

Vehicles slipping on ferry deck???

Motions of a ship, which are expressed through vertical, lateral and longitudinal accelerations and angles of the ship deck to the horizontal plane are usually limited, because of concerns about motion sickness and because people will lose their balance, when subjected to accelerations beyond certain limits. Motion sickness is not a concern in this case, because the exposure of about 15 minutes is too short to make most people seasick. There are different limiting criteria for accelerations and roll angle for ships with experienced professional mariners on board (merchant ships, navy and coast guard vessels) and passenger ships, like ferries with transit passengers and cruise liners with longer term passengers. There is also a difference between average values and limiting significant values which are usually twice the average.

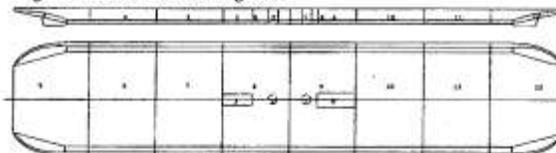
A report, prepared by E.Y.E. Marine Consultants for BC Ferries in February 2013 states, that an operational limit of +/- 5 degrees significant roll was applied to prevent vehicles from slipping on deck. Normal and Cautionary Operations are restricted by roll response and wave height. Wave height of 0.6m and more, which is, according to the report, typically achieved by a wind speed of 12 kts for 4 hours or more can induce a roll angle over 5 degrees and effect the ferry operation. So it is not only a storm of 55 kts that will shut down the ferry service, but a moderate breeze (moving small branches in trees, and raising loose paper according to the Beaufort Wind Scale) of only 12 kts over a longer period of time will do the same.

A 5 degree lateral angle is achieved by parking a car with the right wheels on the sidewalk, hardly a significant slope. To make a vehicle slide on such a minimal slope, significant vertical and lateral accelerations have to coincide. Seakeeping criteria from NORDFOSK 1987 indicate, that for passenger ships the significant vertical acceleration should be less than 0.1 g, the lateral acceleration should be below 0.08 g. Tank tests, conducted by consultants indicate, that at wind speeds of 33 kts, which is within the normal operation range, the accelerations are at least 5 times the recommended limit. That means, the ferry's barge type hull, without sufficient weight and draft to slow it's motions, is rocking and bucking like a rodeo bronco, causing the concern about sliding vehicles.

It would be grossly negligent to proceed with the cable ferry proposal without additional attention directed at the problem of sliding vehicles. Imagine people being crushed between cars and trucks!

BeWe, July 2013

Figure 3.1 shows the tank arrangement



No one requires stability training to realize that this little barge will be uncomfortable in a chop.

The barge is held exactly across the prevailing waves by the wires. This is the worst possible scenario. Ferries has hired people to analyze ship motions and that work has been done. I have to wonder if they have read the reports and if so have they digested the consequences of the tests. Run 6-3 from the tank tests in the EYE report (Appendix F) describes roll angle of 11.93 degrees. That means the deck is swinging through an arc of 24 degrees with every wave. This barge develops a synchronous roll with 0.6 meter waves.

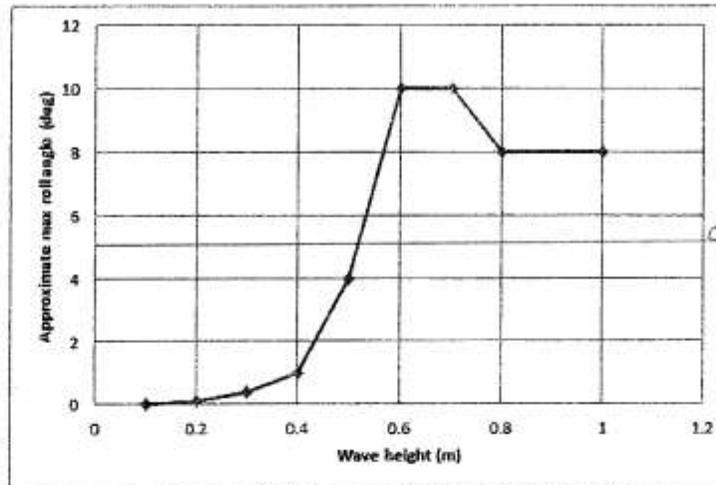
This test also generated 0.83 g of vertical acceleration. That is dangerous! That is almost the full force of gravity cycling up and down with every wave. It means a 180 pound person weighs 31 pounds then 329 alternately with each wave. It also means a 3,000 pound car alternately weighs 510 pounds then 5490 with each wave.

The EYE report recommends limiting roll angle to 5 degrees due to cars sliding on deck. One page of Appendix F describes 44 runs in the test tank with roll angles over 5 degrees. Again, has BC Ferries actually read these reports?

Criteria for Accelerations and Roll (NORDFORSK, 1987)			
Description	RMS Vertical Acceleration	RMS Lateral Acceleration	RMS Roll Motion
Light Manual Work	0.20 g	0.10 g	6.0°
Heavy Manual Work	0.15 g	0.07 g	4.0°
Intellectual Work	0.10 g	0.05 g	3.0°
Transit Passengers	0.05 g	0.04 g	2.5°
Cruise Liner	0.02 g	0.03 g	2.0°

Seakeeping performance criteria for human effectiveness - Limiting Criteria with regard to accelerations (vertical and lateral) and roll motion (NORDFORSK, 1987).

Recommended criteria for Transit passengers is 0.05g of movement. Ferries consultants recorded 0.83 g during a test at 33 knots of wind. That is an awfully lively little barge.



*cars sliding
on deck.
(EYE consultants)*

Figure 4-1 Maximum Roll Single Amplitude vs Wave Height

This graph is from another appendix of the EYE report. It shows how the barge develops a synchronous roll at only 0.6 meters of sea (23 ½ inches). That is not very much. It shows the danger point being reached at just over 0.5 meters of sea (20 inches). That is not very much. We are going to spend a lot of time waiting for weather with this under designed project.

Moulded depth is too small at 2.1 meters. The BC Ministry of transport has just launced a new ferry for the Upper Arrow lakes for the Galena to Shelter Bay run with a moulded depth of 5.5 meters. I would much rather have MOT overseeing new ship construction than BC Ferries.

P. Kimmerly Aug 2013