MWPA WHARF SPECIFICATION BOOKLET

Commercial Shipping Harbour and Fishing Boat Harbour

A summary of Berth Facilities and Capacities at Geraldton Port

Version	Revision Date	Details	Prepared By	Reviewed By	Authorised By
A	Oct 2000	Issued for Client Review	CV	RM/AK	
B	Jul 2000	Final issue	CV		
C	Jan 2002	Revised Final Issue	CSS	CV	KH
D	Jun 2013	MWPA Updates as follows: Items inserted: Appendix B3: 2 x Load Capacity Plans - 0.3 x 0.3m Outrigger Pad Appendix F: Berthing Matrix and Depth Data Sheet Appendix G: Datum definition drawing 07464-C-004-Rev2: Berth 4 Front Infill Load Capacity Plan (1.2m x 1.2m pad) 207464-C-005-Rev2: Berth 4 Front Infill Load Capacity Plan (2m x 2m pad) Drawings Replaced: Drg No. A177-26-C-003 Rev D with 207464-DW-C-002 Rev 2 Drg No. A177-26-C-005 Rev D with A177-26-C-005 Rev E Drg No. A177-26-C-103 Rev A with 207464-DW-C-001 Rev 2 Drg No. 207464-DW-C-001 Rev 0 with 207464-DW-C-001 Rev 2 Drg No. A177-26-105 Rev A with A177-26-C-105 Rev B	JR/RF	JR	IMc
E	Oct 2013	Text updated throughout Items inserted: Appendix H: Bollard location, reference number and type Bollard location drawings	PJD	PJD	
F	Oct 2014	Text updated throughout and Berthing Matrix appendix added	PJD	PJD	
G	Jul 2015	Minor update and released/published			
H	Sep 2015	Released for use with new drawings			
I	Jun 2018	Updated capacities and associated reference material			

Version	Revision Date	Details	Prepared By	Reviewed By	Authorised By
J	Jan 2020	Removed information duplicated in Aecom Berthing Capacity Assessment 2014 A503432 Updated Berth 1+2 Capacities as per Aecom Report Jan 2019 A1167678 Updated Berth 3 Ext, B4 Rear Cantilever and Berth 5 Load Ratings after MCM Berth Strengthening Works 2018 / 2019 Included B4 Shiploader crane location drawing Included B6 LHM280 Crane Location drawings from 12911N Rev C Report A1310733 Included B6 Hopper Capacity from D+A Report P0020-R-001 Rev 0 A925725 Updated construction details B1-B3 and included additional Original Drawings in Appendix H Included Bollard Strengthening Changes Removed berthing and other marine information and referred to the new Berthing Parameters document	JH	JR/CS	PD
K	Jun 2024	Add 2022 B4 Deck Strengthening Works and B5/B6 additional bollards Add 4 No. QRHs and 4 x 125T bollards to the eastern end of B4 Add 4 No. 125T bollards to southern end of B6 Add new Hopper data to B6	JH	SS	IMc

Table of Contents

1 Introduction, Interpretation and Limitations

This document presents a list of current facilities within the Commercial Shipping Harbour and of some facilities within the Fishing Boat Harbour of the Geraldton Port. It does not address jetties in the Work Boat Base Marina (for example, Tug and Pilot Boat Facilities).

The Wharf Specification Book describes the facilities and their capacities in terms of berthing, mooring and deck loads, as well as providing a list of the equipment on the facilities. Berth 7 is privately owned infrastructure and any information pertaining to this berth should be verified with the owner prior to accessing the site.

Unless indicated otherwise the notional capacities in this book are based on designs. Individual components may be downgraded from time to time because of the prevailing condition of asset components and accordingly the status should always be checked with the Mid West Ports Authority (**MWPA**) Engineering Department.

In 2018 a Berth Structural Mooring Load Capacity assessment was completed by D+A, reductions in capacity for Berths 3, 4 and 6 were put in place. The load capacity plans in the book depict those reductions from the design capacities.

The book is intended to cover the loading cases as shown on the drawings and any diversion from these should be referred to the Engineer for comment. Also refer to Section 9 for disclaimer information.

No work on berths is permitted other than in accordance with the MWPA 'Permit System'.

MWPA Procedure 4.1 - Permit to Work Procedure indicates that permits are required for any shore based crane lift, vessel based crane lift (other than those vessel-based lifts that are exempt) or the stacking of loads onto a wharf. Land based crane lifts include all lifts when cranes are set up on wharves.

Apart from No Load zones applicable to some areas of Berths, the following uniformly distributed loads (UDL) generally apply to the berths when using vessel based lifts/wharf loading arrangements. (See drawing 009-MA-0011 in Appendix A for more detail).

Table 1 – Wharf UDL Capacities With / Without Vessel Alongside

Berth	UDL (With Vessel Alongside)	UDL (Without Vessel Alongside)
Berth 1	2.5 T/m^2	3.4 T/m^2
Berth 2	2.5 T/m^2	3.4 T/m^2
Berth 3	1.0 T/m^2	5.0 T/m^2
Berth 3 Ext.	0 T/m^2	1.5 T/m^2
Berth 4 Ext.	4.5 T/m^2	4.5 T/m^2
Berth 4	1 T/m^2	4.5 T/m^2
Berth 5	4.5 T/m^2	4.5 T/m^2
Berth 6	2.0 T/m^2	3.4 T/m^2, 8.0 T/m^2 in load out zone

**** There is a 0.5T/m² UDL restriction within a 6m wide x 12.2m long exclusion zone around any live bollard (Appendix B 009-MA-0012)***

To determine loading capacity on decks current information can be obtained by contacting permits@midwestports.com.au or by contacting the Duty Wharf Supervisor on 0437 413 734. Where there is any doubt about the need for a permit, contact should be made to the number above.

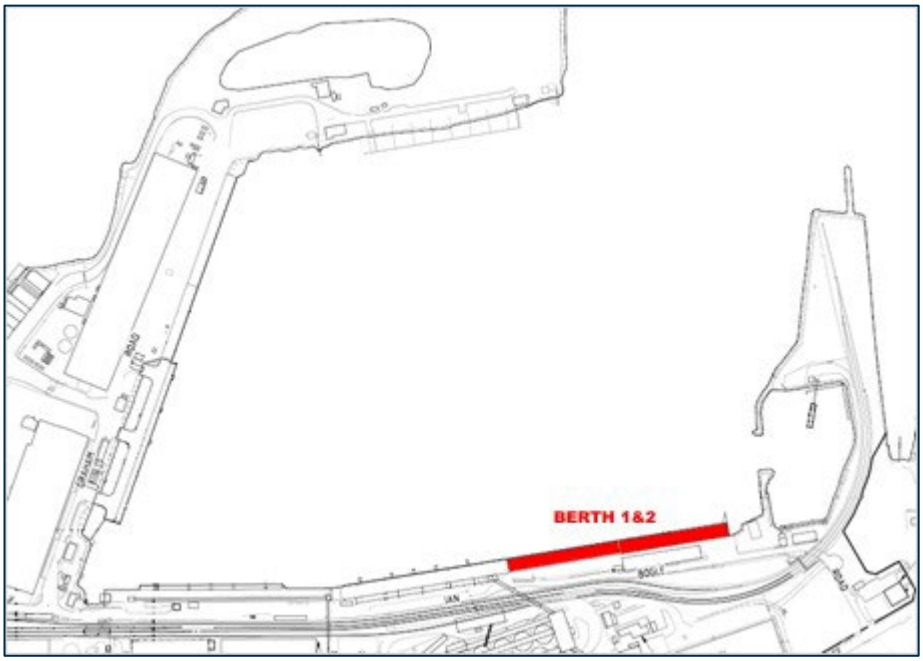
The reference within this book to bollards of capacities at given berths relates to the bollards that are fixed along the length of the wharf or at either adjacent mooring anchor blocks or adjacent mooring dolphins. Note that a vessel positioned at a berth might utilise bollards located at an adjacent wharf. Mooring layouts are at the instruction of the marine pilots and Harbour Master.

All aspects of the Load Capacity Plans must be complied with. These requirements include the following.

- Positioning relative to beams and piles.
- Load exclusion zones for single and multiple bearing loads.
- The nominated loadings are gross loadings, that is, includes the effect of wind, slewing, luffing, and the like.
- The dynamic multiplier for the lifting operation is assumed to be 1.0. Should the dynamic multiplier exceed this the nominated loadings will have to be reduced accordingly (refer to Appendix E).
- Cranes are only operated within the in-service wind conditions as set out in the appropriate Australian Standard.
- No other loads, (including mooring loads), are permitted within 5m from each crane outrigger pad (refer Appendix B).
- Minimum outrigger pad size is 1.2m x 1.2m as shown on the relevant load plan drawing.
- Minimum distance between outrigger pads is 7.0m, centre to centre.
- No ship berthing is to be conducted during lifting operations.
- Authorisation of outrigger load distribution pads by the MWPA engineer is required.

2 Berths 1 and 2

Figure 1 – Berths 1 and 2 Location



Berths 1 and 2 are located at the south-east corner of the Commercial Shipping Harbour in the Port of Geraldton, refer dwg 010-G-0022 in Appendix A.

The combined wharf structure along Berth 1 and Berth 2 is 277.8m, with a deck elevation at the front edge of approximately +3.75m Port Datum (Port Datum = 0.547m below AHD). Be aware that the port datum has changed over time and that older drawings, including some appended to this document, may reflect what at first glance may seem to be different levels.

2.1 DESCRIPTION

The original wharf structure was built around 1931 and included the original Berth 3 wharf. The Berth 1 and 2 wharf were refurbished in 1999/2000 by constructing a new concrete deck on top of the old concrete deck. The new deck was connected to the existing piles by dowels drilled into the top of the piles and 4 no. tie-backs were installed. The old concrete deck and concrete beams are significantly deteriorated and provide very little structural capacity to the deck. In 2018 an additional 24 tie-backs were installed. These anchors supplanted the deteriorated capacity of the existing transverse concrete beams to ensure the global lateral stability of the wharf.

2.2 DECK LOAD CAPACITY

The general deck capacity is:

- No vessel or mooring lines: Uniformly Distributed Load of 3.4 tonne/m^2 (refer dwg 009-MA-0011 Appendix A);
- Vessel alongside: Uniformly Distributed Load of 2.5 tonne/m2, UDL limited to 0.5tonne/m^2 within a 6m wide x 12.2m long exclusion zone around any Bollard with a mooring line attached (refer dwg 009-MA-0011 in Appendices A + 009-MA-0012 in Appendix B);
- Wheel Load from a T44 or B-Double Truck (refer Appendix D); and
- Weight of a fully loaded ‘Stevens’ Hopper. When the Hopper is in use there is to be a minimum 50m separation between the Hopper (and Truck being loaded) to any other truck.

The 1.2m x 1.2m crane outrigger load capacity of the wharf deck for Berths 1 + 2 is detailed on Drawing No. 009-MA-0012 in Appendix B.

Note: The use of different sized outrigger arrangements will result in different localised vertical loads to those referred to in Appendix 009-MA-0012 in Appendix B. To seek approval for alternative load arrangements, which fall outside the conditions of the wharf load capacity plans provided in 009-MA-0012 in Appendix B, contact the MWPA Engineering Department.

2.2.1 Loading Restriction Clarification

T44 = standard truck load of 44 tonnes (also see dwg 009-MA-0011 in Appendix A):

- Front axle = 4.8 tonnes
- Rear axle = 9.6 tonnes each x 4 axles

B-Double = standard truck load of 62.5 tonnes, 27.5m long (also see Appendix D Table C6.2(C)

- Front axle = 6.0 tonnes
- Tandem axle = 16.5 tonnes
- Triaxle = 20.0 tonnes
- Triaxle= 20.0 Tonnes

Mobile Fertiliser Hopper (Steven's)

- Self-weight of Steven's Hopper (on wheels) = 22 tonnes
- Self-weight of Steven's Hopper + weight of grain inside hopper (on skids) = 135 tonnes
- Two Number skids each of dimensions: 6.73m X 0.64m

2.3 BOLLARD CAPABILITIES

Berths 1 and 2 mooring bollards range in capacity from 20 tonne to 75 tonne. Two inshore bollards located between Berth 2 and Berth 3 have recently been tied back to the deadman anchor, increasing their capacity to 100T each. Mooring bollards are connected to the deck via cast in bolts or chemically anchored threads.

The specific location and capacities of bollards is represented in Appendix C on Drawing 009-MA-0002.

2.4 FENDER DATA

The following fender data applies.

Table 2 – Berth 2 Fender Data

Fender Manufacturer	HS Chemical
Fender Type	Arch
Fender size / designation	NV1000 (1m long)
Rubber Grade	RG100
Rubber Tolerance %	10%
Rated Energy Capacity (kNm) [1]	289
Rated Reaction (kN) [1]	717
Facing Panel size (where applicable)	1.0 h x 0.8 w[2]
Fender Manufacturer	HS Chemical

Notes

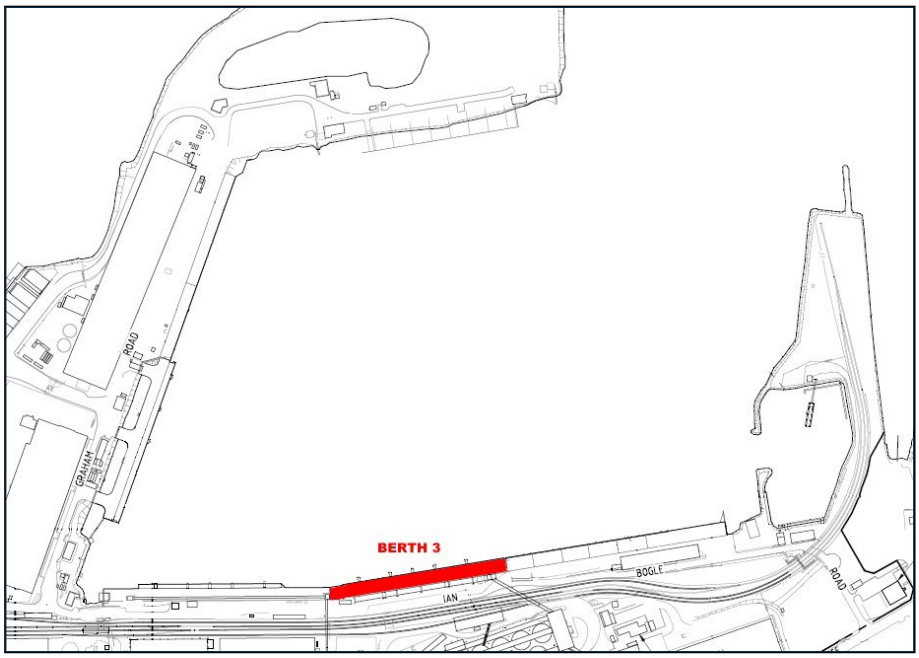
[1] The manufacturers rated data for energy and reaction must be modified for tolerance, temperature, velocity of compression and angular effects.

[2] No punch fitted dimensions in the face area of the fender.

The above data or rubber compound type and grade has not been independently evaluated, confirmed or tested. Rubber grade is marked on fenders and in all cases is confirmed by historical data from design drawings and/or design reports. The manufacturer's published data is used for the assessment of the fenders.

3 Berth 3

Figure 2 – Berth 3 Location



Berth 3 is located at the southern boundary of the Commercial Shipping Harbour in the Port of Geraldton, refer Appendix A.

The wharf length is 223.4m long, including Berth 3 Extension, with a deck elevation of approximately 3.58m Port Datum (Port Datum = 0.547m below AHD). Be aware that the port datum has changed over time and that older drawings, including some appended to this document, may reflect what at first glance may seem to be different levels.

3.1 DESCRIPTION

The Berth 3 original wharf was built around 1931. It was refurbished in 1996/1997 by driving extra steel piles at mid-span between the existing concrete columns. These steel piles support a 510mm thick reinforced concrete deck constructed on top of the old concrete deck.

The Berth 3 Wharf Extension (circa 1964) is 40.8m long, at the west end of the berth, and consists of a 500mm thick reinforced concrete deck supported by a two-way steel beam system. The primary beams, supported by the steel piles, runs in a north-south direction, or perpendicular to the berth face, and consist of 690UB. The secondary beams run in an east-west direction, or parallel to the berth face, and consist of 690UB. The Berth 3 extension was built as part of the Berth 4 project that was undertaken by the Public Works Department of WA (PWD). At some time during the period 1964 to 1996 some additional secondary beams were added in some parts of the Berth 3 Extension. The Berth 3 extension was partially overtopped as part of the 1996/1997 Berth 3 wharf refurbishment.

In 2003 five free-standing berthing dolphins were added in front of the Berth 3 wharf.

3.2 DECK LOAD CAPACITY

The 1.2m x 1.2m outrigger load capacity of the wharf deck for Berth 3 is detailed on Drawing No. 009- MA-0013 in Appendix B.

As a result of deterioration of sheet pile wall capping beam the zone that is on the landward side of the Berth 3 Wharf Extension rear piles is not permitted for the setup of cranes1.

Note: The use of different sized outrigger arrangements will result in different localised vertical loads to those referred to in 009-MA-0013 in Appendix B. To seek approval for alternative load arrangements, which fall outside the conditions of the berth load capacity plans provided in 009-MA-0013 in Appendix B, contact the Asset and Engineering Department.

3.2.1 Main Deck (that is, east of pile bent 34 only)

The general deck capacity, excluding the Berth 3 extension, is:

- No vessel or mooring lines: Uniformly Distributed Load of 5 tonne/m2 (refer 009-MA-0011 in Appendix A);
- Vessel alongside: Uniformly Distributed Load of 1.0 tonne/m2 (refer 009-MA-0011 in Appendix A);
- Wheel load from T44 Truck (refer Appendix D);
- Wheel load from 60 tonne (gross) forklift;
- Bogie load from Shiploader of 40.0 tonne.

3.2.2 Berth Extension (that is, west of pile bent 34)

Other than for the zone on the landward side of the rear piles, Berth 3 Extension deck capacity is:

- No vessel or mooring lines: Uniformly Distributed Load of 1.5 tonne/m2 (refer 009-MA-0011 in Appendix A);
- Vessel alongside: No Uniformly Distributed Load allowed (refer 009-MA-0011 in Appendix A);
- Wheel load from 10.0 tonne (gross) forklift

As a result of deterioration of the sheet pile wall capping beam, the zone that is on the landward side of the rear piles has the following lesser capacity, except for the 10m of capping beam between TT03 and the amenities building that was repaired in 2019, to allow 10T forklift access.

- Wheel load from T44 Truck (refer Appendix D);
- Wheel load from 3.5 tonne (gross) forklift over rear capping beam.

3.2.3 Berthing Dolphins

The vertical load capacity on the Berth 3 berthing dolphins is generally 70 tonne on most of the dolphin head but is only 12 tonne (on a 1.2m x 1.2m outrigger pad) for the 1.0m wide strip that is closest to the wharf.

3.2.4 Conditions

The load capacity plans are based on the following conditions:

- Cranes are only operated within the in-service wind conditions as set out in the appropriate Australian Standard.
- No other loads (including mooring loads) are permitted within 5m from each crane outrigger pad (refer 009-MA-0013 in Appendix B).
- Minimum outrigger pad size is 1.2m x 1.2m as shown on the relevant load plan drawing.

- Minimum distance between outrigger pads is 7.0m, centre to centre.
- The nominated loadings are gross loadings, i.e. includes the effect of wind, slewing, luffing, etc.
- The dynamic multiplier for the lifting operation is assumed to be 1.0. Should the dynamic multiplier exceed this the nominated loadings will have to be reduced accordingly (refer to Appendix E).
- No ship berthing is to be conducted during these lifting operations.

3.2.5 Loading Restriction Clarification (SMEC, 2013)

- T44 = standard truck load of 44 tonnes (also see Appendix D):
  - Front axle = 4.8 tonnes
  - Rear axle = 9.6 tonnes each x 4 axles
- 3.5 t Fork Lift taken as 5.0t self-weight + 3.5 t load distributed as 7.5t on front axle and 1.0t on rear axle.
- 10.0t Fork Lift taken as 16t self-weight + 10.0t load distributed as 24.0t on front axle and 2.0t on rear axle.

3.3 BOLLARD CAPACITIES

3.3.1 Bollard Capacities

Berth 3 mooring bollards range in capacity from 50 tonne to 75 tonne when applying the allowable wharf UDL limitations detailed on Drawing 009-MA-0011 in Appendix A. The five berthing dolphins are each fitted with a bollard and can support a 75 tonne mooring load.

Mooring bollards are connected to the deck via cast in bolts or sleeved bolts through the deck.

The specific location and capacities of bollards is represented in Appendix C on Drawing 009-MA-0003.

3.4 FENDER DATA

Until 2003 the wharf was fitted with 34 No. NV1,000x1,000 – RG100 Arch fenders from Fenders Australia, manufactured by HS Rubber & Automotive Co Ltd of Korea. Some of these items remain bolted to the old wharf face but they are not in use.

In 2003, five berthing dolphins were built and fitted with Fentek SCN 12001.1 fenders (by Trelleborg). The following fender data applies.

Table 3 – Berth

Fender Manufacturer	Fentek
Fender Type	Cone
Fender size / designation	SCN 1200
Rubber Grade	E1.1
Rubber Tolerance %	5%
Rated Energy Capacity (kNm) [1]	688
Rated Reaction (kN) [1]	1073
Facing Panel size (where applicable)	2.67 h x 2.07 w
Fender Manufacturer	Fentek

Notes

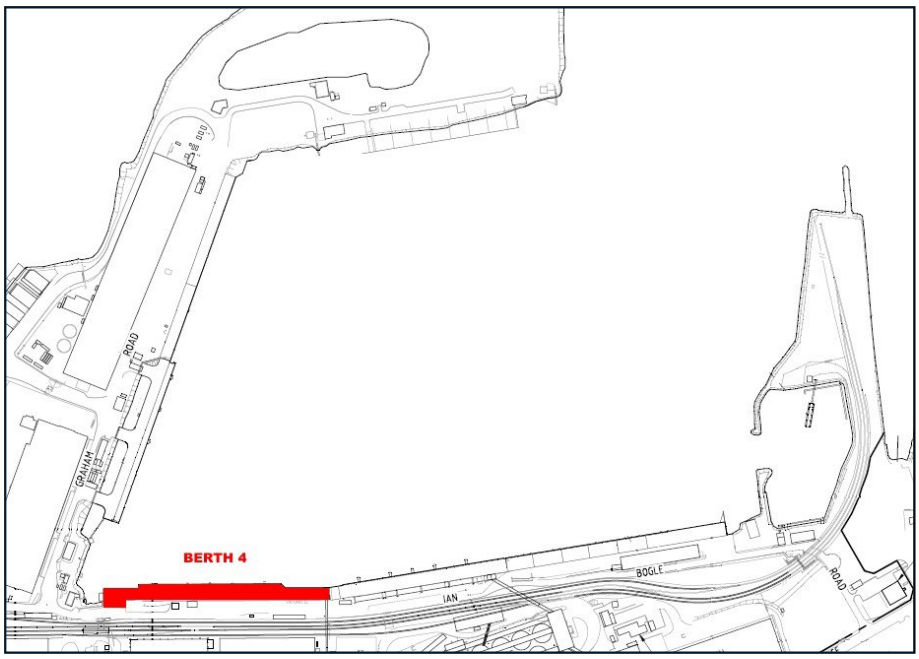
1 The manufacturers rated data for energy and reaction must be modified for tolerance, temperature, velocity of compression and angular effects.

2 No punch fitted dimensions in the face area of the fender.

The above data or rubber compound type and grade has not been independently evaluated, confirmed or tested. Rubber grade is marked on fenders and in all cases is confirmed by historical data from design drawings and/or design reports. The manufacturer's published data is used for the assessment of the fenders

4 Berth 4

Figure 3 – Berth 4 Location



Berth 4 is located at the south-west corner of the Commercial Shipping Harbour in the Port of Geraldton, refer Appendix A.

The wharf structure is 282.4m long, including the Berth 4 Extension wharf, with a deck elevation of approximately 3.08m Port Datum (Port Datum = 0.547m below AHD). Be aware that the port datum has changed over time and that older drawings, including some appended to this document, may reflect what at first glance may seem to be different levels.

4.1 DESCRIPTION

Berth 4 Original Wharf (1964) consists of a 181.1m long, 248mm thick reinforced concrete deck with a 115mm thick non-structural topping supported by a two way beam system. The primary beams run in a north-south direction, or perpendicular to the berth face, and consists of 690UB. The secondary beams run in an east-west direction, or parallel to the berth face, and consist of 690UB.

The Berth 4 west end extension wharf (1987) consists of a 101.3m long, 350mm reinforced concrete deck supported by a two way beam system and bracing angle members. The main beams, perpendicular to the wharf face, are 690UB 140. The secondary beams, parallel to the wharf face, are 690UB 140 at some locations and 690UB 125 at other locations.

In 2003, Berth 4 was amended to add five free standing berthing dolphins and “infill” deck sections that are adjacent to and between the berthing dolphins. Berth 4 infill sections consist of a 125mm reinforced concrete topping over 250mm depth pre-stressed concrete planks that are supported by 610UB 125 beams. Relevant typical drawings are in Appendix H.

In 2017 areas of the original wharf and the 1987 extension substructure were strengthened to accommodate increased rail loads from Shiploader 4. Longitudinal beams at the rear of the wharf were increased in depth of section and an additional steel longitudinal beams were introduced near the front of the original deck.

In 2022 the Original Wharf 4 (constructed in 1964) was strengthened further. The strengthening works consisted of a partial demolition of the top of the original deck and the installation of a new reinforced concrete topping, as well as a below deck thickening, increasing the minimum designed deck thickness to 600mm. Further to this, connection between the Newly Strengthen Original Wharf 4 slab and the adjacent infill slabs, and Wharf 4 Extension slab was undertaken. The shears key between Newly Strengthen Original Wharf 4 and Wharf 4 Extension was replaced with additional steel work. An additional Structural Steel deck was added out front at the east end.

4.2 DECK LOAD CAPACITY

4.2.1 Uniformly Distributed Loads (UDL)

The different structures combining to make up Berth 4 have varying allowable deck capacities depending on age, condition and design.

The allowable uniformly distributed load capacities on Berth 4, in combination with vessel loading and in the absence of mooring forces are detailed on Drawing 009-MA-0011 in Appendix A.

4.2.2 Crane Loads

The 1.2m x 1.2m crane outrigger load capacity of the wharf deck for Berth 4 is detailed on Drawing No. 009-MA-0016 in Appendix B.

Note: The use of different sized outrigger arrangements will result in different localised vertical loads to those referred to in Appendix B. To seek approval for alternative load arrangements, which fall outside the conditions of the berth load capacity plans provided in Appendix B, contact the MWPA Engineering Department.

SHIPLOADER LOADS

The Berth 4 Ship Loader was weighed in January 2019 to assess the Bogie Loads. The full results are in COVA Report 20190214 Report 001 (4710.015) Rev C which is available from the Asset and Engineering Department. Extracted results are tabulated in Figure 6.

Figure 5 – Shiploader 04 – Bogie Loads

Observed Corner, Total Weights and CoG											
Machine Config.	Luff	Shuttle Position	Corner Weight (Tonne)				Total Weight (Tonne)	CoG (mm)		Conditions	
			NE	SE	NW	SW		ΔX	ΔY	Wind Speed (m/s)	Wind Direction
1	+0.4°	Out	111.4	76.3	121.2	65.7	374.6	1610.8	12.81	5 m/s	190°
2	+0.4°	In	106.3	82.0	117.1	69.1	374.4	1287.2	33.66	5 m/s	210°
3	+14.9°	Out	124.1	64.6	124.1	62.9	375.7	2142.4	28.75	5 m/s	190°
4	+14.9°	In	105.9	82.4	115.8	70.3	374.4	1228.4	32.59	5-6 m/s	210°
5	+72.5°	In	82.8	106.3	94.5	90.9	374.7	-348.0	53.85	5-6 m/s	210°
					Average Total Weight		374.7				

Table 1: Observed Corner Reactions, Total Reactions and CoG

4.2.3 Vehicle Loading

Unless demarcated as a 'No Load' zone on the drawings contained in Appendix B, T44 or B-Double truck loading is permitted on Berth 4.

Allowable forklift loads are as follows:

- General - 10 tonne (gross) forklift.

Loading Restriction Clarification (SMEC, 2013)

- T44 = standard truck load of 44 tonnes (also see Appendix D):
  - Front axle = 4.8 tonnes
  - Rear axle = 9.6 tonnes each x 4 axles
- 3.5 t Fork Lift taken as 5.0t self-weight + 3.5 t load distributed as 7.5t on front axle and 1.0t on rear axle.
- 10.0t Fork Lift taken as 16t self-weight + 10.0t load distributed as 24.0t on front axle and 2.0t on rear axle.

The berth 4 Steel seaward deck has been designed for the following loading:

- Forklift – Hyundia 7T
- Axle loading (Loaded) Front /Rear: 14564 kg/ 1866kg
- Axle Loading (loaded) Front/Rear 3867kg /5564kg

- Shore Tension System Including:
  - Shore Tension Unit (3200kg)
  - St Bollard (1086kg)
  - Snatch Block (600kg)
    - 5kPa Live Load

4.3 BOLLARD CAPACITIES

Berth 4 mooring bollards range in capacity from 6 tonne to 75 tonne when applying the allowable wharf UDL limitations detailed on Drawing 009-MA-0011 in Appendix A. There are 4 no. 60T dual hook QRH (Quick Release Hooks) installed at the Eastern End of Berth 4. East QRH is fitted with a capstan and the hooks are linked to a remote release console located near the centre of the wharf.

The five berthing dolphins are each fitted with a bollard and can support a 75 tonne mooring load. There are also two 50 tonne (four bolt) bollards on a concrete footing block at the base of Transfer Tower TT502.

There are also 4 x 125T Tee Bollards located at the eastern end of Berth 4.

Mooring bollards are connected to the deck via cast in bolts or sleeved bolts through the deck.

The specific location and capacities of bollards is represented in Appendix C on Drawing 009-MA-0004.

4.4 FENDER DATA

Five berthing dolphins are fitted with Fentek SCN 12001.1 fenders (by Trelleborg). The following fender data applies.

Table 4 – Berth 4 Fender Data

Fender Manufacturer	Fentek
Fender Type	Cone
Fender size / designation	SCN 1200
Rubber Grade	E1.1
Rubber Tolerance %	5%
Rated Energy Capacity (kNm) [1]	688
Rated Reaction (kN) [1]	1073
Facing Panel size (where applicable)	2.67 h x 2.07 w

Notes

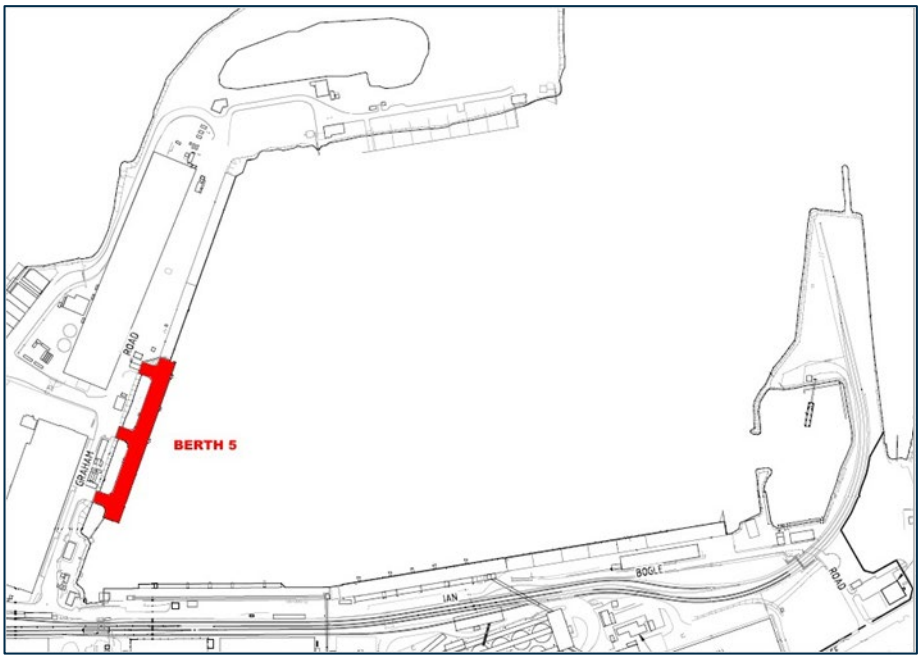
[1] The manufacturers rated data for energy and reaction must be modified for tolerance, temperature, velocity of compression and angular effects.

[2] No punch fitted dimensions in the face area of the fender.

The above data or rubber compound type and grade has not been independently evaluated, confirmed or tested. Rubber grade is marked on fenders and in all cases is confirmed by historical data from design drawings and/or design reports. The manufacturer's published data is used for the assessment of the fenders.

5 Berth 5

Figure 6 – Berth 5 Location



Berth 5 is located at the Western boundary of the Commercial Shipping Harbour in the Port of Geraldton, refer 009-MA-0011 in Appendix A.

The wharf deck is 213.0m long, with a deck elevation of approximately 3.51m Port Datum (Port Datum = 0.547m below AHD). Be aware that the port datum has changed over time and that older drawings, including some appended to this document, may reflect what at first glance may seem to be different levels.

5.1 DESCRIPTION

The initial Berth 5 consists of a 600mm thick reinforced concrete deck supported by diameter 474mm steel piles. The piles are at a spacing of 4.3m along the face of the berth and 4.9m across the berth.

In 2008, an additional ship loader rail beam, mesh walkways, five berthing dolphins and a shiploader maintenance platform deck were fitted in front of the initial berth deck. The maintenance platform consists of a 225-265mm thick in situ reinforced concrete deck on top of 300m depth precast reinforced concrete planks that are supported by 800 x 400mm fabricated box girders.

5.2 DECK LOAD CAPACITY

5.2.1 Uniformly Distributed Loads (UDL)

The allowable uniformly distributed load capacities for Berth 5 are detailed on Drawing 009-MA-0011 in Appendix A.

The UDL capacity of the Berth 5 deck is:

- No vessel or mooring lines: Uniformly Distributed Load of 4.5 tonne/m2 (refer 009-MA-0011 in Appendix A).
- Vessel alongside: Uniformly Distributed Load of 4.5 tonne/m2 (refer 009-MA-0011 in Appendix A).

5.2.2 Crane Loads

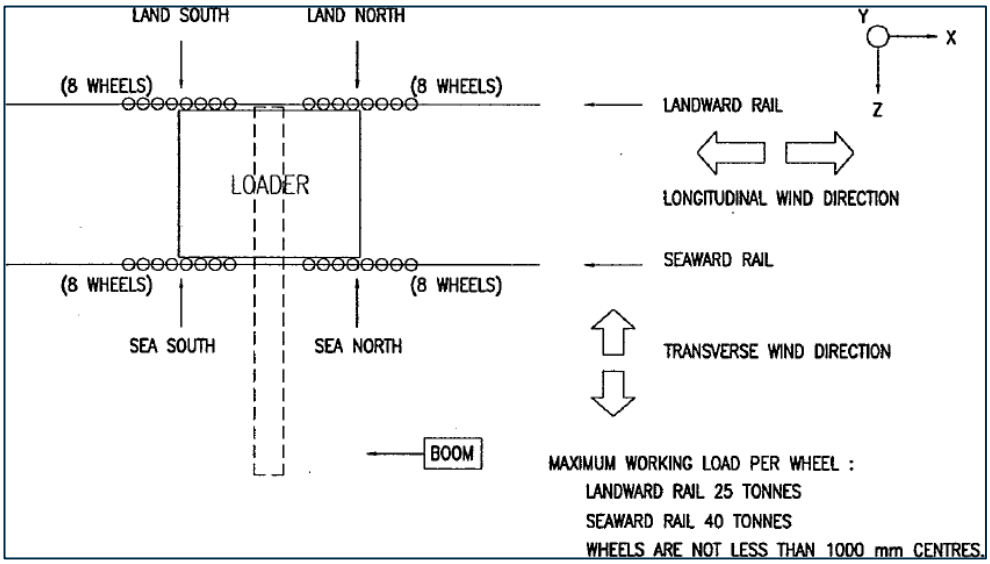
The 1.2m x 1.2m crane outrigger load capacity of the wharf deck for Berth 5 is detailed on Drawing No. 009-MA-0018 in Appendix B.

Note: The use of different sized outrigger arrangements will result in different localised vertical loads to those referred to in Appendix B. To seek approval for alternative load arrangements, which fall outside the conditions of the berth load capacity plans provided in Appendix B, contact the MWPA Engineering Department.

5.2.3 Shiploader Loads

Bogie load from Shiploader 05 of 60.0 tonne or for multiple wheel sets in accordance with Drawing No. 75309405-3541.

Figure 7: Source: Maunsell/Aecom Drawing No. 75309405-3541 Rev 1



5.2.4 Vehicle Loading

The allowable fork lift loading on Berth 5 is as follows:

- General: 60T gross fork lift

Loading Restriction Clarification (SMEC, 2013):

- T44 = standard truck load of 44 tonnes (also see Appendix D):
  - Front axle = 4.8 tonnes
  - Rear axle = 9.6 tonnes each x 4 axles

5.3 BOLLARD CAPACITIES

Berth 5 mooring bollards range in capacity from 50 tonne to 75 tonne when applying the allowable wharf UDL limitations detailed on Drawing 009-MA-0011 in Appendix A. The five berthing dolphins are each fitted with a bollard and can support a 75 tonne mooring load. There are also two 75 tonne bollards on stand-alone structures situated to the south of Berth 5.

Mooring bollards on the original deck are connected to the deck via cast in bolts or sleeved bolts through the deck.

The specific location and capacities of bollards is represented in Appendix C on Drawing 009-MA-0005.

5.4 FENDER DATA

No. 5 Berth berthing dolphins are fitted with Fentek SCN 1200 E1.1 fenders (by Trelleborg). The following fender data applies.

Table 5 – Berth 5 Fender Data

Fender Manufacturer	Trelleborg
Fender Type	Cone
Fender size / designation	SCN 1200
Rubber Grade	E1.1
Rubber Tolerance %	5%
Rated Energy Capacity (kNm) [1]	688
Rated Reaction (kN) [1]	1073
Facing Panel size (where applicable)	2.67 h x 2.07 w

Notes

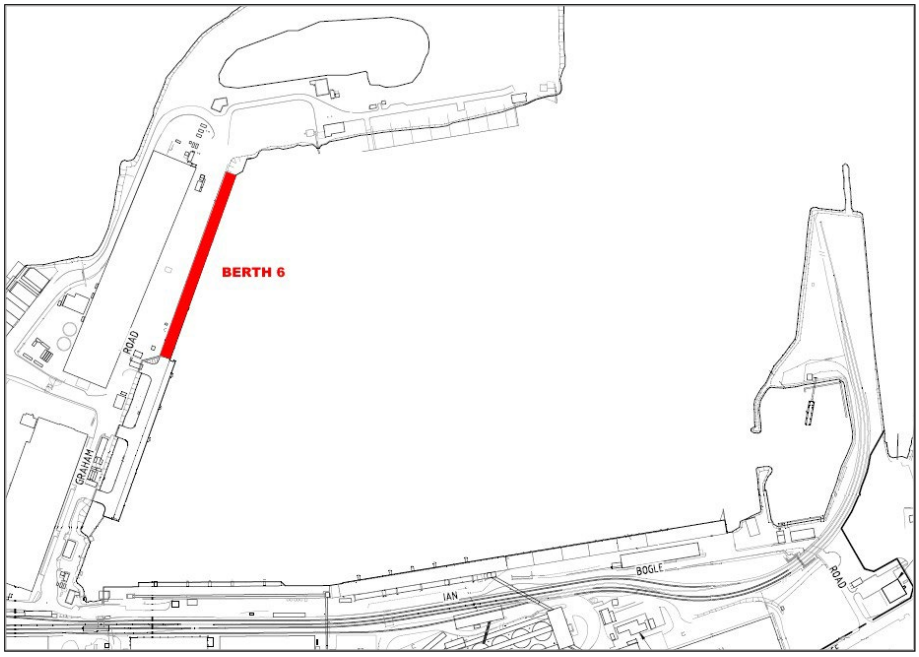
[1] The manufacturers rated data for energy and reaction must be modified for tolerance, temperature, velocity of compression and angular effects.

[2] No punch fitted dimensions in the face area of the fender.

The above data or rubber compound type and grade has not been independently evaluated, confirmed or tested. Rubber grade is marked on fenders and in all cases is confirmed by historical data from design drawings and/or design reports. The manufacturer's published data is used for the assessment of the fenders.

6 Berth 6

Figure 8 – Berth 6 Location Plan



Berth 6 is located at the north-west corner of the Commercial Shipping Harbour in the Port of Geraldton, refer Appendix 009-MA-0011 in A.

The berth wharf is 245.6m long with a deck elevation of approximately 3.51*m Port Datum (Port Datum = 0.547m below AHD). Be aware that the port datum has changed over time and that older drawings, including some appended to this document, may reflect what at first glance may seem to be different levels.

6.1 DESCRIPTION

Berth 6 was constructed in 1996. It consists of a reinforced concrete deck supported by steel beams. The steel beams run in an east-west direction, or perpendicular to the berth face, and consist of 460UB. The concrete deck consists of 200mm thick precast panels with a 100mm thick in situ concrete pour. Within the loadout bridge the pile and beam spacing is closer than in the remainder of the wharf.

In 1997 a grouted revetment protection mattress was installed under the wharf.

In 2003 a berth pocket was dug (by dipper dredge) along 215m of the length of the face of Berth 6. The pocket is very close to the original front wharf piles, and so a concept was adopted that involved the following components and is depicted on the Drawing No. 49915-DPE-443, Berth 6 Retaining Piles - Typical Section:* From December 2019 Bathymetry Survey, previously 3.50m PD

- A continuous hit-and-miss row of several hundred submerged retaining piles (both round hollow tube and 310UCs) driven under the bolt on vertical concrete drop panels at the wharf face.
- A section of plate is chained between the submerged retaining piles at various locations where a slightly larger gap otherwise exists.
- 15 No. ‘fender piles’ between the rubber fenders (to protect the most easterly submerged retaining piles).
- Steel mounting frames to stand-off the rubber fenders a nominal dimension of 630mm from the concrete wharf face.
- Excavation by a dipper dredge between the cutter dredging of Jan de Nul and the submerged retaining pile line (fender line).

Pile driving conditions resulted in non-verticality of some of the submerged retaining piles. Those piles which inclined such that the top edge was on the basin side of the fender pile line were either removed or cut off. A number of slightly inclined piles that have been left in place have flat sides encroaching marginally into the nominal berth pocket.

There are approximately 15 No. 610mm dia steel piles spread along the wharf cope line and outside of the concrete face drop panels. Some drawings of the berth refer to the piles as “Fender Piles”. The piles sit behind the seaward edge of the fenders and are not intended to provide a fendering function. The piles were installed to cover the tops of the submerged retaining wall piles that encroach closest to the edge of the berth pocket. The top of the exposed piles are secured to the berth face drop panels, and the bottoms of the piles were generally dropped over the top of the driven retaining wall 310 UC piles.

6.2 DECK LOAD CAPACITY

6.2.1 Uniformly Distributed Loads (UDL)

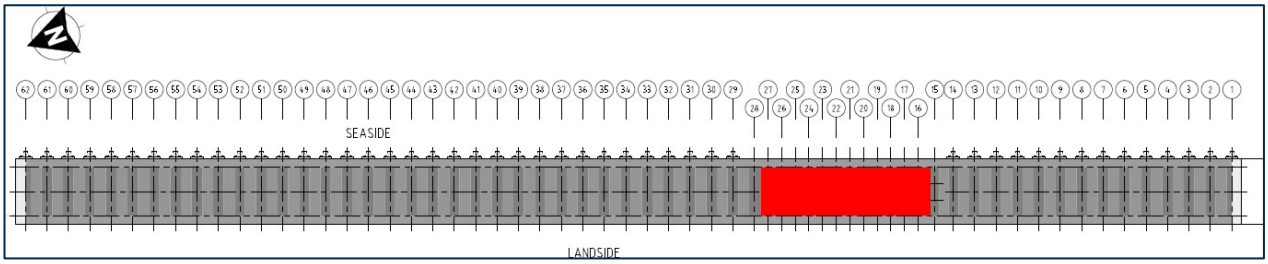
The allowable uniformly distributed load capacities for Berth 6 are detailed on Drawing 009-MA-0011 in Appendix A.

In general, the UDL capacity of the Berth 6 deck is:

- No vessel or mooring lines:
  - Main Deck – Uniformly Distributed Load of 3.4 tonne/m2 (refer 009-MA-0011 in Appendix A)
  - Loadout Bridge – Uniformly Distributed Load of 8 tonne/m2 (refer 009-MA-0011 in Appendix A)
- Vessel alongside: Uniformly Distributed Load of 2 tonne/m2 (refer 009-MA-0011 in Appendix A).

The capacity of the section of deck between grid lines '15' and '28' (referred to as the Loadout Bridge) is higher by design to facilitate the handling of heavier loads.

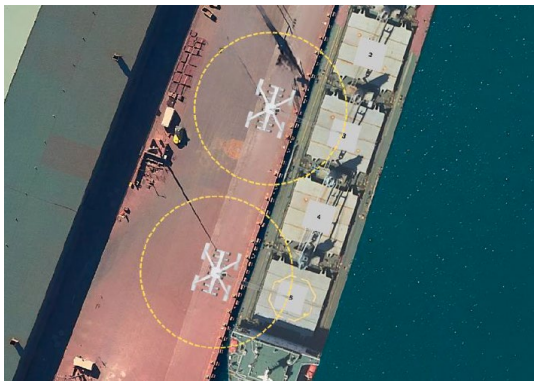
Figure 9 – Berth 6 Showing Heavy Load Area



6.2.2 Crane Loads

The 1.2m x 1.2m crane outrigger load capacity of the wharf deck for Berth 6 is detailed on Drawing No. 009-MA-0020 in Appendix B. The heavy loadout section of Berth 6 can support outrigger loads up to 85tonne on a 1.2m x 1.2m crane outrigger pad.

There are Crane specific drawings for the QUBE Liebherr LHM 280 in Appendix B. QUBE has procured a second crane in August 2024. An operating procure was approved for use and the report QUBE Second Crane Aug2024 (A2184672) is available on request.



Note: The use of different sized outrigger arrangements will result in different localised vertical loads to those referred to in Appendix B. To seek approval for alternative load arrangements, which fall outside the conditions of the berth load capacity plans provided in Appendix B, contact the MWPA Engineering Department.

6.2.3 Vehicle Loading

Berth 6 can support a currently legal fully laden B-double truck. Reference is made to table C6.2(C) in AS5100.2.

Figure 10 – Commentary to AS5100.2 Table C6.2(C) B-Double Loading Configuration

TABLE C6.2(C)

CURRENT LENGTH VEHICLES—CURRENT FREIGHT DENSITY = 0.28 t/m^3

Vehicle	O/A length (m)	Gross mass (tonnes)	Configuration, axle distances and axle group mass (see Note)						
B-double	25.0	62.5	o 1.6 m 6 t	oo 5.6 m 16.5 t	ooo 13.6 m 20 t	ooo 22.6 m 20 t			

NOTE: Distances are from front of vehicle to centre-line of axle group.

6.2.4 Mobile Fertiliser Hopper (Steven's)

Mid West Ports Authority commissioned Design and Analysis to assess the existing Berth 6 wharf structure with the aim of verifying the capacity of the structure against the loads imposed by the mobile CSL hopper (unloading Heavy Metal Concentrate (HMC). The full results are in D&A Report Berth 6 CSL Hopper Berth Capacity Assessment P0063-R-002 rev 0 which is available from the Asset and Engineering Department.

Below is a summary of the findings of the report and are detailed on Drawing 009-MA-0061 in Appendix B.

- The use of the CSL Hopper between 1 to 16 (inclusive) and 27 to 62 (inclusive) is therefore not recommended.
- For the AS3774 compliant load case the CSL hopper is to only be utilised between bents 16 to 27 (inclusive).
- The hopper should not be positioned within 2 spans, or bays, from a bollard which is being utilised for the mooring of a vessel.
- Hopper skids to be placed no closer than 2m from the seaward edge of the wharf.
- Hopper skids to be positioned parallel with the seaward edge of the wharf.
- Hoppers to be empty during transportation.
- Only a single B-Double or single B-triple is allowed on the berth for the CSL hopper.
- If not unloading, the B-doubles/B-triple should traverse the berth at a maximum
- distance possible away from the hopper location. Trucks and vehicles waiting to be
- loaded must be parked landside off the deck and can only access the deck once the
- newly filled truck has left the berth deck completely.
- MWPA OH&S policies and procedures must be adhered to at all times

The following conditions are applicable during the handling of fertiliser product (0.7t/m3-1.0t/m3)) with the hoppers.

- The hopper should not be positioned within 13m of a bollard which is being used to moor the vessel.
- The hoppers are not to be spaced closer than 20 metres of each other along the length of the berth.

- Hopper skids to be placed no closer than 1.5m from the seaward edge of the berth and 1.6m from the rear of the berth. (seaward edge of berth does not include the concrete panel on berth face)
- Hoppers to be empty during transportation.
- Only a single B-Double is allowed on the berth per hopper.
- If not unloading, the B-doubles should traverse the berth at a maximum distance possible away from the hopper location. Trucks and vehicles waiting to be loaded must be parked landside off the deck and can only access the deck once the newly filled truck has left the berth deck completely

6.3 BOLLARD CAPACITIES

Berth 6 deck-mounted mooring bollards have a 50 -75 tonne capacity when applying the allowable wharf UDL limitations detailed on Drawing 009-MA-0011 in Appendix A. There are also two 75 tonne bollards on mass concrete structures situated to the north of Berth 6 and two inshore 75 tonne bollards at the back of the berth. 4 no. 125T bollards were install in 2024 at the southern end of Berth 6 inshore next to TT503.

Mooring bollards are connected to the deck via sleeved bolts through the deck.

The specific location and capacities of bollards is represented in Appendix C on Drawing 009-MA-0006.

6.4 FENDER DATA

The wharf is fitted with fenders of a number of types and sizes. The rubber fender units are mounted on steel packer frames. The berth is fitted with six no. SM-600H 2500 from Bridgestone – these are mounted vertically (nominal length 2.500m). The berth is also fitted with 54 No. DA A600H (ME) Arch fenders from Bridgestone – these are mounted horizontally (nominal length 1.000m).

Table 6 – Berth 6 Fender Data

Fender Manufacturer	Bridgestone
Fender Type	Arch
Fender size / designation	DA 600 (1.3m long)
Rubber Grade	ME
Rubber Tolerance %	10%
Rated Energy Capacity (kNm) [1]	162
Rated Reaction (kN) [1]	645
Facing Panel size (where applicable)	0.45 h x 1.0 w [2]

Notes

[1] The manufacturers rated data for energy and reaction must be modified for tolerance, temperature, velocity of compression and angular effects.

[2] No punch fitted dimensions in the face area of the fender.

The above data or rubber compound type and grade has not been independently evaluated, confirmed or tested. Rubber grade is marked on fenders and in all cases is confirmed by historical data from design drawings and/or design reports. The manufacturer's published data is used for the assessment of the fenders.

7 Berth 7

Berth 7 is a privately owned facility any information pertaining to Berth 7 should be verified with the owners.

7.1 MOORING

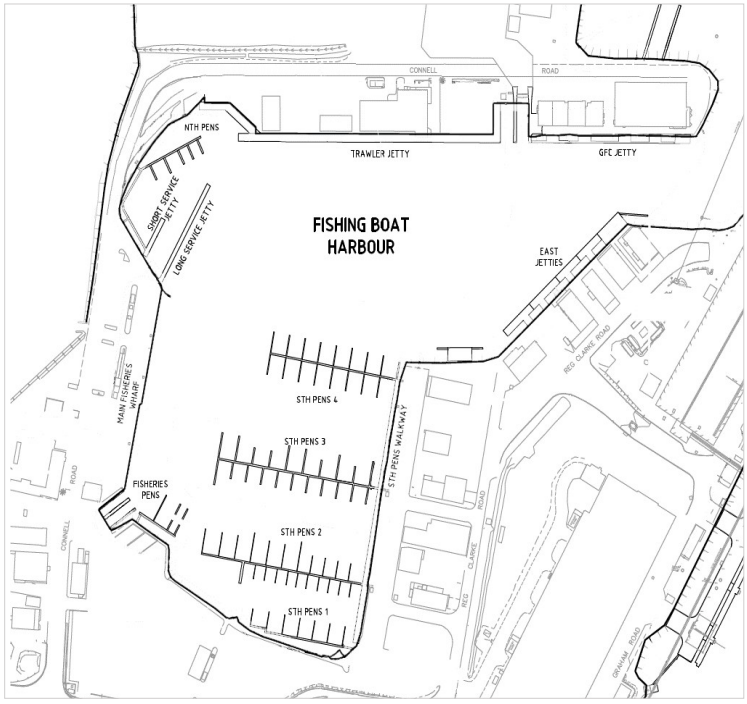
Berth 7 commenced operational services in October 2012 for Panamax Iron Ore vessels port side alongside. It is fitted with a combined mooring line and MoorMaster vacuum mooring system (www.moormaster.com/). The MoorMaster system is not often utilised. The current mooring line plan requires six headlines and six stern lines*.

**Appendix 1 General Mooring Arrangement - Karara Mooring Procedures Berth 7 Rev 3 Aug 2019*

8 Fishing Boat Harbour

The layout of the Fishing Boat Harbour and the location of the key components are shown on the Port Infrastructure, Features, Services and Facilities Identification Map in Appendix A.

Figure 11 – Fishing Boat Harbour General Arrangement



Maximum permitted vessel size is 35 metres LOA at maximum draft of 3.5[3] metres. For vessels operating at drafts in excess of 3.2 metres tidal information is available from the Harbour Master. North Pens & Access Walkway and the Short Service Jetty has a maximum permitted vessel size of 11m and 2.3m draft.

Entry and departure drafts in the Fishing Boat Harbour Channel are in the range of 3.1 metres to

3.8[3] metres accessible up to MSL (Mean Sea Level). Drafts over 3.5[3] metres require the written permission of the Harbour Master.

Permission to berth is required from the MWPA, particularly for large vessels. No double banking of vessels on any Fishing Boat Harbour pens, jetties or wharfs is permitted without prior approval from the Trade Team.

https://www.midwestports.com.au/trade/trade.aspx

[3] Subject to review and change from time to time.

8.1 MOORING PENS

At present, 152 pens are situated along the north-west, south and south east side of the Fishing Boat Harbour. These pens will generally accommodate boats from 8 to 23 metres overall, with a draft not exceeding 3.5 metres [4].

8.2 LONG SERVICE JETTY

The Long Service Jetty is located north of the Main Fishermen's Wharf in the North West area of the Fishing Boat Harbour. The Long Service Jetty was originally constructed circa 1977. This jetty was refurbished in 2017 by an external party to serve as a berthing facility for a tourism vessel and is currently operated under a licence. No access is permitted without prior approval from the licensee.

