

Clump Point and Dunk Island Jetties

Author & Officer's Title: **David Goodman – Manager Civil Works**

Meeting Date: 29/10/2011

Executive Summary:

CivilPlus Constructions Pty Ltd (CivilPlus) has been awarded the contract for reconstruction of Clump Point and Dunk Island jetties based on their preliminary design. At the time of award, the geotechnical investigation had not been completed, but historical geotechnical information including boreholes and pile driving records for the previous (1961) Clump Point jetty were available and used for preliminary determination of pile lengths

During the detailed design phase of the Clump Point and Dunk Island Jetties project, the final geotechnical investigation report was provided to CivilPlus on the 18th September 2012. This report identified a weak layer overlying stiffer layers at depth. The depth of the stiffer layers is deeper than what had been assumed during preliminary design resulting in a requirement to either

- Source an additional \$600,000 in funding for longer piles
- Modify the design loads
- Modify the deck material to a open grated deck to minimise uplift loads
- Modify the attachment of the deck to the substructure so that the failure mechanism due to wave uplift forces is the deck lifting off in preference to piles being lifted out of the sea bed.

CCRC engaged the Bonacci Group to undertake a review of the carry out a high level review and provide comment on:

- wave height and return interval currently being used in design
- design criteria being used, including reference to criteria associated with existing infrastructure that is to be re-used.
- pile capacities used and potential for alternative solutions, if any
- undertake assessment and quantification of design wave forces on the jetty

The key finding of this work is that

- Design pile lengths could be kept to close to the tendered lengths if some modifications were made to the specified design loads
- The rehabilitated section of the Dunk Island jetties piles are not able to withstand the uplift forces from a design wave event with an average return interval of 200 years applied to a fixed solid deck.

Subsequent discussions between Cassowary Coast Regional Council, Queensland Reconstruction Authority (QRA) and CivilPlus have identified that the project can be delivered within budget if the following modifications are made to the preliminary design and design specifications, which was the basis of the tender accepted by Council;

Clump Point

- Modify the design deck load classification to allow for a 23.5 Tonne GVM body truck and a pedestrian crowd load (Currently allows for a 44 Tonne semi trailer)
- Modify the design vessel to a displacement of 65 tonne (currently 110 tonne displacement)

Dunk Island

- Modify the design deck load classification to allow for a 4.5 Tonne vehicle and a pedestrian crowd load on the entire jetty (currently allows for a 44 tonne semi trailer on the new section only)
- Modify the design vessel to a displacement of 45 Tonne (currently 60 Tonne displacement)
- Modify the deck on the rehabilitated section so that the failure mechanism due to wave uplift forces is the deck lifting off in preference to piles being lifted out of the sea bed

Further consideration will need to be given to the type of material used on the rehabilitated section of the Dunk Island Jetty as there is a risk that a concrete deck which fails in a storm event will be

- Expensive to remove from the sea floor

- May damage the remaining structure as it fails

Recommendation:

“That Council approve the following design element alterations to the tender awarded to Civil Plus Constructions Pty Ltd for the Dunk Island and Clump Point Jetties

- 1. Modify the design deck load classification of the Clump Point Jetty to allow for a 23.5 Tonne GVM body truck and a pedestrian crowd load**
- 2. Modify the design vessel for Clump Point Jetty to a displacement of 65 tonne**
- 3. Modify the design deck load classification of the Dunk Island Jetty to allow for a 4.5 Tonne vehicle and a pedestrian crowd load**
- 4. Modify the design vessel to a displacement of 45 Tonne**
- 5. Modify the deck on the rehabilitated section so that the failure mechanism due to wave uplift forces is the deck lifting off in preference to piles being lifted out of the sea bed, and that a timber deck may be utilised in this area if it is determined that a concrete deck failing poses a significant risk to the remaining structure**

Background:

Clump Point and Dunk Island jetties were damaged by waves and storm surge associated with Cyclone Yasi in February 2011. These assets are ineligible for normal (Category B) funding under the Natural Disaster Relief and Recovery arrangements (NDRRA) The State and Federal Governments, however, jointly approved special (Category D) NDRRA funding of \$5.5 million for the reconstruction of Clump Point and Dunk Island jetties.

Council has provided \$300,000 in the current budget to supplement the NDRRA funding.

A two-stage project delivery process based on early contractor involvement was adopted for the project. In Stage 1, selected Tenderers were invited to develop design proposals to a point where the works are sufficiently defined to tender the works. In this Stage 2 process, each contractor selected in Stage 1 was invited to tender for the works, CivilPlus were awarded the tender for these works on the 23rd August 2012 for a total estimated cost of \$4,841,276 (excl GST)

Link to Corporate Plan:

Outcome 1.1 – Provide community services and facilities.

1.1.13 Ensure that there are appropriate marine facilities in the region.

1.1.16 Continue to provide essential community services such as parks and reserves, aquatic centres, sporting facilities, cemeteries etc. that support the lifestyle of our communities

Outcome 4.2 – Achieve best practice asset management

4.2.4 Ensure that asset maintenance and replacement programs are fully funded.

Outcome 4.4 – Compliance with legislative obligations

4.4.1 Ensure compliance with our legislative obligations.

Consultation:

Internal, QRA

Legal Implications (Statutory basis, legal risks):

Nil

Policy Implications:

Nil

Financial & Resource Implications:

If the recommendation is not approved Council will be exposed to a shortfall in approved funding of approximately \$600,000

Report prepared by:

David Goodman

Report authorised by:

David Trotter

Report created date:

24/10/12

Released under RTI - DDMR

Stephen C Day

From: Terry Memory <tmemory@bonacciqld.com>
Sent: Friday, 12 October 2012 11:59 AM
To: Stephen C Day
Cc: 'Peter Lyons'
Subject: Design criteria commentary
Attachments: B3872_TJM_Wave_report_draft.pdf; image001.jpg

Flag Status: Flagged

Categories: Email filed

Stephen

Please find attached our draft letter for your consideration.

Cheers

Terry Memory

Director

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11 October, 2012
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Department of Transport and Main Roads
PO Box 6185
Cairns Qld 4870

Attn: Stephen Day

Clump Point and Dunk Island Jetty Design Criteria Review

Dear Stephen

As requested we have undertaken a review of the design criteria used for the abovementioned project. In particular, our review has focussed on the development of design wave criteria and the application of these criteria to the structural design. Additionally, and to facilitate discussion, we have also provided commentary on the specified general design criteria.

The following documents were used during the review:

- Brief and Functional Specification, Invitation No. 028NDR11, Clump Point and Dunk island Jetty Reconstruction. (TMR Spec).
- GHD letter dated 15 June 2011, RE: Clump Point Jetty:- Preliminary Assessment of Wave.
- GHD 50% Design and documentation report, "Clump Point and Dunk Island Jetties".

1.0 General Design Criteria

The TMR specification cited above is a comprehensive document that provides background information, context and also technical design criteria. The document repeatedly makes explicit reference to the project's funding constraints and the need for the design to be balanced with respect to "*optimum usability and benefit to the community*". This framework, or intent, is arguable very justifiable given the very real funding constraints and the fact that the jetties in question would not be deemed major, or critical, infrastructure by normal industry, or government, measures.

The document does, however, also specify general vertical loading criteria in a prescriptive manner and also states that the jetty shall be "survivable" in all storm events up to 500 year ARI. Consequently, the principle of balancing the project costs against optimum usability and benefit to the community is compromised because the designer is not free to make informed professional design decisions regarding the key criteria. Below we offer our comments regarding the specific design criteria.

Design Life

Specified design = 50 years

The use of 50 years is the industry standard, however, given the following factors:

- The capital cost funding is limited

- The facilities are jetties, in a marine environment, and hence to achieve a 50 years life will require constant maintenance. Additionally, the deck levels have been set very low relative to the normal water and wave levels. Consequently, damage and general degradation to the structures is like to be higher than normal because the deck will be fully submerged in modest storm events, such as, a 1 year ARI storm, or king tides with ambient waves. Also, for Dunk Island, the pile headstocks are wetted on every tide cycle.
- The local council may experience maintenance funding constraints, which is typical for regional Queensland. If maintenance funding limitations are coupled with the accelerated degradation discussed above, the result will be a lesser usable life of the facility. In short, it is only cost effective to design for a 50 years life if the asset owner can afford to maintain the structure over that life span.
- The jetties are in a cyclonic region, even if designed to a high ARI event, may still not survive the event because natural events are inherently probabilistic. The principle we seek to highlight is that one can design for a 1 in 500year event, however, a 1 in 1000 year event could happen any time within the 50 years design life.

Suggestion: Consideration is given to using a 25year design life, as per table 5.4 of AS4997 "Small craft facility", see below:

Annual Probability of exceedance of design wave event (expressed as an ARI)

		Design working life (years)			
		5 or less temporary works	25 small craft facilities	50 normal maritime structures	100 or more special structures / residential developments
1	Structures presenting a low degree of hazard to life or property	20	50	200	500
2	Normal structures	50	200	500	1000
3	High property value or high risk to people	100	500	1000	2000

Deck level and the superstructure configuration as a whole should be reviewed to lift concrete members out of the submersion zone. This is particularly the case for Dunk Island Jetty.

Design Vessels

The following vessel criteria was specified.

Dunk Island = 20m, Displacement 60 tonne
 Clump Point = 25m, Displacement 110 tonne

The design vessels displacement masses are arguably on the high side which adds cost to the project because it necessitates larger fenders which in turn generate larger berthing forces. For comparison purposes a 25m long x 150 Pax catamaran ferry typically has a displacement of 55-60t, likewise a similar 35m long x 400 Pax ferry has a typical displacement of 120t.

Suggestion: Consideration is given to using the following criteria-

Dunk island = 20m, Displacement 45 tonne
 Clump Point = 25m, Displacement 65 tonne

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Deck load Case

Dunk island = Class 15, being 15kPa UDL or 20t point load at 4m crs in any direction.
 Clump Point = Class 15, being 15 kPa UDL or 20t point load at 4m crs in any direction.

The functional description associated with difference classes are reproduced from AS4997 below. One must also appreciate that the UDL will typically govern the pile compression capacity requirements, whereas point loads will govern the deck thickness design. Whilst the Class15 description within table 5.1 may appear representative of the functional intent we suggest it warrants review. That is, whilst the facilities could arguably be described as a "light-duty wharf or jetty etc..." we suggest the corresponding loading for a class 15 facility is not consistent with the functional requirements of this project. In particular, it is anticipated that a class 15 deck will see T44 truck loading and mobile cranes of up to 20t, consistent with a fully operational commercial marine/fishery facility. We suggest the functional scope of the two jetties is more closely aligned to public boardwalks, recreational fishing and small craft use and infrequent emergency services access.

Of significant importance is the fact that the Dunk Island jetty retains part of the existing structure with has a Class 5 rating. Meaning that whilst the new section could be designed to Class 15, the facility as a whole is limited to Class 5. We concur that the jetty should have the capacity to drive small emergency vehicles on the deck. To this end we suggest a combination of Class 5 (UDL) and Class 10 (concentrated loads) is appropriate, as detailed below.

