

PILOTAGE ADVISORY COMMITTEE

**Review on utilizing Tidal Windows
for Slightly Over-height Vessels
to Transit the Ma Wan Channel**

Purpose

The purpose of this paper is to brief member on findings of a review conducted in November 2012 for vessels slightly over the 53m air-draught limitation by utilizing tidal windows to transit through the Ma Wan Channel during low tide.

Background

2. Members of the PAC suggested in the meeting on 15 December 2010 that the 53m air-draught limitation at Tsing Ma Bridge be relaxed by an amount based on the height of tide, so that vessels with air-draft slightly exceeding 53m could pass through the Ma Wan Channel during low tide utilizing the tidal windows.

3. The idea was further discussed at the meetings of the Port Operations Committee and PAC in February and April 2011 respectively. Marine Department (MD) undertook to work on the procedures and implementation details and report back to PAC. It was also agreed that trials should be conducted and be continued until the end of typhoon season of 2012 with a view to building a database on mast heights of ultra large container vessels (ULCS), seasonal weather and tidal height changes to further fine-tune the procedures and arrangements as necessary.

4. The data collection process was completed in October 2012. A review was then conducted to analysis the data collected and to fine-tune the transit procedures.

5. Predicted height of tide from the Hong Kong Observatory (HKO) is the core information in calculating the available tidal windows. In order to study the accuracy of predicted tide over a 12 months period covering different seasons, a large-scale sampling of predicted and measured tide information (over 330 000 pairs) at Ma Wan from November 2011 to October 2012 were produced with the help of MD's Hydrographic Office. The collected tidal data; the data on tidal allowance required; height of ships; and the experiences gained during the trials formed the base of the review.

Finding of the Review

Night Transit of Vessels with Retractable/Collapsible Mast

6. During the study period, majority of the vessels utilizing tidal windows were of 8,000 TEU (320m LOA) and above. The highest vessel reaches 71m. With such a height, the vessel will need to be loaded to a draught of at least 16m, i.e. 71m – 53m (height restriction) – 2m (maximum tidal allowance), for transiting the Ma Wan Channel at low tide. This is not always achievable even with all ballast tanks filled. To further reduce their heights, some vessels are fitted with retractable/collapsible topmasts that give an additional 2 to 3 meters reduction to their air-draughts.

7. However, for some ships, lowering the topmast will also affect the arrangement of their navigation lights. These ships will no longer comply with the International Regulations for Preventing Collision at Sea at night. For this reason, night transit under this condition would not be allowed.

Application, Processing, and Training

8. For the first application, MD would inspect the ship's plans to ascertain its actual height, the associated longitudinal position of the highest point and whether the ship is fitted with a retractable/collapsible topmast. Thereafter, the set of ship's data collected will be used for its subsequent applications. To allow time for MD's officer to study the plans, the first application is required to be made much earlier than subsequent applications.

9. Furthermore, experience gained from the trials indicates that the knowledge of shipping agents on the application procedures is crucial to the smooth operation of granting tidal windows to slightly over-height vessels. It is therefore necessary to provide guidance documentation and briefing for the agents.

Extreme Weather

10. One of the reasons for conducting a 12 months data collection is to study the characteristic of tidal prediction over different seasons and weather conditions as the following note is posted on the HKO's web site about meteorological effect on predicted times and heights of tidal prediction:-

“The predicted times and heights of the high and low tides are derived for average meteorological conditions, the observed tides may differ from those predicted when the actual meteorological conditions deviate from the mean. Under extreme conditions (e.g. during tropical cyclones), these differences might be large.”

11. The same has been observed from the data collected. It has been found that during the passage of typhoon “Vincente” on 23 and 24 July 2012, the predicted tide became unreliable and the largest difference with measured tide recorded was 1.32m.

Accuracy of Tidal Prediction from Hong Kong Observatory

12. Apart from dates of extreme weather, the predicted heights of tide on normal days were found to be close to the measured values. The accuracy observed is between -0.26m to +0.54m. The accuracy is further found to be equal to or less than 0.3m over 91% of the time. In other words, the predicted tide will be more accurate or closer to the actual tide by adopting a correction factor of 0.3m. Annex I is a table analyzing the differences between measured and predicted tide over the 12 months period from November 2011 to October 2012.

