmark name or owner's name] (C) FUNCTN = [2 (harbour master's office), 5 (hospital), 6 (post office), 7 (hotel), 8 (railway station), 9 (police station), 13 (bank office), 16 (factory), 17 (power station), 19 (educational facility), 20 (church), 22 (temple), 29 (communication), 30 (television), 31 (radio), 32 (radar), 33 (light support), 34 (microwave), 35 (cooling), 36 (observation), 38 (clock), 41 (stadium), 42 (bus station)] (M) SCAMIN = [60000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

E.3 Other Cultural Features

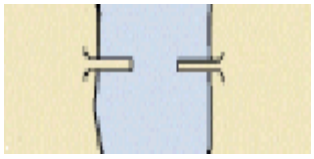
E.3.2 Storage Tanks & Water Towers (O)

An enclosed container, used for storage (Digital Geographic Information Working Group, Oct.87)

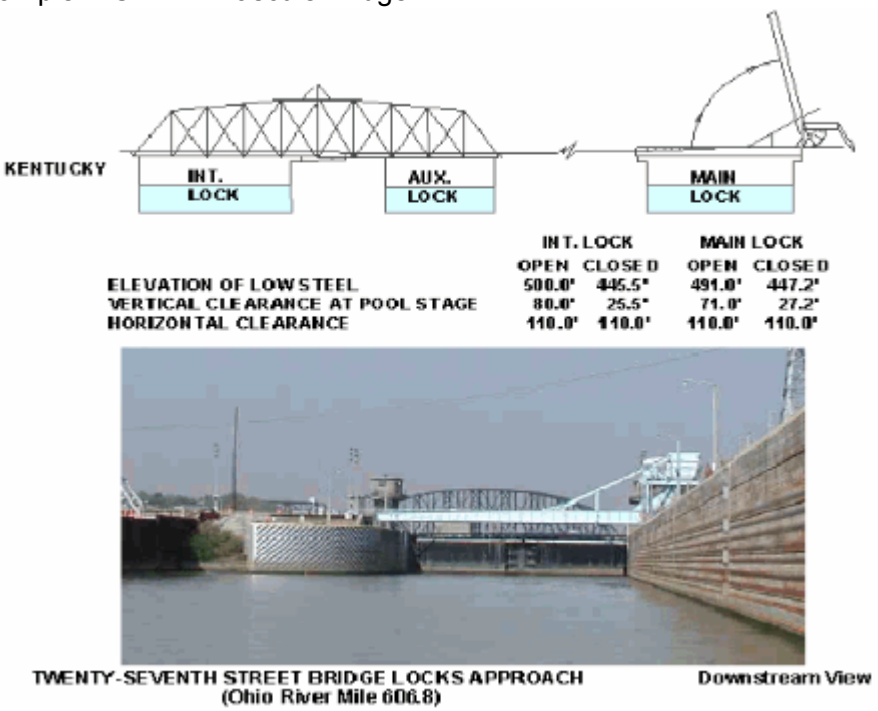
Graphics	Encoding Instructions	Object Encoding
Real World  *Chart Symbol*  *IENC Symbolization* 	A) Outline tank with circle, square, or rectangle. B) Groups of tanks should be aggregated into a single polygon with an INFORM to identify the feature as a group, e.g., "Tank Farm" or "Multiple Tanks". C) Water Towers should be encoded as SILTNK (P) with CATSIL = 4 (water tower)	**Object Encoding** **Object Class =** SILTNK(P, A) (O) PRODCT = [1 (oil), 2 (gas), 3 (water), 7 (chemicals), or 22 (grain)] (C) CATSIL = (Refer to C) (O) OBJNAM = [Facility Owner] (C) INFORM = (Refer to B) (M) SCAMIN = [30000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

F.1.1 Bascule Bridge (M)

A counterpoise bridge rotated in a vertical plane about an axis at one or both ends. Also called a balance. (IHO Dictionary, S-32, 5th Edition, 545)

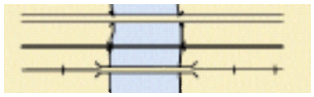
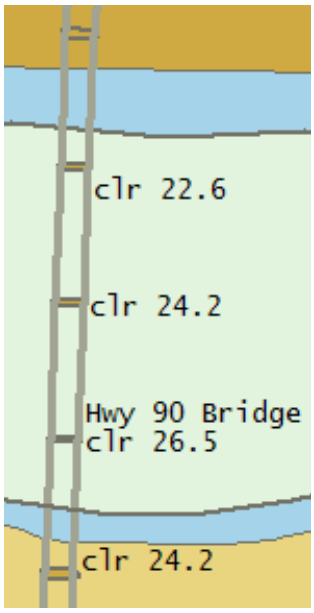
Graphics	Encoding Instructions	Object Encoding
Real World  *Chart Symbol*  *IENC Symbolization* 	A) Bridge piers shall be encoded as PYLONS (see G.1.8). B) The portions of the bridge that approach the movable span from either shore are to be collected as fixed bridges (separate objects). Only that portion of the bridge that is actually movable is to be collected as a movable bridge. C) Create separate bridge objects for spans over navigable channel when attributes of navigable spans are different (e.g. vertical clearance, horizontal clearance). D) If separate spans are required, each span's INFORM should indicate whether it is the "Primary Navigation Span", "Secondary Navigation Span", or "Not to be used for Navigation" E) Bridge approaches (over the bankline) should be encoded. F) Include PICREP, with pictures of bridge when open, and closed, if available. G) Roads and railroads do not cross bridge. H) Place LIGHTS at appropriate position on bridge object and piers bounding navigable channel. I) OBJNAM should be encoded for all bridge spans. J) VERCLR and HORCLR mandatory for primary navigation span(s); use "Unknown" for all other spans if vertical clearance is unknown. K) Use INFORM for any appropriate information about structure height, datum height, and information about the bridge, to include the formula for computing clearances.	**Object Encoding** **Object Class =** BRIDGE(A) (M) CATBRG = [5 (bascule bridge)] (O) HORCLR = [xx.x] (metres), e.g., 34.2 (M) VERCOP = [xx.x] (metres), e.g., 23.4 (M) VERCCL = [xx.x] (metres), e.g., 13.2 - over navigable waters (O) OBJNAM = [Name of Bridge] (C) INFORM = (refer to K) (C) PICREP = (Refer to Section B, General Guidance) (M) SCAMIN = [300000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

Sample PICREP - Bascule Bridge

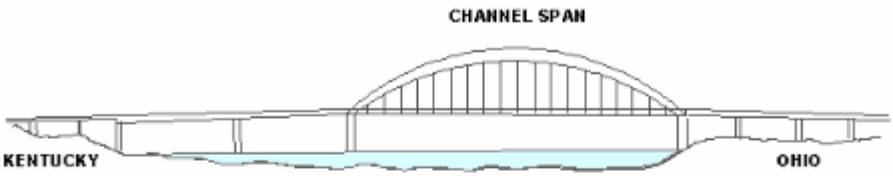


F.1.2 Fixed Bridge (M)

A bridge having permanent horizontal and vertical alignment. (McGraw-Hill Dictionary of Scientific and Technical Terms, 3rd Edition, 1984)

Graphics	Encoding Instructions	Object Encoding
Real World  *Chart Symbol*  *IENC Symbolization*  	A) Bridge piers shall be encoded as PYLONS (see G.1.8) B) Create separate bridge objects for spans over navigable channel when attributes of navigable spans are different (e.g. vertical clearance, horizontal clearance). C) If separate spans are required, each span's INFORM should indicate whether it is the "Primary Navigation Span", "Secondary Navigation Span", or "Not to be used for Navigation." D) Bridge approaches (over the bankline) should be encoded. E) Include PICREP of profile view with vertical clearance shown. F) Road and railroad features do not cross the bridge feature. G) Place LIGHTS on navigable span and piers bounding navigable span. H) OBJNAM should be encoded for all bridge spans. I) VERCLR and HORCLR mandatory for primary navigation span(s); use "Unknown" for all other spans if vertical clearance is unknown. J) Use INFORM for any appropriate information about structure height, datum height, and information about the bridge, to include the formula for computing clearances.	**Object Encoding** **Object Class =** BRIDGE(A) (M) CATBRG = [1 (fixed bridge)] (M) HORCLR = [xx.x] (metres), e.g., 34.2 (M) VERCLR = [xx.x] (metres), e.g., 13.2 - over navigable waters (O) OBJNAM = [Name of Bridge] (M) PICREP = (Refer to Section B, General Guidance) (C) INFORM = (refer to J) (M) SCAMIN = [300000] (M) SORIND = (Refer to Section B, General Guidance) (M) SORDAT = [YYYYMMDD]

Sample PICREP - Fixed Bridge

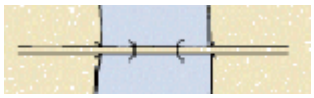
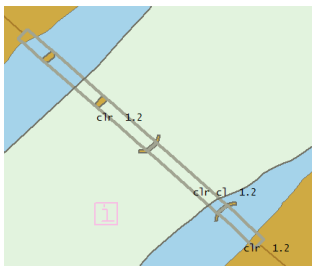


ELEVATION OF LOW STEEL	533.9'
VERTICAL CLEARANCE AT POOL STAGE	78.9'
HORIZONTAL CLEARANCE	704.0'

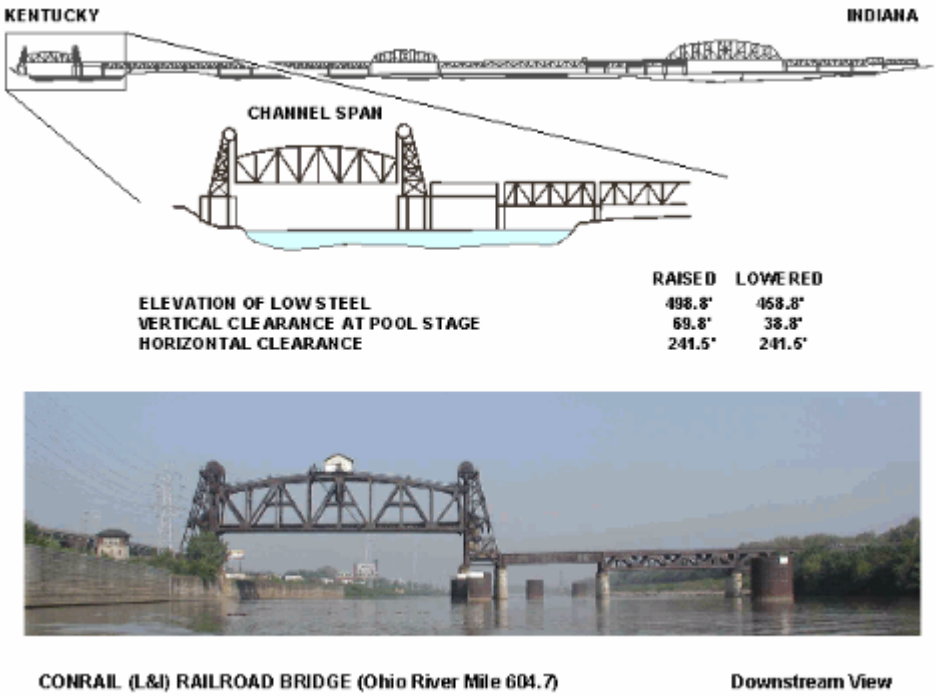
DANIEL CARTER BEARD BRIDGE (I-471) (Ohio River Mile 469.6) Downstream View

F.1.3 Lift Bridge (M)

A movable bridge (or span thereof) which is capable of being lifted vertically to allow vessels to pass beneath.
(adapted from IHO Dictionary, S-32, 5th Edition, 547)

