APPENDIX

APPENDIX A

SELECTED PHOTOGRAPHS TAKEN ON 7/2/08

Photo A1

Photo A2

Photo A3

Photo A4

Photo A5

Photo A6

Photo A7

Photo A8

Photo A9

Photo A10

Photo A11

Photo A12

Photo A13

Photo A14

Photo A15

Photo A16

Photo A17

Photo A18

Photo A19

Photo A20

Photo A21

Photo A22

Photo A23

Photo A24

Photo A25

Photo A26

Photo A27

Photo A28

Photo A29

Photo A30

Photo A31

Photo A32

Photo A33

Photo A34

Photo A35

Photo A36

Photo A37

Photo A38

Photo A39

Photo A40

APPENDIX B

SELECTED PHOTOGRAPHS TAKEN ON 17/2/08 11.30 AM BRIDGE OPENING

Photo B41 – Mustering commences about 10 mins prior to lift (11.21 am)

Photo B42 – Yacht circles in front of bridge staying some 30 m off (11.22 am)

Photo B43 – On this occasion yacht circles within 15 m of bridge (11.25 am)

Photo B44 – Mustering craft on north side of channel (11.27 am)

Photo B45 – Captain Cook makes her approach through the mustering fleet along north side of channel (11.27 am)

Photo B46 – Approximately 2 minutes prior to bridge lift (11.29 am)

Photo B47 – Approximately 1.5 minutes prior to bridge lift (11.29 am)

Photo B48 – Approximately 1 minute prior to bridge lift (11.30 am)

Photo B49 – Gates lowered and car traffic stopped (11.30 am)

Photo B50 – Gates lowered and car traffic stopped (11.30 am)

Photo B51 – Immediately prior to bridge lift (11.30 am)

Photo B52 – Bridge lift underway (11.31 am)

APPENDIX C

GBAC ASSESSMENT OF WAVE CLIMATE COMPLIANCE HAVING REGARD TO BOAT LENGTH

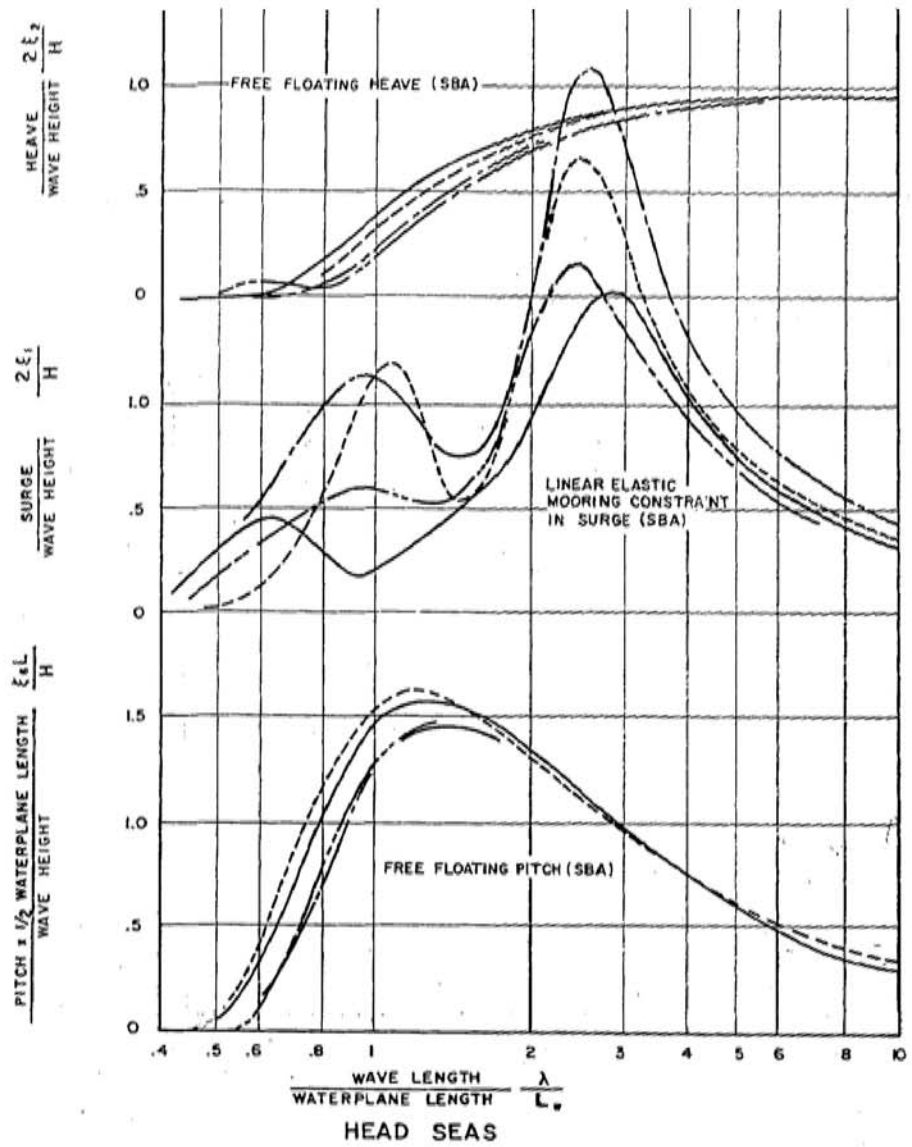
Appendix C - Effect of Boat Length on Vessel Response

