



Gladesville Bridge Marina Pty Ltd

Gladesville Bridge Marina Development

ENARES Pty Ltd Development Application for Gladesville Bridge  
Marina Expansion: Geotechnical Report

October 2019

# Table of contents

1.	Background .....	1
1.1	General .....	1
1.2	Geotechnical report.....	1
1.3	Limitations and assumptions .....	1
2.	The Site .....	2
3.	Proposed development .....	3
4.	Planning requirements .....	4
4.1	SEARs requirements .....	4
4.2	Sydney Planning requirements .....	4
5.	Assessment of potential geotechnical impacts and construction.....	5
5.1	General .....	5
5.2	Existing environment.....	5
5.3	Topography .....	5
5.4	Geology.....	6
5.5	Hydrographic survey .....	8
5.6	Available site investigation information .....	8
5.7	Available drawings .....	9
5.8	Pile embedment information .....	10
5.9	Pile design and construction requirements .....	11
6.	Technical references .....	12

# Table index

Table 5-1 – Secretary Environmental Assessment Requirements .....	5
---	---

# Figure index

Figure 1 – Site location.....	2
Figure 2 – Photo view of site looking west from Victoria Place.....	2
Figure 3 - Marina Expansion Concept Layout.....	3
Figure 4 – GBM Site area looking east towards Gladesville Bridge .....	6
Figure 5 – Geological Series Sheet 9130 (Edition 1) 1983 .....	6
Figure 6 – Rock outcrops and shelves / ledges at the Site area.....	7
Figure 7 – Indicative marina pile layout.....	10

# Appendices

## Appendix A – IMC Drawings

# 1. Background

## 1.1 General

Gladesville Bridge Marina (GBM) proposes to re-develop and improve their facilities to provide additional vessel storage, increasing from 99 boat spaces to 130 boat spaces. Our team has been provided with information about the proposed re-development of the GBM site, which will adopt the latest best practice in marina design and technology.

The proposed development constitutes alterations and additions to the marina berth layout to provide overall storage for 130 vessels comprising 15 swing moorings and 115 floating berths. The works include:

- removal of 29 existing moorings and retention of 15 existing swing moorings;
- construction of 65 new floating berth spaces of varying sizes, that increases the number of floating berths from 50 to 115;
- cessation of slipway activities;
- demolition of the slipway rails and demolition of the internal office mezzanine structure within the covered slipway area; and
- provision of 8 new valet car parking spaces within the existing slipway area.

By way of introduction to the project, the geotechnical team attended a project update in early January 2019.

## 1.2 Geotechnical report

A geotechnical report is required to support the environmental impact assessment for the development of the environmental impact statement (EIS) for GBM's proposed development. This preliminary geotechnical report provides advice in support of the identified EIS requirements; it draws on desktop information and responds to the relevant Secretary's Environmental Assessment Requirements (1268) *Department of Planning and Environment* (SEARs) and initial Program requirements.

Dredging of river bed sediments / materials is understood not to be required for mooring berth deepening as sufficient water depths exist for the proposed facility. Piles into bedrock (rock-socketed) are envisaged for the new floating mooring berths.

## 1.3 Limitations and assumptions

This report has been prepared based upon a review of as-supplied documents and publically available information.

The geotechnical team have worked together with the contamination team; this has included an assessment of the results of exploratory investigation sampling boreholes carried out for contamination assessment purposes. This report does not include consideration of contamination aspects.

## 2. The Site

The GBM site ("the Site") is located on the southern side of the Parramatta river directly upstream of the existing Gladesville bridge crossing between Drummoyne to the south and Huntley's Point and Hunters Hill to the north. The Site is accessed by road via Victoria Place just south of Howley Park. A Google maps image of the Site area is presented below in Figure 1.



Figure 1 – Site location

A photomontage view of the general site area looking west towards the Gladesville bridge is shown below in Figure 2.



Figure 2 – Photo view of site looking west from Victoria Place



### 3. Proposed development

The proposed Marina Expansion Site development is shown below in Figures 3, reproduced from GHD Concept Layout drawing No. 21-27558-K101, Rev. G dated 08/10/2019.

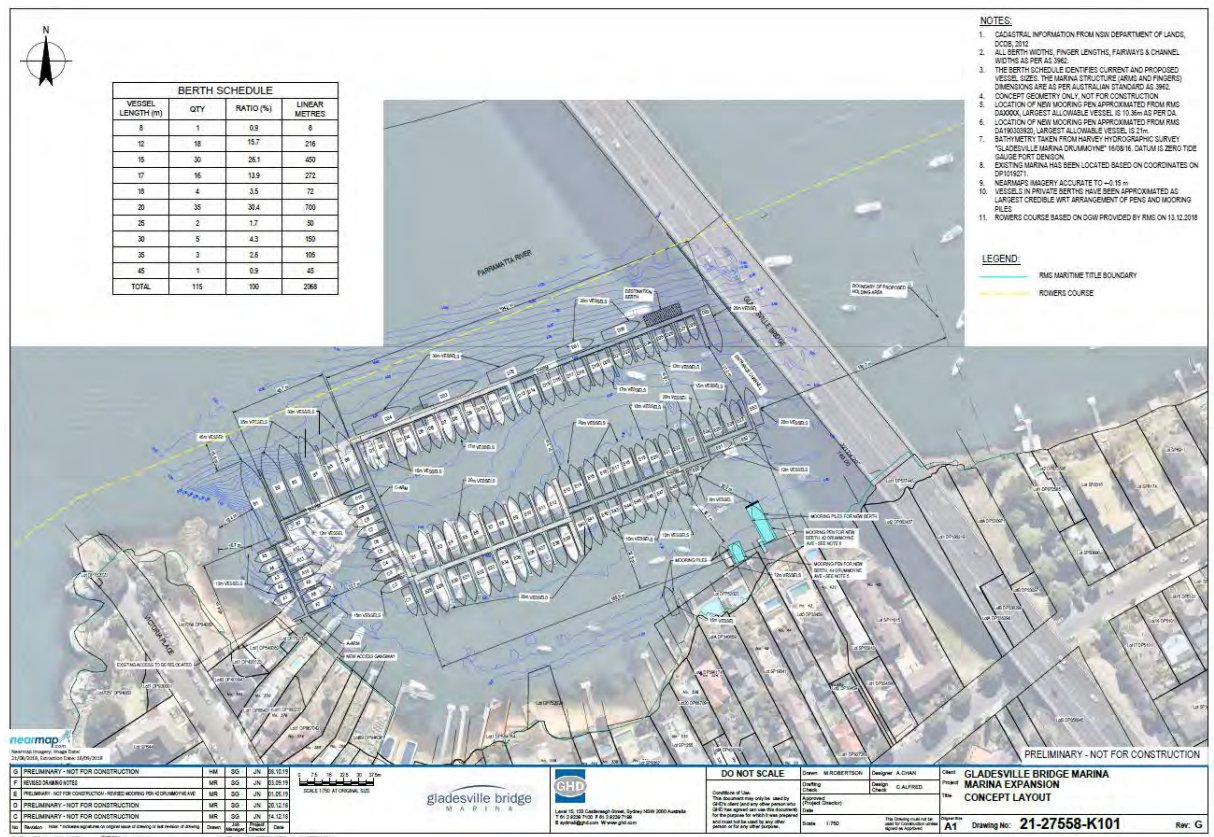


Figure 3 - Marina Expansion Concept Layout

## 4. Planning requirements

### 4.1 SEARs requirements

The SEARs assessment ref. SEAR 1268 received from NSW *Department of Planning and Environment* (dated 15/11/2018) has indicated the following key issues (underline added to identify geotechnical related requirements):