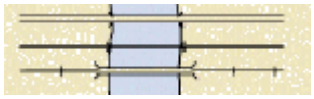
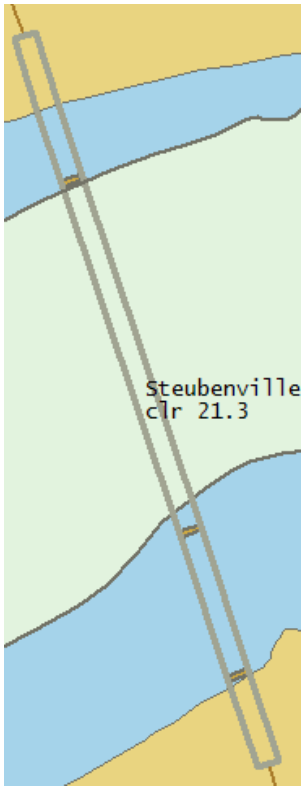
Graphics	Encoding Instructions	Object Encoding
Real World  *Chart Symbol*  *IENC Symbolization* 	A) Bridge piers shall be encoded as PYLONS (please refer to G.1.8) B) The portions of the bridge that approach the movable span from either shore are to be collected as fixed bridges (separate objects). Only that portion of the bridge that is actually movable is to be collected as a movable bridge. C) Create separate bridge objects for spans over navigable channel when attributes of navigable spans are different (e.g. vertical clearance, horizontal clearance). D) If separate spans are required, each span's INFORM should indicate whether it is the "Primary Navigation Span", "Secondary Navigation Span", or "Not to be used for Navigation." E) Bridge approaches (over the bankline) should be encoded. F) Include PICREP of profile view with vertical clearance shown. PICREP should include pictures of bridge when open and closed, if available. G) Roads and railroads do not cross bridge. H) Place LIGHTS on navigable span and piers bounding navigable span. I) OBJNAM should be encoded for all bridge spans. J) VERCLR and HORCLR mandatory for primary navigation span(s); use "Unknown" for all other spans if vertical clearance is unknown. K) Use INFORM for any appropriate information about structure height, datum height, and information about the bridge, to include the formula for computing clearances.	**Object Encoding** **Object Class =** BRIDGE(A) (M) CATBRG = [4 (lifting bridge)] (O) HORCLR = [xx.x] (metres), e.g., 34.2 (M) VERCOP = [xx.x] (metres), e.g., 23.4 (M) VERCCL = [xx.x] (metres), e.g., 13.2 - over navigable waters (O) OBJNAM = [Name of Bridge] (C) INFORM = (refer to K) (C) PICREP = (Refer to Section B, General Guidance) (M) SCAMIN = [300000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

Sample PICREP



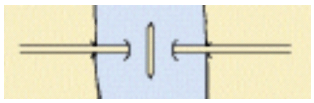
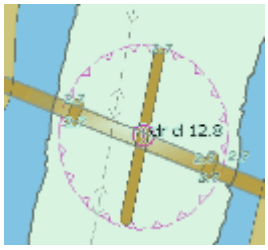
F.1.4 Suspension Bridge (M)

A fixed bridge consisting of either a roadway or a truss suspended from two or more cables which pass over towers and are anchored by backstays to a firm foundation. (McGraw-Hill Encyclopaedia of Science and Technology, 7th Edition, 1992)

Graphics	Encoding Instructions	Object Encoding
Real World  *Chart Symbol*  *IENC Symbolization* 	A) Bridge piers shall be encoded as PYLONS (please refer to G.1.8) B) Create separate bridge objects for spans over navigable channel when attributes of navigable spans are different (e.g. vertical clearance, horizontal clearance). C) If separate spans are required, each span's INFORM should indicate whether it is the "Primary Navigation Span", "Secondary Navigation Span", or "Not to be used for Navigation." D) Bridge approaches (over the bankline) should be encoded. E) Include PICREP representation of profile view with vertical clearance shown. F) Roads and railroads do not cross bridge. G) Place LIGHTS on navigable span and piers bounding navigable span. H) OBJNAM should be encoded for all bridge spans. I) VERCLR and HORCLR mandatory for primary navigation span(s); use "Unknown" for all other spans if vertical clearance is unknown. J) Use INFORM for any appropriate information about structure height, datum height, and information about the bridge, to include the formula for computing clearances.	**Object Encoding** **Object Class =** BRIDGE(A) (M) CATBRG = [12 (suspension bridge)] (O) HORCLR = [xx.x] (metres), e.g., 34.2 (M) VERCLR = [xx.x] (metres), e.g., 13.2 (O) OBJNAM = [Name of Bridge] (C) INFORM = (refer to J) (C) PICREP = (Refer to Section B, General Guidance) (M) SCAMIN = [300000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

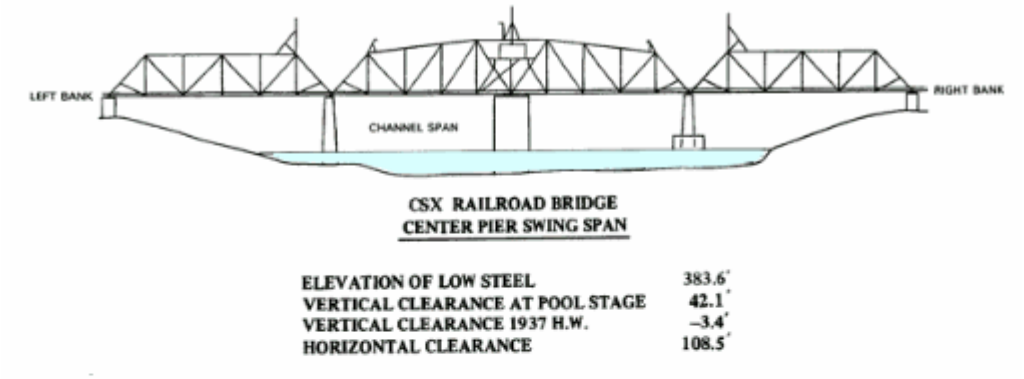
F.1.5 Swing Bridge (M)

A movable bridge (or span thereof) that rotates in a horizontal plane about a vertical pivot to allow the passage of vessels. (adapted from McGraw-Hill Encyclopedia of Science and Technology, 7th Edition, 1992)

Graphics	Encoding Instructions	Object Encoding
Real World  *Chart Symbol*  *IENC Symbolization* 	A) Bridge piers shall be encoded as PYLONS (please refer to G.1.8) B) The portions of the bridge that approach the movable span from either shore are to be collected as fixed bridges (separate objects). Only that portion of the bridge that is actually movable is to be collected as a movable bridge. C) Create separate bridge objects for spans over navigable channel when attributes of navigable spans are different (e.g., vertical clearance, horizontal clearance). D) If separate spans are required, each span's INFORM should indicate whether it is the "Primary Navigation Span", "Secondary Navigation Span", or "Not to be used for Navigation." E) Bridge approaches (over the bankline) should be encoded. F) Include PICREP of profile view with vertical clearance shown. PICREP should include pictures of bridge when open and closed, if available. G) Roads and railroads do not cross bridge. H) Place LIGHTS at appropriate position on bridge object and piers bounding the navigable channel. I) OBJNAM should be encoded for all bridge spans. J) VERCLR and HORCLR mandatory for primary navigation span(s); use "Unknown" for all other spans if vertical clearance is unknown. K) Use INFORM for any appropriate information about structure height, datum height, and information about the bridge, to include the formula for computing clearances.	**Object Encoding** **Object Class =** BRIDGE(A) (M) CATBRG = [3 (swing bridge)] (O) HORCLR = [xx.x] (metres), e.g., 34.2 (M) VERCLR = [xx.x] (metres), e.g., 13.2 - over navigable waters (O) OBJNAM = [Name of Bridge] (C) INFORM = (refer to K) (M) PICREP = (Refer to Section B, General Guidance) (M) SCAMIN = [300000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance) **Caution Area around Swing Span** **Object Class =** CTNARE(A) (M) INFORM = ["Swing Area"] (M) SCAMIN = [60000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

	L) Add a CTNARE object (INFORM = Swing Area) around the swing area. Use any published caution area or ¼ span distance buffer from open span.	

Sample PICREP - Swing Bridge

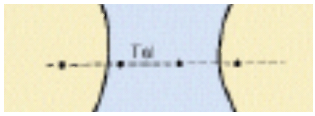
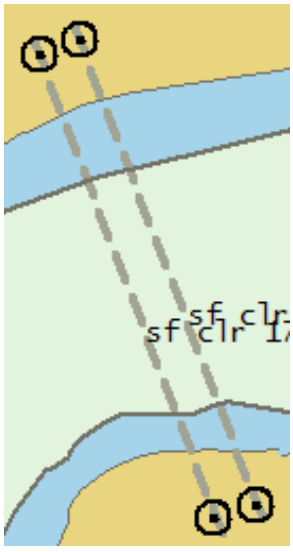


CSX RAILROAD BRIDGE
CENTER PIER SWING SPAN

ELEVATION OF LOW STEEL	383.6'
VERTICAL CLEARANCE AT POOL STAGE	42.1'
VERTICAL CLEARANCE 1937 H.W.	–3.4'
HORIZONTAL CLEARANCE	108.5'

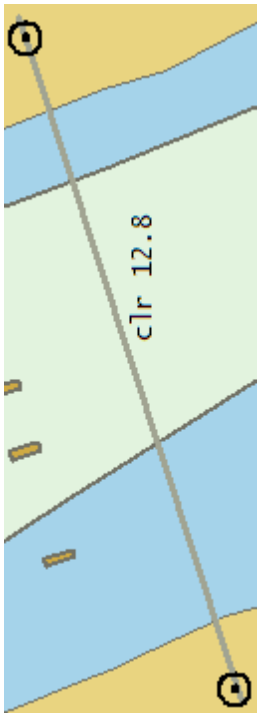
F.1.6 Overhead Cable (M)

An overhead cable is an assembly of wires or fibres, or a wire rope or chain, which is supported by structures such as poles or pylons and passing over or nearby navigable waters. (Hydrographic Service, Royal Australian Navy).

Graphics	Encoding Instructions	Object Encoding
Real World  *Chart Symbol*  *IENC Symbolization* 	A) Cable supports (PYLONS) closest to the land side of the bankline and those within the water must be coded (refer to G.1.8). B) If there are multiple cables supported by the pylon (as in Real World photo), represent only the lowest hanging cable. C) The value given as the vertical clearance (VERCLR) shall be provided in metres and indicate the vertical distance between the lowest point of the cable (over the navigable part of the waterway). D) Lights on the towers should be encoded E) Use INFORM to provide any additional information, such as owner's phone number or contact information.	**Object Encoding** **Object Class =** CBLOHD(L) (M) VERCLR = [xx.x] (metres), e.g., 13.2 (O) CATCBL = [1 (powerline), 3 (transmission line), 4 (telephone), 5 (telegraph), 6 (mooring cable/chain)] (O) OBJNAM = [Owner's Name] (C) INFORM = (Refer to E) (M) SCAMIN = [90000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

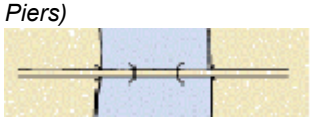
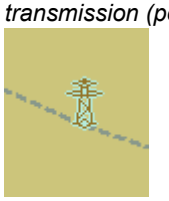
F.1.7 Overhead Pipe (M)

A pipeline is a string of interconnected pipes used for the transport of matter, nowadays mainly oil or gas. (IHO Dictionary, S-32, 5th Edition, 3857)
An overhead pipeline is a pipeline supported by pylons and passing over or nearby navigable waters. (S-57 Standard)

Graphics	Encoding Instructions	Object Encoding
Real World  *Chart Symbol*  *IENC Symbolization*  	A) Pipeline supports (PYLONS) closest to the land side of the bankline and those within the water must be coded (refer to G.1.8). B) Pipelines should extend over COALNE onto land a short distance. C) Do not include PIPOHD on bridges unless the pipeline affects VERCLR. D) Overhead pipelines and cables may have significant towers that should be captured as a Landmark (LNDMRK) with a CATLMK=17 (tower). E) Lights on the towers should be encoded. F) The value given as the vertical clearance (VERCLR) shall be provided in metres and indicate the vertical distance between the lowest point of the pipeline (over the navigable part of the waterway). G) Use INFORM to provide any additional information, such as owner's phone number or contact information.	**Object Encoding** **Object Class =** PIPOHD(L) (O) CATPIP = [2 (outfall pipe), 3 (intake pipe), 4 (sewer), 6 (supply pipe)] (O) PRODCT = [1 (oil), 2 (gas), 3 (water), 7 (chemicals), 8 (drinking water)] (M) VERCLR = [xx.x] (metres), e.g., 13.2 (O) OBJNAM = [Owner Name] (C) INFORM = (Refer to G) (M) SCAMIN = [90000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