TABLE 5.1
MARITIME STRUCTURES—DECK LOAD CLASSIFICATIONS

Class	Uniformly distributed load (Q) (see Note 1)	Concentrated load (area, mm) s = spacing, m (see Note 2)	Anticipated load conditions	Application
5	5 kPa	20 kN (150 × 150) s = 1.8	Pedestrian crowd load. Light motor vehicles up to 3 t tare	Private and public boardwalks. Passenger jetties
10	10 kPa	45 kN (300 × 150) s = 1.3	Small emergency vehicles	Public boardwalks and promenades with access for emergency vehicle and service vehicles
15	15 kPa	200 kN (400 × 700) s = 4.0	Bridge design code (W7, W8, A160, T44 loading) Small mobile crane up to 20 t SWL	Light-duty wharf and jetty for fishing industry, charter boat industry, ferry wharves, light commercial activities
25	25 kPa	500 kN (700 × 700) s = 5.0	Bridge design code (SM1600 heavy platform loading) Mobile crane 50 t SWL	Secondary port general cargo wharf
40	40 kPa	1000 kN (1000 × 1000) s = 7.0	Container forklift and other machinery for 40 ft containers Mobile crane 100 t SWL	General cargo wharf or container wharf (For containers stacked 2 high ship-side, see Note 3 & Appendix A)
50	50 kPa	1500 kN (1000 × 1000) s = 8.0	Container forklift, reach stacker and other machinery for largest containers Mobile crane 150 t SWL	Primary port, international gateway container terminal (For containers stacked 2 high ship-side, see Note 3 & Appendix A)
60	60 kPa	2000 kN (1000 × 1000) s = 9.0	Mobile crane to 200 t SWL	Heavy-duty maintenance wharf

Suggestion: Consideration is given to using the following criteria-

Both Jetties are signed with the following load limitations:

Maximum Uniformly distributed load = 5kPa
Maximum vehicle mass = 5 tonne

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We suggest the design criteria corresponding to this signage is: UDL = 5 kPa or 45kN point loads at 1.8m crs in any direction

Wave Climate

The specification calls for the design to be "survivable" in storm (cyclonic) event up to a 500 year average recurrence interval (ARI).

We believe the origins for this requirement are quite straight forward, being a 50 year design life and a function category 2, as previously shown in table 5.4 of AS4997. As discussed above, however, we suggest this facility could be justifiable re-classified as either:

- a) A 25 year design life with a function category 2 = 200 year ARI or
- b) A 50 year design with a function category 1 = 200 year ARI

Either way the design wave event is reduced from a 500 year ARI to a 200 year ARI.

Suggestion: Consideration is given to using a 200 year ARI wave event criterion.

2.0 Wave Climate Study

The rigour of wave climate study, prepared by GHD, appears commensurate with the project budget and scale and therefore suitable to the purpose of establishing design wave characteristics. It is nevertheless appropriate that key assumptions are understood, along with the practical application of this criteria to structural analysis and design. When assessing marine structures the following basic steps are undertaken:

- a) Establish a design average recurrence interval, ARI.
- b) Assess wave data to establish a wave height, typically the H_s wave, that corresponds to the chosen ARI criterion.
- c) Simulate combinations of cyclone with tidal levels to establish a design still water level that corresponds with the design wave
- d) Convert the design wave and water level into a force on the structure.
- e) Perform a structural analysis to ascertain the piles loads and other design actions.
- f) Perform a geotechnical assessment to establish provisional pile lengths.

Each step listed above can be done with various methods, typically of varying sophistication. Each step also requires assumptions. The scope for the accumulation of conservative assumptions and/or simplistic methods is therefore high, and this can lead to a less than optimal design outcome.

Item a) has already been discussed above in section 1.0, and will not be addressed any further. Item b) and c) will be discussed below for completeness.

Wave height and water level criteria.

For the purpose of this discussion the important tidal planes for both jetties are:

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HAT = +3.62 m CD
MSL = +1.73 m CD
LAT = 0.00 m CD

Given the limited size of this project GHD, understandably, did not simulate cyclones with varying tides to establish a statistical estimate of the design still water level associated with different ARI events. Instead, we understand learned estimates were used instead, being shown in table 3 of the GHD report, and reproduced below for convenience.

Table 3 Wave Levels for Modelling Purpose (based on Cardwell)

Return Period	Water Level (mCD)
1	+4.1
3	+4.1
10	+4.4
50	+4.6
100	+4.8

We understand from the GHD report that a still water level of +4.8m CD was used in the Mike 21 model to establish wave heights for a 100 year ARI cyclone event. It is important to realise that both decks, at Dunk Is and Clump Point are fully submerged by this water level. The water depths over the two decks are 0.9m and 0.2m respectively.

Additionally, and as stated in the report, the still water depth of +4.1m CD for a 1 year ARI conservatively represents HAT at Cardwell, being 0.5m higher than HAT at the project site. For completeness HAT actually occurs every 17 years only, based on lunar cycles, however "king tides" typically approached this level (within a few hundred millimetres) for a number of days each year.

The +4.8m CD water level presumably represents a notional storm surge difference of 0.7m between and ARI 1 year and 100 year event. Likewise, it could be implied that GHD are suggesting the storm surge on the 1 year ARI event is 0.5m, being the difference between +4.1m CD and the actual site HAT of +3.6m CD. This would suggest an implied total surge of 1.2m for a 100 year ARI event, which compared to TC Larry's known surge of 2.3m, seems plausible.

There are two critical points here:

- The basis of the still water level is particularly vague, and this is in no way a criticism of GHD. Rather, it is simply the acknowledgment that a project of this scale does not justify the intensive wave modelling that is required to achieve more reliable predictions. The water levels cited above should be understood in their true context, that is, they are a learned guess.
- It should be understood that a storm surge coinciding with an HAT event is as probable as it coinciding with a LAT event. If we accept the 100 year ARI surge is notionally 1.2m the most probable still water level is the surge plus MSL, and the more probable peak water level, is surge plus MHWS. These scenarios result in still water levels +3.0m CD and +4.0m CD respectively.

The GHD report predicts Hs wave heights in the order of 3-4m for an ARI 100 year events at the -2.0m CD seabed level, and approx 1.0m for a 1 year ARI event. The report also seeks to correlate actual cyclone wave data to the Mike 21 model and concludes that the 1.0m ARI 1 year wave

corresponds to a 3.0m wave at the testing station and therefore the wave climate is dominated by cyclonic/storm events. That is, the implied suggestion is that the typical wave environment at the jetty sites are benign and only become elevated in storm conditions.

In the 50% Design and documentation report, GHD cite 500 year ARI significant wave heights (Hs) as being 3.0m for Dunk Island and 4.2m for Clump Point and a still water level of +4.53m CD. These wave heights are only marginally greater than the 100 year ARI events and the still water level is less. The revised 100 year ARI still water level is +4.18m CD, compared to the previous value of +4.8m CD, refer table 14, reproduced below for convenience. It must be noted again that the 1 year ARI water level is simply HAT at the project site, opposed to Cardwell, which was used in the original report.

Table 14 Wave Levels for Modelling Purpose (based on Wongaling Beach)

Return Period	Water Level (mCD)
1	+3.62
3	+3.62
10	+3.93
50	+4.03
100	+4.18
500	+4.53

We therefore conclude that the 50% design report represents a refinement of the original wave study report. Moreover, the wave heights and water levels cited in the original report are possibly overstated and the water levels cited above are still learned estimates only.

For the purposes of structural design it is quite common to convert the significant wave height (Hs), being the average height of the top 30th percentile, to a "design" wave height. Different methods are used and conversions to the top 10th percentile are common and labelled and H₁₀ wave height. The peak wave, being notionally the top one percentile wave, H₁, is also a wave height of interest. Historically the Hs was used for structural design with conventional load factors or the H₁₀ wave for extreme loading. The H₁ wave was often use to set level, but not used for structural design because it is too extreme. In BS6349.1 the concept of Hmax and average Hmax are used. AS4997 specifies the design wave as H₁, without a load factor, as this wave is deemed to be the ultimate limit state condition. However, even without a load factor, this requirement can be excessive or impractical at times, depending on the circumstances.

Using AS4997 the design Hs wave should be increased by a factor of 1.7 to convert it to an H₁ design wave. This would mean the design waves for Dunk Is and Clump Pt are 5.1m and 7.14m respectively if the 500 year ARI event is maintained. As will be discussed below, we suggest waves of this size are implausible for the site in question.

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Wave Force Predictions

The preceding part of this report has sought to highlight, and explain, the following:

- a) The still water depth criteria used to date are estimates only
- b) The techniques used to predicted wave heights are well established, sound and plausible, albeit that they are linked to estimated still water depths only and in generally appear a little conservative as they predict 5-7m waves, some 150m offshore.

- c) Using the predicted water levels and waves heights, both jetties are subject to frequency and complete submersion because they are set too low.

The key purpose of the following section is to:

- a) To highlight the implausibility of $H_s > 3\text{m}$ waves along the entire length of the jetty.
- b) Present the sensitively of wave loading with respect to wave height and water depth assumptions.
- c) Quantify the wave loading within a framework of risk and probability awareness.

Wave Steepness

As a wave approaches the shore the energy contained within it is "redistributed" as the available water depth reduces. The wave consequently grows steeper and ultimately breaks. The breaking action dissipates energy as turbulence, but prior to breaking the crest velocities are maximised.

The point when a wave becomes unstable is generally regarded to be when the water depth is less than $1.3 \times$ wave height.

The following two pages graph and tabulate non-dimensional wave steepness parameters that indicate the stability state of the wave. The data used are designs wave height of 1m to 5m , still water levels of 3.0m CD and 4.5m CD, and sea bed levels of -2.m CD, -1m CD and 0m CD.

The conclusion of the steepness curves are:

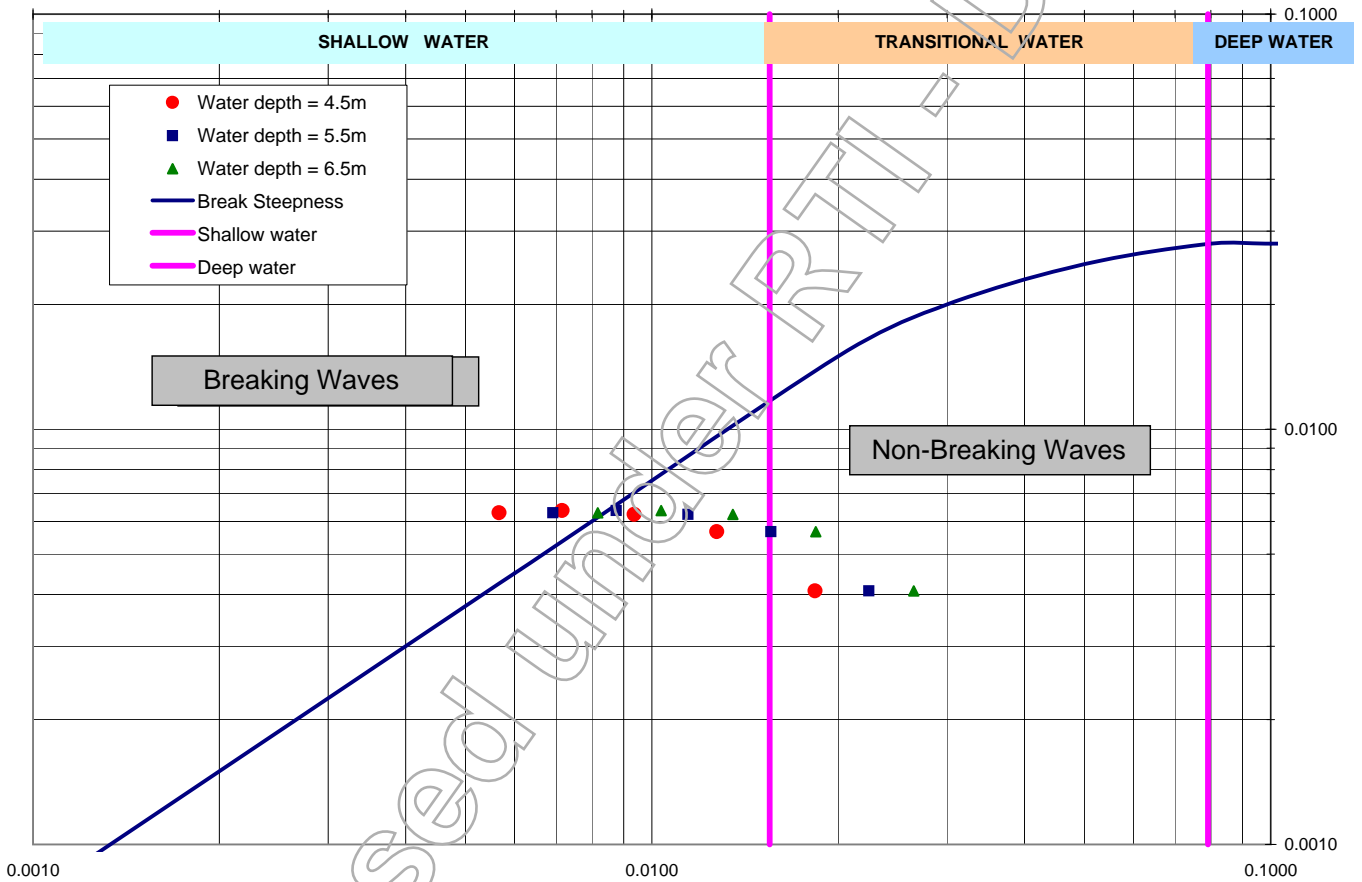
- a) For still water levels of 4.5m CD, 5m high waves are only just sustainable at the jetty head and in broad terms the realistic maximum height of non-breaking along the majority of the jetty is 3.0m
- b) For still water levels of 3.0m CD, the realistic maximum non-breaking wave height is 3m. Likewise, along the majority of the jetty the realistic maximum non-breaking wave height is limited to 2.0m.

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Still Water level 4.5 m LAT

Broken wave
Broken or near breaking wave

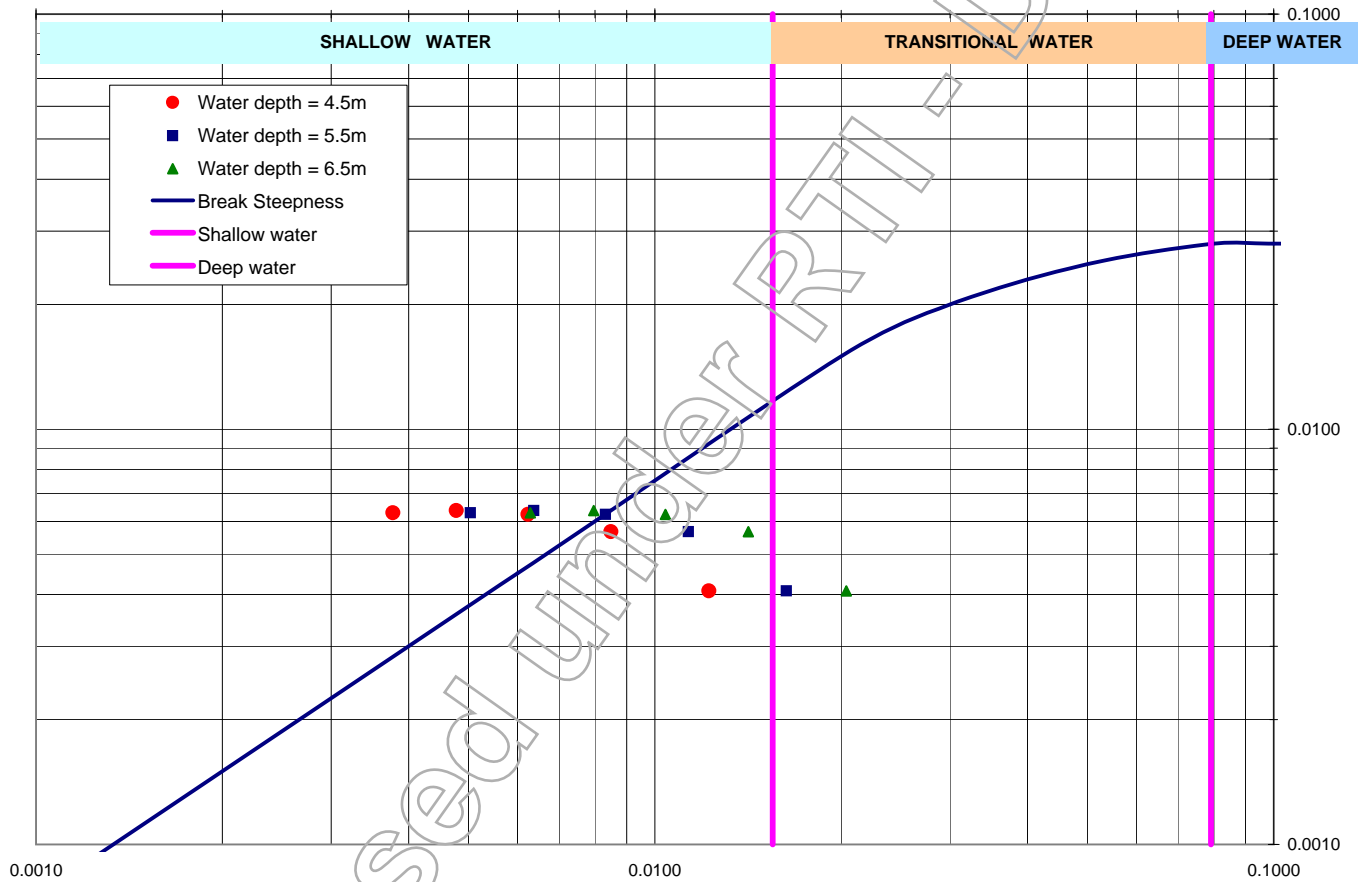
Wave Height (m)	Tp (sec)	Bed level (m LAT)	Water depth (m)	d/gT ²	H/gT ²	H/d
1	5	0.0	4.5	0.0183	0.0041	0.22
2	6	0.0	4.5	0.0127	0.0057	0.44
3	7	0.0	4.5	0.0094	0.0062	0.67
4	8	0.0	4.5	0.0072	0.0064	0.89
5	9	0.0	4.5	0.0057	0.0063	1.11
1	5	-1.0	5.5	0.0224	0.0041	0.18
2	6	-1.0	5.5	0.0156	0.0057	0.36
3	7	-1.0	5.5	0.0114	0.0062	0.55
4	8	-1.0	5.5	0.0088	0.0064	0.73
5	9	-1.0	5.5	0.0069	0.0063	0.91
1	5	-2.0	6.5	0.0265	0.0041	0.15
2	6	-2.0	6.5	0.0184	0.0057	0.31
3	7	-2.0	6.5	0.0135	0.0062	0.46
4	8	-2.0	6.5	0.0104	0.0064	0.62
5	9	-2.0	6.5	0.0082	0.0063	0.77



Still Water level 3.0 m LAT

Broken wave
Broken or near breaking wave

Wave Height (m)	Tp (sec)	Bed level (m LAT)	Water depth (m)	d/gT ²	H/gT ²	H/d
1	5	0.0	3.0	0.0122	0.0041	0.33
2	6	0.0	3.0	0.0085	0.0057	0.67
3	7	0.0	3.0	0.0062	0.0062	1.00
4	8	0.0	3.0	0.0048	0.0064	1.33
5	9	0.0	3.0	0.0038	0.0063	1.67
1	5	-1.0	4.0	0.0163	0.0041	0.25
2	6	-1.0	4.0	0.0113	0.0057	0.50
3	7	-1.0	4.0	0.0083	0.0062	0.75
4	8	-1.0	4.0	0.0064	0.0064	1.00
5	9	-1.0	4.0	0.0050	0.0063	1.25
1	5	-2.0	5.0	0.0204	0.0041	0.20
2	6	-2.0	5.0	0.0142	0.0057	0.40
3	7	-2.0	5.0	0.0104	0.0062	0.60
4	8	-2.0	5.0	0.0080	0.0064	0.80
5	9	-2.0	5.0	0.0063	0.0063	1.00



Lateral Wave Loading on a typical Jetty Bent.

Below are tabulated results of lateral loading on a typical bent spaced at 10m centres. Again, the results are presented in the form of wave height of 1m-5m and for the two different water levels. Of note is that waves of the same height in shallower water have greater velocities and hence shallow water waves generate greater forces.

The wave forces below have been calculated using 11th order stream function theory, after Dean and Dalrymple.

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Wave Height (m)	Period, Tp (sec)	Dunk Island		Clump Point	
		SWL=3m CD	SWL=4.5m CD	SWL=3m CD	SWL=4.5m CD
1	5	32	22	26	18
2	6	63	40	51	32
3	7	106	61	86	50
4	8	140	88	113	71
5	9	168	106	136	86

The 4m and 5m waves on the still water level of 3m CD have been crossed following the previous discussion that suggested non-breaking waves of this height are not plausible for the corresponding water depth. Reviewing the remaining values, we would suggest that a generic lateral load, for both jetties, of 110kN per bent is justifiable. In principle, this value is a limit state value, hence it doesn't require a load factor because it represents the peak wave height. However, there is uncertainty surrounding the water level and hence the peak wave height that is possible. In this context, a live load factor of 1.3-1.5 is arguably appropriate.

Vertical Wave Loading

The vertical component of the wave loading is understood to be a particularly critical design parameter as it governs the pile tension load. Unfortunately, vertical wave loading is also one of the most difficult quantities to assess. The Australian Maritime structures code provides limit guidance on this subject, but does provide a very basic method for calculating a load. The method is simply twice the hydrostatic submersion head. The justification for this approach is grossly simplistic and disconnected from any assessment of actual dynamic effects. Below is a tabular summary of the jetty submersion depths for various waves and water depths.

Wave Height (m)	Period, Tp (sec)	Crest Height above MSL (m)	Deck mid level submersion							
			SWL 3.0		SWL 4.5		Dunk Is		Clump Pt	
			Crest level (m CD)	Trough level (m CD)	Crest level (m CD)	Trough level (m CD)	SWD =3.0	SWD=4.5	SWD =3.0	SWD=4.5
1	5	0.55	3.55	2.55	5.05	4.05	-0.225	1.275	-0.955	0.545
2	6	1.22	4.22	2.22	5.72	3.72	0.445	1.945	-0.285	1.215
3	7	2.07	5.07	2.07	6.57	3.57	1.295	2.795	0.565	2.065
4	8	3.09	6.09	2.09	7.59	3.59	2.315	3.815	1.585	3.085
5	9	4.18	7.18	2.18	8.68	3.68	3.405	4.905	2.675	4.175

The table above highlights the extent to which the jetty is submerged. That is, for Dunk Island the deck is typically only just "visible" in the wave trough. It must be said that the proposed levels are uncharacteristically low and present significant durability issues for the facilities. To this extent we recommend the asset owner reconsider the jetty deck levels with a view to lifting the deck, and supporting beams, to well above HAT.