Consultation

13. After the review, we have shared the findings with Hong Kong Pilots Association (HKPA), members of Hong Kong Liner Shipping Association (HKSLA) and China Merchants Holdings (International) Company Limited (CMHCL) on 21 November 2012. Another two follow up meetings were held on 13 December 2012 and 11 January 2013 to discuss and fine-tune the transit procedures.

Procedures

14. Taking into account the findings of the review, the procedure for applying of tidal allowance is agreed as follows:-

- i. vessels with retractable/collapsible mast that affect their navigation lights when lowered will not be permitted for night transit unless they have approved alternative arrangements for displaying the navigation lights;
- ii. vessels should submit the required ship's plans to MD at least 7 days in advance of their first transit. Applications for subsequent transits should be submitted to MD at least 24 hours in advance together with the Pre-arrival Notification;
- iii. utilizing tidal allowance to transit Ma Wan Channel would be suspended during extreme weather, i.e. upon the hoist of No. 3 or higher typhoon signal; and
- iv. to cater for the discrepancy in the tidal height prediction, a correction factor of 0.3m will be added to the predicted tidal height for the calculation of tidal window in transiting Ma Wan Channel. MD will continue to monitor and analyze the accuracy of HKO's tidal prediction against measured tide records over time, with a view to make better assessment on its accuracy and the correction factor to be applied.

15. To follow-up with the agreed procedures, a seminar to brief shipping agents on the application requirement and procedures will be arranged in the 4th

week of January 2013. MD will conduct analysis on the accuracy of the height of predicted tide at 3 months interval. Any changes to the value of the correction factor will be discussed with HKPA, HKSLA and CMHCL and applied accordingly.

16. Members are invited to give comment on the above procedures.

Vessel Traffic Services Branch

Marine Department

January 2013

**Distribution of Difference in Measured and Predicted Height of Tide at Ma Wan
(November 2011 - October 2012)**

Difference (m)	No. of Observations	% Share	Cumulative % Share
-0.30 - < -0.25	5	0.0%	0.0%
-0.25 - < -0.20	235	0.1%	0.1%
-0.20 - < -0.15	1 239	0.4%	0.4%
-0.15 - < -0.10	4 063	1.2%	1.7%
-0.10 - < -0.05	15 880	4.8%	6.4%
-0.05 - < 0.00	36 533	11.0%	17.4%
0.00 - < +0.05	51 287	15.4%	32.8%
+0.05 - < +0.10	51 979	15.6%	48.4%
+0.10 - < +0.15	45 785	13.7%	62.2%
+0.15 - < +0.20	40 971	12.3%	74.5%
+0.20 - < +0.25	33 895	10.2%	84.6%
+0.25 - < +0.30	22 225	6.7%	91.3%
+0.30 - < +0.35	14 589	4.4%	95.7%
+0.35 - < +0.40	8 816	2.6%	98.4%
+0.40 - < +0.45	3 211	1.0%	99.3%
+0.45 - < +0.50	1 273	0.4%	99.7%
+0.50 - < +0.55	229	0.1%	99.8%
+0.55 - < +0.60	71	0.0%	99.8%
+0.60 - < +0.65	63	0.0%	99.8%
+0.65 - < +0.70	86	0.0%	99.8%
+0.70 - < +0.75	66	0.0%	99.9%
+0.75 - < +0.80	65	0.0%	99.9%
+0.80 - < +0.85	122	0.0%	99.9%
+0.85 - < +0.90	70	0.0%	99.9%
+0.90 - < +0.95	16	0.0%	99.9%
+0.95 - < +1.00	22	0.0%	99.9%
+1.00 - < +1.05	21	0.0%	99.9%
+1.05 - < +1.10	14	0.0%	100.0%
+1.10 - < +1.15	29	0.0%	100.0%
+1.15 - < +1.20	69	0.0%	100.0%
+1.20 - < +1.25	45	0.0%	100.0%
+1.25 - < +1.30	16	0.0%	100.0%
+1.30 - < +1.35	4	0.0%	100.0%
Total	332 994	100%	100%

Distribution of Difference in Measured and Predicted Height of Tide at Ma Wan (November 2011 - October 2012)