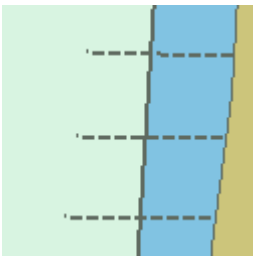
F.1.8 Pylons, Piers, and Bridge, Cable, and Pipeline Support (M)

A vertical construction consisting, for example, of a steel framework or pre-stressed concrete to carry cables, pipelines or bridges. (S-57 Standard)

Graphics	Encoding Instructions	Object Encoding
Real World (Bridge (pier))  *Chart Symbol (Bridge with Piers)*  *IENC Symbolization (Power transmission (point))*  *IENC Symbolization (Bridge (area))* 	A) Use PYLONS (P) objects to code supports for overhead cables and pipelines (CATPYL=1,2, or 3). B) PYLONS (A) must have a LNDARE underneath C) ALL pylons and piers in the water must be encoded. D) Bridge piers on land closest to the water must be encoded. E) For suspension bridges use CATPYL=4 (bridge pylon) For all other bridges use CATPYL=5 (bridge pier)	**Object Encoding** **Object Class =** PYLONS(P, A) (M) CATPYL = [1 (power transmission pylon/pole), 2 (telephone/telegraph pylon/pole), 3 (aerial cableway/sky pylon), 4 (bridge pylon), 5 (bridge pier)] (M) WATLEV = [2 (always dry)] (M) SCAMIN = [30000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

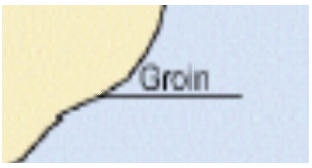
F.2.1 Bendway Weir / Training Wall (M)

A wall or bank, often submerged, built to direct or confine the flow of a river or tidal current, or to promote a scour action. (Adapted from IHO Dictionary, S-32, 5th Edition, 5586 and IHO Chart Specifications, M-4).

Graphics	Encoding Instructions	Object Encoding
IENC Symbolization 	A) Line feature should denote the centerline of the structure. B) Multiple NATCONs can be used, if appropriate; use commas to separate NATCON values. C) If data is available, use INFORM to include toe elevation of feature. D) Inter-tidal or submerged features that are not attached to the shoreline should be encoded in the following manner CATSLC = 7 (training wall) with WATLEV = 3 (always under water/submerged) or WATLEV = 4 (covers and uncovers). E) Bendway Weir: an upstream-angled low-elevation stone sill, built at an elevation low enough to allow normal river traffic to pass over unimpeded, designed to control and redirect currents and velocities throughout a bend of a river. OBJNAM (M) = "Bendway Weir" with WATLEV = 3 (always under water/submerged). F) For Navigation Weirs see Dam/Barrier G) For dikes, see Dike / Groin	**Object Encoding** **Object Class =** SLCONS(L) (M) CATSLC = [7 (training wall)] (O) NATCON = [1 (masonry), 2 (concreted), 3 (loose boulder), 4 (hard surfaced), 5 (unsurfaced), 6 (wooden), 7 (metal), 8 (reinforced plastic)] (O) WATLEV = [1 (partly submerged at high water), 2 (always dry), 3 (always under water/submerged), 4 (covers and uncovers)] (C) INFORM = [Refer to C] (O) OBJNAM = [Refer to E] (M) SCAMIN = [45000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

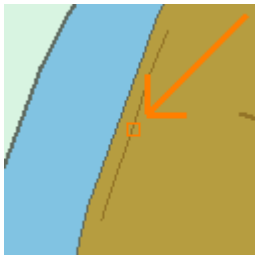
F.2.2 Dike (dyke) / Groin (M)

A low artificial wall-like structure of durable material extending from the land to seaward for a particular purpose, such as to prevent coast erosion (adapted from IHO Dictionary, S-32, 5th Edition, 2525 and IHO Chart Specifications, M-4)

Graphics	Encoding Instructions	Object Encoding
Chart Symbol  *IENC Symbolization* 	A) Line feature should denote the centerline of the structure. B) Multiple NATCONs can be used, if appropriate. C) If data is available, use INFORM to include toe elevation of feature. D) WATLEV should be = 1 (partly submerged at high water) E) If feature is usually submerged, see Bendway Weir / Training Wall.	**Object Encoding** **Object Class =** SLCONS(L) (M) CATSLC = [2 (groin)] (O) NATCON = [1 (masonry), 2 (concreted), 3 (loose boulder), 4 (hard surfaced), 5 (unsurfaced), 6 (wooden), 7 (metal), 8 (reinforced plastic), 9 (painted)] (M) WATLEV = [1 (partly submerged at high water)] (C) INFORM = [Refer to C] (M) SCAMIN = [45000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

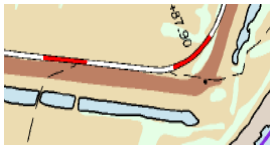
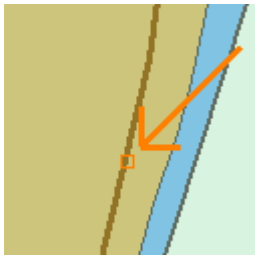
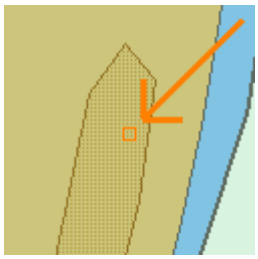
F.2.3 Floodwall (O)

A man-made barrier used for flood protection.

Graphics	Encoding Instructions	Object Encoding
Real World  *Chart Symbol*  *IENC Symbolization (Wall)* 	A) Encode floodwalls as CATFNC = 4 (wall), INFORM = Floodwall B) OBJNAM mandatory, use name of floodwall or levee district (e.g., Indianapolis LFPP)	**Object Encoding** **Object Class =** FNCLNE(L) (M) CATFNC = [4 (wall)] (O) OBJNAM = (Refer to B) (M) INFORM = ["Floodwall"] (M) SCAMIN = [18750] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

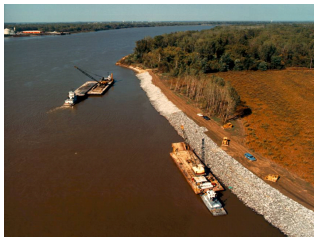
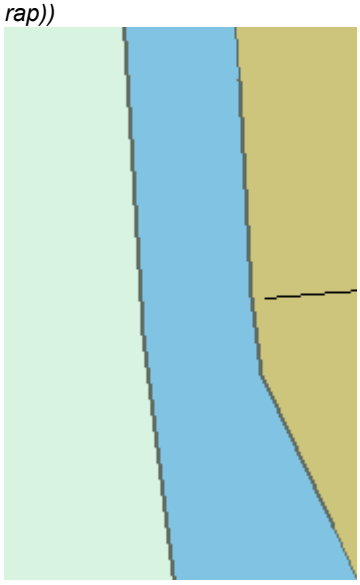
F.2.4 Levee (O)

Artificial earthen embankment, roughly paralleling the waterway, to keep flood waters within the river course.

Graphics	Encoding Instructions	Object Encoding
Real World  *Chart Symbol*  *IENC Symbolization (line)*  *IENC Symbolization (area)* 	A) If area of levee is unavailable, use line feature to portray levee crown. B) The altitude of the highest point of the levee above the vertical reference level may be encoded by the attribute HEIGHT.	**Object Encoding** **Object Class =** DYKCON(L, A) (O) HEIGHT = [xxx.x] metres (O) OBJNAM = [Name of levee or levee district] (M) SCAMIN = [22000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

F.2.5 Revetment / Rip Rap (M)

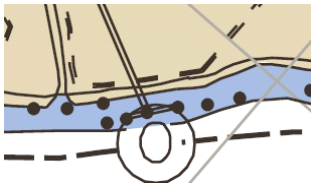
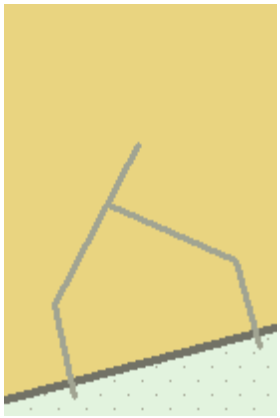
Facing of stone or of concrete blocks linked together, placed along the edge of a stream, river or canal to stabilize the bank and to protect it from the erosive action of the stream. (Adapted from IHO Dictionary, S-32, 5th Edition, 4379)

Graphics	Encoding Instructions	Object Encoding
Real World (Revetment)  *Real World (Rip rap)*  *IENC Symbolization ((Rip rap))* 	A) Place line feature near or along shoreline, extending the length of the underwater structure, or if not known, the length of the above water structure. B) For loose stone / rip rap, use SLCONS (L or A) with CATSLC = 8 (rip rap), NATCON = 3 (loose boulders). No RESARE required. C) For Concrete Mattress, use SLCONS (A) with CATSLC = 9 (revetment), NATCON = 2 (concreted). RESARE required (refer to D). D) For Concrete Mattress: Create RESARE depicting the outline of the known structure above and below the waterline. E) Use OBJNAM if feature has a known name. F) Use WATLEV as follows: 1 (partly submerged at high water): structure has above and below water portions at normal high water conditions 2 (always dry): full structure is above water at normal high water conditions 3 (always underwater/submerged): structure is always submerged (no visible portion) at normal low water conditions, or extent of underwater portion is unknown. 4 (covers and uncovers): projection from the bottom of the body of water which periodically extends above and is submerged below the surface. 5 (awash): structure extends only a small distance underwater at normal low water conditions.	**Object Encoding** **Object Class =** SLCONS(L, A) (M) CATSLC = [8 (rip rap), 9 (revetment)] (O) OBJNAM = "Name + Revetment", e.g. Carrollton Revetment (M) NATCON = [3 (loose boulders), 2 (concreted)] (M) WATLEV = [1 (partly submerged at high water), 2 (always dry), 3 (always underwater/submerged), 5 (awash)] (M) SCAMIN = [30000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance) **Restricted Area around Concrete Mattresses** **Object Class =** RESARE(A) (M) RESTRN = [1 (anchorage prohibited)] (M) SCAMIN = [75000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

F.3 Installations & Commercial Facilities

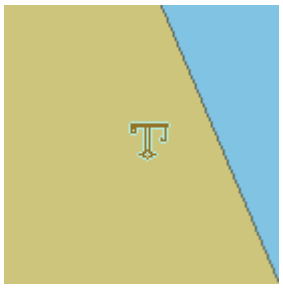
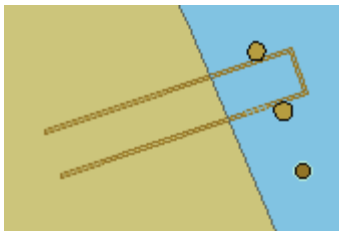
F.3.1 Conveyor (M)

A mechanical apparatus for moving bulk material or people from place to place (as by a moving belt or chain of receptacles); usually extends from a land-based facility over the shoreline to a dock, wharf, or mooring facility. (Adapted from S-57 Standard)

Graphics	Encoding Instructions	Object Encoding
Real World  *Chart Symbol*  *IENC Symbolization* 	A) SLCONS (L) preferred: place line feature from land-based facility to fixed structure in water at which product loads or offloads. B) Supporting structures (e.g., pylons, piers) should be coded when in the water. C) If vertical clearance is unavailable, use VERCLR = "Unknown". D) If CATCON is belt conveyor, code as 2 (belt conveyor), otherwise use INFORM to detail information about the type of conveyor.	**Object Encoding** **Object Class =** CONVYR(L, A) (C) CATCON = (Refer to D) (O) PRODCT = [4 (stone), 5 (coal), 6 (ore), 7 (chemicals), 14 (sand), 15 (timber), 17 (scrap metal), 21 (cement), 22 (grain)] (M) VERCLR = (Refer to C) (C) INFORM = (Refer to D) (O) OBJNAM = [Facility Name] (M) SCAMIN = [30000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

