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ENC Contours and Safe Navigational Practices

By Bren Wade

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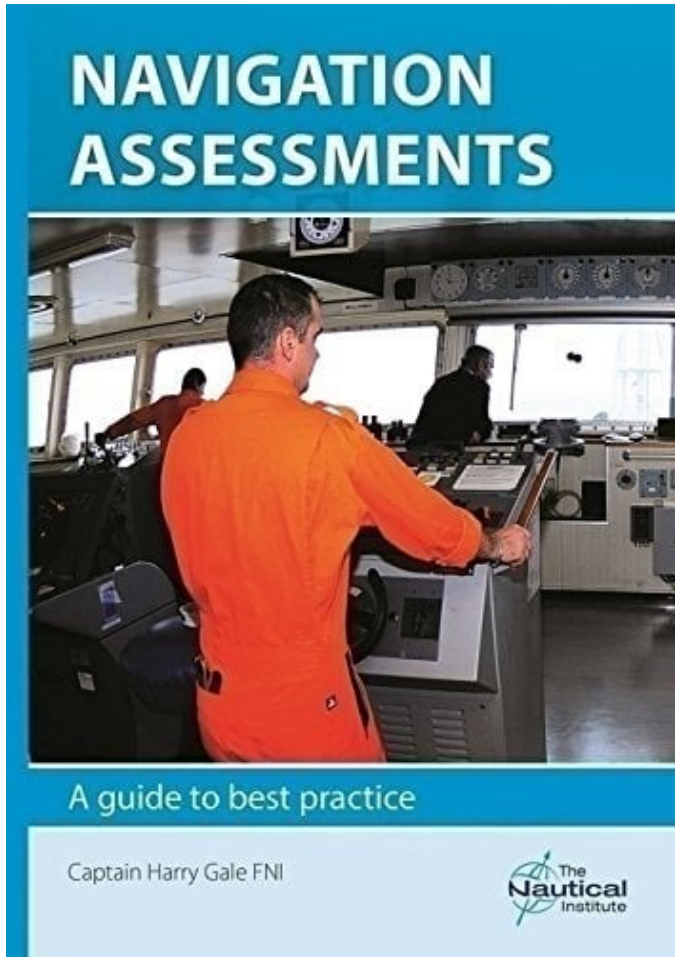
Not a Hydrographic Expert



BREN WADE - BACKGROUND

USMMA BS Marine Transportation

Webster University MBA

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Master of Towing

USCG Qualified Assessor & Designated Examiner

Nautical Institute Navigation Assessor & Associate Fellow

10 yrs exp Navigation assessments & Audits

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“A workaround is an intentional adaptation, improvisation or change to an existing work system in order to overcome established policies that are perceived as preventing that work system from achieving a desired goal”

From The Theory of Workarounds by Steven Alter

Intent of Contours

- **Original Purpose**: On a paper chart, water depths may be connected with a line known as a depth contour, similar to the topographic lines or surface features that you see on a map. Depth contours *present a picture of the bottom to the mariner.*

- **Current Purpose:** Contour lines on a ENC chart are set by the user to indicate where the vessel at her present draft can, shouldn't or can't go.

Typical Crowley coastal tanker

Average draft in ballast 8.0m to 8.5m, average loaded draft 10.7-12.0m

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Defining Contours

Shallow Contour: Depth at which vessel will certainly ground. Generally, the sum of the vessel's deep draft and predicted squat.

- For the example tanker draft of 11.0m + 0.7m squat = 11.7m

Safety Contour: Intended to mark the boundary of guaranteed safe water for the vessel, meaning if the vessel remains outside of the safety contour, they have no worries about grounding. Should be a greater number than the shallow contour. Generally Deep draft plus squat plus required under keel clearance (UKCr). Crowley tankers, for example) are generally required to carry a minimum UCKr of 2.0 ft for a port transit.