8.3 MAIN FISHERMEN'S WHARF

The Main Fishermen's Wharf is approximately 155 metres in length and is often referred to as the "fuel berth". Depths of water alongside the facilities vary from 1.5 metres to in excess of 4 metres. The Main Fisherman's Wharf can be divided into two distinct sections, a northern section and a southern section. Note that two of the existing fuel bowsers are located on the southern section and two are located on the northern section which also houses a Crane Lift Zone (approximately centred around Fuel Bowser No. 4 on Figure 13).

The original sheet piled wharf of the Fishing Boat Harbour (FBH) was rehabilitated circa 2000. The rehabilitation project involved the original northern 95m of wall (distinguishable by a notable kink in the face of the wharf). The rehabilitation design provided provision for a -4m seabed level but no more (based on the Chart Datum 0=0.847m below AHD current at the time). The wharf is fendered with timber chafers that are approximately four metres long. The fendering was designed for a maximum normal berthing velocity of 0.3m/sec and an abnormal berthing velocity of 0.4m/sec. The southern 60m of wall was not part of the 2000 rehabilitation project.

In 2019 the entire 155m sheet wall length was repaired and repainted.

8.3.1 Northern Section

The specified maximum allowable safe working loads (SWL) and limitations of the Main Fisherman's Wharf, northern section are as follows:

- Crane SWL – 20T Max Outrigger Load (3m from wharf edge) within dedicated crane lift zone
- Vessel SWL – 400T Trawler Vessel
- Truck SWL – 10T Axle Load
- Forklift SWL – 10T (1m from wharf edge)
- Wharf UDL – 2400kg per m^2 (1m from wharf edge)

[4] Subject to review and change from time to time.

The rehabilitated structure is designed for a mobile crane that is capable of lifting 20 tonnes at a radius of 10 metres. Crane set up is only permitted in the crane lift zone that is depicted in Figure 13. For all crane lifts requirements on the wharf outside of this zone prior approval must be obtained from MWPA.

Figure 12 – Crane Lift Zone

8.3.2 Southern Section

The specified maximum allowable safe working loads (SWL) and limitations of the Main Fisherman's Wharf, southern section are as follows:

- Crane SWL – No Cranes
- Vessel SWL – 200T Trawler Vessel
- Truck SWL – 10T Axle Load
- Forklift SWL – 10T (1m from wharf edge)
- Wharf UDL – 1000kg per m2 (1m from wharf edge)

8.4 OTHER FBH JETTIES

8.4.1 Vertical Loads

Following are the recommended operational restrictions for deck loading.

TRAWLER JETTY

Max loading of 800kg/m^2.

This Jetty is privately leased and operated by multiple Lessees. Leaseholder consultation needs to occur prior to accessing the area.

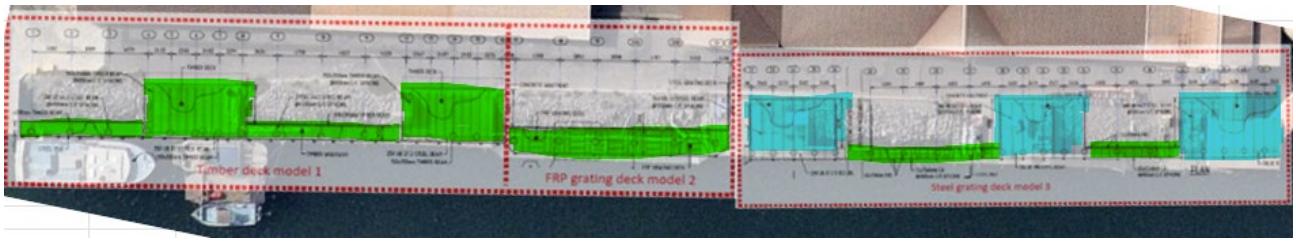
GFC JETTY

With reference to Figure 8 below,

- Blue – Light vehicle loads only

  2T Fork Lift
- Green - Pedestrian Traffic Only

Figure 13 – GFC Jetty Vertical Load Mark-up



This data should be verified with the owners/leaseholders of the facilities before it is used.

8.4.2 Trawler Jetty – Mooring and Berthing Loads

A forensic assessment has been made of a theoretical design vessel for what is now commonly known as the Trawler Jetties that are associated with various lease sites and which were constructed circa 1995.

Before it is used all data should be verified by:

- reading the full reports that are discussed below; and
- consulting the owners / leaseholders of the facilities.

This Jetty is privately leased and operated by multiple Lessees.

9 Disclaimers

The original version of this document and Revisions A to C were produced by Aurecon (previously Connell Wagner). The original Connell Wagner disclaimer is below.

> *The information contained in this report has been based on the information presented on the drawings issued by the Geraldton Port Authority. It has been assumed that the facilities are in good structural condition and adequately maintained.*
>
> *Connell Wagner Pty Ltd takes no responsibility for the accuracy of the information presented on the drawings issued by Geraldton Port Authority. Connell Wagner Pty Ltd does not warrant that the drawings reflect the actual structures as constructed. Should the structures deviate from what is shown on the drawings, the impact of this deviation will have to be assessed by a suitably qualified engineer.*
>
> *Connell Wagner does not warrant the information shown for the drawings for Berth No 1 and 2 as this work was undertaken by Halpern Glick Maunsell.*

Many elements of the main body and also within the appendices of the Wharf Specification Book relating to berth or mooring bollard loading capacities were updated based on work undertaken by Design and Analysis (D&A). The following D&A disclaimer applies:

> *"This Technical Engineering Report has been prepared in accordance with the scope of services agreed upon between D&A and the Mid West Ports Authority (MWPA). To the best of D&A's knowledge, the report presented herein represents the MWPA's intentions at the time of printing of the report. However, the passage of time, manifestation of latent conditions or impacts of future events may result in the actual project and its impact differing from that described in this report. In preparing this report D&A has relied upon data, surveys, analysis, designs, plans and other information provided by MWPA, and other individuals and organisations referenced herein. Except as otherwise stated in this report, D&A has not verified the accuracy or completeness of such data, surveys, analysis, designs, plans and other information.*
>
> *No responsibility is accepted for use of any part of this report in any other context or for any other purpose by third parties.*
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> *This report does not purport to provide legal advice. Readers should engage professional legal advisers for this purpose.*
>
> *The recommendations presented in this report assumes that the structure is complete and that all remedial works have been completed to degraded elements so as to reinstate their original design capacity. All ongoing strengthening and remedial works affecting the supporting structural system must be completed prior to using the berth structures for the loading arrangements shown in this report. The structural capacity of the structural elements is also assumed to have been maintained in keeping with the details shown on the as- constructed drawings."*

10 Monitoring, Evaluation and Review

This document is required to be reviewed every two years from the last scheduled review date.

Minor updates made within this two year period, will not be taken as a *full review*.

The Document Custodian is responsible for conducting the review in accordance with **Controlled Documents Review and Approval Process Work Instruction**.

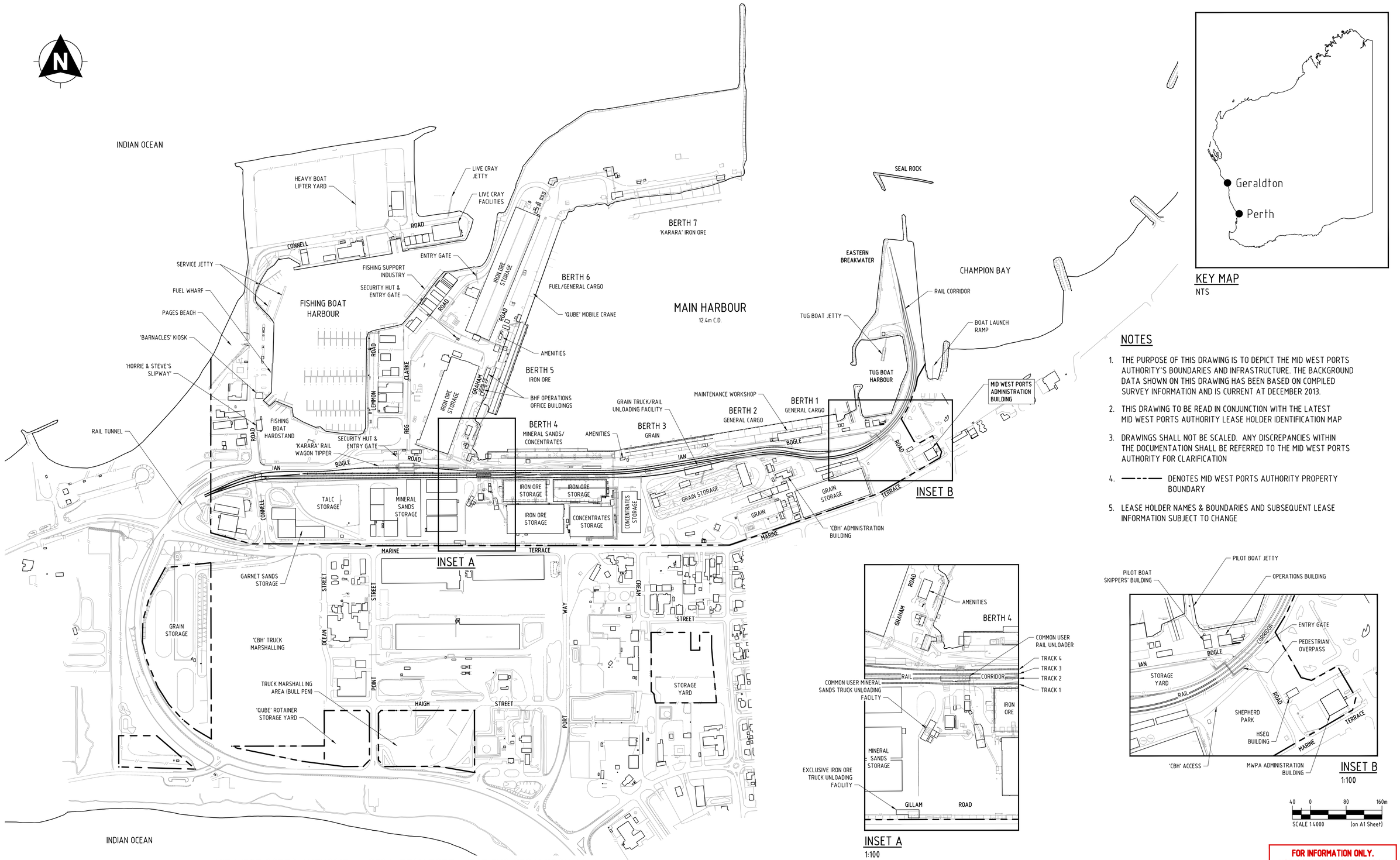
11 Administration

Document Custodian:	Structural Engineer
Document Approver:	Assets & Engineering Manager
Approval Date:	29 October 2024
Document Review Period:	2 yrs

Appendix A

GERALDTON PORT – GENERAL ARRANGEMENT AND UDL CAPACITY PLAN

Title	Drawing Number	Rev Number
Port Infrastructure Features, Services and Facilities	010-G-0022	B
Commercial Harbour Berth Capacity Uniformly Distributed Load Capacity Plan	009-MA-0011	E



KEY MAP
NTS

NOTES

1. THE PURPOSE OF THIS DRAWING IS TO DEPICT THE MID WEST PORTS AUTHORITY'S BOUNDARIES AND INFRASTRUCTURE. THE BACKGROUND DATA SHOWN ON THIS DRAWING HAS BEEN BASED ON COMPILED SURVEY INFORMATION AND IS CURRENT AT DECEMBER 2013.
2. THIS DRAWING TO BE READ IN CONJUNCTION WITH THE LATEST MID WEST PORTS AUTHORITY LEASE HOLDER IDENTIFICATION MAP
3. DRAWINGS SHALL NOT BE SCALED. ANY DISCREPANCIES WITHIN THE DOCUMENTATION SHALL BE REFERRED TO THE MID WEST PORTS AUTHORITY FOR CLARIFICATION
4. ——— DENOTES MID WEST PORTS AUTHORITY PROPERTY BOUNDARY
5. LEASE HOLDER NAMES & BOUNDARIES AND SUBSEQUENT LEASE INFORMATION SUBJECT TO CHANGE

INSET A
1:100

INSET B
1:100

40 0 80 160m
SCALE 1:4000 (on A1 Sheet)

FOR INFORMATION ONLY. NOT ISSUED FOR CONSTRUCTION

MID WEST PORTS AUTHORITY - GERALDTON PORT, WEST END GERALDTON, WA

REV	DATE	DESCRIPTION	DRN	APP
B	17.02.20	FBH JETTIES UPDATED. ISSUED FOR INFORMATION	RF	JH
A	21.08.14	ISSUED FOR INFORMATION	RF	JG

REVISIONS

DRAWING No.	DRAWING TITLE
010-G-0074	LEASE HOLDER IDENTIFICATION MAP - AERIAL IMAGE
010-G-0073	LEASE HOLDER IDENTIFICATION MAP

REFERENCE DRAWINGS

MWPA PROJECT No:

DESIGNED	MWPA	DESIGN CHECK	MWPA
DRAWN	R. FERSTAT	CHECKED	P. DUPLEX
ENGINEER	------	APPROVED	J. GIBSON

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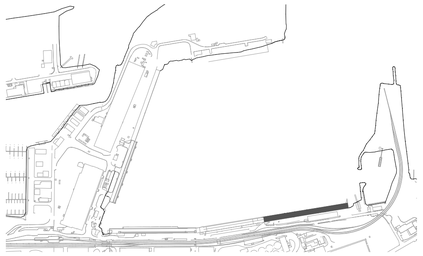
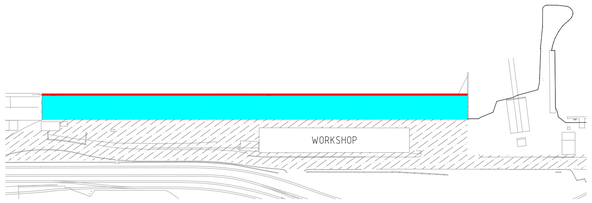
Tel: +61 8 9964 0520
www.midwestports.com.au

GERALDTON PORT
PORT INFRASTRUCTURE
FEATURES, SERVICES AND FACILITIES
IDENTIFICATION MAP

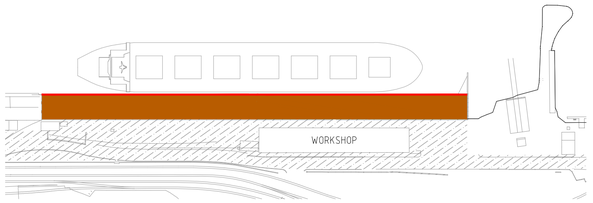
SCALE	DRG No.	REV.
A1 - 1:4000 U.N.O.	010-G-0022	B



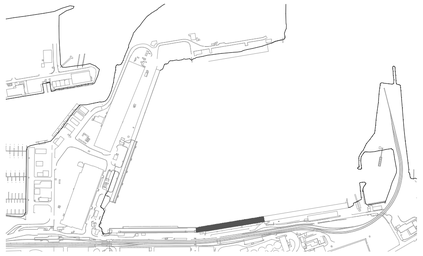
LOCATION PLAN BERTH 1 & 2



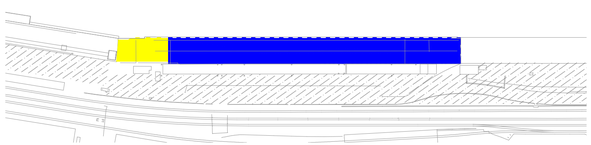
BERTH 1 & 2 (NO VESSEL OR MOORING LINES)



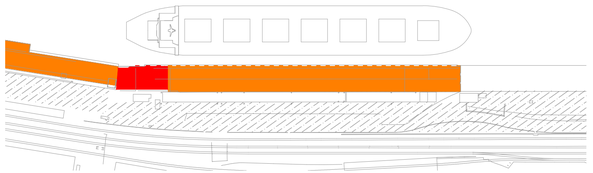
BERTH 1 & 2 (VESSEL ALONGSIDE)



LOCATION PLAN BERTH 3

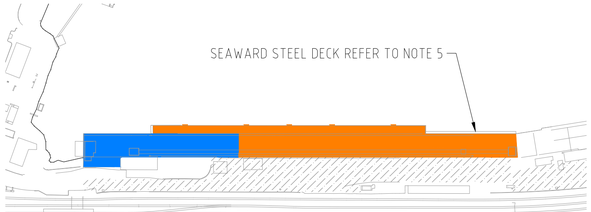


BERTH 3 (NO VESSEL OR MOORING LINES)

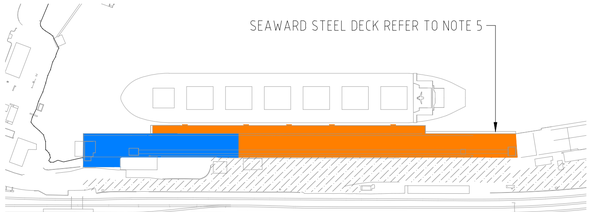


BERTH 3 (VESSEL ALONGSIDE)

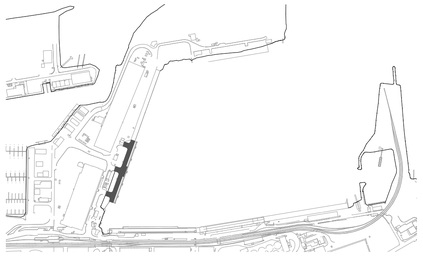
LOCATION PLAN BERTH 4



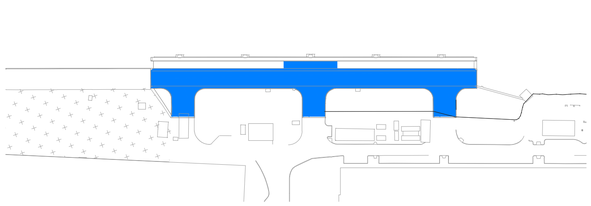
BERTH 4 (NO VESSEL OR MOORING LINES)



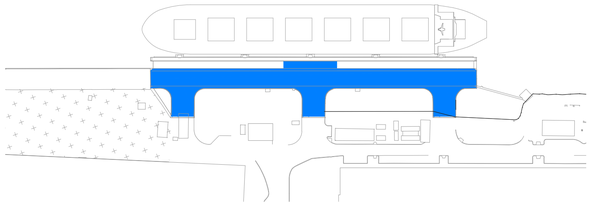
BERTH 4 (VESSEL ALONGSIDE)



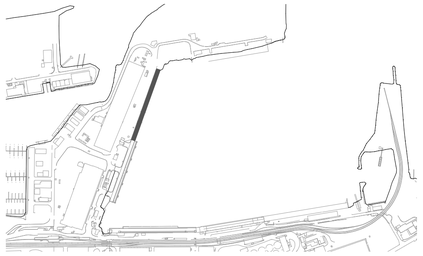
LOCATION PLAN BERTH 5



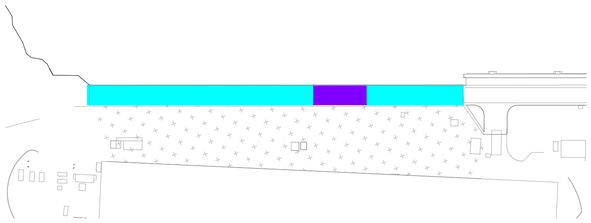
BERTH 5 (NO VESSEL OR MOORING LINES)



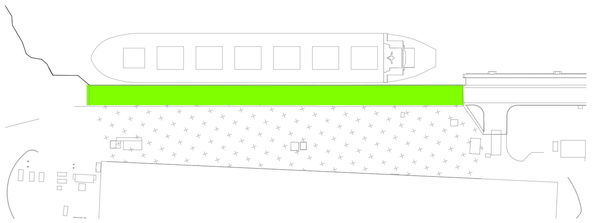
BERTH 5 (VESSEL ALONGSIDE)



LOCATION PLAN BERTH 6



BERTH 6 (NO VESSEL OR MOORING LINES)



BERTH 6 (VESSEL ALONGSIDE)

NOTES

1. THE PERMISSIBLE UNIFORMLY DISTRIBUTED LOADS THAT ARE GIVEN REFLECT THE CONDITIONS AT THE TIME OF THE SMEC 2013 ASSET CONDITION ASSESSMENT.
   LOADS REFLECT THE FINDINGS OF THE 2018 D+A REPORT (REF DOC. P0017-R-001 REV 0) & FOR BERTH 1 & 2, THE 2019 AECOM REPORT (REF DOC. 60554034-REP-002 TASK 1 DECK LOAD CAPACITY REV 1)
2. LOADING RESTRICTION CLARIFICATION:
   a. T44 = STANDARD TRUCK LOAD OF 44 tonnes
      FRONT AXLE = 4.8 tonnes
      REAR AXLE = 9.6 tonnes EACH x 4 AXLES
   b. 3.5t FORK LIFT = 5.0t SELF WEIGHT + 3.5t LOAD DISTRIBUTED AS 7.5t ON FRONT AXLE AND 1.0t ON REAR AXLE
   c. 10t FORK LIFT = 16t SELF WEIGHT + 10.0t LOAD DISTRIBUTED AS 24.0t ON FRONT AXLE AND 2.0t ON REAR AXLE (NOTE THIS IS FOR A VERY OLD MACHINE)
3. THIS DRAWING DOES NOT APPLY TO HOPPER LOADING OPERATIONS
4. FOR BERTH 1 & 2 UDL EXCLUSION ZONES APPLY AROUND BOLLARDS WITH A MOORING LINE. REFER TO WHARF SPECIFICATION BOOK FOR MORE INFORMATION.
5. BERTH 4 STEEL SEAWARD DECK HAS BEEN DESIGNED FOR THE FOLLOWING LOADING:
   - FORKLIFT -HYUNDAI 7T:
     × AXLE LOADING (LOADED) FRONT/REAR: 14564 Kg/1866Kg
     × AXLE LOADING (LOADED) FRONT/REAR: 3867 Kg/5564 Kg
   - SHORE TENSION SYSTEMS INCLUDING:
     × SHORE TENSION UNIT (3200 Kg)
     × ST BOLLARD (1086 Kg)
     × SNATCH BLOCK (600 Kg)
   - 5KPa LIVE LOAD.

NOTE THAT ALL LOADS MENTIONED ABOVE HAVE BEEN CONSIDERED IN ISOLATION (NOT COINCIDENTAL). SHORE TENSION SYSTEM COMPONENTS HAVE BEEN CONSIDERED AS LOADING THE SEAWARD DECK AT THE SAME TIME.

LEGEND

NOTE: 1 T/m² = 10kPa

- 0.0 T/m²
- 1.0 T/m²
- 1.5 T/m²
- 2.0 T/m²
- 2.5 T/m²
- 3.4 T/m²
- 4.5 T/m²
- 5.0 T/m²
- 8.0 T/m²
- AREA SUSPECTED TO CONTAIN SOFT SILTS TO SIGNIFICANT DEPTH. REFER GEOTECH
- AREA PREVIOUSLY LOADED WITH HEAVY VEHICULAR TRAFFIC. ADEQUATE PERFORMANCE TO DATE UNDER APPLIED LOADS. NO SPECIFIC LOAD CAPACITY NOMINATED.

TYPICAL LOADS

TRAFFIC LOADS

PEDESTRIAN	300kg/m²
VEHICULAR TRAFFIC (CARS)	300kg/m²
VEHICULAR TRAFFIC (LIGHT TRUCKS) AGGREGATE 3T	500kg/m²
VEHICULAR TRAFFIC (HEAVY TRUCKS) AGGREGATE 16T	1.5 T/m²
VEHICULAR TRAFFIC (SEMI TRAILERS)	2.4 T/m²
CRANES - TO BE ASSESSED	

STACK LOADS

SOIL	1.0 T/m²
WATER	300kg/m²
WHEAT	720kg/m²
BARLEY	300kg/m²
STEEL	7.9 T/m²
ZINC	7.0 T/m²

REV	DATE	DESCRIPTION	DRN	APP
E	26.04.23	UPDATE FOLLOWING BERTH 4 STRENGTHENING	RR	JR
D	12.10.20	LOAD CAPACITIES REVISED	RF	JR
C	17.02.20	LOAD CAPACITIES REVISED	RF	JR
B	26.04.18	ISUED FOR USE	RF	IM
A	22.06.15	ISSUED FOR INFORMATION	RF	JR

REVISIONS

DRAWING No.	DRAWING TITLE

REFERENCE DRAWINGS

MWPA PROJECT No:

DESIGNED	W & G	DESIGN CHECK	SMEC & D+A
DRAWN	R. FERSTAT	CHECKED	I. MCLEOD
ENGINEER	I. MCLEOD	APPROVED	J.REILLY

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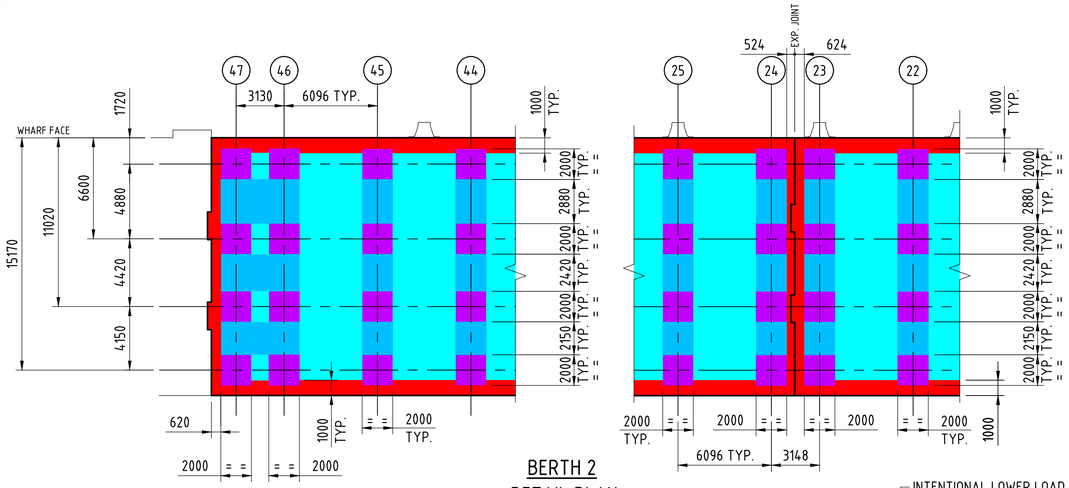
GERALDTON PORT
COMMERCIAL HARBOUR
BERTH CAPACITY
UNIFORMLY DISTRIBUTED LOAD CAPACITY PLAN

SCALE: A1 - NOT TO SCALE
DRG No.: 009-MA-0011
REV.: E

Appendix B

LOAD CAPACITY PLANS – 1.2M x 1.2M OUTRIGGERS AND CUSTOM ASSESSMENTS

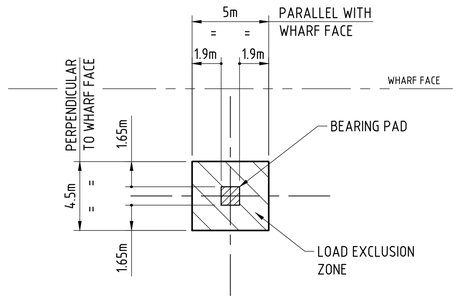
Berth Number	Title	Drawing Number	Rev Number
Berths 1 and 2	Commercial Harbour – Berth 1 and Berth 2 Load Capacity Plan 1.2m x 1.2m Outrigger Pad	009-MA-0012	G
Berth 3	Commercial Harbour – Berth 3 Load Capacity Plan 1.2m x 1.2m Outrigger Pad	009-MA-0013	C
Berth 4	Commercial Harbour – Berth 4 Load Capacity Plan 1.2m x 1.2m Outrigger Pad	009-MA-0016	D
Berth 5	Commercial Harbour – Berth 5 Load Capacity Plan 1.2m x 1.2m Outrigger Pad	009-MA-0018	C
Berth 6	Commercial Harbour – Berth 6 Load Capacity Plan 1.2m x 1.2m Outrigger Pad	009-MA-0020	C
Berth 6	Commercial Harbour – Berth 6 Stevens Hopper Arrangement Plan and Details	009-MA-0061	0
Berth 6	Berth 6 QUBE Liebherr LHM280 Crane	EX-B-1.01 EX-B-1.02 EX-B-1.03 EX-B-1.04	4 4 3 3



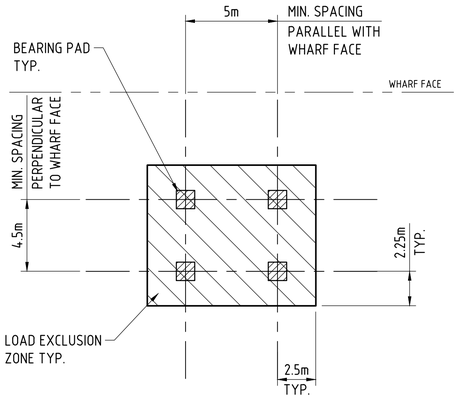
BERTH 2
DETAIL PLAN
1:200

NOTE
LOADS SHOWN ARE FOR 1.2m x 1.2m OUTRIGGER PADS

THE COLOURED AREAS REPRESENT ACCEPTABLE LOCATIONS OF THE BEARING PADS RELATIVE TO THE CENTRE OF THE PAD.



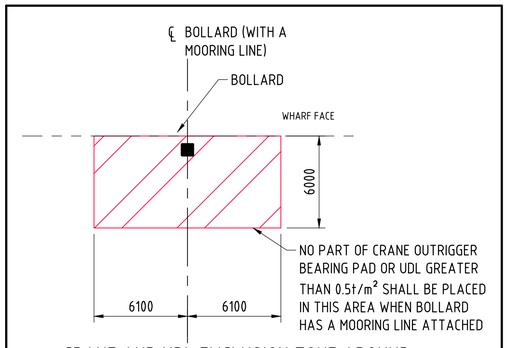
SINGLE OUTRIGGER BEARING PAD
1:200



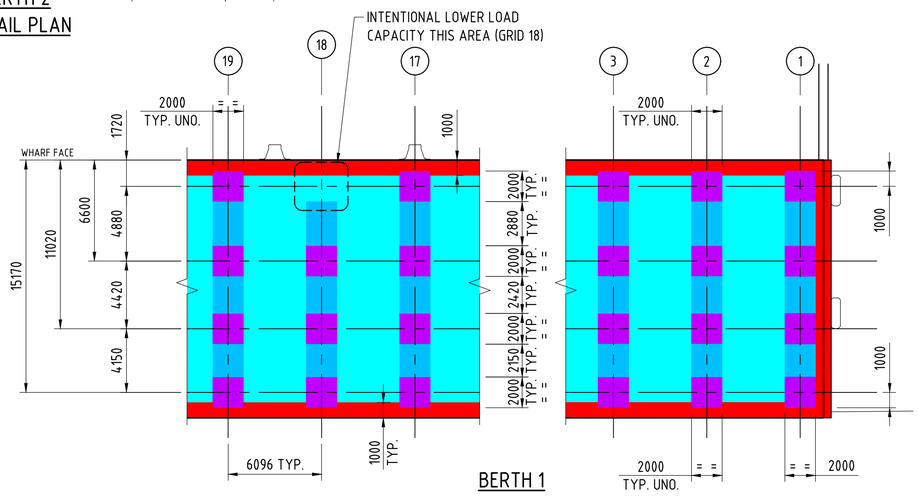
MULTIPLE OUTRIGGER BEARING PAD
1:200

NOTES

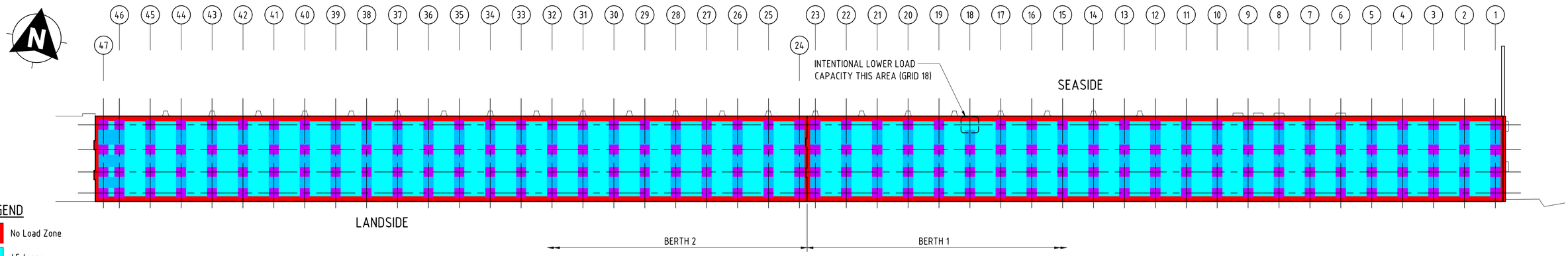
1. BERTH 1 & BERTH 2 CONSIST OF A 320mm THICK REINFORCED CONCRETE DECK, SUPPORTED ON CONCRETE PILES.
2. UDL LIMITED TO 34kPa.
3. BERTH DESIGN LIVE LOADS ARE:
   a. UNIFORMLY DISTRIBUTED LOAD OF 3.4t/m² (WHEN VESSELS ARE BERTHING 2.5t/m²) EXCEPT 1m FROM THE BERTH FACE WHICH SHALL BE 0.5t/m².
   b. POINT LOADS FROM T44 TRUCK AND B-DOUBLE. REFER TO APPENDIX D.
4. THIS LOAD CAPACITY PLAN IS BASED ON REPORT 60554034-REP-002. REFER TO REPORT FOR APPLICABLE LIFTING LIMITATIONS.
5. HEAVY LOAD LIMITS:
   a. ALLOWABLE CRANE LOADS ARE BASED ON THE MAXIMUM ALLOWABLE REACTION ON MULTIPLE CRANE OUTRIGGERS.
   b. NO OTHER LIVE LOADS SHALL BE PLACED WITHIN A LOAD EXCLUSION ZONE CENTRED ON EACH BEARING PAD. LOADS UP TO THE DESIGN LIVE LOADS IN NOTE 2 MAY BE PLACED OUTSIDE THESE ZONES.
   c. MINIMUM SPACING BETWEEN TWO OR MORE OUTRIGGERS SHALL BE 4.5m PERPENDICULAR TO THE WHARF FACE AND 5m PARALLEL TO THE WHARF FACE. OUTRIGGER SPACINGS LESS THAN THIS SHALL BE REFERRED TO THE DESIGNERS.
   d. PILES SHALL BE ACCURATELY LOCATED PRIOR TO LOADING. NB FENDERS DO NOT NECESSARILY ALIGN WITH PILE GRIDS.
   e. OUTRIGGER LOADS THAT DO NOT COMPLY WITH (a) ABOVE SHALL BE REFERRED TO THE DESIGNERS.
   f. THE ALLOWABLE CRANE OUTRIGGER LOADS ARE INCLUSIVE OF ALL HOISTING / SLEWING DYNAMIC EFFECTS ON THE CRANE.
   g. FOR NO SHIP MOORED: UDL BEHIND DECK IS LIMITED TO 2.5t/m².
      DURING SHIP MOORING: UDL BEHIND DECK IS LIMITED TO 3.4t/m²
6. THE PERMISSIBLE LOADS THAT ARE GIVEN ASSUME THAT THE WHARF IS IN THE CONDITION THAT WAS ENCOUNTERED DURING THE 2015 ASSET CONDITION ASSESSMENT.
7. REFER TO 009-MA-0002 AND 002-MA-0009 FOR DETAILS OF BOLLARD LOADS.



CRANE AND UDL EXCLUSION ZONE AROUND BOLLARDS WITH A MOORING LINE
1:200



BERTH 1
DETAIL PLAN
1:200



LEGEND
- No Load Zone
- 45 tonne
- 50 tonne
- 80 tonne

REV	DATE	DESCRIPTION	DRN	APP
F	17.02.20	NOTE 5g ADDED. LOAD COLOUR SCALE REVISED	RF	JH
E	08.01.19	WHARF LOADING MODIFIED. ISSUED FOR INFORMATION	PL	AW
D	18.10.18	WHARF LOADING MODIFIED. ISSUED FOR INFORMATION	PL	AW
C	30.11.16	WHARF LOADING MODIFIED. ISSUED FOR INFORMATION	RF	IM
G	12.10.20	NOTES UPDATED	RF	JR

REVISIONS

DRAWING No.	DRAWING TITLE

REFERENCE DRAWINGS

MWPA PROJECT No:

DESIGNED	AECOM	DESIGN CHECK	I. MCLEOD
DRAWN	R. FERSTAT	CHECKED	------
ENGINEER	P. DUPLEX	APPROVED	C. STEAMER

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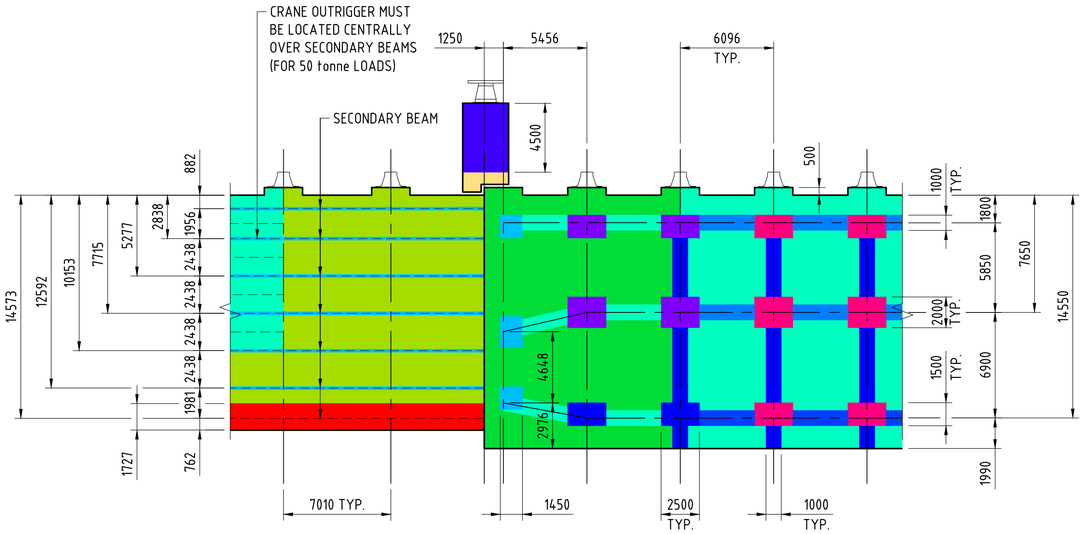
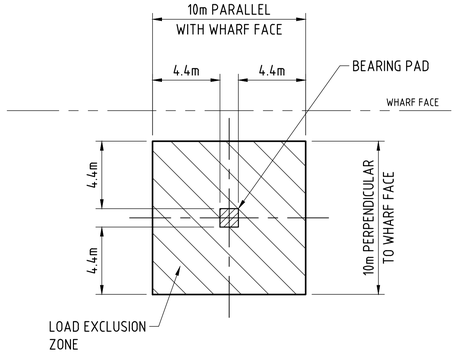
GERALDTON PORT
COMMERCIAL HARBOUR - BERTH 1 & BERTH 2
LOAD CAPACITY PLAN
1.2m x 1.2m OUTRIGGER PAD

SCALE	DRG No.	REV.
A1 - 1:400 U.N.O.	009-MA-0012	G



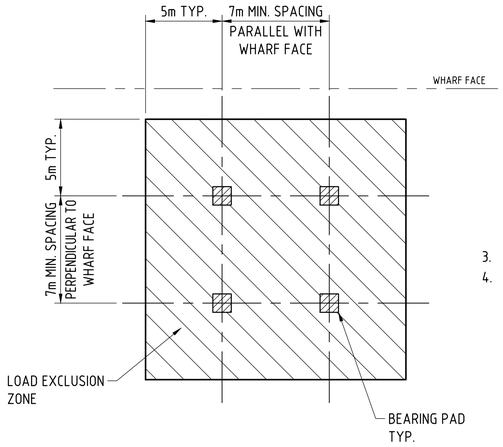
DETAIL PLAN
1:200



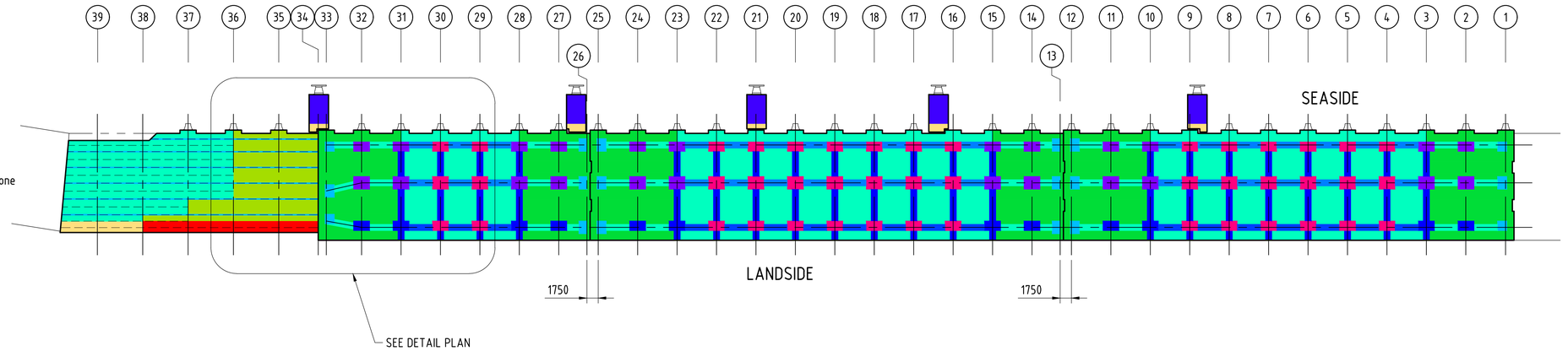
SINGLE OUTRIGGER BEARING PAD
1:200

NOTE
LOADS SHOWN ARE FOR 1.2m x 1.2m OUTRIGGER PADS

THE COLOURED AREAS REPRESENT ACCEPTABLE LOCATIONS OF THE BEARING PADS RELATIVE TO THE CENTRE OF THE PAD.



MULTIPLE OUTRIGGER BEARING PADS
1:200



LEGEND
- No Load Zone
- 12 tonne
- 25 tonne
- 30 tonne
- 40 tonne
- 50 tonne
- 55 tonne
- 60 tonne
- 65 tonne
- 70 tonne
- 75 tonne
- 110 tonne

NOTES
1. BERTH 3 CONSISTS OF A 500mm THICK REINFORCED CONCRETE DECK, SUPPORTED ON ϕ508mm x 12mm STEEL PILES CAST OVER AND REPLACING AN EXISTING BEAM AND SLAB DECK SUPPORTED ON COMPOSITE CONCRETE & STEEL PILES.
2. BERTH DESIGN LIVE LOADS ARE:
   a. ORIGINAL BERTH 3 AREA (EAST PILE BENT 34):
      UNIFORMLY DISTRIBUTED LOAD OF 5.0t/m^2
      WHEEL LOAD FROM TRUCK T44 TRUCK. REFER TO APPENDIX D.
      WHEEL LOAD FROM 60.0tonne (GROSS) FORKLIFT.
      BOGIE LOAD FROM SHIP LOADER OF 40.0tonnes.
   b. BERTH 3 EXTENSION ZONE A (WEST OF PILE BENT 34 AND SEAWARD OF REAR PILES):
      UNIFORMLY DISTRIBUTED LOAD OF 34kPa
      WHEEL LOAD FROM TRUCK T44 TRUCK. REFER TO APPENDIX D.
      BOGIE LOAD FROM SHIP LOADER OF 40.0tonnes.
   c. BERTH 3 EXTENSION ZONE B (WEST OF PILE BENT 34 AND LANDWARD OF REAR PILES):
      UNIFORMLY DISTRIBUTED LOAD OF 10kPa
      WHEEL LOAD FROM TRUCK T44 TRUCK. REFER TO APPENDIX D.
      WHEEL LOAD FROM 3.5 tonne (GROSS) FORKLIFT.
      BOGIE LOAD FROM SHIP LOADER OF 40.0tonnes.
3. REFER TO REPORT FOR APPLICABLE LIFTING LIMITATIONS.
4. HEAVY LOAD LIMITS:
   a. ALLOWABLE CRANE LOADS ARE BASED ON THE MAXIMUM ALLOWABLE REACTION ON A SINGLE CRANE OUTRIGGER.
   b. NO OTHER LIVE LOADS SHALL BE PLACED WITHIN A 10mx10m LOAD EXCLUSION ZONE CENTRED ON EACH BEARING PAD. LOADS UP TO THE DESIGN LIVE LOADS IN NOTE 2 MAY BE PLACED OUTSIDE THESE ZONES.
   c. MINIMUM SPACING BETWEEN TWO OR MORE OUTRIGGERS SHALL BE 7m PERPENDICULAR AND PARALLEL TO THE WHARF FACE. OUTRIGGER SPACINGS LESS THAN 7m SHALL BE REFERRED TO THE DESIGNERS.
   d. PILES SHALL BE ACCURATELY LOCATED PRIOR TO LOADING.
   e. OUTRIGGER LOADS THAT DO NOT COMPLY WITH (A) ABOVE SHALL BE REFERRED TO THE DESIGNERS.
   f. THE ALLOWABLE CRANE OUTRIGGER LOADS ARE INCLUSIVE OF ALL HOISTING / SLEWING DYNAMIC EFFECTS ON THE CRANE.
5. ALL COLUMN LINES ON THIS DRAWING REFER TO THE STEEL PILES.
6. THE PERMISSIBLE LOADS THAT ARE GIVEN ASSUME THAT THE WHARF IS IN THE CONDITION THAT WAS ENCOUNTERED DURING THE SMEC 2013 ASSET CONDITION ASSESSMENT
7. LOADING RESTRICTION CLARIFICATION:
   a. T44 = STANDARD TRUCK LOAD OF 44 tonnes
      FRONT AXLE = 4.8 tonnes
      REAR AXLE = 9.6 tonnes EACH x 4 AXLES
   b. 3.5t FORK LIFT = 5.0t SELF WEIGHT + 3.5t LOAD DISTRIBUTED AS 7.5t ON FRONT AXLE AND 1.0t ON REAR AXLE
   c. 10t FORK LIFT = 16t SELF WEIGHT + 10.0t LOAD DISTRIBUTED AS 24.0t ON FRONT AXLE AND 2.0t ON REAR AXLE (NOTE THIS IS FOR A VERY OLD MACHINE)
8. THIS LOAD CAPACITY PLAN IS BASED ON CONNELL WAGNER DRAWING A177-26-C-001 REV. D

REV	DATE	DESCRIPTION	DRN	APP
C	17.02.20	LOAD COLOUR SCALE REVISED, CAPPING BEAM LOAD INCREASED	RF	JR
B	27.08.15	ISSUED FOR INFORMATION	RF	PD

REVISIONS

DRAWING No.	DRAWING TITLE

REFERENCE DRAWINGS

MWPA PROJECT No:

DESIGNED	CONNELL WAGNER	DESIGN CHECK	SMEC
DRAWN	R. FERSTAT	CHECKED	P. DUPLEX
ENGINEER	P. DUPLEX	APPROVED	P. BLUNDELL

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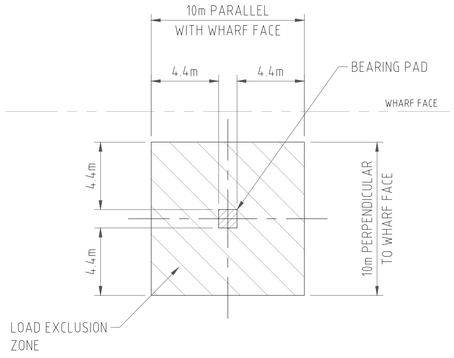
GERALDTON PORT

COMMERCIAL HARBOUR - BERTH 3

LOAD CAPACITY PLAN

1.2m x 1.2m OUTRIGGER PAD

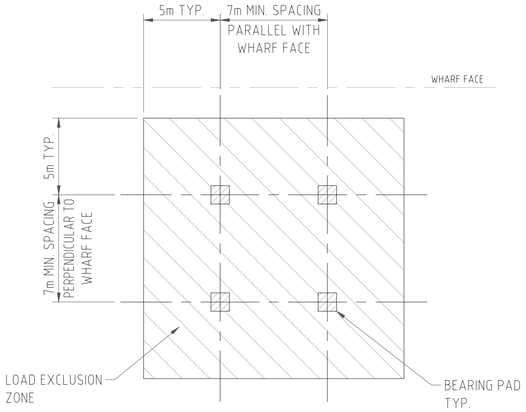
SCALE	DRG No.	REV.
A1 - 1:400 U.N.O.	009-MA-0013	C



BERTH 4

SINGLE OUTRIGGER BEARING PAD

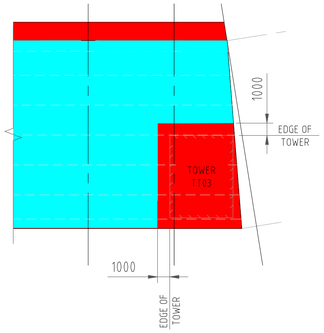
1:200



BERTH 4

MULTIPLE OUTRIGGER BEARING PADS

1:200



DETAIL PLAN

1:250

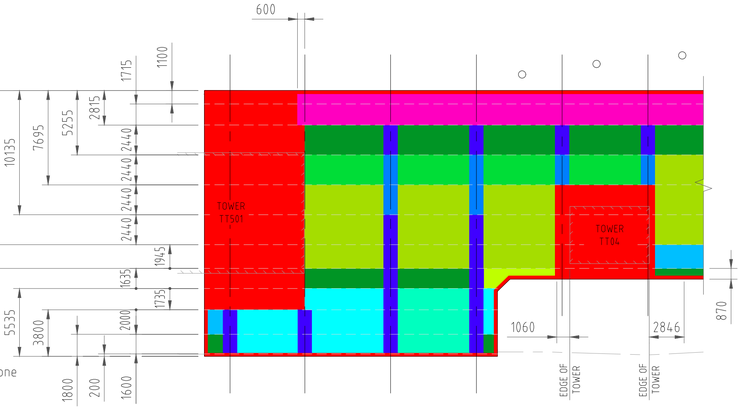
NOTE

LOADS SHOWN ARE FOR 1.2m x 1.2m OUTRIGGER PADS

THE COLOURED AREAS REPRESENT ACCEPTABLE LOCATIONS OF THE BEARING PADS RELATIVE TO THE CENTRE OF THE PAD.

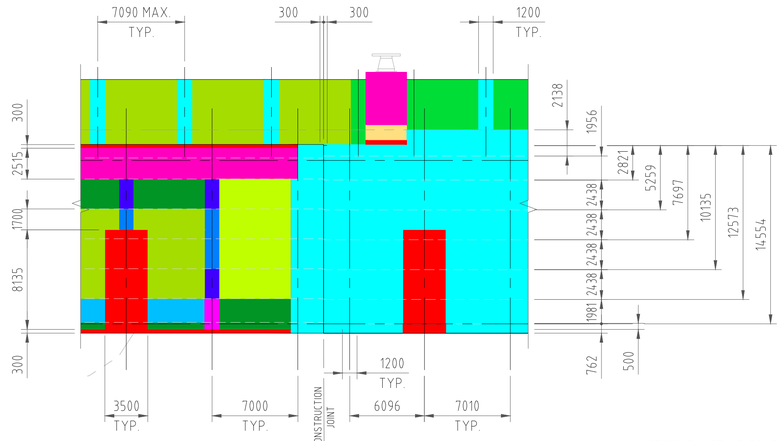
NOTES

1. BERTH 4 CONSISTS OF THE FOLLOWING ELEMENTS WITH THE ASSUMED PROPERTIES LISTED:
   a. ORIGINAL BERTH 4 (CIRCA 1964):
      CONCRETE SLAB - 600mm THICK REINFORCED
      F'C = 50MPA
      REINFORCING STEEL ASSUMED YIELD STRESS 500MPA
      ASSUMED COVER 50mmTOP, 70mm BOTTOM.
      STEEL BEAMS - ASSUMED YIELD STRESS 228MPA TO AS A1 -1956.
   b. BERTH 4 EXTENSION (CIRCA 1987):
      CONCRETE SLAB - 350mm THICK REINFORCED CONCRETE (245mm DEEP AT CRANE RAIL RECESS)
      F'C = 30MPA
      REINFORCING STEEL YIELD STRESS 400MPA
      STEEL BEAMS - ASSUMED GRADE 250.
2. LOADS GIVEN HAVE BEEN CALCULATED FROM AVAILABLE INFORMATION AND FOLLOWING 2019 DECK REPAIRS
3. LOAD CALCULATIONS TAKE THE 2016 & 2022 BERTH STRENGTHENING INTO ACCOUNT.
4. STRUCTURE LOAD ASSESSMENT HAS BEEN CONDUCTED TO AS 5100, WITH A ULS FACTOR OF 1.5 APPLIED TO CRANE PAD LOADS.
5. HEAVY LOAD LIMITS
   a. ALLOWABLE CRANE LOADS ARE BASED ON THE MAXIMUM ALLOWABLE REACTION ON A SINGLE CRANE OUTRIGGER BEARING PAD.
   b. NO OTHER LIVE LOADS SHALL BE PLACED WITHIN A 10m x 10m LOAD EXCLUSION ZONE CENTERED ON EACH BEARING PAD. LOADS UP TO THE DESIGN LIVE LOADS SHOWN MAY BE PLACED OUTSIDE THESE ZONES.
   c. CRANE OUTRIGGER PAD 10x10m LOAD EXCLUSION ZONE APPLIES TO SHIPLOADER TRESTLE.
   d. MINIMUM SPACING BETWEEN TWO OR MORE OUTRIGGERS SHALL BE 7m PERPENDICULAR AND PARALLEL TO THE WHARF FACE. OUTRIGGER SPACINGS LESS THAN 7m SHALL BE REFERRED TO THE DESIGNERS.
   e. PILES, LONGITUDINAL BEAMS AND HEADSTOCKS SHALL BE ACCURATELY LOCATED PRIOR TO LOADING.
   f. OUTRIGGER LOADS THAT DO NOT COMPLY WITH THESE CONSTRAINTS SHALL BE REFERRED TO THE DESIGNERS.
   g. ALLOWABLE CRANE OUTRIGGER LOADS SHOWN ON DIAGRAMS ARE UN-FACTORED ULS LOADS, INCLUSIVE OF ALL HOISTING / SLEWING DYNAMIC EFFECTS ON THE CRANE.
   h. SERVICEABILITY LIMIT STATE LIMITATIONS REQUIRE THAT NO CRANE LOADING IS TO BE LOCATED WITHIN 20m OF THE SHIPLOADER
   i. A 300mm WIDE NO LOAD ZONE SHALL APPLY TO ALL MAIN BERTH EDGES
6. ORIGINAL WHARF 4 CRANE AND UDL LOADING CAPACITIES AS OUTLINED WITHIN THIS DRAWING HAVE BEEN BASED ON THE DESIGN INTENT OUTLINED WITHIN THE ORIGINAL DESIGN DRAWINGS AND REPORTS (P0044-R-006 REV D). IT IS EXPECTED THAT THE DESIGN INTENT HAS BEEN ACHIEVED DURING CONSTRUCTION, WITH ANY TECHNICAL QUERIES AND NON-CONFORMANCES RAISED AND RESOLVED WITH THE ORIGINAL DESIGNER AT THE TIME OF CONSTRUCTION ENSURES THAT THE OUTLINED DESIGN INTENT HAS BEEN ACHIEVED.