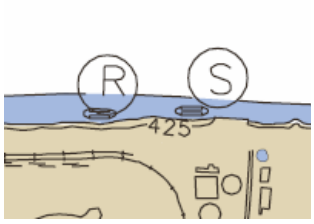
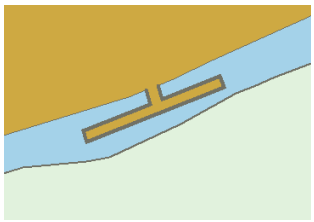
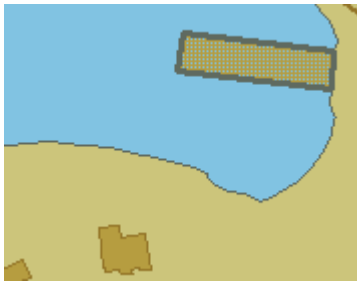
F.3.2 Crane (M)

A machine for lifting, shifting and lowering objects or materials by means of a swinging boom or with a lifting apparatus supported on an overhead track. (Digital Geographic Information Working Group, Oct.87)

Graphics	Encoding Instructions	Object Encoding
Real World  *IENC Symbolization (Point)*  *IENC Symbolization (Area)* 	A) For Area features, delineate the perimeter of the crane. B) If vertical clearance is unavailable, use VERCLR = "Unknown".	**Object Encoding** **Object Class =** CRANES(P, A) (M) CATCRN = [2 (container crane/gantry), 3 (sheerlegs), 4 (traveling crane), 5 (A-frame)] (M) VERCLR = (Refer to B) (O) OBJNAM = [name of owner] (M) SCAMIN = [30000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

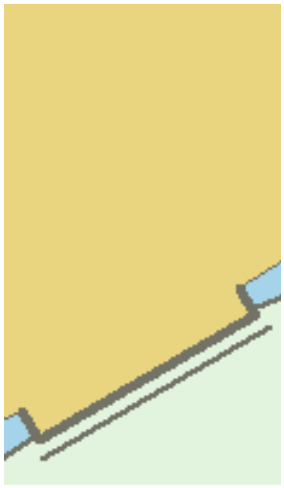
F.3.3 Dock / Wharf (M)

Platform or structure in the water where materials are loaded, unloaded and/or services are provided.

Graphics	Encoding Instructions	Object Encoding
Real World  *Chart Symbol*  *IENC Symbolization ((Point))*  *IENC Symbolization ((Line))*  *IENC Symbolization ((Area))* 	A) Land facilities should be represented with buildings (BUISGL) and storage tank (SILTNK) feature objects. B) Multiple NATCON values can be used, if applicable. C) Use CATSLC as follows: 4 (Pier/Jetty): facility is primarily a structure extending perpendicular from the shoreline into the water; 6 (Wharf/Quay): facility is primarily a structure parallel to the shoreline; use if details of CATSLC 15 or 16 are unknown; 15 (Solid Face Wharf): facility consisting of a solid wall such that water cannot circulate underneath; 16 (Open Face Wharf): facility supported on piles or other structures that allow free circulation of water under the wharf. D) Include the name of the facility in OBJNAM if known.	**Object Encoding** **Object Class =** SLCONS(P, L, A) (M) CATSLC = [4 (pier/jetty), 6 (wharf/quay), 15 (solid face wharf), 16 (open face wharf)] (O) NATCON = [1 (masonry), 2 (concreted), 3 (loose boulder), 4 (hard surfaced), 5 (unsurfaced), 6 (wooden), 7 (metal), 8 (reinforced plastic), 9 (painted)] (M) WATLEV = [2 (always dry)] (O) OBJNAM = [owner's name] (M) SCAMIN = [45000 for line, 22000 for area or 8000 for point objects] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

F.3.4 Fender (M)

A protective structure designed to cushion the impact of a vessel and prevent damage. (S-57 Standard)

Graphics	Encoding Instructions	Object Encoding
Real World  *IENC Symbolization* 	A) Place line feature to accurately reflect the edge facing vessel traffic. B) Fenders need not have depictions of structural pylons behind the fender. C) More than one value may be selected for NATCON.	**Object Encoding** **Object Class =** SLCONS(L, A) (M) CATSLC = [14 (fender)] (O) NATCON = [1 (masonry), 2 (concreted), 3 (loose boulder), 4 (hard surfaced), 5 (unsurfaced), 6 (wooden), 7 (metal), 8 (reinforced plastic)] (M) WATLEV = [2 (always dry)] (M) SCAMIN = [30000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

F.3 Installations & Commercial Facilities

F.3.5 Harbor Area (administrative) (O)

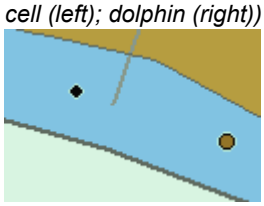
The area over which a harbour authority has jurisdiction.

Graphics	Encoding Instructions	Object Encoding
Real World  *Chart Symbol*  *IENC Symbolization*  	A) A harbor area shall cover the entire named area of jurisdiction, to include both land and water objects. B) Use INFORM to add any additional information or details about the Harbor Area C) For yacht harbor / marina, see Marina (F.5.2)	**Object Encoding** **Object Class =** HRBARE(A) (M) OBJNAM = [Name of Harbor Area] (O) INFORM = (refer to B) (M) SCAMIN = [45000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

F.3 Installations & Commercial Facilities

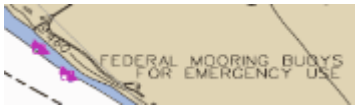
F.3.6 Mooring Facility (M)

The equipment or structure used to secure a vessel (adapted from IHO Dictionary, S-32, 5th Edition, 3322)

Graphics	Encoding Instructions	Object Encoding
Real World (Mooring Cell)  *Real World (Dolphin)*  *IENC Symbolization (Point cell (left); dolphin (right))* 	A) Area feature should be used for structures greater than 3 metres in diameter. LNDARE must be placed beneath MORFAC (A) if feature is not floating. B) If not floating, use WATLEV=2 (always dry) for MORFAC object. C) For mooring cells, use CATMOR=5 (post/pile). D) Place OBJNAM of facility, if known, on each MORFAC. E) In an instance when a barge has been sunk near the shoreline and dolphins permanently attached to it, code each dolphin as a MORFAC(P), CATMOR=1.	**Object Encoding** **Object Class =** MORFAC(P, A) (M) CATMOR = [1 (dolphin), 5 (post/pile), 7 (mooring buoy)] (O) NATCON = [1 (masonry), 2 (concreted), 3 (loose boulder), 4 (hard surfaced), 5 (unsurfaced), 6 (wooden), 7 (metal), 8 (reinforced plastic)] (O) OBJNAM = (Refer to D) (O) WATLEV = [2 (always dry)] (M) SCAMIN = [30000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

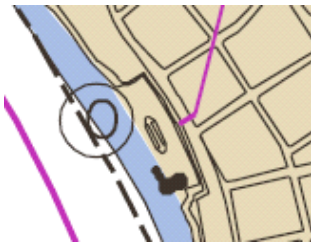
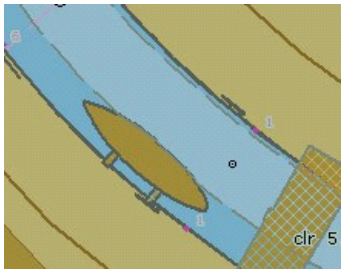
F.3.7 Federal Mooring Facility (O)

A device designated and maintained by a federal authority for tie-ups and a guaranteed depth year round.

Graphics	Encoding Instructions	Object Encoding
Chart Symbol  *IENC Symbolization* 	A) Code MORFAC as stated in G.2.7 Mooring Facility B) Create SEAARE (P) with OBJNAM = "Federal Mooring Cell(s) / Buoy(s) / Block(s)" C) Only one SEAARE should be located at each MORFAC or set of MORFACs	**Object Encoding** **Object Class =** SEAARE(P) (O) OBJNAM = ["Name" + (River Mile)], e.g. Federal Mooring Buoys (172.4)] (M) SCAMIN = [60000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

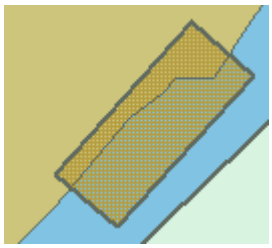
F.3.8 Permanently Moored Vessel or Facility (M)

A permanently moored ship (S-57 standard)

Graphics	Encoding Instructions	Object Encoding
Real World  *Chart Symbol*  *IENC Symbolization* 	A) Place shape in location, orientation, and dimensions of the real world object. B) If a name of the vessel or facility is available, it should be encoded in OBJNAM. C) HULKES is a Group 1 (Skin of the Earth) object. D) For Casinos, CATHLK not required, however OBJNAM required.	**Object Encoding** **Object Class =** HULKES(A) (C) CATHLK = [1 (floating restaurant), 2 (historic ship), 3 (museum), 4(accommodation), 5 (floating breakwater)] (M) OBJNAM = [facility name] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

F.3.9 Slipway (M)

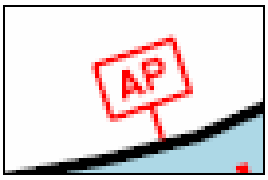
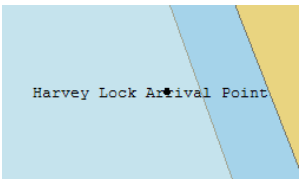
The prepared and usually reinforced inclined surface on which vessels, usually barges, are launched.

Graphics	Encoding Instructions	Object Encoding
Real World  *IENC Symbolization* 	A) The outside edge of the slipway, both on land and in water, should be depicted as closely to its exact location as possible	**Object Encoding** **Object Class =** SLCONS(A) (M) CATSLC = [13 (slipway)] (O) OBJNAM = [name of facility or owner] (M) SCAMIN = [45000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

F.4 Locks

F.4.1 Arrival Point (M)

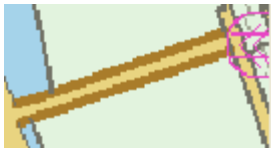
Arrival point location commonly associated with vessel queues at locks.

Graphics	Encoding Instructions	Object Encoding
Chart Symbol  *IENC Symbolization*  	A) If a structure exists in which to tie up, place SEAARE (point) on structure, usually MORFAC. B) If no structure, place SEAARE near shoreline.	**Object Encoding** **Object Class =** SEAARE(P) (M) OBJNAM = [Facility/Lock Name + "Arrival Point"] (M) SCAMIN = [45000] (O) INFORM = Check-in information, such as: Call-in Frequency, Phone Number, and Lock Name (C) TXTDSC = Check-in procedures and current lock conditions, planned closures, and operating schedules. (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

F.4 Locks

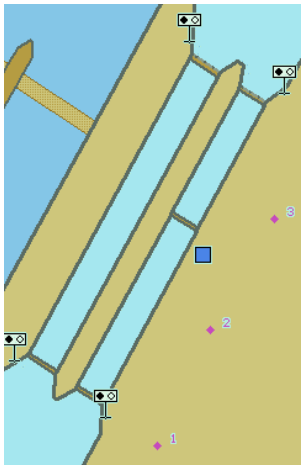
F.4.2 Dam / Barrier (M)

A barrier to check or confine anything in motion; particularly one constructed to hold back water and raise its level to form a reservoir, or to prevent flooding. (IHO Dictionary, S-32, 5th Edition, 1196)

Graphics	Encoding Instructions	Object Encoding
Real World  *Chart Symbol*  *IENC Symbolization* 	A) Overlay the feature on LNDARE object. B) If appropriate, place RESARE around dam, extending on both sides of the dam the length of the lock guidewall or the area that is marked by buoys. C) Use OBJNAM option according to most commonly accepted name. D) For Navigation Weirs (a low dam built across a river to raise its level or divert its flow; constructed at an elevation low enough to allow river traffic to pass over it unimpeded during certain times of year), encode as CATDAM = 1 (weir) with appropriate NATCON.	**Object Encoding** **Object Class =** DAMCON(L, A) (M) CATDAM = [1 (weir), 2 (dam)] (M) OBJNAM = (Refer to C) (O) NATCON = [1 (masonry), 2 (concreted), 3 (loose boulder), 6 (wooden), 7 (metal)] (M) SCAMIN = [45000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

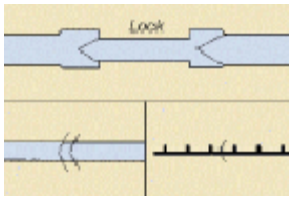
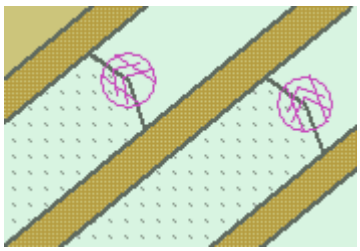
F.4.3 Lock Chamber (M)

A lock chamber is a wet dock in a waterway, permitting a ship to pass from one level to another. (adapted from IHO Dictionary, S-32, 5th Edition, 2881)

Graphics	Encoding Instructions	Object Encoding
Real World  *IENC Symbolization* 	A) DRVAL1 represents the minimum operating depth of the chamber; in most instances, 2.7 metres. B) The minimum physical length and width of the lock chamber must be encoded in the INFORM field, e.g. 1200 feet x 110 feet. C) TXTDSC should state hours of operation, gate operator phone number, radio contact information, VHF channel, etc.	**Object Encoding** **Object Class =** DRGARE(A) (M) DRVAL1 = [x.x] (metres), e.g., 2.7 (O) OBJNAM = [Lock name] (O) INFORM = (Refer to B) (O) TXTDSC = (Refer to C) (M) SCAMIN = [30000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

F.4.4 Lock Gate (M)

Structure swung, drawn, or raised/lowered to hold or release water in a lock.