Below is a tabular summary of uplift pressure on the deck soffit using the crude method in AS4997, BS6349.1 and calculated from first principles based on water particle vertical velocities and accelerations.

Wave Height (m)	Period, Tp (sec)	Crest Height above MSL (m)	AS4997 Uplift Pressure (kPa)				BS6349.1	
			Dunk Is		Clump Pt		Both Jetties	
			SWL=3m CD	SWL=4.5m CD	SWL=3m CD	SWL=4.5m CD	SWL=3m CD	SWL=4.5m CD
1	5	0.55	-	26	-	11	0.8	0.7
2	6	1.22	9	39	-	24	2.7	2.2
3	7	2.07	26	56	11	42	6.2	4.7
4	8	3.09	47	77	32	62	9.6	8.4
5	9	4.18	68	99	54	84	14.1	11.7

Wave Height (m)	Period, Tp (sec)	Crest Height above MSL (m)	1st Principles Soffit uplift (kPa)			
			Dunk Island		Clump Point	
			SWL=3m CD	SWL=4.5m CD	SWL=3m CD	SWL=4.5m CD
1	5	0.55	0.8	0.5	1.1	0.6
2	6	1.22	1.3	1.0	2.0	1.3
3	7	2.07	2.5	1.7	3.8	2.2
4	8	3.09	3.0	2.3	4.7	3.2
5	9	4.18	4.4	2.6	6.8	3.5

DRAFT

From the table above one can see a significant disparity in the results that range from 100kPa (AS4997) to 12kPa (BS6349.1) to 4kPa using first principle methods. We suggest AS4997 is grossly conservative and has little technical merit, and on this basis we are inclined to disregard it.

BS6349.1, whilst based on a plausible conceptual model, is derived from the peak vertical water velocity - which occurs at the wave crest. The use of the peak crest velocity is normally sound because submergence is not normally avoided, and when it does occur, the submerged element is typically submerged by the wave crest only. This, however, is not the case for the jetties at Dunk Is and Clump Pt. Presently, for all design waves the decks are actually closer to the wave trough. Given this, it can be suggested that the BS6349.1 method overstates the loading, with the exception of small waves in combination with low tides, which would locate a wave crest near deck level.

The tabulated first principles method uses the actual water particle velocities and accelerations at the deck level, within the wave body, and in this context are the most rational.

Given the project funding constraints and the low degree of hazard to jetty damage we suggest a design uplift pressure in the order of 5kPa with a load factor of 1.5. Alternatively a limit state value

of 10kPa (no factors) is justifiable as well. For these load cases the buoyant deck dead weight should be used.

Before adopting the suggested values above the uplift pressure generated from smaller waves at lower water levels should also be reviewed in case they govern over larger waves that completely submerge the deck.

It should be noted that if the jetty deck levels are raised then the uplift pressures should be reassessed.

DRAFT

Yours faithfully
BONACCI GROUP (Qld) P/L

Terry Memory
DIRECTOR

Released under RTI - DTMR

Stephen C Day

From: Stephen C Day
Sent: Friday, 12 October 2012 5:01 PM
To: David.goodman@ccrc.qld.gov.au; tony.rooks@ccrc.qld.gov.au
Cc: David G Hamilton
Subject: Notes for Council Meeting - Background and Key issues

Flag Status: Flagged

Categories: Email filed

Gents,

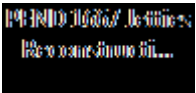
Attached are some notes I have put together giving background and design-related considerations, actions being taken to resolve, and an update of current considerations based on the latest costings from CivilPlus for the grated option and the design review report and discussion at today's meeting.

I have prepared this for your purposes rather than as a report to Council. I will leave it to you to decide what you present to Council.

I suggest you see if Scott is able to give some sense of the cost of a refined design option before your meeting as this will be a key consideration for Council.

My apologies for not being available for this meeting. When I committed to go to Barcaldine, I did not expect we would be dealing with quite so challenging an issue.

I will be checking my email each night and will have my phone with me. I will be in the office Tuesday morning, but may otherwise be out of range Monday to Wednesday.



Kind regards,

Stephen Day
Engineer (Civil) | Far North Region / Cairns Office
Program Delivery & Operations | Department of Transport and Main Roads

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Queensland
Government



CLUMP POINT & DUNK ISLAND JETTIES RECONSTRUCTION

**DESIGN ISSUES
PILE COSTS**

For Internal Project Use Only

Prepared by
Stephen Day
Project Manager

12 October 2012

Released Under RTI - QLMR

Issue

- CivilPlus Constructions has advised that pile lengths developed from the geotechnical investigation results have resulted in increased pile lengths at an estimated additional cost of \$0.6m
- Works have been delayed pending a final commitment to pile lengths

Background

General

- CivilPlus Constructions Pty Ltd (CivilPlus) were awarded the contract for reconstruction of the jetties based on preliminary design
- At the time of award, the geotechnical investigation had not been completed, but historical geotechnical information including boreholes and pile driving records for the previous (1961) Clump Point jetty were available and used for preliminary determination of pile lengths
- CivilPlus adopted what appeared from historical records and other design information to be a conservative design for pile lengths
 - CivilPlus design was based on:
 - At Clump Point, pile lengths of 20 metres - 5 metres longer than those of the current jetty and 10 metres longer than those of the 1961 jetty
 - At Dunk Island, pile lengths of 15 to 17 metres – several metres longer than the existing jetty

Not Relevant

- The geotechnical investigation has produced unexpected outcomes in terms of the length of pile required to provide adequate support
- The additional lengths of pile would add \$0.6m to the cost of the works

Geotechnical Investigation

- Golders were engaged on 25th May 2012 to carry out the geotechnical investigation
- Original offer was to commence within 2 weeks and complete within 6 weeks (7 July)
- Delays were experienced obtaining approval to the EMP from GBRMPA to undertake the works, with the EMP requiring multiple submissions.
- As a result, the subcontractors organised to undertake the works could not be rescheduled for several weeks.
- Decision to recommend award of the works was based on a review of the existing information and assessed likelihood of significant variation from the assumed pile lengths. Risks were assessed to be low relative to the costs of delays (see above).
- Field work completed 28-31 Aug 2012
- Seismic report forwarded 13 Sept 2012
- Pile driveability report (for CivilPlus) 21 Sept 2012
- Pile length and additional costs notified by CivilPlus 26 Sept 2012
- Final geotechnical investigation report forwarded to Project Manager 28 Sept 2012

Design Considerations

Design Wave Loads

- The critical design loads for both uplift and down loads are caused by wave loadings
- STP Consultants (designer for CivilPlus) have essentially followed the methodology in Australian Standard 4997 - *Guidelines for the design of maritime structures* to calculate wave uplift and downward loads
- The Australian Standard method for calculating design wave loads is generally considered conservative for design purposes and, being a guideline, offers some scope for more refined design methods
- STP's calculated wave loads are significantly greater than those adopted by the other designer, GHD.
- More refined methods commonly used by the industry may result in significant reduction in design wave loads

Design Wave Event

- Original brief requirement was for a 50-year design life, with the jetty to be survivable in a 1 in 500 year storm event (eg. Cat 4 cyclone)
- The intent was to achieve a level of resilience whereby the main structure would not suffer significant damage to key components that could not be rectified at relatively low cost in a reasonable time frame
- The Australian Standard would allow this structure to be designed for a 1 in 200 year event (eg. Cat 3 cyclone)
- When designing for extreme events, such as a 1 in 500-year storm event consideration is often given to the probability of certain events occurring together (eg design storm, tides, wind direction, etc) to understand the probability an event will arise and cause damage.
- Traditional design methods and factors of safety can lead to unrealistically conservative designs and there is often scope for the designer

Construction Loading

- Due to the method of construction, the next highest critical load at Clump Point are crane loads during construction
- If wave loads are significantly reduced, construction loads would still require some longer piles at Clump Point by the current design

Geotechnical Results and Design

- The geotechnical investigation included 2 boreholes taken from the shore at each site and seismic testing through the full site
- The boreholes and seismic results indicate a weak layer overlying stiffer layers at depth
- Geotechnical design can also be somewhat conservative with high safety factors
- The assessed strength of the weak layer appears to be quite low given that previous jetties did not penetrate to the deeper stiffer layers

Actions taken

Alternative Design – Grated Decking Option

- CivilPlus have been investigating alternative design solutions that will enable works to proceed within the available budget
- Proposed design solution is to use grated decking to reduce wave loads and pile lengths (see Civil+ email 11th Oct)
 - Full grating at Dunk Island
 - Partial grating at Clump Point
- Total cost estimate (including other agreed variations) is \$4,923,447
 - \$82,171 above the original tender price of \$4,841,276
 - \$260,000 above revised post-tender price inclusive of negotiated savings
- Design is based on Australian Standard methodology
- Grated deck can support 10kPa deck loading, but not the additional point loading for a Class 10 loading. It should achieve Class 5 (similar to existing jetty) which would be adequate for a golf buggy or small utility.
- Proposed grating includes 30mm gap between grates

Design Review

- With strong potential for overly-conservative design, it was appropriate to review the design methodology and criteria
- STP carried out an initial review with some reductions in wave loading, but little change to design pile lengths
- Discussions were held with a more experienced marine design firm (Bonacci Group) confirming that there appeared to be potential to achieve an outcome closer to the original concept by using more refined design methods and design criteria
- Bonacci Group were subsequently engaged to:
 - carry out a high level review and provide comment on:
 - wave height and return interval currently being used in design
 - design criteria being used, including reference to criteria associated with existing infrastructure that is to be re-used.
 - pile capacities used and potential for alternative solutions, if any
 - undertake assessment and quantification of design wave forces on the jetty

Outcomes of Design Review

Key outcomes (refer Bonacci Group draft report).

- Australian Standard are guidelines, not prescriptive code
- For type of structure, it would be reasonable to adopt:
 - Reduced design storm event from 1 in 500 to 1 in 200
 - Reduction in design life from 50 years to 25 years
 - Reduction in vessel loadings (100T to 65T -> large catamaran ferry)
 - Reduced load class (Class 15 to Class 5+emergency vehicles)
 - Reduced design wave heights and loadings (100kPa -> possibly 10kPa)

Outcomes from teleconference on Friday 12 Oct 2012

- Bonacci to prepare final design review report by COB Monday 14th
 - include further review to ensure lower wave heights do not cause higher loads
- Bonacci to provide separate comment on geotechnical design considerations
- STP to review Bonacci report and redesign pile loads and pile length by Thursday
- Civil+ to provide updated costings by Friday
- Team to meet by teleconference Friday

Options

The following options for moving forward are available:

OPTION	COMMENT
Original concept to CivilPlus design	<ul style="list-style-type: none">• \$0.6m additional funding
Grated decking (per CivilPlus)	<ul style="list-style-type: none">• \$0.26m additional funding• Reduced design loads at Dunk Island
Original concept with original pile lengths	<ul style="list-style-type: none">• Minor (delay) costs• Increased risk of damage during construction and major storm events• May be acceptable risk with improved design methodology
Original concept with refined design methodology	<ul style="list-style-type: none">• Lower pile lengths at Dunk -> savings• Construction controls at Dunk -> higher costs• Expect some increased costs

Summary

- CivilPlus have indicated additional costs of \$0.6m to achieve original concept design due to longer-than-expected pile lengths
- Two options to reduce costs are currently being explored:
 - Use full or partial grated deck to reduce wave loads on the deck at additional cost estimated at \$260,000
 - Refine the design to remove conservatism in the methods nominated in Australian Standard. Revised costings not yet known, but expected to be higher than original
- A combination of these two options may also be viable
- Project is delayed pending resolution
 - Priority is to finalise design concept and pile lengths for Dunk Island
 - Finalisation of Clump Point design and pile lengths may occur slightly later

Recommendation

- Evaluate options once refined design approach is finalised and costings are known

Stephen C Day

From: Terry Memory <tmemory@bonacciqld.com>
Sent: Tuesday, 16 October 2012 5:06 PM
To: Stephen C Day
Cc: David.goodman@ccrc.qld.gov.au; Scott Ironside; Anthony Florence; 'Peter Lyons'
Subject: Design criteria report
Attachments: B3872_Design Criteria report_tm_02.pdf; image001.jpg

Flag Status: Flagged

Categories: Email filed

Stephen

Please find attached our report on the design criteria for the Dunk Is and Clump Pt jetties.