DETAIL PLAN

1:250

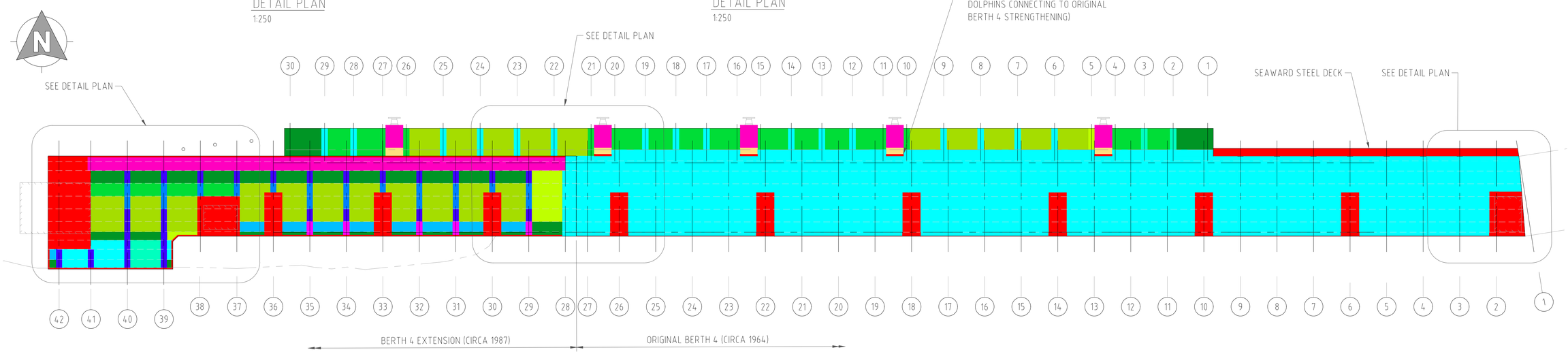


DETAIL PLAN

1:250

LEGEND

- No Load Zone
- 5 tonne
- 10 tonne
- 12 tonne
- 15 tonne
- 20 tonne
- 25 tonne
- 30 tonne
- 35 tonne
- 40 tonne
- 45 tonne
- 50 tonne
- 55 tonne
- 70 tonne
- 85 tonne
- 100 tonne



REV	DATE	DESCRIPTION	DRN	APP
E	26.04.23	UPDATE FOLLOWING BERTH 4 STRENGTHENING	RR	MB
D	17.02.20	COLOUR SCALE REVISED	RF	JH
C	26.06.17	ISSUED FOR INFORMATION	RF	IM

REVISIONS

DRAWING No.	DRAWING TITLE

REFERENCE DRAWINGS

MWPA PROJECT No:

DESIGNED	D. STIPP	DESIGN CHECK	I. MCLEOD
DRAWN	R. FERSTAT	CHECKED	------
ENGINEER	D. STIPP	APPROVED	J.REILLY

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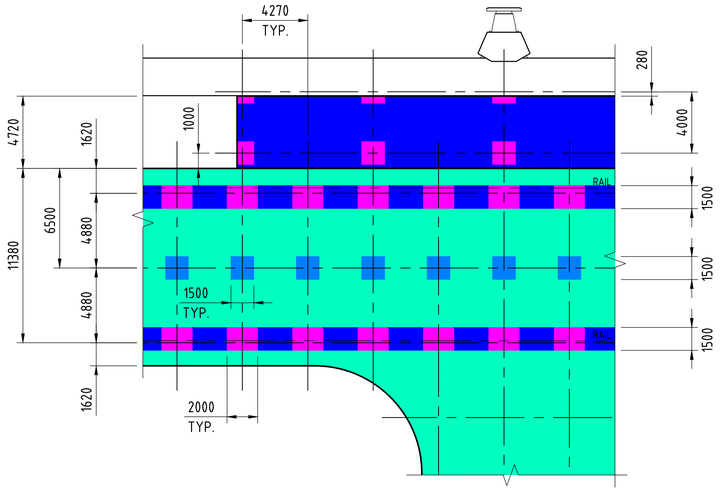
GERALDTON PORT

COMMERCIAL HARBOUR - BERTH 4

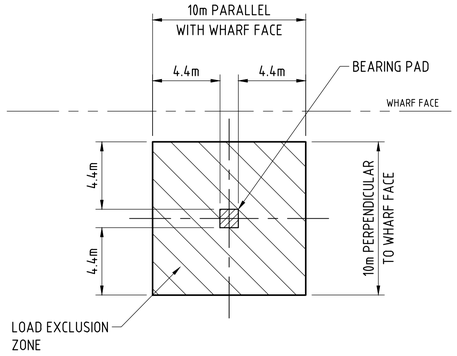
LOAD CAPACITY PLAN

1.2m x 1.2m OUTRIGGER PAD

SCALE	DRG No.	REV.
A1 - 1:400 U.N.O.	009-MA-0016	E



DETAIL PLAN
1:200

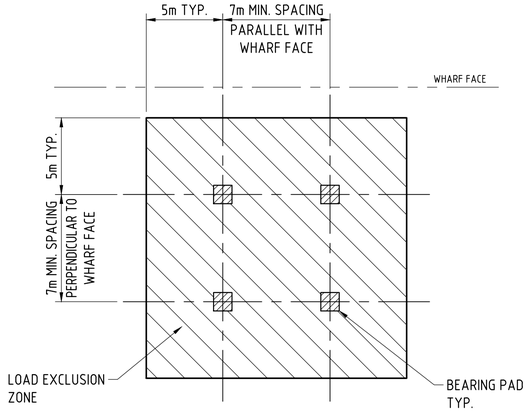


SINGLE OUTRIGGER BEARING PAD
1:200

INCREASE LOAD EXCLUSION ZONE DISTANCES FROM 4.4m TO 8.8m AT MAINTENANCE DECK FOR SHIP LOADER.

NOTE
LOADS SHOWN ARE FOR 1.2m x 1.2m OUTRIGGER PADS

THE COLOURED AREAS REPRESENT ACCEPTABLE LOCATIONS OF THE BEARING PADS RELATIVE TO THE CENTRE OF THE PAD.

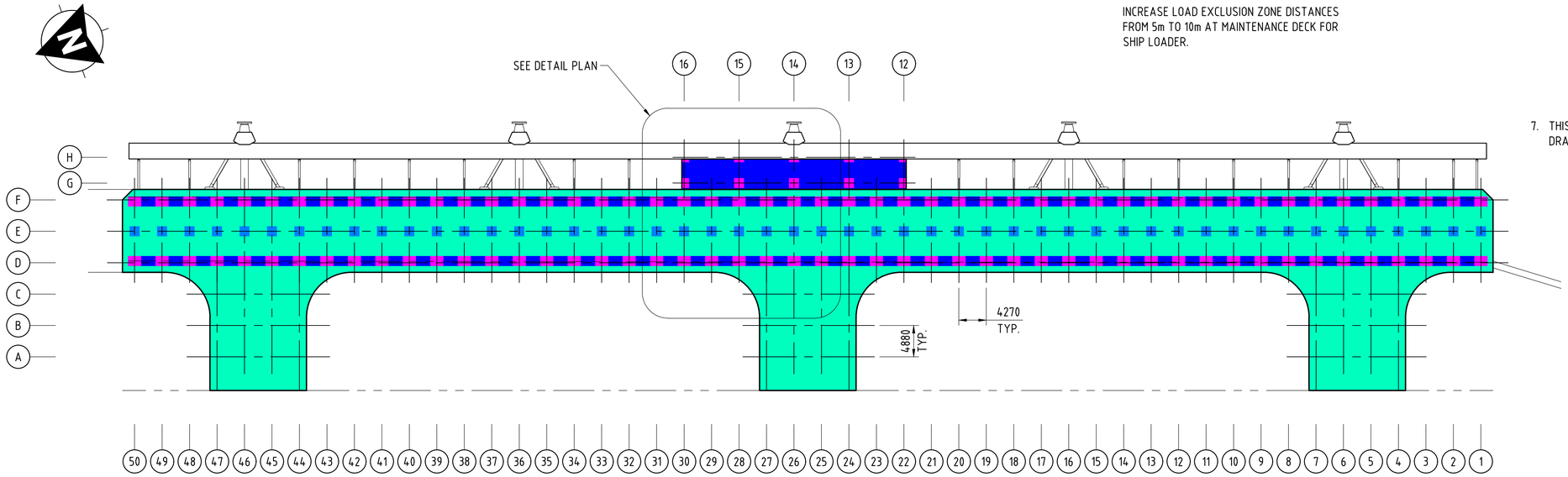


MULTIPLE OUTRIGGER BEARING PADS
1:200

INCREASE LOAD EXCLUSION ZONE DISTANCES FROM 5m TO 10m AT MAINTENANCE DECK FOR SHIP LOADER.

NOTES

1. BERTH 5 CONSISTS OF A 600mm THICK REINFORCED CONCRETE DECK, SUSPENDED ON ϕ 400mm x 12mm STEEL PILES.
2. BERTH DESIGN LIVE LOADS ARE:
   UNIFORMLY DISTRIBUTED LOAD OF 4.5t/m^2.
   WHEEL LOAD FROM 60.0tonne (GROSS) FORKLIFT.
   BOGIE LOAD FROM SHIPLOADER OF 60.0tonne.
3. REFER TO REPORT FOR APPLICABLE LIFTING LIMITATIONS.
4. HEAVY LOAD LIMITS:
   a. ALLOWABLE CRANE LOADS ARE BASED ON THE MAXIMUM ALLOWABLE REACTION ON A SINGLE CRANE OUTRIGGER PAD.
   b. NO OTHER LIVE LOADS SHALL BE PLACED WITHIN A 10mx10m LOAD EXCLUSION ZONE CENTRED ON EACH BEARING PAD. LOADS UP TO THE DESIGN LIVE LOADS IN NOTE 2 MAY BE PLACED OUTSIDE THESE ZONES.
   c. MINIMUM SPACING BETWEEN TWO OR MORE OUTRIGGERS SHALL BE 7m PERPENDICULAR AND PARALLEL TO THE WHARF FACE. OUTRIGGER SPACINGS LESS THAN 7m SHALL BE REFERRED TO THE DESIGNERS.
   d. PILES SHALL BE ACCURATELY LOCATED PRIOR TO LOADING.
   e. OUTRIGGER LOADS THAT DO NOT COMPLY WITH (a.) ABOVE SHALL BE REFERRED TO THE DESIGNERS.
   f. THE ALLOWABLE CRANE OUTRIGGER LOADS ARE INCLUSIVE OF ALL HOISTING / SLEWING DYNAMIC EFFECTS ON THE CRANE.
5. THE PERMISSIBLE LOADS THAT ARE GIVEN ASSUME THAT THE DECK WAS REMEDIATED IN 2018/2019 TO ITS ORIGINAL CONDITION
6. LOADING RESTRICTION CLARIFICATION:
   a. T44 = STANDARD TRUCK LOAD OF 44 tonnes
      FRONT AXLE = 4.8 tonnes
      REAR AXLE = 9.6 tonnes EACH x 4 AXLES
   b. 3.5t FORK LIFT = 5.0t SELF WEIGHT + 3.5t LOAD DISTRIBUTED AS 7.5t ON FRONT AXLE AND 1.0t ON REAR AXLE
   c. 10t FORK LIFT = 16t SELF WEIGHT + 10.0t LOAD DISTRIBUTED AS 24.0t ON FRONT AXLE AND 2.0t ON REAR AXLE (NOTE THIS IS FOR A VERY OLD MACHINE)
7. THIS LOAD CAPACITY PLAN IS BASED ON CONNELL WAGNER DRAWING A177-26-C-005 REV. E



LEGEND

- 20 tonne
- 40 tonne
- 55 tonne
- 65 tonne
- 85 tonne

REV	DATE	DESCRIPTION	DRN	APP
C	17.02.20	NOTES & COLOUR SCALE REVISED, 20T LOAD RESTRICTION REMOVED	RF	JH
B	27.08.15	ISSUED FOR INFORMATION	RF	PD

REVISIONS

DRAWING No.	DRAWING TITLE

REFERENCE DRAWINGS

MWPA PROJECT No:

DESIGNED	CONNELL WAGNER	DESIGN CHECK	SMEC
DRAWN	R. FERSTAT	CHECKED	P. DUPLEX
ENGINEER	P. DUPLEX	APPROVED	P. BLUNDELL

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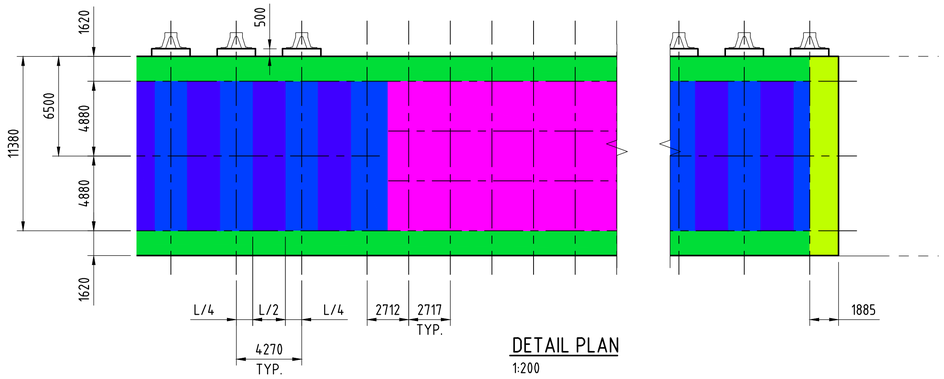
GERALDTON PORT

COMMERCIAL HARBOUR - BERTH 5
LOAD CAPACITY PLAN
1.2m x 1.2m OUTRIGGER PAD

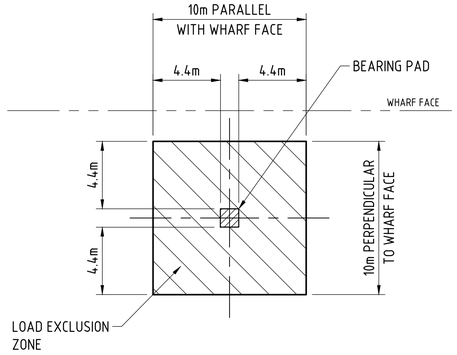
SCALE	ORG No.	REV.
A1 - 1:400 U.N.O.	009-MA-0018	C



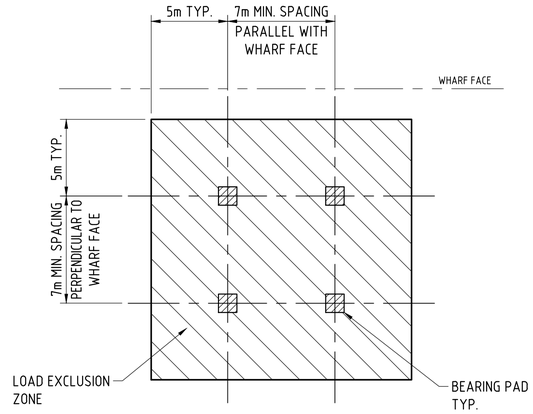
DETAIL PLAN
1:200

NOTE
LOADS SHOWN ARE FOR 1.2m x 1.2m OUTRIGGER PADS

THE COLOURED AREAS REPRESENT ACCEPTABLE LOCATIONS OF THE BEARING PADS RELATIVE TO THE CENTRE OF THE PAD.



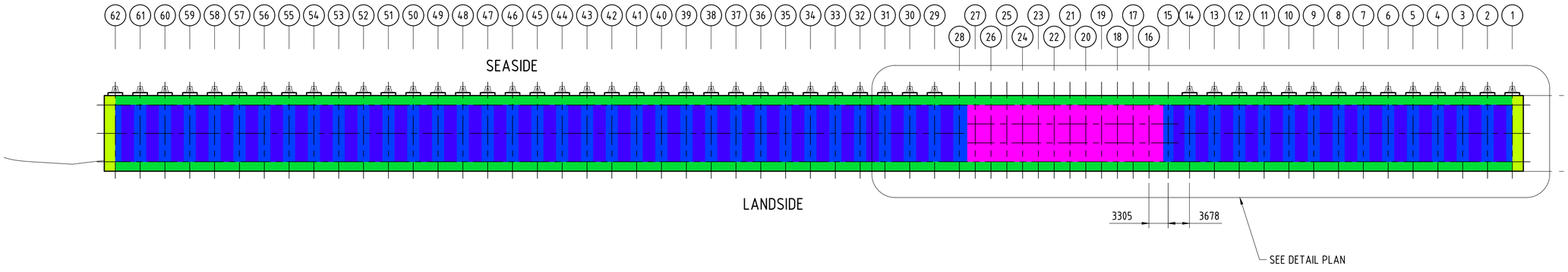
SINGLE OUTRIGGER BEARING PAD
1:200



MULTIPLE OUTRIGGER BEARING PADS
1:200

NOTES

1. BERTH 6 CONSISTS OF A 300mm THICK REINFORCED CONCRETE DECK, SUSPENDED ON STEEL BEAMS, SUPPORTED ON ϕ 406mm STEEL PILES.
2. BERTH DESIGN LIVE LOADS ARE:
   a. LOAD OUT BRIDGE:
      UNIFORMLY DISTRIBUTED LOAD OF 8.0t/m^2
   b. ELSEWHERE:
      UNIFORMLY DISTRIBUTED LOAD OF 3.4t/m^2.
3. REFER TO REPORT FOR APPLICABLE LIFTING LIMITATIONS.
4. HEAVY LOAD LIMITS:
   a. ALLOWABLE CRANE LOADS ARE BASED ON THE MAXIMUM ALLOWABLE REACTION ON A SINGLE CRANE OUTRIGGER PAD.
   b. NO OTHER LIVE LOADS SHALL BE PLACED WITHIN A 10mx10m LOAD EXCLUSION ZONE CENTRED ON EACH BEARING PAD. LOADS UP TO THE DESIGN LIVE LOADS IN NOTE 2 MAY BE PLACED OUTSIDE THESE ZONES.
   c. MINIMUM SPACING BETWEEN TWO OR MORE OUTRIGGERS SHALL BE 7m PERPENDICULAR AND PARALLEL TO THE WHARF FACE. OUTRIGGER SPACINGS LESS THAN 7m SHALL BE REFERRED TO THE DESIGNERS.
   d. PILES SHALL BE ACCURATELY LOCATED PRIOR TO LOADING.
   e. OUTRIGGER LOADS THAT DO NOT COMPLY WITH (a.) ABOVE SHALL BE REFERRED TO THE DESIGNERS.
   f. THE ALLOWABLE CRANE OUTRIGGER LOADS ARE INCLUSIVE OF ALL HOISTING / SLEWING DYNAMIC EFFECTS ON THE CRANE.
5. THE PERMISSIBLE LOADS THAT ARE GIVEN ASSUME THAT THE WHARF IS IN THE CONDITION THAT WAS ENCOUNTERED DURING THE SMEC 2013 ASSET CONDITION ASSESSMENT
6. THIS LOAD CAPACITY PLAN IS BASED ON CONNELL WAGNER DRAWING A177-26-C-007 REV. D



LEGEND

- 20 tonne
- 30 tonne
- 60 tonne
- 70 tonne
- 85 tonne

REV	DATE	DESCRIPTION	DRN	APP
C	17.02.20	COLOUR SCALE REVISED	RF	JH
B	27.08.15	ISSUED FOR INFORMATION	RF	PD

REVISIONS

DRAWING No.	DRAWING TITLE

REFERENCE DRAWINGS

MWPA PROJECT No:

DESIGNED	CONNELL WAGNER	DESIGN CHECK	SMEC
DRAWN	R. FERSTAT	CHECKED	P. DUPLEX
ENGINEER	P. DUPLEX	APPROVED	P. BLUNDELL

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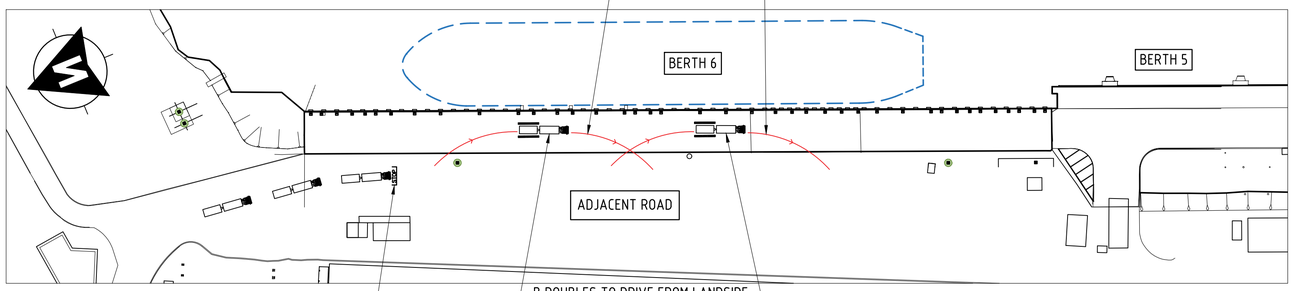
GERALDTON PORT
COMMERCIAL HARBOUR - BERTH 6
LOAD CAPACITY PLAN
1.2m x 1.2m OUTRIGGER PAD

SCALE	ORG No.	REV.
A1 - 1:400 U.N.O.	009-MA-0020	C



TRUCKS TO TRAVEL TO LANDSIDE OF BERTH USING SHORTEST DISTANCE POSSIBLE. TRUCKS ARE NOT PERMITTED TO DRIVE ON DECK ADJACENT TO HOPPER BEING USED FOR TRUCK LOADING

B DOUBLES TO CUE HERE & WAIT LANDSIDE OF BERTH UNTIL HOPPER HAS BEEN VACATED AND LOADED TRUCK IS LANDSIDE

B DOUBLES TO DRIVE FROM LANDSIDE OF BERTH UNDERNEATH HOPPERS

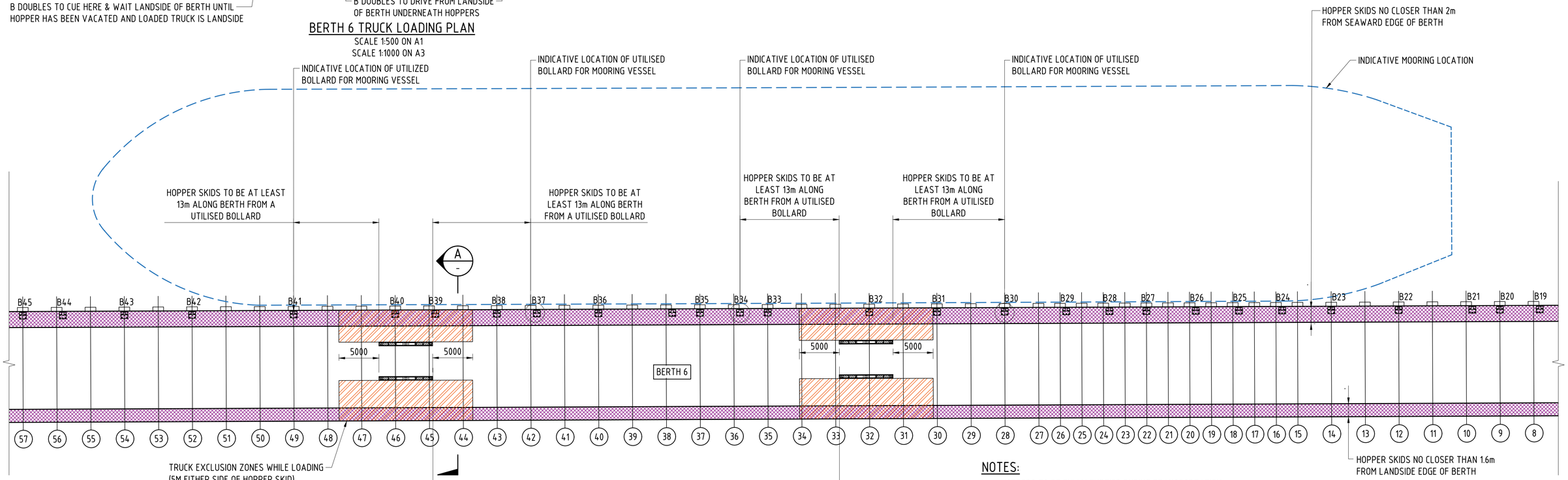
BERTH 6 TRUCK LOADING PLAN

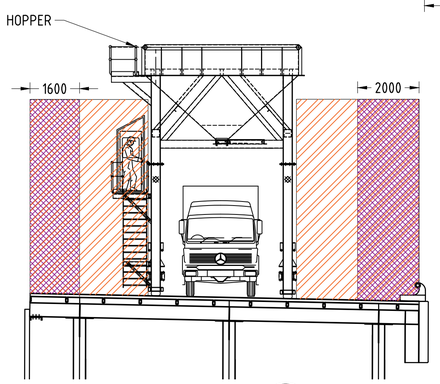
SCALE 1:500 ON A1
SCALE 1:1000 ON A3

LEGEND:

HOPPER EXCLUSION ZONE

HOPPER ADJACENT TRUCK EXCLUSION ZONE DURING LOADING





SECTION A
1:100 ON A1
1:200 ON A3

BERTH 6 DECK PERMITTED HOPPER LOCATION PLAN

BOLLARD LOCATIONS INDICATIVE ONLY
SCALE 1:250 ON A1
SCALE 1:500 ON A3

NOTES:

1. HOPPERS TO BE FULLY EMPTIED DURING TRANSPORTATION
2. THE HOPPER SHOULD NOT BE POSITIONED WITHIN 13 METRES OF A BOLLARD WHICH IS USED TO MOOR THE VESSEL
3. THE HOPPERS ARE NOT TO BE SPACED CLOSER THAN 20 METRES OF EACH OTHER ALONG THE LENGTH OF THE BERTH
4. HOPPER SKIDS TO BE PLACED NO CLOSER THAN 2m FROM THE SEAWARD EDGE OF THE BERTH AND 1.6m FROM THE REAR OF BERTH
5. ONLY A SINGLE B-DOUBLE IS ALLOWED ON THE BERTH PER HOPPER
6. IF NOT UNLOADING, THE B-DOUBLES SHOULD TRAVERSE THE BERTH AT A MAXIMUM DISTANCE POSSIBLE AWAY FROM THE HOPPER LOCATION. TRUCKS AND VEHICLES WAITING TO BE LOADED MUST BE PARKED LANDSIDE OFF THE DECK AND CAN ONLY ACCESS THE DECK ONCE THE NEWLY FILLED TRUCK HAS LEFT THE BERTH DECK COMPLETELY
7. MWPA OH&S POLICIES AND PROCEDURES MUST BE ADHERED TO AT ALL TIMES
8. THIS PLAN IS APPLICABLE TO THE USE OF STEVENS' BULK SERVICES HOPPER AS OUTLINED ON PLANS ON DRAWING 15054-03 (24.05.2015), PREPARED BY NTGR PTY LTD CONSULTING ENGINEERS, ON BERTH 6 ONLY. THE HOPPER IS TO BE UTILISED WITH THE FOLLOWING RESTRICTIONS:
   - × CONTAINER CAPACITY NOT TO EXCEED 80m^3
   - × MAX BULK MATERIAL WEIGHT OF 1.4t/m^3
   - × BULK MATERIAL ANGLE OF REPOSE OF NO GREATER THAN 27 DEGREES.
10. THE PERMISSIBLE LOCATIONS FOR HOPPERS SHOWN ON THIS DRAWING ASSUMES THAT THE WHARF STRUCTURE IS IN A CONDITION SIMILAR TO THAT PRESENTED ON THE AS-CONSTRUCTED DRAWINGS FOR THIS WHARF DATED 1995. NO ALLOWANCE HAS BEEN MADE FOR LOSS OF CAPACITY AS A RESULT OF DETERIORATION OR DISCREPANCIES BETWEEN THE ACTUAL CONSTRUCTION AND THE DETAILS SHOWN ON THE AS-CONSTRUCTED DRAWINGS. HOPPERS MUST NOT BE USED ON THE WHARF IF THE CAPACITY OF THE STRUCTURE HAS BEEN COMPROMISED.

REV	DATE	DESCRIPTION	DRN	APP
0	19.02.2020	ISSUED FOR REVIEW	JC	DS

REVISIONS

DRAWING No.	DRAWING TITLE

REFERENCE DRAWINGS

MWPA PROJECT No: 0000000947

DESIGNED	M. BUNN	DESIGN CHECK	D. STIPP
DRAWN	J. CLOETE	CHECKED	J. HENDERSON
ENGINEER		APPROVED	

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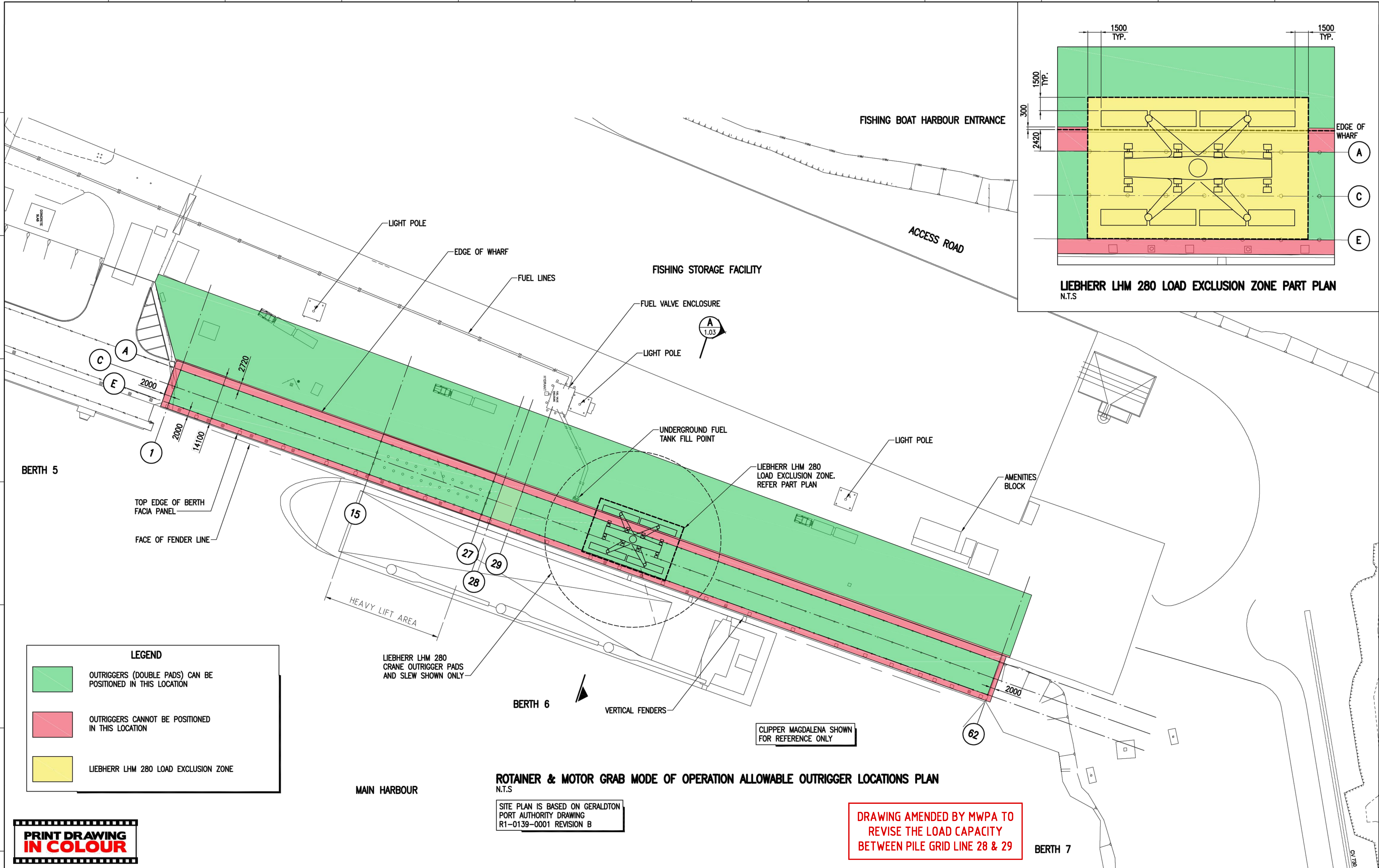
GERALDTON PORT

BERTH 6
STEVENS HOPPER
ARRANGEMENT PLAN AND DETAILS

SCALE	DRG No.	REV.
A1 - A3 AS SHOWN	009-MA-0061	0



ROTAINER & MOTOR GRAB MODE OF OPERATION ALLOWABLE OUTRIGGER LOCATIONS PLAN

N.T.S

SITE PLAN IS BASED ON GERALDTON PORT AUTHORITY DRAWING R1-0139-0001 REVISION B

DRAWING AMENDED BY MWPA TO REVISE THE LOAD CAPACITY BETWEEN PILE GRID LINE 28 & 29

PRINT DRAWING IN COLOUR

DO NOT SCALE DRAWINGS, USE FIGURED DIMENSIONS

REFER COVER SHEET FOR NOTES UNLESS NOTED OTHERWISE

Rev	Revision Description	By	App	Date
P1	ISSUE FOR INFORMATION	SS	–	21.02.13
P2	ISSUE FOR INFORMATION	JAL	–	13.03.13
P3	DIMENSION ADDED AND CRANE LOCATION REVISED	JAL	–	14.03.13

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MECHANICAL
INFRASTRUCTURE
VISUALISATION

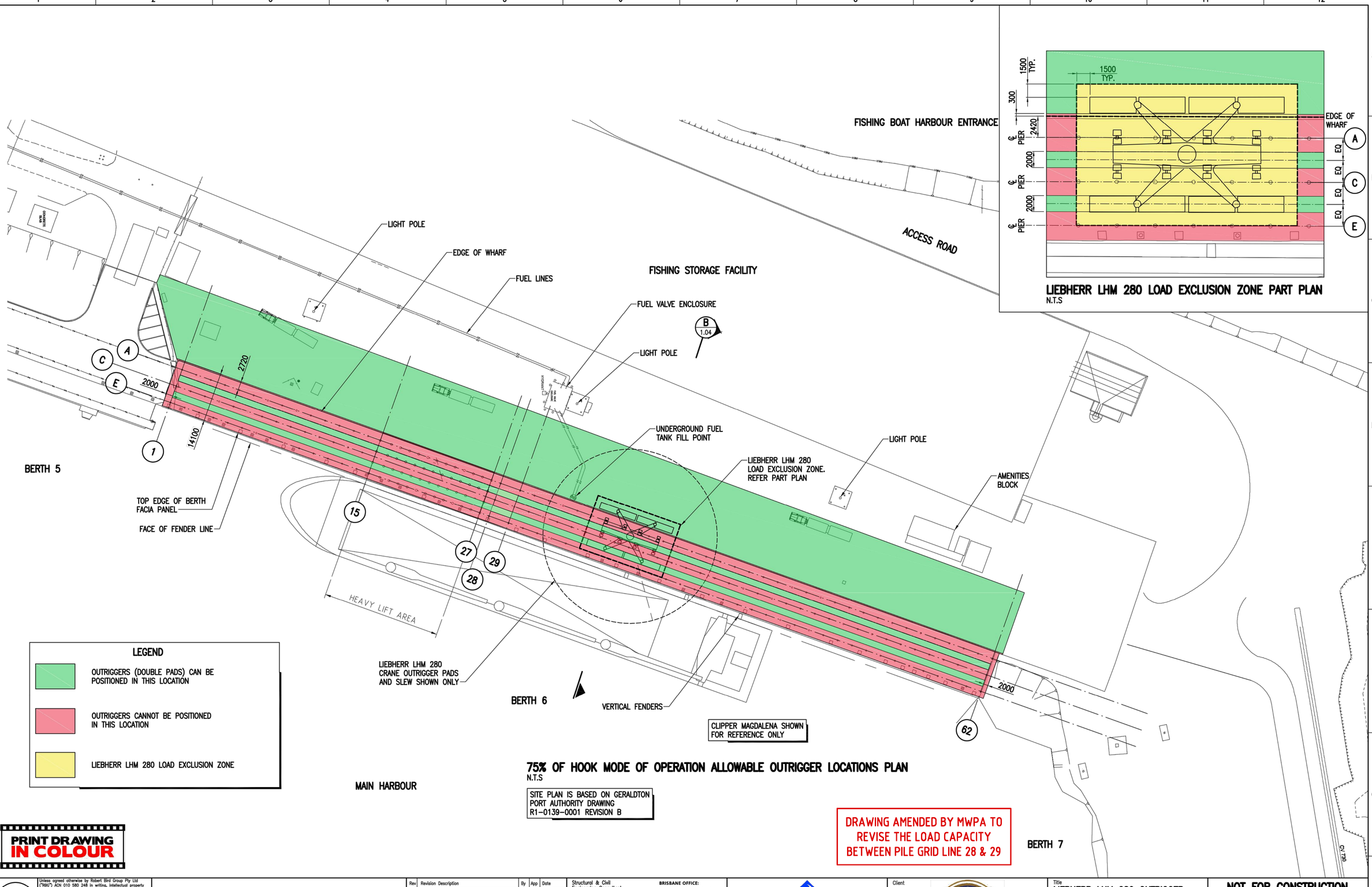
Client: GERALDTON PORT AUTHORITY

Title: LIEBHERR LHM 280 OUTRIGGER LOCATIONS FOR ROTAINER & MOTOR GRAB MODE PLAN

Project: GERALDTON PORT WHARF DECK ANALYSIS AT GERALDTON, WA 6530

NOT FOR CONSTRUCTION

Date	Designer	Design Checker	Reviewer
FEB 2013		–	
Scale at A1	**Drawn**	**Drawing Checker**	
AS SHOWN	S.SNYMAN	–	–
Job Number	**Drawing Number**		**Revision**
12911N	EX-B-1.01		P3



LIEBHERR LHM 280 LOAD EXCLUSION ZONE PART PLAN
N.T.S

LEGEND

- OUTRIGGERS (DOUBLE PADS) CAN BE POSITIONED IN THIS LOCATION
- OUTRIGGERS CANNOT BE POSITIONED IN THIS LOCATION
- LIEBHERR LHM 280 LOAD EXCLUSION ZONE

75% OF HOOK MODE OF OPERATION ALLOWABLE OUTRIGGER LOCATIONS PLAN
N.T.S

SITE PLAN IS BASED ON GERALDTON PORT AUTHORITY DRAWING R1–0139–0001 REVISION B

DRAWING AMENDED BY MWPA TO REVISE THE LOAD CAPACITY BETWEEN PILE GRID LINE 28 & 29

PRINT DRAWING IN COLOUR

DO NOT SCALE DRAWINGS, USE FIGURED DIMENSIONS

REFER COVER SHEET FOR NOTES UNLESS NOTED OTHERWISE

Rev	Revision Description	By	App	Date
P1	ISSUE FOR INFORMATION	SS	–	21.02.13
P2	ISSUE FOR INFORMATION	JAL	–	13.03.13
P3	DIMENSION ADDED	JAL	–	14.03.13

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Fax. (07) 3319 2799
ACN 010 580 248
Web Site: www.robertbird.com

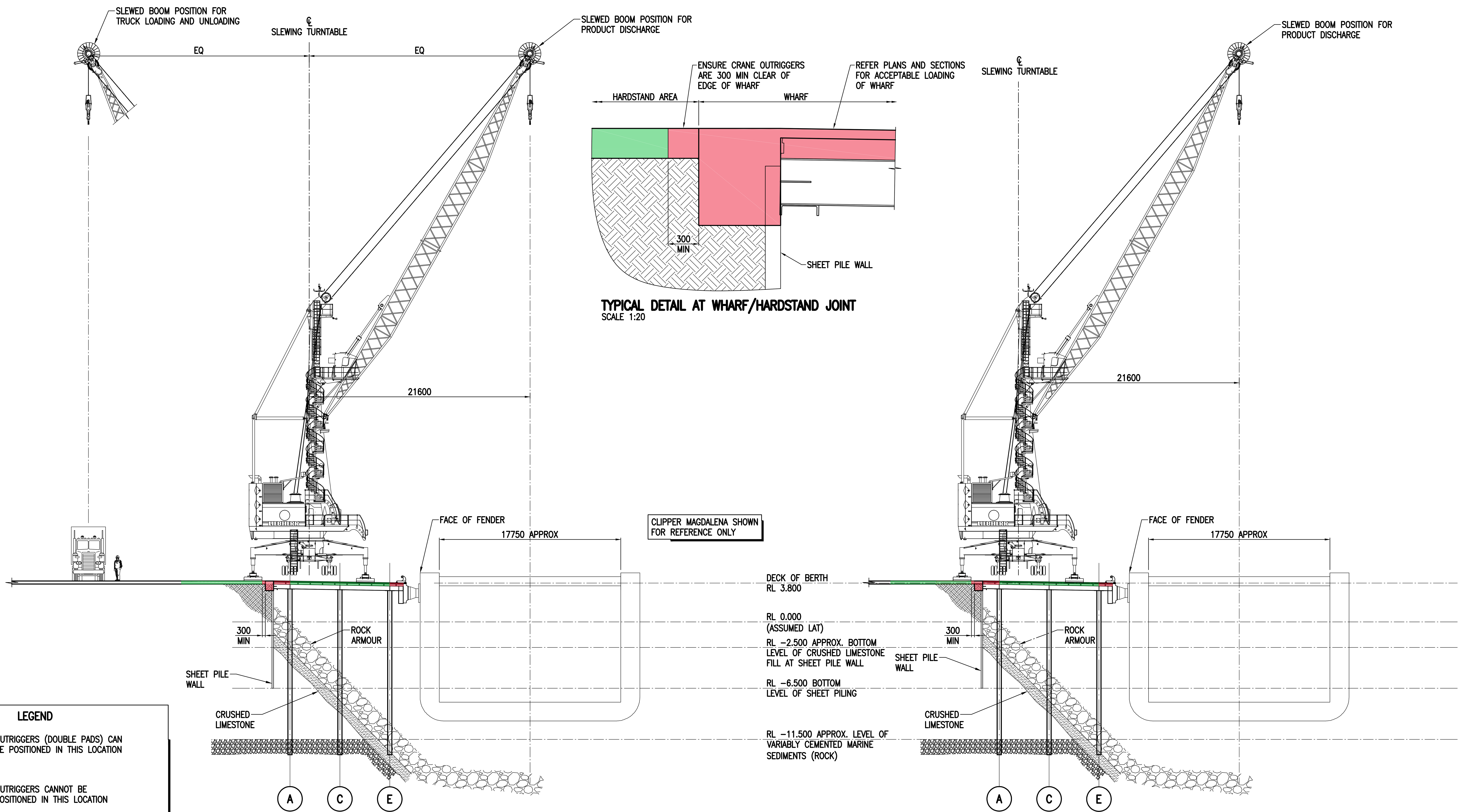
Client

Title
LIEBHERR LHM 280 OUTRIGGER LOCATIONS FOR 75% HOOK MODE PLAN

Project
GERALDTON PORT WHARF DECK ANALYSIS AT GERALDTON, WA 6530

NOT FOR CONSTRUCTION

Date	Designer	Design Checker	Reviewer
FEB 2013	–	–	–
Scale at A1	Drawn	Drawing Checker	
AS SHOWN	S.SNYMAN	–	
Job Number	Drawing Number		Revision
12911N	EX–B–1.02		P3



CRANE POSITION DURING ROTAINER OPERATION

CRANE POSITION DURING MOTOR GRAB OPERATION

SECTION A / 1.01
SCALE 1:200

LEGEND

(green)	OUTRIGGERS (DOUBLE PADS) CAN BE POSITIONED IN THIS LOCATION
(red)	OUTRIGGERS CANNOT BE POSITIONED IN THIS LOCATION
(yellow)	LIEBHERR LHM 280 CRANE EXCLUSION ZONE

PRINT DRAWING IN COLOUR

DO NOT SCALE DRAWINGS, USE FIGURED DIMENSIONS
REFER COVER SHEET FOR NOTES UNLESS NOTED OTHERWISE

SCALE 1:200 — 2 0 2 4 6 8m
SCALE 1:20 — 200 0 200 400 600 800 1000mm

Rev	Revision Description	By	App	Date
P1	ISSUE FOR INFORMATION	SS	–	21.02.13
P2	ISSUE FOR INFORMATION	JF	–	25.02.13
P3	ISSUE FOR INFORMATION	JAL	–	13.03.13

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MECHANICAL
INFRASTRUCTURE
VISUALISATION

Client: GERALDTON PORT AUTHORITY

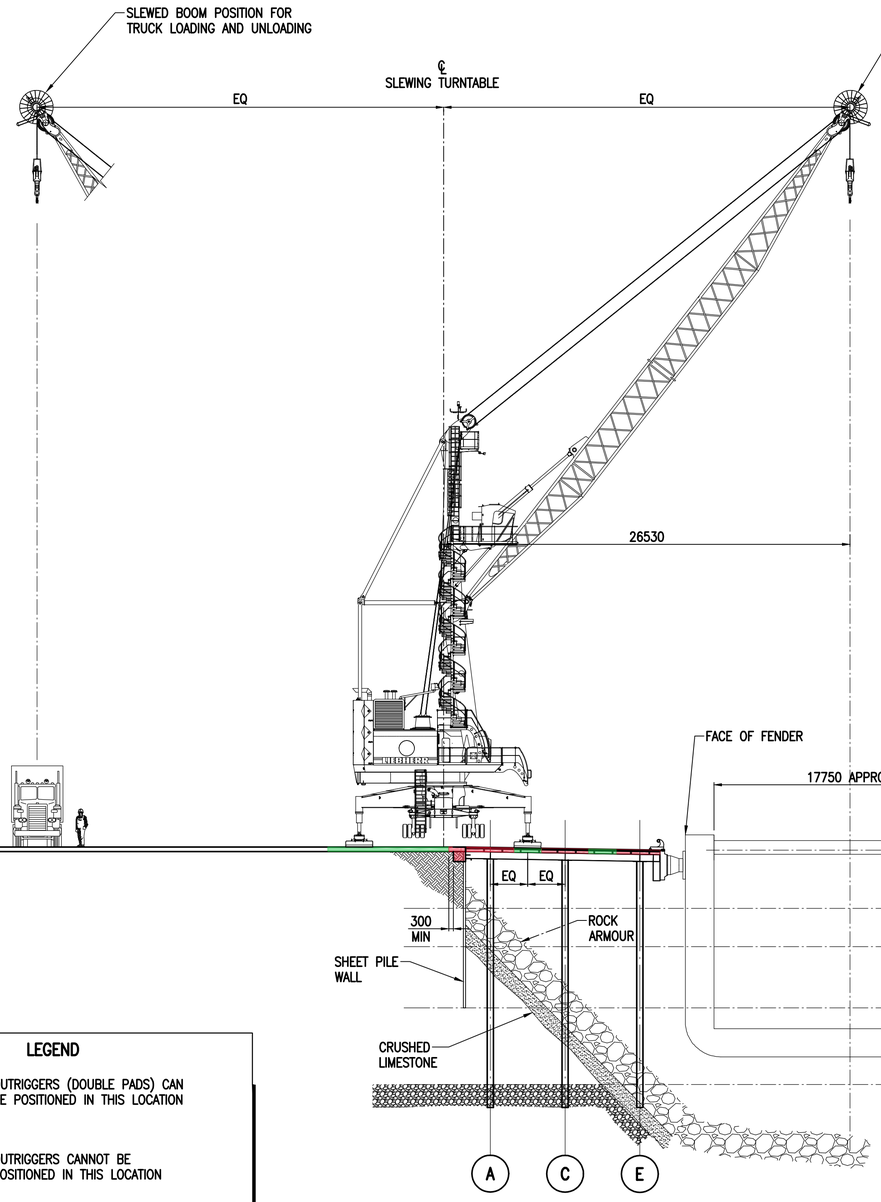
Title: LIEBHERR LHM 280 OUTRIGGER LOCATIONS FOR ROTAINER & MOTOR GRAB OPERATION SECTION

Project: GERALDTON PORT WHARF DECK ANALYSIS AT GERALDTON, WA 6530

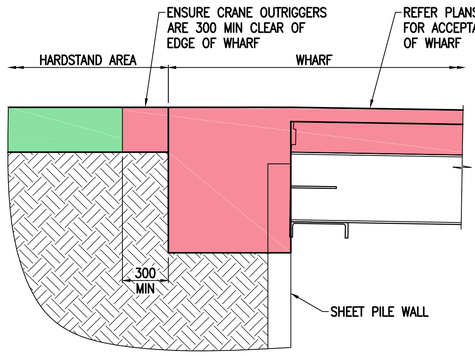
NOT FOR CONSTRUCTION

Date	Designer	Design Checker	Reviewer
FEB 2013		–	–
Scale at A1: AS SHOWN	Drawn: S.SNYMAN	Drawing Checker: –	
Job Number: 12911N	Drawing Number: EX-B-1.03		Revision: P3

A1

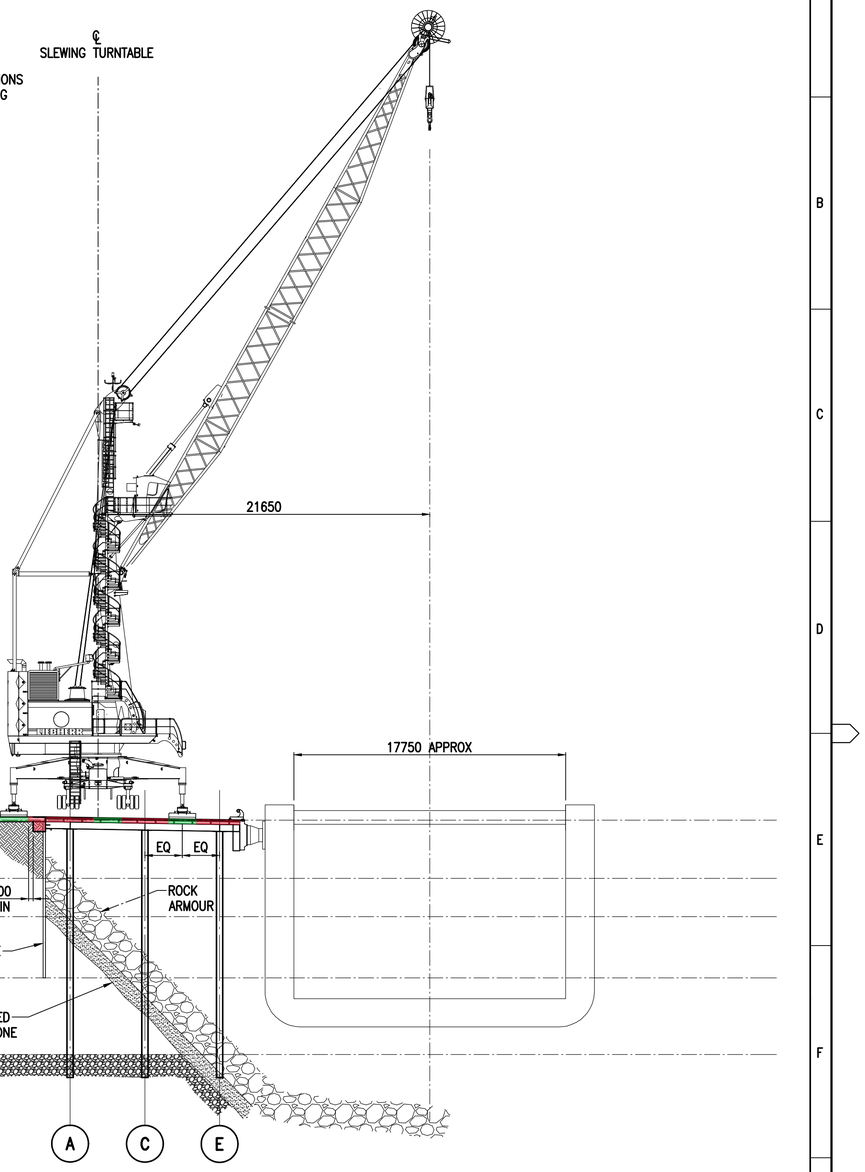


CRANE POSITION OPTION 1



TYPICAL DETAIL AT WHARF/HARDSTAND JOINT
SCALE 1:20

CLIPPER MAGDALENA SHOWN FOR REFERENCE ONLY



CRANE POSITION OPTION 2

LEGEND

- OUTRIGGERS (DOUBLE PADS) CAN BE POSITIONED IN THIS LOCATION
- OUTRIGGERS CANNOT BE POSITIONED IN THIS LOCATION
- LIEBHERR LHM 280 CRANE EXCLUSION ZONE

SECTION B 1.01
SCALE 1:200

PRINT DRAWING IN COLOUR

DO NOT SCALE DRAWINGS, USE FIGURED DIMENSIONS

REFER COVER SHEET FOR NOTES UNLESS NOTED OTHERWISE

SCALE 1:200
2 0 2 4 6 8m

SCALE 1:20
200 0 200 400 600 800 1000mm

Rev	Revision Description	By	App	Date
P1	ISSUE FOR INFORMATION	SS	–	21.02.13
P2	ISSUE FOR INFORMATION	JF	–	25.02.13
P3	ISSUE FOR INFORMATION	JAL	–	13.03.13

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EXALLOS
SPECIALIST ENGINEERING SERVICES
CONSTRUCTION
RESOURCES
ENERGY
PROPERTY
MECHANICAL
INFRASTRUCTURE
VISUALISATION

Client

Title
LIEBHERR LHM 280 OUTRIGGER LOCATIONS FOR 75% HOOK MODE SECTION

Project
GERALDTON PORT WHARF DECK ANALYSIS AT GERALDTON, WA 6530

NOT FOR CONSTRUCTION

Date	Designer	Design Checker	Reviewer
FEB 2013		–	
Scale at A1	Drawn	Drawing Checker	–
AS SHOWN	S.SNYMAN	–	
Job Number	Drawing Number		Revision
12911N	EX–B–1.04		P3

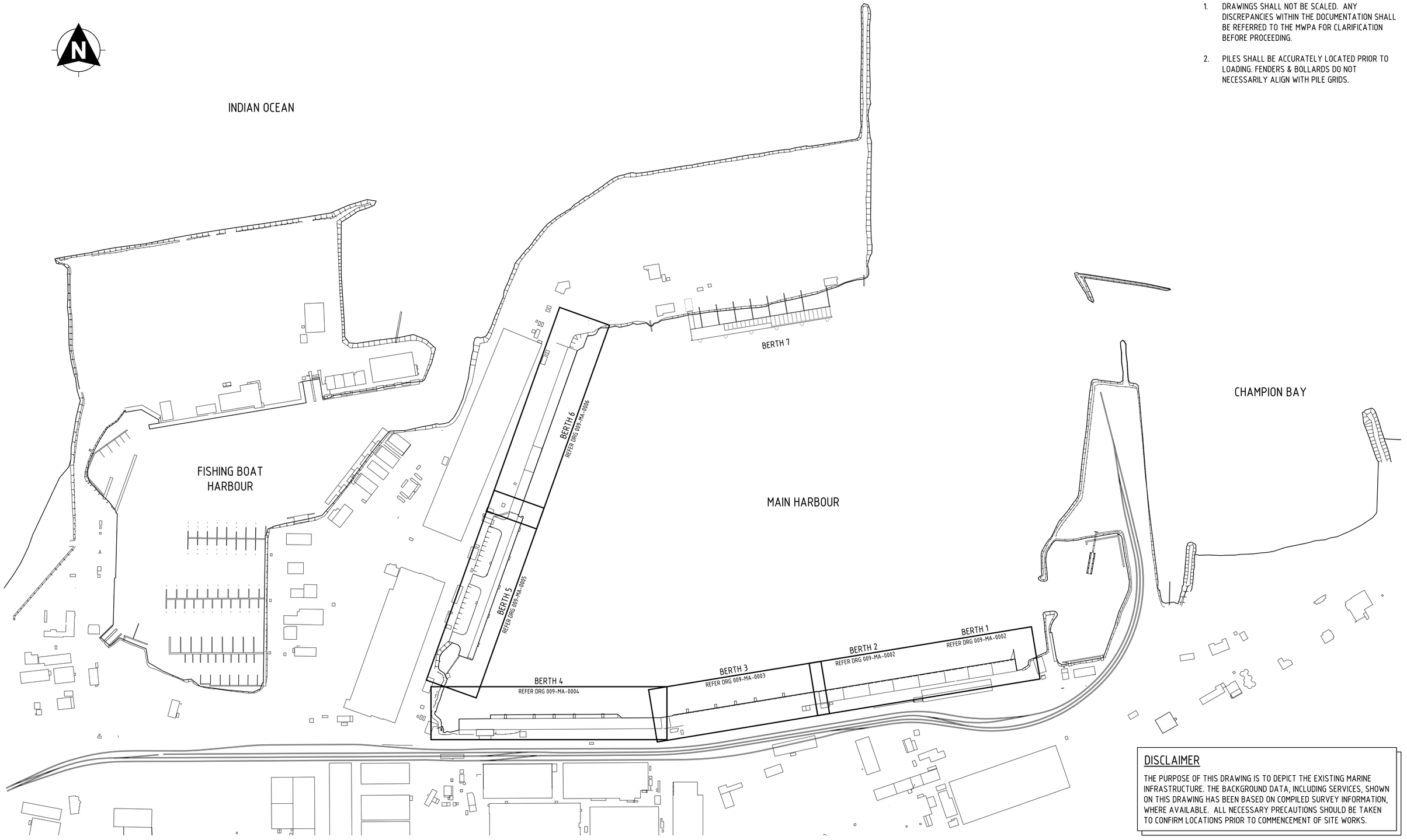
Appendix C

BOLLARD IDENTIFICATION AND CAPACITY PLANS

Title	Drawing Number	Rev Number
Commercial Harbour Marine Infrastructure Location Plan	009-MA-0001	D
Commercial Harbour Marine Infrastructure Identification Plan – Berth 1 and Berth 2	009-MA-0002	J
Berths 1 and 2 Maximum Combined Bollard Loads	002-MA-0009	A
Commercial Harbour Marine Infrastructure Identification Plan – Berth 3	009-MA-0003	G
Commercial Harbour Marine Infrastructure Identification Plan – Berth 4	009-MA-0004	F
Commercial Harbour Marine Infrastructure Identification Plan – Berth 5	009-MA-0005	E
Commercial Harbour Marine Infrastructure Identification Plan – Berth 6	009-MA-0006	M

NOTES

1. DRAWINGS SHALL NOT BE SCALED. ANY DISCREPANCIES WITHIN THE DOCUMENTATION SHALL BE REFERRED TO THE MWPA FOR CLARIFICATION BEFORE PROCEEDING.
2. PILES SHALL BE ACCURATELY LOCATED PRIOR TO LOADING. FENDERS & BOLLARDS DO NOT NECESSARILY ALIGN WITH PILE GRIDS.



