Piloting 20,000 TEU Container Vessel via Tong Gu Channel

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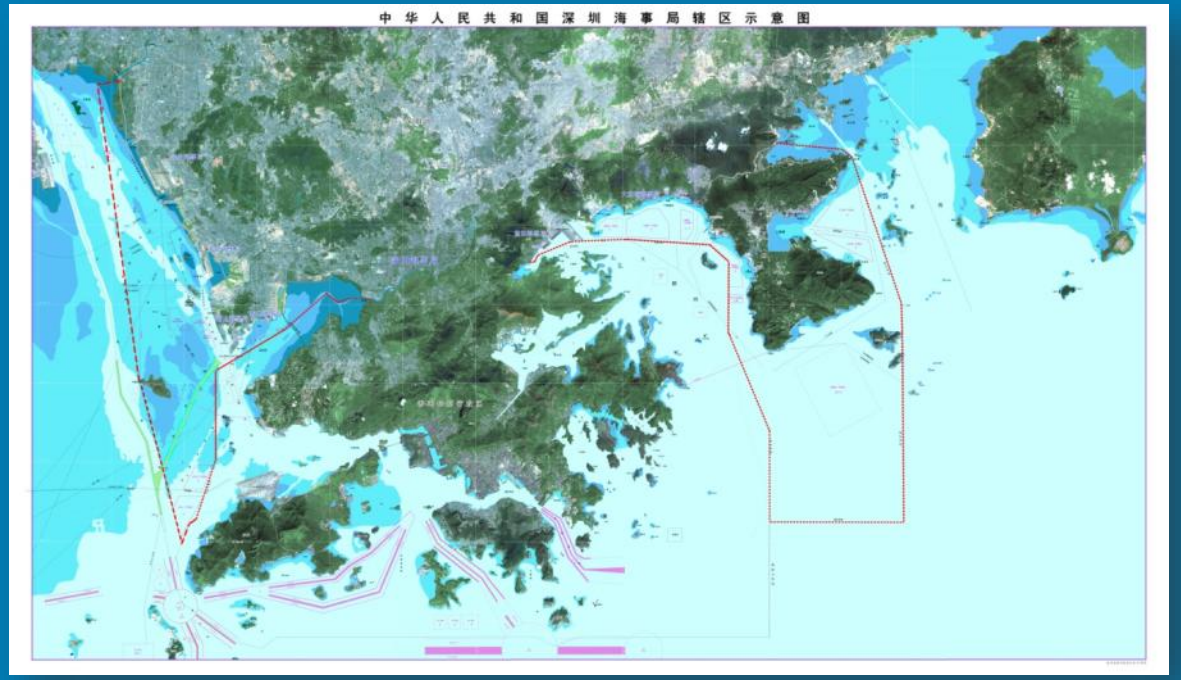
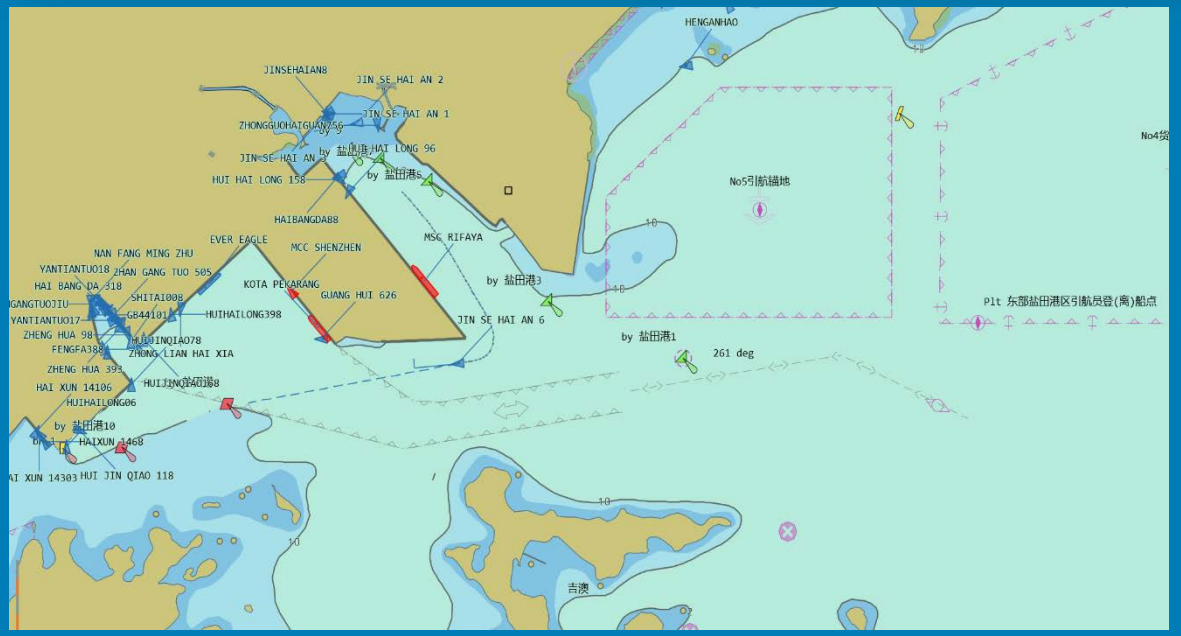
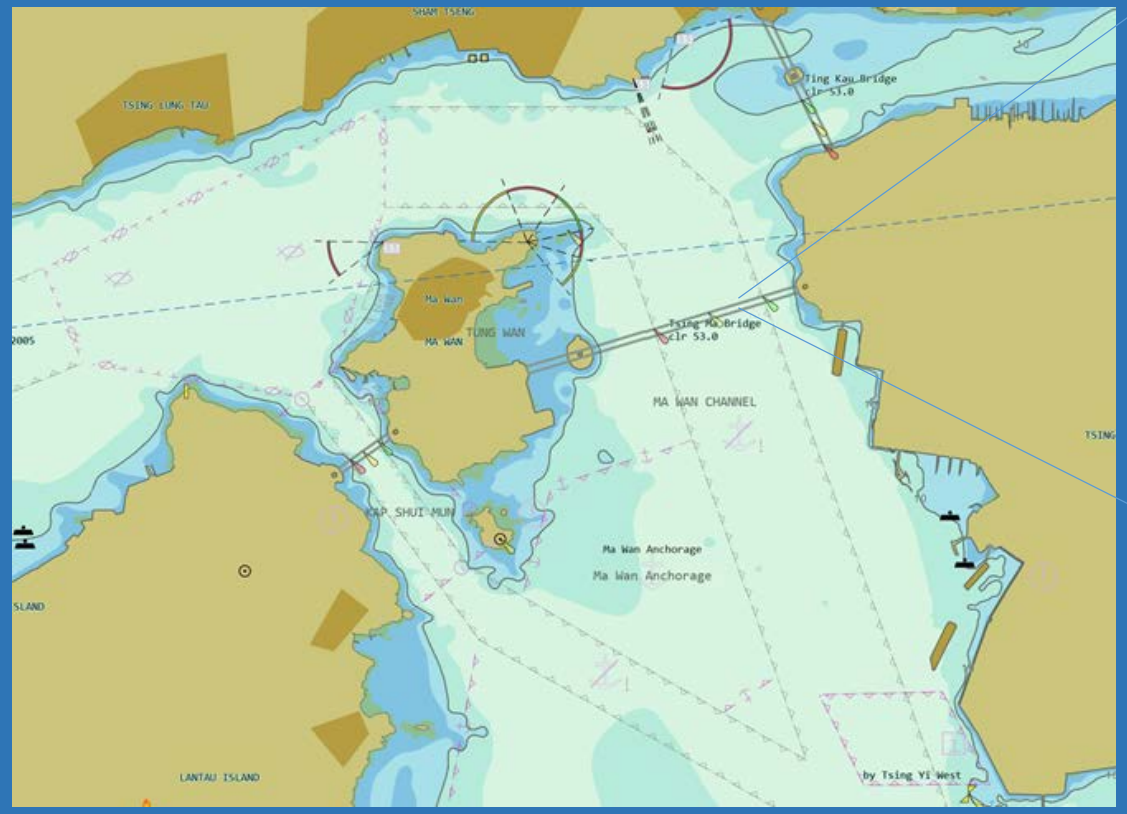
Port of Shenzhen is composed of two port groups in the East and the West.