*“soil and water - including:*

- *a description of local soils, topography, drainage and landscapes;*
- *an assessment of potential impacts on the quality and quantity of surface and groundwater resources;*
- *details of sediment and erosion controls;*
- *benthic morphology, water flow in and around the development, flushing, and wave bounce; (an existing hydrographic survey of the sea-bed is available)*
- *details of construction methodology and any proposed dredging, including measures to manage and minimise disturbance of the shoreline, substrate stability and potentially contaminated sediments; and*
- *a description and appraisal of mitigation and monitoring measures”.*

The EPA (ref. Attachment A to their SEARs response letter ref: DOC18/791709-01 dated 24/10/2018) have identified additional EIS requirements, as reproduced below:

*“THE PREMISES The EIS will need to fully identify all of the processes and activities intended for the site and during the life of the project. This will include details of:*

- *all equipment proposed for use at the site*
- *presence of acid sulfate soils and potential acid sulfate soils*
- *methods to mitigate any expected environmental impacts of the development”, and*

*“CONTAMINATION.....The EIS must provide sufficient information to demonstrate that the proposed use is suitable for the site. Consideration must be given to:*

- *the potential impacts of mobilising these (river bed) sediments disturbed during the site’s construction works or operation (including the movement of boats with significant enough draft to disturb the bed of the harbour), and*
- *any controls and/or management measures to mitigate the impacts of contamination on the site, if present”.*

### 4.2 Sydney Planning requirements

The following planning related documents were also referred to in the preparation of this report, with particular reference to the requirements to assess acid sulfate soils, erosion, dredging, etc.:

- Department of Planning (2005). *Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005*, Sydney; and
- Department of Planning (2005). *Sydney Harbour Foreshores and Waterways Area Development Control Plan (Sydney Harbour Catchment) 2005*, NSW Government, 05\_026, Sydney.

## 5. **Assessment of potential geotechnical impacts and construction**

### 5.1 General

This section assesses the potential geotechnical and related impacts on geology and soils within the Site and study area as a result of the proposal. The assessment presented in this section draws on desktop information and site inspection observations, and responds to the relevant SEARs items identified in Section 4, as outlined in the Table 5-1 below. The potential impacts of contamination are presented by others.

Table 5-1 – Secretary Environmental Assessment Requirements

Key issue	SEAR	Where addressed
Soil and Water	Description of local soils, topography, drainage and landscapes;	Section 5.2 – 5.4
	Benthic morphology	Section 5.5
Water Quality and Contamination	Assess the geotechnical and contamination issues (including Acid Sulfate Soils) associated with the construction of the development including the contamination status of the sediments to be disturbed, the impacts associated with disturbance of sediment, and the management and mitigation measures to be employed during marine works	Section 5.6  Section 6.1 Section 6.2 Section 6.3 and Section 6.4

### 5.2 Existing environment

The proposal area is underlain by a number of geological and soil landscape units. The general topography and anticipated geological and soil landscape units are discussed further in the following sections.

### 5.3 Topography

Based on site observations the Gladesville bridge area comprises the wide Parramatta river channel which abuts against elevated terrain inland outside the river channel itself, such as Huntley's Point and Drummoyne, see Figure 2.

The landside area is generally developed comprising buildings and concrete wharf / berth frontages, small jetties and parking / access routes, see Figure 5 below.





Figure 4 – GBM Site area looking east towards Gladesville Bridge

#### 5.4 Geology

The GBM Site area is situated approximately 8 km to the west of Sydney CBD within the Sydney Basin.

Based on the 1:100,000 scale Geological Series Sheet for Sydney (Sheet 9130, Edition 1, Geological survey of NSW, Department of Mineral Resources, 1983), the Gladesville Bridge area comprises a relatively low-lying wide river valley / harbour side area becoming elevated terrain inland generally on bedrock. Figure 6 shows an extract from Geological Series Sheet 9130 covering the Gladesville Bridge area.



Figure 5 – Geological Series Sheet 9130 (Edition 1) 1983



The Sydney Basin is characterised by a sub-horizontal Permo-Triassic sedimentary sequence underlain by the Hawkesbury Sandstone Formation and Ashfield Shale of the Wianamatta Group. Recent Quaternary age sediments associated with the Botany Basin sedimentary sequence overlie the basement bedrock. Buried valleys (paleo-channels) have been formed from fluvial bedrock erosion during the Pleistocene era, with depths ranging from a few metres to between 40m to 80m at locations near Sydney Airport and Botany Bay.

The Holocene valley-filling sediments, (Qha) which are present in the widened river valley, are expected to generally consist of peat, sandy peat and mud, and silty to peaty quartz sand, silt and clay, with common shell layers. Localised dredged estuarine sand and gravel, or man-made fill (mf) is indicated to the west of the Site. Localised fill and alluvial and beach deposits are present alongside the Site area.

Sandstone bedrock (Rh) in the Site area and Drummoyne typically consists of medium to coarse grained quartz Sandstone, with very minor shale and laminate lenses. A site inspection undertaken by GHD geotechnical staff on Wednesday 27 February 2019 indicates that the sandstone bedrock is observed as localised outcrops along the river banks and at shallow depths, extending outwards from the river banks as rock shelves and ledges. Cross bedded sandstone bedrock with sub-horizontal bedding, is shown in Figure 7.

Elsewhere within the river channel / valley, we envisage that bedrock may be encountered at geologically shallow depths (<10m) below the bed level near to the shore increasing to significant depth within the buried main river channel (>30m) below the river bed, overlain by a considerable thickness of river / marine 'mud'.



Figure 6 – Rock outcrops and shelves / ledges at the Site area

## 5.5 Hydrographic survey

A hydrographic survey for the Gladesville Marina was undertaken in 2016. The survey was undertaken by Harvey Hydrographic Surveys, with the survey results presented on a 1:500 scale Hydrographic Survey Plan, CAD Ref. GLADESVILLEMARINA2016, dated 15/08/2016.

The hydrographic survey shows:

- Foreshore details supplied by NSW Maritime;
- The results of river sub-bed probing (where taken) and
- Soundings taken using an Ceeducer Pro Survey echo-sounder (related to zero tide gauge at Fort Denison).

The presented bed level results of the hydrographic survey have been updated considering the survey results presented in Section 1.2 '*GBM Proposed Development*' and Figure 2 of the 2019 MPR ECOLOGY ASSESSMENT REPORT. Section 1.2 states that:

*"With regard to the existing and proposed Marina facilities:*

- *Current marina depths range from -3m to -5m below lowest astronomical tide (LAT) for the inner (southern) marina arm and berths, and -5.5m to -8m for the outer (northern) marina arm and berths.*
- *There are a series of shallow inshore berths offshore from the slipway, generally -1m to -2m.*
- *Depth ranges for proposed new floating pontoons and berths are consistent with the existing structure; -3 to -4.5m for the inner arm and -5.5m to -9m for the outer arm".*

Bed levels are observed to increase to >13m below datum north of the existing Marina berths.

## 5.6 Available site investigation information

Zoic Environmental ("Zoic") carried out site investigations of soil, sediments and groundwater at the site between 4th to 13th June 2019 (reference Zoic, 2019), as part of their contamination investigation. The site investigation comprised the sinking of five (5 No.) auger boreholes (BH01 – BH05) and the collection of three (3 No.) sediment samples. Boreholes BH01 and BH02 were combined borehole / groundwater well locations. The five boreholes were located within the GBM site facilities landside area (comprising buildings and concrete wharf / berth frontages as shown in Figure 5) at locations indicated in Zoic Figure 3. The three sediment samples were collected immediately offshore near this area. Zoic did not identify other boreholes within the site area.