DISCLAIMER

THE PURPOSE OF THIS DRAWING IS TO DEPICT THE EXISTING MARINE INFRASTRUCTURE. THE BACKGROUND DATA, INCLUDING SERVICES, SHOWN ON THIS DRAWING HAS BEEN BASED ON COMPILED SURVEY INFORMATION, WHERE AVAILABLE. ALL NECESSARY PRECAUTIONS SHOULD BE TAKEN TO CONFIRM LOCATIONS PRIOR TO COMMENCEMENT OF SITE WORKS.

REV	DATE	DESCRIPTION	DRN	APP
D	17.02.20	FBH JETTY INFRASTRUCTURE MODIFIED	RF	JH
C	24.06.15	ISSUED FOR INFORMATION	RF	PD

REVISIONS

DRAWING No.	DRAWING TITLE
009-MA-0006	COMMERCIAL HARBOUR MARINE INFRASTRUCTURE IDENTIFICATION PLAN - BERTH 6
009-MA-0005	COMMERCIAL HARBOUR MARINE INFRASTRUCTURE IDENTIFICATION PLAN - BERTH 5
009-MA-0004	COMMERCIAL HARBOUR MARINE INFRASTRUCTURE IDENTIFICATION PLAN - BERTH 4
009-MA-0003	COMMERCIAL HARBOUR MARINE INFRASTRUCTURE IDENTIFICATION PLAN - BERTH 3
009-MA-0002	COMMERCIAL HARBOUR MARINE INFRASTRUCTURE IDENTIFICATION PLAN - BERTH 1 & BERTH 2

REFERENCE DRAWINGS

MWPA PROJECT No:

DESIGNED	I. ROBERTS	DESIGN CHECK	P. DUPLEX
DRAWN	R. FERSTAT	CHECKED	P. DUPLEX
ENGINEER	P. DUPLEX	APPROVED	P. BLUNDELL

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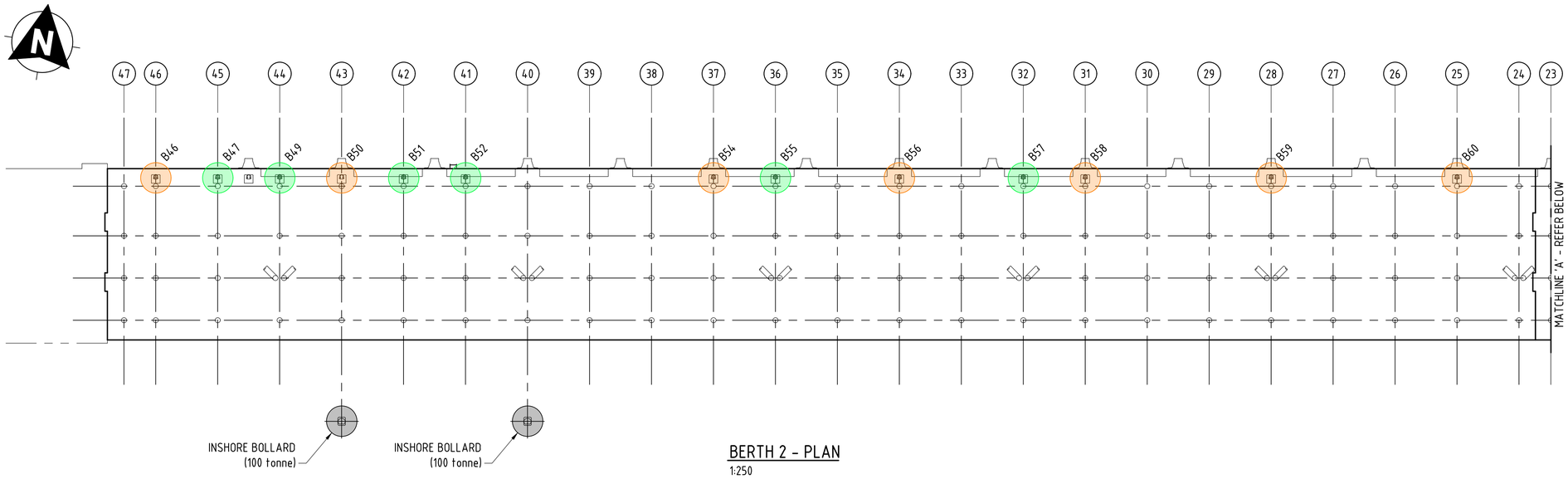
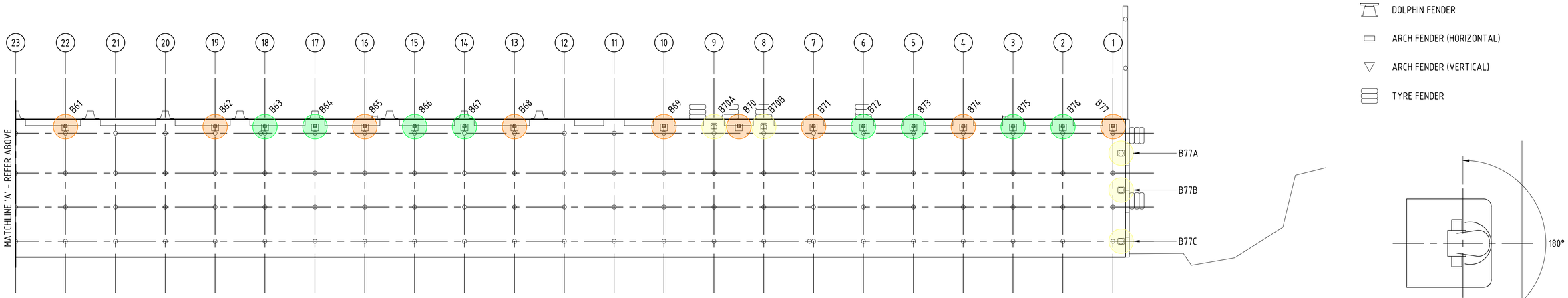
GERALDTON PORT
COMMERCIAL HARBOUR MARINE INFRASTRUCTURE LOCATION PLAN

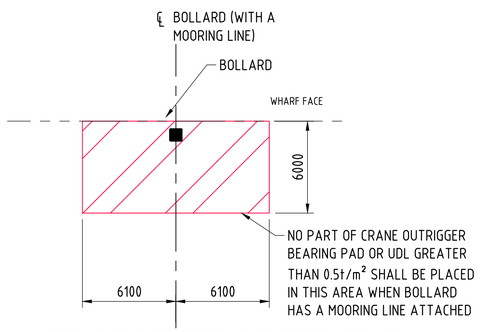
SCALE	DRG No.	REV.
A1 - 1:2500	009-MA-0001	D



BERTH 2 - PLAN
1:250



BERTH 1 - PLAN
1:250



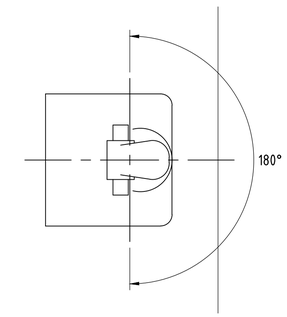
CRANE AND UDL EXCLUSION ZONE AROUND BOLLARDS WITH A MOORING LINE
1:200

NOTES

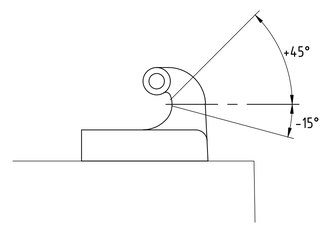
1. STATED DESIGN CAPACITY IS SUBJECT TO SITE CONDITION OF COMPONENTS
2. MAXIMUM 2.5t/m2 UDL WHEN VESSELS ARE BERTHING EXCEPT 1m FROM THE BERTH FACE WHICH SHALL BE 0.5t/m2.
3. ONLY ONE MOORING ROPE PER BOLLARD.
4. COMBINED LOADS ON BOLLARDS ARE NOT TO EXCEED THOSE NOTED ON SKETCH SK 100 TO ENSURE THE GLOBAL LATERAL CAPACITY OF THE TIEBACK ANCHOR SYSTEM IS NOT EXCEEDED.
5. REFER TO 009-MA-0012 FOR DETAILS OF THE LOCATION OF CRANE OUTRIGGER LOADS PERMITTED WITH RESPECT TO BOLLARDS WITH A MOORING LINE ATTACHED.

LEGEND

- 75 tonne BOLLARD
- 50 tonne BOLLARD
- SMALL CRAFT BOLLARD
- BOLLARD
- ACCESS LADDER
- STEEL GRATING
- DOLPHIN FENDER
- ARCH FENDER (HORIZONTAL)
- ARCH FENDER (VERTICAL)
- TYRE FENDER



MOORING LINE HORIZONTAL LIMITS
1:20



MOORING LINE VERTICAL LIMITS
1:20

REV	DATE	DESCRIPTION	DRN	APP
G	30.09.20	UDL NOTE REMOVED	RF	JR
F	17.02.20	BOLLARD CAPACITIES REVISED	RF	JH
E	06.02.18	BOLLARD CAPACITIES REVISED	RF	IM
J	17.06.24	INSHORE BOLLARD CAPACITIES ADDED	RF	SS
H	01.12.21	BOLLARD 50 CAPACITY CHANGED AND UDL REVISED	RF	JH

REVISIONS

DRAWING No.	DRAWING TITLE
009-MA-0001	COMMERCIAL HARBOUR MARINE INFRASTRUCTURE LOCATION PLAN

REFERENCE DRAWINGS

MWPA PROJECT No:

DESIGNED	I. ROBERTS	DESIGN CHECK	P. DUPLEX
DRAWN	R. FERSTAT	CHECKED	P. DUPLEX
ENGINEER	P. DUPLEX	APPROVED	P. BLUNDELL

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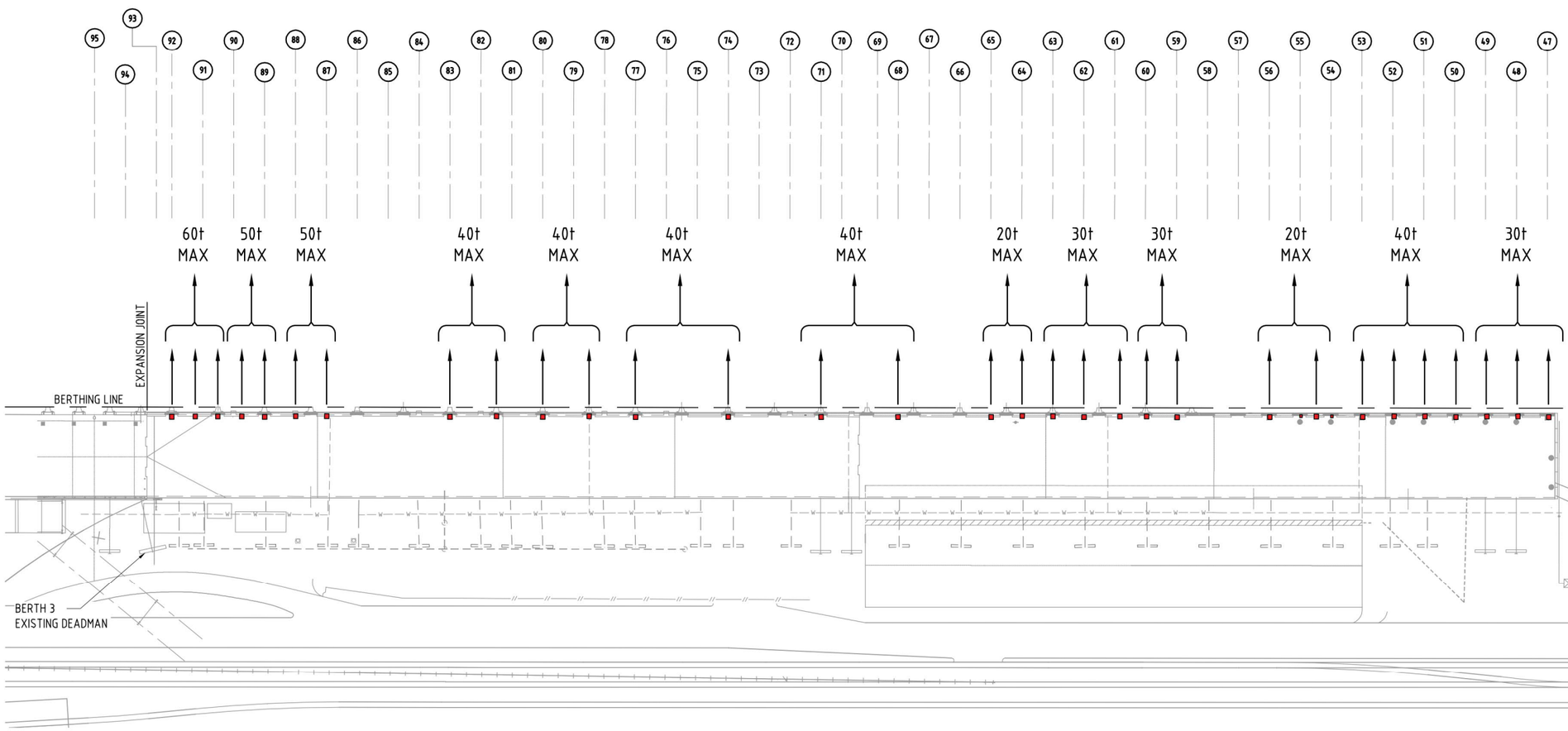
GERALDTON PORT
COMMERCIAL HARBOUR
MARINE INFRASTRUCTURE
IDENTIFICATION PLAN - BERTH 1 & BERTH 2

SCALE	DRG No.	REV.
A1 - 1:250	009-MA-0002	J



MOORING CONCURRENT BOLLARD LATERAL LOADS

1:500

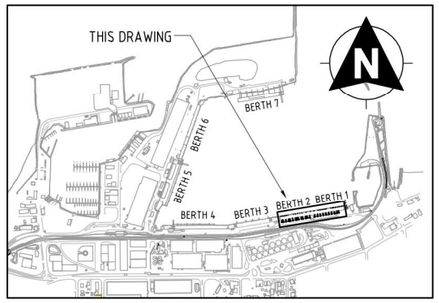
NOTE:

THE BOLLARD LATERAL LOADS SHOWN ARE ASSUMED TO BE APPLIED TO THE 31 BOLLARDS CONCURRENTLY AT A HORIZONTAL ANGLE OF 90 DEGREES TO THE WHARF LONGITUDINAL AXIS AND AT A VERTICAL INCLINATION OF 0 DEGREES.

THE MAGNITUDE OF THE CONCURRENT BOLLARDS LATERAL LOADS HAS BEEN SELECTED SO AS NOT TO EXCEED THE GLOBAL LATERAL CAPACITY OF THE TIEBACK ANCHOR SYSTEM.

KEYPLAN

NTS



GENERAL NOTES:

1. THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH ALL OTHER DRAWINGS AND SPECIFICATIONS AND WITH SUCH OTHER WRITTEN INSTRUCTIONS AS MAY BE USED DURING THE COURSE OF THE CONTRACT. ALL DISCREPANCIES SHALL BE REFERRED TO THE MWPA PROJECT SUPERVISOR FOR DECISION BEFORE PROCEEDING WITH THE WORK.
2. DIMENSIONS SHALL NOT BE OBTAINED BY SCALING THE DRAWINGS.

LEGEND:

- EXISTING BOLLARD LOCATIONS (AS PER HTD SURVEY 02118AS1-1-0 DATED 27.03.2018)

FOR INFORMATION ONLY.
NOT ISSUED FOR CONSTRUCTION

5 0 10 20m
SCALE 1:500 (on A1 Sheet)

AECOM

REV	DATE	DESCRIPTION	DRN	APP
A	08.01.19	FOR INFORMATION	PL	AW

REVISIONS

DRAWING No.	DRAWING TITLE

REFERENCE DRAWINGS

MWPA PROJECT No: 911

DESIGNED	P. LONGSTAFF	DESIGN CHECK	A.W. WRIGHT
DRAWN	P. LONGSTAFF	CHECKED	S.CHAINE
ENGINEER	A.WRIGHT	APPROVED	A. SARANDILY

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GERALDTON PORT

BERTH 1 & 2
MAXIMUM COMBINED
BOLLARD LOADS

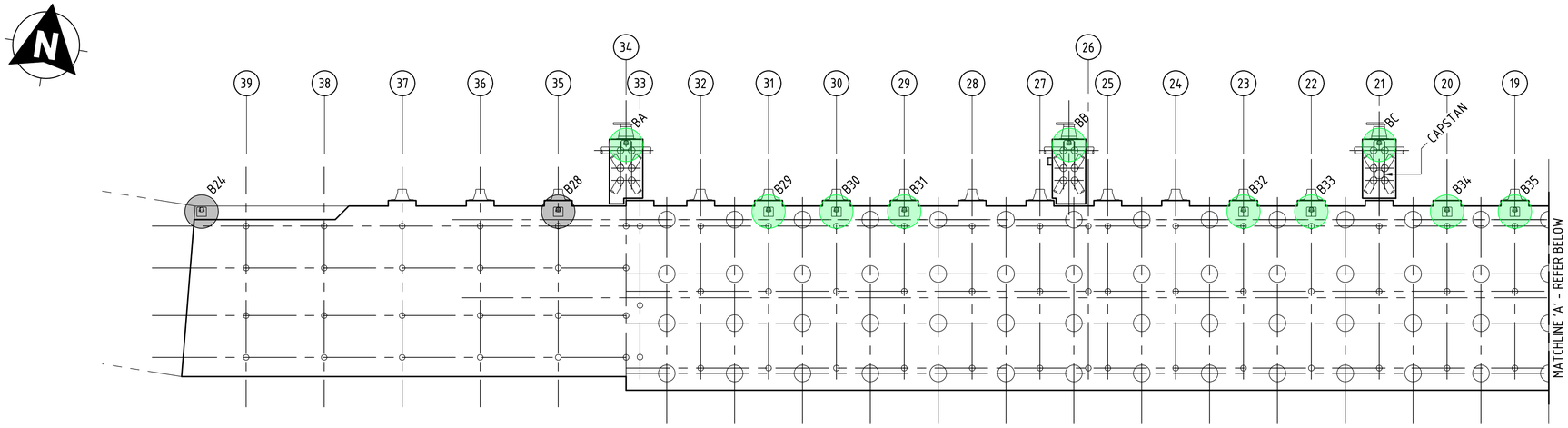
SCALE	DRG No.	REV.
A1 - 1:500	002-MA-0009	A

NOTES

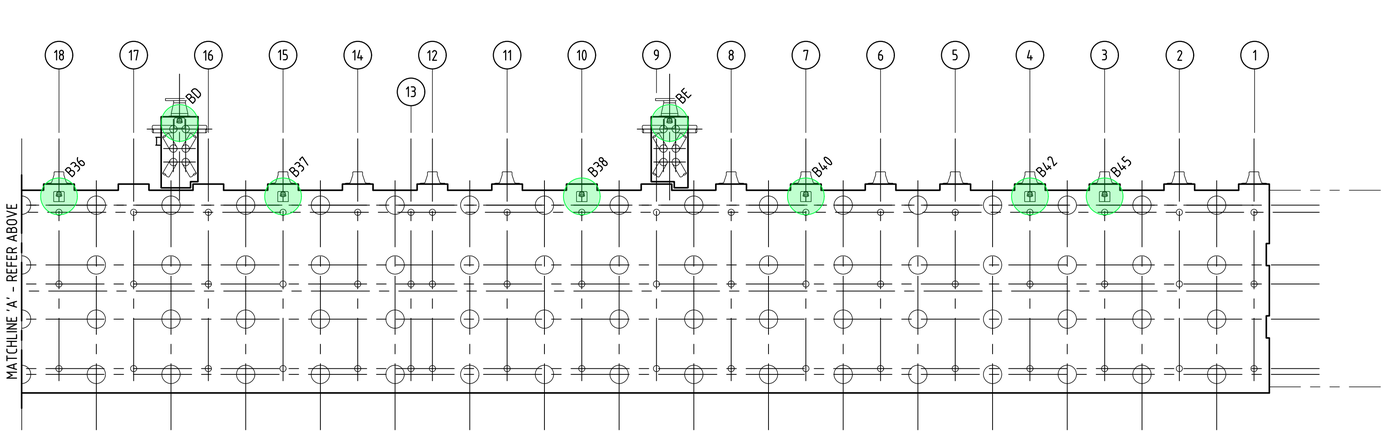
1. STATED DESIGN CAPACITY IS SUBJECT TO SITE CONDITION OF COMPONENTS
2. MAXIMUM 1t/m^2 UDL DURING MOORING

LEGEND

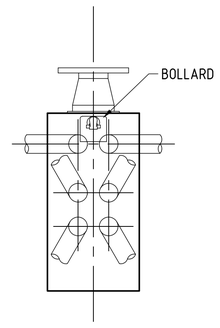
- 75 tonne BOLLARD
- 50 tonne BOLLARD
- SMALL CRAFT BOLLARD
- BOLLARD
- ACCESS LADDER
- STEEL GRATING
- DOLPHIN FENDER
- ARCH FENDER (HORIZONTAL)
- ARCH FENDER (VERTICAL)
- TYRE FENDER



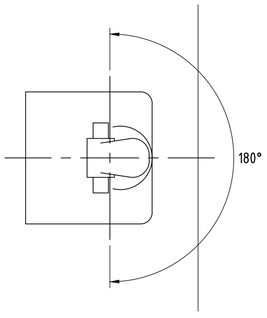
BERTH 3 - PART PLAN
1:250



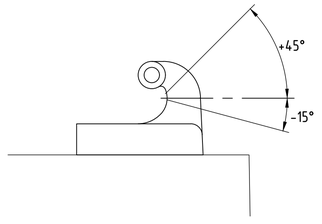
BERTH 3 - PART PLAN
1:250



TYPICAL DOLPHIN PLAN
1:100



MOORING LINE HORIZONTAL LIMITS
1:20



MOORING LINE VERTICAL LIMITS
1:20

REV	DATE	DESCRIPTION	DRN	APP
G	17.02.20	BOLLARD CAPACITIES UPDATED	RF	JH
F	30.04.18	BOLLARD 45 REMOVED	RF	IM
E	06.02.18	BOLLARDS 25, 27, 39, 41 & 43 REMOVED	RF	IM
D	09.01.18	BOLLARD CAPACITIES REVISED	RF	PB
C	24.06.15	ISSUED FOR INFORMATION	RF	PD

REVISIONS

DRAWING No.	DRAWING TITLE
009-MA-0001	COMMERCIAL HARBOUR MARINE INFRASTRUCTURE LOCATION PLAN

REFERENCE DRAWINGS

MWPA PROJECT No:

DESIGNED	I. ROBERTS	DESIGN CHECK	P. DUPLEX
DRAWN	R. FERSTAT	CHECKED	P. DUPLEX
ENGINEER	P. DUPLEX	APPROVED	P. BLUNDELL

MID WEST PORTS AUTHORITY
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www.midwestports.com.au

GERALDTON PORT
COMMERCIAL HARBOUR
MARINE INFRASTRUCTURE
IDENTIFICATION PLAN - BERTH 3

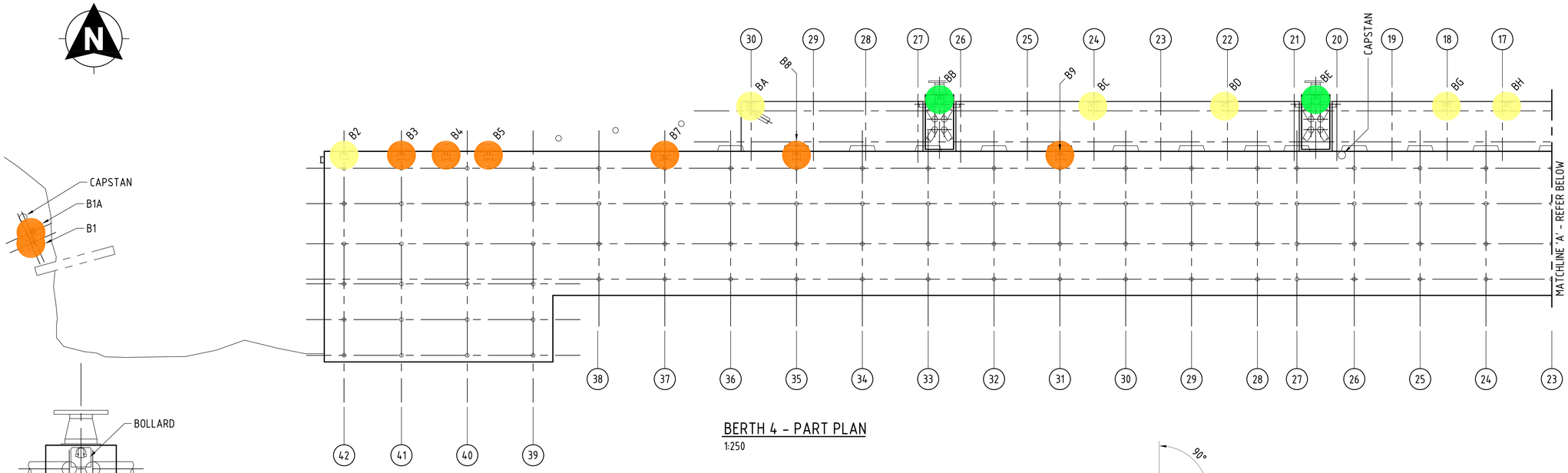
SCALE	ORG. No.	REV.
A1 - 1:250	009-MA-0003	G

NOTES

1. STATED DESIGN CAPACITY IS SUBJECT TO SITE CONDITION OF COMPONENTS.

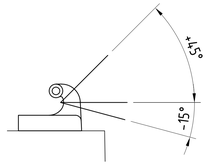
LEGEND

- 75 tonne BOLLARD
- 50 tonne BOLLARD
- LOW CAPACITY BOLLARD
- 125 tonne BOLLARD
- 2x 60 tonne QUICK RELEASE HOOK
- STEEL GRATING
- DOLPHIN FENDER
- ARCH FENDER (HORIZONTAL)

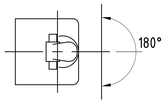


BERTH 4 - PART PLAN
1:250

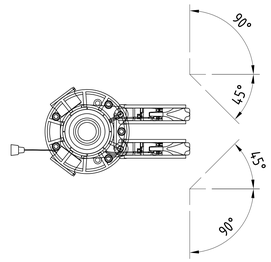
TYPICAL DOLPHIN PLAN
1:100



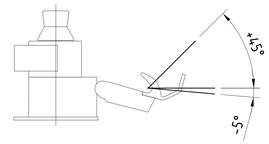
MOORING LINE VERTICAL LIMITS
1:40



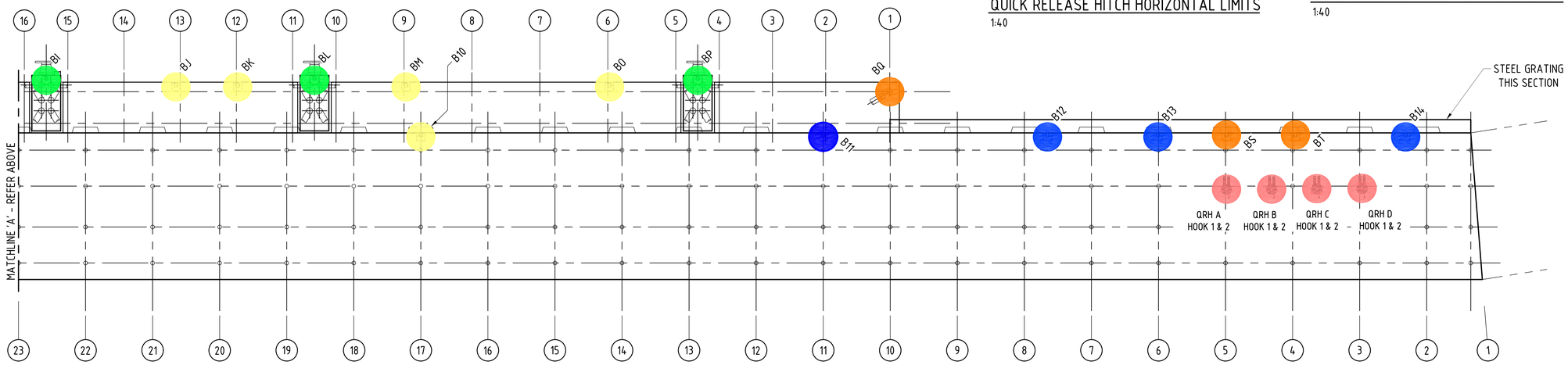
MOORING LINE HORIZONTAL LIMITS
1:40



QUICK RELEASE HITCH HORIZONTAL LIMITS
1:40



QUICK RELEASE HITCH VERTICAL LIMITS
1:40



BERTH 4 - PART PLAN
1:250

REV	DATE	DESCRIPTION	DRN	APP
G	23.10.24	QUICK RELEASE HITCH DETAILS ADDED	S.J	S.S
F	17.020.20	BOLLARD CAPACITIES UPDATED	RF	JH
E	06.02.18	BOLLARD 7 ROTATED	RF	IM
D	09.01.18	BOLLARD CAPACITIES REVISED	RF	PB
C	24.06.15	ISSUED FOR INFORMATION	RF	PD

REVISIONS

DRAWING No.	DRAWING TITLE
009-MA-0001	COMMERCIAL HARBOUR MARINE INFRASTRUCTURE LOCATION PLAN

REFERENCE DRAWINGS

MWPA PROJECT No:

DESIGNED	I. ROBERTS	DESIGN CHECK	P. DUPLEX
DRAWN	R. FERSTAT	CHECKED	P. DUPLEX
ENGINEER	P. DUPLEX	APPROVED	P. BLUNDELL

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www.midwestports.com.au

GERALDTON PORT
COMMERCIAL HARBOUR
MARINE INFRASTRUCTURE
IDENTIFICATION PLAN - BERTH 4

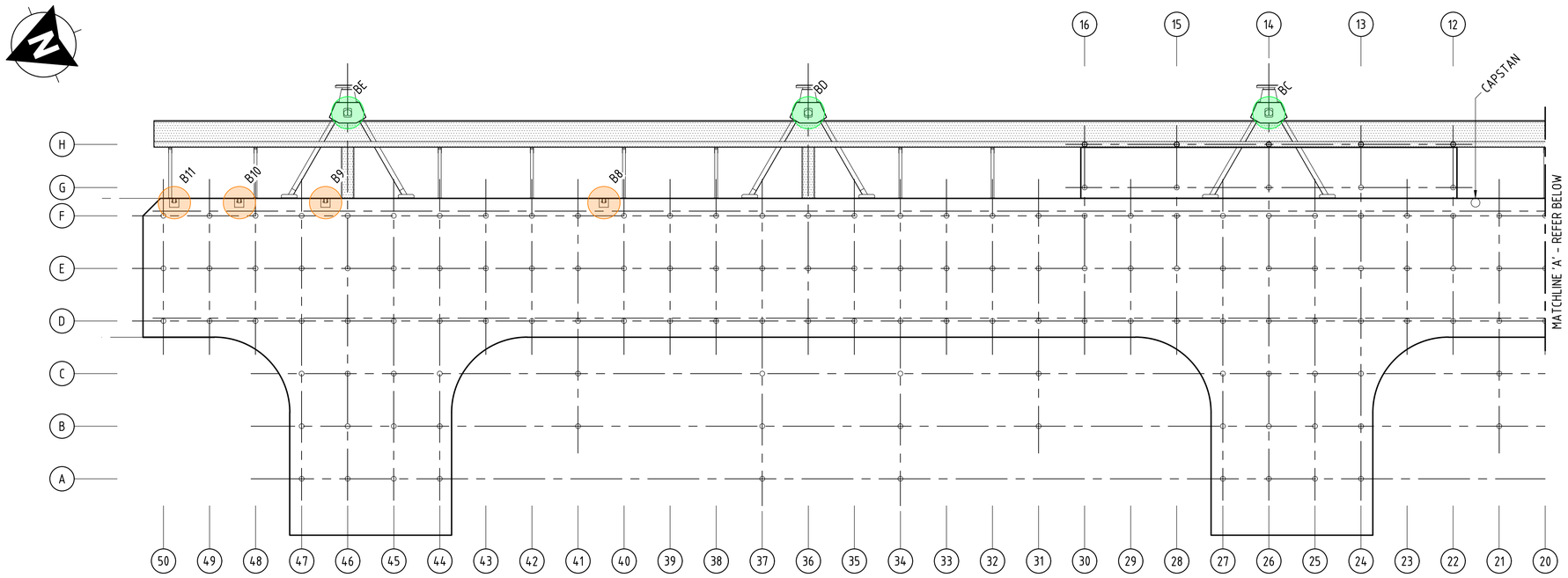
SCALE	DRG No.	REV.
A1 - 1:250	009-MA-0004	G

NOTES

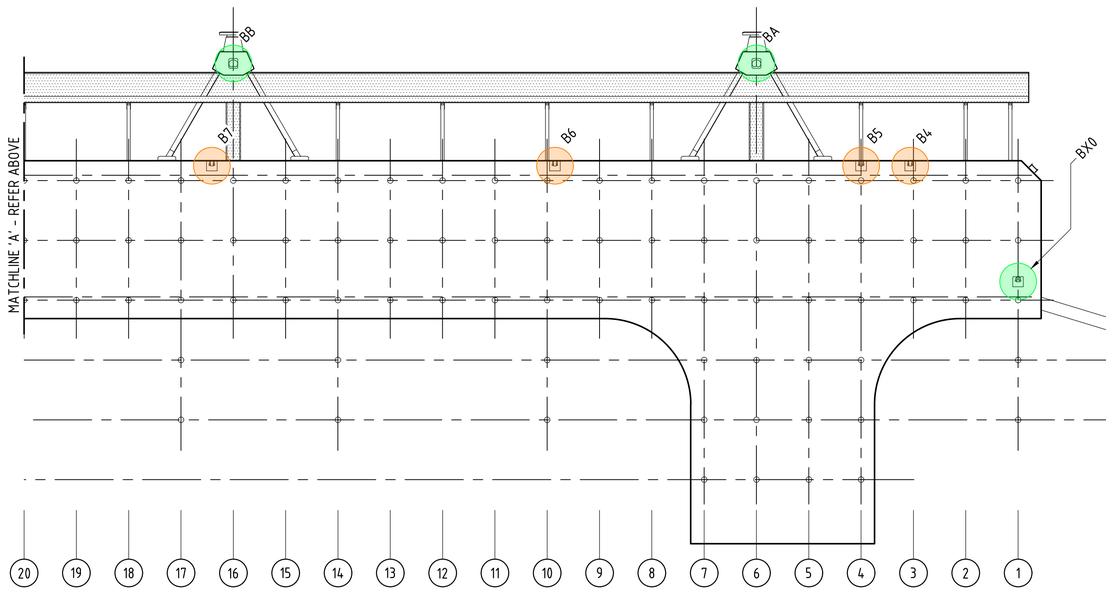
1. STATED DESIGN CAPACITY IS SUBJECT TO SITE CONDITION OF COMPONENTS
2. MAXIMUM 4.5t/m^2 UDL DURING MOORING
3. LIMITED MOORING LINE ANGLE FOR BOLLARDS B2 & B3

LEGEND

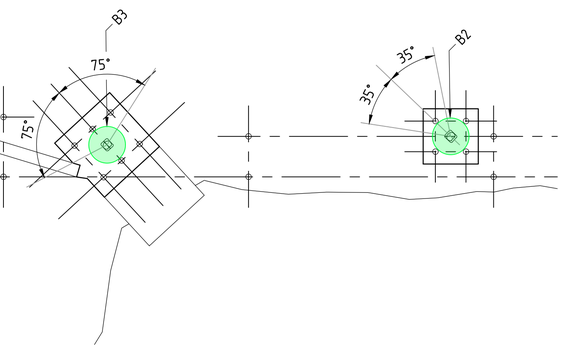
- 75 tonne BOLLARD
- 50 tonne BOLLARD
- SMALL CRAFT BOLLARD
- BOLLARD
- ACCESS LADDER
- STEEL GRATING
- DOLPHIN FENDER
- ARCH FENDER (HORIZONTAL)
- ARCH FENDER (VERTICAL)
- TYRE FENDER

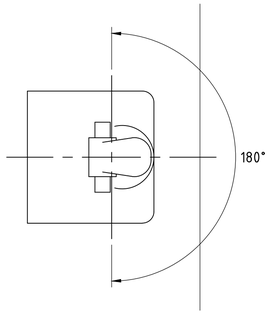


BERTH 5 - PART PLAN
1:250

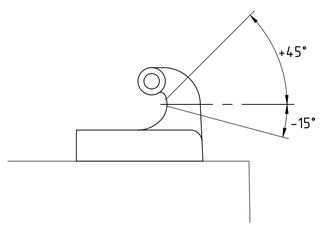


BERTH 5 - PART PLAN
1:250





MOORING LINE HORIZONTAL LIMITS
1:20



MOORING LINE VERTICAL LIMITS
1:20

REV	DATE	DESCRIPTION	DRN	APP
E	09.01.18	BOLLARD CAPACITIES REVISED	RF	PB
D	21.07.15	BOLLARD X0 ADDED. ISSUED FOR INFORMATION	RF	PD

REVISIONS

DRAWING No.	DRAWING TITLE
009-MA-0001	COMMERCIAL HARBOUR MARINE INFRASTRUCTURE LOCATION PLAN

REFERENCE DRAWINGS

MWPA PROJECT No:

DESIGNED	I. ROBERTS	DESIGN CHECK	P. DUPLEX
DRAWN	R. FERSTAT	CHECKED	P. DUPLEX
ENGINEER	P. DUPLEX	APPROVED	P. BLUNDELL

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GERALDTON PORT
COMMERCIAL HARBOUR
MARINE INFRASTRUCTURE
IDENTIFICATION PLAN - BERTH 5

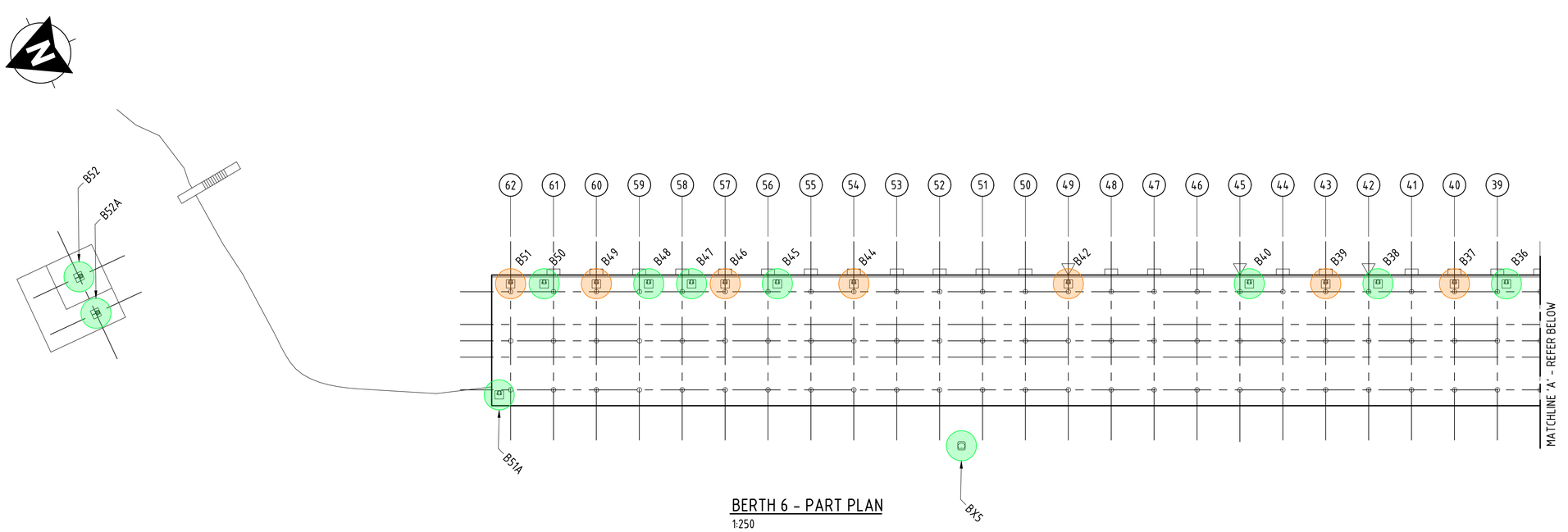
SCALE	ORG. No.	REV.
A1 - 1:250	009-MA-0005	E

NOTES

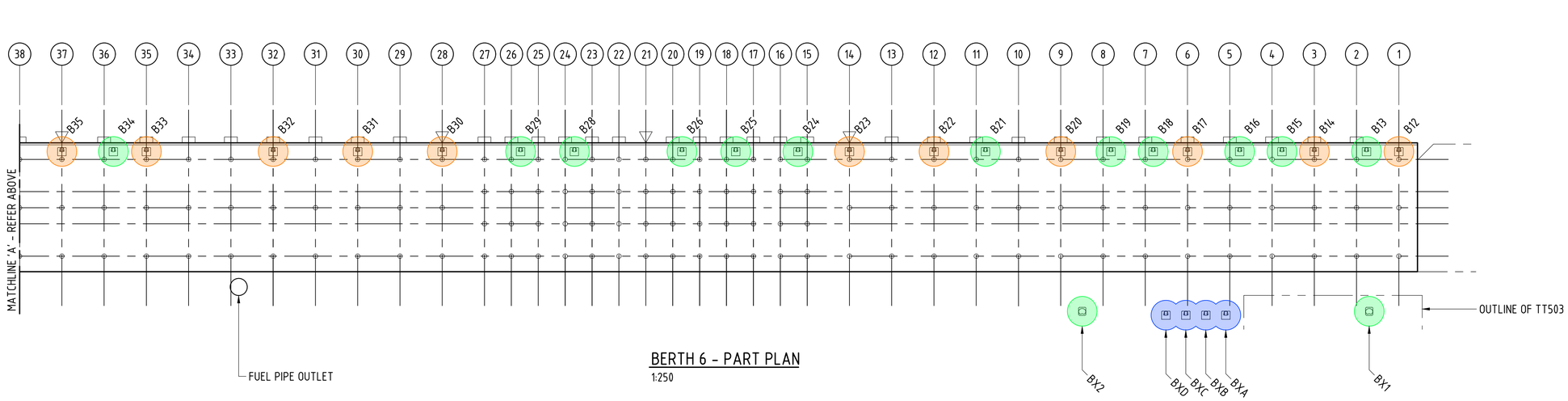
1. STATED DESIGN CAPACITY IS SUBJECT TO SITE CONDITION OF COMPONENTS
2. MAXIMUM 2t/m² UDL DURING MOORING

LEGEND

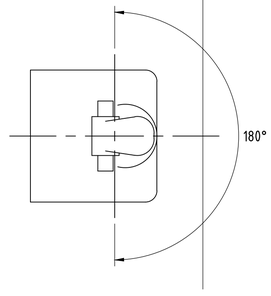
- 125 tonne BOLLARD
- 75 tonne BOLLARD
- 50 tonne BOLLARD
- SMALL CRAFT BOLLARD
- BOLLARD
- ACCESS LADDER
- STEEL GRATING
- DOLPHIN FENDER
- ARCH FENDER (HORIZONTAL)
- ARCH FENDER (VERTICAL)
- TYRE FENDER



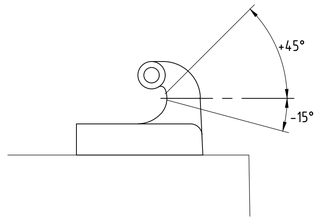
BERTH 6 - PART PLAN
1:250



BERTH 6 - PART PLAN
1:250



MOORING LINE HORIZONTAL LIMITS
1:20



MOORING LINE VERTICAL LIMITS
1:20

REV	DATE	DESCRIPTION	DRN	APP
H	17.02.20	BOLLARD CAPACITIES REVISED	RF	JH
M	13.06.24	BOLLARD BXA, BXB, BXC, BXD, B51A ADDED	RF	SS
L	10.12.21	BOLLARDS RELOCATED	RF	JH
K	30.09.20	BOLLARD CAPACITIES REVISED & LOCATIONS CORRECTED	RF	JR
J	03.07.20	BOLLARD RATINGS REVISED FOLLOWING STRENGTHENING WORKS	RF	GR

REVISIONS

DRAWING No.	DRAWING TITLE
009-MA-0001	COMMERCIAL HARBOUR MARINE INFRASTRUCTURE LOCATION PLAN

REFERENCE DRAWINGS

MWPA PROJECT No:

DESIGNED	I. ROBERTS	DESIGN CHECK	P. DUPLEX
DRAWN	R. FERSTAT	CHECKED	P. DUPLEX
ENGINEER	P. DUPLEX	APPROVED	P. BLUNDELL

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www.midwestports.com.au

GERALDTON PORT
COMMERCIAL HARBOUR
MARINE INFRASTRUCTURE
IDENTIFICATION PLAN - BERTH 6

SCALE	ORG. No.	REV.
A1 - 1:250	009-MA-0006	M

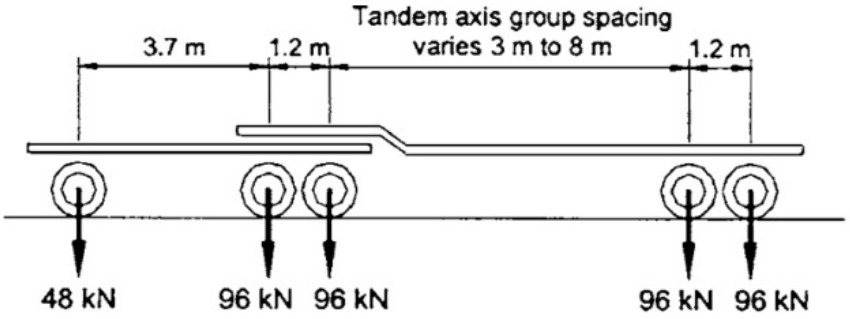
Appendix D

T44 AND B-DOUBLE TRUCK LOADING

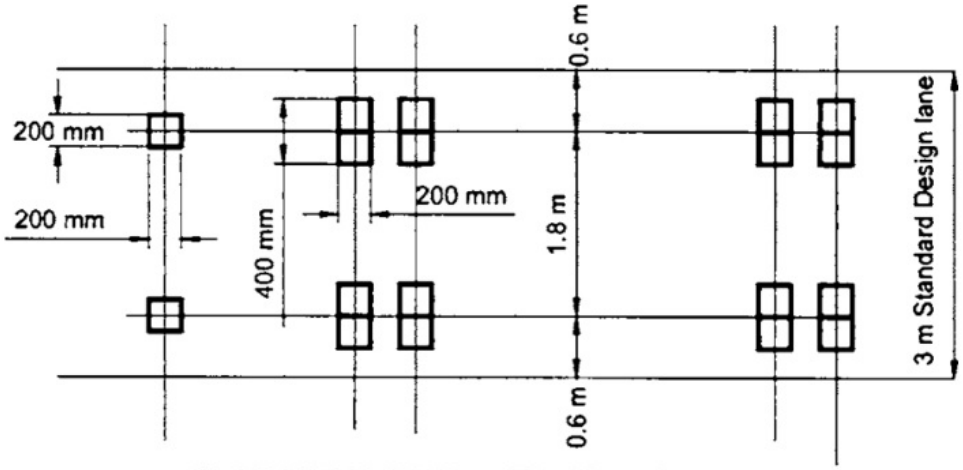
(T44 Extract from '92 Austroads Bridge Design Code)

(B-Double from NHVR Website – National heavy vehicle mass and dimension limits July 2016)

(Current Freight Combinations from AS 5100.2 Supp 1 – 2007)



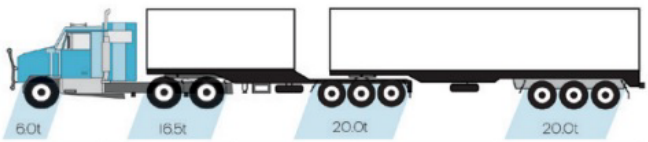
ELEVATION VIEW OF T44 TRUCK LOADING



PLAN VIEW OF T44 TRUCK LOADING

Common 9 Axle B-double

#26m is available for eligible vehicles.
#Combination must meet mass limits relating to axle spacing's for the full mass entitlement.



Type of Mass Limits	Maximum Length (metres)	Allowable CVM/CCM (tonnes)	Single Steer Axle (tonnes)	Twin Steer Axle Group (tonnes)	Single Axle (tonnes)	Tandem Axle Group (tonnes)	Triaxle Group (tonnes)
GML	25.0m#	62.5t	6.0t*	N/A	N/A	16.5t	20.0t per tri axle group

Source: NHVR - National heavy vehicle mass and dimension limits

TABLE C6.2(C)

CURRENT LENGTH VEHICLES—CURRENT FREIGHT DENSITY = 0.28 t/m³

Vehicle	O/A length (m)	Gross mass (tonnes)	Configuration, axle distances and axle group mass (see Note)						
Articulated	19.0	42.5	o 1.6 m 6 t	oo 6.4 m 16.5 t	ooo 15.9 m 20 t				
B-double	25.0	62.5	o 1.6 m 6 t	oo 5.6 m 16.5 t	ooo 13.6 m 20 t	ooo 22.6 m 20 t			
B-triple	33.0	82.5	o 1.6 m 6 t	oo 5.6 m 16.5 t	ooo 13.6 m 20 t	ooo 21.6 m 20 t	ooo 30.6 m 20 t		
RT triple	53.5	115.5	o 1.6 m 6 t	oo 6.4 m 16.5 t	ooo 15.9 m 20 t	oo 23.8 m 16.5 t	ooo 33.3 m 20 t	oo 41.2 m 16.5 t	ooo 50.7 m 20 t

NOTE: Distances are from front of vehicle to centre-line of axle group.

Appendix E

DYNAMIC LOAD FACTORS

(Extract from API Recommended Practice)

be designed for a horizontal force of 5% of the static sling load, applied simultaneously with the static sling load. This horizontal force should be applied perpendicular to the padeye at the center of the pinhole.

2.4.2.b. Static Loads. When suspended, the lift will occupy a position such that the center of gravity of the lift and the centroid of all upward acting forces on the lift are in static equilibrium. The position of the lift in this state of static equilibrium should be used to determine forces in the structure and in the slings. The movement of the lift as it is picked up and set down should be taken into account in determining critical combinations of vertical and horizontal forces at all points, including those to which lifting slings are attached.

2.4.2.c. Dynamic Load Factors. For lifts where either the lifting derrick or the structure to be lifted is on a floating vessel, the selection of the design lifting forces should consider the impact from vessel motion. Load factors should be applied to the design forces as developed from considerations of 2.4.2a and 2.4.2b.