The Eastern port Yantian is a natural seaport with no restrictions for 20,000 TEU Container Vessel.



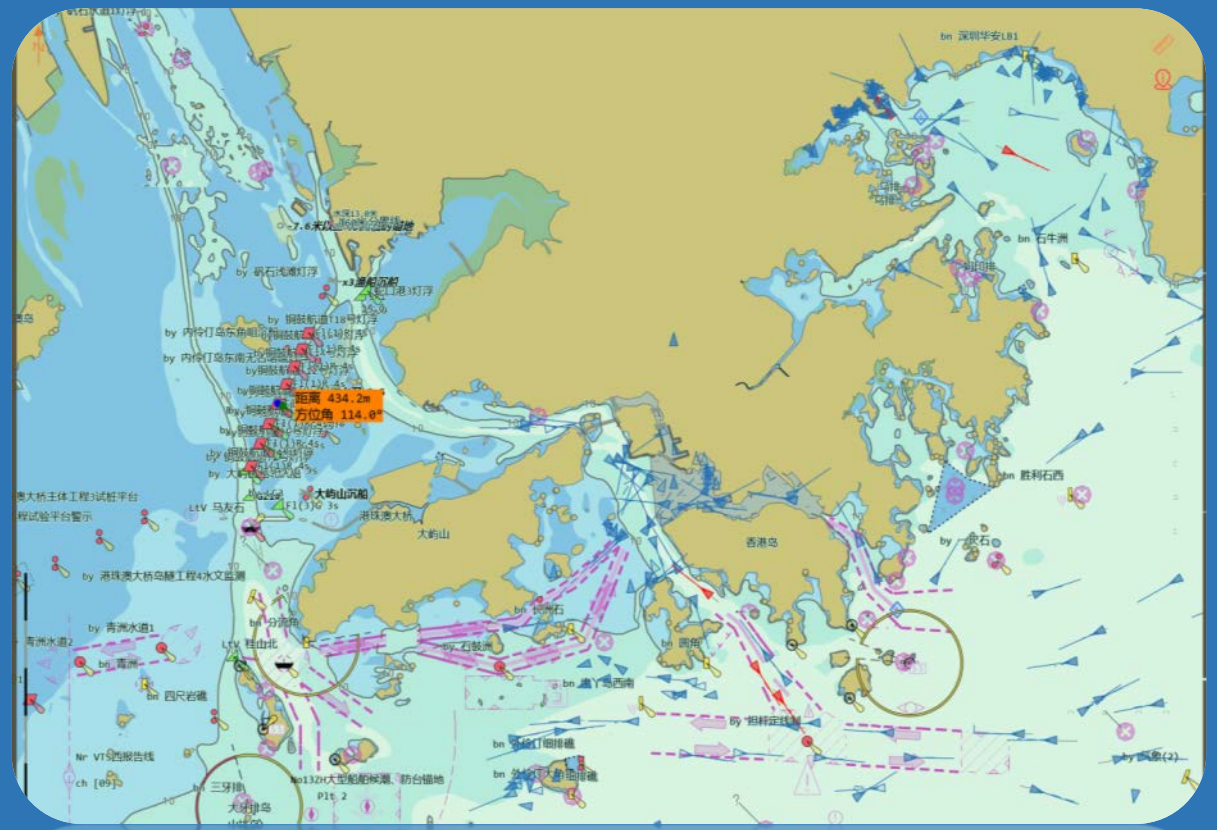


20,000TEU Container Vessel can only approach the Western Port of Shenzhen via Tong Gu Channel



