COWES FLOATING BRIDGE FB6
Operational Review

Prepared for the Isle of Wight Council by
3S Business Review Limited

November 2023

What is 3S?

- **3S Business Review Limited comprises former directors of a British ‘top 10’ international engineering consulting and project management firm**
- **John Springate served as CEO, and is a business graduate with long experience in the structuring and negotiation of major capital projects**
- **Steve Reynolds is a Chartered Engineer with similarly long experience in the delivery of major systems control and transportation projects**
- **Under their management their firm comprised 1700 staff and undertook major infrastructure projects in the building, environmental, power and transportation sectors**
- **Their transportation experience includes Channel Tunnel, HS1, NR West Coast Main Line, LUL Jubilee Line, DLR, HK Tuen Mun Tramway, Delhi Metro, Manchester Metrolink, Edinburgh Tram and many major highway schemes**

How did 3S become involved with FB6?

- **John and Steve undertake only projects of personal interest to them**
- **John is a long-term resident of the IOW and a Cowes-based 'Yachty'**
- **Aware of the challenges posed by FB6, John persuaded Steve to join him in providing 3 years of initially pro bono advice to IWC**
- **In view of John and Steve's accumulated knowledge of FB6 and its challenges, IWC then commissioned 3S to prepare this report**
- **As project and risk managers John and Steve focus on identifying and commercially resolving operational issues at least cost to IWC, rather than proposing technical solutions best left to experienced shipwrights**

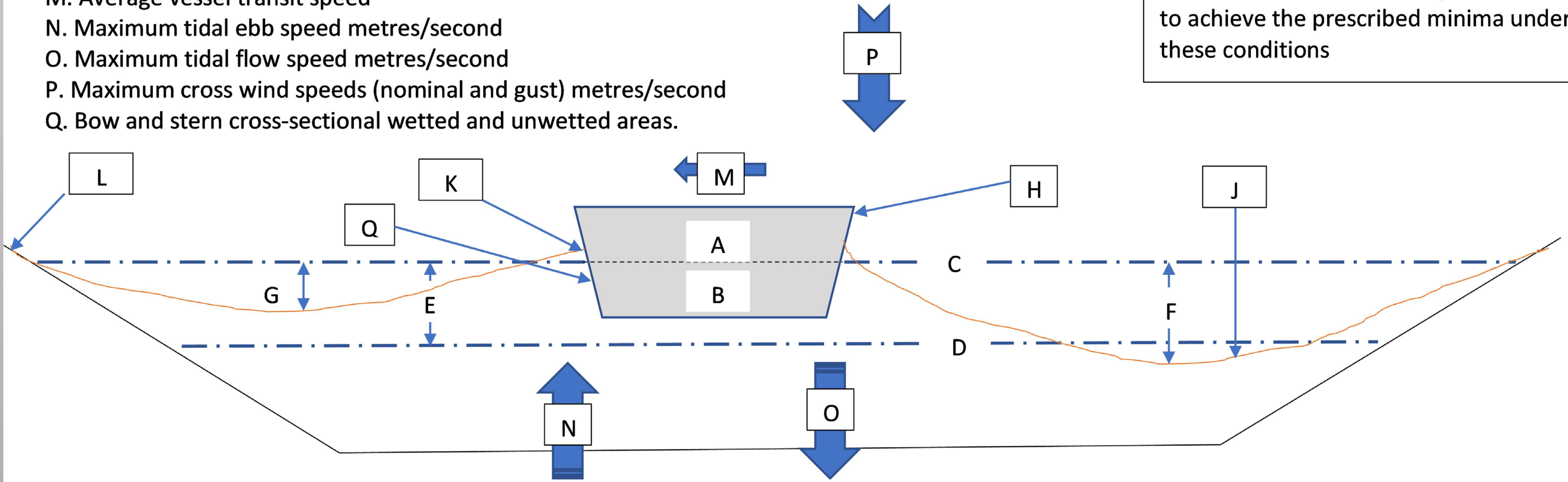
What did IWC ask 3S to do?