For lifts to be made at open, exposed sea (i.e., offshore locations), padeyes and other internal members (and both end connections) framing into the joint where the padeye is attached and transmitting lifting forces within the structure should be designed for a minimum load factor of 2.0 applied to the calculated static loads. All other structural members transmitting lifting forces should be designed using a mini- mum load factor of 1.35.

For other marine situations (i.e., loadout at sheltered locations), the selection of load factors should meet the expected local conditions but should not be less than a minimum of 1.5 and 1.15 for the two conditions previously listed.

For typical fabrication yard operations where both the lifting derrick and the structure or components to be lifted are land-based, dynamic load factors are not required. For special procedures where unusual dynamic loads are possible, appropriate load factors may be considered.

2.4.2.d. Allowable Stresses. The lift should be designed so that all structural steel members are proportioned for basic allowable stresses as specified in Section 3.1. The AISC increase in allowable stresses for short-term loads should not be used. In addition, all critical structural connections and primary members should be designed to have adequate reserve strength to ensure structural integrity during lifting.

2.4.2.e. Effect of Tolerances. Fabrication tolerances and sling length tolerances both contribute to the distribution of forces and stresses in the lift system which are different from that normally used for conventional design purposes. The load factors recommended in Section 2.4.2c are intended to apply to situations where fabrication tolerances do not exceed the requirements of Section 11.1.5, and where the variation in length of slings does not exceed plus or minus ¼ of 1% of nominal sling length, or 1½ inches.

The total variation from the longest to the shortest sling should not be greater than ½ of 1% of the sling length or 3 inches. If either fabrication tolerance or sling length tolerance exceeds these limits, a detailed analysis taking into account these tolerances should be performed to determine the redistribution of forces on both slings and structural members. This same type analysis should also be performed in any instances where it is anticipated that unusual deflections of particularly stiff structural systems may also affect load distribution.

2.4.2.f. Slings, Shackles and Fittings. For normal offshore conditions, slings should be selected to have a factor of safety of 4 for the manufacturer's rated minimum breaking strength of the cable compared to static sling load. The static sling load should be the maximum load on any individual sling, as calculated in 2.4.2a, b, and e above, by taking into account all components of loading and the equilibrium position of the lift. This factor of safety should be increased when unusually severe conditions are anticipated, and may be reduced to a minimum of 3 for carefully controlled conditions.

Shackles and fittings should be selected so that the manufacturer's rated working load is equal to or greater than the static sling load, provided the manufacturer's specifications include a minimum factor of safety of 3 compared to the minimum breaking strength.

2.4.3. Loadout Forces.

2.4.3.a. Direct Lift. Lifting forces for a structure loaded out by direct lift onto the transportation barge should be evaluated only if the lifting arrangement differs from that to be used in the installation, since lifting in open water will impose more severe conditions.

2.4.3.b. Horizontal Movement Onto Barge. Structures skidded onto transportation barges are subject to load conditions resulting from movement of the barge due to tidal fluctuations, nearby marine traffic and/or change in draft; and also from load conditions imposed by location, slope and/or settlement of supports at all stages of the skidding operation. Since movement is normally slow, impact need not be considered.

2.4.4. Transportation Forces

2.4.4.a. General. Transportation forces acting on templates, towers, guyed towers, minimum structures and platform deck components should be considered in their design, whether transported on barges or self-floating. These forces result from the way in which the structure is supported, either by barge or buoyancy, and from the response of the tow to environmental conditions encountered enroute to the site. In the subsequent paragraphs, the structure and supporting barge and the self-floating tower are referred to as the tow.

2.4.4.b. Environmental Criteria. The selection of environmental conditions to be used in determining the motions of the tow and the resulting gravitational and inertial forces acting on the tow should consider the following:

1. Previous experience along the tow route.

Extract from API Recommended Practice 2A – WSD(RP 2A-WSD)
Twentieth Edition, July 1, 1993

Appendix F

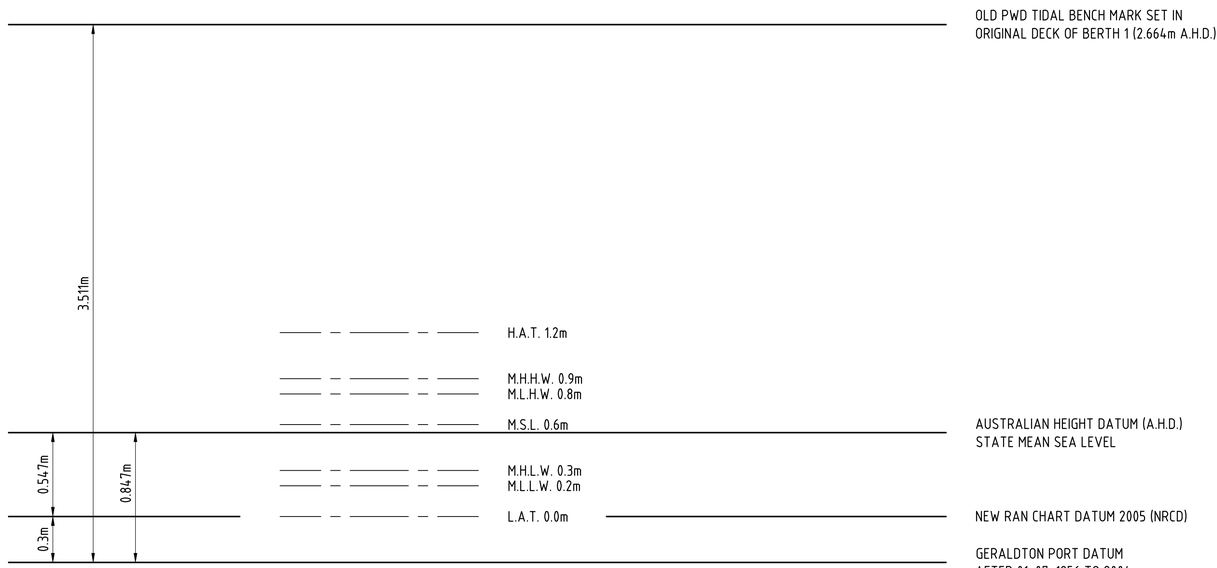
DATUM DEFINITION DRAWING

NOTES

1. ALL MARITIME CONSTRUCTION WILL BE CHART DATUM (NRCD)
2. ALL ONSHORE STRUCTURAL CONSTRUCTION WILL BE AUSTRALIAN HEIGHT DATUM (AHD.)
3. KEY INTERFACE LEVELS ON DRAWING WILL USE BOTH NRCD & AHD DATUMS
4. HORIZONTAL DATUM CO-ORDINATES RELATE TO GCG94
5. THIS DRAWING IS BASED ON INFORMATION SUPPLIED BY DRAWING No. GPA05-DATUM-01-B (REV B)

LEGEND

H.A.T.	HIGHEST ASTRONOMICAL TIDE
M.H.H.W.	MEAN HIGH HIGH WATER
M.L.H.W.	MEAN LOW HIGH WATER
M.S.L.	MEAN SEA LEVEL
M.H.L.W.	MEAN HIGH LOW WATER
M.L.L.W.	MEAN LOW LOW WATER
L.A.T.	LOWEST ASTRONOMICAL TIDE



REV	DATE	DESCRIPTION	DRN	APP
A	24.06.15	DATA TRANSFERRED FROM GPA DRAWING 010-MA-0004	RF	PD

REVISIONS

DRAWING No.	DRAWING TITLE

REFERENCE DRAWINGS

MWPA PROJECT No:

DESIGNED	D. MILLER	DESIGN CHECK	P. DUPLEX
DRAWN	R. FERSTAT	CHECKED	P. DUPLEX
ENGINEER	P. DUPLEX	APPROVED	P. BLUNDELL

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GERALDTON PORT
COMMERCIAL HARBOUR
CHART DATUM
DATUM SUMMARY - 2007

SCALE	ORG No.	REV.
A1 - 1:20	009-MA-0007	A

Table 2 from Aecom 60333556-REP-001 2014

Table 2 Berthing Capacity of Design Vessel for each Berth expressed as Maximum Approach Velocity for Normal and Abnormal conditions

Berth	Vessel Size	Approach Capacity in Ballast[1]		Approach Capacity Laden[2]		Proposed Design Limit[3] (m/sec)
		Displacement (tonne)	Velocity (m/sec)	Displacement (tonne)	Velocity (m/sec)	
1	No fenders not examined					
2	Handymax Bulk, 50,000 DWT (LOA 190m, Beam 32.2m)	29,500	*0.11*[5]	49,000	*0.08/0.10*[5]	
	Large Handysize, 30,000 DWT (LOA 170m, Beam 25.3m)	20,000	0.12	32,000	0.09/0.11	0.18
	Small Handysize, 20,000 DWT (LOA 140m, Beam 25.0m)	14,000	0.14	26,000	0.10/0.12	
3/4/5	Panamax Bulk, 87,000 DWT (LOA 229m, Beam m)	49,000	0.14	68,000	0.12/0.14	
	Panamax Bulk, 70,000 DWT (LOA 225m, Beam 32.26m)	42,000	0.16	58,000	0.14/0.16	0.16
	Handysize Bulk, 30,000 DWT (LOA 170m, Beam 25.3m)	20,000	0.20	32,000	0.15/0.18	
6	Panamax Bulk, 70,000 DWT (LOA 225m, Beam 32.26m)	42,000	*0.1*	58,000	*0.08/0.01*	
	Handymax Bulk, 56,000 DWT (LOA 190m, Beam 32.26m)	33,000	0.10	51,000	0.08/0.10	
	Product Tanker, 26,500 DWT (LOA 160m, Beam 24.4m)	18,500	0.13	34,000	0.09/0.11	0.16
	Product Tanker (LOA189 m, Beam 32.2m)	Not applicable		67,000	*0.07/0.09*[5]	
	General Cargo, 18,500 DWT (LOA 157m, Beam m)	Not applicable		24,000	0.10/0.13	
7	Mini Cape, 115,000 DWT (LOA 254m, Beam 43m)	68,000	0.22	88,000	0.2/0.24[4]	
	Post Panamax Bulk, 93,000 DWT (LOA 235m, Beam 38m)	54,000	0.24	72,000	0.22/0.24	0.17
	Panamax Bulk, 70,000 DWT (LOA 225m, Beam 32.26m)	42,000	0.27	58,000	*0.22/0.25*[5]	

[1] Normal Berthing Condition.

[2] Max Draft 10.0m, larger vessels are part laden. Velocity is Normal/Abnormal.

[3] Suggested revision of PIANC criteria to suit Geraldton.

[4] For bow impact in this case.

[5] Indicates Value estimated from Approach velocity curves (refer section 6.4)

Legend

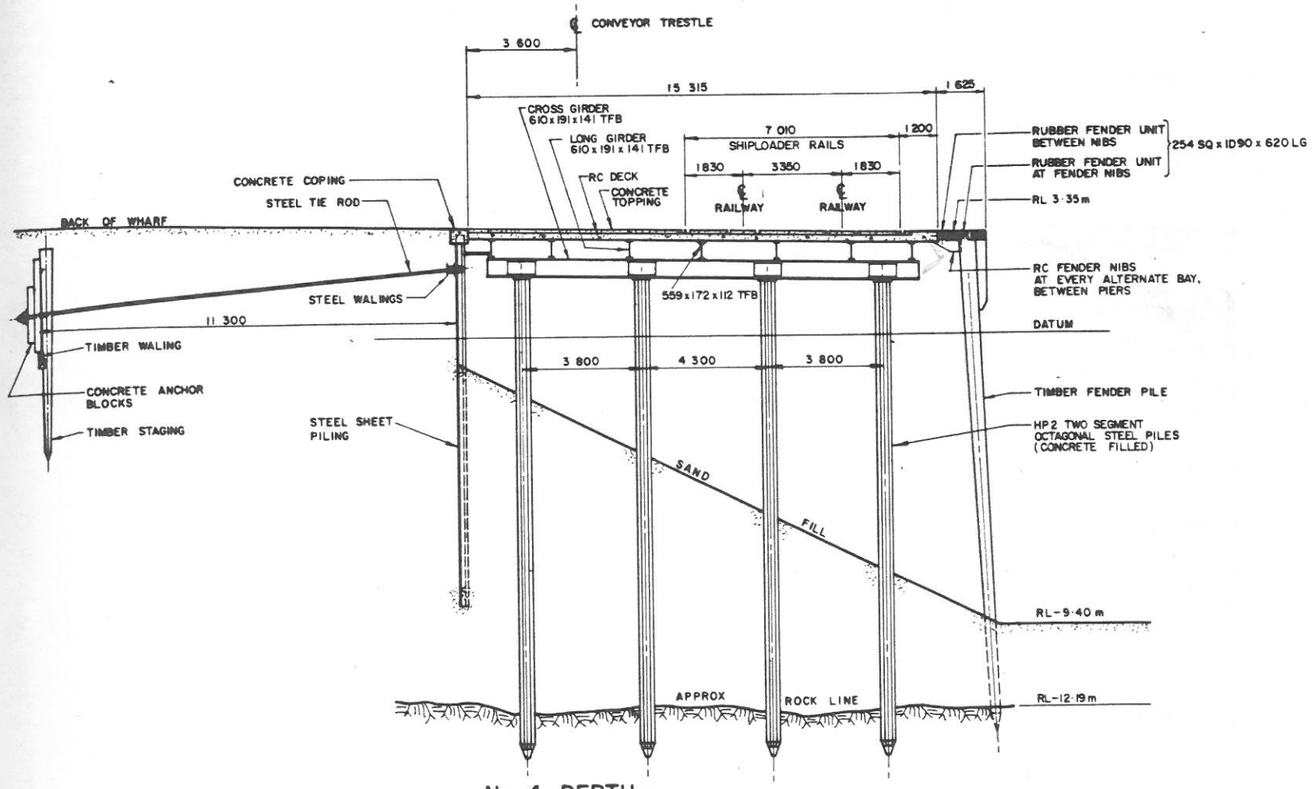
	Meets PIANC and Proposed Design Limit
	Meets PIANC, but not Proposed Design Limit
	Considered a risk for berthing at anything other than very shallow angles

Appendix G

BERTH GENERAL ARRANGEMENTS AND SECTIONS

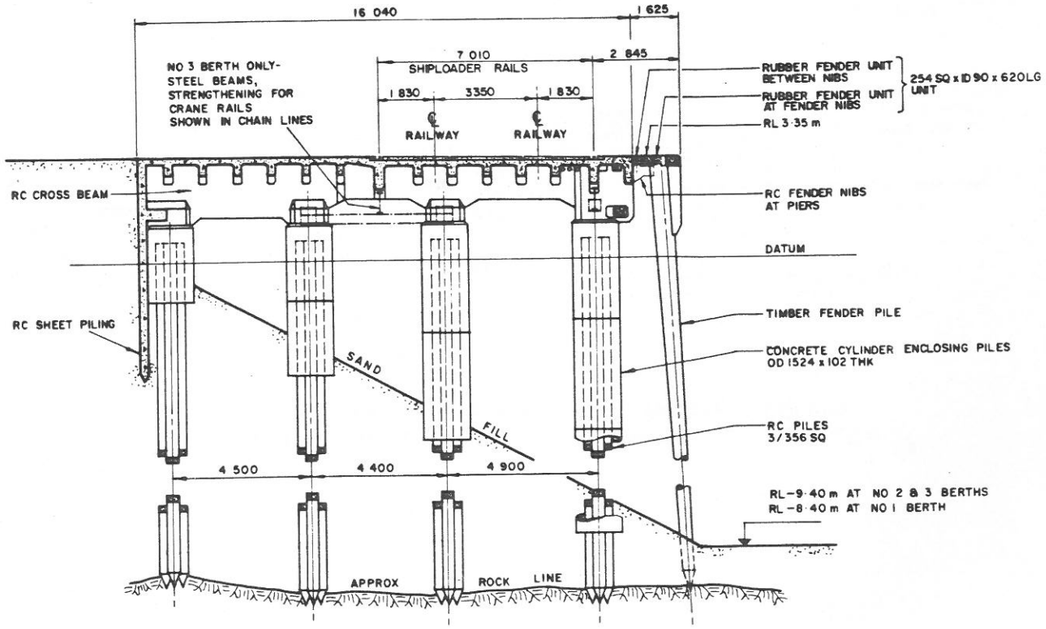
Title	Drawing Number	Rev Number
Berths 1, 2, 3 and 4		
Regional Ports of Western Australia, Port of Geraldton, Cross Sections and Design Loadings	53923-7-3	Circa 1983
Berths 1 and 2		
Original Berth 1, 2 + 3 Plan and Front Elevation Typical Cross Section and Elevation of Wharf Reinforced Concrete Piles	25711-1 25711-2 25711-3	Circa 1928 Circa 1928 Circa 1928
Original Berth 1, 2 + 3 Cross Beam	25711-14	Circa 1928
Rehabilitation of Berths 1 and 2, General Arrangement Cross-Sections	MP5566-002	3
Berth 1 and 2 Tieback Layout 1	002-C-0004	0
Berth 1 and 2 Tieback Layout 2	002-C-0005	0
Berth 1 and 2 Permanent Remediation Works Tie Rod Details	60554034-SK017	0
Berth 3		
No. 3 Berth Extension, General Cross Section	PWD	Circa 1961
Reconstruction of Berth No. 3, Existing Berth Cross Section	MP4102-03	1
Reconstruction of Berth No. 3, General Arrangement Section and Elevation of Fendering	MP4102-05	1
Geraldton Harbour Berth No. 3, General Arrangement	A177-26-C-002	C
Geraldton Port Enhancement Project, Modification to Berths 3 and 4 Berth 3 – Section, Details and Dolphin Fixtures Setout	44915-URS-DPE-354	3
Berth 4		
No. 4 Berth, Details of Longitudinal Beams	PWD 39195	Circa 1961
No. 4 Berth Extensions, Deck Steelwork Plan	10765C/3D	D
Geraldton Harbour Berth No. 4, General Arrangement	A177-26-C-004	C
Modification to Berths 3 and 4, Berth 4 - Sections	44915-URS-DPE-358	3
Modification to Berths 3 and 4, Berth 4 Drainage Typical Section Through Berth	44915-URS-DPE-371	2
Berth 5		
Regional Ports of Western Australia, Port of Geraldton, Cross Sections and Design Loadings	53923-7-4	Circa 1984
Geraldton Harbour Berth No. 5, General Arrangement	A177-26-C-006	C
Berth 5, Design Criteria	75309405-3541	1
Berth 5, General Arrangement Sections – Sheet 1 of 3	75309405-3546	1
Berth 6		
Geraldton Harbour No. 6 Berth, Pile Layout and Sections	14228-S2	D
Geraldton Harbour No. 6 Berth, Sheet Piling Plan and Sections	14228-S3	D
Geraldton Harbour No. 6 Berth, Precast Concrete Panels and Steelwork Plan Area 1	14228-S4	D
Modification to Berth 6 Pile Retaining Wall, As Constructed Plan 1 of 4	44915-URS-DPE-438	B

Title	Drawing Number	Rev Number
Modification to Berth 6 Pile Retaining Wall, As Constructed Plan 2 of 4	44915-URS-DPE-439	B
Modification to Berth 6 Pile Retaining Wall, As Constructed Plan 3 of 4	44915-URS-DPE-440	B
Modification to Berth 6 Pile Retaining Wall, As Constructed Plan 4 of 4	44915-URS-DPE-441	B
Berth 6 Retaining Piles, Typical Section	44915-DPE-443	1



No 4 BERTH - TYPICAL CROSS SECTION ①

(PIERS AT 7 010 CENTRES)



No 1, 2 & 3 BERTHS - TYPICAL CROSS SECTION ①

(DESIGN LOADINGS ON APPLICATION TO CHIEF ENGINEER, HARBOURS AND RIVERS, P.W.D.)

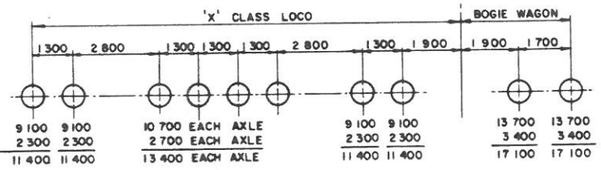
(PIERS AT 6 095 CENTRES)

DESIGN LOADINGS ON No 4 BERTH

(A) STACKED LOADS

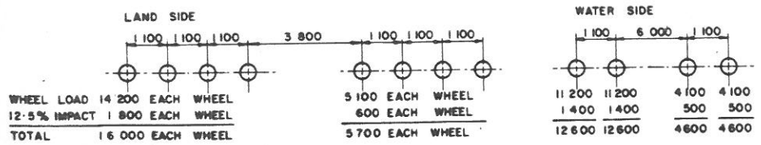
ON WHARF DECK - 3 400 kg / m²
AT BACK OF WHARF - 4 900 kg / m²

(B) RAILWAY LOADS (kg)

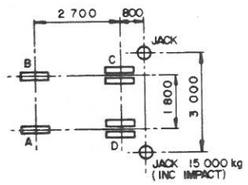


(C) CRANE AND SHIPLOADER LOADS

5 TONNE GANTRY (ESTIMATED LOADS - kg.)

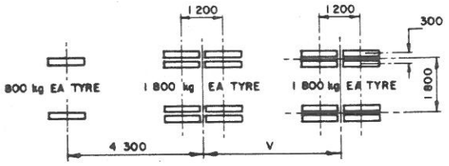


10 - 6 TONNE COLES MOBILE S 1210S. (JIB OVER D.)



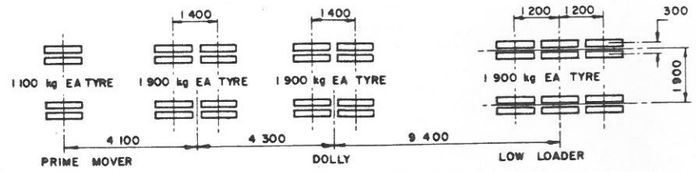
(D) HEAVY ROAD VEHICLES

21 TONNE SEMI-TRAILER AGGREGATE TYRE LOADS SHOWN.



V = VARIABLE SPACING 4 300 TO 9 100.

35 TONNE LOW LOADER. AGGREGATE TYRE LOADS SHOWN.



(E) STANDARD TRUCK LOADING

BERTH DESIGNED FOR STANDARD MS 18 TRUCK.
(14 700 kg AGGR LOADS ON DUAL WHEEL TANDEM AXLES.)

(F) BERTHING LOAD

20 000 TONNE VESSEL (LOADED DISPLACEMENT MASS) AT 0·15 m/s - 50 % KINETIC ENERGY ABSORBED BY STRUCTURE.

1cm = 2m.

1000 0 2000 4000 6000

SCALE OF MILLIMETRES (1:200) ①

ZONE	DATE	REVISION	DR'N	APP'D

SURVEY BOOKS — FILE No: PW 1248/65

GENERAL NOTES

UNLESS OTHERWISE SHOWN ALL DIMENSIONS ARE IN MILLIMETRES.

1. SEE DRG 53923-7-1 FOR LOCALITY PLAN.

REVISED TO DEC 31, 1983

SCALES AS SHOWN
MICROFILMED
DATUM
CHART DATUM WHICH IS ZERO ON THE TIDE GAUGE AND 0·847 m BELOW AHD.

DESIGN CALC. BOOK
CHECKED BOOK
DRAWN C.S. CHECKED CS/JMS
TRACED CHECKED
SUPERVISING DESIGN ENGINEER, H&R
SUBMITTED DATE 29 12 83
CHIEF DESIGN ENGINEER
APPROVED DATE 24-1-84
CHIEF ENGINEER, HARBOURS & RIVERS

PUBLIC WORKS DEPARTMENT — WESTERN AUSTRALIA
REGIONAL PORTS OF WESTERN AUSTRALIA
PORT OF GERALDTON
CROSS SECTIONS AND DESIGN LOADINGS
P.W.D., W.A. 53923-7-3
REVN

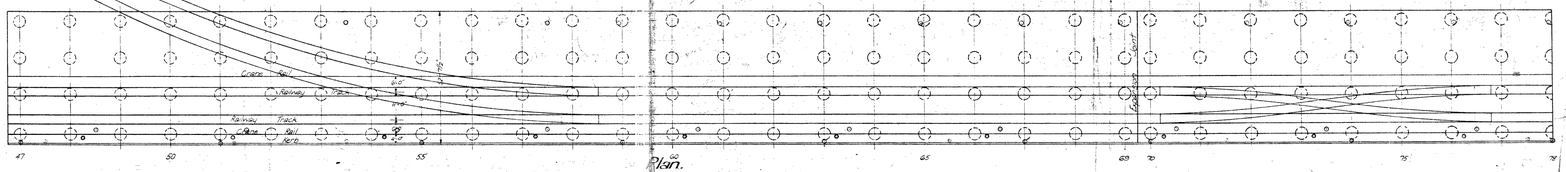
Geraldton Harbour Works.
Reinforced Concrete Wharf.
Plan and Front Elevation showing Strata.

Scale 20 Feet to 1 Inch

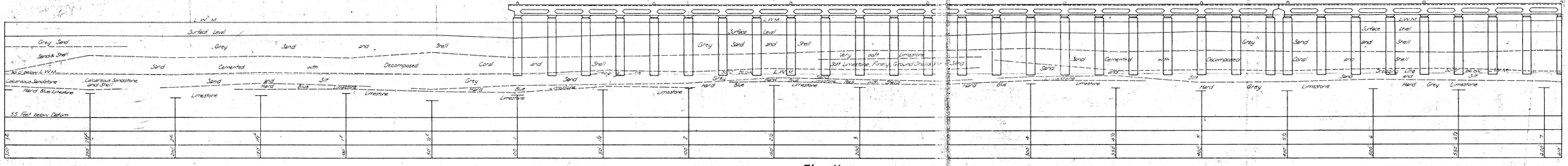
Drawing No 1.

NOTE:-

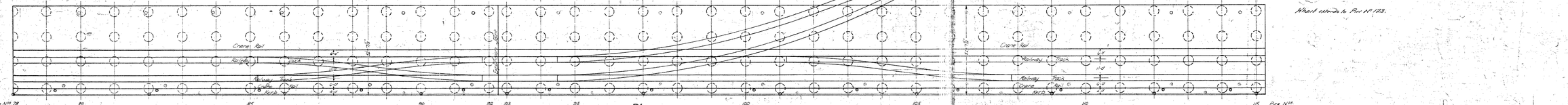
BOLLARDS	SHEWN THUS	○
F.C.D. HYDRANTS		○
EL CRANE PEDDLE		○
EL LIGHTING PLUGS		○



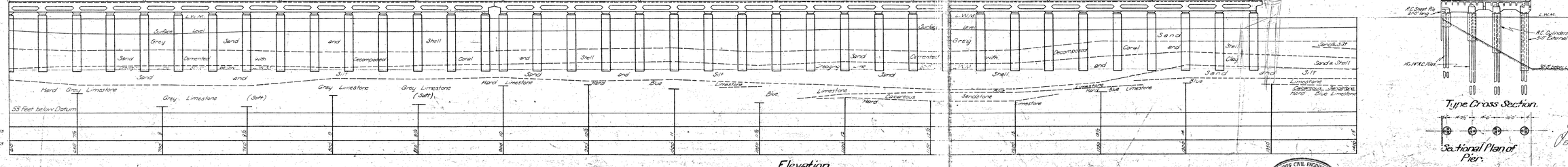
Plan.



Elevation.

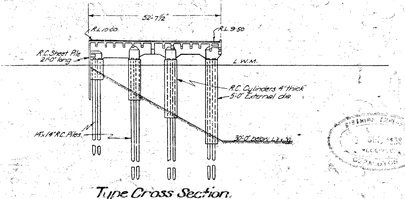


Plan.



Elevation.

Wharf extends to Pier No 128.



J. Stevenson Young
Engineer for Harbours & Rivers 7/9/38

CHIEF CIVIL ENGINEER
5 SEP 1938
PLAN RECORD

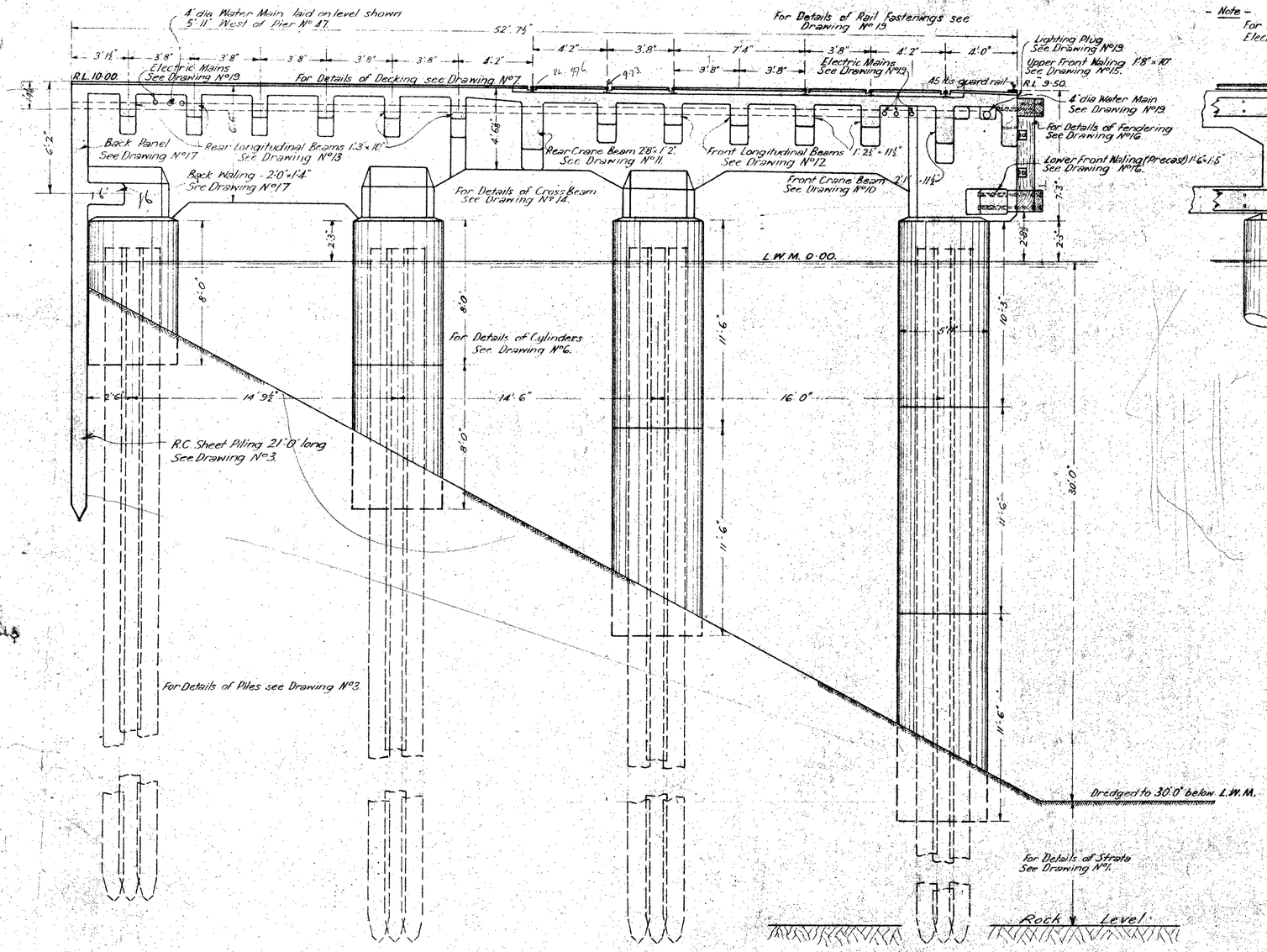
COPY OF P.W.D., W.A. 25711

DRAWN BY J.S.N.
EXAMINED BY D.J.D.
TRACED BY J.S.N.
EXAMINED BY J.S.N.-18.

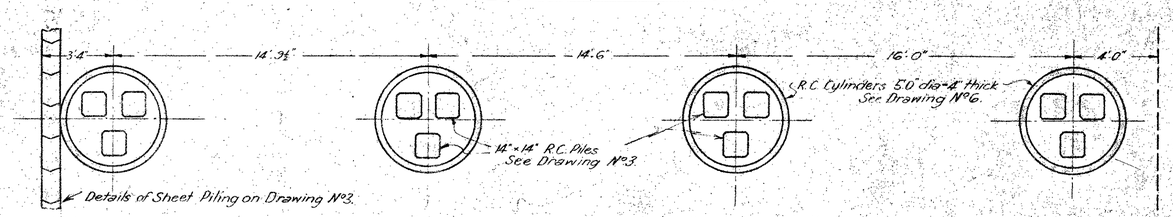
Geraldton Harbour Works.
Reinforced Concrete Wharf.
Type Cross Section and Elevation of Wharf.

Drawing No 2.

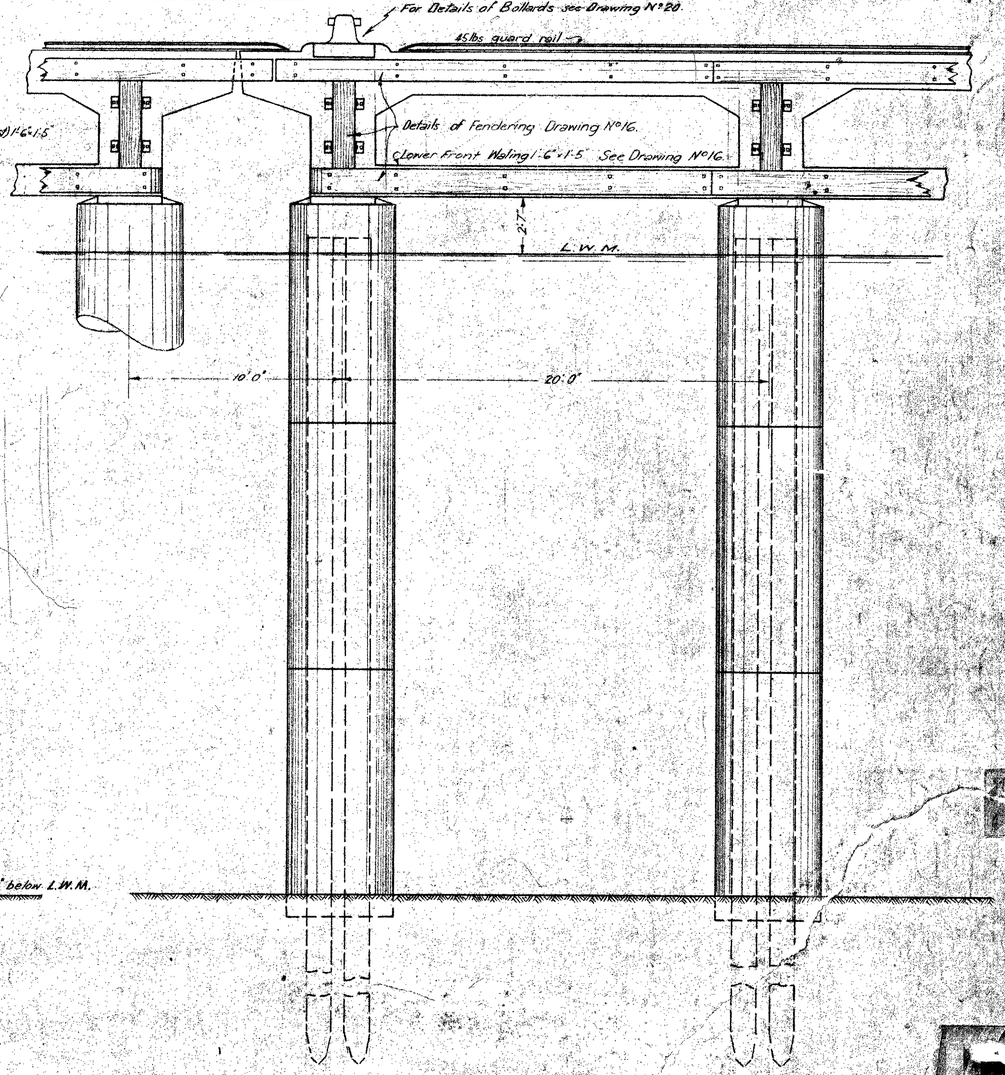
-Scale- 4 Feet to 1 Inch.



Type Cross Section



Sectional Plan through Cylinders



Part Elevation

Geraldton Harbour Works.
Reinforced Concrete Wharf.
Type Cross Section and Elevation of Wharf

J. Stevenson Jun
Engineer for Harbours and Rivers.
24. 5. 28.

DRAWN BY A.G.A.
EXAMINED BY D.J.A.D.
D BY A.E.A.
NO. 6-11-28

COPY of C.C.E. PLAN No. 28197

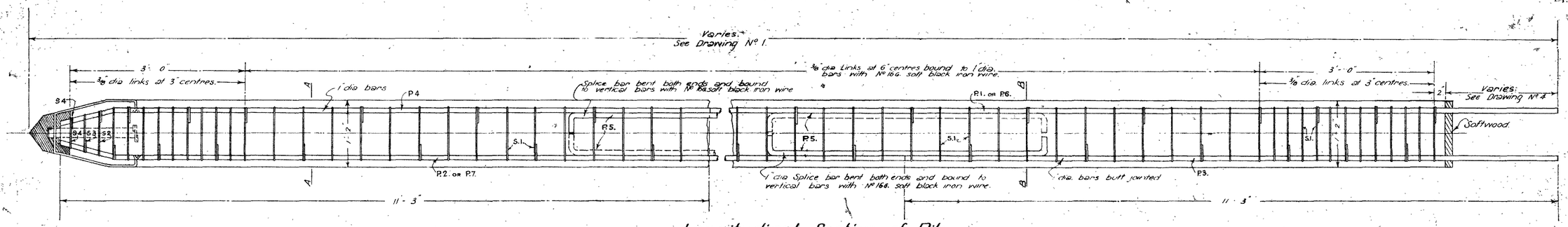
N.A. 2570

Geraldton Harbour Works.
New Reinforced Concrete Wharf.
Reinforced Concrete Piles.

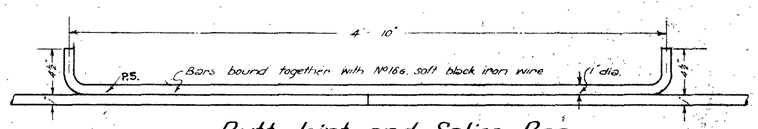
Drawing No. 3.

Scales.

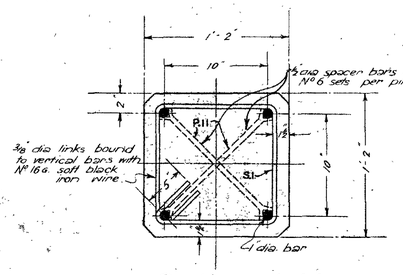
1 Foot to 3 Inches for Fig. ①
1 Foot to 1 Inch " " ②
1 Foot to 1½ Inches " " ③



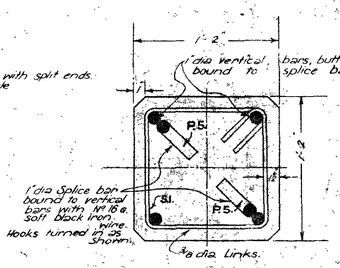
Longitudinal Section of Pile.
②



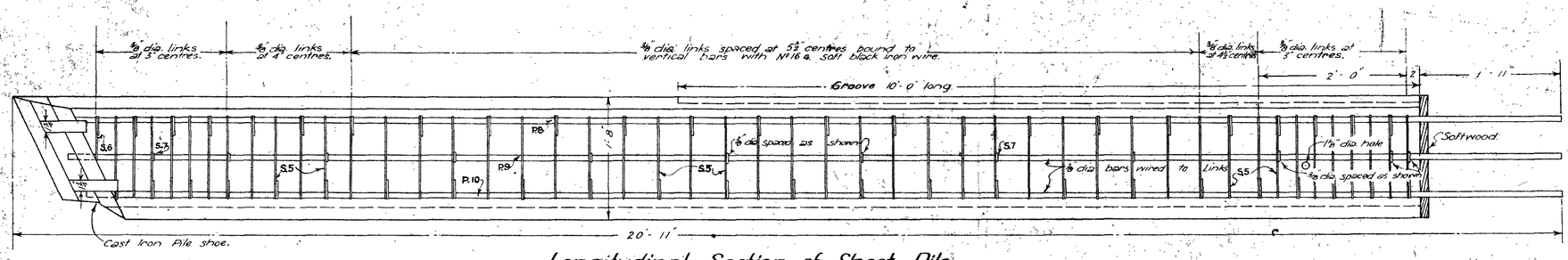
Butt Joint and Splice Bar.
③



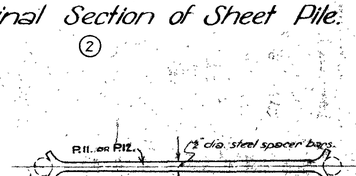
Section at AA.
③



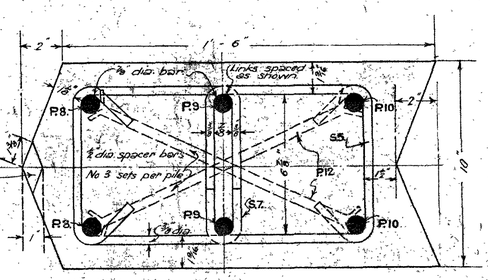
Section at BB.
③



Longitudinal Section of Sheet Pile.
②



Spacer Bars.
①



Type Cross Section of Sheet Pile.
①

DRAWN BY S.M.
EXAM.D BY
TRACED BY H.W.
EXAM.D BY J.W.S. 24.5.28

CHIEF CIVIL ENGINEER 5 SEP 1938 PLAN RECORD

DISTRICT ENGINEER 6 SEP 1938 PILBARA GERALDTON

J. Stevenson
Engineer for Harbours and Rivers. 24/5/28.

G.H.W.
New Reinforced Concrete Wharf.
Reinforced Concrete Piles.

24.5.28.

COPY OF P.W.D. W.A. 25711

Geraldton Harbour Works
Reinforced Concrete Wharf
Details of Cross Beam.

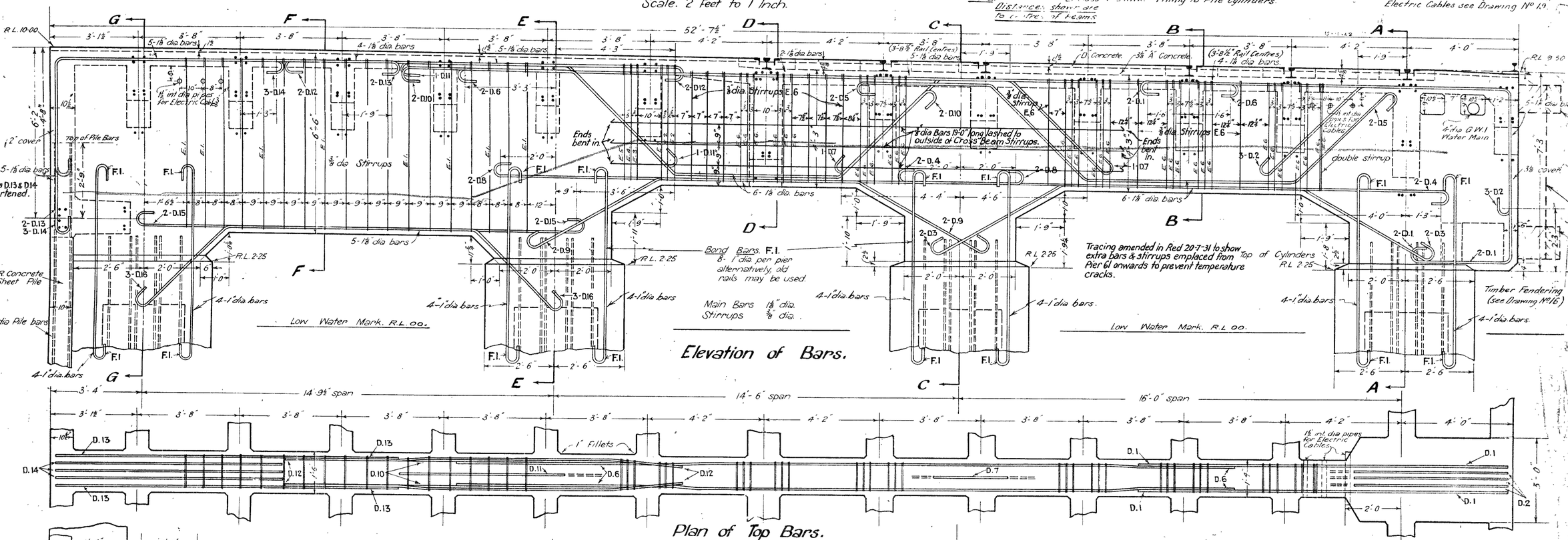
Scale. 2 Feet to 1 Inch.

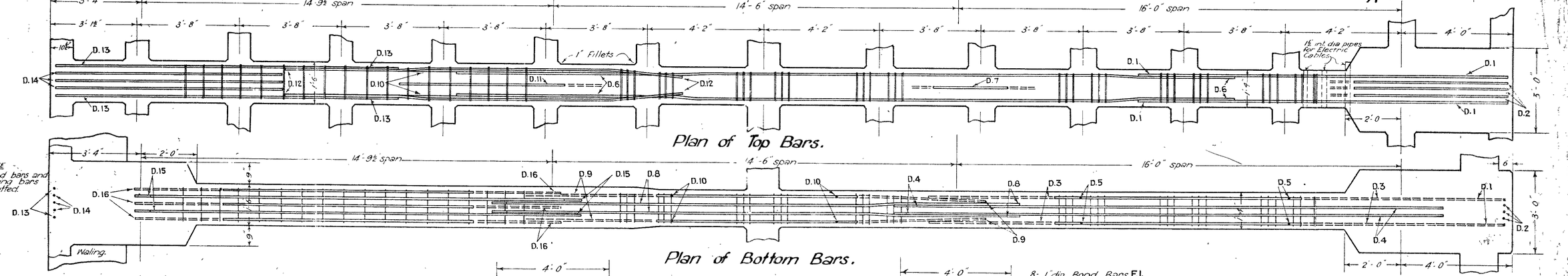
~~Drawing No. 14~~
14

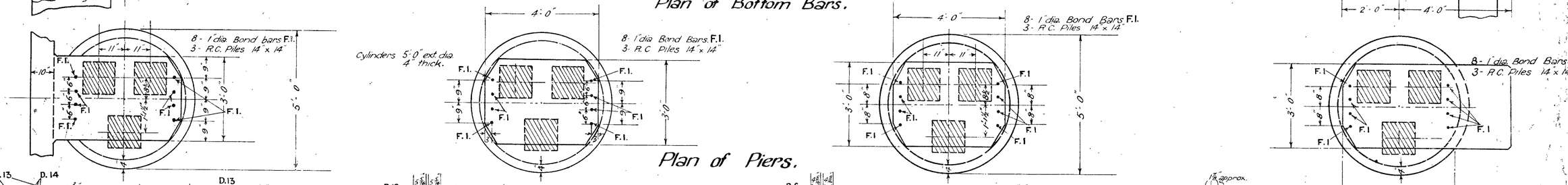
For details of Rails, Water Main & Electric Cables see Drawing No. 19.

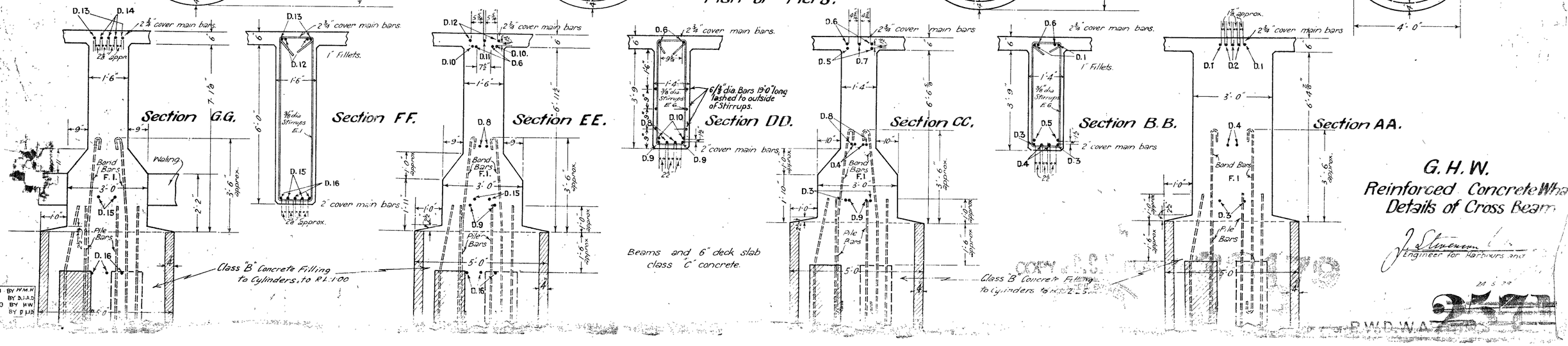
Concrete:
A Class 1:6 mix - 3" filling over front of wharf.
C Class 1:2:4 mix. Beams and 6" deck slab.
D Class 1:1:3 mix. 12" surfacing over all of wharf.
B Class 1:5 mix. - Filling to Pile Cylinders.

NOTE. Distances shown are to centres of beams.









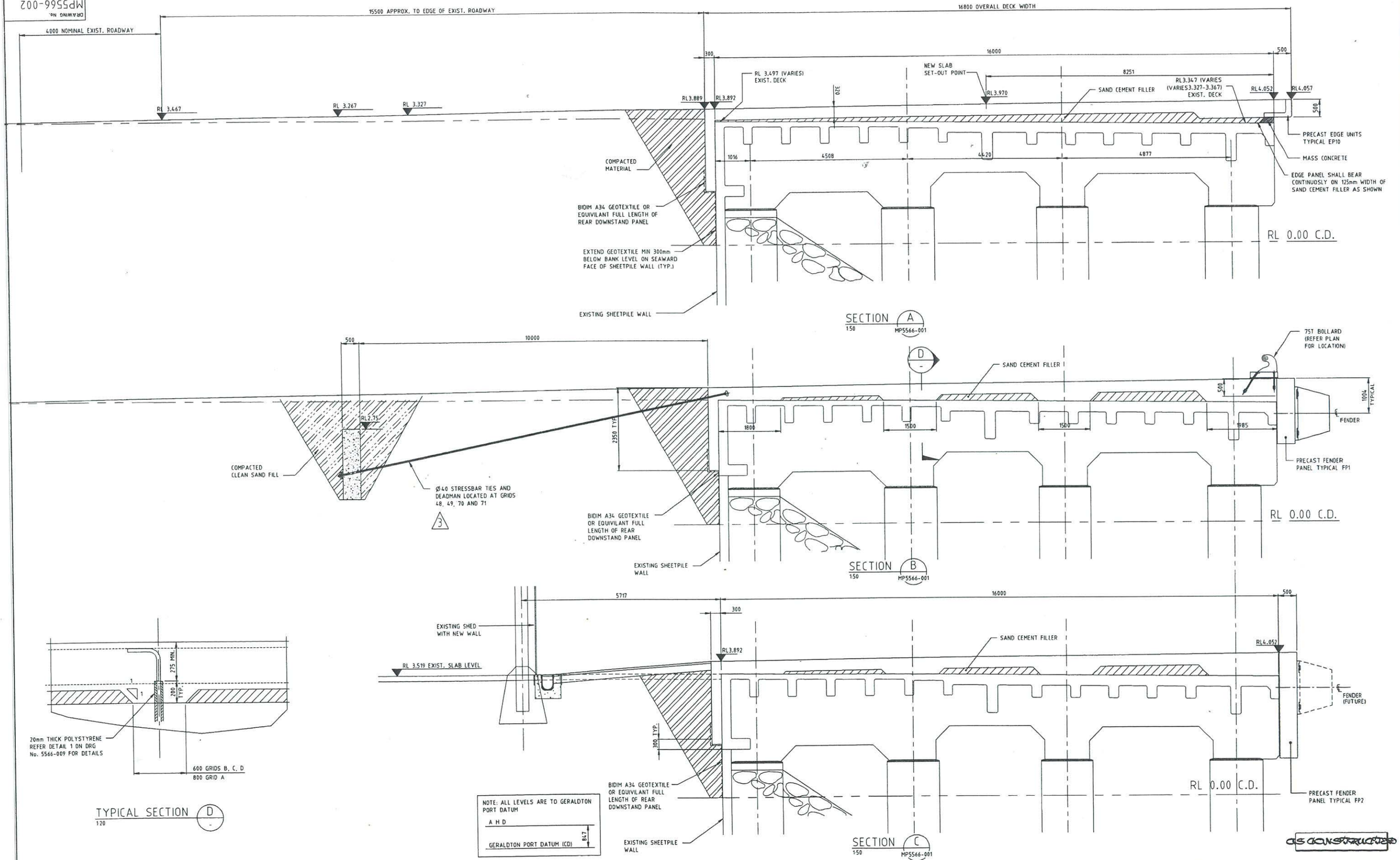
DRAWN BY W.M.H.
EXAM. BY D.J.A.D.
TRACED BY H.W.
EXAM. BY P.J.B.

J. Stinson
Engineer for Harbours and

24 5 32

P.W.D. W.A.