Cheers

Terry Memory

Director

tmemory@bonacciqld.com

Mobile:



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16 October, 2012
B3872_tm_02.doc

Department of Transport and Main Roads
PO Box 6185
Cairns Qld 4870

Attn: Stephen Day

Clump Point and Dunk Island Jetty Design Criteria Review

Dear Stephen

As requested we have undertaken a review of the design criteria used for the abovementioned project. In particular, our review has focussed on the development of design wave criteria and the application of these criteria to the structural design. Additionally, and to facilitate discussion, we have also provided commentary on the specified general design criteria.

The following documents were used during the review:

- Brief and Functional Specification, Invitation No. 028NDR11, Clump Point and Dunk island Jetty Reconstruction. (TMR Spec).
- GHD letter dated 15 June 2011, RE: Clump Point Jetty:- Preliminary Assessment of Wave.
- GHD 50% Design and documentation report, "Clump Point and Dunk Island Jetties".

1 GENERAL DESIGN CRITERIA

The TMR specification cited above is a comprehensive document that provides background information, context and also technical design criteria. The document repeatedly makes explicit reference to the project's funding constraints and the need for the design to be balanced with respect to "*optimum usability and benefit to the community*". This framework, or intent, is arguable very justifiable given the very real funding constraints and the fact that the jetties in question would not be deemed major, or critical, infrastructure by normal industry, or government, measures.

The document does, however, also specify general vertical loading criteria in a prescriptive manner and also states that the jetty shall be "survivable" in all storm events up to 500 year ARI. Consequently the principle of balancing the project costs against optimum usability and benefit to the community is compromised because the designer is not free to make informed professional judgements pertaining to key design criteria. Below we offer our comments regarding the specific design criteria.

1.1 Design Life

Specified design life = 50 years

The use of 50 years is the industry standard, however, given the following factors:

- The capital cost funding is limited
- The facilities are jetties, in a marine environment, and hence to achieve a 50 years life will require constant maintenance. Additionally, the deck levels have been set very low relative to the normal water and wave levels. Consequently, damage and general degradation to the structures is likely to be higher than normal because the deck will be fully submerged in modest storm events, such as, a 1 year ARI storm, or king tides with ambient waves. Also, for Dunk Island, the pile headstocks are wetted on every tide cycle.
- The local council may experience maintenance funding constraints, which is typical for regional Queensland. If maintenance funding limitations are coupled with the accelerated degradation, as discussed above, the result will be a lesser usable life for the facility. In short, it is only cost effective to design for a 50 years life if the asset owner can afford to maintain the structure over that life span.
- The jetties are in a cyclonic region, even if designed to a high ARI event, may still not survive the event because natural events are inherently probabilistic. The principle we seek to highlight is that one can design for a 1 in 500 year event, however, a 1 in 1000 year event could happen any time within the 50 years design life.

Suggestion: Consideration is given to using a 25year design life, as per table 5.4 of AS4997 "Small craft facility", see below:

Annual Probability of exceedance of design wave event (expressed as an ARI)

Category Description		Design working life (years)			
		5 or less temporary works	25 small craft facilities	50 normal maritime structures	100 or more special structures / residential developments
1	Structures presenting a low degree of hazard to life or property	20	50	200	500
2	Normal structures	50	200	500	1000
3	High property value or high risk to people	100	500	1000	2000

Deck level and the superstructure configuration as a whole should be reviewed to lift concrete members out of the submersion zone. This is particularly the case for Dunk Island Jetty.

1.2 Design Vessels

The following vessel criteria were specified.

Dunk Island = 20m long, Displacement 60 tonne
 Clump Point = 25m long, Displacement 110 tonne

The design vessels displacement masses are arguably on the high side which adds cost to the project because it necessitates larger fenders, which in turn, generate larger berthing forces. For comparison purposes a 25m long x 150 Pax catamaran ferry typically has a displacement of 55-60t, likewise a similar 35m long x 400 Pax ferry has a typical displacement of 120t.

Suggestion: Consideration is given to using the following criteria-

Dunk island = 20m long, Displacement 45 tonne

Clump Point = 25m long, Displacement 65 tonne

1.3 Deck load Case

The following deck load criteria were specified.

- Dunk island = Class 15, being 15kPa UDL or 20t point load at 4m crs in any direction.
- Clump Point = Class 15, being 15 kPa UDL or 20t point load at 4m crs in any direction.

The functional description associated with difference classes of marine structure are reproduced from AS4997 below, refer table 5.1. When selecting a structural class, one should appreciate that the UDL will typically govern the pile compression capacity requirements, whereas point loads will govern the deck thickness design. Whilst the Class15 description within table 5.1 may appear representative of the functional intent we suggest it warrants review. That is, whilst the facilities could arguably be described as a "light-duty wharf or jetty etc..." we suggest the corresponding loading for a class 15 facility is not consistent with the functional requirements of this project. In particular, it is anticipated that a class 15 deck will see T44 truck loading and mobile cranes of up to 20t, consistent with a fully operational commercial marine/fishery facility. We suggest the functional scope of the two jetties is more closely aligned to public boardwalks, recreational fishing and small craft use and infrequent emergency services access and should therefore attract a loading class of 5 or 10.

1.3.1 Special Considerations for Dunk Island Jetty

Of significant importance is the fact that the Dunk Island jetty retains part of the existing structure with has a Class 5 rating. Meaning, that whilst the new section could be designed to Class 15, as specified, the facility as a whole is limited to Class 5. We concur that the jetty should have the capacity to drive small emergency vehicles on the deck. To this end we suggest a combination of Class 5 (UDL) and Class 10 (concentrated loads) maybe appropriate, refer suggestion below.

1.3.2 Special Considerations for Clump Point Jetty

We understand that there is an expectation that Clump Point Jetty will be able to accommodate small fuel trucks, for refuelling vessels. Additionally, the construction of Clump Point Jetty uses an "over the top" construction methodology employing an 85t crawler crane. This means that the 85t crane will temporarily load the permanent works. Having the construction loading govern the permanent design is not desirable because it can lead to inefficiency in the design. It is acknowledged, however, that in this case the cost of mobilising marine plant to construct the jetty is not necessarily cost effective either; hence a system governed by temporary loading may, on balance, be the most cost effective solution. As a closing comment, and at the risk of stating the obvious, we highlight that the optimal pile solution probably occurs when the headstocks are spaced such that the peak operational crane mass (including hook load) equals the total in service dead+live load, per headstock. Accordingly, suggested headstock spacing as a function of UDL are listed below, assuming a 5m wide x 250mm deck.

	UDL (kPa)		
	5	10	15
Span length (m)	35.4	18.8	12.8

Assumed maximum crane operational mass = 100 tonnes

Assumed precast deck thickness = 250mm

TABLE 5.1
MARITIME STRUCTURES—DECK LOAD CLASSIFICATIONS

Class	Uniformly distributed load (Q) (see Note 1)	Concentrated load (area, mm) s = spacing, m (see Note 2)	Anticipated load conditions	Application
5	5 kPa	20 kN (150 × 150) s = 1.8	Pedestrian crowd load. Light motor vehicles up to 3 t tare	Private and public boardwalks. Passenger jetties
10	10 kPa	45 kN (300 × 150) s = 1.8	Small emergency vehicles	Public boardwalks and promenades with access for emergency vehicle and service vehicles
15	15 kPa	200 kN (400 × 700) s = 4.0	Bridge design code (W7, W8, A160, T44 loading) Small mobile crane up to 20 t SWL	Light-duty wharf and jetty for fishing industry, charter boat industry, ferry wharves, light commercial activities
25	25 kPa	500 kN (700 × 700) s = 5.0	Bridge design code (SM1600 heavy platform loading) Mobile crane 50 t SWL	Secondary port general cargo wharf
40	40 kPa	1000 kN (1000 × 1000) s = 7.0	Container forklift and other machinery for 40 ft containers Mobile crane 100 t SWL	General cargo wharf or container wharf (For containers stacked 2 high ship-side, see Note 3 & Appendix A)
50	50 kPa	1500 kN (1000 × 1000) s = 8.0	Container forklift, reach stacker and other machinery for largest containers Mobile crane 150 t SWL	Primary port, international gateway container terminal (For containers stacked 2 high ship-side, see Note 3 & Appendix A)
60	60 kPa	2000 kN (1000 × 1000) s = 9.0	Mobile crane to 200 t SWL	Heavy-duty maintenance wharf

Suggestion: In light of the special considerations discussed above we suggest the following criteria.

Dunk Island Jetty:-

The jetty is signed with the following load limitations:

- Maximum Uniformly distributed load = 5kPa
- Maximum vehicle mass = 5 tonne

We suggest the design criteria corresponding to this signage is: UDL = 5 kPa or 45kN point loads at 1.8m crs in any direction.

Below in the wave study section of this report we suggest downward wave pressure of 10kPa, in combination with the buoyant mass of the deck and a 1.5 load factor. This loading is larger than the 5kPa live load suggested. Whilst the use of a Class 5 deck loading and 10kPa wave loading is rational, because the two types of loading are independent to one another, it could be suggested that the criteria are somewhat paradoxical. Given the 10kPa wave loading, we acknowledge that the use of a Class 10 loading, as per AS4997, would be a rational design decision.

Clump Point Jetty:-

We highlight, that in our experience, vessel refuelling capability on a jetty triggers several other design requirements associated with safety, access limitations and fire fighting. Hence we suggest that whilst the idea of permitting a refuelling vehicle on the jetty deck is functional, it introduces another layer of planning and functional control which may, in practice, be impractical. We therefore suggest the requirement for a refuelling vehicle be reviewed to ensure compliance to regulatory requirements can be achieved within the budget of the project. If the refuelling vehicle is subsequently omitted as a design requirement we suggest the Dunk Island load criteria above be used for Clump Point Jetty. Additionally, we suggest consideration be given to increasing the headstock spacing from 10m to 12-15m, to gain some efficiency in the substructure design, given the use of the crawler crane during construction.

Should the refuelling vehicle remain as a design criterion, we suggest the jetty be designed as Class 10 facility, as per table 5.1 of AS4997. Additionally, should the refuelling vehicle have a gross mass of greater than 5t, the deck should be explicitly checked/designed for the refuelling vehicle or a generic equivalent.