The following geotechnical related observations are made from the Zoic site investigation report:

- Soils – generally comprised brown to dark grey clayey sand to gravel Fill material with sandstone cobbles (BH01, BH03) and wood (BH04). The Fill material is underlain by Sandstone bedrock ranging in depth from 0.2m below ground level (bgl) to 2.0m bgl;
- Soils were observed to be 'wet' immediately below the concrete (Marina hard standing surface) at between 0.5 – 0.9m bgl indicating groundwater flows running through the fill / soil layer immediately above the Sandstone bedrock. These were noted to follow the topographical decline towards the north-east;
- Sediment samples comprised fine to medium grained brown to dark grey silty sand with inclusions of gravel and shell grit;
- Groundwater was observed to be slightly alkaline to alkaline with reducing conditions in MW02. Highly saline conditions were observed in boreholes MW01 and brackish waters were encountered in borehole MW02;
- An Enviro-Screen report appended to Zoic's report indicates that a Class 5 acid sulphate soil risk exists on the site (works likely to lower water table or advancement to classes 1-4) with a high probability of occurrence (>70%).

As no *in-situ* tests such as SPT's were performed in these boreholes, soil strength or relative density assessment cannot be made from the provided soil descriptions.

The marine sediments are expected to comprise silty sand or sandy silt, clay and organic materials. Anthropogenic materials can be expected such as rock debris, bricks, chains / metal fragments.

J&K Pty Ltd ("J&K") have carried out on-land geotechnical site investigation for proposed alterations and additions at Gladesville Bridge Marina on 26 October 2010 (reference No.7, J&K). The proposed development comprises alterations and additions to the north eastern portion of the existing building. No offshore site investigation was undertaken.

The site investigation comprised the sinking of two (2 No.) cored boreholes (BH1 and BH2) with *in-situ* SPT testing and the collection of sandstone core samples.

The following geotechnical related observations are made from the J&K geotechnical site investigation report:

- Soils – Uncontrolled Fill was encountered to between 1.3m to 3.3m depth below ground level, taken as the existing concrete surface (bgl), underlain by residual clayey sands of medium density that grade into sandstone bedrock of medium strength. The depths to sandstone are highly variable from 1.3m to 3.85m bgl. Groundwater was encountered in BH1 at depth of about 0.9m bgl.
- Bedrock – Sandstone bedrock occurs at variable depths within the area investigated. Laboratory point load strength test results showed reasonable correlation with field assessments of rock strength. The approximate Unconfined Compressive Strengths (UCS) of the rock core, estimated from correlations with the point load strength index test results, varied from 6MPa to 16MPa indicating medium strength for intact Sandstone bedrock in BH1.

## 5.7 Available drawings

A series of design drawings, produced by International Marine Consultants Pty. Ltd. for Bellingham Marine in 1999, are presented in Appendix A. Drawing number 2003-102/B, titled 'PILE LAYOUT PROFILE & SCHEDULE' indicates a typical marina pile arrangement for 400mm to 450mm diameter driven marine piles.

Drawing number 2003-102/B contains a schematic pile installation diagram, which is reproduced below in Figure 8.

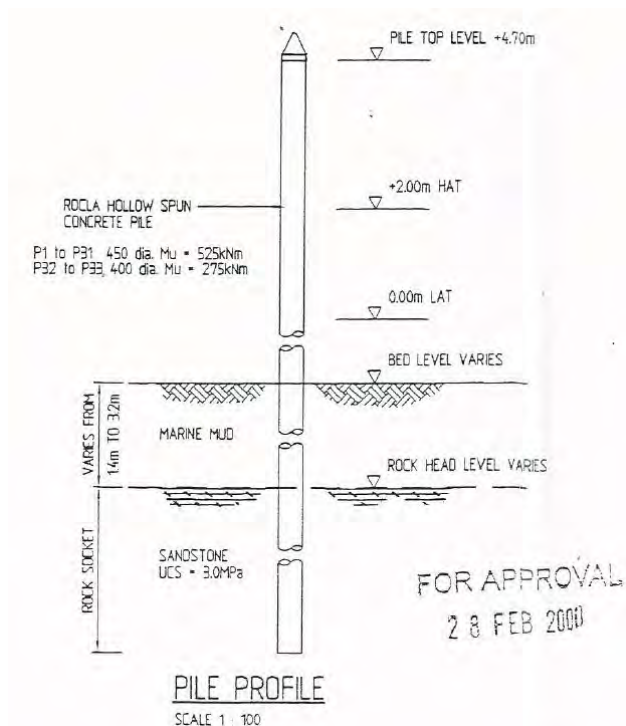


Figure 7 – Indicative marina pile layout

This profile and the Pile Schedule on the design drawing indicates that the marine piles will need to be installed through a considerable thickness of river / marine 'mud' of between 14m to 32m thickness, with a 2.5m rock socket, indicating total pile lengths of up to 40m including the berthing section (above bed level). This information is an estimate for design purposes, with exact pile lengths dependent upon the positioning of new berths relevant to water depth, sediment depths and buried bedrock levels.

## 5.8 Pile embedment information

An indication of the expected pile lengths for the new Marina floating berths can be obtained from examination of limited as-supplied piling information for the berth piling works carried out in 2000. A series of emails have been provided to GHD (under reference No. 8).

The following geotechnical related observations are made from the as-supplied piling records and associated information:

- drill information provided by Symmetry Surveying Pty indicates that the depth of sedimentary materials from the sea-bed to firm material is 7.3m at pile position P9 (location indicated on Drawing number 2003-102/B). It is assumed that this is above the bedrock;
- drill information provided by Symmetry Surveying Pty indicates that the depth of embedment sedimentary materials from the sea-bed to firm material is 5.5m at pile position P14. It is assumed that this is above the bedrock;
- pile embedment depths under the pile self-weight were 5.5m and 3.4m, respectively, confirming the very soft / loose / weak nature of the sea-bed sediments;
- The following pile installation records were contained in the email.



Pile No.	Position Easting	Position Northing	Top of Pile (R.L.)	Length supplied (m)	Diameter (mm)	Type	Sea Bed (R.L.)	Top of Pile (R.L.)	Embed. (Total) (m)	Depth driven (m)	Final Set (mm)	Date drilled/driven
P27	456.935	3789.713	4.70	18.00	450	Conc.	-6.40	-13.29	6.89	1.42	20	24.03.2000
P28	463.412	3774.761	4.70	17.00	450	Conc.	-5.90	-12.24	6.34	1.36	35	28.03.2000
P29	475.698	3779.163	4.70	17.00	450	Conc.	-5.70	-12.24	6.54	0.37	60	27.03.2000
P30	481.482	3798.507	4.70	18.00	450	Conc.	-6.60	-13.25	6.65	N/A	N/A	25.03.2000
P31	488.038	3787.413	4.70	17.00	450	Conc.	-5.40	-12.28	6.88	1.98	30	27.03.2000
P32	395.396	3742.031	4.70	15.00	400	Conc.	-5.50	-10.22	4.72	1.71	30	16.03.2000
P33						Conc.						