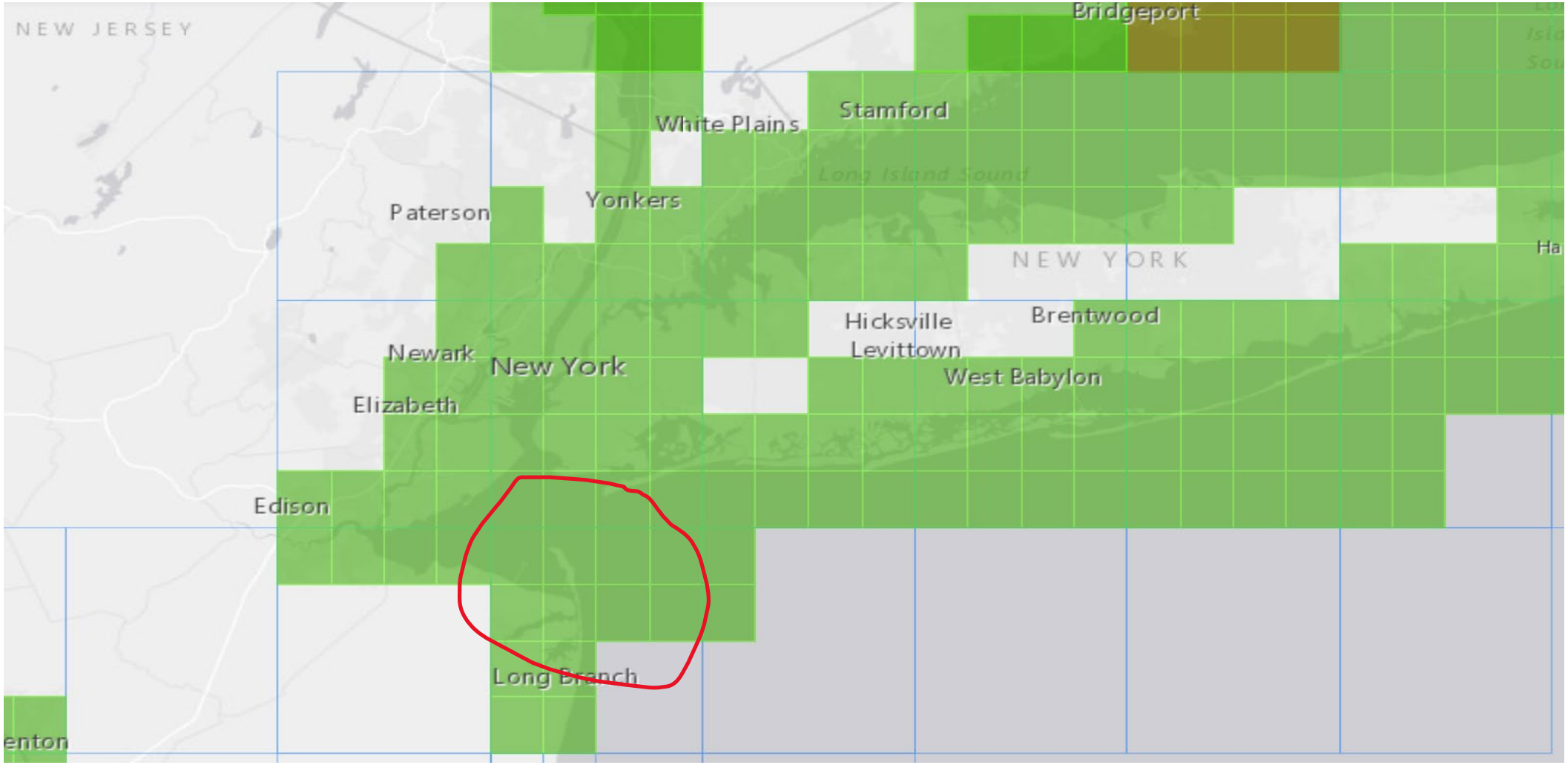
- Sample tanker: draft 11.0m + squat 0.5m + UKCr 0.6m = 12.1m

Deep Contour: This contour choice does not directly affect safe navigation and can be used as best suits the navigator. At Crowley, this contour is set (in theory) to differentiate between the depth at which the vessel might experience squat effect and the depth at which she would not.