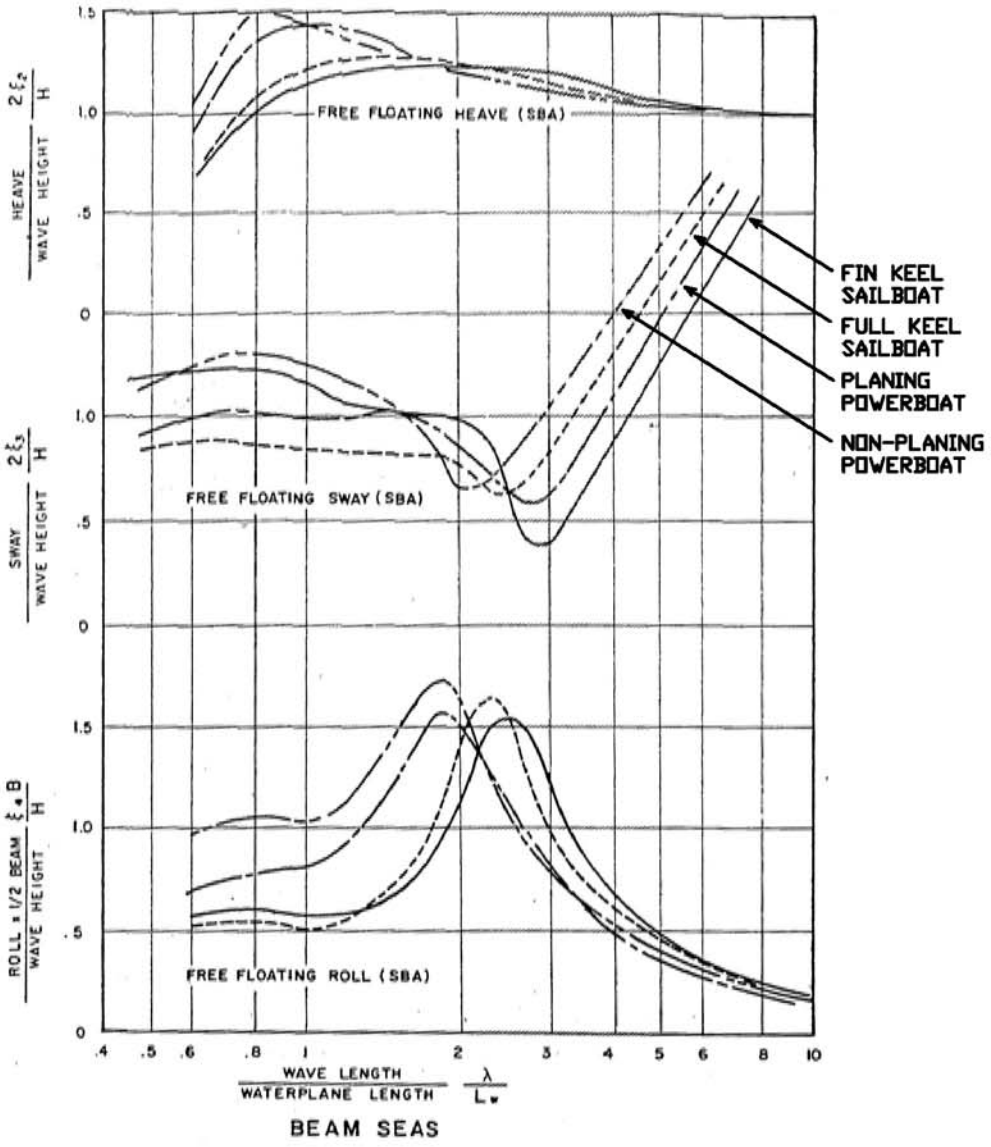
A review of NHC (1980) has found that the Mercer criteria, used directly for developing marina wave climate criteria in AS 3962, were developed specifically for 20 to 40 foot boats *(6 to 12 m).* The design vessels to be moored at Spit Marina range up to 35 m with the average size slightly over 13 m. The question arises as to what effect this could have on seakeeping behaviour and the application of Mercer.