1.4 Design Wave Average Recurrence Interval (ARI)

The specification calls for the design to be "survivable" in storm (cyclonic) event up to a 500 year average recurrence interval (ARI).

We believe the origins for this requirement are quite straight forward, being a 50 year design life and a function category 2, as previously shown in table 5.4 of AS4997. As discussed above, however, we suggest this facility could be justifiably re-classified as either:

- a) A 25 year design life with a function category 2 = 200 year ARI or
- b) A 50 year design with a function category 1 = 200 year ARI

Either way the design wave event is reduced from a 500 year ARI to a 200 year ARI.

Suggestion: Consideration is given to using a 200 year ARI wave event criterion.

2 WAVE CLIMATE STUDY

The methodology employed by GHD in preparing the wave climate study appears to be commensurate with the project budget and scale, and therefore suitable to the purpose of establishing design wave characteristics. It is nevertheless appropriate that key assumptions are understood, along with the practical application of these criteria to structural analysis and design. When assessing marine structures the following basic steps are undertaken:

- a) Establish a design average recurrence interval, ARI.
- b) Assess wave data to establish a wave height, typically the H_s wave, that corresponds to the chosen ARI criterion.
- c) Simulate combinations of cyclone with tidal levels to establish a design still water level that corresponds with the design wave
- d) Convert the design wave and water level into a force on the structure.
- e) Perform a structural analysis to ascertain the piles loads and other design actions.
- f) Perform a geotechnical assessment to establish provisional pile lengths.

Each step listed above can be done with various methods, typically of varying sophistication. Each step also requires assumptions. The scope for the accumulation of conservative assumptions and/or simplistic methods is therefore high, and this can lead to a less than optimal design outcome.

Item a) has already been discussed above in section 1.0, and will not be addressed any further. Item b) and c) will be discussed below for completeness.

2.1 Wave height and water level criteria

For the purpose of this discussion the important tidal planes for both jetties are:

HAT = +3.62 m CD
 MSL = +1.73 m CD
 LAT = 0.00 m CD

Given the limited size of this project GHD, understandably, did not simulate cyclones with varying tides to establish a statistical estimate of the design still water level associated with different ARI events. Instead, we understand learned estimates were used, as shown in table 3 of the GHD report, and reproduced below for convenience.

Table 3 Wave Levels for Modelling Purpose (based on Cardwell)

Return Period	Water Level (mCD)
1	+4.1
3	+4.1
10	+4.4
50	+4.6
100	+4.8

We understand from the GHD report that a still water level of +4.8m CD was used in the Mike 21 model to establish wave heights for a 100 year ARI cyclone event. It is important to realise that both decks, at Dunk Is and Clump Point are fully submerged by this water level. The water depths over the two decks are 0.9m and 0.2m respectively.

Additionally, and as stated in the report, the still water depth of +4.1m CD for a 1 year ARI conservatively represents HAT at Cardwell, being 0.5m higher than HAT at the project site. For completeness HAT actually occurs every 17 years only, based on lunar cycles, however “king tides” typically approach this level (within a few hundred millimetres) for a number of days each year.

The +4.8m CD water level presumably represents a notional storm surge difference of 0.7m between and ARI 1 year and 100 year event. Likewise, it could be implied that GHD are suggesting the storm surge on the 1 year ARI event is 0.5m, being the difference between +4.1m CD and the actual site HAT of +3.6m CD. This would suggest an implied total surge of 1.2m for a 100 year ARI event which, when compared to TC Larry’s known surge of 2.3m, seems plausible.

There are two critical points of note here, being:

- The basis of the still water level is particularly vague, and this is in no way a criticism of GHD. Rather, it is simply the acknowledgment that a project of this scale does not justify the intensive wave modelling that is required to achieve more reliable predictions. The water levels cited above should be understood in their true context, that is, they are a learned guess.
- It should be understood that a storm surge coinciding with an HAT event is as probable as it coinciding with a LAT event. If we accept the 100 year ARI surge is notionally 1.2m the most probable still water level is the surge plus MSL, and the more probable peak water level, is surge plus MHWS. These scenarios result in still water levels +3.0m CD and +4.0m CD respectively.

The GHD report predicts Hs wave heights in the order of 3-4m for an ARI 100 year events at the -2.0m CD seabed level, and approx 1.0m for a 1 year ARI event. The report also seeks to correlate actual cyclone wave data to the Mike 21 model and concludes that the 1.0m ARI 1 year wave corresponds to a 3.0m wave at the testing station and therefore the wave climate is dominated by cyclonic/storm events. That is, the implied suggestion is that the typical wave environments at the jetty sites are benign and only become elevated in storm conditions.

In the 50% Design and documentation report, GHD cite 500 year ARI significant wave heights (Hs) as being 3.0m for Dunk Island and 4.2m for Clump Point and a still water level of +4.53m CD. These wave heights are only marginally greater than the 100 year ARI events and the still water level is less. The revised 100 year ARI still water level is +4.18m CD, compared to the previous value of +4.8m CD, refer table 14, reproduced below for convenience. It must be noted again that the 1 year ARI water level is simply HAT at the project site, opposed to Cardwell, which was used in the original report.

Table 14 Wave Levels for Modelling Purpose (based on Wongaling Beach)

Return Period	Water Level (mCD)
1	+3.62
3	+3.62
10	+3.93
50	+4.03
100	+4.18
500	+4.53

We therefore conclude that the 50% design report represents a refinement of the original wave study report. Moreover, the wave heights and water levels cited in the original report are possibly overstated and the water levels cited above are still learned estimates only.

For the purposes of structural design it is quite common to convert the significant wave height (Hs), being the average height of the top 30th percentile, to a "design" wave height. Different methods are used and conversions to the top 10th percentile are common and labelled and H₁₀ wave height. The peak wave, being notionally the top one percentile wave, H₁, is also a wave height of interest. Historically, the Hs wave was used for structural design with conventional load factors, or the H₁₀ wave for extreme loading. The H₁ wave was often use to set level, but not used for structural design because it is too extreme. In BS6349.1 the concept of Hmax and average Hmax are used. AS4997 specifies the design wave as H₁, without a load factor, as this wave is deemed to be the ultimate limit state condition. However, even without a load factor, this requirement can be excessive or impractical at times, depending on the circumstances.

Using AS4997 the design H_s wave should be increased by a factor of 1.7 to convert it to an H_1 design wave. This would mean the design waves for Dunk Is and Clump Pt are 5.1m and 7.14m respectively if the 500 year ARI event is maintained. As will be discussed below, we suggest waves of this size are implausible for the site in question.

2.2 Maximum Plausible Wave Height relative to water depth

The preceding part of this report has sought to highlight, and explain, the following:

- a) The still water depth criteria used to date are estimates only
- b) The techniques used by GHD to predicted wave heights are well established, however, for this project they are linked to estimated still water depths only. Additionally, these still water depths appear a little too conservative as they predict 5-7m waves some 150m offshore at the seabed level of RL-2.0m CD.
- c) Using the GHD predicted water levels and waves heights, both jetties are subject to frequent and complete submersion because they are set too low.

The key purpose of this section is to:

- a) Explore the plausibility of large non-breaking waves at the seabed contour of -2.0m CD
- b) Quantify plausible peak wave heights along the entire length of the jetty, being notionally wave heights at the -1.0m CD and 0m CD contours.
- c) Explore the effects of smaller waves within the normal tide range, which can be more damaging, because their crest's coincides with the jetty deck level.

2.2.1 Maximum plausible wave heights associated with storm surges and based on Wave Steepness

As a wave approaches the shore the energy contained within it is "redistributed" as the available water depth reduces. The wave consequently grows steeper and ultimately breaks. The breaking action dissipates energy as turbulence, but prior to breaking the crest velocities are maximised.

The point when a wave becomes unstable is generally regarded to be when the water depth is less than 1.3 x wave height.

The following two pages graph and tabulate non-dimensional wave steepness parameters that indicate the stability state of the wave. The parameters used are designs wave heights of 1m to 5m , still water levels of 3.0m CD and 4.5m CD, and sea bed levels of -2.m CD, -1m CD and 0m CD.

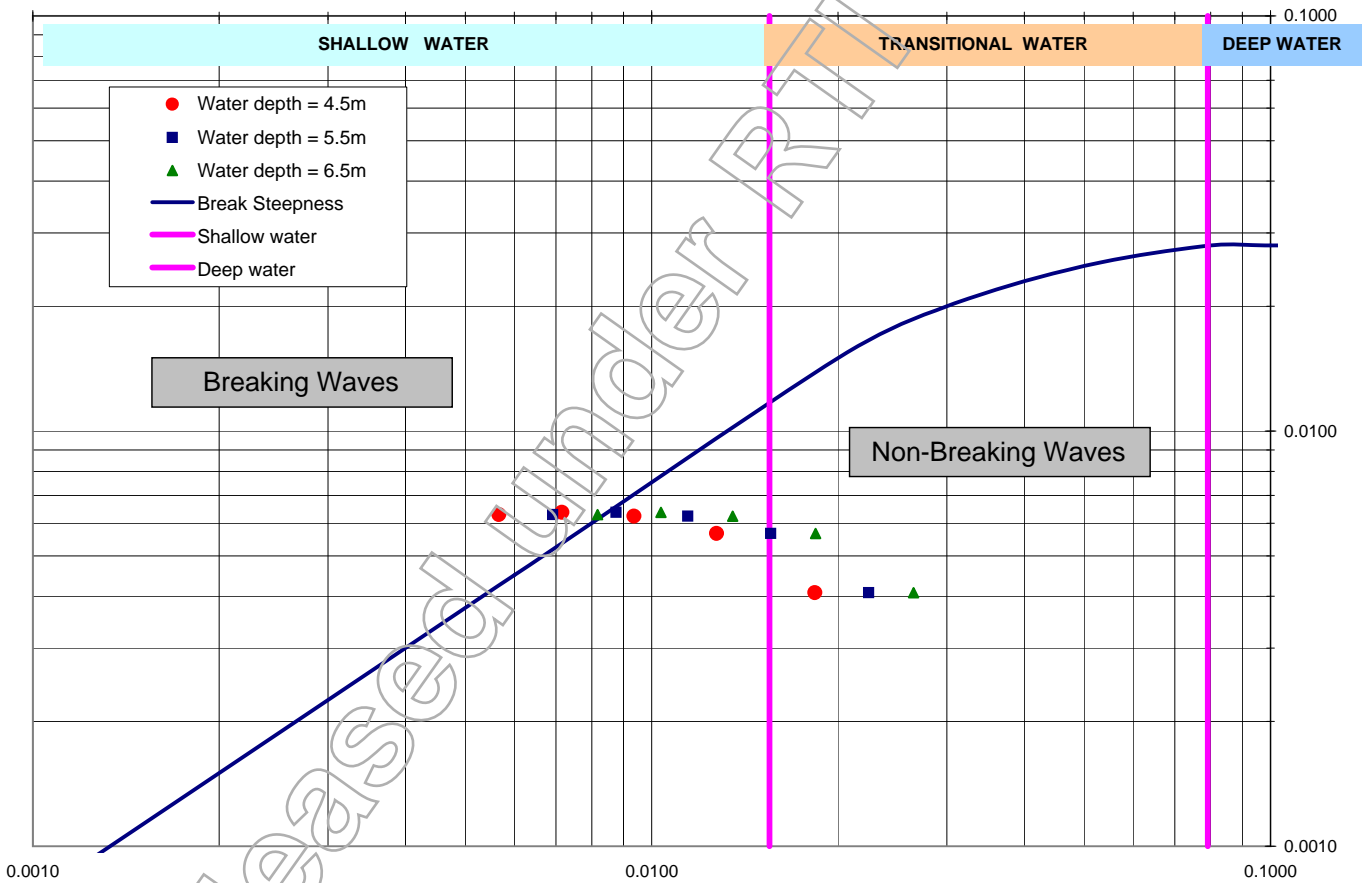
The conclusion of the steepness curves are:

- a) For still water levels of 4.5m CD, 5m high waves are only just sustainable at the jetty head and in broad terms the realistic maximum height of non-breaking along the majority of the jetty is 3.0m
- b) For still water levels of 3.0m CD, the realistic maximum non-breaking wave height is 3m. Likewise, along the majority of the jetty the realistic maximum non-breaking wave height is limited to 2.0m.