Depth Contours Derived from US Charts in feet & fathoms

Table 1. Depth Contours in ENC				
Native contours on International charts	*Native contours on US charts*	*Converted to meters*	*Truncated values used in US ENC*	*How ECS interpret US contours in feet*
m	ft	m	m	ft
0	0	0.000	0.0	0.0
5	6	1.829	1.8	5.9
10	12	3.658	3.6	11.8
20	18	5.486	5.4	17.7
30	24	7.315	7.3	24.0
40	30	9.144	9.1	29.9
50	60	18.288	18.2	59.7
60	120	36.576	36.5	119.8
70	180	54.864	54.8	179.8

Areas of New Standard Metric Depth Contour Intervals



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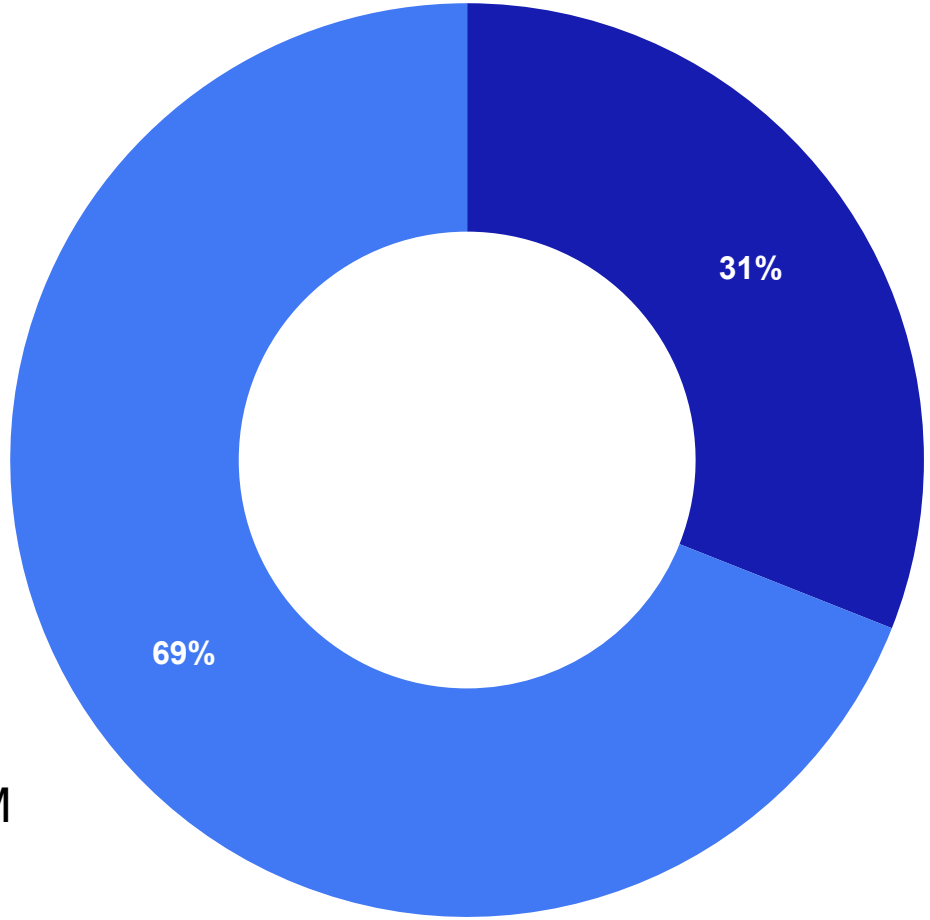
New Standard Metric Depth Contour Intervals

Usage Band	Navigational Purpose	Compilation Scale	Depth Contours (meters)
1	Overview	5,760,000	100 200 300 400 500 ...
		2,560,000	50 100 150 200 300 400 500 ...
2	General	1,280,000	50 100 150 200 300 400 500 ...
		640,000	20 50 100 150 200 300 400 500 ...
3	Coastal	320,000	20 30 50 100 150 200 300 400 500 ...
		160,000	10 20 30 50 100 150 200 300 400 500 ...
4	Approach	80,000	5 10 15 20 30 50 100 150 200 300 400 500 ...
		40,000	2 5 10 15 20 30 50 100 150 200 300 400 500 ...
5	Harbor	20,000	2 5 10 15 20 30 50 100 150 200 300 400 500 ...
		10,000	2 3 4 5 6 7 8 10 15 20 30 50 100 150 200 300 400 500 ...
6	Berthing	5,000	2 3 4 5 6 7 8 10 15 20 30 50 100 150 200 300 400 500 ...

2020 US Army Corps of Engineers Port Data

Out of 73,000 sailings from US ports in 2020, 31% of vessels had a deep draft greater than 10m.