- **Produce a Computerised Fluid Dynamics (CFD) digital model replicating the response of FB6 to extreme wind and tidal forces**
- **Identify potential improvements enabling FB6 to cope better with these extreme forces, and hopefully dispense with the push boat**
- **Identify possible operational improvements, hopefully enabling FB6 to achieve increased frequency of service and passenger revenues**
- **Produce a strategy for the possible replacement of FB6 should adequate improvements not prove to be possible**
- **For this, 3S specified modelling objectives and parameters, and identified the Wolfson Unit at Southampton University to build and run the model**

Building a CFD Model

A. Unwetted hull and superstructure area exposed to cross wind (square metres) - empty and fully laden
B. Wetted hull dimensions and area (square metres) exposed to tidal pressure - empty and fully laden.
C. Maximum transit distance
D. Minimum transit distance
E. Maximum tidal range
F. Minimum permitted depth of trailing chain below surface
G. Minimum permitted depth of leading chain below surface
H. Vessel mass maximum (fully loaded) and minimum (empty)
J. Chain link configuration (e.g. open or studded), mass kg/metre and surface area per metre length
K. Chain exit height above surface
L. Chain anchorage height above tide height at peak and bottom of tidal range
M. Average vessel transit speed
N. Maximum tidal ebb speed metres/second
O. Maximum tidal flow speed metres/second
P. Maximum cross wind speeds (nominal and gust) metres/second
Q. Bow and stern cross-sectional wetted and unwetted areas.

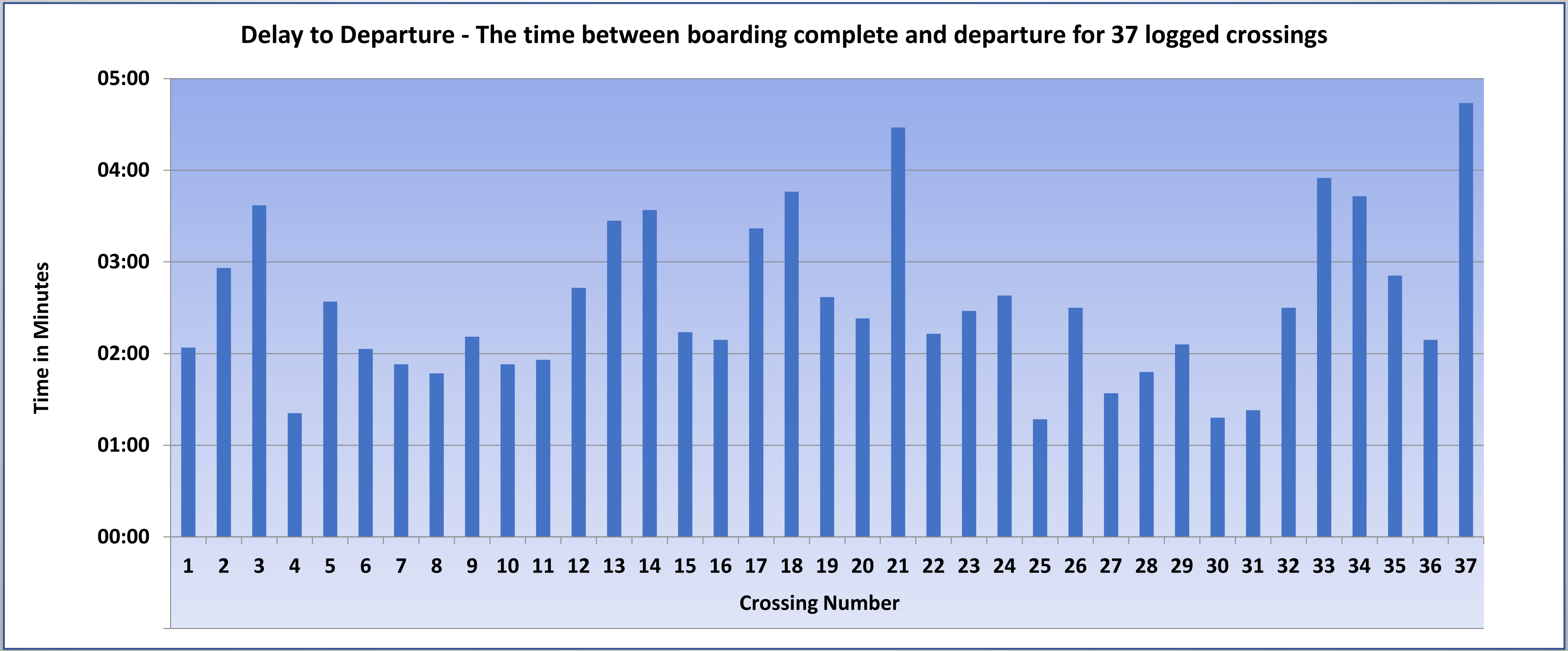
'X' = the deviation of the course of the vessel from its 'no tide, no wind' direct path under maximum and selected intermediate values for tide and wind speed. This will be reflected in differing actual values for F and G, enabling calculation of the chain length necessary to achieve the prescribed minima under these conditions