Ma Wan Channel

Tsing Ma Bridge: Air draft limitation- 53.0m


距离 434.2m
方位角 114.0°

待泊
道7
水深160米
M1-M5分界线
水深15.8米
bn 赤湾港引导灯桩后(有)
船锚地
bn 赤湾港引导灯桩前
公共航道5
1335 deg
338 deg
货船锚地
329 deg
by 公共航道3
by 蛇口港5灯浮
x3渔船沉船
by 公共航道1
浅滩灯浮
by 公共航道2
sk1
CP11
航道T23灯浮

Part 1

Maneuvering Characteristics

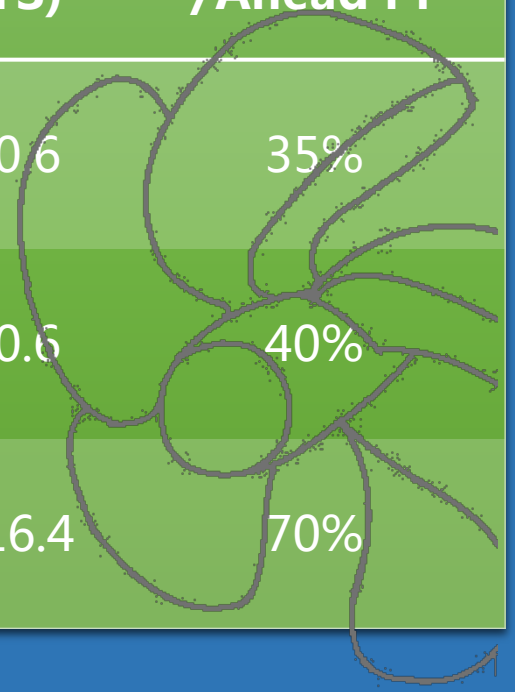
Types of main engine & Maneuverability

Type A: Double main engine and double rudder, flexible maneuverability Refer to Triple-E Class, mainly by Maersk Line;

Type B: Single main engine with relatively high horsepower.

Type C: Single main engine with relatively small horsepower.
(Very economic)
(It is what we are most concerned about)

	Vessel	LOA	Breadth	ME Max. HP(KW)	Harbor Spd(KTS)	Astern Pr /Ahead Pr
1	EVER GOODS	399.98	58.8	53370	6.2 – 10.6	35%
2	TOKYO TRUMPH	365.94	51.2	48911	6.4 – 10.6	40%
3	CSCL NEPTUNE	366.1	51.2	69493	10.0 – 16.4	70%



TOKYO TRUMPH, about 5000 KW <EVER GOODS < about 16000 KW, CSCL NEPTUNE.

Astern power: 35% of ahead power.

Total 14 x 20,000 TEU Container Vessels called at Western Port of Shenzhen since 2018;

10 are economic type and mainly by EVER GREEN CO.

Only 3 Indicator devices on bridge wing, some ships even not installed.