From this data it can be seen that, for the six piles installed:

- average pile lengths supplied were between 15.00 to 18.00m;
- the pile embedment depths (taken as depth below sea-bed) are variable and ranged from 4.72m to 6.89m;
- the pile driven depths (taken as the pile length driven into hard strata or bedrock pile founding material) using a 2T (2 tonne) pile driving hammer generally ranged from 1.36m to 1.98m with one result of 0.37m and one result recorded as "N/A" (not available?).

These recorded as constructed pile installation depths may be used for guidance purposes for the piling for the nearshore new Marina floating berths. As indicated in Section 5.4, the thickness of river / marine 'mud' and hence depth to bedrock can be expected to increase with distance away from the shore. An additional allowance for the thickness of marine mud as indicated in Figure 8 should be allowed for, with reference to piling for the berths farthest from the shore.

## 5.9 Pile design and construction requirements

The new marina will require the design and installation of marine piles suitable for long term installation in the marine environment. The pile design is to be carried out in accordance with the relevant Australian Standards and guidelines which includes the following:

- Standards Australia AS 4997-2005. *Guidelines for the design of maritime structures*
- Standards Australia AS 2159-2009. *Piling - design and installation*

Marina piles can be formed from dense spun pre-stressed reinforced concrete giving a pile with strength, durability and low maintenance costs. The piles will be designed for the new floating marina pontoon moorings and site condition loads and will be driven to refusal into the underlying bedrock. Such piles are typically available in lengths of up to 24m and will require pile driving using floating equipment such as specialist barges and pontoons including a floating crane for pile handling and pile driving. A range of fittings allows the piles to be easily incorporated into fixed structural elements such as pontoons, jetties, walkways and ramps.

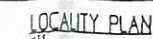
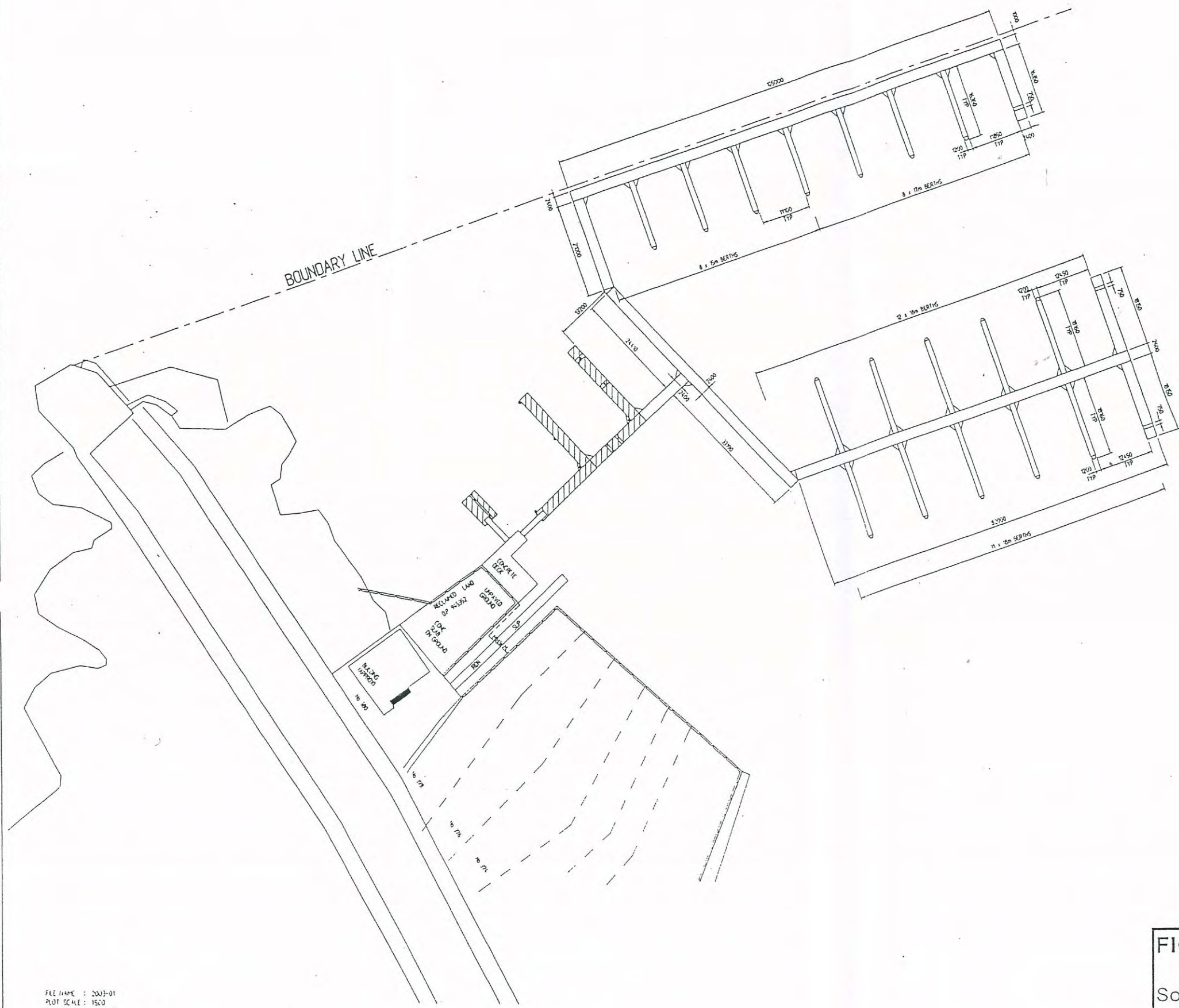
## 6. Technical references

1. Sydney 1:100,000 scale Geological Series Sheet 9130, Geological Survey of NSW Department of Minerals and Energy, Edition 1, 1983.
2. Herbert, Geology of the Sydney 1:100,000 Sheet 9130 (explanatory report), New South Wales Geological Survey, 1980.
3. NSW Department of Natural Resources website, NSW Natural Resources Atlas, <http://nratlas.nsw.gov.au>, March 2015.
4. Zoic Environmental (2019). *Contamination Investigation, Alterations and Additions to the Gladesville Bay Marina 380 Victoria Place, Drummoyne, NSW 2047*. Doc. Ref. 18166, Issue 1, (DRAFT) 2 August.
5. Department of Environment and Climate Change NSW (2007). *ENVIRONMENTAL ACTION FOR MARINAS, BOATSHEDS AND SLIPWAYS*, June.
6. J&K Pty Ltd (2010). *Report to NRS PROPERTIES PTY LIMITED C /-CANDALEPAS ASSOCIATES on GEOTECHNICAL INVESTIGATION for PROPOSED ALTERATIONS AND ADDITIONS at GLADESVILLE BRIDGE MARINA 380 VICTORIA PLACE, RUMMOYNE, NSW*. 12 November 2010, Ref: 24281Vrpt Drummoyne.
7. International Marina Consultants (2000) – Fax titled ‘*Gladesville Bridge Marina – Pile Embedment*’, to Bellingham Marine, New Zealand, dated 22 March 2000 (plus attachments).
8. Marine Pollution Research Pty Ltd. (2019). *GLADESVILLE BRIDGE MARINA EIS - ECOLOGY ASSESSMENT REPORT*. MPR Report No. MPR 1162, Ver.3, 4 October.

# Appendices

# Appendix A – IMC Drawings





- NOTES:
1. ALL DIMENSIONS ARE SHOWN IN MILLIMETRES.
  2. PONTOON DIMENSIONS ARE NOMINAL AND DO NOT INCLUDE TIMBER WALERS.