Graphics	Encoding Instructions	Object Encoding
Real World  *Chart Symbol*  *IENC Symbolization* 	A) All lock gates must be encoded. B) GATCON features should follow the edge of DRGARE that defines the lock chamber. C) HORCLR should be equal to half the width of the lock chamber for mitre gates and the full width of the lock chamber for lift gates, unless value is different. D) VERCLR required for lift gates only.	**Object Encoding** **Object Class =** GATCON(L, A) (M) CATGAT = [4 (lock gate)] (M) HORCLR = [xx.x] (metres), e.g., 34.2 (C) VERCLR = [xx.x] (metres) (Refer to D) (M) SCAMIN = [22000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

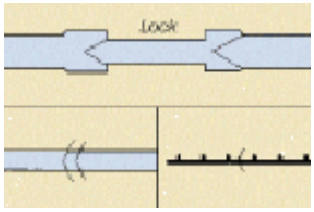
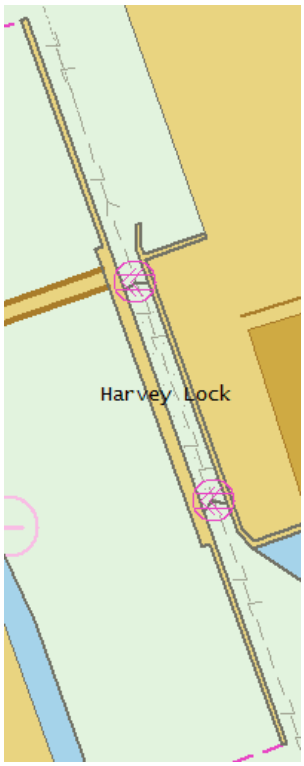
F.4.5 Lock Name (M)

The commonly known name of the lock facility.

Graphics	Encoding Instructions	Object Encoding
IENC Symbolization 	A) Place SEAARE point feature in the center of the primary lock chamber. B) Encode OBJNAM as the commonly known name of the lock and dam facility.	**Object Encoding** **Object Class =** SEAARE(P) (M) OBJNAM = (Refer to B) (M) SCAMIN = [60000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

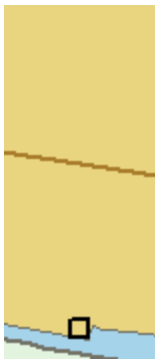
F.4.6 Lock Wall (M)

Permanent structure bounding a lock, and including guide walls.

Graphics	Encoding Instructions	Object Encoding
Real World  *Chart Symbol*  *IENC Symbolization*  	A) The SLCONS object must be coincident with a LNDARE object. B) Multiple NATCON can be used, as in different materials for the lock wall and guide wall.	**Object Encoding** **Object Class =** SLCONS(A) (M) INFORM = [“Lock/Guidewall”] (O) NATCON = [1 (masonry), 2 (concreted), 3 (loose boulder), 6 (wooden), 7 (metal)] (O) OBJNAM = [Lock & Dam name] (M) SCAMIN = [45000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

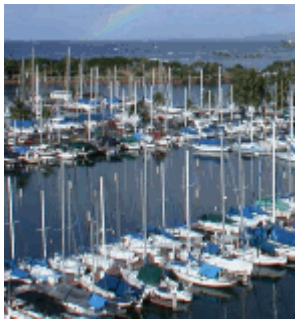
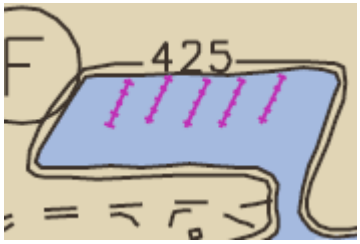
F.5.1 Boat Ramp (M)

A sloping structure that can either be used, as a landing place, at variable water levels, for small vessels, landing ships, or a ferry boats. (Adapted from IHO Dictionary, S-32, 5th Edition, 4209)

Graphics	Encoding Instructions	Object Encoding
Real World  *Chart Symbol*  *IENC Symbolization* 	A) The boat ramp should be positioned just above the waterline to be clearly seen by the mariner. B) Include only structures that have been permitted by USACE. Use STATUS 8 (private) or 14 (public) to indicate ownership. C) Refer to LNDRGN for boat ramps that are not functional but are common landmarks or locations for reference (historic landings, etc.) D) Include OBJNAM, if known. E) For ramps that are accessible during all seasons, use WATLEV = 2 (always dry). If ramp is often / sometime unaccessible to to flooding, use WATLEV = 4 (covers, uncovers)	**Object Encoding** **Object Class =** SLCONS(P) (M) CATSLC = [12 (ramp)] (O) NATCON = [1 (masonry), 2 (concreted), 3 (loose boulder), 4 (hard surfaced), 5 (unsurfaced), 6 (wooden), 7 (metal)] (M) WATLEV = [Refer to E] (O) OBJNAM = [Name + “Boat Ramp”] (M) SCAMIN = [30000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance) (M) STATUS = [8 (private), 14 (public)]

F.5.2 Marina (M)

A harbour installation with a service or commercial operation of public interest. (S-57 Standard)

Graphics	Encoding Instructions	Object Encoding
Real World  *Chart Symbol*  *IENC Symbolization* 	A) Only code HRBFAC (A) object when extents of marina feature are known. Use HRBFAC (P) when extents are not known.	**Object Encoding** **Object Class =** HRBFAC(P, A) (M) CATHAF = [5 (yacht harbour/marina)] (O) OBJNAM = [Marina Name] (M) SCAMIN = [60000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

F.5.3 Small Craft Facility (O)

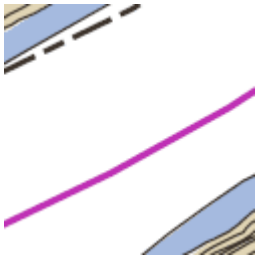
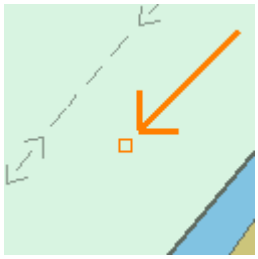
A place at which a service generally of interest to small craft or pleasure boats is available.

Graphics	Encoding Instructions	Object Encoding
IENC Symbolization 	A) This object class encodes only the service available for small craft or pleasure boats at this location.	**Object Encoding** **Object Class =** SMCFAC(P, A) (M) CATSCF = [1 (visitor's berth), 3 (boat hoist), 5 (boatyard), 7 (restaurant), 8 (provisions), 12 (water tap), 13 (fuel station), 14 (electricity), 15 (bottle gas), 16 (showers), 17 (launderette), 18 (public toilets), 20 (public telephone), 22 (car park), 23 (parking for boats and trailers), 25 (camping site), 26 (sewage pump-out station), 27 (emergency telephone), 28 (landing/launching place for boats), 29 (visitors mooring)] (O) OBJNAM = [name and/or owner] (M) SCAMIN = [12000} (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

G.1 Depth Areas, Contours & References

G.1.1 Project Depth (M)

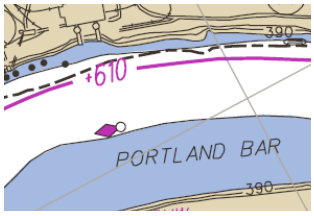
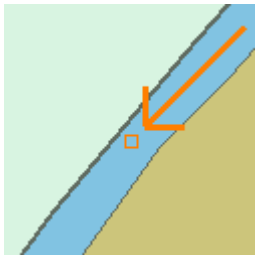
Area within the waterway bounded by a depth contour that denotes the designated navigation area.

Graphics	Encoding Instructions	Object Encoding
Chart Symbol  *IENC Symbolization* 	A) DRVAL1 = 2.7 (equivalent to typical 9-foot project depths for vast majority of shallow draft projects) or appropriate value (in meters) if depth is different than 9'. B) DRVAL2 = "Unknown" if value is not known.	**Object Encoding** **Object Class =** DEPARE(A) (M) DRVAL1 = [x.x] (metres), e.g., 2.7 (M) DRVAL2 = Maximum known depth of depth area: [xx.x] (metres) or UNKNOWN (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

G.1 Depth Areas, Contours & References

G.1.2 Shallow Depth (M)

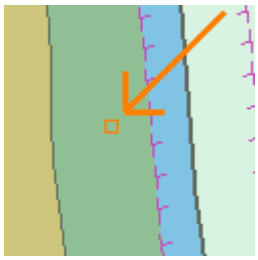
Area within the waterway bounded by zero depth and the project depth.

Graphics	Encoding Instructions	Object Encoding
Chart Symbol  *IENC Symbolization* 	A) Encode the depth area between the shoreline (COALNE) and the project depth area. B) DRVAL1 = 0 and DRVAL2 = 2.7 (or other value in meters if Project Depth is not equal to 9 feet)	**Object Encoding** **Object Class =** DEPARE(A) (M) DRVAL1 = [0.0] (metres) (M) DRVAL2 = [2.7] (metres) (Refer to B) (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

G.1 Depth Areas, Contours & References

G.1.3 Low / High Water Range (Drying Height) (C)

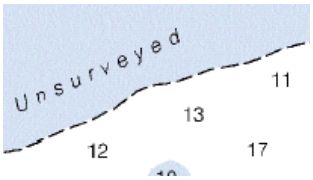
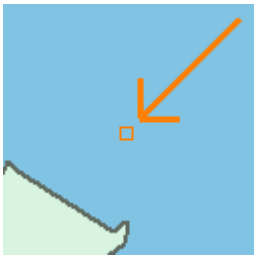
Area denoting the range between low and high water conditions (often referred to as 'drying height'). The feature applies only to open rivers.

Graphics	Encoding Instructions	Object Encoding
IENC Symbolization 	A) Area should border the shoreline and top bank. B) In case of tidal influence, use -H, where -H is height of tide C) INFORM is mandatory	**Object Encoding** **Object Class =** DEPARE(A) (M) DRVAL1 = UNKNOWN or -H (M) DRVAL2 = 0.0 (M) INFORM = ["Range between low and high water conditions"] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

G.1 Depth Areas, Contours & References

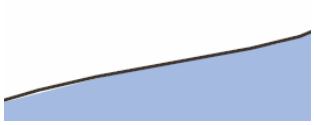
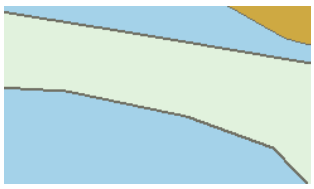
G.1.4 Unsurveyed Area (M)

An area for which no bathymetric survey information is available. (S-57standard)

Graphics	Encoding Instructions	Object Encoding
Chart Symbol  *IENC Symbolization* 	A) This object shall only be used in case detailed (bathymetric) depth data is available for most parts of the river. B) Typically, unsurveyed areas are used for backwater soughs, areas behind islands, and areas outside the project contour when the project area occupies only a small portion of the river. C) Populate INFORM field as "Unsurveyed Area"	**Object Encoding** **Object Class =** DEPARE(A) (M) DRVAL1 = [0.0] (M) DRVAL2 = [Unknown] (M) INFORM = (Refer to C) (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

G.1.5 Depth Contour (M)

Line of constant depth denoting the depth between Shallow Depth and Project Depth.