The difficulty in changing or steadying course at low speed

Limited navigable width

Poor manoeuver ability

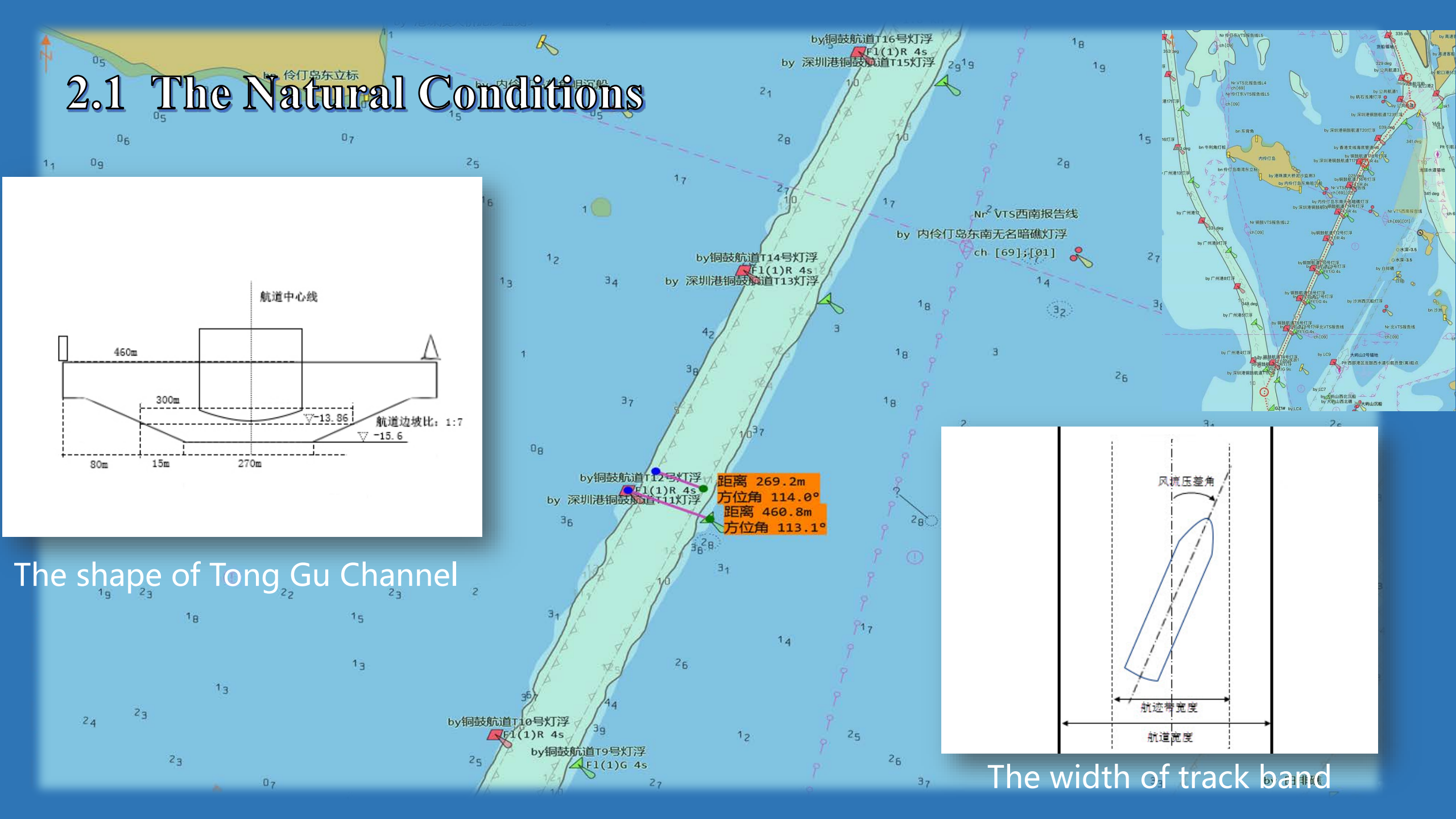
Drift by wind and tide

Part 2

Management & Operations

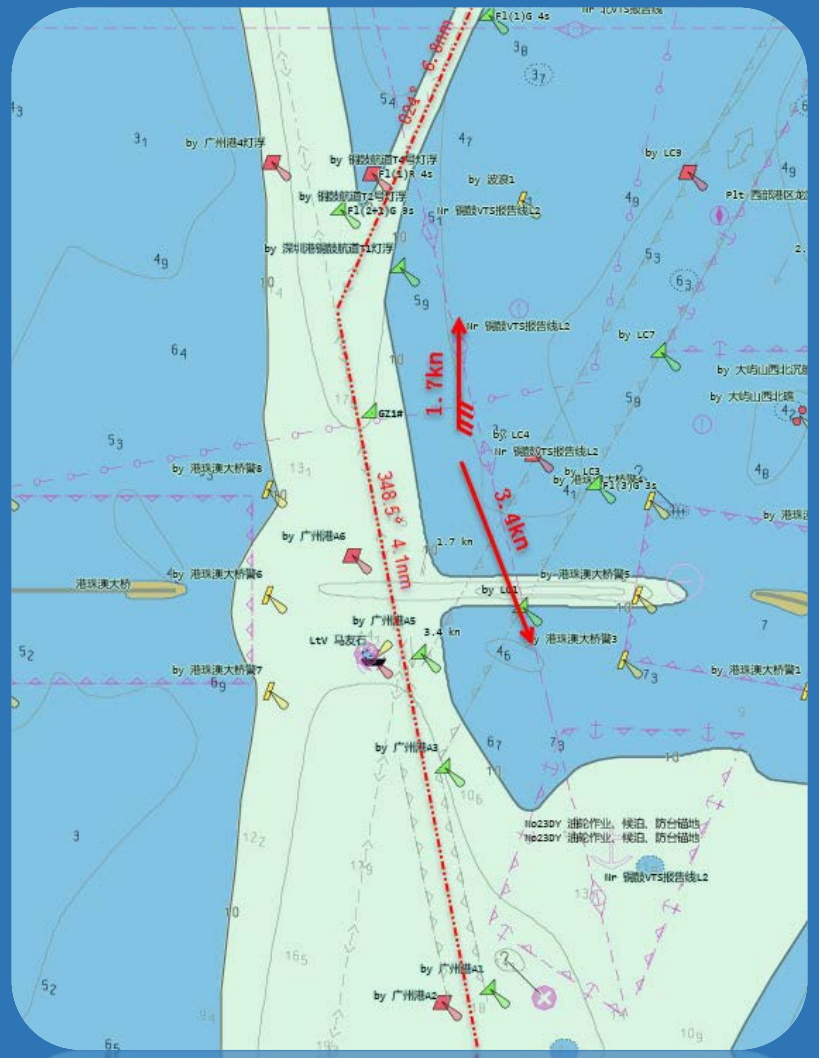
2.1 The Natural Conditions

The shape of Tong Gu Channel



The width of track band

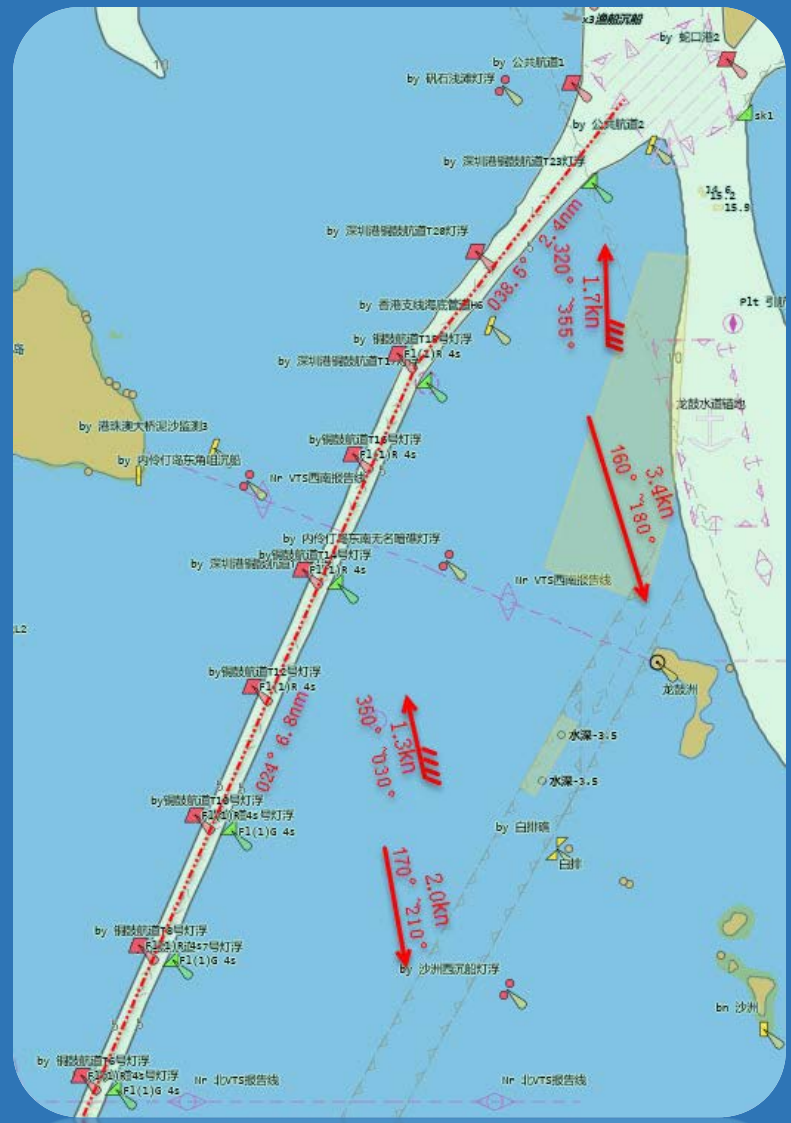
Tidal Analysis Diagram



Southern section:
Flood tide:
Set to N, Max. drift: 1.7kts,
Ebb tide:
Set to E by S, Max. drift: 3.4kts;

Middle section:
Flood tide:
Set: 350°- 030°, Max. drift: 1.3kts,