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Scotland Light to Sandy Hook NJ ENC on RosePoint ECS
Sample tanker with 11.0m draft, contours set at:

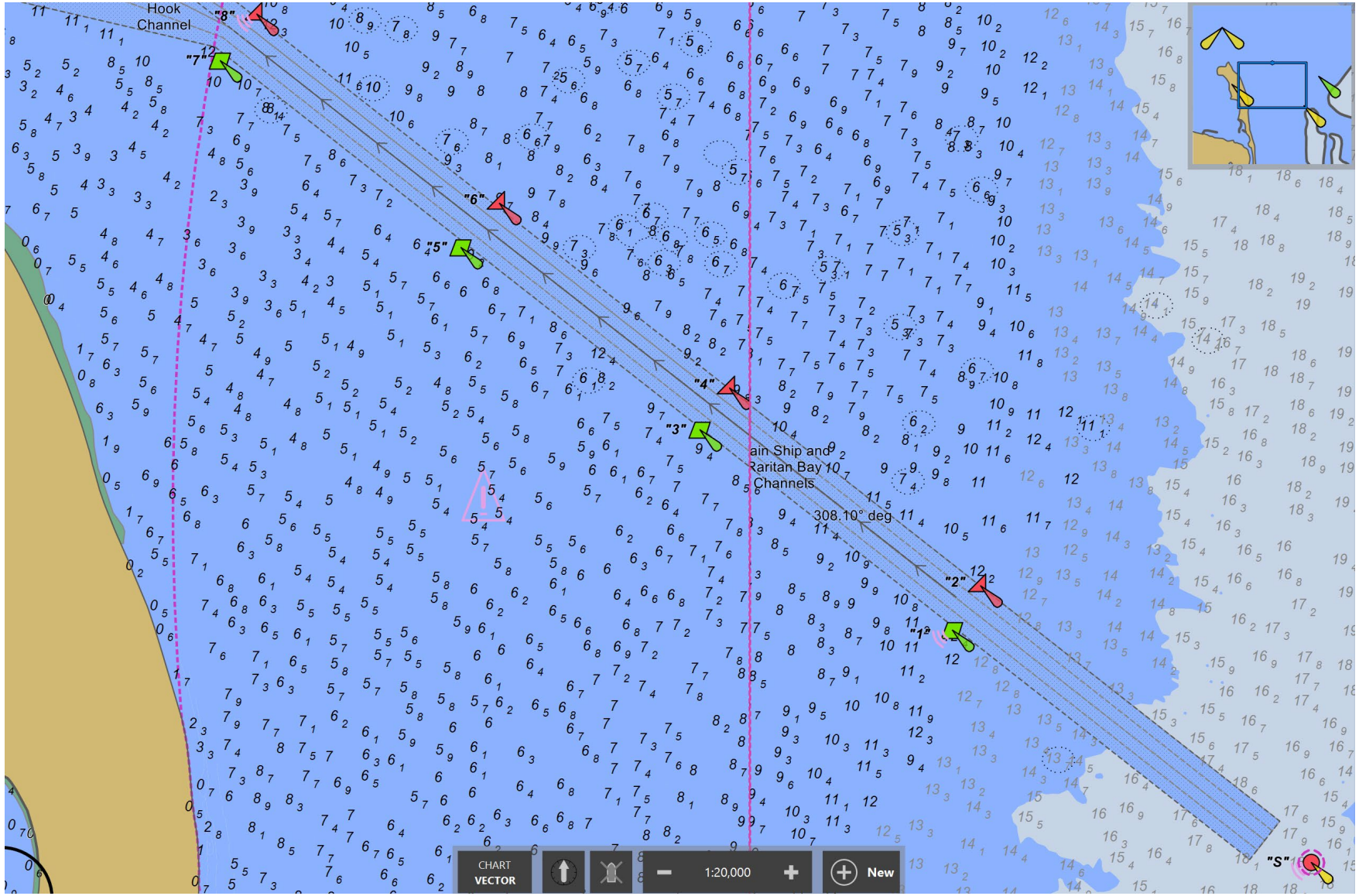
Shallow Contour – 12.0m

Safety Contour – 13.0m

Deep Contour – 24.0m

Contour settings per industry standard recommendations. No 1/10th meters.