Graphics	Encoding Instructions	Object Encoding
Chart Symbol  *IENC Symbolization* 	A) IENCs should only show a single depth contour for project depth. Other depth contours are not authorized. B) 2.7 metres (9 feet) is the typical inland waterway project depth. Note: Exceptions may exist.	**Object Encoding** **Object Class =** DEPCNT(L) (M) VALDCO = [xx.x] (metres), e.g., 2.7 (M) SCAMIN = [18750] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

G.1 Depth Areas, Contours & References

G.1.6 River Gauge (M)

A device that measures the water level referenced to an official tide or hydraulic datum.

Graphics	Encoding Instructions	Object Encoding
Chart Symbol (USACE Gauge)  *IENC Symbolization* 	A) Gauges installed and maintaned by USACE, NOAA, USGS, or a municipal authority, and which provide data accessible by the general public should be encoded. B) Use CATSIW = 12 (tide gauge) for gauges near coastal areas, which have tidal influence, to which Corps waterway maintenance activities are referenced. C) Use CATSIW = 15 (water level gauge) for waterways in which Corps waterway maintenance and activities are referenced to a specific water plane or pool level. D) Use INFORM to populate any pertinent information regarding the gauge, to include zero gauge readings, datums, reference stages for normal pool, etc. E) Staff gauges on bridges may also be included	**Object Encoding** **Object Class =** SISTAW(P) (M) CATSIW = [12 (tide gauge), 15 (water level gauge) (O) OBJNAM = [name of gauge] (O) INFORM = (Refer to D) (M) SCAMIN = [45000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

H - Wrecks, Obstructions

H.1 Rocks, Wrecks & Obstructions

H.1.1 Rocks (O)

A concreted mass of stony material that dries, is awash or is below the water surface.

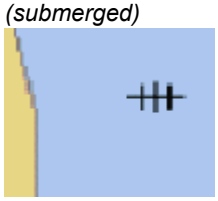
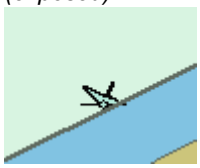
Graphics	Encoding Instructions	Object Encoding
	A) A drying height is indicated by a negative value within the attribute VALSOU. If this value is not known, VALSOU = Unknown shall be encoded.	**Object Encoding** **Object Class =** UWTROC(P) (M) WATLEV = [1 (partly submerged at high water), 2 (always dry), 3 (always under water/submerged), 4 (covers and uncovers), 5 (awash)] (M) VALSOU = [+/- xx.x] (meters), e.g., -00.3 or unknown (M) SCAMIN = [18750] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

H - Wrecks, Obstructions

H.1 Rocks, Wrecks & Obstructions

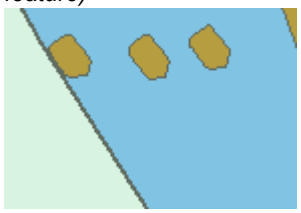
H.1.2 Wrecks (M)

The ruined remains of a stranded or sunken vessel that has been rendered useless. (IHO Dictionary, S-32, 5th Edition, 6027)

Graphics	Encoding Instructions	Object Encoding
Real World  *Chart Symbol*  *IENC Symbolization (submerged)*  *IENC Symbolization (exposed)* 	A) Any wreck in or outside the channel known to exist and confirmed through reliable means, is charted. B) Wrecks are removed only upon confirmation from reliable means that the wreck does not exist at or near the charted position. C) The true or actual location is not needed for removal of the erroneous location.	**Object Encoding** **Object Class =** WRECKS(P) (M) CATWRK = [1 (non-dangerous wreck), 2 (dangerous wreck), 5 (wreck showing any portion of hull or superstructure)] (M) WATLEV = [1 (partly submerged at high water), 2 (always dry), 3 (always under water/submerged), 4 (covers and uncovers), 5 (awash)] (M) SCAMIN = [45000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

H.1.3 Obstruction (M)

In marine navigation, anything that hinders or prevents movement, particularly anything that endangers or prevents passage of a vessel. The term is usually used to refer to an isolated danger to navigation... (IHO Dictionary, S-32, 5th Edition, 3503)

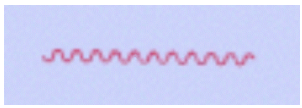
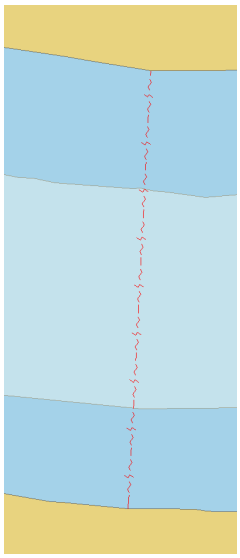
Graphics	Encoding Instructions	Object Encoding
Real World (Ice Breakers)  *IENC Symbolization (Point feature)*  *IENC Symbolization (Area feature)* 	A) Ice Breakers are encoded as OBSRTN (P) or (A) with mandatory CATOBS = 8 (ice boom).	**Object Encoding** **Object Class =** OBSTRN(P, A) (M) CATOBS = [8 (ice boom)] (M) VALSOU = [x.xx or "Unknown"] (metres) (M) WATLEV = [2 (always dry)] (M) SCAMIN = [30000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

I - Offshore Installations

I.1 Submarine Cables

I.1.1 Submarine Cable (M)

An assembly of wires or fibres, or a wire rope or chain which has been laid underwater or buried beneath the seabed (Hydrographic Service, Royal Australian Navy)

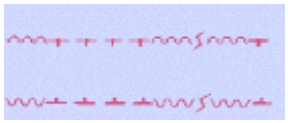
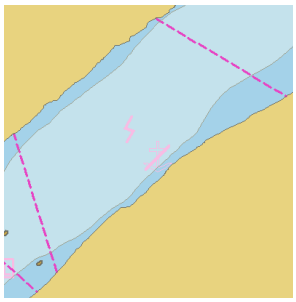
Graphics	Encoding Instructions	Object Encoding
Chart Symbol  *IENC Symbolization* 	A) Cable features should be encoded just inside the bankline to minimize clutter. B) Create CTNARE object buffering the pipeline 20 metres upstream and downstream of the cable. C) If there are multiple cables in the same area, do not code as cable, submarine (CBLSUB), but as a CBLARE (see Submarine Cable Area)	**Object Encoding** **Object Class =** CBLSUB(L) (O) CATCBL = [1 (powerline), 3 (transmission line), 4 (telephone), 5 (telegraph), 6 (mooring cable/chain)] (O) OBJNAM = [owner name] (M) SCAMIN = [60000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance) **Object Encoding** **Object Class =** CTNARE(A) (M) INFORM = ["Cable buffer zone"] (M) SCAMIN = [60000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

I - Offshore Installations

I.1 Submarine Cables

I.1.2 Submarine Cable Area (M)

An area which contains more than one submarine cable. (S-57 Standard)

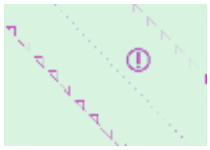
Graphics	Encoding Instructions	Object Encoding
Chart Symbol  *IENC Symbolization* 	A) CBLARE should generally be used if; dFCLC/NC < 50, where dFCLC is distance between first cable and last cable in designated area, and NC is the number of cables; cartographic judgment should still be applied for final analysis. B) Cable areas should be used, unless very precise single cable data is available. Symbology should never be used due to the unreliability of the cable location. C) Extend CBLARE 20 metres beyond first and last cable; farther if uncertainty is greater. D) If various types of cables exist in the area, include description in TXTDSC. If at least one of the cables is a powerline, CATCBL = 1 has to be used. E) Do not use both Submarine Cable and Cable Area to represent the same feature.	**Object Encoding** **Object Class =** CBLARE(A) (O) CATCBL = [1 (powerline), 3 (transmission line), 4 (telephone), 5 (telegraph), 6 (mooring cable/chain)] (M) RESTRN = [1 (anchoring prohibited)] (O) OBJNAM = [owner name] (C) TXTDSC = (Refer to D) (M) SCAMIN = [60000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

I - Offshore Installations

I.2 Submarine Pipelines

I.2.1 Submarine Pipeline (M)

A submarine or land pipeline is a pipeline lying on or buried under the seabed or the land. (S-57 Standard)

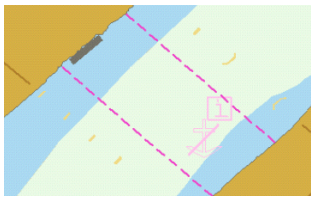
Graphics	Encoding Instructions	Object Encoding
Real World (pipeline sign)  *Chart Symbol* *IENC Symbolization (Pipeline with CTNARE buffer)* 	A) Pipeline features should be collected just inside the bankline to minimize clutter. B) Create CTNARE object buffering the pipeline 20 metres upstream and downstream of the pipeline. INFORM field of CTNARE must be populated with "Pipeline Buffer Zone" C) See Submarine Pipeline Area (J.2.2) for multiple pipelines. D) For water outfalls, use PIPSOL (P) with CATPIP = 2 (outfall), PRODCT = 3 (wtaer). No CTNARE required.	**Object Encoding** **Object Class =** PIPSOL(P, L) (O) CATPIP = [2 (outfall pipe), 3 (intake pipe), 4 (sewer), 6 (supply pipe)] (O) PRODCT = [1 (oil), 2 (gas), 3 (water), 7 (chemicals), 8 (drinking water)] (O) OBJNAM = [owner name] (M) SCAMIN = [60000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance) **Object Encoding** **Object Class =** CTNARE(A) (M) INFORM = ["Pipeline buffer zone"] (M) SCAMIN = [60000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

I - Offshore Installations

I.2 Submarine Pipelines

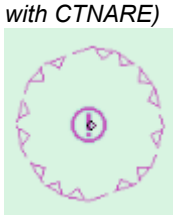
I.2.2 Submarine Pipeline Area (M)

An area containing more than one pipeline. (S-57 Standard)

Graphics	Encoding Instructions	Object Encoding
Chart Symbol  *IENC Symbolization* 	A) PIPARE generally should be used if; dFPLP/NP < 50, where dFPLP is distance between first pipe and last pipe in designated area, and NP is the number of pipes; cartographic judgment still should be applied for final analysis. B) Extend PIPARE 20 metres beyond first and last pipe; farther if uncertainty is greater. C) Use multiple values for CATPIP if various types are in the PIPARE.	**Object Encoding** **Object Class =** PIPARE(A) (O) CATPIP = [2 (outfall pipe), 3 (intake pipe), 4 (sewer), 6 (supply pipe)] (O) PRODCT = [1 (oil), 2 (gas), 3 (water), 7 (chemicals), 8 (drinking water)] (M) RESTRN = [1 (anchoring prohibited)] (O) OBJNAM = [owner name] (M) SCAMIN = [60000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

I.2.3 Water Intake (M)

A submarine pipeline lying on or beneath the riverbed or the land used for he intake of water into a facility.

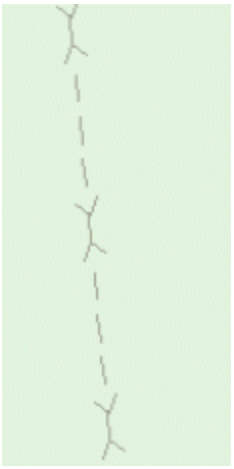
Graphics	Encoding Instructions	Object Encoding
Chart Symbol  *IENC Symbolization (intake with CTNARE)* 	A) Place point PIPSOL object near intake location if actual pipe (line) location is unknown. B) Place 20 metre diameter CTNARE around PIPSOL (P). INFORM field of CTNARE must be populated with "Submerged Utility" C) Due to the sensitive nature of intake locations, the PIPSOL object will later be removed from the dataset, leaving only the CTNARE around the location.	**Object Encoding** **Object Class =** PIPSOL(P) (M) CATPIP = [3 (intake pipe)] (M) PRODCT = [3 (water)] (O) OBJNAM = [owner name] (M) SCAMIN = [60000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance) **Object Encoding** **Object Class =** CTNARE(A) (M) INFORM = ["Submerged Utility"] (M) SCAMIN = [60000] (M) SORDAT = [YYYYMMDD] (M) SORDAT = [YYYYMMDD]

J - Tracks, Routes

J.1 Tracks, River Miles

J.1.1 Sailing Line / Recommended Track (M)

Recommended sailing route for all or certain vessels.