Ebb tide:
Set: 170°- 210°, Max. drift: 2.0kts

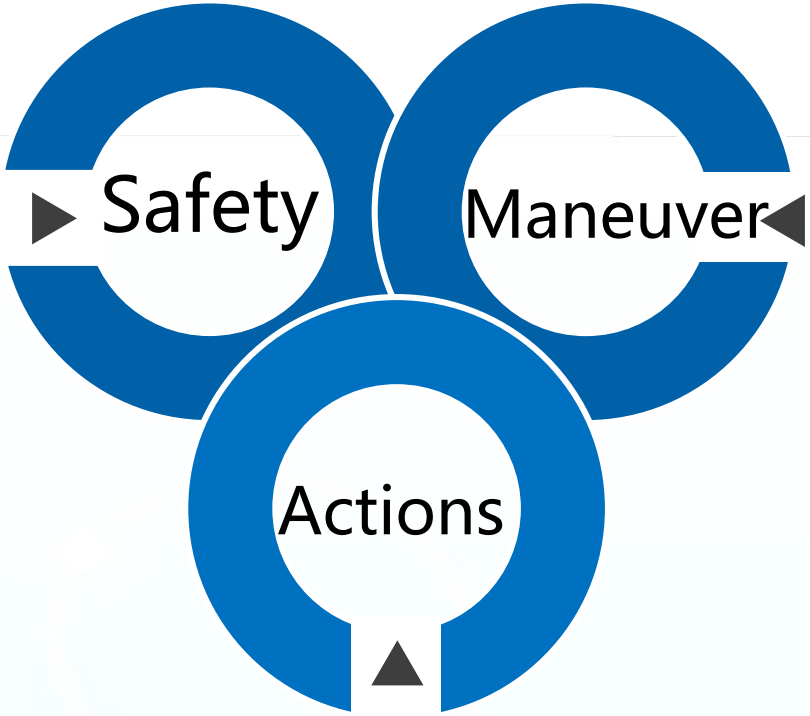
Northern section,
Flood tide :
Set: 320°-355°, Max. drift: 1.7kts
E bb tide :
Set: 160° - 180°, Max. drift: 3.4kts



Factors need to be considered in maneuvering 20,000 TEU container vessels

Human Factors

(Knowledge, experience, skill etc.)



Vessel Factors

(Loading condition, speed, reliability)

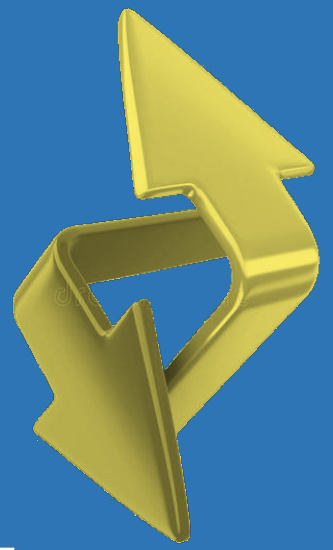
Environmental Factors

(Wind and tide)

2.2 Management By the MSA

Safety Concerns:

The two sections are affected by cross tidal stream.