### LEGEND



EXISTING PONTOON

BERTH SCHEDULE	
BERTH SIZE	NUMBER
15m	8
17m	8
18m	23
TOTAL	39

FIGURE 1 PROPOSED LAYOUT

Source: Bellingham Marine

**UNIFLOAT.**  
Precision engineering flotation systems

No.	Date	Description
Revisions		

This plan is copyright and cannot be used or reproduced without the written permission of International Marine Consultants.

International  
Marina  
Consultants

Consultants to the Marina Industry.

International Marina  
Consultants Pty. Ltd.  
A.C.N. 079 905 481

Suite 305 "Toowong Tower"  
9 Sherwood Road Toowong Qld 4066  
Australia  
Phone (07) 3371 1711 Fax (07) 3371 1722  
Email: [inc@mc-mamas.com](mailto:inc@mc-mamas.com)

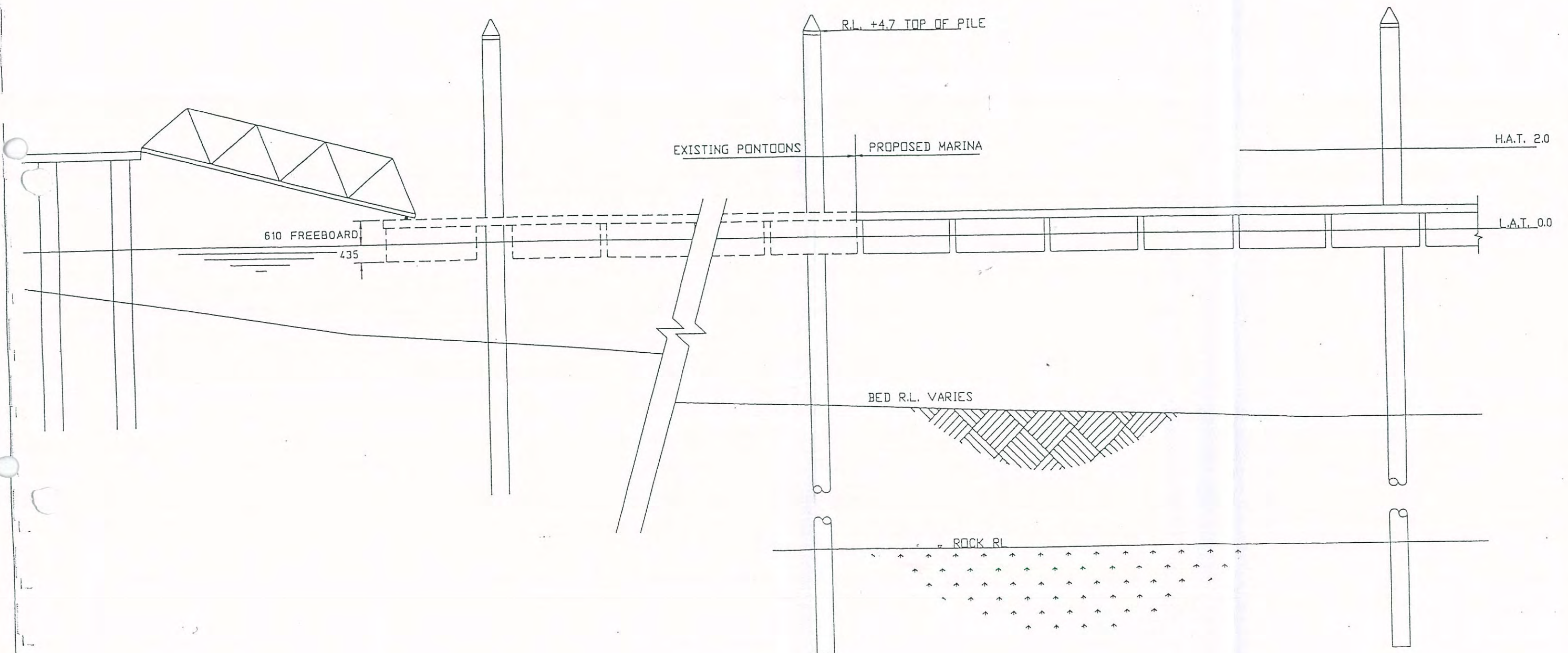
Client  
BELLINGHAM MARINE  
AUSTRALIA PTY. LTD.

PROJECT  
GLADESVILLE BRIDGE  
MARINA

Time  
PROPOSED LAYOUT

Drawn By	Designed By
Drawing Check	Engineering Check
Approved	Scale 1500
Drawing No. 2003-01	Unit





ELEVATION

**Bellingham**  
**MARINE**  
Innovative harbour  
and waterfront solutions

22 Sinnaman Road  
Seventeen Mile Rocks Qld 4073  
Australia

Bellingham  
Marine  
Australia Pty. Ltd.  
A.C.N. 074 864 887

Phone (07) 3376 6955  
Fax (07) 3376 7955  
International (617)

**PACIFIC**  
Marina Flotation System

Email: sales@bellingham-marine.com.au  
Website: www.bellingham-marine.com

This plan is copyright  
and cannot be used  
or reproduced without  
the written permission  
of Bellingham Marine  
Australia Pty Ltd.

AMENDMENT:

FIGURE 2 GENERAL ELEVATION

Source: Bellingham Marine

Date: 30/07/98

Drawing: Gladesville-02

Scale: 1 :100

Drawn by: E Jansen

Chk'd

App'd by:



## GENERAL NOTES :

- 1.0 ALL DIMENSIONS AND LEVELS ARE TO BE VERIFIED ON SITE.
- 2.0 WHEN IN DOUBT 'ASK' DO NOT SCALE.
- 3.0 ALL DIMENSIONS ARE SHOWN IN MILLIMETRES.
- 4.0 ALL LEVELS ARE SHOWN IN METRES AND ARE REDUCED TO L.S.L.W.
- 5.0 PILES
  - TOLERANCE FOR DRIVING IN PLAN  $\pm 50$  mm, MEASURED AS THE WORST COMBINATION OF PLAN DEVIATION AND OUT OF PLUMB OVER THE FULL TIDAL RANGE.
  - VERTICAL = 1 IN 100 MAX OUT OF PLUMB
  - CONTRACTOR TO ADVISE ENGINEER IF BED LEVEL AND /OR ROCK HEAD LEVEL DIFFERS FROM DESIGN LEVEL BY MORE THAN 400mm.

- 6.0 PONTOON DIMENSIONS ARE NOMINAL.
  - DIMENSIONS ARE MEASURED CONCRETE TO CONCRETE AND DO NOT INCLUDE WALERS AND FENDER STRIP.
- 7.0 PONTOONS ARE TO BE CONNECTED TOGETHER WITH TIMBER WALERS.
- 8.0 ALL THRU-RODS ARE TO BE M20 NOMINAL ROLL THREADED ROD (GALV.) EX 18.5mm DIA., SPACING TO VARY WITH LOCATION.

- 9.0 ALL KNEE BRACKETS TO BE 1800mm x 1200mm U.N.D.
- 10.0 ALL TIMBER DESIGN AND CONSTRUCTION TO BE IN ACCORDANCE WITH AS 1720.1 - 1997.
  - WALER SIZES

LOCATION	WALER SYSTEM
FINGERS	2/50 x 200 GRADE F17 HW
INNER WALKWAY AND LINKWAY	2/50 x 200 GRADE F17 HW + 40 x 200 GRADE F8 SOFTWOOD COVER BOARD
OUTER WALKWAY	2/50 x 250 GRADE F17 HW + 40 x 200 GRADE F8 SOFTWOOD COVER BOARD

- ALL STRUCTURAL TIMBER TO BE GRADE F17 HARDWOOD, JOINT GROUP JD1.
- ALL TIMBER TO BE SEASONED AND TREATED IN ACCORDANCE WITH AS 1604.
- STRUCTURAL TIMBER MUST NOT BE CUT OR DRILLED FOR ANY REASON OTHER THAN SHOWN ON THESE DRAWINGS.