Still Water level 4.5 m LAT

- Broken wave
- Broken or near breaking wave

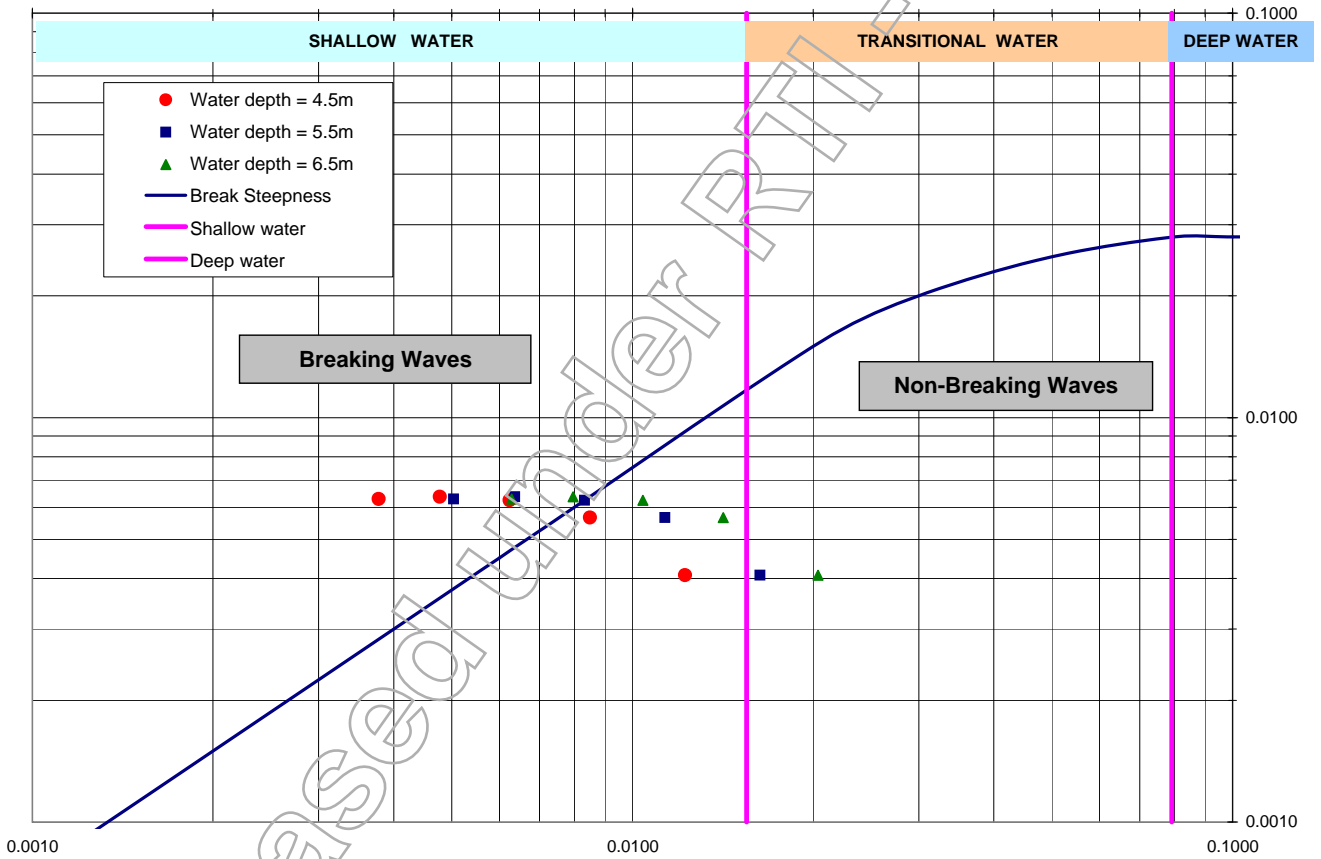
Wave Height (m)	Tp (sec)	Bed level (m LAT)	Water depth (m)	d/gT ²	H/gT ²	H/d
1	5	0.0	4.5	0.0183	0.0041	0.22
2	6	0.0	4.5	0.0127	0.0057	0.44
3	7	0.0	4.5	0.0094	0.0062	0.67
4	8	0.0	4.5	0.0072	0.0064	0.89
5	9	0.0	4.5	0.0057	0.0063	1.11
1	5	-1.0	5.5	0.0224	0.0041	0.18
2	6	-1.0	5.5	0.0156	0.0057	0.36
3	7	-1.0	5.5	0.0114	0.0062	0.55
4	8	-1.0	5.5	0.0088	0.0064	0.73
5	9	-1.0	5.5	0.0069	0.0063	0.91
1	5	-2.0	6.5	0.0265	0.0041	0.15
2	6	-2.0	6.5	0.0184	0.0057	0.31
3	7	-2.0	6.5	0.0135	0.0062	0.46
4	8	-2.0	6.5	0.0104	0.0064	0.62
5	9	-2.0	6.5	0.0082	0.0063	0.77



Still Water level 3.0 m LAT

Broken wave
Broken or near breaking wave

Wave Height (m)	Tp (sec)	Bed level (m LAT)	Water depth (m)	d/gT ²	H/gT ²	H/d
1	5	0.0	3.0	0.0122	0.0041	0.33
2	6	0.0	3.0	0.0085	0.0057	0.67
3	7	0.0	3.0	0.0062	0.0062	1.00
4	8	0.0	3.0	0.0048	0.0064	1.33
5	9	0.0	3.0	0.0038	0.0063	1.67
1	5	-1.0	4.0	0.0163	0.0041	0.25
2	6	-1.0	4.0	0.0113	0.0057	0.50
3	7	-1.0	4.0	0.0083	0.0062	0.75
4	8	-1.0	4.0	0.0064	0.0064	1.00
5	9	-1.0	4.0	0.0050	0.0063	1.25
1	5	-2.0	5.0	0.0204	0.0041	0.20
2	6	-2.0	5.0	0.0142	0.0057	0.40
3	7	-2.0	5.0	0.0104	0.0062	0.60
4	8	-2.0	5.0	0.0080	0.0064	0.80
5	9	-2.0	5.0	0.0063	0.0063	1.00



2.2.2 Maximum plausible wave heights associated with normal tides based on Wave Steepness

The previous section dealt with notional “cyclonic waves” coupled with still water level storm surges at notionally MSL and MHWS. This section examines plausible maximum waves, based on wave steepness theory alone, for still water levels within the normal tidal range, being MLWS to MHWS. Additionally, smaller than the maximum plausible waves, for a given water depth, are also examined because the crest of these waves will strike at deck level

The peak water velocities and acceleration in a wave occur at the wave crest. Accordingly, these smaller waves at low water levels are important, because whilst their absolute velocities and accelerations are less than cyclonic waves, their crest coincide with the deck - unlike the larger waves, hence they can govern the design.

The following page contains two tables of wave information for Dunk Island and Clump Point jetties respectively. For each jetty the upper table summaries still water depth for different seabed levels and different tides. The second block of data in each table calculates the maximum plausible wave height based on steepness alone, irrespective of probability or ARI. The third block of data summaries the wave crest height above SWL for the wave height in the second block. Likewise, the fourth block of data is the wave crest elevation. The last block of data is the deck inundation distance at the wave crest. The diagonally crossed cells are values for which the wave passes under the deck. For this exercise, the yellow highlighted cells are the waves of interest because they roughly coincide with the deck level.

The second table for each jetty is essentially the same as the first, however, the pale brown cells have been changed, relative to the first table. The change is a reduction in the maximum plausible wave height, to a lesser wave, and has been strategically done to align the wave crest with the jetty deck level. The reason for assessing smaller waves that strike at deck level was discussed above.

The lesser waves of interest are therefore the yellow and brown highlighted waves and are summarised below for completeness.

Dunk Island Jetty

Seabed level (m CD)	Still water level (m CD)	Corresp. Tidal plane	Still water depth (m)	Wave Height (m)	Period, Tp (sec)	Crest level (m CD)	Deck submersion (m)
-2	1.73	MSL	3.7	2.9	7.0	4.2	0.3
				2.7	7.0	4.0	0.1
-1	2.01	MHWN	3	2.3	6.5	4.0	0.1
0	2.72	MHWS	2.7	2.1	6.0	4.5	0.6
				1.7	6.0	4.0	0.1

Clump Point Jetty

Seabed level (m CD)	Still water level (m CD)	Corresp. Tidal plane	Still water depth (m)	Wave Height (m)	Period, Tp (sec)	Crest level (m CD)	Deck submersion (m)
-2	2.72	MHWS	4.7	3.7	7.5	5.8	1.2
				2.7	6.5	4.7	0.1
-1	2.72	MHWS	3.7	2.9	7.0	5.2	0.5
				2.5	6.5	4.7	0.1

Wave of limited interest because deck excessively submerged, refer cyclonic study instead
 Critical Waves, for deck within crest
 Wave height (less than Hmax) with crest at deck level

Dunk Island Jetty

Still water Level (SWL)	Still water depth (m)						Plausible Hmax, assuming max steepness of H/d =0.78 (m)						Crest height above SWL (m)						Crest Level (m CD)						Deck submerision depth (m)						
	Bed level=-2		Bed level=-1		Bed level=0		Bed level=-2		Bed level=-1		Bed level=0		Bed level=-2 m CD		Bed level=-1 m CD		Bed level=0 m CD		Bed level=-2 m CD		Bed level=-1 m CD		Bed level=0 m CD		Bed level=-2 m CD		Bed level=-1 m CD		Bed level=0 m CD		
	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	
MLWS	0.79	2.8	1.8	1.8	0.8	0.6	2.2	1.4	1.4	0.6	1.87	1.20	0.51	1.30	1.99	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
MLWN	1.49	3.5	2.5	2.5	1.5	1.2	2.7	1.9	1.9	1.2	2.28	1.60	1.02	2.51	3.09	2.51	2.51	2.51	2.51	2.51	2.51	2.51	2.51	2.51	2.51	2.51	2.51	2.51	2.51	2.51	2.51
MSL	1.73	3.7	2.7	2.7	1.7	1.3	2.9	2.1	2.1	1.3	2.44	1.77	1.10	2.83	3.50	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83
MHWN	2.01	4.0	3.0	3.0	2.0	1.6	3.1	2.3	2.3	1.6	2.59	1.94	1.36	3.37	3.95	3.37	3.37	3.37	3.37	3.37	3.37	3.37	3.37	3.37	3.37	3.37	3.37	3.37	3.37	3.37	3.37
MHWS	2.72	4.7	3.7	3.7	2.7	1.7	3.7	2.9	2.9	1.7	3.09	2.44	1.26	3.98	5.16	3.98	3.98	3.98	3.98	3.98	3.98	3.98	3.98	3.98	3.98	3.98	3.98	3.98	3.98	3.98	3.98