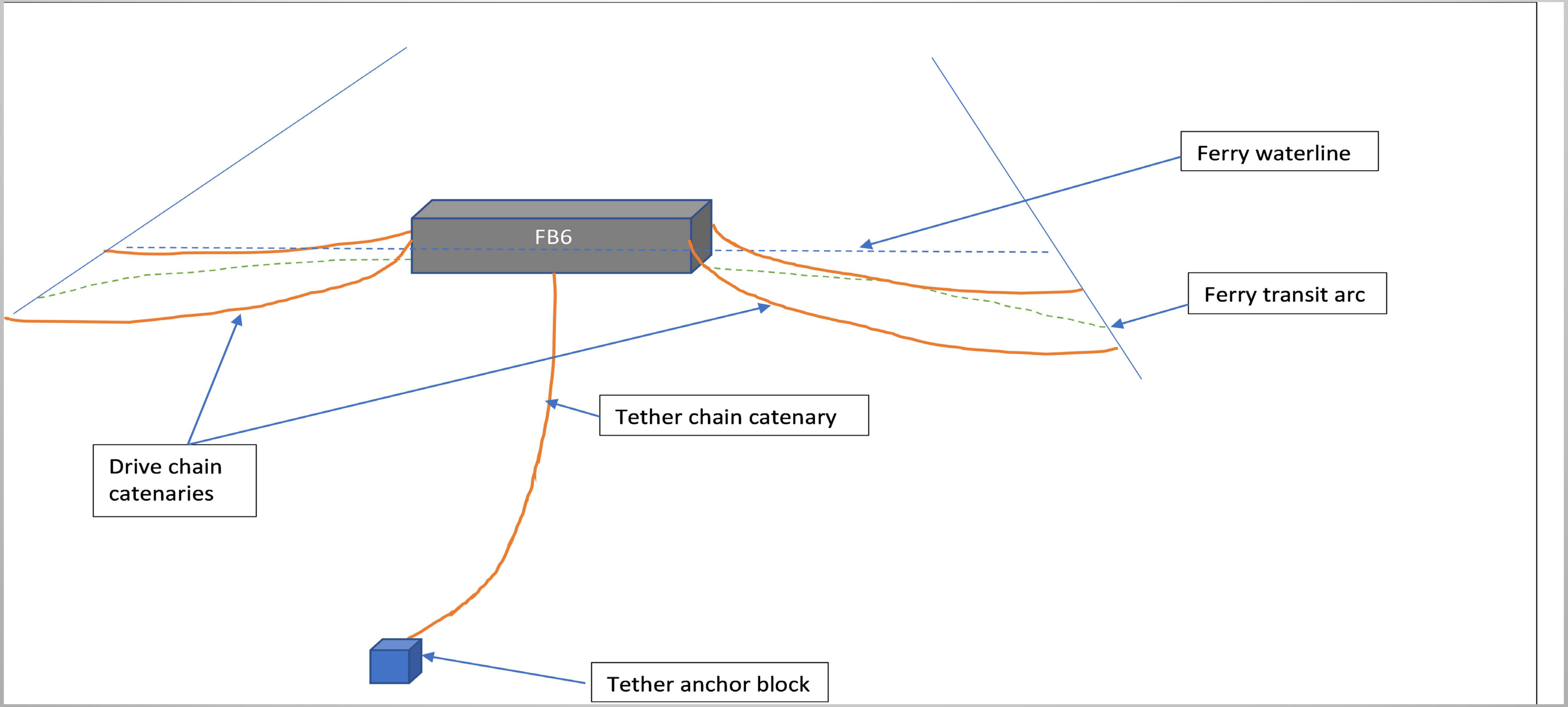
What conclusions did 3S reach?