- 11.0 ALL STEEL TO BE GRADE 300 PLUS MINIMUM U.N.D.  
ALL STEEL PLATE TO BE GRADE 250 MINIMUM U.N.D.
- 12.0 ALL WELDS TO BE COMPLETE PENETRATION BUTT WELD OR 5mm FILLET WELD AS REQUIRED U.N.D.
- 13.0 ALL STEEL WORK TO BE HOT DIPPED GALVANISED IN ACCORDANCE WITH AS 1650.
  - a. ABRASIVE BLAST CLEAN TO CLASS 2 $\frac{1}{2}$  - AS 1627.4
  - b. HOT DIP GALVANISE
    - AVERAGE COATING 600 g/m<sup>2</sup>
    - EQUIVALENT THICKNESS 85 MICRONS
- 14.0 ALL ALUMINIUM WORK TO BE IN ACCORDANCE WITH AS 1664.
  - ALL EXTRUSIONS TO BE TYPE 6061 U.N.D.
  - PLATES TO BE TYPE 5083 U.N.D.
  - ALL WELDS SHALL BE INERT GAS WELD USING TIG WELDING PROCESS.

- 15.0 ALL STEEL AND ALUMINIUM WORK SHALL BE NEATLY FINISHED WITH ALL SHARP EDGES GROUND SMOOTH.

- 16.0 PILE GUIDE BLOCKS ARE TO BE ADJUSTED AS REQUIRED TO SUIT PILE SIZE AND POSITION ON SITE.
  - CLEARANCE MUST BE PROVIDED BETWEEN PILE AND GUIDE TO PREVENT "HANGING" OF PONTOON UNDER THE FULL TIDAL RANGE.

- 17.0 CONCRETE
  - ALL CONCRETE WORKS SHALL COMPLY WITH AS 3600
  - MINIMUM CONCRETE STRENGTH f<sub>c</sub> = 35MPa
  - ALL REINFORCEMENT TO BE HOT DIPPED GALVANISED
  - MINIMUM COVER TO REINFORCEMENT = 25mm
  - FIBREMESH ADDITIVE TO CONCRETE = 900 g/m<sup>3</sup>
  - MAXIMUM AGGREGATE SIZE SHALL BE 10mm TO AS 2758.1
  - MINIMUM CEMENT CONTENT SHALL BE 360 kg/m<sup>3</sup>

- 18.0 KNEE BRACKET INFILL PANELS TO BE UNIMOLD MULTI-PURPOSE PANEL U.N.D.  
ALL PANELS TO BE FIXED TO COMPLY TO MANUFACTURERS SPECIFICATIONS.

### 19.0 INSULATION

BOLTED MATERIAL	INSULATING MATERIAL
ALUMINIUM / GALV. STEEL	BARIUM CHROMATE JOINING COMPOUND OR EQUIVALENT
ALUMINIUM / CONCRETE	3mm NEOPRENE
STEEL / CONCRETE	3mm NEOPRENE

### 20.0 DESIGN PARAMETERS

- WIND
- BASIC WIND SPEEDS
    - V<sub>u</sub> = 50 m/s
    - V<sub>s</sub> = 38 m/s
  - TERRAIN CATEGORY TC2
  - GUST DURATION = 30sec
- WAVE
- WIND GENERATED WAVE
    - N.W. H<sub>s</sub> = 0.42m T<sub>s</sub> = 154sec
    - N.N.E. H<sub>s</sub> = 0.5m T<sub>s</sub> = 19sec
  - BOAT WAKE
    - H<sub>1</sub> = 0.4m T<sub>s</sub> = 2.0 to 2.5sec

- CURRENT
- OUTER ARM V = 1.0m/s
  - INNER ARM V = 0.5m/s

- LIVE LOAD ON PONTOONS
- MAX. UNIFORM LIVE LOAD 3 kPa
  - FREEBOARD UNDER DEAD LOAD 600mm (APPROX.)

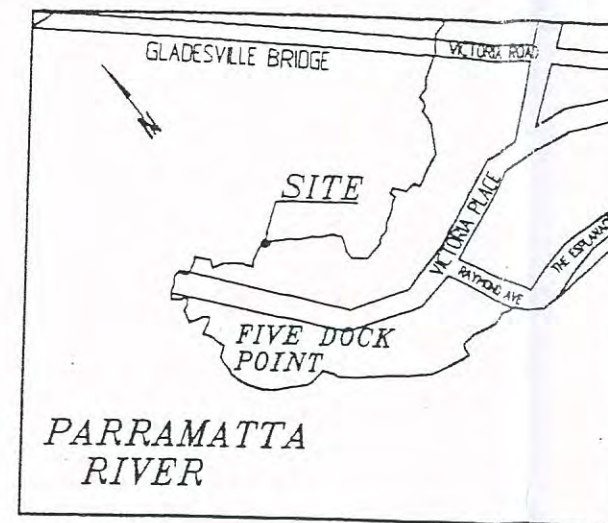
- BERTHING IMPACT
- APPROACHING VELOCITY
    - v = 0.3m/s

- DESIGN VESSELS
- ALL VESSELS ARE ASSUMED TO BE POWER BOATS.

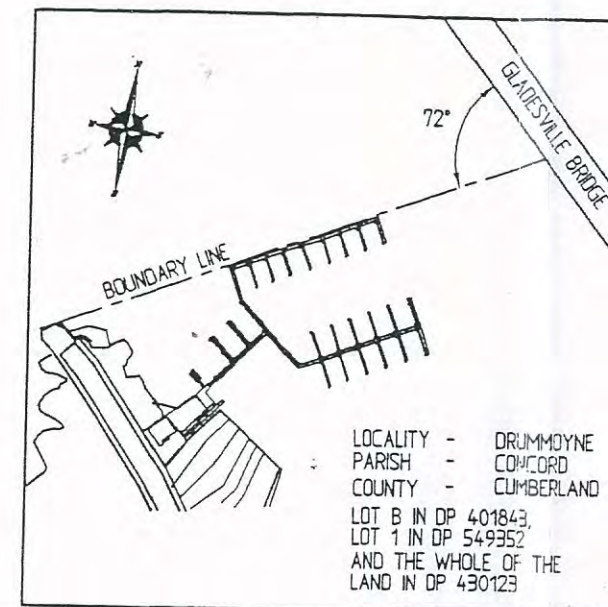
VESSEL (m)	PROFILE AREA (m <sup>2</sup> )		DISPLACEMENT (t)
	HEAD	BEAM	
12	11.0	29.0	10.1
15	18.0	45.0	15.8
17	20.7	57.7	20.4
18	22.0	64.0	22.7

- 21.0 ALL DIMENSIONS MARKED \* TO BE CONFIRMED ON SITE.

- 22.0 PROVIDE FOUR STANDARD MOORING CLEATS PER BERTH



LOCALITY PLAN  
N.T.S.