DRAWING No. MP5566-002



3	AS CONSTRUCTED	MJM	DW	DW	DW	28.8.00
2	BOLLARD DETAILS REVISED	MJM	DW	DW	DW	22.02.00
1	HOLD DELETED, SECTION A, B, C & D REVISED	MJM	DW	DW	DW	21.01.00
	DOWNPIPE ADDED, NOTES ADDED					
0	ISSUED FOR CONSTRUCTION	MMM	DW	DW	RBLS	23/12/99
A	ISSUED FOR INFORMATION	AJH				13.10.99
Rev	Issue Description	Drn by	Chk'd	Proj. Eng	Proj. Dir.	Date

Owner/Principal

GERALDTON PORT AUTHORITY

John Holland

Project Manager

Halpern Glick Maunsell

Consulting Engineers and Environmental Scientists

Members of the Association of Consulting Engineers Australia

HGM

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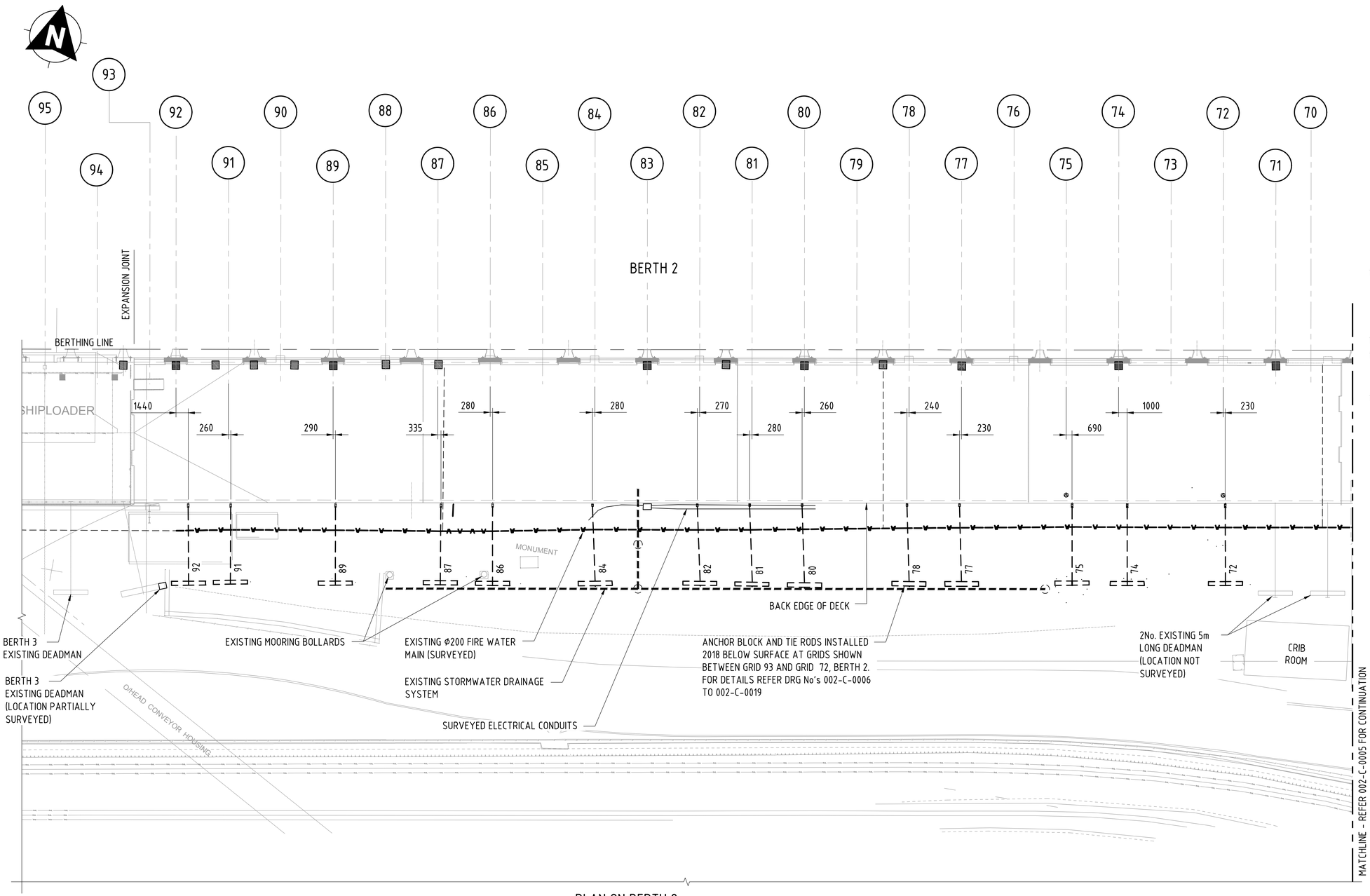
11 Prinsep Street, Bunbury 6230
Ph (08) 9721 9676 Fax (08) 9721 9611

19 Durlacher St, Geraldton, 6530
Ph (08) 9921 8299 Fax (08) 9921 7265

A.C.N. 009 396 516

HGM Proj. No.	MP005566
CAD No.	5566-002
Project Engineer	BD WARWICK
Design By	BD WARWICK
Drawn By	MMM
Project Director	RB LAMONT-SMITH
Survey Information	

Project Name	GERALDTON WHARF
Drawing Title	REHABILITATION OF BERTHS 1 AND 2 GENERAL ARRANGEMENT CROSS-SECTIONS
Drawing No.	MP5566-002
Scale	1:50
Datum	CD
Dwg Size	A1
Rev	3
WAPC	

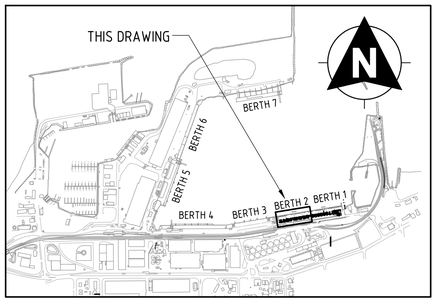


PLAN ON BERTH 2

1:250

KEYPLAN

NTS



GENERAL NOTES:

1.1 THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH ALL OTHER DRAWINGS AND SPECIFICATIONS AND WITH SUCH OTHER WRITTEN INSTRUCTIONS AS MAY BE USED DURING THE COURSE OF THE CONTRACT. ALL DISCREPANCIES SHALL BE REFERRED TO THE MWPA PROJECT SUPERVISOR FOR DECISION BEFORE PROCEEDING WITH THE WORK.

1.2 DIMENSIONS SHALL NOT BE OBTAINED BY SCALING THE DRAWINGS.

1.3 GEOMETRY OF EXISTING STRUCTURES IS SHOWN INDICATIVELY ONLY AND MUST BE CONFIRMED BY THE CONTRACTOR PRIOR TO THE COMMENCEMENT OF STEELWORK FABRICATION DRAWINGS.

1.4 ALL DIMENSIONS ARE IN MILLIMETRES AND ALL LEVELS ARE IN METRES RELATIVE TO AUSTRALIAN HEIGHT DATUM (mAHD) UNLESS OTHERWISE NOTED.

LEGEND:

- TIE ROD
- 87 — ADJACENT GRID No.
- 4m LONG BY 2m HIGH CONCRETE ANCHOR BLOCK (500THK)
- FIRE WATER MAIN (SURVEYED)
- FIRE WATER MAIN (ASSUMED)
- STORMWATER DRAINAGE SYSTEM
- MOORING BOLLARD

2.5 0 5 10m

SCALE 1:250 (on A1 Sheet)

AECOM

REV	DATE	DESCRIPTION	DRN	APP
0	17.08.18	AS CONSTRUCTED	PL	AS

REVISIONS

DRAWING No.	DRAWING TITLE

REFERENCE DRAWINGS

MWPA PROJECT No: 911

DESIGNED	P. LONGSTAFF	DESIGN CHECK	A.W. WRIGHT
DRAWN	P. LONGSTAFF	CHECKED	A.W. WRIGHT
ENGINEER	P.RALLABHANDI	APPROVED	A. SARANDILY

MID WEST PORTS

MID WEST PORTS AUTHORITY
298 Marine Terrace, GERALDTON 6530
Tel: +61 8 9964 0520
www.midwestports.com.au

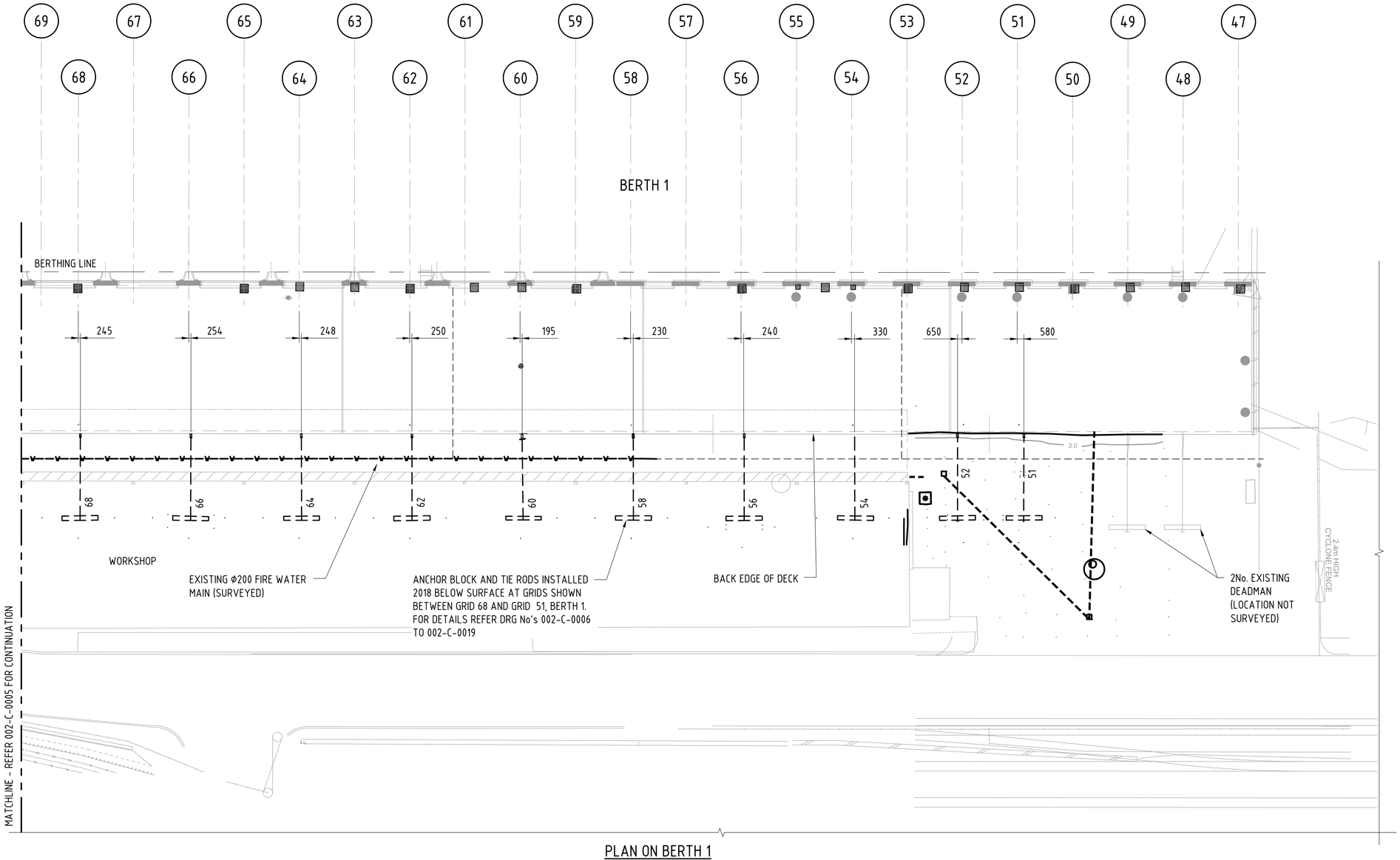
GERALDTON PORT

BERTH 1 & 2

BERTH 2 - PERMANENT REMEDIATION WORKS

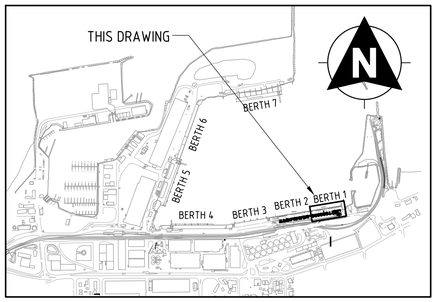
PLAN

SCALE	DRG No.	REV.
A1 - 1:250	002-C-0004	0



PLAN ON BERTH 1
1:250

KEYPLAN
NTS



GENERAL NOTES:

1. REFER DRG No. 002-C-0004 FOR GENERAL NOTES

LEGEND:

- TIE ROD
- 87 — ADJACENT GRID No.
- 4m LONG BY 2m HIGH CONCRETE ANCHOR BLOCK (500THK)
- FIRE WATER MAIN (SURVEYED)
- FIRE WATER MAIN (ASSUMED)
- STORMWATER DRAINAGE SYSTEM
- MOORING BOLLARD

AECOM

2.5 0 5 10m
SCALE 1:250 (on A1 Sheet)

REV	DATE	DESCRIPTION	DRN	APP
0	29.08.18	AS CONSTRUCTED	PL	AS

REVISIONS

DRAWING No.	DRAWING TITLE

REFERENCE DRAWINGS

MWPA PROJECT No: 911

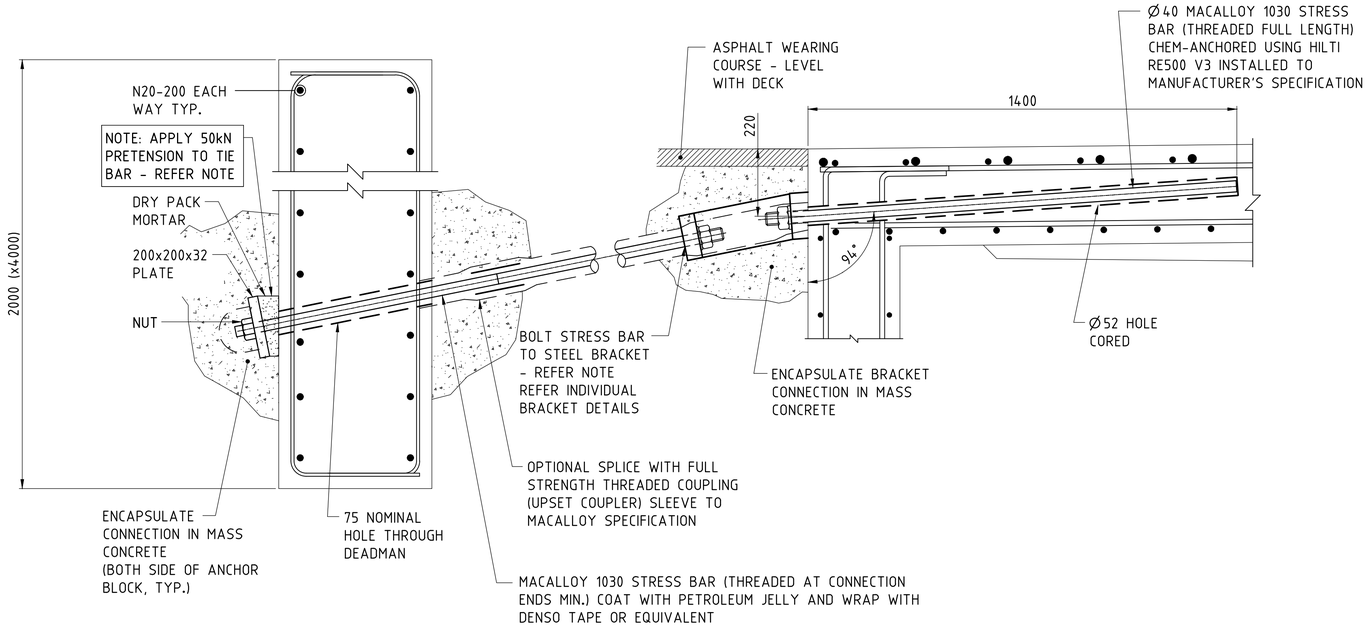
DESIGNED	P. LONGSTAFF	DESIGN CHECK	A.W. WRIGHT
DRAWN	P. LONGSTAFF	CHECKED	A.W. WRIGHT
ENGINEER	P.RALLABHANDI	APPROVED	A. SARANDILY

MID WEST PORTS

MID WEST PORTS AUTHORITY
298 Marine Terrace, GERALDTON 6530
Tel: +61 8 9964 0520
www.midwestports.com.au

GERALDTON PORT
BERTH 1 & 2
BERTH 1 - PERMANENT REMEDIATION WORKS
PLAN

SCALE	DRG No.	REV.
A1 - 1:250	002-C-0005	0



DEADMAN TIEBACK DETAIL

1:10

NOTES:

1. THIS DRAWING TO BE READ IN CONJUNCTION WITH AS BUILT DRAWINGS 002-C-0006 TO 002-C-0015, MP5566-000 & MP5566-021.
2. CONCRETE BACKFILL SHALL BE 15MPa AROUND ANCHOR BLOCKS AND 25MPa AROUND BRACKETS.
3. STEEL REINFORCEMENT SHALL COMPLY WITH AS 4671 GRADE D500N.
4. STEEL PLATE SHALL BE MINIMUM GRADE 250 COMPLYING WITH AS 3678.
5. STEEL BRACKET PAINT TREATMENT - BLAST CLEAN CLASS 2 1/2 500 DFT INTERZONE 954 OR APPROVED EQUIVALENT.

NOTE - NUT TENSIONING

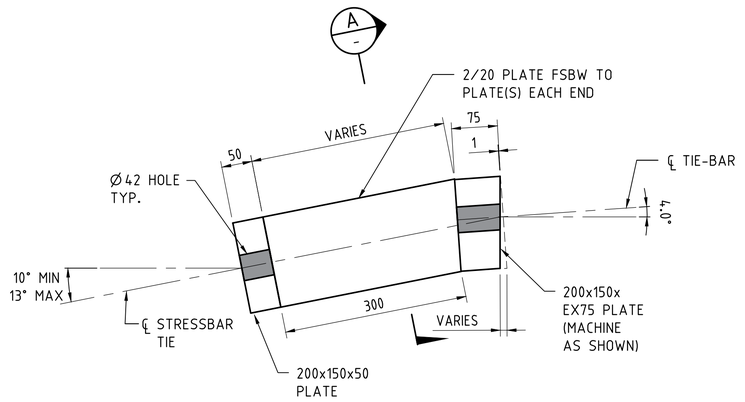
TORQUE OF 444 NEWTON METRES SHALL BE APPLIED TO EITHER THE NUT BEHIND THE PRECAST BLOCK, OR THE NUT AT THE WHARF END.

444Nm IS EQUAL TO A FORCE OF:

- 90.5kg AT 0.5m RADIUS, OR
- 45.3kg AT 1.0m RADIUS, OR
- 30.2kg AT 1.5m RADIUS.

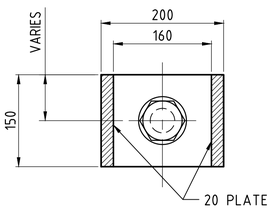
THE DIRECTION OF THE FORCE IS PERPENDICULAR TO THE WRENCH CENTRELINE. THE NUT THREADS SHOULD BE FREE OF DELETERIOUS MATERIAL AND BE GREASED TO FREELY TURN.

NOTE: THIS TORQUE DOES NOT GET APPLIED TO THE CHEM-ANCHORED BAR NUT, THIS NUT SHOULD BE DONE UP SNUGLY.



TYPICAL BRACKET DETAIL

1:5



SECTION A - 1:5

50 0 100 200mm
SCALE 1:5 (on A1 Sheet)

100 0 200 400mm
SCALE 1:10 (on A1 Sheet)

AECOM

REV	DATE	DESCRIPTION	DRN	APP
0	17.08.18	AS CONSTRUCTED	PL	AW

REVISIONS

DRAWING No.	DRAWING TITLE

REFERENCE DRAWINGS

MWPA PROJECT No: 911

DESIGNED	P. LONGSTAFF	DESIGN CHECK	A.W. WRIGHT
DRAWN	P. LONGSTAFF	CHECKED	A.W. WRIGHT
ENGINEER	A.W.WRIGHT	APPROVED	A. SARANDILY

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298 Marine Terrace, GERALDTON 6530
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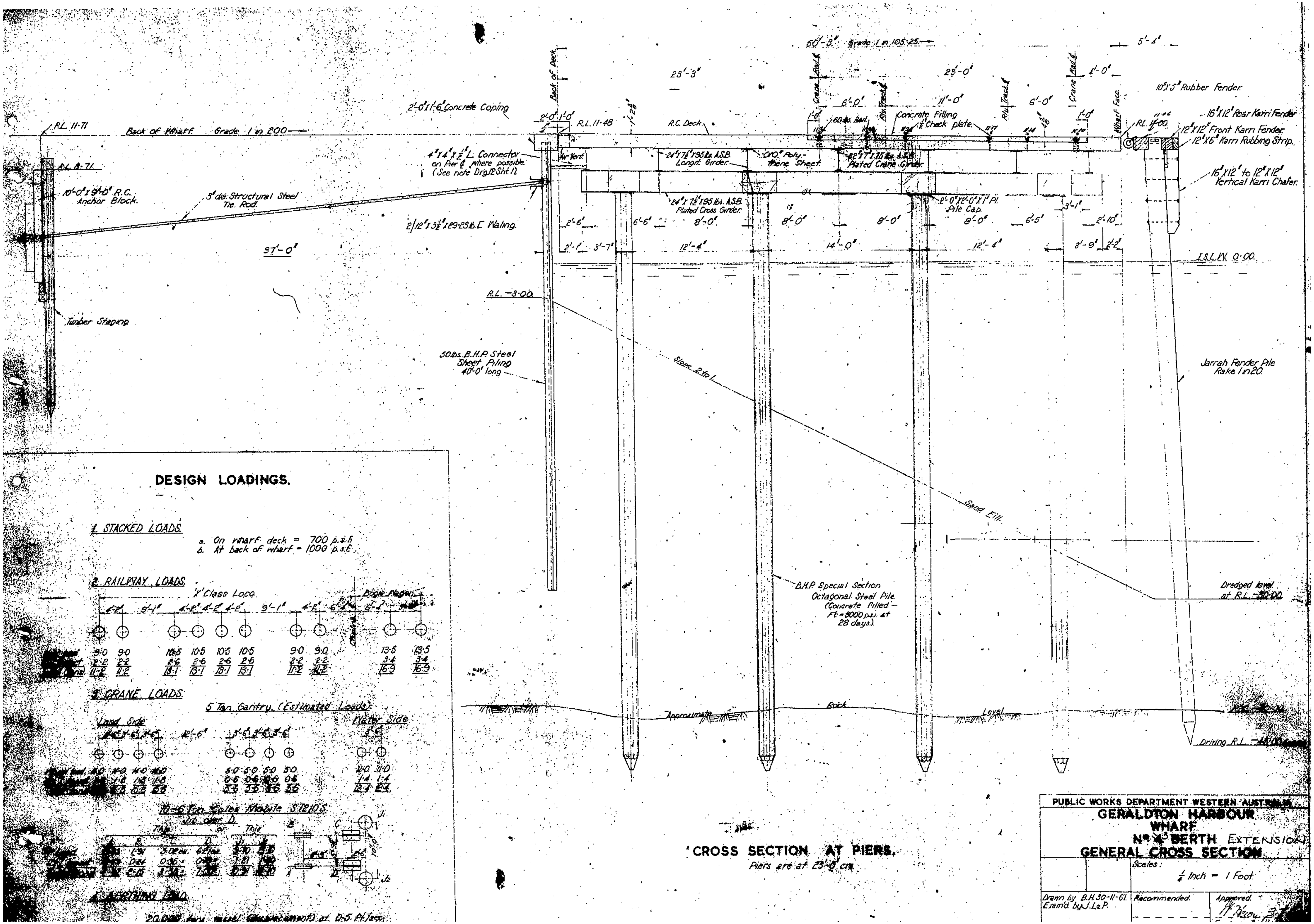
GERALDTON PORT

BERTH 1 & 2

PERMANENT REMEDIATION WORKS

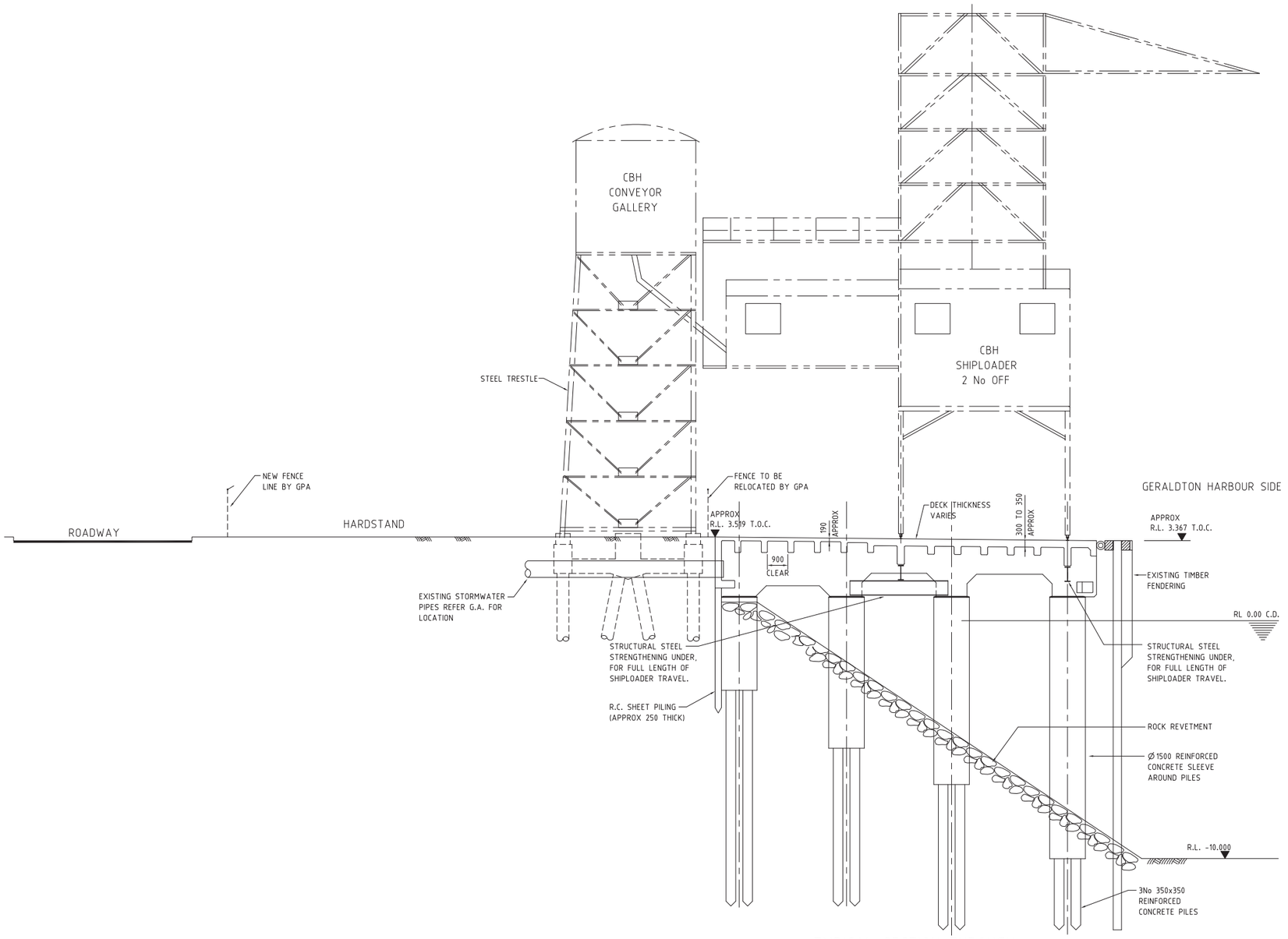
TIE ROD DETAILS

SCALE	DRG. No.	REV.
A1 - AS SHOWN	60554034-SK017	0



PUBLIC WORKS DEPARTMENT WESTERN AUSTRALIA.
GERALDTON HARBOUR
WHARF
Nº 4 BERTH EXTENSION
GENERAL CROSS SECTION
Scales: 1/4 Inch = 1 Foot
Drawn by B.H. 30-11-61
Examd. by J. Le P.
Recommended.
Approved.
CROSS SECTION AT PIERS.
Piers are at 23'-0" crs.
DESIGN LOADINGS.
1. STACKED LOADS.
a. On wharf deck = 700 p.s.f.
b. At back of wharf = 1000 p.s.f.
2. RAILWAY LOADS.
'X' Class Loco.
Bogie Wagon
3. CRANE LOADS.
5 Ton Gantry. (Estimated Loads)
Land Side
Water Side
4. BERTHING LOAD
Back of Wharf Grade 1 in 200
R.L. 11·71
R.L. 8·71
10'-0" x 9'-0" R.C. Anchor Block.
Timber Staging
3" dia. Structural Steel Tie Rod.
37'-0"
2'-0" x 1'-6" Concrete Coping
4" x 4" x 1/2" L Connector on Pier ℄ where possible. (See note Drg. 12 Sht. 1)
2/12" x 3 1/2" x 29·23 lb. [Waling.
Back of Deck
Air Vent
R.L. 11·48
R.C. Deck
24" x 7 1/2" x 95 lbs. A.S.B. Longit. Girder.
0·10" Polythene Sheet.
22" x 7" x 75 lbs. A.S.B. Plated Crane Girder.
24" x 7 1/2" x 95 lbs. A.S.B. Plated Cross Girder.
2'-0" x 2'-0" x 1" Pl. Pile Cap.
Concrete Filling
1/2" Check plate.
60 lbs. Rail
60'-3" Grade 1 in 105·25
23'-3"
23'-0"
5'-4"
Crane Rail ℄
Track ℄
Wharf Face
R.L. 11·00
10" x 5" Rubber Fender.
16" x 12" Rear Karri Fender.
12" x 12" Front Karri Fender.
12" x 6" Karri Rubbing Strip.
16" x 12" to 12" x 12" Vertical Karri Chafer.
I.S.L.W. 0·00.
R.L. -3·00
50 lbs. B.H.P. Steel Sheet Piling 40'-0" long
Slope 2 to 1
Sand Fill
B.H.P. Special Section Octagonal Steel Pile (Concrete Filled - Fc = 3000 p.s.i. at 28 days).
Jarrah Fender Pile Rake 1 in 20.
Dredged level at R.L. -30·00
Approximate Rock Level
Driving R.L. -44·00

DRAWING No. MP4102-03



TYPICAL SECTION THROUGH
REINFORCED CONCRETE BEAM AND SLAB DECK
1:100

FURTHER DETAIL DRAWINGS OF EXISTING DECK STRUCTURE AND CBH GALLERY CAN BE VIEWED HGM OFFICES. REFER SPECIFICATION.

NOTE:
1. LEVELS ARE REFERENCED TO CHART DATUM
2. ALL DIMENSIONS ARE INDICATIVE ONLY CONTRACTOR TO DETERMINE AND VERIFY ON SITE.

REV	ISSUE DESCRIPTION	DRAWN BY	CHECKED (SIGNED)	PROJ. ENG	DATE
2	AS CONSTRUCTED	D.P.S.			30-3-98
1	ISSUED FOR CONSTRUCTION	B.PROWSE	P.E.SCOTT	P.E.SCOTT	11-9-96
0	FIRST ISSUE FOR TENDER	B.PROWSE	P.E.SCOTT	P.E.SCOTT	19-07-96

CLIENT

GERALDTON PORT AUTHORITY

Halpern Glick Maunsell

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1 ORD STREET, WEST PERTH. 6005
Ph. (09) 3214844 Fax. (09) 3241079

11 PRINSEP STREET, BUNBURY. 6230
Ph. (097) 219676 Fax. (097) 219611

19 DURLACHER ST, GERALDTON. 6530
Ph. (099) 218299 Fax. (099) 217265

HGM PROJ. No.	CAD No.
4102	4102-03

PROJECT ENGINEER	D.MEAGER
DESIGNED	D.MEAGER
DRAWN	B.J.PROWSE
DATE	30-05-96

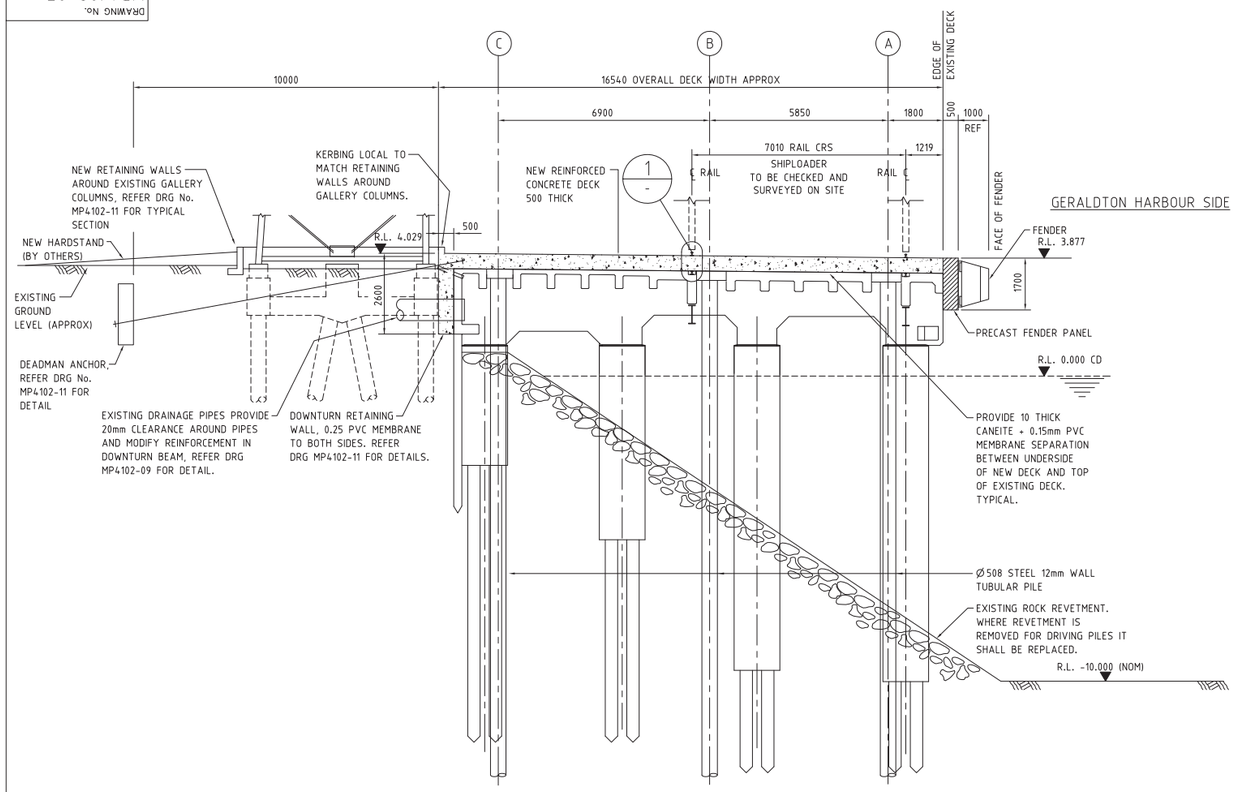
PROJECT NAME: GERALDTON PORT AUTHORITY 1997 RECONSTRUCTION OF BERTH No3

DRAWING TITLE: EXISTING BERTH CROSS SECTION

SCALE	DRG SIZE
1:100	A1
DATUM: CHART DATUM GERALDTON PORT AUTH.	
DRAWING No. MP4102-03	REV. 1

B.J.PROWSE - 20/05/96 - 09:18 - G:\4102\4102-03.DWG - SCALE 1:100

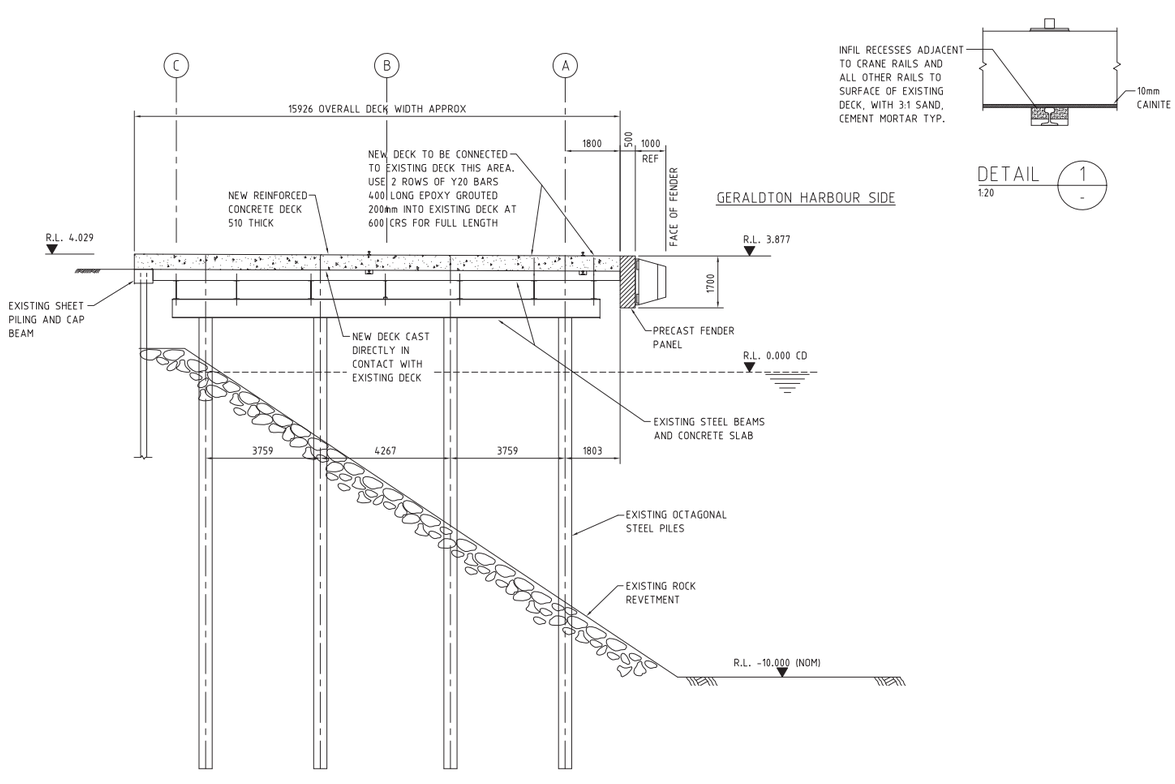
DRAWING No. MP4102-05



TYPICAL SECTION THROUGH BERTH No3 OVER EXISTING R.C. BEAM & SLAB DECK

1:100

ADJUST DIMENSIONS SO PILES ARE LOCATED MIDWAY BETWEEN EXISTING BEAMS. DETERMINE BY ON SITE MEASUREMENTS, GRID 93 TO 124 ONLY.



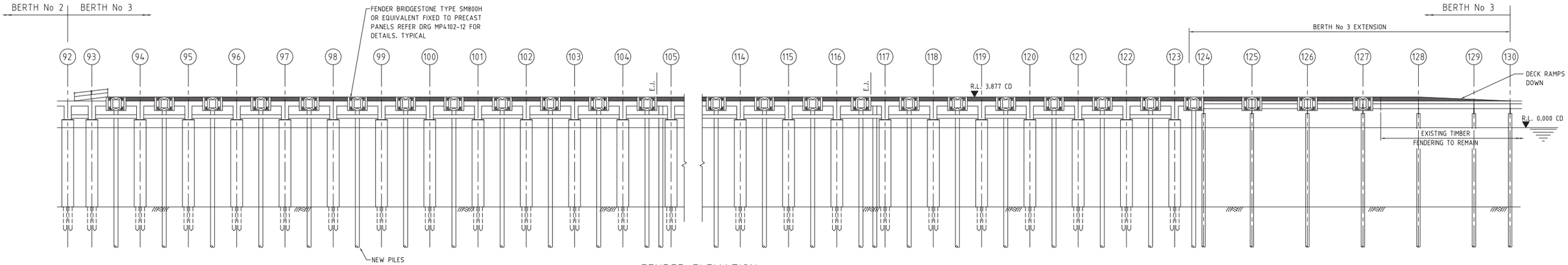
TYPICAL SECTION THROUGH BERTH OVER EXISTING R.C. SLAB ON STEEL BEAMS

1:100

BERTH No 3 EXTENSION

NOTE: NEW SHIPLOADER RAILS

1. NEW RAILS SHALL BE LOCATED IN THE SAME PLAN POSITION ±2mm RELATIVE RAILS TO THE EXISTING.
2. THE NEW RAIL ELEVATIONS SHALL BE SUCH THAT THE HEIGHT RAISED FOR BOTH RAILS IS THE SAME ±2mm.
3. THE LOCATION AND LEVEL OF EXISTING SHIPLOADER RAILS SHALL BE SURVEYED AT 6m INTERNALS PRIOR TO CONSTRUCTING THE DECK OVERLAY. THIS SURVEY SHALL BE USED TO LOCATE NEW SHIPLOADER RAILS.



FENDER ELEVATION

1:250

REV	ISSUE DESCRIPTION	DRAWN BY	CHECKED (SIGNED)	PROJ. ENG	DATE
2	AS CONSTRUCTED	D.P.S.			30-3-98
1	ISSUED FOR CONSTRUCTION	B.PROWSE	P.E.SCOTT	P.E.SCOTT	11-9-96
0	FIRST ISSUE FOR TENDER	B.PROWSE	P.E.SCOTT	pp P.E.SCOTT	19-07-96

CLIENT

GERALDTON PORT AUTHORITY

Halpern Glick Maunsell

CONSULTING ENGINEERS AND ENVIRONMENTAL SCIENTISTS

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Ph. (09) 3214844 Fax. (09) 3241079

11 PRINSEP STREET, BUNBURY, 6230
Ph. (097) 219676 Fax. (097) 219611

19 DURLACHER ST, GERALDTON, 6530
Ph. (099) 218299 Fax. (099) 217265

HGM PROJ. No.	CAD No.
MP4102	4102-05

PROJECT ENGINEER	D.MEAGER
DESIGNED	P.E.SCOTT
DRAWN	B.J.PROWSE
DATE	30-05-96

PROJECT NAME: GERALDTON PORT AUTHORITY 1997 RECONSTRUCTION OF BERTH No3

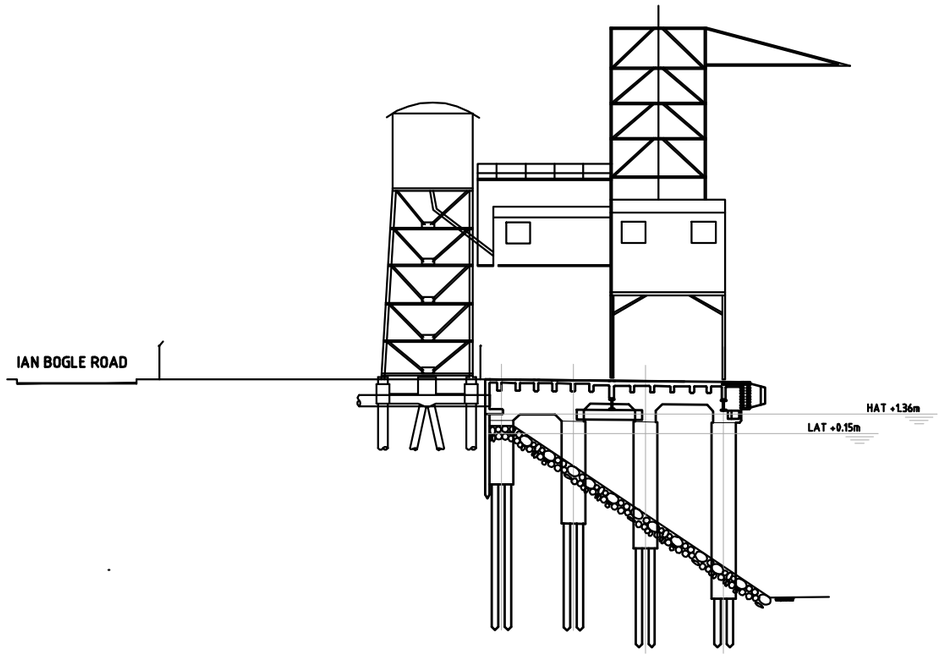
DRAWING TITLE: GENERAL ARRANGEMENT SECTION AND ELEVATION OF FENDERING

SCALE	1:250
DATUM	GPA C.D.
DRAWING No.	MP4102-05
DRG SIZE	A1
REV.	1

J.J.MCBOULL - 11/09/96 - 11:22 - G:\4102\4102-05.DWG - SCALE 1:250

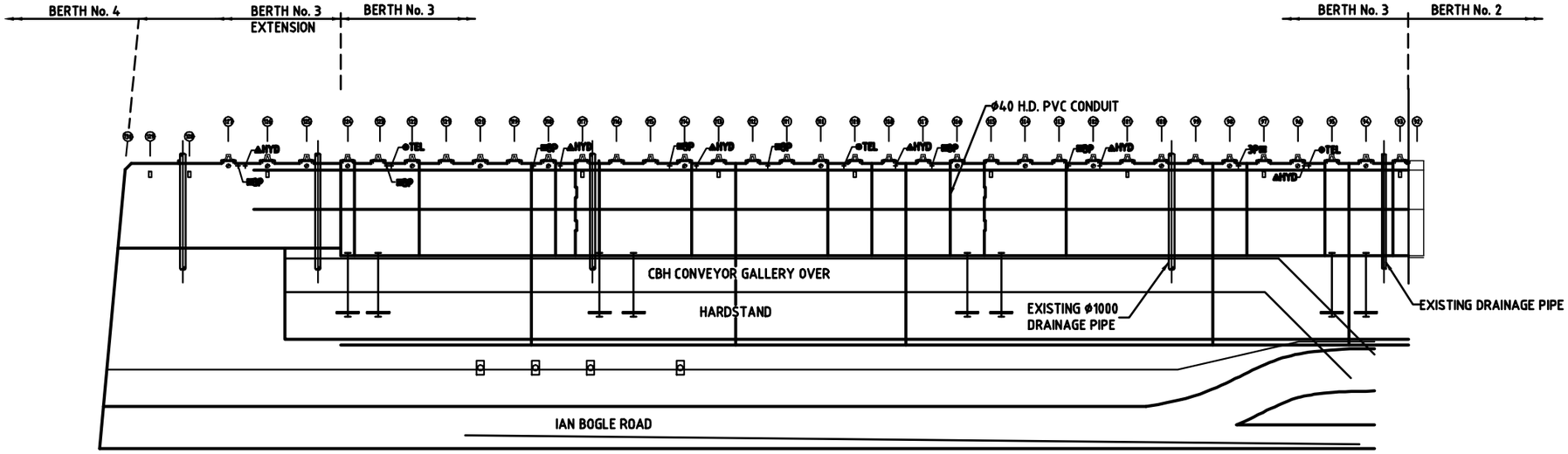
A1

THIS DRAWING HAS BEEN REDUCED



TYPICAL SECTION

SCALE 1:200



SERVICES PLAN

SCALE 1:500

LEGEND:

- MOORING BOLLARD LOCATION
- FENDERS
- 125Ø H.D. ELECTRICAL PVC CONDUITS IN CENTRE OF DECK SLAB
- EXISTING WATER PIPE
- EXISTING BOUNDARY FENCE
- HYDRANT RECESS
- 3 PHASE POWER RECESS
- TELSTRA
- EXISTING PILED BOLLARD

Rev.	Date	Revision Details	By	Ver.	App.
C	10.01.02	FINAL ISSUE	IN		
B	10.04.01	ADDED TIDE LEVELS TO ELEVATION	DPH		
A	02.11.00	ISSUE FOR CLIENT REVIEW	C.B.		

Connell Wagner

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Facsimile: +61 08 9325 9948
Email: cwper@hutch.com.au

Client: GERALDTON PORT AUTHORITY

Project: WHARF SPECIFICATION BOOKLET

Drawn C.B.	Signed	Date
Designed N/A	Signed	Date
Verified C.V.	Signed	Date
Approved K.H.	Signed	Date

Drawing Title: GERALDTON HARBOUR BERTH No.3 GENERAL ARRANGEMENT

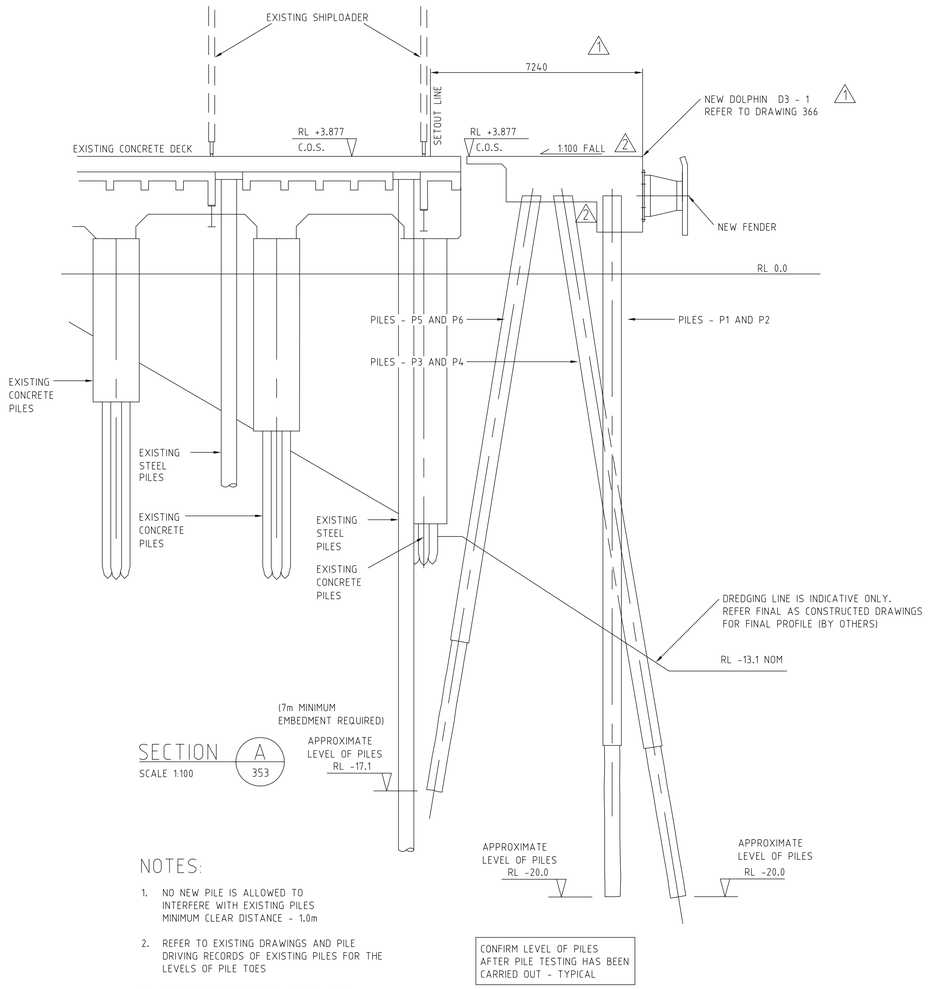
CW Project No. A177-26

Scale AS SHOWN

Drawing No. C - 002

Rev. C

110_071100

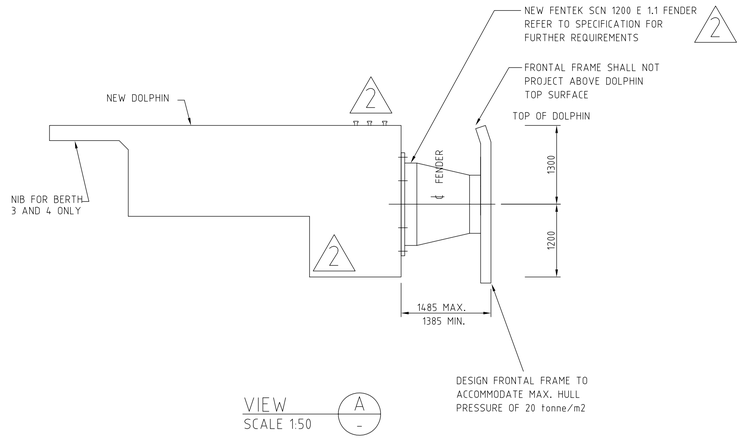


SECTION A 353
SCALE 1:100

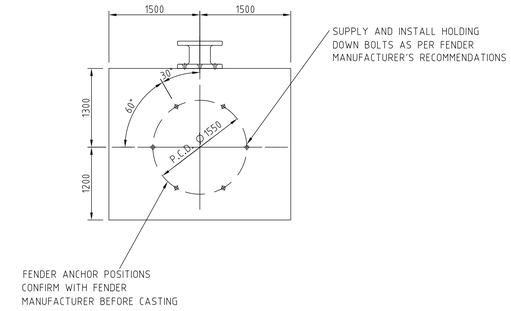
CONFIRM LEVEL OF PILES AFTER PILE TESTING HAS BEEN CARRIED OUT - TYPICAL

NOTES:

1. NO NEW PILE IS ALLOWED TO INTERFERE WITH EXISTING PILES MINIMUM CLEAR DISTANCE - 1.0m
2. REFER TO EXISTING DRAWINGS AND PILE DRIVING RECORDS OF EXISTING PILES FOR THE LEVELS OF PILE TOES
3. REFER TO DRAWING 366 FOR PILE AND DOLPHIN PILE GENERAL ARRANGEMENT SECTION AND DETAILS.



VIEW A - SCALE 1:50

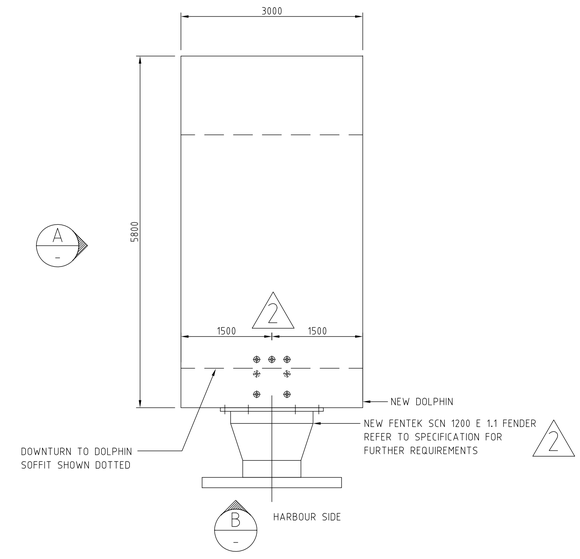


VIEW B - SCALE 1:50 — Anchor Bolts for Fender
NOTE: FENDER OMITTED FOR CLARITY

NOTES:

1. CONFIRM LOCATION OF HOLDING DOWN BOLTS/ANCHORS, BLOCKOUTS WITH CAPSTAN'S MANUFACTURER BEFORE CASTING ON SITE
2. CONFIRM LOCATION OF ANCHOR/HOLDING DOWN BOLTS FOR FENDER WITH THE FENDER'S MANUFACTURER BEFORE CASTING ON SITE
3. FRONTAL FRAME COATING:
   AS PER MANUFACTURER'S RECOMMENDATIONS

   MINIMUM REQUIREMENTS:
   BLASTING GRADE : SSPC-SP-10 OR SIS Sa21/2
   PRIMARY COATING : ZINC RICH PRIMER -- 70 MICRONS
   FINAL COATING : HIGH BUILD HIGH SOLIDS EPOXY -- 2 x 200 MICRONS
   TOTAL DRY FILM THICKNESS : MIN. 450 MICRONS (BLACK)
4. CAST-IN FERRULES FOR ATTACHMENT OF ANY FRONTAL FRAME CHAINS NOT SHOWN. IF REQUIRED CAST-IN FERRULES TO BE TO MANUFACTURER'S RECOMMENDATIONS AND APPROVED BY SUPERINTENDENT.