- **Due to the constraints placed on operation FB6 cannot achieve the 5 return crossings per hour required by the Business Case**
- **However, there might be scope to streamline procedures to increase the average frequency from 3.4 to 4.4 return crossings per hour**
- **FB6 cannot be modified so as to be capable of operation without the push boat at maximum ebb tide flow rate**
- **Maintaining the prescribed depth of water over the chains presents a particular challenge probably requiring a radically redesigned vessel**
- **However, the push boat also assists FB6 in berthing safely, and resolving this might be less of a challenge**

Delay to Departure after Boarding Complete



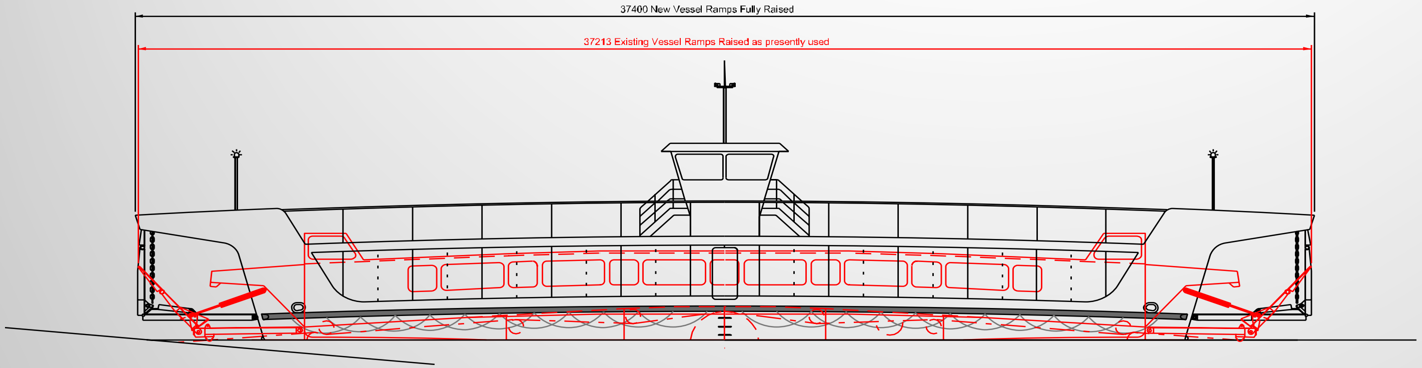
Testing alternative solutions



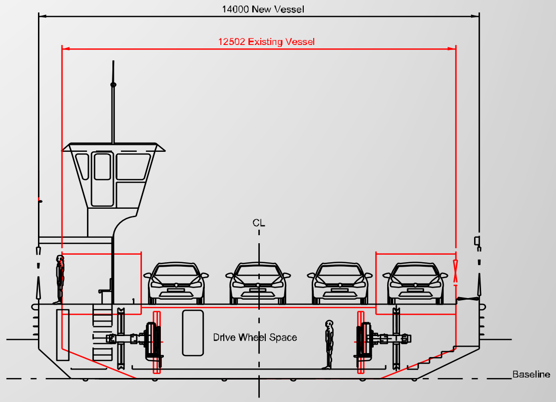
What are the main problems with FB6?

- **FB6 is over 100 tons heavier than FB5 which increases the underwater hull area directly facing tidal forces**
- **FB6 also has a much greater longitudinal topside profile than FB5 resulting in increased exposure to wind forces**
- **However, CFD modelling showed FB5 would be unable to maintain the prescribed chain depth at present ebb speeds of 2 meters/sec**
- **This supports theories of recent increases in maximum tidal ebb speed, whether due to subsequent marine works or silting**
- **It also indicates that the solution is not simply to replicate FB5**