Graphics	Encoding Instructions	Object Encoding
Chart Symbol  *IENC Symbolization* 	A) Line should follow known safe and optimal route used by commercial vessels. If no such route is known, the deepest area within the channel, current patterns, and any obstructions to navigation should be considered. B) CATTRK always = 2 (not based on a system of fixed marks) ORIENT always = "Unknown" TRAFIC always = 4 (two-way) C) A second sailing line should be used only if needed for routing through an alternate lock, or around a lock, if warranted. If second sailing line is required, use OBJNAM to define "Primary Sailing Line" and "Secondary Sailing Line. D) Use INFORM to define conditions of use for Secondary Sailing Line. E) If secondary sailing line is required, use a SEAARE object for labeling the "Primary Sailing Line" and "Secondary Sailing Line".	**Object Encoding** **Object Class =** RECTRC(L) (M) CATTRK = [1 (based on a system of fixed marks), 2 (not based on a system of fixed marks)] (M) ORIENT = [Unknown] (M) TRAFIC = [4 (two-way)] (C) OBJNAM = (Refer to C) (C) INFORM = (Refer to D) (M) SCAMIN = [45000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance) **Conditional - Please refer to E** **Object Class =** SEAARE(P) (M) OBJNAM = (Refer to E) (M) SCAMIN = [45000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

J.1.2 River Miles (M)

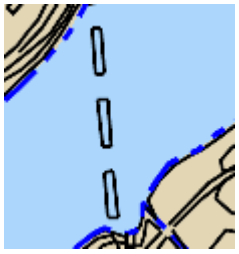
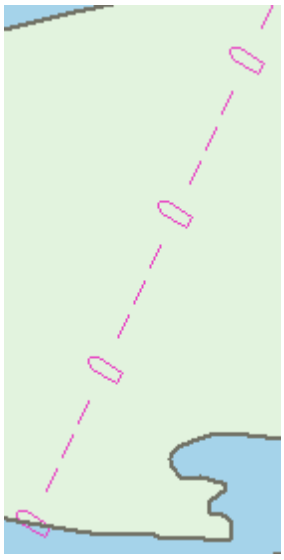
A distance mark indicates the distance measured from an origin and consists of a distinct location without special installation, used to serve as a reference along the waterway. (Adapted from S-57 Standard).

Graphics	Encoding Instructions	Object Encoding
Chart Symbol  *IENC Symbolization*  	A) Distance marks (river miles) should be along the recommended sailing line. Measurement between these DISMAR objects may not yield uniform or exact values, as they are used as a historic reference location. B) The point object placement should follow locations established by the Corps district or division for referencing all waterway engineering, construction, maintenance, and navigation activities C) Code the mile marker with the accepted integer value. D) The river mile marker is not a physical object, but it is a specific location established by the Corps.	**Object Encoding** **Object Class =** DISMAR(P) (M) CATDIS = [1 (distance mark not physically installed)] (M) INFORM = (Refer to C) (M) SCAMIN = [120000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

J.2 Ferries

J.2.1 Ferry Route (M)

A route in a body of water where a ferry crosses from one shoreline to another. In this specific case a ferry which may have routes that vary with weather, tide and traffic. (adapted from M-4) (Digital Geographic Information Working Group, Oct.87)
Cable ferries (either assisted by propulsion or not) are fixed to a cable. This cable is crossing the river either above or below water surface

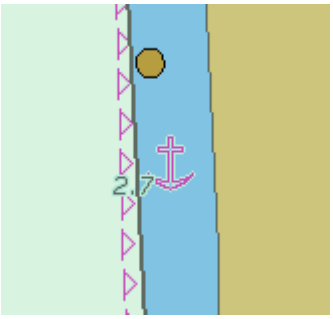
Graphics	Encoding Instructions	Object Encoding
Chart Symbol  *IENC Symbolization* 	A) Code the route that connects the docks, mooring facilities, or ramps used by the ferry. B) The route should be the path officially permitted by the relevant authority. If no such official designation exists, use the route typically used by the ferry vessel(s). C) Use STATUS if any of the conditions apply. D) Use TXTDSC to note any significant information regarding the operating season, schedule, or particular information about the ferry, to include whether it is used for a particular water level (high or low). E) For Cable Ferry, if cables are submerged, create a 20 metre buffer around cables and encode a CTNARE with an INFORM of "Submerged ferry cables"	**Object Encoding** **Object Class =** FERYRT(L) (M) CATFRY = [1 (free moving ferry), 2 (cable ferry)] (O) OBJNAM = [ferry name] (M) INFORM = [river mile], e.g. 300.2 (C) STATUS = [1 (permanent), 2 (occasional, seasonal), 4 (not in use)] (C) TXTDSC = (Refer to D) (M) SCAMIN = [60000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance) **Cable Ferry with submerged cables** **Object Class =** CTNARE(A) (M) INFORM = ["Submerged ferry cables"] (M) SCAMIN = [50000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

K - Areas, Limits

K.1 Anchorage and Fleeting Areas

K.1.1 Anchorage Area (M)

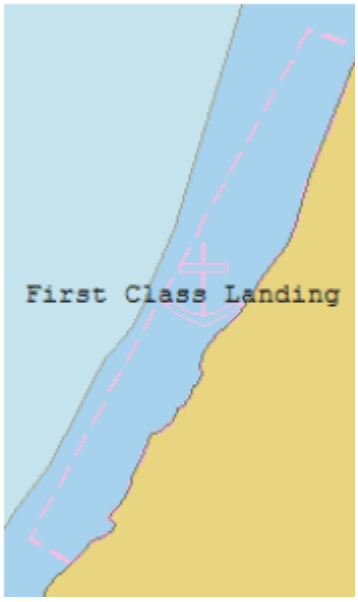
An area in which vessels anchor or may anchor. (IHO Dictionary, S-32, 5th Edition, 130)

Graphics	Encoding Instructions	Object Encoding
IENC Symbolization  	A) Where an anchorage may only be used for a limited period the duration should be indicated in INFORM.	**Object Encoding** **Object Class =** ACHARE(A) (M) CATACH = [1 (unrestricted anchorage), 9 (anchorage for periods up to 24 hours, 10 (anchorage for a limited period of time)] (C) INFORM = [additional information, e.g., limited duration of use, restrictions of the number, the kind or size of vessels] (M) SCAMIN = [45000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

K.1 Anchorage and Fleeting Areas

K.1.2 First & Second Class Landings (M)

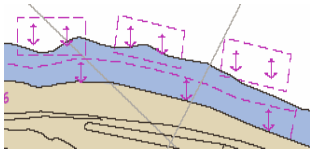
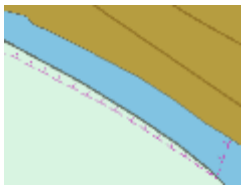
A designated area providing tie-ups for: at least 9 feet of water during lower water level (First Class Landing) or at least 9 feet of water during normal pool level (Second Class Landing).

Graphics	Encoding Instructions	Object Encoding
Chart Symbol (First Class Landing)  *IENC Symbolization (First Class Landing)*  	A) Linear extent of ACHARE object should be defined by markers on the bank. B) OBJNAM = "First Class Landing" or "Second Class Landing" in both ACHARE and SEAARE. C) First Class Landing, INFORM = "An area providing tie-ups and at least 9' of water during low water level". D) Second Class Landing, INFORM = "An area providing tie-ups and at least 9' of water during normal pool level"	**Object Encoding** **Object Class =** ACHARE(A) (M) CATACH = [10 (limited period of time)] (M) OBJNAM = (Refer to B) (M) INFORM = (Refer to C or D) (M) SCAMIN = [45000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance) **Object Encoding** **Object Class =** SEAARE(A) (M) OBJNAM = (Refer to B) (M) SCAMIN = [45000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

K.1 Anchorage and Fleeting Areas

K.1.3 Fleeting Area (M)

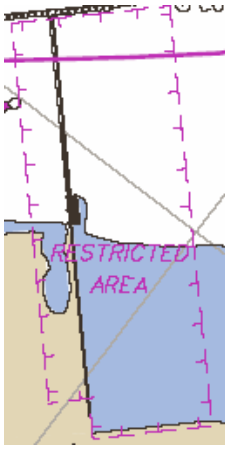
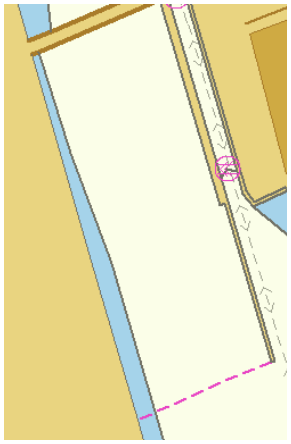
An area in or near the waterway designated for temporary barge mooring

Graphics	Encoding Instructions	Object Encoding
Real World (Fleeting Area)  *Chart Symbol (Fleeting Area)*  *IENC Symbolization* 	A) INFORM = "Fleeting Area" OBJNAM = Owner's name if known. B) Encode mooring facilities (cells, dolphins, buoys) within the fleeting area if applicable. C) If the width of fleeting area is not specifically known, use 110' (33.55m) (approximately three barge widths) to generate fleeting area out from shoreline.	**Object Encoding** **Object Class =** RESARE(A) (M) RESTRN = [8 (entry restricted)] (M) CATREA = [19 (waiting area)] (C) OBJNAM = [owner's name] (M) INFORM = ["Fleeting Area"] (M) SCAMIN = [45000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

K.2 Restricted Areas

K.2.1 Restricted Area (M)

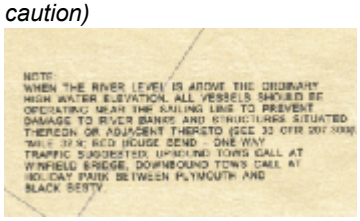
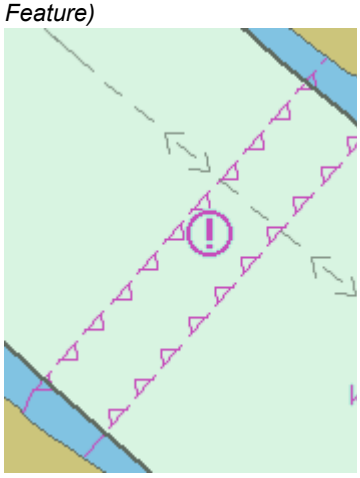
Area designated by the competent authority in which entry is prohibited or restricted to certain vessels, or certain transit rules apply. Restricted areas typically surround dams.

Graphics	Encoding Instructions	Object Encoding
Chart Symbol  *IENC Symbolization* 	A) Outline restricted area. The restricted area can be adjacent to the shoreline, but may not be overlapped. B) Use INFORM field for a brief description of restriction or TXTDSC if description is over 10 words.	**Object Encoding** **Object Class =** RESARE(A) (M) RESTRN = [7 (entry prohibited), 8 (entry restricted)] (M) CATREA = [4 (nature reserve), 9 (military area), 12 (navigational aid safety zone), 19 (waiting area)] (C) INFORM = (Refer to B) (M) TXTDSC = (Refer to B) (M) SCAMIN = [75000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

K.3 Caution Areas

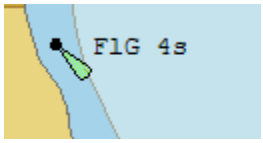
K.3.1 Caution Area (M)

An area in which entry may be dangerous to vessels or where certain precautions may apply.

Graphics	Encoding Instructions	Object Encoding
Chart Symbol (Note of caution)  *IENC Symbolization (Point Feature)*  *IENC Symbolization (Area Feature)* 	A) Outline of the CTNARE (A) can be adjacent to, but not overlap, the shoreline. B) Use CTNARE (P) objects for general chart notes which may impact safety of navigation. C) Use INFORM for notes or comments less than 10 words in length, otherwise use TXTDSC.	**Object Encoding** **Object Class =** CTNARE(P, A) (C) INFORM = (Refer to C) (C) TXTDSC = (Refer to C) (M) SCAMIN = [60000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

L.1.1 Minor Light (O)

A navigation light, which may or may not be included in the USCG Light List as a "private aid". As a minor light, the name will not be displayed. Minor lights include lights at locks and dams as well as lights used that may be used for aeronautical navigation.