A main part of the NHC (1980) investigations was devoted to physical and numerical modeling of boat response to waves. A scale physical model was moored to a walkway with lines that incorporated the correct elasticity, and the response of the boat to waves of different periods was measured in heave, surge and pitch for head seas, and heave, sway and roll for beam seas. The physical model results were then used to verify a numerical analysis carried out for a range of sailboat and power boat hull types. Relevant data extracted from these assessments are shown in the attached **Figure C-1**.
It is understood from NHC (1980) that the magnitude of vessel motions was the most important quantifiable parameter used to develop the Mercer criteria. It can be shown using data presented in **Figure C-1** that, in general terms, longer vessels can tolerate incident wave conditions which are larger than shorter vessels.

Example outputs from our assessment used to modify the application of the Mercer criteria at Spit Marina are attached.

FIGURE C.1





NOTE:
ξ REPRESENTS AMPLITUDE OF MOTION
(ANGULAR FOR ROLL AND PITCH)

Notes

1. Source: NHC (1980)

Gary Blumberg & Associates
J07-4/R73
Plot date: 29/1/09

EFFECT OF BOAT LENGTH ON VESSEL RESPONSE

C-Arm outer Head																		
Variables checked against report																		
General variables																		
				Actual	Permissible				Actual									
50 yr				Response	Response				Response									
				m	m				m									
Hs		m		0.89	0.750				0.89									
T		s		2.60					2.60									
λ		m	10.55					10.55										
L	AS 3962	m	12.00	worst case				25.00										
λ/L			**0.88**					**0.42**										
Head Seas																		
Pitch RAO	Planing power		1.08					0.00										
	Non-planing power		1.10					0.00										
	Average		**1.09**	**0.081**	**0.068**	**rad**		**0.00**	**0.000**	**rad**	amplitude		Actual response less than permissible response so OK					
				4.6	**3.9**	**deg**			**0.0**	**deg**	amplitude							
Surge RAO	Planing power		1.10					0.10										
	Non-planing power		0.58					0.05										
	Average		**0.84**	**0.374**	**0.315**	**m**		**0.08**	**0.033**	**m**	amplitude		Actual response less than permissible response so OK					
Heave RAO	Planing power		0.15					0.00										
	Non-planing power		0.13					0.00										
	Average		**0.14**	**0.062**	**0.053**	**m**		**0.00**	**0.000**	**m**	amplitude		Actual response less than permissible response so OK					
				Actual	Permissible				Actual									
1yr				Response	Response				Response									
				m	m				m									
Hs		m		0.58	0.375				0.89									
T		s		2.30					2.30									
λ		m	8.25					8.25										
L	AS 3962	m	12.00					25.00										
λ/L			**0.69**					**0.33**										
Head Seas																		
Pitch RAO	Planing power		0.30					0.00										
	Non-planing power		0.30					0.00										
	Average		**0.30**	**0.015**	**0.009**	**rad**		**0.00**	**0.000**	**rad**	amplitude		Actual response less than permissible response so OK					
				0.8	**0.5**	**deg**			**0.0**	**deg**	amplitude							
Surge RAO	Planing power		0.70					0.00										
	Non-planing power		0.40					0.00										
	Average		**0.55**	**0.160**	**0.103**	**m**		**0.00**	**0.000**	**m**	amplitude		Actual response less than permissible response so OK					
Heave RAO	Planing power		0.00					0.00										
	Non-planing power		0.08					0.00										
	Average		**0.04**	**0.012**	**0.008**	**m**		**0.00**	**0.000**	**m**	amplitude		Actual response less than permissible response so OK					