DOLPHIN FIXTURES SETOUT - PLAN
SCALE 1:50

AS-CONSTRUCTED

Drg Number	Reference Drawings
44915-URS-DPE-367	DOLPHIN CONCRETE REINFORCEMENT AND DETAILS
44915-URS-DPE-366	DOLPHIN PILE - GENERAL ARRANGEMENT SECTION AND DETAILS
44915-URS-DPE-355	BERTH 4 PLAN DOLPHIN AND TEMPORARY PONTOONS
44915-URS-DPE-353	BERTH 3 PLAN

Date	Rev	Revision Record	Drn	Chk	Eng	App	Client
04.08.15	3	REFERENCE TO BERTH 5 REMOVED	RF	PD	PD	PD	
25.05.04	2	AS-CONSTRUCTED INFORMATION ADDED	PC	AT			
26.08.03	1	SET OUT LINE REVISED	PC	AJR	DJM	APB	
06.08.03	0	ISSUED FOR CONSTRUCTION	MF	AJR	DJM	APB	
15.03.03	B	ISSUED FOR TENDER	RH	CB	CB		
12.03.03	A	ISSUED FOR REVIEW	RH	CB	CB		

URS
LEVEL 3, HYATT CENTRE,
20 TERRACE ROAD
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DESIGN BY	C. BUI	28.02.03
DRAWN BY	R. HOARE	28.02.03
DRAFTING CHECK	C.B.	11.03.03
DESIGN CHECK	N.S./M.I./A.E/W.A	11.03.03
APPROVAL	A.P.B.	06.08.03
FINAL APPROVAL BY CLIENT		
PLOT SCALE 1:1	DRAWING SCALE AS SHOWN	
VERTICAL DATUM PORT DATUM	HORIZONTAL DATUM GCG94	

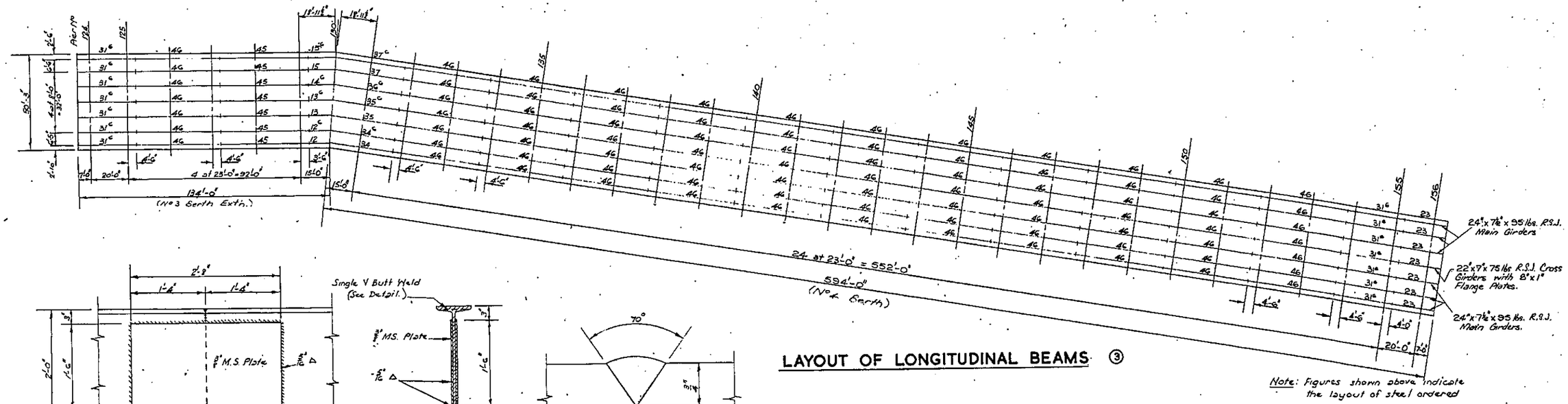
CLIENT: GERALDTON PORT AUTHORITY

TITLE
GERALDTON PORT ENHANCEMENT PROJECT
MODIFICATION TO BERTH 3 & 4
BERTH 3 – SECTION, DETAILS AND DOLPHIN FIXTURES SETOUT

PROJECT No.	DRAWING No.	REV
44915-004	44915-URS-DPE-354	3

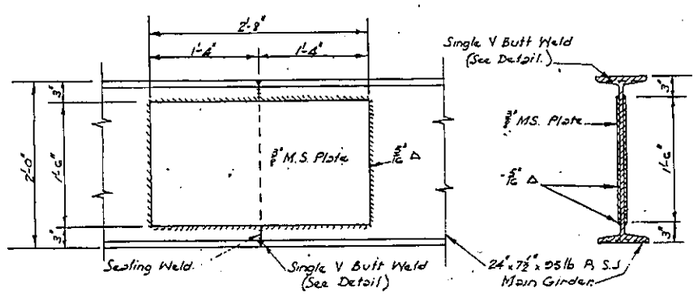
S:\ENGINEERING\44915004.gpo\DRAWINGS\BERTHS\44915-URS-DPE-354.DWG

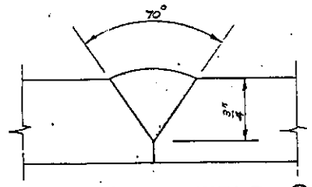
A1



Note: Figures shown above indicate the layout of steel ordered

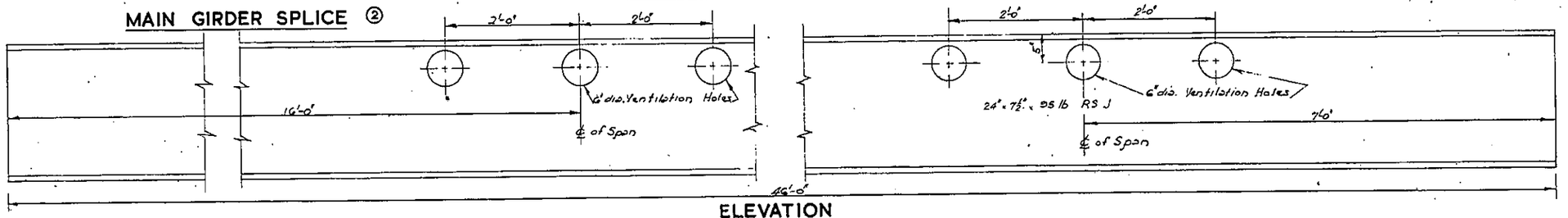
LAYOUT OF LONGITUDINAL BEAMS ③



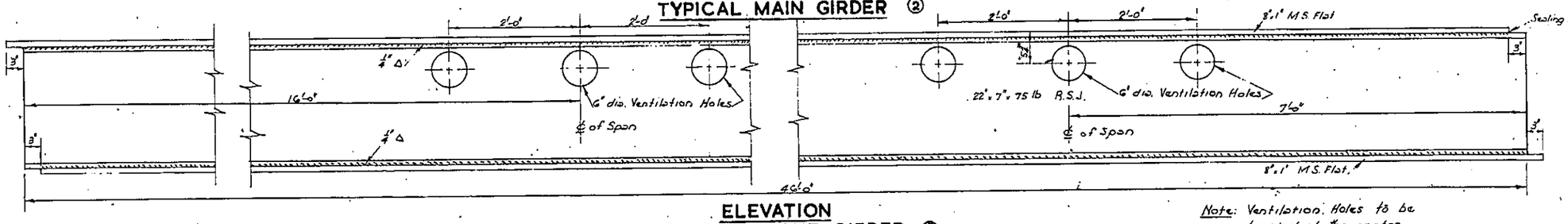


SINGLE V BUTT WELD ①

MAIN GIRDER SPLICE ②

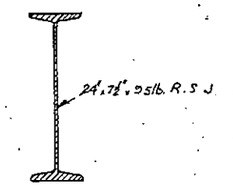


ELEVATION TYPICAL MAIN GIRDER ②

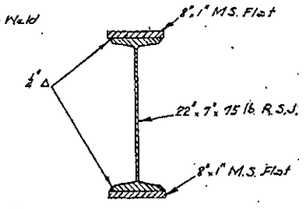


ELEVATION TYPICAL CRANE GIRDER ②

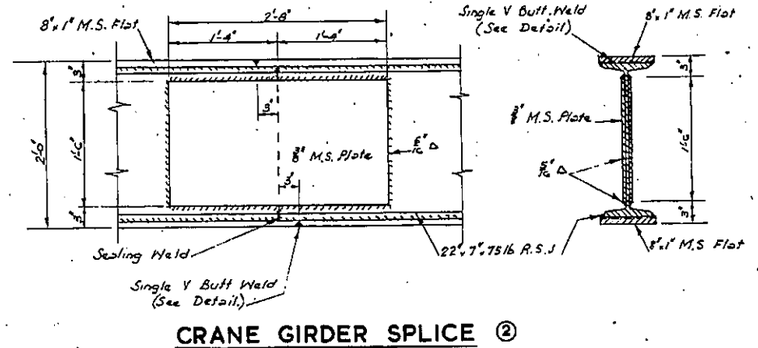
Note: Ventilation Holes to be located at the centre of each span.



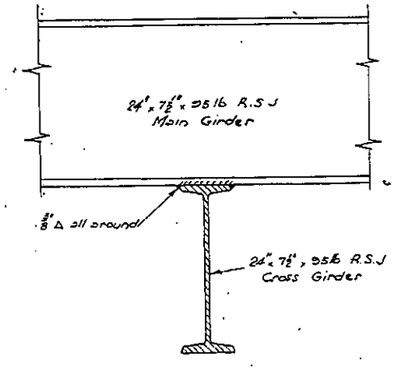
SECTION

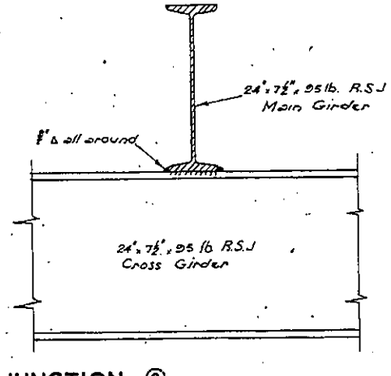


SECTION



CRANE GIRDER SPLICE ②





WELDING AT CROSS GIRDER JUNCTION ②

MODIFICATION: BERTH EXTENDED 46FT.
28/2/64

PUBLIC WORKS DEPARTMENT - WESTERN AUSTRALIA

GERALDTON HARBOUR WHARF No 4 BERTH DETAILS OF LONGITUDINAL BEAMS

Scales. Full Size ① 1 Inch = 1 Foot ② 30 Feet to an Inch ③

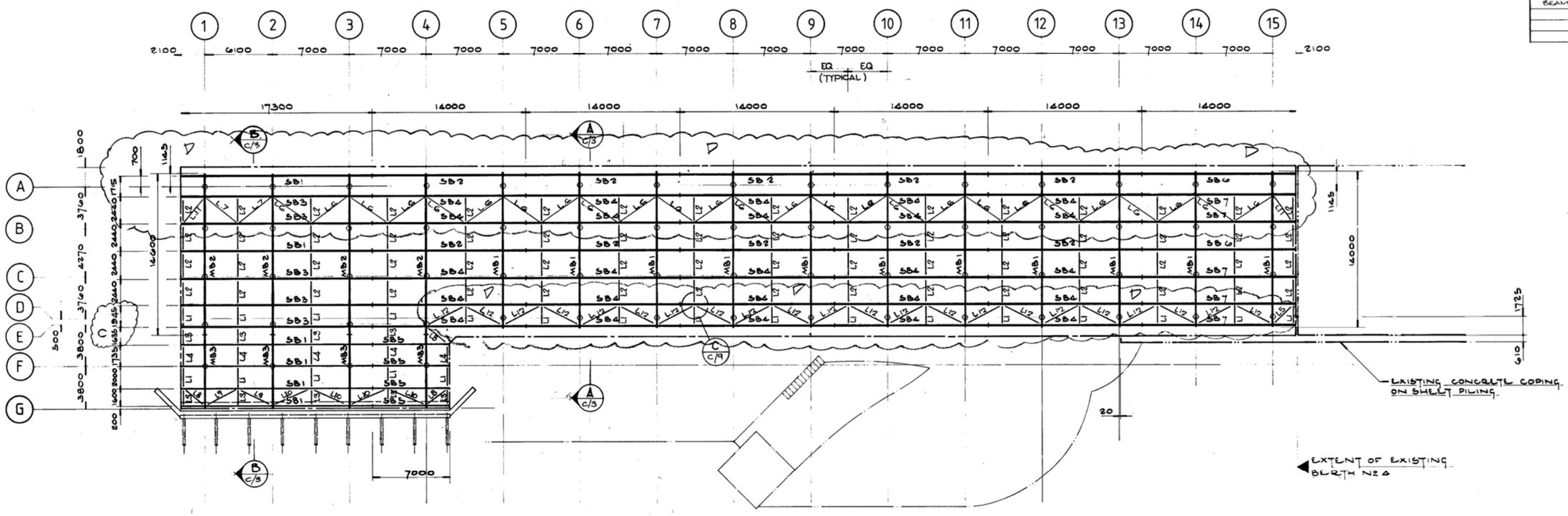
Drawn by P.M 28-11-61
Stamp by B.H.

Recommended

Approved.
Engineer Harbours & Rivers

DRG. NO. 20165 SHT. NO.

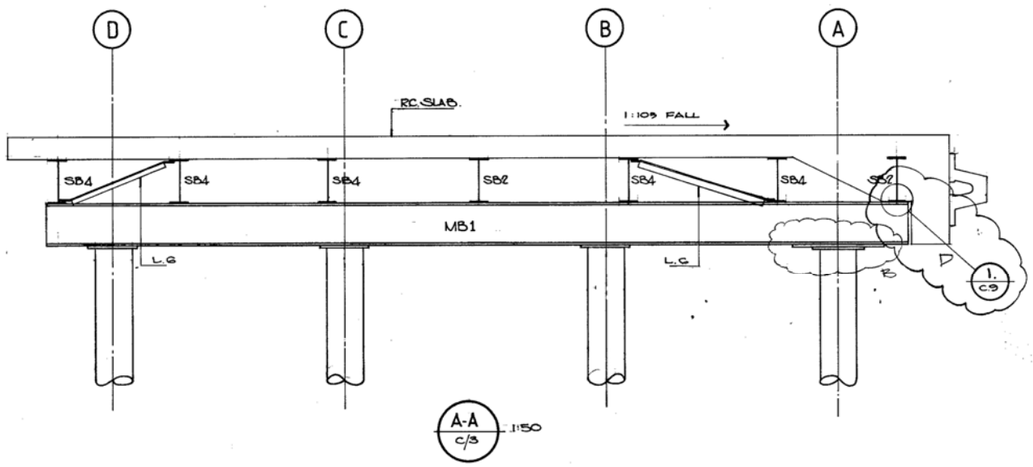
REVISION	No.	DATE
ISSUE FOR CONSTRUCTION	A	1.7.87
REVISED AS SHOWN	B	3.7.87
DIMENSIONS REVISED	C	31.8.87
BRACING MOVED	D	22.10.87
BEAM RELOCATED, DETAILS CALLED UP		

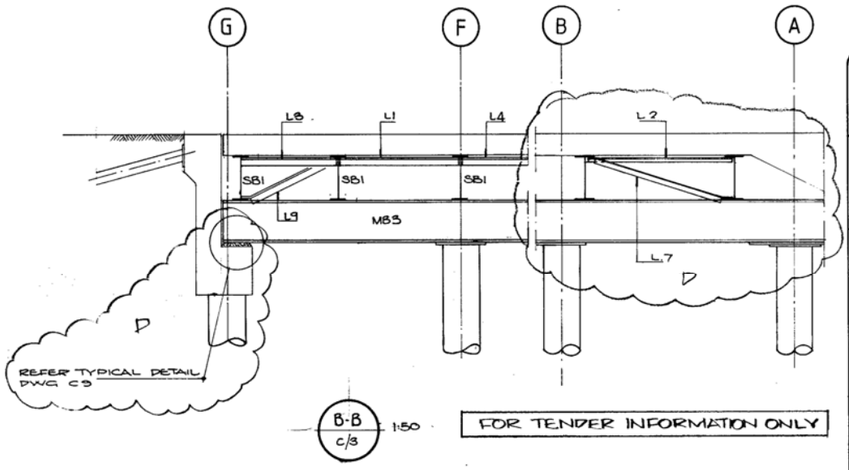


MEMBER SCHEDULE			
MARK	SIZE	REF. DRAWING	REMARKS.
MB1, MB2, MB3	690 UB 140	C/4, C/5	PLATED AS DETAILED
SB1, SB2 SB5, SB6	610 UB 140	C/6, C/7, C/8	" " "
SB3, SB4, SB.7	690 UB 125	C/6, C/7, C/8	" " "
L1, L2, L8, L4	65 x 65 x 10L	C/9	
L5, - L12	100 x 75 x 10L	C/9	

DESIGN LOADINGS:

1. VERTICAL STACK OF $4.5 t/m^2$
2. FORKLIFT TRUCK OF 27.2 t LIFT CAPACITY, PLACING 6 0 t ON FRONT AXLE. DUAL WHEELS AT 2.4 m CRS TO CARRY 15 t PER WHEEL.
3. SHIPLOADER WITH 2 WHEELS PER LEG AT 1.5 m CENTRES, EACH WHEEL TO CARRY 32 t. LEGS AT 6.4 m CENTRES & RAILS AT 7.03 m CRS.
4. MOBILE CRANE WITH 6 AXLES & 312 t TRAVELLING WEIGHT TO BE DRIVEN ONLY IN AREAS SHOWN ON DRG 10765C/20
5. MOBILE CRANE WITH 3 OUTRIGGERS ON EACH SIDE, 5 m FROM CENTRAL AXIS OF CRANE. OUTRIGGERS ON 7.01 m CRS. MAX. OUTRIGGER LOAD 129.3 t. OUTRIGGERS TO BE SET ONLY AT POSITIONS SHOWN ON DRG 10765C/20
6. BOLLARD PULL OF 50 t AT APPLICABLE HORIZONTAL & VERTICAL ANGLES TO THE BERTH.





FOR TENDER INFORMATION ONLY

WOOD & GRIEVE PTY LTD
CONSULTING ENGINEERS
CIVIL STRUCTURAL MECHANICAL & ELECTRICAL
16 ORD STREET
WEST PERTH, 6005
WESTERN AUSTRALIA
TELEPHONE (09) 3218825
FACSIMILE (09) 4811724

GERALDTON PORT AUTHORITY

PROJECT:

NO. 4 BERTH EXTENSIONS

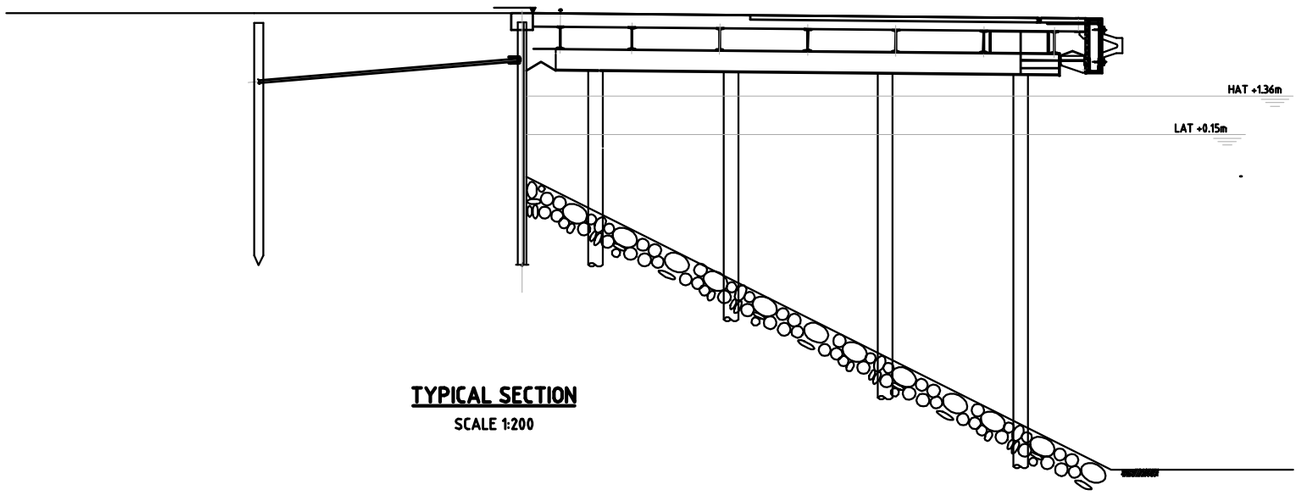
TITLE:

DECK STEELWORK PLAN

DESIGNED:	G.J.P.
DRAWN:	W.G.V
DATE:	MARCH '87
SCALE:	1:200
CHECKED:	/ /

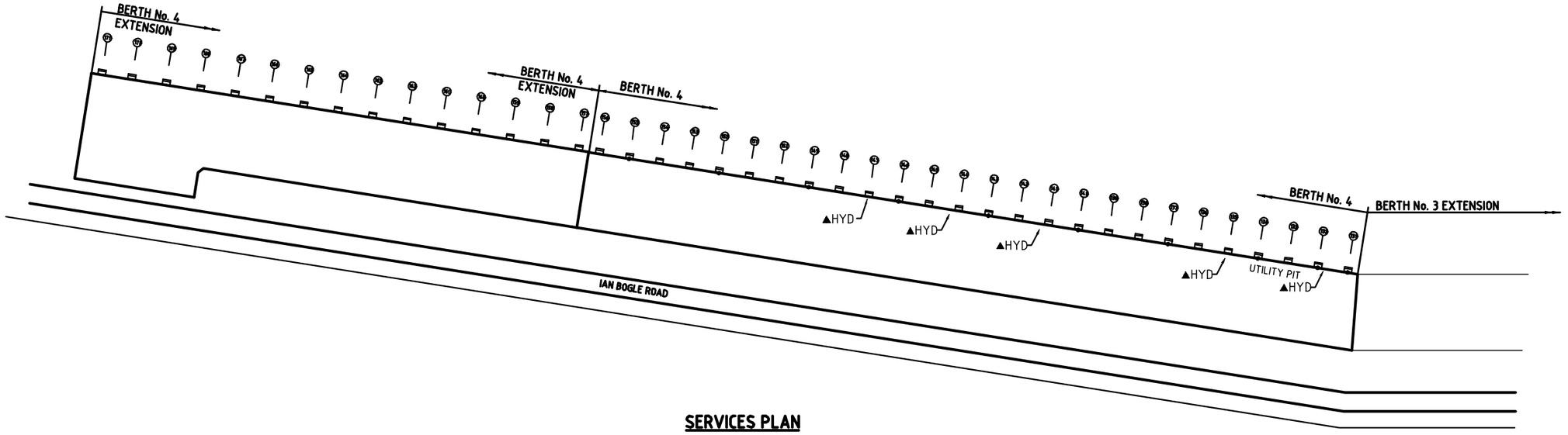
DRG No. 10765C/3 D

A1



TYPICAL SECTION

SCALE 1:200



SERVICES PLAN

SCALE 1:500

LEGEND:

- MOORING BOLLARD LOCATION
- FENDERS
- 125ϕ H.D. ELECTRICAL PVC CONDUITS IN CENTRE OF DECK SLAB
- EXISTING WATER PIPE
- EXISTING BOUNDARY FENCE
- ▲HYD HYDRANT RECESS
- 3 PHASE POWER RECESS
- ●TEL TELSTRA

Rev.	Date	Revision Details	By	Ver.	App.
C	10.01.02	FINAL ISSUE	IN		
B	17.04.01	ADDED LEVELS AND REVISED FENDERS	DPH		
A	02.11.00	PRELIMINARY ISSUE	DPH		

Connell Wagner

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Email: cwper@hutch.com.au

Client: GERALDTON PORT AUTHORITY

Project: WHARF SPECIFICATION BOOKLET

Drawn DPH	Signed	Date
Designed N/A	Signed	Date
Verified C.V.	Signed	Date
Approved K.H.	Signed	Date

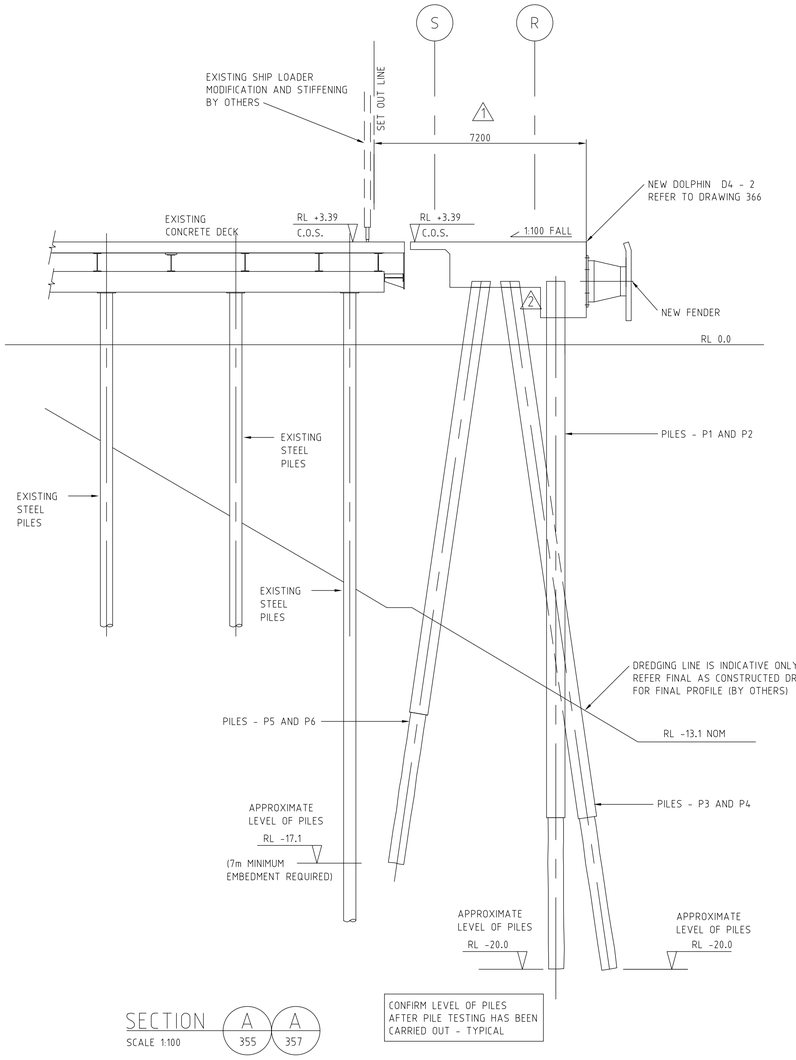
Drawing Title: **GERALDTON HARBOUR BERTH No.4 GENERAL ARRANGEMENT**

CW Project No. A177-26

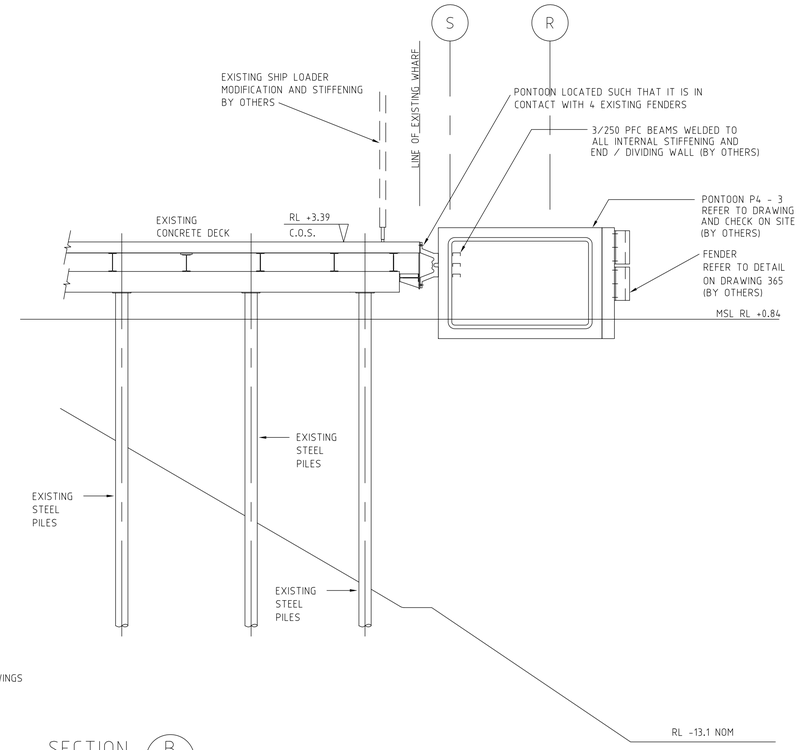
Scale 1:500

Drawing No. C - 004 Rev. C

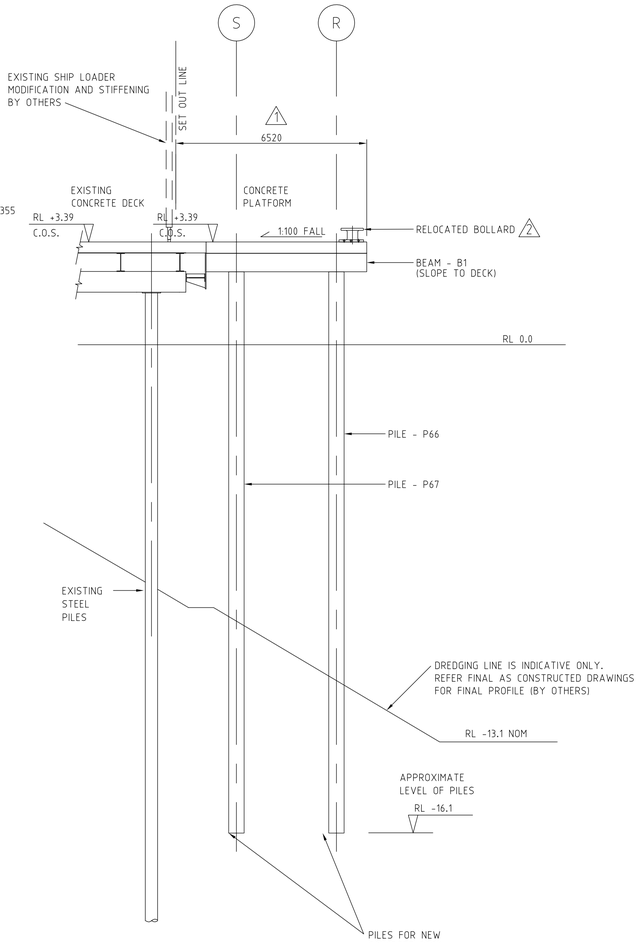
20 10 0 10 20 30 40 50 100mm



SECTION A 355 / A 357
SCALE 1:100



SECTION B 355
SCALE 1:100



SECTION C 356
SCALE 1:100

CONFIRM LEVEL OF PILES AFTER PILE TESTING HAS BEEN CARRIED OUT - TYPICAL

NOTES:

1. NO NEW PILE IS ALLOWED TO INTERFERE WITH EXISTING PILES MINIMUM CLEAR DISTANCE - 1.0m
2. REFER TO EXISTING DRAWINGS AND PILE DRIVING RECORDS OF EXISTING PILES FOR THE LEVELS OF PILE TOES
3. REFER TO DRAWING 366 FOR DOLPHIN PILE GENERAL ARRANGEMENT SECTION AND DETAILS.

NOTE:

FOR PILE SUPPORTING BOLLARDS, (P32, P44, P54 AND P66) A MINIMUM DRIVEN PENETRATION OF 3m FROM RL -13.1 (SEA BED LEVEL) IS REQUIRED.
IF THE PILE CANNOT BE DRIVEN BECAUSE OF HARD ROCK FOUNDATION, PRE-DRILL AND THEN DRIVE THE PILES.
IF THE RESULT OF THE PILE TEST REQUIRES DEEPER PENETRATION, DRIVE THE PILE TO NEW REQUIRED PENETRATION.

AS-CONSTRUCTED

Drg Number	Reference Drawings
44915-URS-DPE-367	DOLPHIN CONCRETE REINFORCEMENT AND DETAILS
44915-URS-DPE-366	DOLPHIN PILE - GENERAL ARRANGEMENT SECTION AND DETAILS
44915-URS-DPE-365	PONTOON MODIFICATION DETAILS
44915-URS-DPE-355	BERTH 4 PLAN DOLPHIN AND TEMPORARY PONTOONS

Date	Rev	Revision Record	Drn	Chk	Eng	App	Client
04.08.15	3	REFERENCE TO BERTH 5 REMOVED	RF	PD	PD	PD	
25.05.04	2	AS-CONSTRUCTED INFORMATION ADDED	PC	AT			
26.08.03	1	SET OUT LINE REVISED	PC	AJR	DJM	APB	
06.08.03	0	ISSUED FOR CONSTRUCTION	MF	AJR	DJM	APB	
15.03.03	B	ISSUED FOR TENDER	RH	CB	CB		
12.03.03	A	ISSUED FOR REVIEW	RH	CB	CB		

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20 TERRACE ROAD
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Telephone: (08) 9221 1630
Facsimile: (08) 9221 1639

DESIGN BY	C. BUI	28.02.03
DRAWN BY	R. HOARE	28.02.03
DRAFTING CHECK	C.B.	11.03.03
DESIGN CHECK	N.S./M.I./AE/W.A.	11.03.03
APPROVAL	A.P.B.	06.08.03
FINAL APPROVAL BY CLIENT		

PLOT SCALE	DRAWING SCALE
1:1	AS SHOWN
VERTICAL DATUM	HORIZONTAL DATUM
PORT DATUM	GCG94

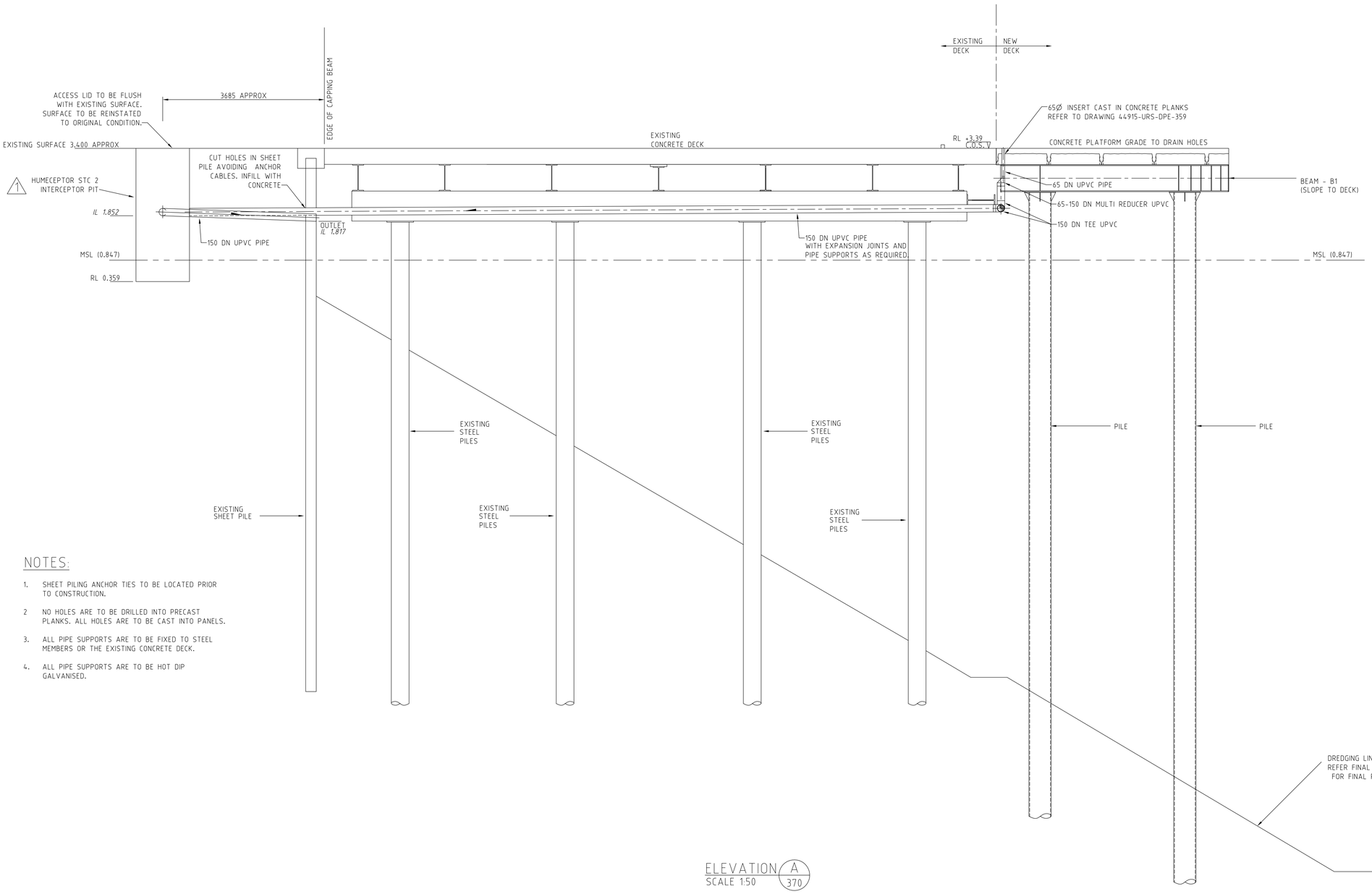
CLIENT: GERALDTON PORT AUTHORITY

TITLE
GERALDTON PORT ENHANCEMENT PROJECT
MODIFICATION TO BERTH 3 & 4
BERTH 4
SECTIONS

PROJECT No.	DRAWING No.	REV
44915-004	44915-URS-DPE-358	3

S:\ENGINEERING\44915004.gpo\DRAWINGS\BERTHS\44915-URS-DPE-358.DWG

A1



ELEVATION A
SCALE 1:50
370

NOTES:

1. SHEET PILING ANCHOR TIES TO BE LOCATED PRIOR TO CONSTRUCTION.
2. NO HOLES ARE TO BE DRILLED INTO PRECAST PLANKS. ALL HOLES ARE TO BE CAST INTO PANELS.
3. ALL PIPE SUPPORTS ARE TO BE FIXED TO STEEL MEMBERS OR THE EXISTING CONCRETE DECK.
4. ALL PIPE SUPPORTS ARE TO BE HOT DIP GALVANISED.

AS-CONSTRUCTED

Drg Number	Reference Drawings
44915-URS-DPE-370	BERTH 4 DRAINAGE LAYOUT
44915-URS-DPE-359	BERTH 4 REINFORCEMENT PLAN - TYPICAL CONCRETE DECK PLATFORM
44915-URS-DPE-355	BERTH 4 PLAN DOLPHIN AND TEMPORARY PONTOONS

Date	Rev	Revision Record	Drn	Chk	Eng	App	Client
08.04.04	2	REFERENCE TO BERTH 5 REMOVED	RF	PD	PD	PD	
08.04.04	1	AS-CONSTRUCTED INFORMATION ADDED	PC	AT			
06.08.03	0	ISSUED FOR CONSTRUCTION	MF	AJR	DJM	APB	
12.03.03	A	ISSUED FOR REVIEW	MF	MI	RP		

URS
LEVEL 3, HYATT CENTRE,
20 TERRACE ROAD
EAST PERTH, WA 6004
Telephone: (08) 9221 1630
Facsimile: (08) 9221 1639

DESIGN BY	R.PATERSON	12.03.03
DRAWN BY	M.FISTONICH	12.03.03
DRAFTING CHECK	M.ILYAS	12.03.03
DESIGN CHECK	M.ILYAS	12.03.03
APPROVAL	A.P.B.	06.08.03
FINAL APPROVAL BY CLIENT		

PLOT SCALE	DRAWING SCALE
1:1	1:50
VERTICAL DATUM	HORIZONTAL DATUM
PORT DATUM	GCG94

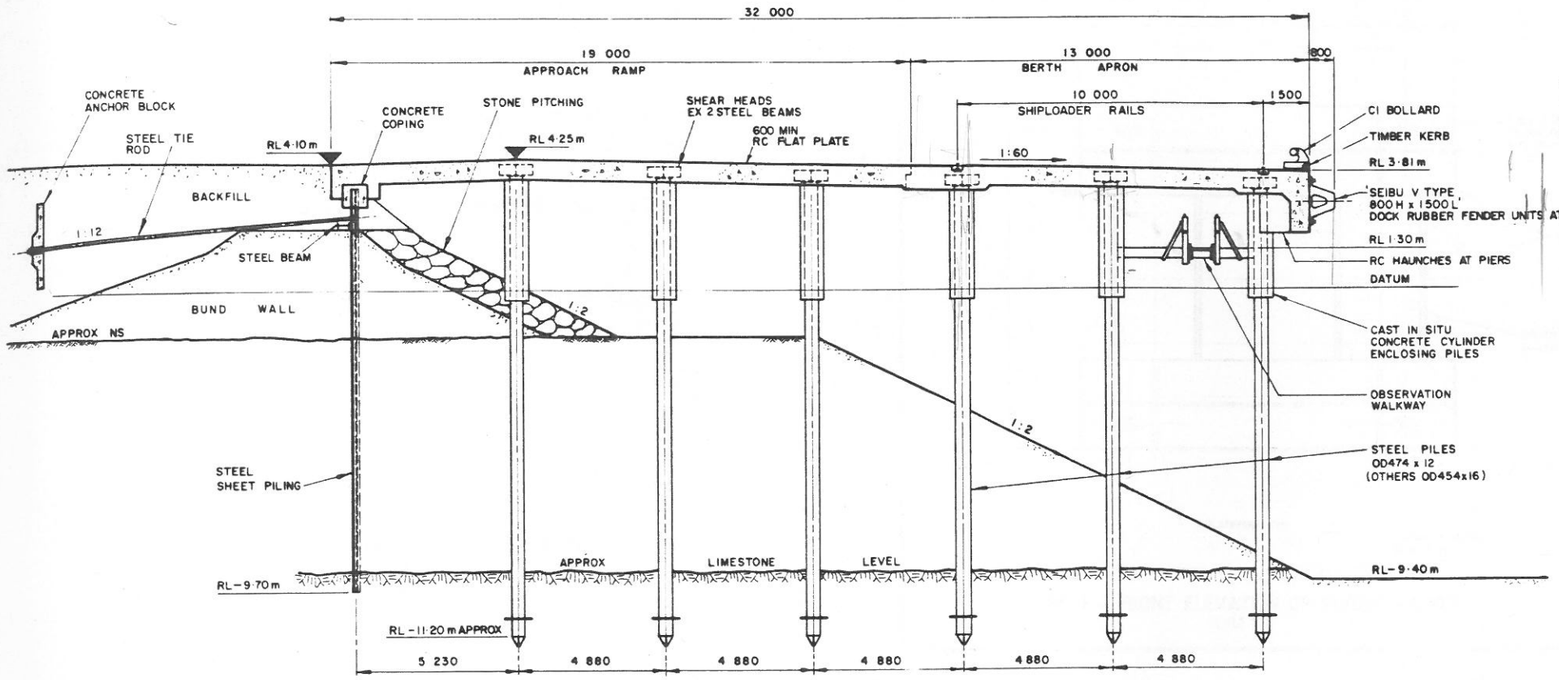
CLIENT

TITLE
GERALDTON PORT
ENHANCEMENT PROJECT
MODIFICATION TO BERTH 3 & 4
BERTH 4 DRAINAGE
TYPICAL SECTION THROUGH BERTH

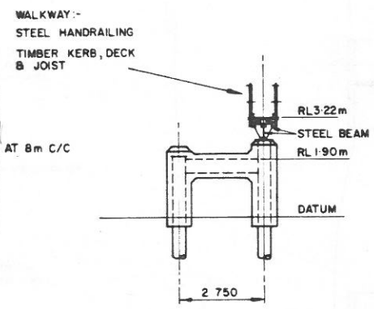
PROJECT No.	DRAWING No.	REV
44915-004	44915-URS-DPE-371	2

S:\ENGINEERING\44915004.gpe\DRAWINGS\BERTHS\44915-URS-DPE-371.DWG

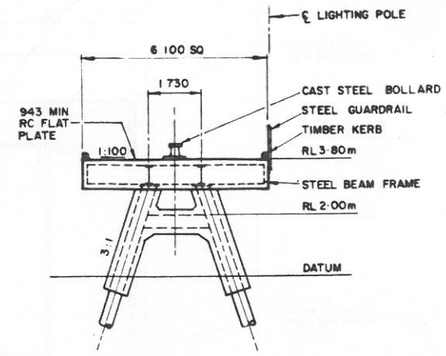
A1



No 5 BERTH
TYPICAL CROSS SECTION AT
APPROACH RAMP & BERTH APRON (1)
(PIERS AT 4 270 CENTRES)



MOORING DOLPHIN WALKWAY
TYPICAL CROSS SECTION (1)

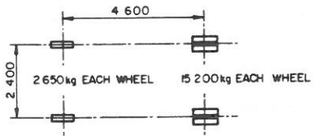


MOORING DOLPHIN
TYPICAL CROSS SECTION (1)

DESIGN LOADINGS ON No5 BERTH

(A) STACKED LOADS
4500 kg/m²

(B) CRANE
HEAVY FORK LIFT 27 200 kg LIFT CAPACITY
"TOWMOTOR" MODEL AH 60. (No 3 BERTH ONLY.)



(C) BERTHING LOAD
27 000 TONNE VESSEL (LOADED DISPLACEMENT MASS) AT 0·15 m/s, 50% OF KINETIC ENERGY ABSORBED BY STRUCTURE.

5'9" = 1.752

F 1.2 / .8 / 5.0 (·24cm)

1cm = 2m.

1000 0 2000 4000 6000
SCALE OF MILLIMETRES (1:200) (1)

ZONE	DATE	REVISION	DR'N	APP'D
SURVEY BOOKS			FILE No	
			PW 1248/65	

GENERAL NOTES
UNLESS OTHERWISE SHOWN ALL DIMENSIONS ARE IN MILLIMETRES.
1. SEE DRG 53923-7-1 FOR LOCALITY PLAN

REVISED TO DEC 31, 1983

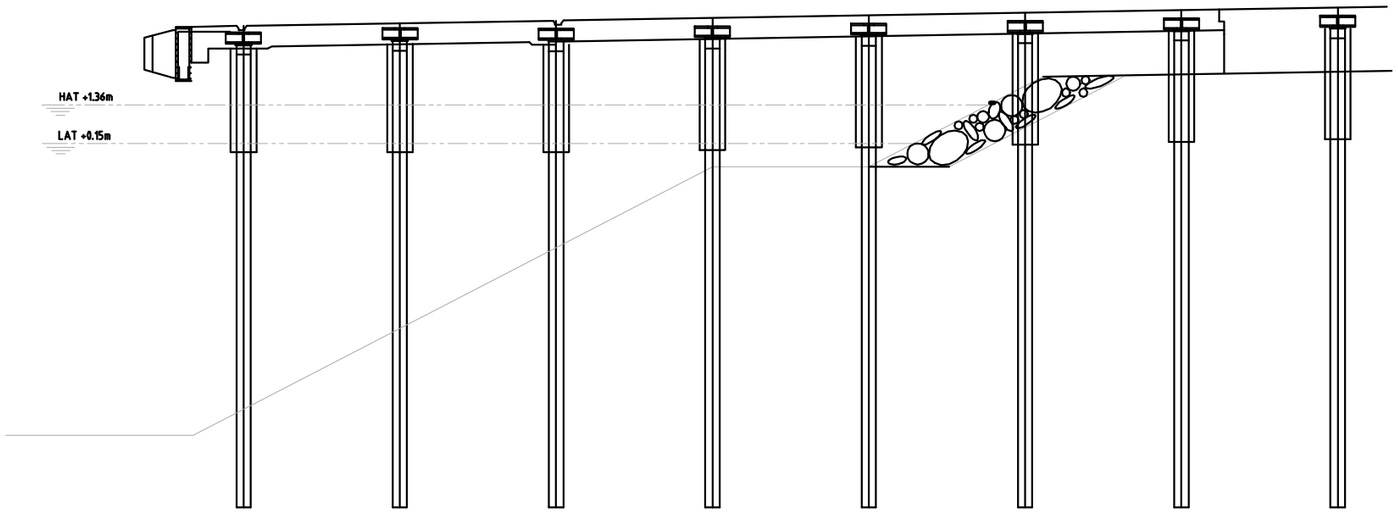
SCALES AS SHOWN
MICROFILMED
DATUM
CHART DATUM WHICH IS ZERO ON THE TIDE GAUGE AND 0·847 m BELOW AHD.

DESIGN CALC. BOOK
CHECKED BOOK
DRAWN C.S. CHECKED CS/JHS
TRACED CHECKED
SUPERVISING DESIGN ENGINEER, H&R
SUBMITTED DATE 29 12 83
CHIEF DESIGN ENGINEER

PUBLIC WORKS DEPARTMENT — WESTERN AUSTRALIA
REGIONAL PORTS OF WESTERN AUSTRALIA
PORT OF GERALDTON
CROSS SECTIONS AND DESIGN LOADINGS
APPROVED DATE 24-4-84
CHIEF ENGINEER, HARBOURS & RIVERS
P.W.D., W.A. 53923-7-4
REV'N

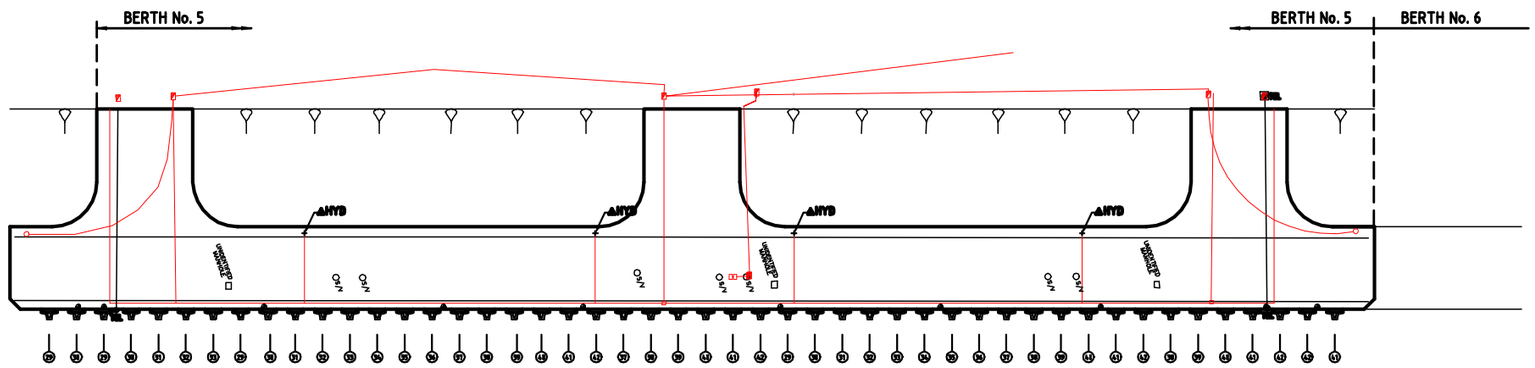
A1

THIS DRAWING HAS BEEN REDUCED



TYPICAL SECTION

SCALE 1:100



SERVICES PLAN

SCALE 1:500

LEGEND:

- MOORING BOLLARD LOCATION
- FENDERS
- 125ø H.D. ELECTRICAL PVC CONDUITS IN CENTRE OF DECK SLAB
- EXISTING WATER PIPE
- EXISTING BOUNDARY FENCE
- HYD HYDRANT RECESS
- 3 PHASE POWER RECESS
- TEL TELSTRA

Rev.	Date	Revision Details	By	Ver.	App.
C	10.01.02	FINAL ISSUE	IN		
B	17.04.01	REVISED DRAWING No. & NOTES	DPH		
A	02.11.00	ISSUE FOR INFORMATION	C.B.		

Connell Wagner

Connell Wagner Pty Ltd ABN 54 005 139 873
4th Floor, 207 Adelaide Tce, Perth
Western Australia, 6004, Australia

Telephone: +61 08 9223 1500
Facsimile: +61 08 9325 9948
Email: cwper@hutch.com.au

Client: GERALDTON PORT AUTHORITY

Project: WHARF SPECIFICATION BOOKLET

Drawn DPH	Signed	Date	
Designed N/A	Signed	Date	
Verified C.V.	Signed	Date	
Approved K.H.	Signed	Date	

Drawing Title: **GERALDTON HARBOUR BERTH No.5 GENERAL ARRANGEMENT**

CW Project No. A177-26

Scale 1:500, 1:100

Drawing No. C - 006 Rev. C

20 10 0 10 20 30 40 50 100mm

SUMMARY OF DESIGN LOADS

NOTE: DESIGN LOADS APPLIES TO BOTH BERTH NO.5 & BERTH NO. 6 UNLESS OTHERWISE NOTED.

REFER TO "MARINE STRUCTURES" SPECIFICATION FOR DESIGN AND CONSTRUCTION FOR DETAIL DESIGN CRITERIA. ABBREVIATED CRITERIA AS BELOW.

1. VERTICAL DEAD LOADS

1.1 CONCRETE – SELF WEIGHT BASED ON A CONCRETE DENSITY OF 25t/m3

1.2 STEELWORK – 7.85 t/m3

1.3 ALUMINUM – 2.70 t/m3

2. VERTICAL LIVE LOADS

REFER CONNELL WAGNER REPORT "WHARF SPECIFICATION BOOKLET COMMERCIAL SHIPPING HARBOUR GERALDTON PORT AUTHORITY" JANUARY 2002 REFERENCE A177–26 REVISION C

2.1 DOLPHINS

LIVE LOAD: 5 kPa

2.2 WALKWAYS

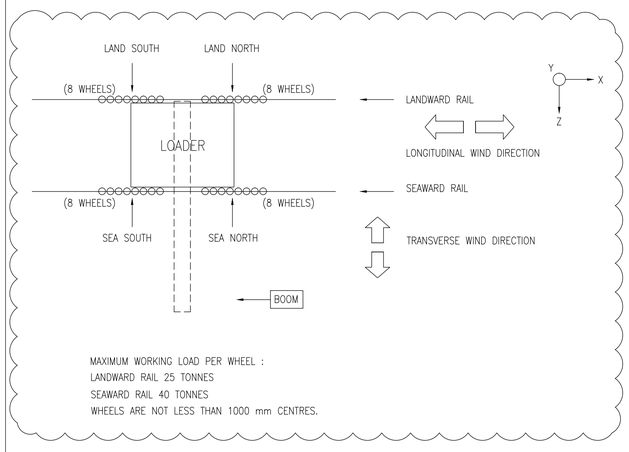
LIVE LOAD: 2.5 kPa, 1.5kN POINT LOAD

2.3 SHIPS MOBILE GANGWAY PLATFORMS

LIVE LOAD: 3 kPa

SHIPS' GANGWAY NOT TO BE LANDED DIRECTLY ON TROLLEY, A "SHIP'S BROW" BETWEEN SHIP'S GANGWAY AND TROLLEY SHALL BE USED.

2.4 SHIPLOADER LOADS



MAXIMUM WORKING LOAD PER WHEEL :
LANDWARD RAIL 25 TONNES
SEAWARD RAIL 40 TONNES
WHEELS ARE NOT LESS THAN 1000 mm CENTRES.

3. HORIZONTAL LOADS

3.1 VEHICLE BRAKING LOADS

ALL VEHICLES 30% x MASS

3.2 WIND

THE DETERMINATION OF LOADS INDUCED BY WIND ARE BASED ON THE FOLLOWING CONDITIONS:

3.2.1 OPERATIONAL WIND LOADS

IMPORTANCE LEVEL 3
REGION B, TERRAIN CATEGORY 1

MOORING AND FENDER LEAN ON FORCES V = 32 m/sec 30 sec GUST
OPERATING SERVICEABILITY V = 23 m/sec 3 sec GUST

3.2.2 NON–OPERATIONAL WIND LOADS

IMPORTANCE LEVEL 3
REGION B, TERRAIN CATEGORY 2

ULTIMATE V_{1000} = 60 m/sec 3 sec GUST

3.3 WAVE

NOT CRITICAL

3.4 SEISMIC FORCES

LOADS WILL BE DETERMINED IN ACCORDANCE WITH AS1170.4 AND AS1170.0 2002 APPENDIX D USING THE FOLLOWING FACTORS.