SITE PLAN  
SCALE 1:5000

FOR APPROVAL

28 FEB 2000

**Bellingham**  
MARINE  
Innovative harbour and waterfront solutions  
22 Sinnamon Road  
Seventeen Mile Rocks Qld 4073  
Australia  
Phone: (07) 3376 6955  
Fax: (07) 3376 7955  
International: (617)  
Email: sales@bellingham-marine.com.au

**UNIFLOAT**  
Precision engineering flotation systems

B 28/2/00 AMENDMENT TO COMPLY WITH DA APPROVAL  
A 20/1/00 NOTE No. 22 ADDED

#### Revisions

This plan is copyright and cannot be used or reproduced without the written permission of International Marina Consultants

**International Marina Consultants**  
Consultants to the Marina Industry.  
International Marina Consultants Pty. Ltd.  
A.C.N. 079 905 481  
Suite 305 "Toowong Tower"  
9 Sherwood Road Toowong 4066  
Australia  
Phone: (07) 3371 1711 Fax: (07) 3371 1722  
Email: imc@imc-marinas.com

#### CLIENT:

**BELLINGHAM MARINE AUSTRALIA PTY. LTD.**

#### PROJECT:

**GLADESVILLE BRIDGE MARINA**

#### TITLE:

**GENERAL NOTES**

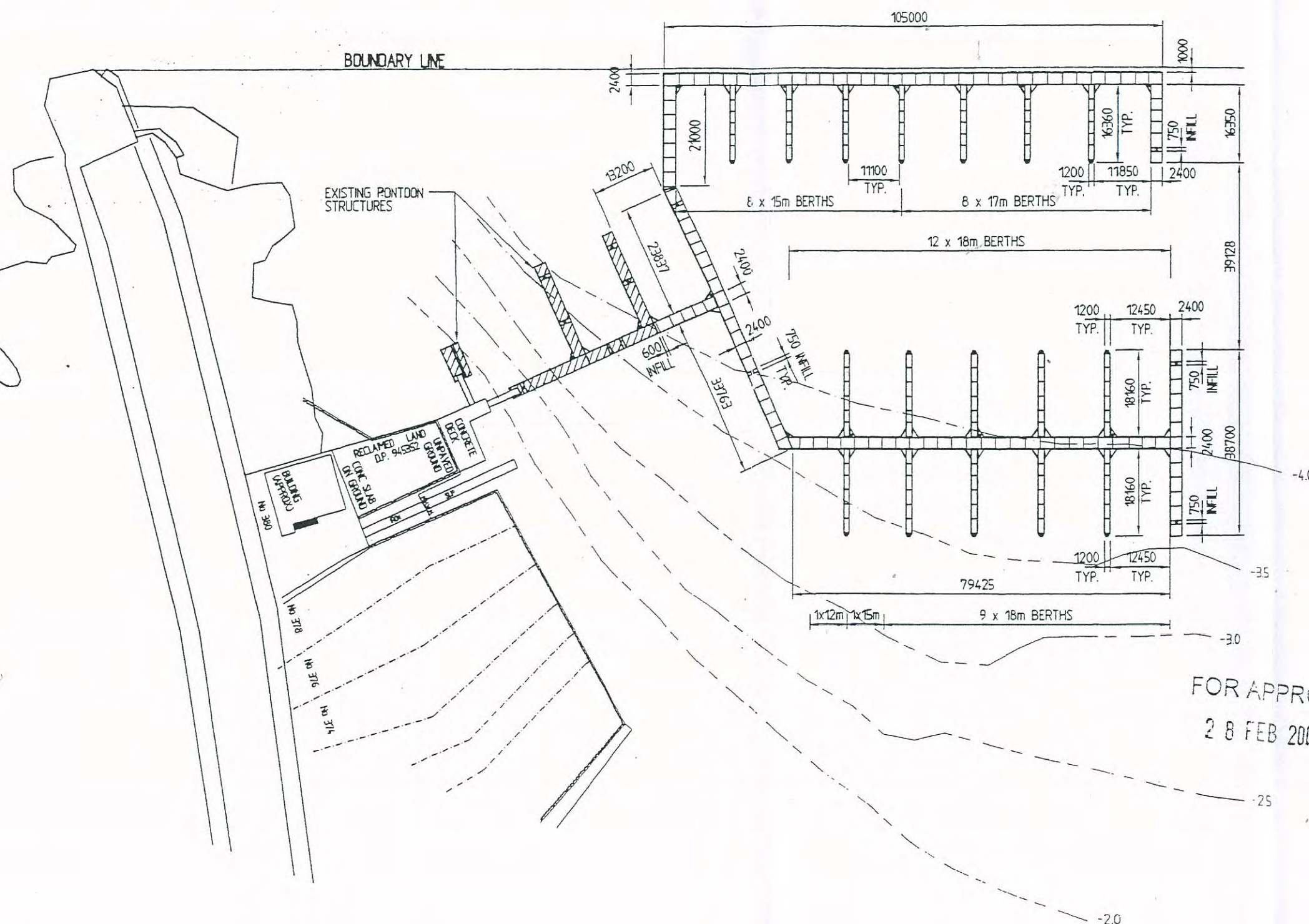
Date: 2/12/99  
Drawing No.: 2003-100/B  
Scale: NIL  
Drawn By: W.L. Designed By: K.C.  
Approved By: C.H.A.





10 FOR GENERAL NOTE REFER DRAWING No. 2003-100.

— — — CONTOUR



FOR APPROVAL  
28 FEB 2000

# International Marina Consultants

Consultants to the Marina Industry.

International Marina  
Consultants Pty. Ltd.  
A.C.N. 079 905 481

Suite 305 "Toowong Tower"  
9 Sherwood Road Toowong 4066  
Australia  
Phone (07)3371 1711 Fax (07)3371 1722  
Email : [imc@imc-marinas.com](mailto:imc@imc-marinas.com)

CLIENT:

BELLINGHAM MARINE  
AUSTRALIA PTY. LTD.

PROJECT:

GLADESVILLE BRIDGE  
MARINA

TITLE:

## GENERAL ARRANGEMENT

Date: 9/12/99

Drawing No.: 2003-101/B

Scale: 1:1000

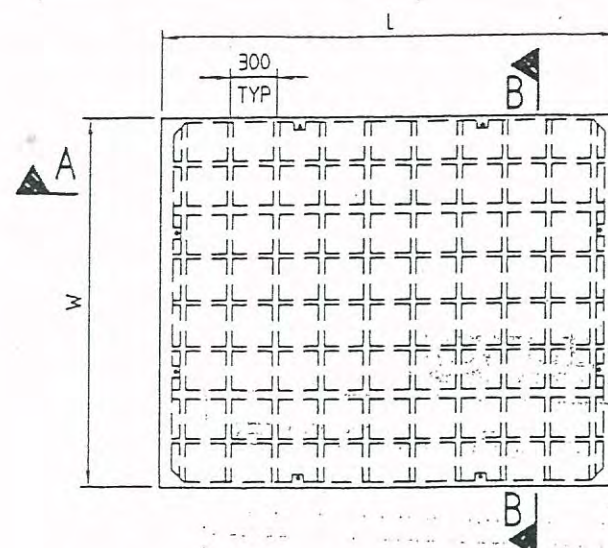
Drawn By: W.L.	Designed By: K.C.
----------------	-------------------

Approved By: C.H.A.