N-Arm N-S berths Beam																		
Variables checked against report																		
General variables																		
				Actual	Permissible				Actual									
50 yr				Response	Response				Response									
				m	m				m									
Hs		m		0.33	0.310				0.33									
T		s		2.30					2.30									
λ		m	8.25					8.25										
L	AS 3962	m	12.00	worst case				25.00										
λ/L			**0.69**					**0.33**										
Beam	AS 3962	m	4.4					6.5										
Beam Seas																		
Roll RAO	Planing power		0.73					0.23										
	Non-planing power		1.06					0.25										
	Average		**0.90**	**0.067**	**0.063**	**rad**		**0.24**	**0.012**	**rad**	amplitude		Actual response less than permissible response so OK					
				3.8	**3.6**	**deg**			**0.7**	**deg**	amplitude							
Sway RAO	Planing power		1.02					0.75										
	Non-planing power		1.27					1.00										
	Average		**1.15**	**0.189**	**0.177**	**m**		**0.88**	**0.144**	**m**	amplitude		Actual response less than permissible response so OK					
Heave RAO	Planing power		1.20					0.50										
	Non-planing power		1.27					0.70										
	Average		**1.24**	**0.204**	**0.191**	**m**		**0.60**	**0.099**	**m**	amplitude		Actual response less than permissible response so OK					
				Actual	Permissible				Actual									
1yr				Response	Response				Response									
				m	m				m									
Hs		m		0.21	0.190				0.21									
T		s		2.00					2.00									
λ		m	6.24					6.24										
L	AS 3962	m	12.00	worst case				25.00										
λ/L			**0.52**					**0.25**										
Beam		m	4.4					6.5										
Beam Seas																		
Roll RAO	Planing power		0.65					0.23										
	Non-planing power		0.85					0.25										
	Average		**0.75**	**0.036**	**0.032**	**rad**		**0.24**	**0.008**	**rad**	amplitude		Actual response less than permissible response so OK					
				2.1	**1.9**	**deg**			**0.4**	**deg**	amplitude							
Sway RAO	Planing power		0.91					0.75										
	Non-planing power		1.19					1.00										
	Average		**1.05**	**0.110**	**0.100**	**m**		**0.88**	**0.092**	**m**	amplitude		Actual response less than permissible response so OK					
Heave RAO	Planing power		0.62					0.50										
	Non-planing power		0.77					0.70										
	Average		**0.70**	**0.073**	**0.066**	**m**		**0.60**	**0.063**	**m**	amplitude		Actual response less than permissible response so OK					

N-Arm N-S berths Head																		
Variables checked against report																		
General variables																		
				Actual	Permissible				Actual									
1yr				Response	Response				Response									
				m	m				m									
Hs		m		0.50	0.375				0.50									
T		s		2.50					2.50									
λ		m	9.75					9.75										
L	AS 3962	m	12.00	worst case				25.00	worst case									
λ/L			**0.81**					**0.39**										
Head Seas																		
Pitch RAO	Planing power		0.73					0.00										
	Non-planing power		0.79					0.00										
	Average		**0.76**	**0.032**	**0.024**	**rad**		**0.00**	**0.000**	**rad**	amplitude		Actual response less than permissible response so OK					
				1.8	**1.4**	**deg**			**0.0**	**deg**								
Surge RAO	Planing power		1.05					0.10										
	Non-planing power		0.55					0.00										
	Average		**0.80**	**0.200**	**0.150**	**m**		**0.05**	**0.013**	**m**	amplitude		Actual response less than permissible response so OK					
Heave RAO	Planing power		0.08					0.00										
	Non-planing power		0.06					0.00										
	Average		**0.07**	**0.018**	**0.013**	**m**		**0.00**	**0.000**	**m**	amplitude		Actual response less than permissible response so OK					