Channel depth: 11.7m,
Tide: high at 1.7m



Raritan Bay, NY ENC on RosePoint ECS
11.0m draft, contours set at:

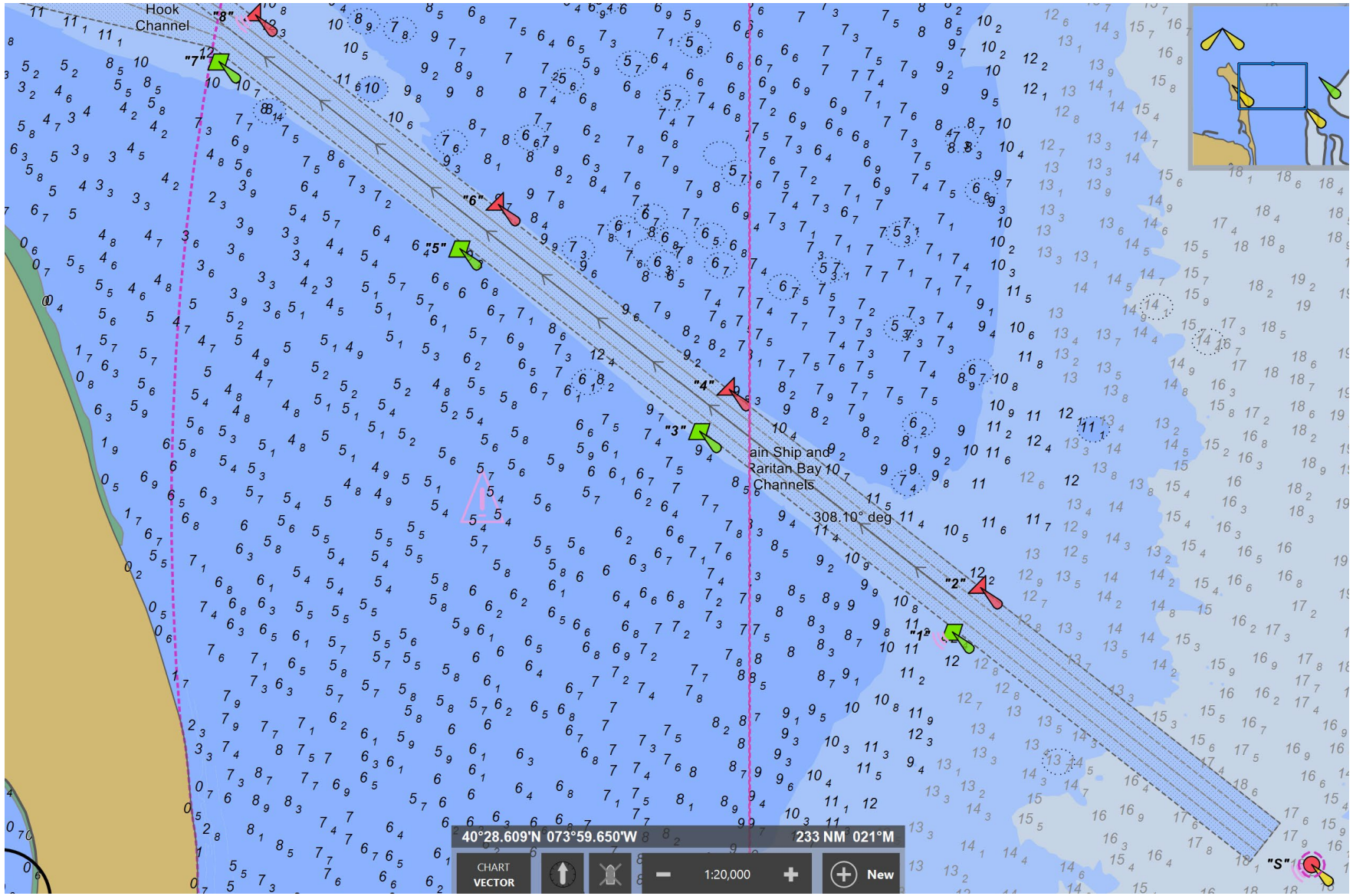
Shallow Contour – 9.0m

Safety Contour – 12.0m

Deep Contour – 24.0m

Channel depth: 11.7m,
Tide: high at 1.7m

Contour setting ‘gamed’
In order to see differentiation between channel and sounding water



NEW LA/LB Band 6 Hi-Def ENC on RosePoint ECS 11.0m draft, contours set at:

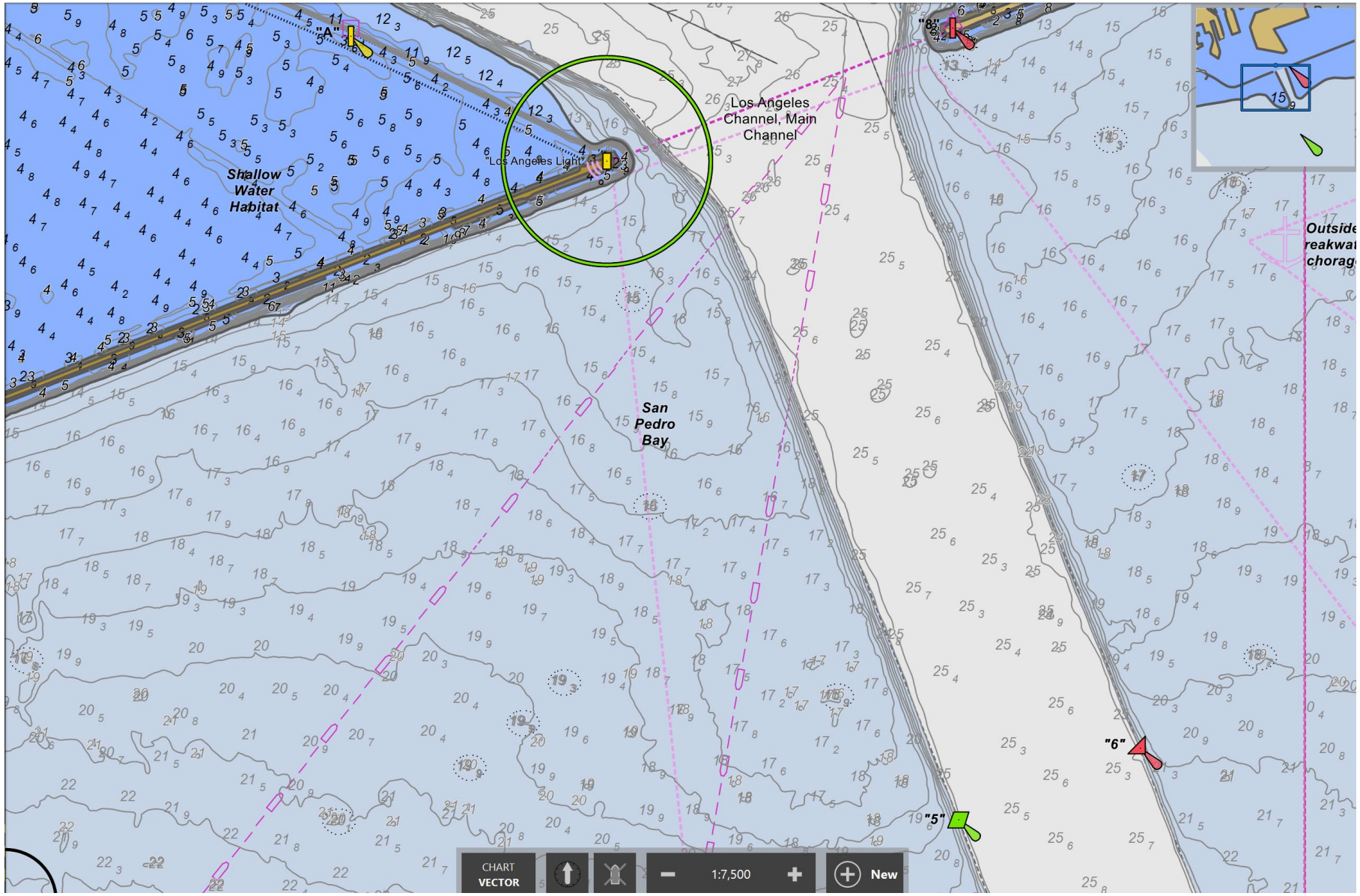
Shallow Contour – 9.0m

Safety Contour – 12.0m

Deep Contour – 24.0m

Channel depth: 25m,

Contour setting ‘gamed’ In order to see differentiation between channel and sounding water



Conclusion

There needs to be a minimum granularity of 1m for contours in the 10m to 20m range and some way to account for the height of the tide. A large percentage of deep-draft cargo vessels operate in this range of drafts. If they follow established industry standards for setting contours, key safety of navigation features become unusable.

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Thank you

For questions, contact

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