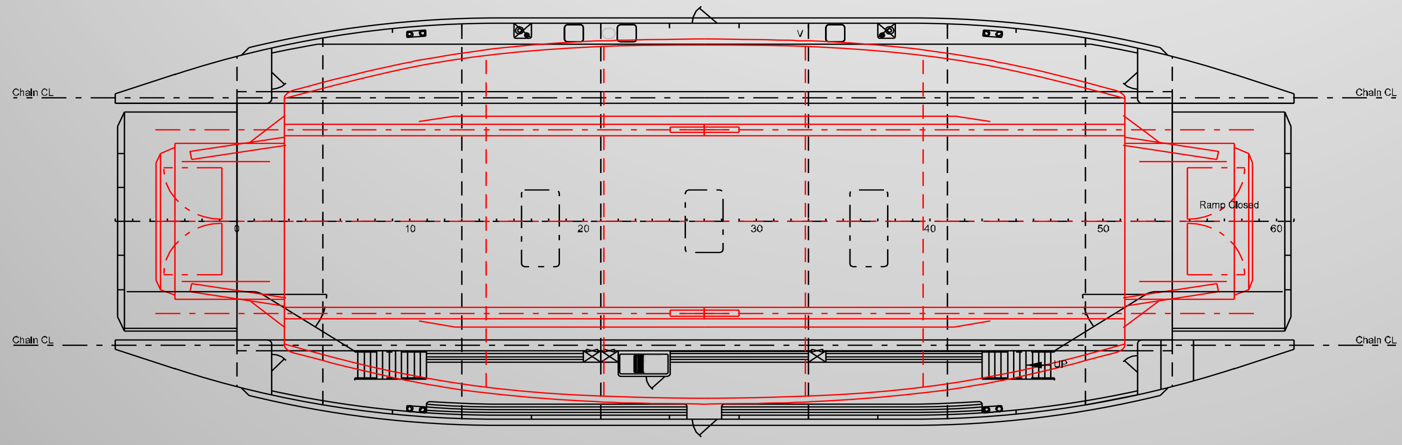
FB5 and FB6 Dimensional Comparison



OUTBOARD PROFILE (NORTH SIDE)



MIDSHIP SECTION



VEHICLE & ACCOMMODATION DECK

What design changes are necessary?

- **This is difficult to answer in the context of this report as it requires further expert technical thought and more thorough investigation**
- **However, a lighter, smaller vessel would go some way towards resolving the berthing issue and assist in achieving the required chain depth**
- **Aluminium construction could provide a weight saving of 30% over steel**
- **Greater hydrodynamic efficiency of hull design and a smaller topside profile would provide further improvements**
- **The CFD model will be of key importance in testing design concepts to help ensure that any such innovations will work in practice**

Could a new vessel offer other benefits?

- **A smaller vessel operating more frequently could increase daily capacity**
- **Redesign of the FB6 loading ramps to reduce approach angles would speed vehicle loading and restore usage by owners of vulnerable cars**
- **A more radical redesign of ramps could also revisit passenger and car segregation to improve foot passenger safety and further speed loading**
- **Replacement of diesel with electric motors would reduce maintenance requirements, servicing downtime and noise levels**
- **An electric boat would be lighter and eliminate refueling requirements**
- **Greater power and torque of electric motors could increase crossing speeds**
- **And electrification would assist IOW’s achievement of Net Zero by eliminating emissions!**

How do we set about procuring FB7?

- **Firstly, by producing a performance specification stating in broad terms what we want the vessel to actually DO**
- **For example, to be capable of transporting a given number of vehicles in its normal daily cycle - rather than specifying the vessel's size or capacity**
- **Then place a contract with an accredited company who will adopt IWC's performance specification, and design and build his vessel to achieve it**
- **For this, IWC would place a single contract on a 'Turnkey' supplier, rather than expose itself to risk by separately employing a designer and builder**
- **The 'Turnkey' contract would allow IWC to recover liquidated damages, or reject the new vessel if IWC's performance specification is not met**

How does IWC then pay for a new FB7?

- **With over 300 cable ferries in use worldwide it is likely FB6 can be sold to an operator with a less demanding operational environment**
- **However, this presents cash flow issues for an outright purchase**
- **An alternative is to lease the new vessel from the designer/builder**
- **If the lease includes maintenance the supplier relieves IWC of this element of risk in achieving availability and reliability requirements**
- **This will leave only the interface arising from IWC's responsibility for staffing the vessel and managing day-to-day operations**
- **However, this could be eliminated by IWC's sale of a license to Design, Build Own and Operate the vessel for a defined period – e.g. 25 years**

Where do we go from here? Replacement?

- **The report contains a great deal more detail than is presented here**
- **It is for IWC to decide whether to consider procuring a new vessel**
- **If so, further thought must be given to feasibility based upon:**
  - **Production of a Performance Specification for the new vessel**
  - **Likely cost of a compliant vessel**
  - **Identification of available ‘Turnkey Suppliers’, ‘Lessors’ and ‘DBOO Licensees’**
  - **Development of respective contract terms and conditions**
  - **Further research of opportunity to sell FB6 to another operator**

Where do we go from here? – other options?

- **Replacing FB6 is only one of a number of optional solutions**
- **The immediate option is securing the most efficient operation of FB6**
- **Other options include a tunnel or bridge**
- **Or discontinuing the service altogether**
- **All options must be carefully evaluated in terms of cost, time, social, macro-economic, environmental and other aspects**
- **Following which, replacement of FB6 by FB7 might be dismissed**
- **However, for completeness the following slides assume replacement**

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