3.4.1 ULTIMATE LEVEL EARTHQUAKE

ANNUAL EXCEEDANCE PROBABILITY	1:1000
PROBABILITY FACTOR Kp	1.4
PEAK HORIZONTAL GROUND ACCELERATION, a	0.09 g
ADJUSTED ACCELERATION FACTOR, a	0.0126 g
SITE FACTOR, S	1.25
STRUCTURE RESPONSE FACTOR Rf	4.5
IMPORTANCE FACTOR, I	1.0

3.5 TEMPERATURE

LOADS WILL BE DETERMINED IN ACCORDANCE WITH : AS5100:2
AMBIENT TEMPERATURE : 25°C
UNIFORM TEMPERATURE VARIATION : 5°C TO 58°C
POSITIVE VERTICAL DIFFERENTIAL GRADIENT : 0°C (BOTTOM SURFACE), TO –18°C (TOPSURFACE)
NEGATIVE VERTICAL DIFFERENTIAL GRADIENT : 7°C (TOP SURFACE), TO –0°C (BOTTOM SURFACE)

4. BERTHING STRUCTURES

4.1 DESIGN VESSEL RANGE

DESIGN VESSEL – BULK CARRIER	UNITS	BULK CARRIER MINIMUM	BULK CARRIER MAXIMUM	TANKER
DEADWEIGHT TONNAGE (DWT)	tonnes	30,000	70,000	55,000
DISPLACEMENT TONNAGE (DISP)	tonnes	40,000	90,000	72,700
LENGTH OVERALL (Loa)	metres	187	225	222
BREADTH (B)	metres	27	32.4	35
MOULDED DEPTH	metres	14.5	18	19
LADEN DRAFT (D)	metres	10.3	12.5	12.5
BALLASTED DRAFT	metres	6.2	6.5	7
BALLASTED DISPLACEMENT	tonnes	24,000	40,000	42,000
BERTHING ANGLE	degrees	6	6	6

4.2 BERTHING VELOCITY (m/sec)

30,000 BULK CARRIER		70,000 DWT BULK CARRIER		55,000 OIL TANKER	
BALLAST	LADEN	BALLAST	LADEN	BALLAST	LADEN
0.15	0.12	0.15	0.10	0.15	0.11

ABNORMAL FACTOR (APPLIED TO NORMAL ENERGY)

30,000 BULK CARRIER		70,000 DWT BULK CARRIER		55,000 OIL TANKER	
BALLAST	LADEN	BALLAST	LADEN	BALLAST	LADEN
1.75	1.50	1.50	1.25	1.50	1.25

4.3 BERTHING ENERGIES

VESSEL ABNORMAL BERTHING ENERGY 565 kNm
–1/3 POINT BERTHING FOR 30,000 DWT VESSEL
–1/4 POINT BERTHING FOR 70,000 DWT VESSEL
–1/4 POINT BERTHING FOR 55,000 DWT VESSEL

FENDER SHALL MEET THE FOLLOWING CHARACTERISTICS:
MAXIMUM RATED DEFLECTION 72%
MINIMUM RATED ENERGY 570 kNm
MAXIMUM RATED REACTION 1300 kN

RATED ENERGY AND RATED REACTION INCLUDE TEMPARATURE, TOLERANCE AND ANGULAR CORRECTION FACTORS IN ACCORDANCE WITH PIANC.

MAXIMUM STRUCTURE LOAD AT FENDER LOCATIONS IS 1689 kN (SERVICEABILITY).

4.4 FRICTION

COEFFICIENT OF FRICTION BETWEEN THE SHIP'S HULL AND THE FENDER PANEL: μ = 0.3 MAXIMUM

4.5 CONTACT PRESSURE

MAXIMUM PRESSURE BETWEEN THE SHIP'S HULL AND THE FENDER PANEL:
BULK CARRIER = 200kPa

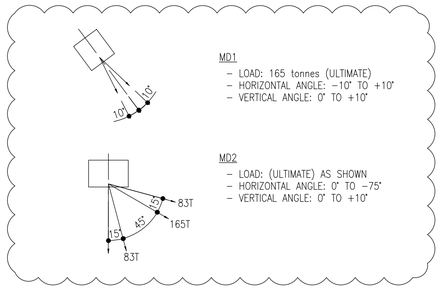
4.6 APPROACH ANGLE

MAXIMUM ANGLE OF APPROACH WHEN BERTHING: 6° FROM BREASTING LINE

4.6 ROPE ANGLES

VERTICAL : –10° TO +25° DEGREES
HORIZONTAL : 0° TO 10° DEGREES
LOAD : 113t (ULTIMATE)

5. MOORING STRUCTURES



6. CORROSION ALLOWANCE

STEEL STRUCTURES BELOW SEABED : NIL
STEEL STRUCTURES BETWEEN SEABED 0.0 AND –0.5m C.D : 1 mm
STEEL STRUCTURES BETWEEN 0.5m AND 2.0m C.D : 2 mm
STEEL STRUCTURES ABOVE 2.0m C.D : 1 mm

CORROSION ALLOWANCE IS NOT APPLIED TO THE INTERNAL SURFACES OF HOLLOW STRUCTURAL STEEL SECTIONS AS THESE WILL BE SPECIFIED TO BE SEALED AND HAS NOT BEEN APPLIED TO HANDRAILS AND GRATING.

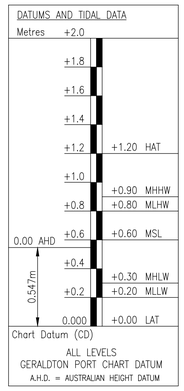
7. DESIGN LIFE

DESIGN LIFE FOR STRUCTURES: 40 YEARS

HANDRAILS AND GRATING WILL HAVE A NOMINAL DESIGN LIFE OF 10 YEARS, ASSUMING REGULAR ROUTINE MAINTENANCE AND PERIODIC REPLACEMENT.

8. TIDES

APPROXIMATE TIDE LEVELS IN GERALDTON HARBOUR ARE AS FOLLOWS:



AS □ONSTRU□TED

REVISIONS No.	BY	DATE	DESCRIPTION	APPD
1	PSS	13.05.08	AS BUILT	IP
0	P.L.G.	22.12.06	ISSUED FOR CONSTRUCTION	R.X.B.

REFERENCE DRGS. No	TITLE
DRG. No	

T:\01 Drafting\10308\Reference\75309405–3541.dwg 22 July 2015

Client

DESIGNED	I.J.P.	CHECKED	I.J.P.
DRAWN	J.L.	CHECKED	P.M.
APPROVED	R.X.B.	DATE	06.10.06
Datum		Survey	

MAUNSELL AECOM
Maunsell Australia Pty Ltd
Level 1, 629 Newcastle Street
PO Box 81, Leederville 6902
Western Australia
Tel +61 8 9281 6100
Fax +61 8 9281 6299
Email maunsell.com
ACN 20 093 846 925

BERTH 5 (IRON ORE EXPANSION) PROJECT

BERTH 5
DESIGN CRITERIA

Scale A1– A3–

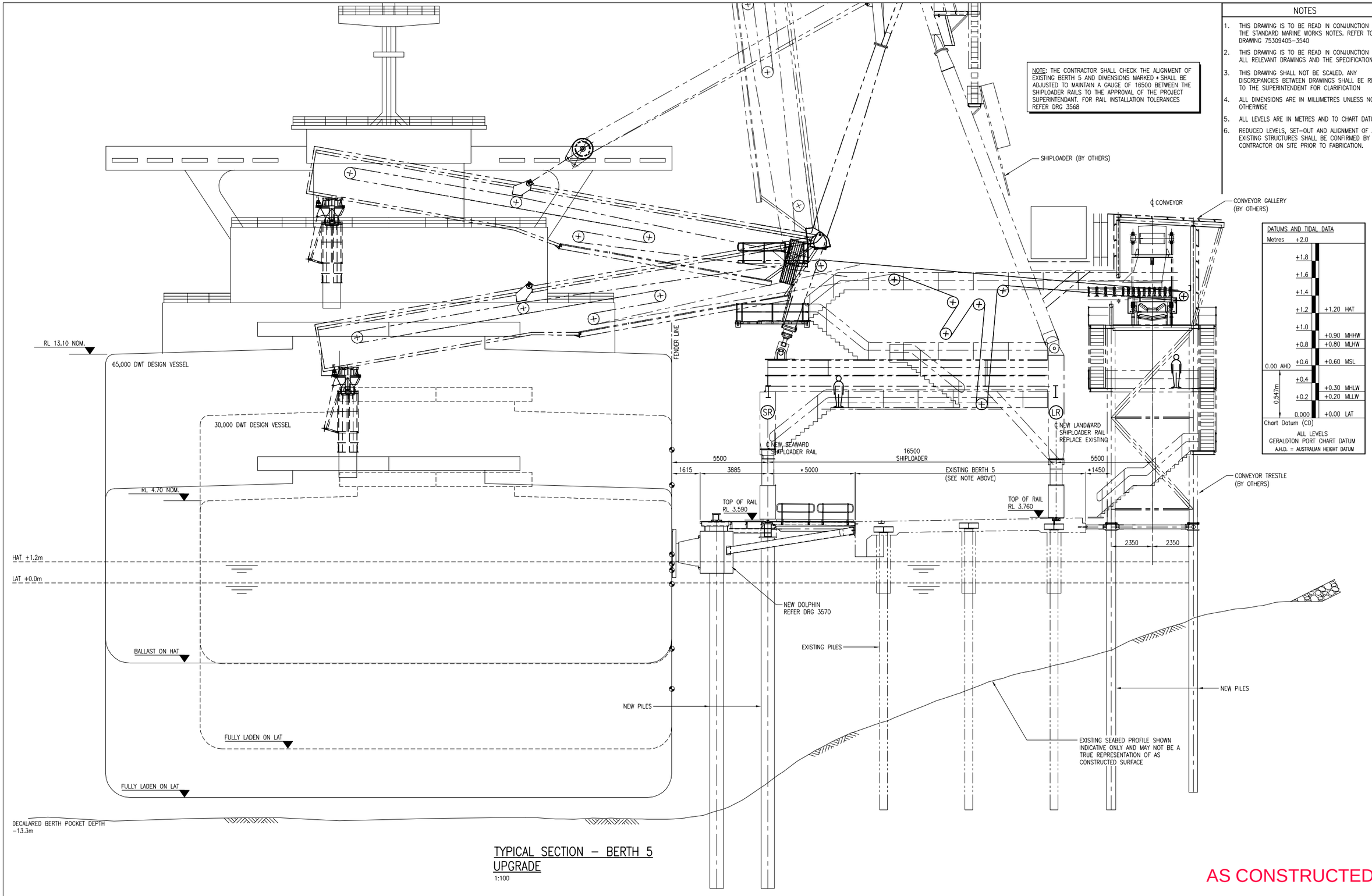
Drg No. 75309405–3541

Rev. 1

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE STANDARD MARINE WORKS NOTES. REFER TO DRAWING 75309405–3540
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT DRAWINGS AND THE SPECIFICATION
3. THIS DRAWING SHALL NOT BE SCALED. ANY DISCREPANCIES BETWEEN DRAWINGS SHALL BE REFERRED TO THE SUPERINTENDENT FOR CLARIFICATION
4. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE
5. ALL LEVELS ARE IN METRES AND TO CHART DATUM (CD)
6. REDUCED LEVELS, SET–OUT AND ALIGNMENT OF ALL EXISTING STRUCTURES SHALL BE CONFIRMED BY THE CONTRACTOR ON SITE PRIOR TO FABRICATION.

NOTE: THE CONTRACTOR SHALL CHECK THE ALIGNMENT OF EXISTING BERTH 5 AND DIMENSIONS MARKED * SHALL BE ADJUSTED TO MAINTAIN A GAUGE OF 16500 BETWEEN THE SHIPLOADER RAILS TO THE APPROVAL OF THE PROJECT SUPERINTENDANT. FOR RAIL INSTALLATION TOLERANCES REFER DRG 3568



DATUMS AND TIDAL DATA

Metres		
+2.0		
+1.8		
+1.6		
+1.4		
+1.2		+1.20 HAT
+1.0		
		+0.90 MHHW
+0.8		+0.80 MLHW
0.00 AHD	+0.6	+0.60 MSL
0.547m	+0.4	+0.30 MHLW
	+0.2	+0.20 MLLW
	0.000	+0.00 LAT
Chart Datum (CD)		

ALL LEVELS GERALDTON PORT CHART DATUM
A.H.D. = AUSTRALIAN HEIGHT DATUM

TYPICAL SECTION – BERTH 5 UPGRADE

1:100

AS CONSTRUCTED

REVISIONS No.	BY	DATE	DESCRIPTION	APPD
1	PSS	22.05.08	AS BUILT	IP
0	P.L.G.	22.12.06	ISSUED FOR CONSTRUCTION	R.X.B.

DRGS. REFERENCE: DRG. No | TITLE

W:\60013240 – Berth 5\103\cad\3_Structural\75309405–3546.dwg 24 March 2009

Client: GERALDTON PORT AUTHORITY

DESIGNED	I.J.P.	CHECKED	I.J.P.
DRAWN	M.H.	CHECKED	P.M.
APPROVED	R.X.B.	DATE	06.10.06
Datum	CHART DATUM	Survey	

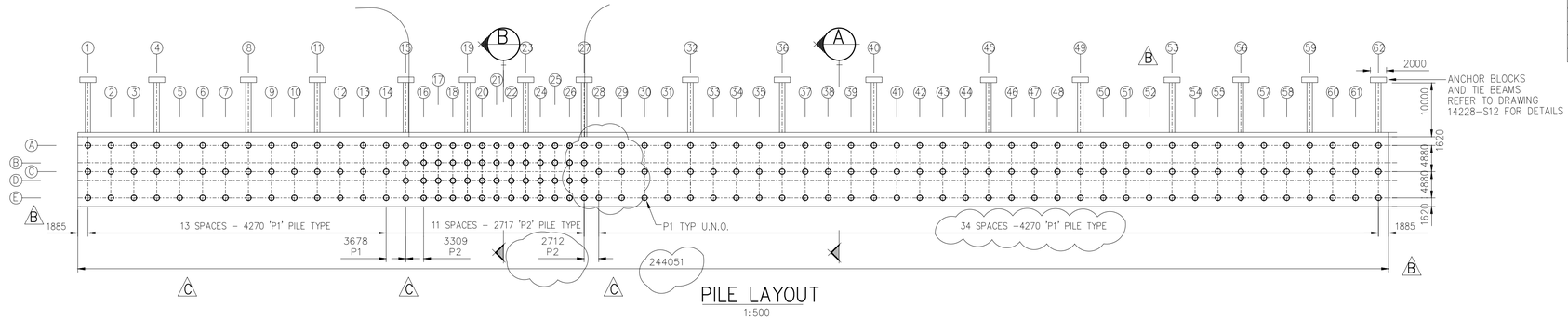
MAUNSELL AECOM
Maunsell Australia Pty Ltd
Level 1, 629 Newcastle Street
PO Box 81, Leederville 6902
Western Australia
Tel +61 8 9281 6100
Fax +61 8 9281 6299
perth@maunsell.com
ABN 20 093 846 925

BERTH 5 (IRON ORE EXPANSION) PROJECT

BERTH 5 GENERAL ARRANGEMENT SECTIONS – SHEET 1 OF 3

Scale	Drg No.	Rev.
A1– A3–	75309405–3546	1

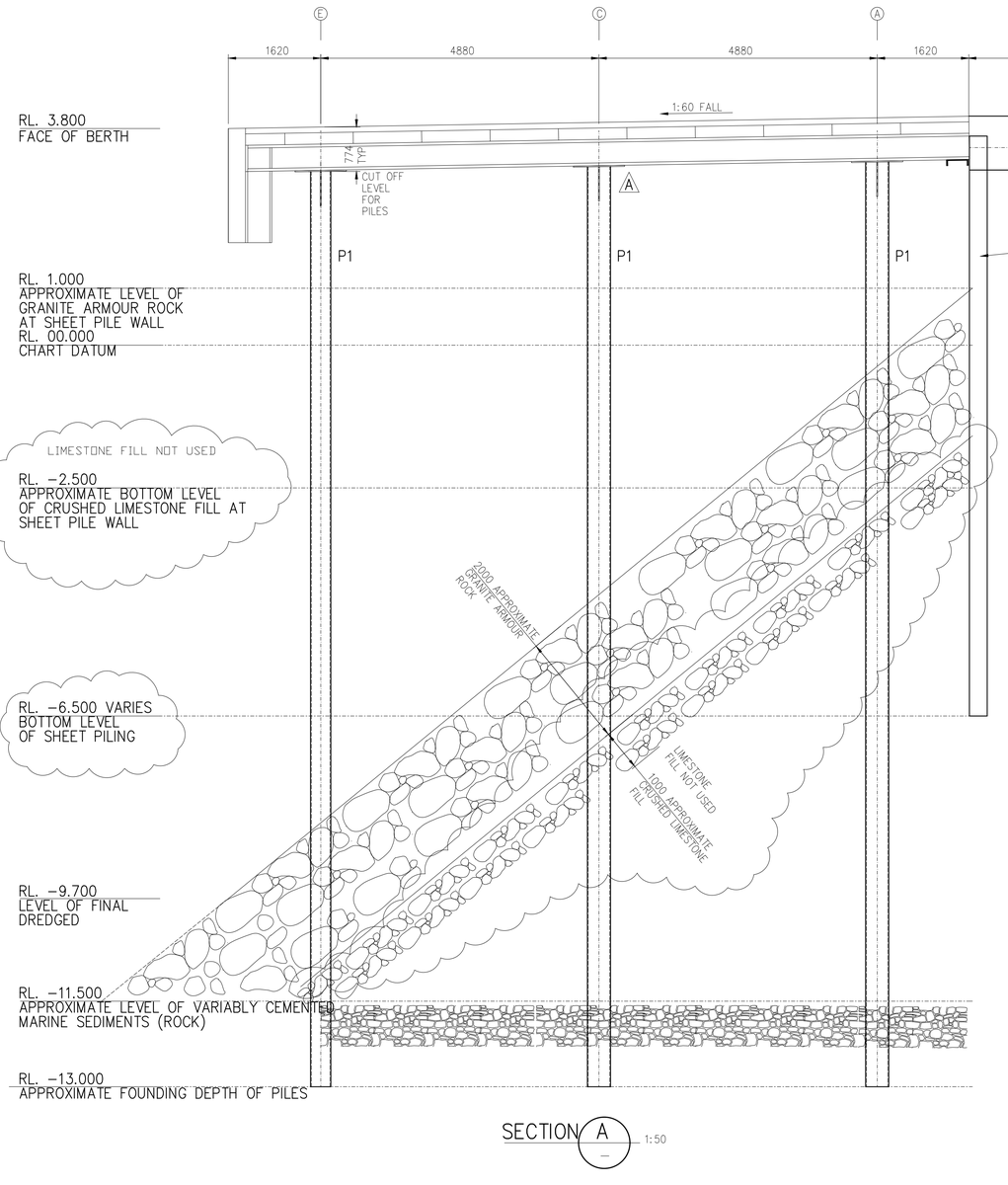
REV.	DESCRIPTION	APP'D	DATE
A	PILE CUT OFFS REVISED		4/11/94
B	DRAWING REVISED		23/11/94
C	GRIDS AMENDED		31/ 1/95
D	AS CONSTRUCTED MARK UP INFO I. ROBERTS		3/5/06



PILE LAYOUT

1:500

○ – LOCATION OF PILE SHOWN ON PLAN THUS

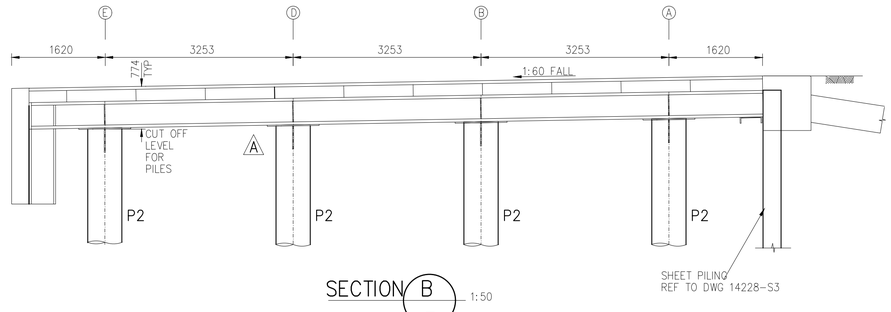


SECTION A

1:50

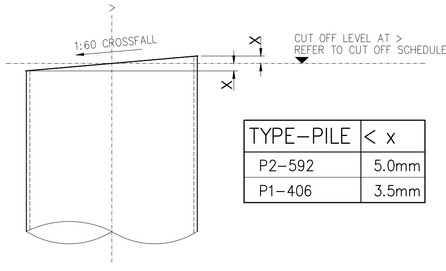
SCHEDULE OF PILE CUT – OFF LEVELS	
GRID A	3.216
GRID B	3.161
GRID C	3.134
GRID D	3.107
GRID E	3.053

MEMBER SCHEDULE	
MEMBER MARK	SIZE
P1	406x11.1 CHS
P2	592x12 CHS



SECTION B

1:50



TYPE–PILE	< x
P2–592	5.0mm
P1–406	3.5mm

PILE CUT OFF DETAIL

1:10

Wood & Grieve ENGINEERS
Wood & Grieve Pty Ltd
A.C.N. 008 858 786
16 Altona St., West Perth
Western Australia 6005
Facsimile (09) 481 1724
Telephone (09) 321 9925
Quality Endorsed Company AS 3901

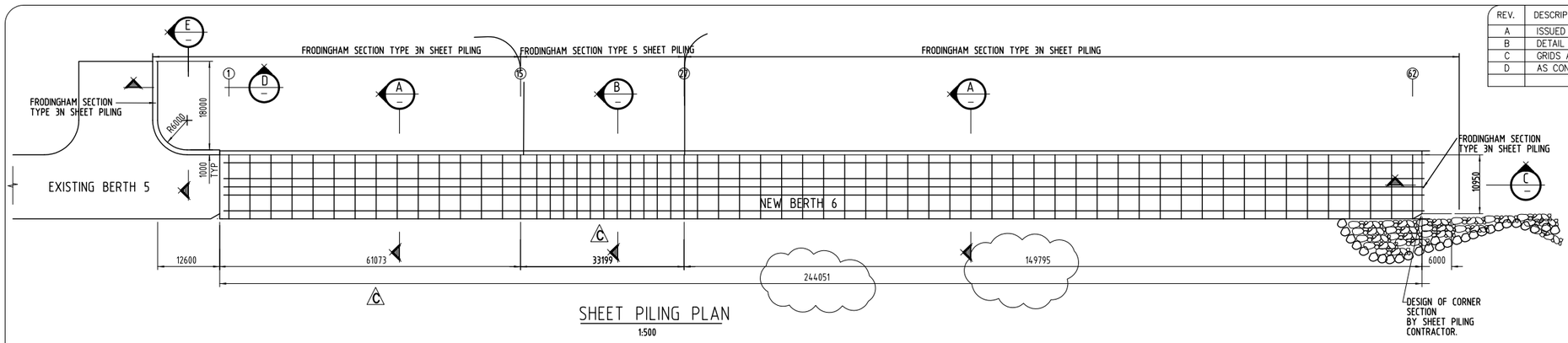
CLIENT: GERALDTON PORT AUTHORITY

PROJECT: GERALDTON HARBOUR No 6 BERTH

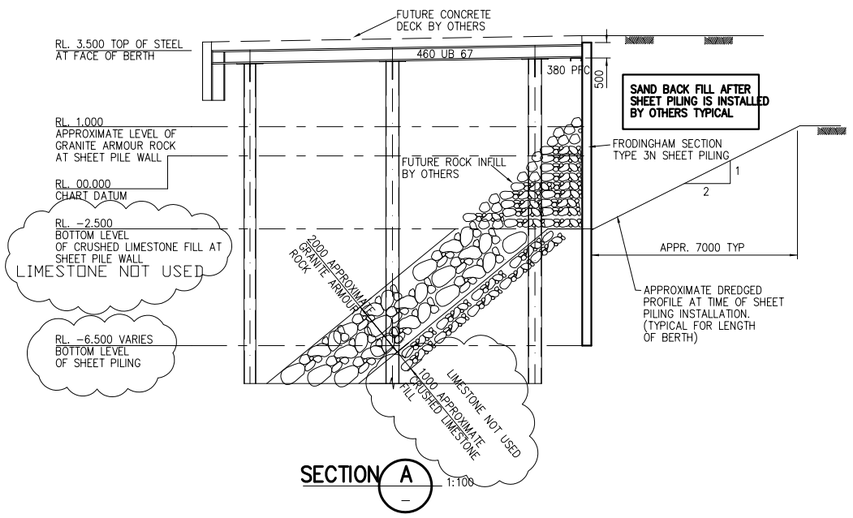
TITLE: PILE LAYOUT AND SECTIONS

DESIGNED:	TLF	VERIFIED:	/ /	DRAWING No.	REV.
DRAWN:	KM	APPROVED FOR TENDER:	/ /	14228–S2	D
APPROVED FOR CONSTRUCTION:			/ /		

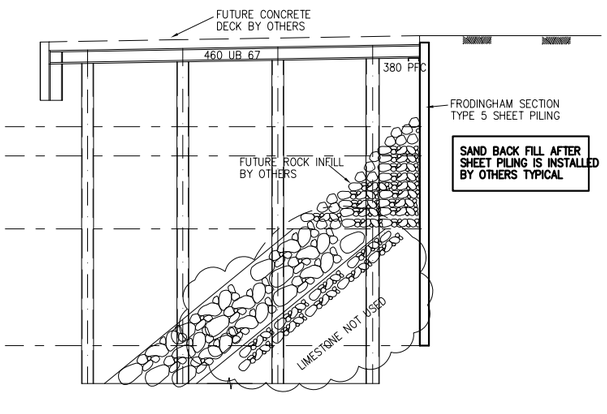
REV.	DESCRIPTION	APP'D	DATE
A	ISSUED FOR TENDER	C.J.B.	22/08/94
B	DETAIL 'F' REV.	C.J.B.	23/11/94
C	GRIDS AMENDED	C.J.B.	31/ 1/95
D	AS CONSTRUCTED INFO I. ROBERTS	DM	3/5/06



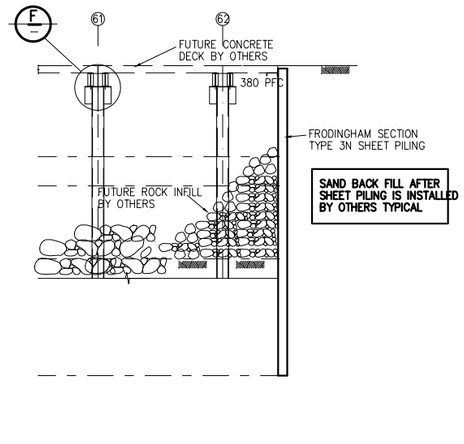
SHEET PILING PLAN
1:500



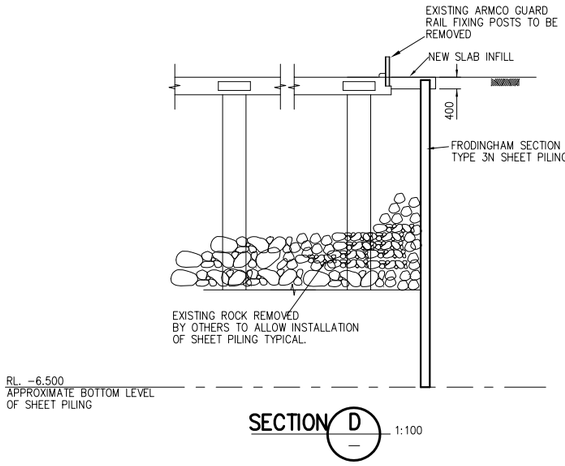
SECTION A 1:100



SECTION B 1:100



SECTION C 1:100



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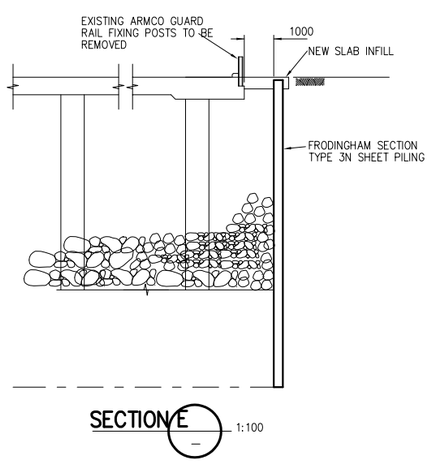

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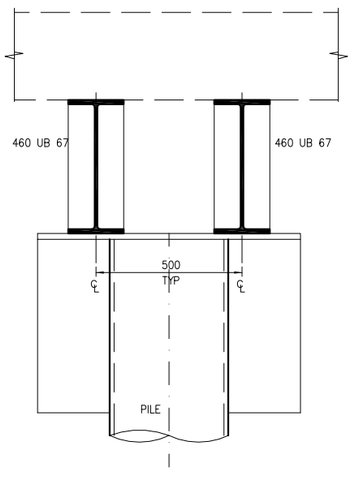


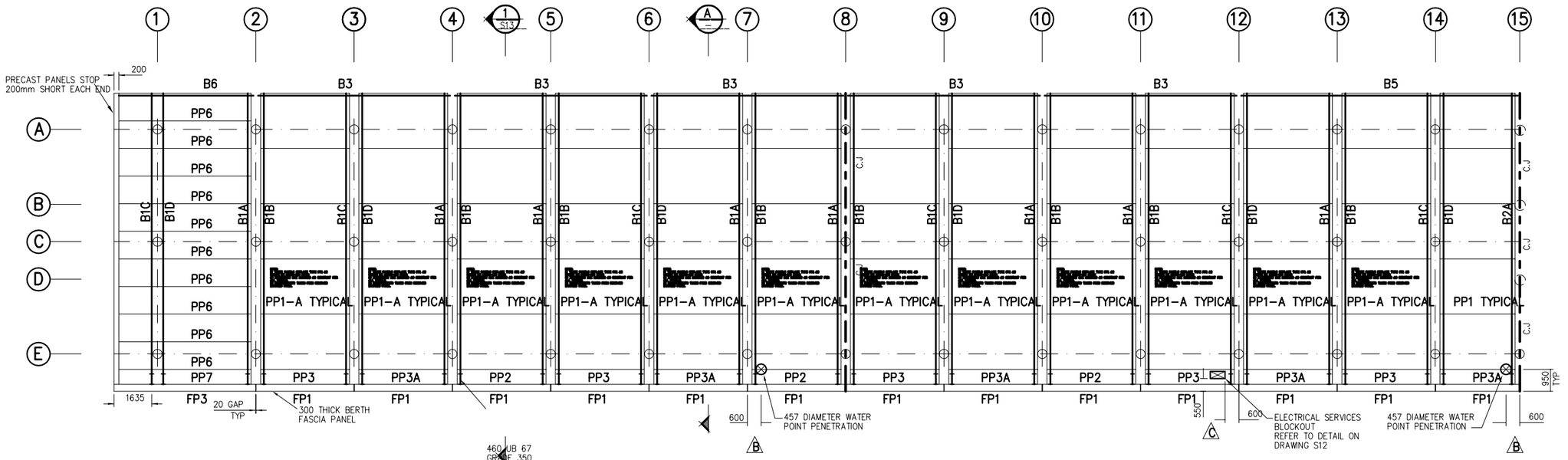
SECTION F 1:10

Wood & Grieve ENGINEERS
Wood & Grieve Pty Ltd
A.C.N. 008 808 786
16 Altona St, West Perth
Western Australia 6005
Facsimile (09) 481 1724
Telephone (09) 321 9925
Quality Endorsed Company AS 3901

CLIENT:	GERALDTON PORT AUTHORITY
PROJECT:	GERALDTON HARBOUR No 6 BERTH
TITLE:	SHEET PILING PLAN AND SECTIONS

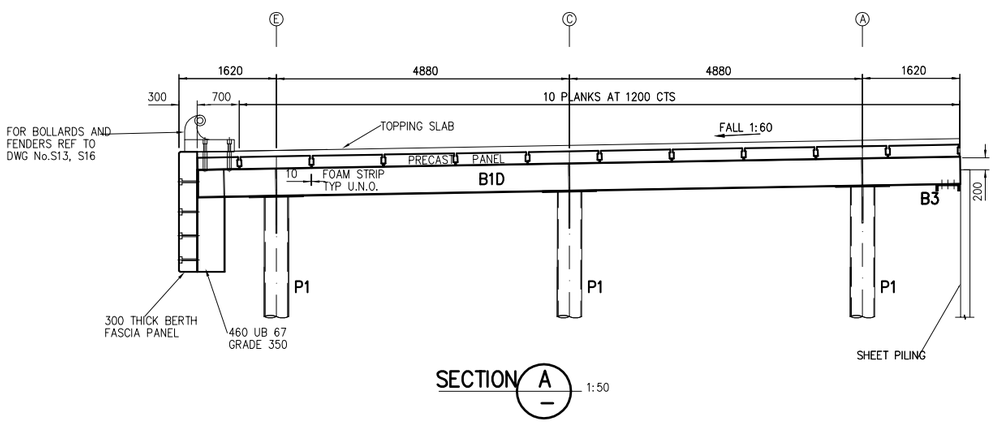
DESIGNED:	C.J.B.	VERIFIED:	/ /	DRAWING No.	REV.
DRAWN:	KM	APPROVED FOR TENDER:	/ /	14228-S3	D
APPROVED FOR CONSTRUCTION:			/ /		

REV.	DESCRIPTION	APP'D	DATE
A	ISSUED FOR APPROVAL	C.J.B.	23/11/94
B	GRID AMENDED & PENETRATIONS ADDED	C.J.B.	31/ 1/95
C	ELECTRICAL BLOCKOUT ADDED	C.J.B.	10/ 6/95
D	PANEL PP1-A TO REPLACE PP1	GMH/CR	15-10-08



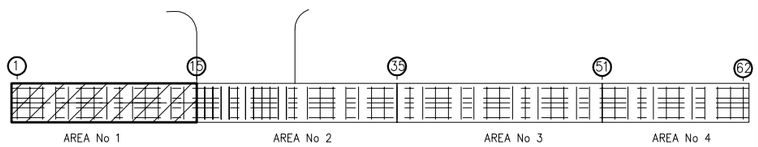
PRECAST CONCRETE PANELS AND STEELWORK PLAN AREA 1

1:100



SECTION A — 1:50

MEMBER SCHEDULE		
MEMBER MARK	SIZE	REMARKS
B1	460 UB67	GRADE 350
B2	460 UB67	GRADE 350
B3	380 PFC	GRADE 250



KEY PLAN

Wood & Grieve ENGINEERS
Wood & Grieve Pty Ltd
A.C.N. 008 808 786
16 Altona St, West Perth
Western Australia 6005
Facsimile (09) 481 1724
Telephone (09) 321 9925
Quality Endorsed Company AS 3901

CLIENT:	GERALDTON PORT AUTHORITY
PROJECT:	GERALDTON HARBOUR No 6 BERTH
TITLE:	PRECAST CONCRETE PANELS AND STEELWORK PLAN AREA 1

DESIGNED:	TLF	VERIFIED:	/ /	DRAWING No.	REV.
DRAWN:	KM	APPROVED FOR TENDER:	/ /	14228-S4	D
APPROVED FOR CONSTRUCTION:			/ /		

NOTE.

1. ALL PILES SHOWN SCHEMATICALLY ONLY. ROTATION OF PILES NOT SHOWN.

DWG Number	Reference Drawings

Date	Rev	Revision Record	Drn	Chk	Eng.	App	Client
25.02.2005	B	ISSUED AS SURVEYED	AJR				
05.07.2004	A	ISSUED FOR DRAFTING CHECK BY GPA	MF				

URS

LEVEL 3, HYATT CENTRE,
20 TERRACE ROAD
EAST PERTH, WA 6004
Telephone: (08) 9221 1630
Facsimile: (08) 9221 1639

DESIGN BY		
DRAWN BY	M.FISTONICH	23.06.2004
DRAFTING CHECK	W.CARLTON	
DESIGN CHECK		
APPROVAL		
FINAL APPROVAL BY CLIENT		

PLOT SCALE 1:1	DRAWING SCALE 1:50
VERTICAL DATUM PORT DATUM	HORIZONTAL DATUM N/A

CLIENT

GERALDTON PORT AUTHORITY

TITLE

PORT ENHANCEMENT PROJECT
MODIFICATION TO BERTH 6
PILE RETAINING WALL
AS CONSTRUCTED PLAN 1 OF 4

PROJECT No.	DRAWING No.	REV
44915-004	44915-URS-DPE-438	B

S:\ENGINEERING\44915004.gpo\DRAWINGS\BERTHS\44915-URS-DPE-438.DWG

MATCH LINE REFER 44915-URS-DPE-438

CHA 61.10 OFF 0.180 310 UC
CHA 61.96 OFF 0.050 TUBE
CHA 63.00 OFF 0.230 310 UC
CHA 64.98 OFF 0.275 310 UC
CHA 65.70 OFF 0.290 310 UC
CHA 65.96 OFF 0.050 310 UC
CHA 66.80 610-5 1:120 W
CHA 67.48 OFF 0.320 310 UC
CHA 68.74 OFF 0.290 310 UC
CHA 69.21 OFF 0.160 310 UC
CHA 70.00 BOLLARD 33
CHA 70.52 OFF 0.260 310 UC
CHA 71.78 OFF 0.300 310 UC
CHA 72.49 OFF 0.170 310 UC
CHA 73.47 OFF 0.230 310 UC
CHA 74.26 OFF 0.130 310 UC
CHA 75.07 OFF 0.230 310 UC

FACE OF BERTH 6

REFER BELOW MATCH LINE

MATCH LINE REFER ABOVE

CHA 76.25 OFF 0.290 310 UC
CHA 76.99 OFF 0.460 310 UC
CHA 77.99 OFF 0.050 310 UC
CHA 78.73 OFF 0.090 310 UC
CHA 79.27 OFF 0.300 310 UC
CHA 80.40 OFF 0.130 310 UC
CHA 81.42 OFF 0.220 310 UC
CHA 82.15 OFF 0.190 310 UC
CHA 82.80 BOLLARD 32
CHA 83.60 OFF 0.270 310 UC
CHA 84.20 OFF 0.320 310 UC
CHA 85.27 OFF 0.350 310 UC
CHA 86.08 OFF 0.410 310 UC
CHA 87.04 OFF 0.240 310 UC
CHA 88.00 OFF 0.270 310 UC
CHA 89.20 610-4 VERTICAL
CHA 89.85 OFF 0.190 310 UC
CHA 90.75 OFF 0.360 310 UC

FACE OF BERTH 6

MATCH LINE REFER BELOW

MATCH LINE REFER ABOVE

CHA 91.89 OFF 0.320 310 UC
CHA 92.58 OFF 0.480 310 UC
CHA 93.34 OFF 0.340 310 UC
CHA 94.35 OFF 0.390 310 UC
CHA 95.18 OFF 0.335 310 UC
CHA 95.60 BOLLARD 31
CHA 96.27 OFF 0.255 310 UC
CHA 97.20 OFF 0.340 310 UC
CHA 98.02 OFF 0.340 310 UC
CHA 99.02 OFF 0.200 310 UC
CHA 99.88 OFF 0.175 310 UC
CHA 100.70 OFF 0.200 310 UC
CHA 102.05 OFF 0.180 310 UC
CHA 103.00 610-7 1:120 W
CHA 103.86 OFF 0.230 TUBE
CHA 104.64 OFF 0.170 310 UC

FACE OF BERTH 6

MATCH LINE REFER BELOW

MATCH LINE REFER ABOVE

CHA 107.20 OFF 0.200 310 UC
CHA 108.14 OFF 0.200 310 UC
CHA 108.40 BOLLARD 30
CHA 109.54 OFF 0.140 TUBE
CHA 109.95 OFF 0.155 310 UC
CHA 112.41 OFF 0.190 310 UC
CHA 112.86 OFF 0.180 TUBE
CHA 113.00 OFF 0.400 310 UC
CHA 113.94 OFF 0.000 310 UC
CHA 114.81 OFF 0.340 310 UC
CHA 115.68 OFF 0.320 310 UC
CHA 116.55 OFF 0.570 310 UC
CHA 116.90 BOLLARD 29
CHA 117.58 OFF 0.420 UNKNOWN
CHA 118.49 610-8 VERTICAL
CHA 119.23 OFF 0.400 TUBE
CHA 119.51 OFF 0.340 310 UC
CHA 120.21 OFF 0.150 310 UC
CHA 120.73 OFF 0.130 310 UC
CHA 121.41 OFF 0.000 310 UC

MATCH LINE REFER 44915-URS-DPE-440

LEGEND.

BOLLARD 323 TUBE 610 (F PILE)

SETOUT.

SURVEYED POINT OF CHAINAGE AND OFFSET
OFFSET
SURVEYED POINT OF CHAINAGE AND OFFSET
OFFSET
SURVEYED POINT OF CHAINAGE AND OFFSET

NOTE.

1. ALL PILES SHOWN SCHEMATICALLY ONLY. ROTATION OF PILES NOT SHOWN.

DWG Number	Reference Drawings

Date	Rev	Revision Record	Drn	Chk	Eng.	App	Client
25.02.2005	B	ISSUED AS SURVEYED	AJR				
05.07.2004	A	ISSUED FOR DRAFTING CHECK BY GPA	MF				

URS
LEVEL 3, HYATT CENTRE,
20 TERRACE ROAD
EAST PERTH, WA 6004
Telephone: (08) 9221 1630
Facsimile: (08) 9221 1639

DESIGN BY		
DRAWN BY	M.FISTONICH	23.06.2004
DRAFTING CHECK	W.CARLTON	
DESIGN CHECK		
APPROVAL		
FINAL APPROVAL BY CLIENT		
PLOT SCALE 1:1	DRAWING SCALE 1:50	
VERTICAL DATUM PORT DATUM	HORIZONTAL DATUM N/A	

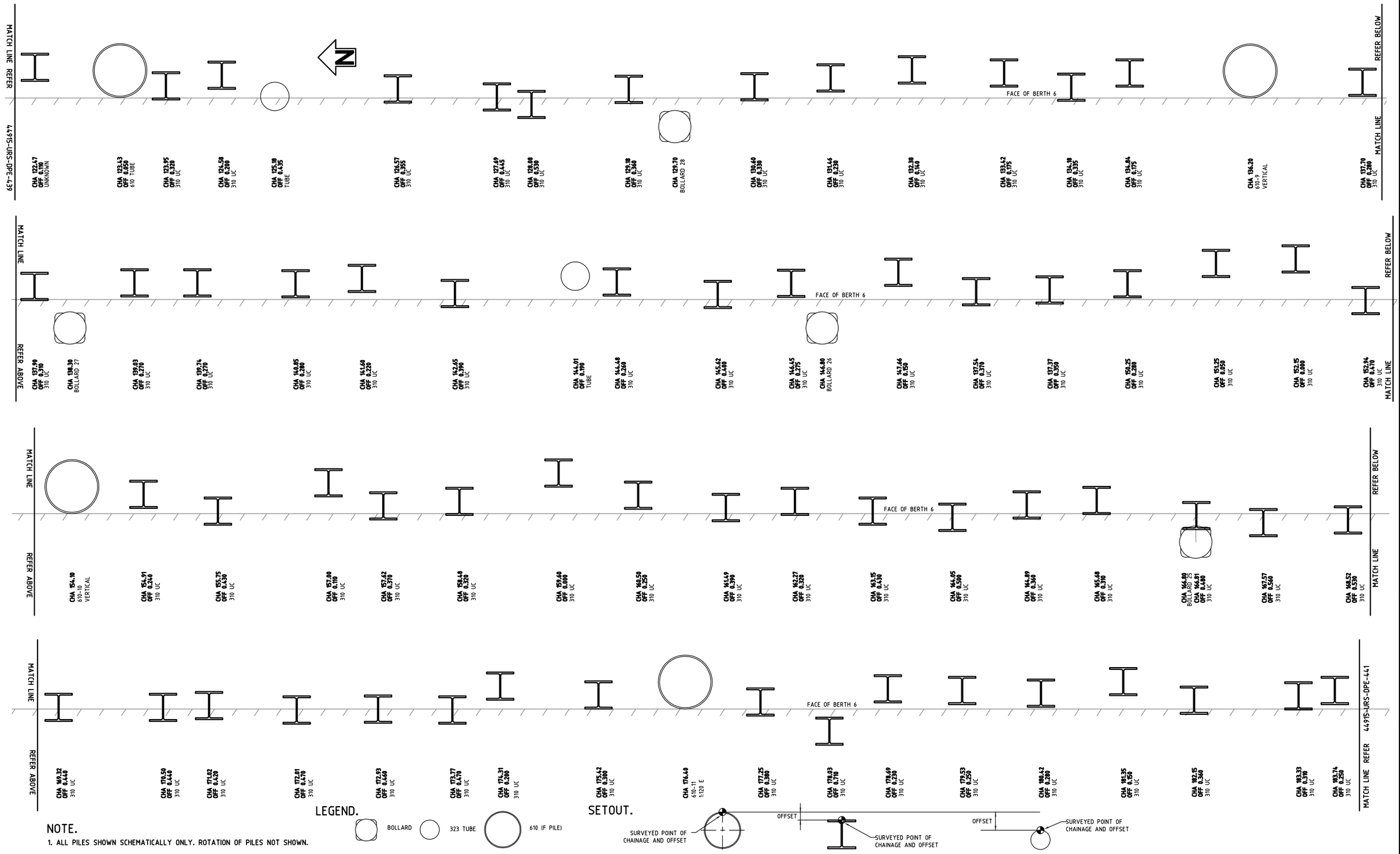
CLIENT

GERALDTON PORT AUTHORITY

TITLE

PORT ENHANCEMENT PROJECT
MODIFICATION TO BERTH 6
PILE RETAINING WALL
AS CONSTRUCTED PLAN 2 OF 4

PROJECT No.	DRAWING No.	REV
44915-004	44915-URS-DPE-439	B



LEGEND.

BOLLARD — 323 TUBE — 610 (F PILE)

SETOUT.

NOTE.

1. ALL PILES SHOWN SCHEMATICALLY ONLY. ROTATION OF PILES NOT SHOWN.

DWG Number	Reference Drawings

Date	Rev	Revision Record	Drn	Chk	Eng.	App	Client
25.02.2005	B	ISSUED AS SURVEYED	AJR				
05.07.2004	A	ISSUED FOR DRAFTING CHECK BY GPA	MF				

URS
LEVEL 3, HYATT CENTRE,
20 TERRACE ROAD
EAST PERTH, WA 6004
Telephone: (08) 9221 1630
Facsimile: (08) 9221 1639

DESIGN BY		
DRAWN BY	M.FISTONICH	23.06.2004
DRAFTING CHECK	W.CARLTON	
DESIGN CHECK		
APPROVAL		
FINAL APPROVAL BY CLIENT		

PLOT SCALE	DRAWING SCALE
1:1	1:50
VERTICAL DATUM	HORIZONTAL DATUM
PORT DATUM	N/A

CLIENT

GERALDTON PORT AUTHORITY

TITLE

PORT ENHANCEMENT PROJECT
MODIFICATION TO BERTH 6
PILE RETAINING WALL
AS CONSTRUCTED PLAN 3 OF 4

PROJECT No.	DRAWING No.	REV
44915-004	44915-URS-DPE-440	B

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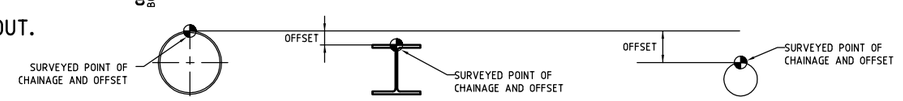
NOTE.

1. ALL PILES SHOWN SCHEMATICALLY ONLY. ROTATION OF PILES NOT SHOWN.

LEGEND.

BOLLARD 323 TUBE 610 (F PILE)

SETOUT.



DWG Number	Reference Drawings

Date	Rev	Revision Record	Drn	Chk	Eng.	App	Client
25.02.2005	B	ISSUED AS SURVEYED	AJR				
05.07.2004	A	ISSUED FOR DRAFTING CHECK BY GPA	MF				

URS
LEVEL 3, HYATT CENTRE,
20 TERRACE ROAD
EAST PERTH, WA 6004
Telephone: (08) 9221 1630
Facsimile: (08) 9221 1639

DESIGN BY		
DRAWN BY	M.FISTONICH	23.06.2004
DRAFTING CHECK	W.CARLTON	
DESIGN CHECK		
APPROVAL		
FINAL APPROVAL BY CLIENT		

PLOT SCALE	DRAWING SCALE
1:1	1:50
VERTICAL DATUM	HORIZONTAL DATUM
PORT DATUM	N/A

CLIENT

GERALDTON PORT AUTHORITY

TITLE

PORT ENHANCEMENT PROJECT
MODIFICATION TO BERTH 6
PILE RETAINING WALL
AS CONSTRUCTED PLAN 4 OF 4

PROJECT No.	DRAWING No.	REV
44915-004	44915-URS-DPE-441	B

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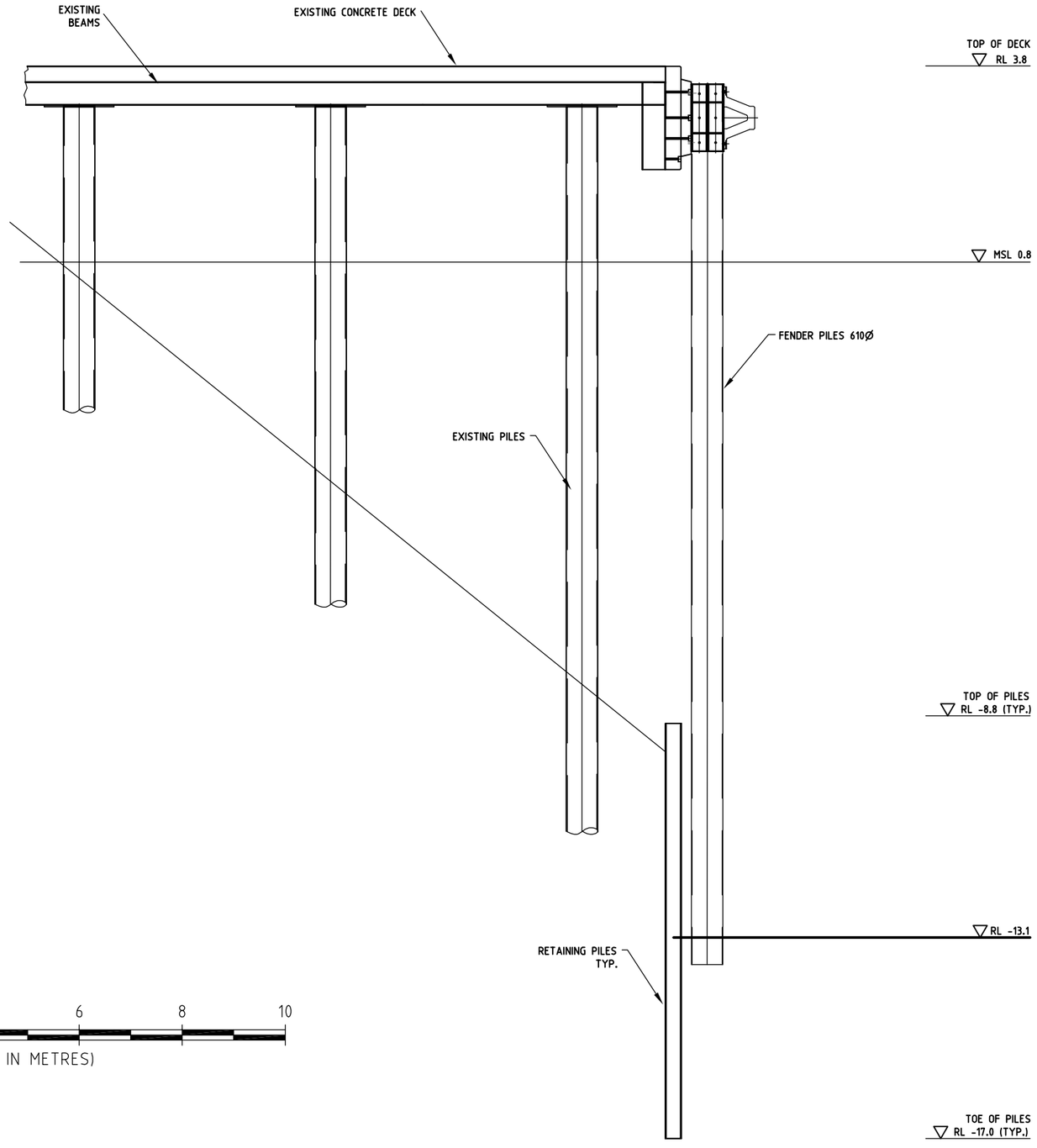

2 0 2 4 6 8 10

1:100 (DIMENSIONS IN METRES)

Drg Number	Reference Drawings
44915-URS-DPD-178	BASIN DREDGING PLAN & TYPICAL CROSS SECTION
44915-URS-SPE-412	FENDER PACKER
44915-URS-DPE-441	PILE RETAINING WALL PLAN 1 OF 4
44915-URS-DPE-440	PILE RETAINING WALL PLAN 2 OF 4
44915-URS-DPE-439	PILE RETAINING WALL PLAN 3 OF 4
44915-URS-DPE-438	PILE RETAINING WALL PLAN 4 OF 4

Date	Rev	Revision Record	Drn	Chk	Eng	App	Client
25.02.2005	1	TOP OF DECK, MSL, AND301 UC PILES AMENDED	A.R	DM	DM	DM	
00.00.0000	A	AS CONSTRUCTED	A	A	A	A	A

URS
LEVEL 3, HYATT CENTRE,
20 TERRACE ROAD
EAST PERTH, WA 6004
Telephone: (08) 9221 1630
Facsimile: (08) 9221 1639

DESIGN BY	A.N.OTHER	01/01/2000
DRAWN BY	N. FARRELL	12/10/2004
DRAFTING CHECK		
DESIGN CHECK		
FINAL APPROVAL		
PLOT SCALE 1:1	DRAWING SCALE 1:100	
VERTICAL DATUM PORT DATUM	HORIZONTAL DATUM GCG94	

CLIENT

GERALDTON PORT AUTHORITY

TITLE

PORT ENHANCEMENT PROJECT
GERALDTON PORT
BERTH 6 RETAINING PILES
TYPICAL SECTION

PROJECT No.	DRAWING No.	REV
44915-004	44915-DPE-443	1

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