The traffic situation near the intersection is complex and risk of collision is high

Radar Blind Zone: Not fully cover the southern intersection

1. Apply for permission: 24hrs in advance
2. UKC： Not less than 15%

3. One-way navigation, overtaking is not permitted
4. Interval: Same way-1.0hrs; Opposite way-1.5hrs

5. Patrol boat and escort tug: DWT80000 and above
6. Wind Force: 7 or below

7. Visibility: 1000m and above, from sunrise to sunset
8. Tide: Ebb tide: 2kts or below; Flood tide: 1.5kts or below

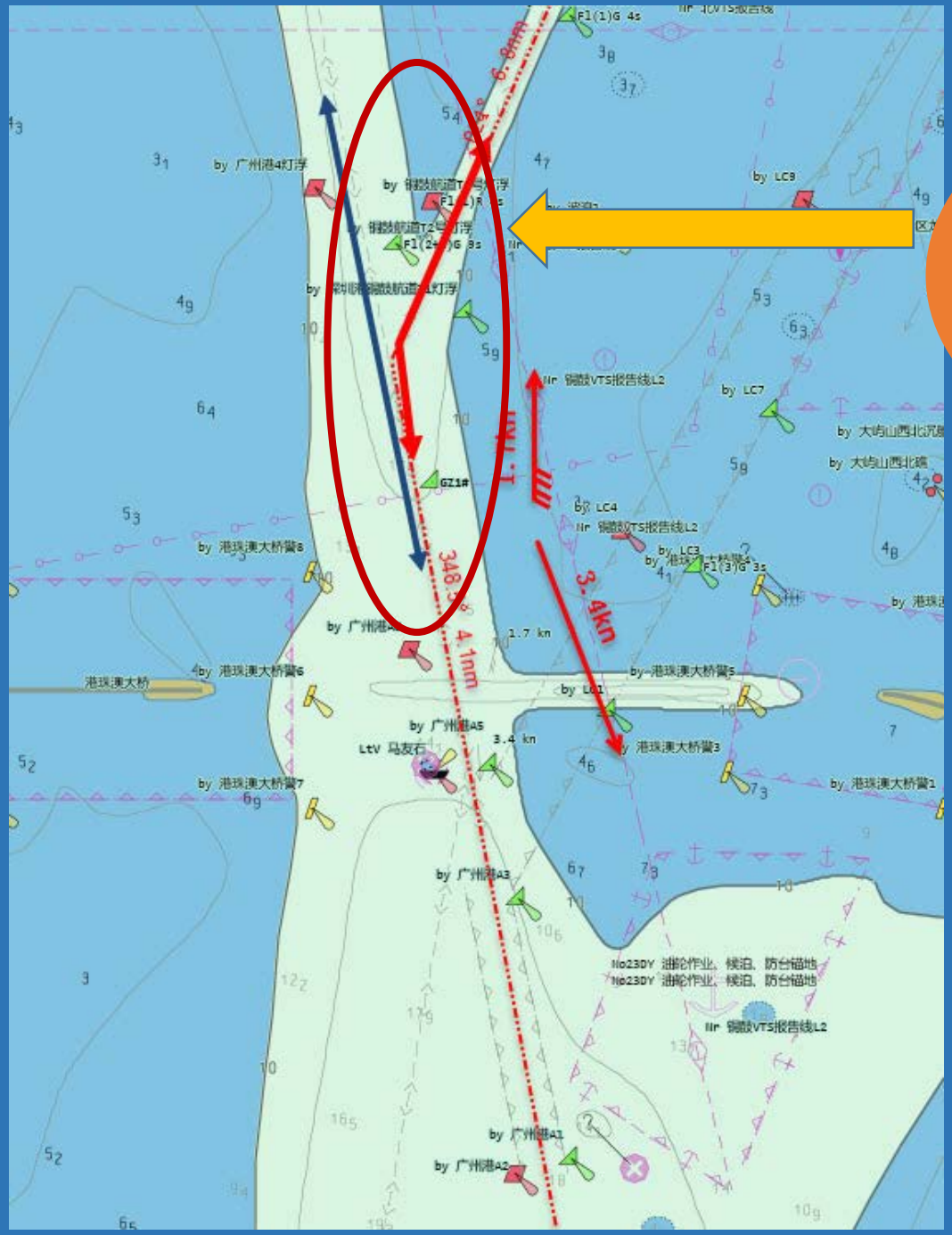
2.3 Operations