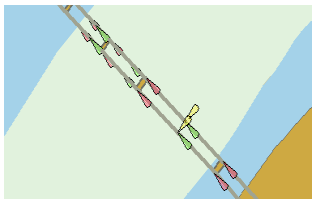
Graphics	Encoding Instructions	Object Encoding
Real World  *Chart Symbol*  *IENC Symbolization* 	A) PILPNT, MORFAC, or LNDMRK must be defined as the master object with LIGHTS as the slave object. If the supporting structure is not known, PILPNT must be used. B) OBJNAM should be placed on both the master and the LIGHTS object, unless master is PILPNT. C) When no specific signal group is provided, use SIGGRP=(). D) Western River Rules, RED will always be a double flash SIGGRP (2), and Green will always be a single flash (). E) STATUS = 8 (private) F) INFORM = descending bank; e.g. (LDB or RDB) G) If there are multiple lights in the same position, make one LIGHTS object and use MLTYLT to define the number of lights represented.	**Coding of Structure Object** **Object Class =** PILPNT(P) (M) SCAMIN = [60000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance) **Coding of Equipment Object** **Object Class =** LIGHTS(P) (M) COLOUR = [1 (white), 3 (red), 4 (green), 6 (yellow)] (M) LITCHR = [1 (fixed), 2 (flashing), 4 (quick-flashing), 7 (isophased)] (O) OBJNAM = ["Name" + (River Mile)] e.g. Dow Chemical (284.4) (C) SIGGRP = [(x),(x)…], e.g., (), (2), (2+1) (C) MLTYLT = (Refer to G) (M) INFORM = (Refer to F) (M) STATUS = [8 (private)] (M) SCAMIN = [60000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

L - Lights and Daymarks

L.1 Bridge & Private Lights

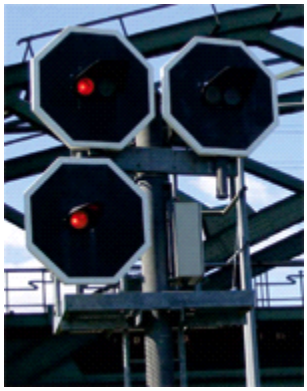
L.1.2 Bridge Light (M)

A navigation light positioned on a bridge span or support pier.

Graphics	Encoding Instructions	Object Encoding
Real World  *Chart Symbol*  *IENC Symbolization* 	A) Place the LIGHTS object on navigable span and piers bounding navigable span. No structure object is required, however the BRIDGE object should be designated as the master. B) Name of the light should be placed in the INFORM field. C) If there are multiple lights in the same position, make one LIGHTS object and use MLTYLT to define the number of lights represented. D) Use one LIGHTS feature to represent upper and lower deck lights, unless the two lights are used for navigation alignment.	**Object Encoding** **Object Class =** LIGHTS(P) (M) COLOUR = [1 (white), 3 (red), 4 (green), 6 (yellow)] (M) LITCHR = [1 (fixed), 2 (flashing), 4 (quick-flashing), 7 (isophased)] (C) SIGPER = [xx.x] e.g. "12" for 12 seconds (M) INFORM = [“Bridge Name” + (River Mile), e.g. Greenville Bridge Lt. (284.4)] (C) MLTYLT = (Integer number of lights, minimum 2) (M) SCAMIN = [60000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

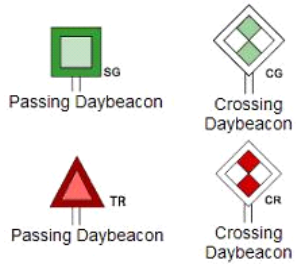
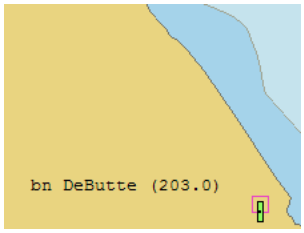
L.1.3 Lock Traffic Signal Station (O)

Place on shore from which signals are made for the control of vessels entering or leaving a lock.

Graphics	Encoding Instructions	Object Encoding
Real World  *Real World*  *Real World*  *IENC Symbolization* 	A) Use COMCHA for the specific radio frequency or frequencies. Separate multiple channels by semi-colon, e.g. 13;14. B) If the traffic signal station has an official name it has to be encoded with the object attribute OBJNAM. C) INFORM can be used to give unformatted text as additional information. For formatted text TXTDSC must be used.	**Coding of Structure Object** **Object Class =** PILPNT(P) (M) SCAMIN = [60000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance) **Coding of Equipment Object** **Object Class =** SISTAT(P) (M) CATSIT = [6 (lock)] (M) COMCHA = [[XXXX];[XXXX];...] (C) OBJNAM = (name and/or operator/owner) (O) INFORM = (additional information) (O) TXTDSC = (please refer to C) (M) SCAMIN = [60000] (C) SORDAT = [YYYYMMDD] (C) SORIND = (Refer to Section B, General Guidance)

L.2.1 USCG Lights & Daybeacons (M)

Day marks are used to code passing and crossing day beacons on the inland river system.

Graphics	Encoding Instructions	Object Encoding
Real World  *Chart Symbol*  *IENC Symbolization*  	A) BCNLAT must be defined as the master object, with DAYMAR and LIGHTS (if present) as the slave objects. If aid has no lateral significance (e.g. colour = yellow), BCNSPP may be used as the master. B) Descending bank/ COLOUR/ CATLAM attributes must be used in the following combinations: LDB / 3 (red)/ 2 (starboard hand lateral mark) RDB / 4 (green)/ 3 (port hand lateral mark) C) COLOUR of BCNLAT = "Unknown", unless lateral beacon colored. D) Use BCNSHP = 5 (pile beacon); a long heavy timber or section of steel, wood, or concrete to serve as an aid to navigation or as the support for an aid to navigation, unless on tower. E) OBJNAM should be the name designated by the US Coast Guard Light List followed by the river mile, e.g. Debutte Light and Daybeacons (233.4). F) For LIGHTS and BCNLAT objects use INFORM to denote the descending bank, e.g. LDB, RDB. G) For DAYMAR objects use INFORM to denote the USCG structure, e.g. TR(U), TR(D) or CG (U), etc. H) Code two DAYMAR objects at the same location only if a separate type of mark is used for up and down-bound traffic, e.g. TR(U), CR(D). I) For daybeacons that have a specific color pattern, as with a crossing daybeacon, COLPAT should be used.	**Coding of Structure Object** **Object Class =** BCNLAT(P) (M) BCNSHP = [3 (beacon tower), 5 (pile beacon)] (M) CATLAM = [1 (port-hand lateral mark), 2 (starboard-hand lateral mark)] (M) COLOUR = ["Unknown", 3 (red), 4 (green)] (M) OBJNAM = (Refer to D) (M) INFORM = (Refer to E) (M) SCAMIN = [60000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance) **Coding of Equipment Object (Light)** **Object Class =** LIGHTS(P) (M) COLOUR = [1 (white), 3 (red), 4 (green), 6 (yellow)] (M) LITCHR = [1 (fixed), 2 (flashing), 4 (quick-flashing), 7 (isophased)] (C) SIGPER = [xx] (e.g., signal period of 12 seconds coded as "12") (C) SIGGRP = [(xx)] (e.g. (), (2), (2+1) (M) OBJNAM = (Refer to E) (C) INFORM = (Refer to F) (M) SCAMIN = [60000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance) **Coding of Equipment Object (Daybeacon)** **Object Class =** DAYMAR(P) (M) COLOUR = [1 (white), 3 (red), 4 (green), 6 (yellow)] (M) TOPSHP = [12 (rhombus (diamond)), 19 (square), 24 (triangle point up)] (C) COLPAT = (Refer to I) (M) OBJNAM = (Refer to E)

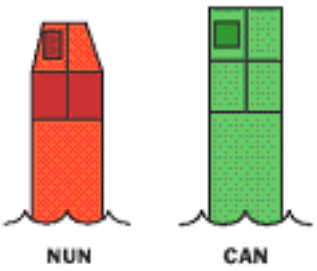
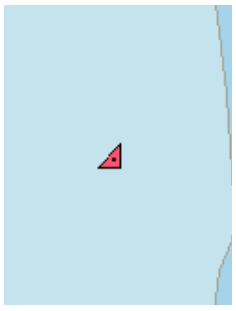
	J) Crossing daybeacons consist of two colors (red/white for beacons on the left descending bank (LDB) and green/white for the right descending bank (RDB), use COLOUR to denote multiple colors of the daybeacons, e.g. COLOUR = 1,3.	(M) INFORM = (Refer to G) (M) SCAMIN = [60000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

M - Buoys

M.1 Buoys

M.1.1 Lateral Buoy (C)

Lateral buoys are used to mark the direction or limits of the navigation channel.

Graphics	Encoding Instructions	Object Encoding
Real World (Can)  *Real World (Nun)*  *Chart Symbol*  *IENC Symbolization (Nun)* 	A) Place buoy at location indicated by the USCG or surveyed by the Corps, if Corps has been approved by USCG for locating buoys. B) Buoys used on the inland system generally are not uniquely named or identified; if a buoy has a name, OBJNAM field should be populated. C) With a few exceptions, current IENC production rules do not require buoy collection and exclude buoy placement in the IENC. D) BOYSHP/CATLAM/COLOUR attributes must be used in the following combinations: 1 (nun)/starboard-hand lateral mark/red 2 (can)/port-hand lateral mark/green E) Use INFORM to note the river tender or vessel used to place/set buoy, if known. F) For lighted lateral buoys, encode LIGHTS object as in Minor Light (M.1.1) with BOYLAT as the master (structure) object.	**Object Encoding** **Object Class =** BOYLAT(P) (M) BOYSHP = [1 (nun), 2 (can)] (M) CATLAM = [1 (port-hand lateral mark), 2 (starboard-hand lateral mark)] (M) COLOUR = [3 (red), 4 (green)] (O) OBJNAM = (Refer to B) (O) INFORM = (Refer to E) (M) SCAMIN = [60000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

M.1 Buoys

M.1.2 Buoy Marking Danger Point (M)

Buoys to indicate the presence of potentially dangerous obstructions such as groins or wrecks.

Graphics	Encoding Instructions	Object Encoding
Real World  *IENC Symbolization* 	A) If the buoy has a name, OBJNAM field should be populated, else OBJNAM should state that it's a wreck buoy followed by the river mile, e.g. Wreck Buoy (233.4). B) Use INFORM to note the river tender or vessel used to place/set buoy C) For lighted special purpose buoys, encode LIGHTS object as in Minor Light (M.1.1) with BOYSPP as the master (structure) object.	**Object Encoding** **Object Class =** BOYSPP(P) (M) BOYSHP = [1 (nun), 2 (can)] (M) CATSPM = [45 (foul ground mark)] (M) COLOUR = [3 (red), 4 (green)] (O) OBJNAM = (Refer to A) (O) INFORM = (Refer to B) (M) SCAMIN = [60000] (M) SORDAT = [YYYYMMDD] (M) SORIND = (Refer to Section B, General Guidance)

N - Abbreviations

Co.	Company
Corp.	Corporation
Dbn	Daybeacon
ECDIS	Electronic Chart Display and Information Systems
Hwy	Highway
IENC	Inland Electronic Navigational Chart
IHO	International Hydrographic Organisation
I-xx	Interstate, where xx equals interstate number
JPEG or JPG	stanndardized image file formate of the Joint Photographic Expert Group
LDB	Left Descending Bank
Ldg	Landing
LL	Light List number
Lt	Light
No	Number
RDB	Right Descending Bank
RR	Railway, railroad
SOTE	Skin of the Earth, (Group 1 features)
TIFF or TIF	Tagged Image File Format
USACE	US Army Corps of Engineers
VHF	Very High Frequency Radio

Bridges	Hwy,RR/Bridge Name Bridge (e.g.,Kansas City Southern RR Swing Bridge)
Cities and Towns	St. Louis, MO Vicksburg, MS
Interstates/Highways	I-90 Hwy 20
Railways	Kansas City Southern RR Union Pacific RR

P - Record of Changes

Section | Page | Proposed By	Change Made | Reason | Status