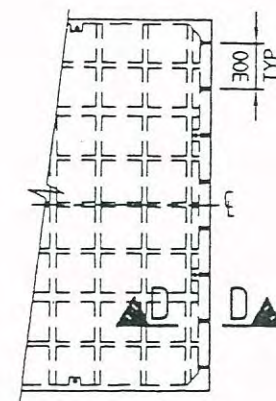
# NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. PROVIDE STAINLESS STEEL INSERTS AS REQUIRED TO END OF LAST PONTOON ONLY TO WALKWAYS AND FINGERS.
3. CONCRETE STRENGTH  $f_c' = 35\text{MPa}$ .
4. MINIMUM COVER TO REINFORCEMENT = 25mm
5. ALL REINFORCEMENT TO BE HOT DIPPED GALVANISED.
6. MATERIAL SIZES MAY BE VARIED BY THE MANUFACTURER WITHOUT NOTICE TO COMPLY WITH SPECIFIC APPLICATIONS.
7. DIMENSION 'D' VARIES TO SUIT FREEBOARD REQUIREMENTS.



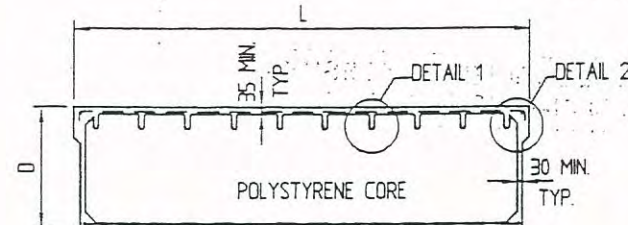
PLAN - TYPICAL WALKWAY PONTOON  
(2400 WIDE SHOWN)

SCALE 1:50



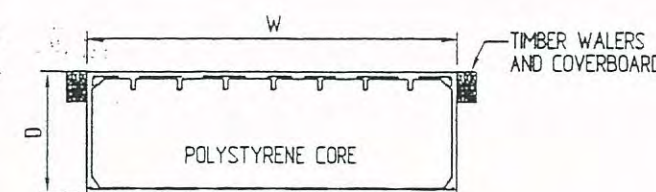
PART PLAN SHOWING  
INSERT AT ONE END

SCALE 1:50



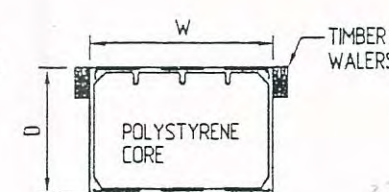
SECTION A - A

SCALE 1:50



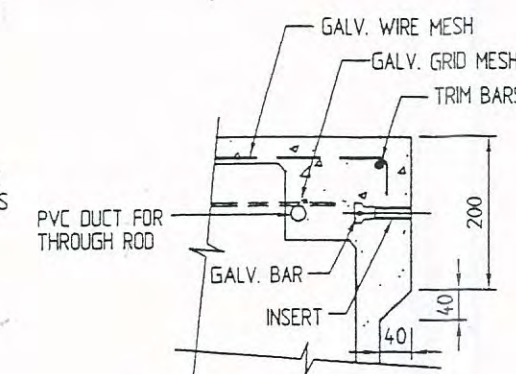
SECTION B - B

SCALE 1:50



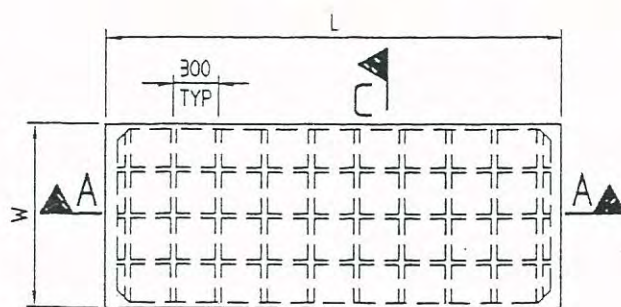
SECTION C - C

SCALE 1:50



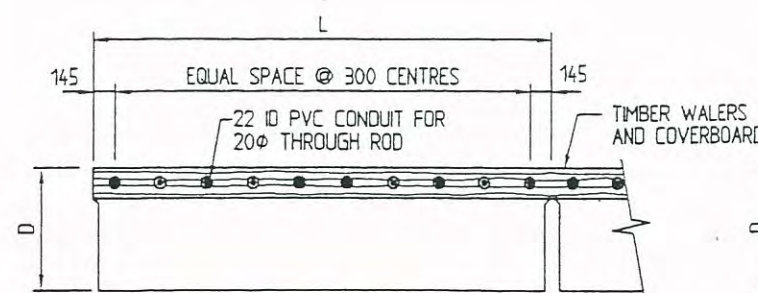
SECTION D - D

SCALE 1:10



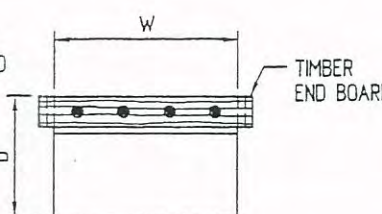
PLAN - TYPICAL FINGER PONTOON  
(1200 WIDE SHOWN)

SCALE 1:50



ELEVATION

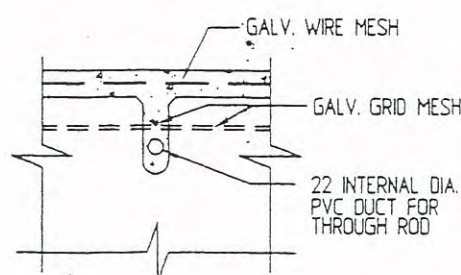
SCALE 1:50



END ELEVATION

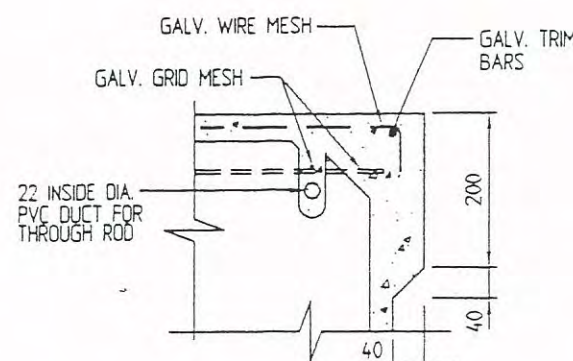
SCALE 1:50

DIMENSION SCHEDULE		
TYPE	L	W
12/3.0	2990	1200
12/2.4	2390	1200
24/3.0	2990	2400
24/2.4	2390	2400



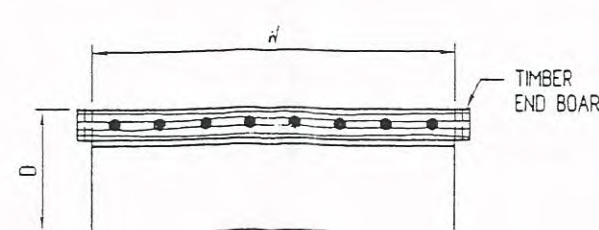
DETAIL 1

SCALE 1:10



DETAIL 2

SCALE 1:10



END ELEVATION

SCALE 1:50

FOR APPROVAL

22 DEC 1999

Revisions

This plan is copyright and cannot be used or reproduced without the written permission of International Marina Consultants

**International  
Marina  
Consultants**

Consultants to the Marina Industry.

International Marina  
Consultants Pty. Ltd.  
A.C.N. 079 905 481

Suite 305 "Toowong Tower"  
9 Sherwood Road Toowong 4066  
Australia  
Phone (07)3371 1711 Fax (07)3371 1722  
Email: imc@imc-marinas.com

CLIENT:

BELLINGHAM MARINE  
AUSTRALIA PTY. LTD.

PROJECT:

GLADESVILLE BRIDGE  
MARINA

TITLE:

STANDARD FLOAT  
DRAWING

Date: 2/12/99

Drawing No.: 2003-103

Scale: 1:50

Drawn By: J.C. Designed By: W

Approved By: C.A.