Pilotage Plan

Double pilots

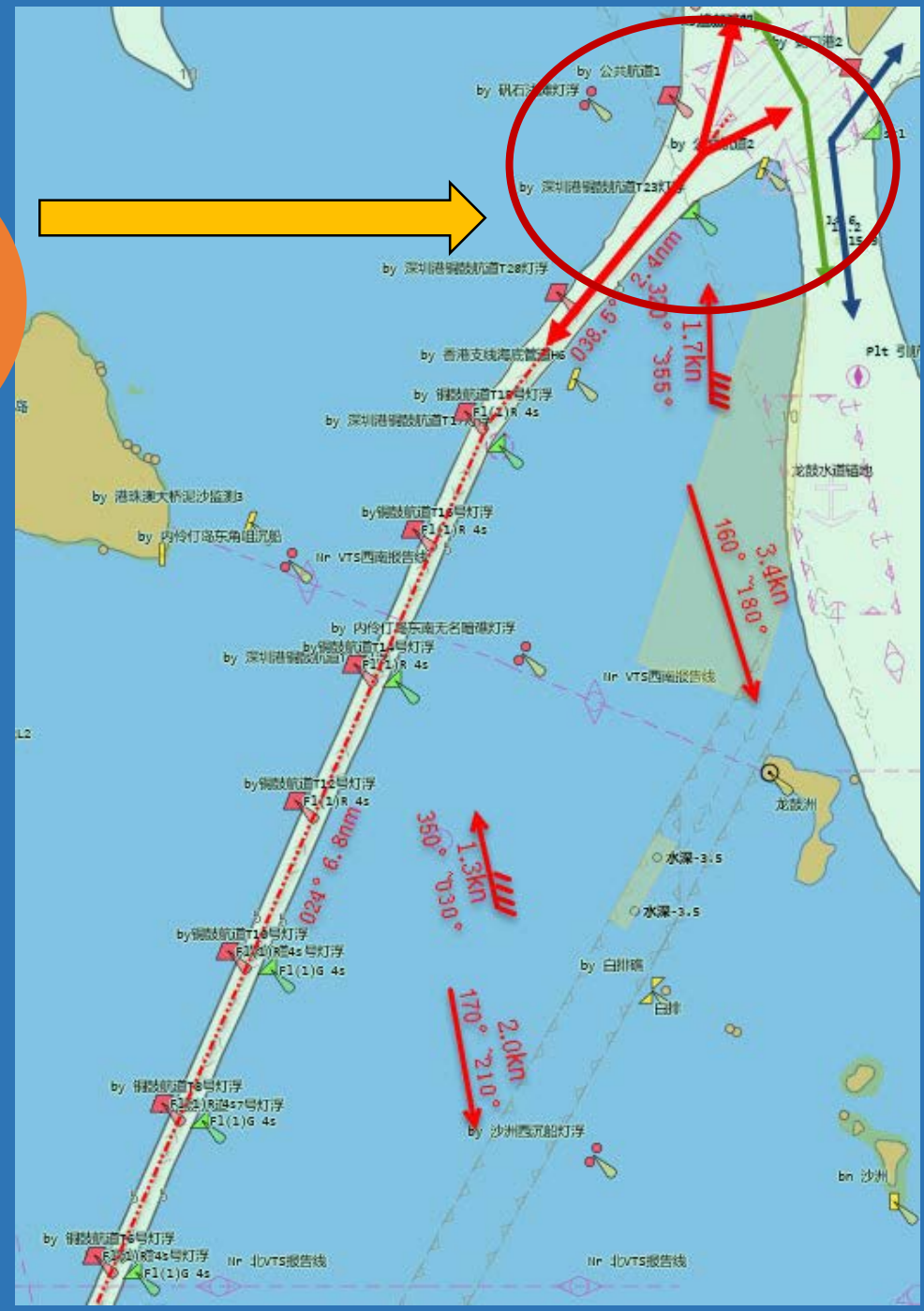
Three tugs are required to assist in berthing

Vessel Entering/Leaving



348.5°
4.1nm
1.7kn
3.4kn

Two-Area



038.6°
2.4nm
320°
355°
1.7kn
160°
180°
3.4kn
024°
6.8nm
350°
030°
1.3kn
170°
210°
2.0kn

Part 3

Suggestions

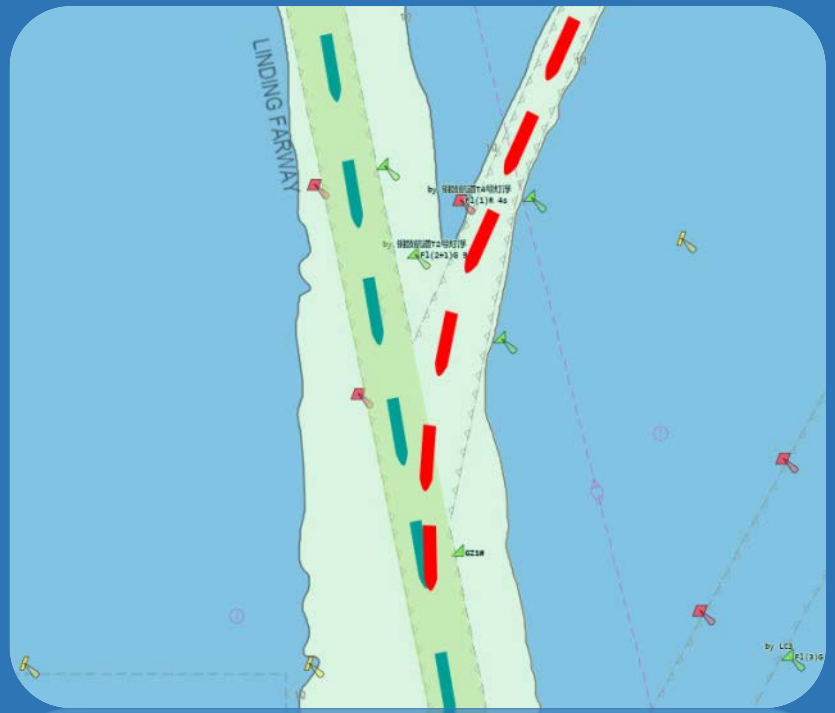
3.1 Improve and Perfect navigation rules (Local Rules)

Article 9: A vessel when carrying out the following activities, shall as far as possible, not involve risk of collision with another vessel proceeding along the fairway:

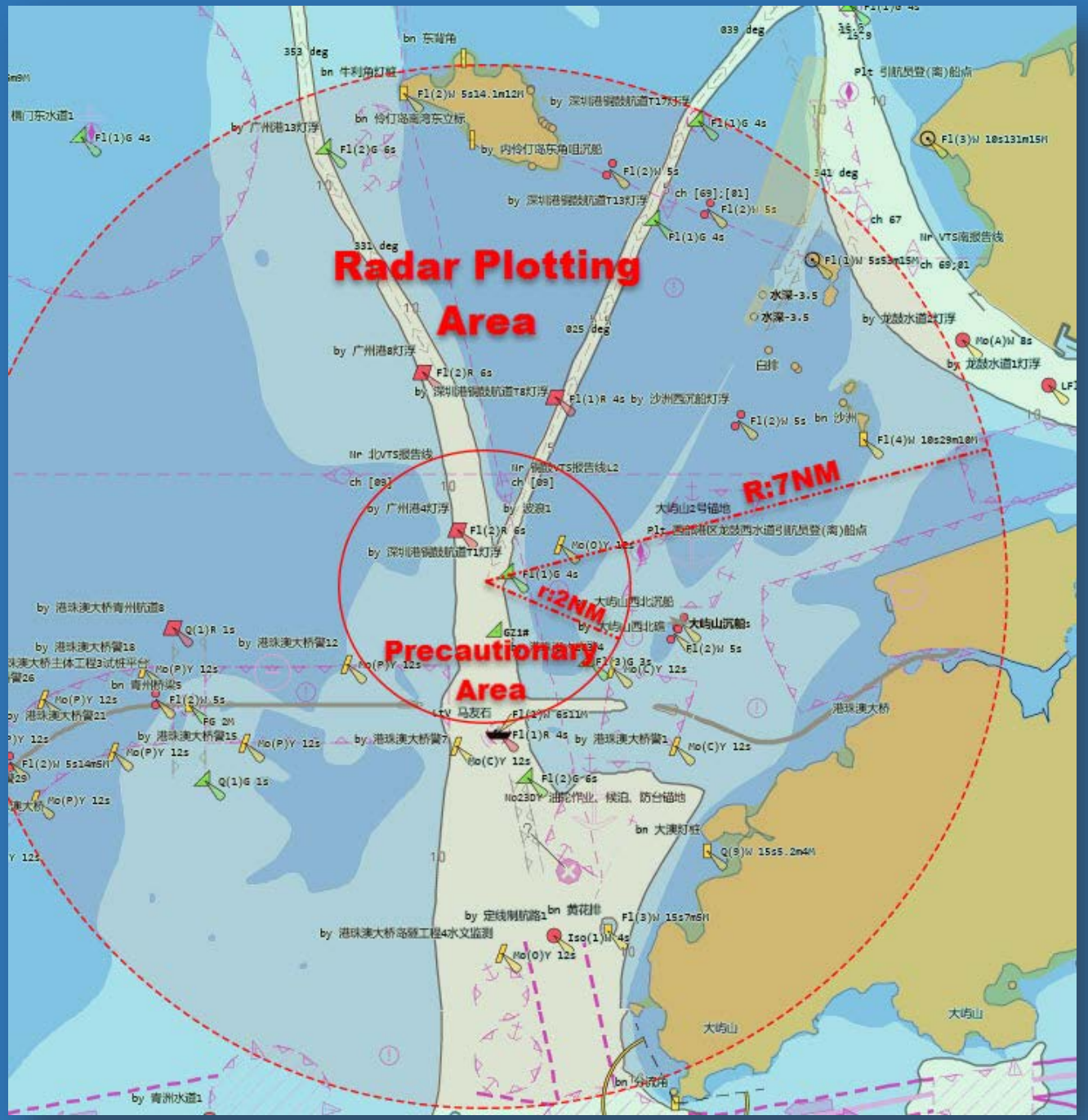
A. Entering or leaving the fairway;
B. Entering or leaving the anchorage;
C. Mooring or unmooring the buoy, berthing or unberthing the wharf;
D. Entering or leaving the dock.

If the risk of collision exists, both shall observe the relevant provisions of the rules (COLREGS)

According to the spirit of the above rule, the outgoing vessel shall not impede the safe passage of another vessel proceeding along Lingding fairway.



3.2 Set up a Precautionary Area


Radar Plotting Area
R:7NM
r:2NM
Precautionary Area

Part 4

Conclusions

4 Conclusions

With excellent professional skills, good service consciousness and tenacious working spirit, we provide escort for the development of Shenzhen Port and the construction of the Greater Bay Area.

At last, Masters will not only feel at ease and be relieved while navigating through Tong Gu Channel, but also have confidence with our good pilotage service.

Finally, I sincerely invite you to share your professional advice and suggestions on improving our pilotage services and safe operations.

Thank you !!!

2.1.1 Navigable width of channel: according to the General Plane Design Code of Seaport, the navigable width of channel is calculated according to the following formula:

One way channel: $W=A+2C$, $A=n(L*\sin\gamma+B)$

Where: W – the navigable width of channel

A – the width of track band

C – the clearance between the width of vessel and the channel, for container vessel's speed greater than 6kts, C=0.75B

n – multiple vessel drift, n=1.69, which according to the results of the vessel simulation

γ – leeway and drift angle, $\gamma=7°$ for the northern part of the channel, $\gamma=14°$ for the southern part of the channel, which according to the results of the vessel simulation

L – LOA, 399m

B – breadth, 59m