Wave of limited interest because deck excessively submerged, refer cyclonic study instead
 Critical Waves, for-deck within crest
 Wave height (less than Hmax) with crest at deck level

Glump Point Jetty

Still water Level (SWL)	Still water depth (m)						Plausible Hmax, assuming max steepness of H/d =0.78 (m)						Crest height above SWL (m)						Crest Level (m CD)						Deck submerision depth (m)							
	Bed level=-2		Bed level=-1		Bed level=0		Bed level=-2		Bed level=-1		Bed level=0		Bed level=-2 m CD		Bed level=-1 m CD		Bed level=0 m CD		Bed level=-2 m CD		Bed level=-1 m CD		Bed level=0 m CD		Bed level=-2 m CD		Bed level=-1 m CD		Bed level=0 m CD			
	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD		
MLWS	0.79	2.8	1.8	1.8	0.8	0.6	2.2	1.4	1.4	0.6	1.87	1.20	0.51	1.30	1.99	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	
MLWN	1.49	3.5	2.5	2.5	1.5	1.2	2.7	1.9	1.9	1.2	2.28	1.60	1.02	2.51	3.09	2.51	2.51	2.51	2.51	2.51	2.51	2.51	2.51	2.51	2.51	2.51	2.51	2.51	2.51	2.51	2.51	2.51
MSL	1.73	3.7	2.7	2.7	1.7	1.3	2.9	2.1	2.1	1.3	2.44	1.77	1.10	2.83	3.50	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83
MHWN	2.01	4.0	3.0	3.0	2.0	1.6	3.1	2.3	2.3	1.6	2.59	1.94	1.36	3.37	3.95	3.37	3.37	3.37	3.37	3.37	3.37	3.37	3.37	3.37	3.37	3.37	3.37	3.37	3.37	3.37	3.37	3.37
MHWS	2.72	4.7	3.7	3.7	2.7	1.7	3.7	2.9	2.9	1.7	3.09	2.44	1.26	3.98	5.16	3.98	3.98	3.98	3.98	3.98	3.98	3.98	3.98	3.98	3.98	3.98	3.98	3.98	3.98	3.98	3.98	3.98

Wave of limited interest because deck excessively submerged, refer cyclonic study instead
 Critical Waves, for-deck within crest
 Wave height (less than Hmax) with crest at deck level

Glump Point Jetty

Still water Level (SWL)	Still water depth (m)						Plausible Hmax, assuming max steepness of H/d =0.78 (m)						Crest height above SWL (m)						Crest Level (m CD)						Deck submerision depth (m)							
	Bed level=-2		Bed level=-1		Bed level=0		Bed level=-2		Bed level=-1		Bed level=0		Bed level=-2 m CD		Bed level=-1 m CD		Bed level=0 m CD		Bed level=-2 m CD		Bed level=-1 m CD		Bed level=0 m CD		Bed level=-2 m CD		Bed level=-1 m CD		Bed level=0 m CD			
	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD	m CD		
MLWS	0.79	2.8	1.8	1.8	0.8	0.6	2.2	1.4	1.4	0.6	1.87	1.20	0.51	1.30	1.99	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	
MLWN	1.49	3.5	2.5	2.5	1.5	1.2	2.7	1.9	1.9	1.2	2.28	1.60	1.02	2.51	3.09	2.51	2.51	2.51	2.51	2.51	2.51	2.51	2.51	2.51	2.51	2.51	2.51	2.51	2.51	2.51	2.51	2.51
MSL	1.73	3.7	2.7	2.7	1.7	1.3	2.9	2.1	2.1	1.3	2.44	1.77	1.10	2.83	3.50	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83
MHWN	2.01	4.0	3.0	3.0	2.0	1.6	3.1	2.3	2.3	1.6	2.59	1.94	1.36	3.37	3.95	3.37	3.37	3.37	3.37	3.37	3.37	3.37	3.37	3.37	3.37	3.37	3.37	3.37	3.37	3.37	3.37	3.37
MHWS	2.72	4.7	3.7	3.7	2.7	1.7	3.7	2.9	2.9	1.7	3.09	2.44	1.26	3.98	5.16	3.98	3.98	3.98	3.98	3.98	3.98	3.98	3.98	3.98	3.98	3.98	3.98	3.98	3.98	3.98	3.98	3.98

3 WAVE LOADING DESIGN CRITERION

In this section we seek to present the sensitively of wave loading with respect to wave height and water depth assumptions. In particular, we shall quantify wave loading for the cyclonic waves and smaller waves discussion above in sections 1.6.1 and 1.6.2 respectively.

3.1 Maximum plausible waves at elevated still water depths (Cyclonic conditions)

Below are the estimated lateral and vertical waves forces associated with notional cyclonic conditions, as per section 1.6.1 above.

3.1.1 Lateral wave loading on a typical Jetty Bent.

Below are tabulated results of lateral loading on a typical bent spaced at 10m centres. Again, the results are presented in the form of wave height of 1m-5m and for the two different water levels. Of note is that waves of the same height in shallower water have greater velocities and hence shallow water waves generate greater forces.

The wave forces below have been calculated using 11th order stream function theory, after Dean and Dalrymple.

Wave Height (m)	Period, Tp (sec)	Dunk Island		Clump Point	
		SWL=3m CD	SWL=4.5m CD	SWL=3m CD	SWL=4.5m CD
1	5	Horz. Load per 10m bent (kN)	Horz. Load per 10m bent (kN)	Horz. Load per 10m bent (kN)	Horz. Load per 10m bent (kN)
1	5	32	22	26	18
2	6	63	40	51	32
3	7	106	61	86	50
4	8	140	88	113	71
5	9	168	106	136	86

The 4m and 5m waves on the still water level of 3m CD have been crossed following the previous discussion that suggested non-breaking waves of this height are not plausible for the corresponding water depth.

Reviewing the remaining values, leads one to conclude that a generic cyclonic wave lateral load, for both jetties, of 110kN per bent is justifiable. Before adopting this values for design, however, the loads generated by smaller waves need to be considered, refer below in section 3.1.3.

3.1.2 Vertical Wave Loading

The vertical component of the wave loading is understood to be a particularly critical design parameter as it governs the pile tension load. Unfortunately, vertical wave loading is also one of the most difficult quantities to assess. The Australian Maritime structures code provides limited guidance on this subject, but does provide a very basic method for calculating a load. The method is simply twice the hydrostatic submersion head. The justification for this approach is grossly simplistic and disconnected from any assessment of actual dynamic effects. Below is a tabular summary of the jetty submersion depths for various waves and water depths.

Wave Height (m)	Period, Tp (sec)	Crest Height above MSL (m)	SWL 3.0		SWL 4.5		Deck mid level submersion			
			Crest level (m CD)	Trough level (m CD)	Crest level (m CD)	Trough level (m CD)	Dunk Is		Clump Pt	
							SWD =3.0	SWD=4.5	SWD =3.0	SWD=4.5
1	5	0.55	3.55	2.55	5.05	4.05	-0.225	1.275	-0.955	0.545
2	6	1.22	4.22	2.22	5.72	3.72	0.445	1.945	-0.285	1.215
3	7	2.07	5.07	2.07	6.57	3.57	1.295	2.795	0.565	2.065
4	8	3.09	6.09	2.09	7.59	3.59	2.315	3.815	1.585	3.085
5	9	4.18	7.18	2.18	8.68	3.68	3.405	4.905	2.675	4.175

The table above highlights the extent to which the jetty is submerged. That is, for Dunk Island the deck is typically only just "visible" in the wave trough. It must be said that the proposed levels are uncharacteristically low and present significant durability issues for the facilities. To this extent we recommend the asset owner reconsider the jetty deck levels with a view to lifting the deck, and supporting beams, to well above HAT.

Below is a tabular summary of uplift pressure on the deck soffit using the crude method in AS4997, BS6349.1 and calculated from first principles based on water particle vertical velocities and accelerations.

Wave Height (m)	Period, Tp (sec)	Crest Height above MSL (m)	AS4997 Uplift Pressure (kPa)				BS6349.1	
			Dunk Is		Clump Pt		Both Jetties	
			SWL=3m CD	SWL=4.5m CD	SWL=3m CD	SWL=4.5m CD	SWL=3m CD	SWL=4.5m CD
1	5	0.55	-	26	-	11	0.8	0.7
2	6	1.22	9	39	-	24	2.7	2.2
3	7	2.07	26	56	11	42	6.2	4.7
4	8	3.09	47	77	32	62	9.6	8.4
5	9	4.18	68	99	54	84	14.1	11.7

Wave Height (m)	Period, Tp (sec)	Crest Height above MSL (m)	1st Principles Soffit uplift (kPa)			
			Dunk Island		Clump Point	
			SWL=3m CD	SWL=4.5m CD	SWL=3m CD	SWL=4.5m CD
1	5	0.55	0.8	0.5	1.1	0.6
2	6	1.22	1.3	1.0	2.0	1.3
3	7	2.07	2.5	1.7	3.8	2.2
4	8	3.09	3.0	2.3	4.7	3.2
5	9	4.18	4.4	2.6	6.8	3.5

From the table above one can see a significant disparity in the results that range from 100kPa (AS4997) to 12kPa (BS6349.1) to 4kPa using first principle methods. We suggest AS4997 is grossly conservative and has little technical merit, and on this basis we are inclined to disregard it.

BS6349.1, whilst based on a plausible conceptual model, is derived from the peak vertical water velocity - which occurs at the wave crest. The use of the peak crest velocity is normally sound

because submergence is not normally avoided, and when it does occur, the submerged element is typically submerged by the wave crest only. This, however, is not the case for the jetties at Dunk Is and Clump Pt. Presently, all cyclonic design waves the decks are actually closer to the wave trough. Given this, it can be suggested that the BS6349.1 method overstates the loading, with the exception of small waves in combination with low tides, which would locate a wave crest near deck level.

The tabulated first principles method uses the actual water particle velocities and accelerations at the deck level, within the wave body, and in this context are the most rational.

Before adopting, or suggesting, design uplift pressure values from the above tables we need to consider smaller waves at lower water levels because they may govern over larger waves that completely submerge the deck.

3.1.3 Smaller Waves at lower still water levels

Below are the estimated lateral and vertical waves forces associated with small waves, as per section 1.6.2 above.

Dunk Island Jetty

Seabed level (m CD)	Still water level (m CD)	Corresp. Tidal plane	Still water depth (m)	Wave Height (m)	Crest level (m CD)	Uplift Pressure (kPa)	Corresp. lateral load (kN)	BS6349.1 Uplift (kPa)
-2	1.73	MSL	3.7	2.9	4.2	9.9	236	6.9
				2.7	4.0	9.2	226	6.2
-1	2.01	MHWN	3	2.3	4.0	8.8	220	5.4
0	2.72	MHWS	2.7	2.1	4.5	5.3	151	5.0
				1.7	4.0	4.4	119	3.6

Clump Point Jetty

Seabed level (m CD)	Still water level (m CD)	Corresp. Tidal plane	Still water depth (m)	Wave Height (m)	Crest level (m CD)	Uplift Pressure (kPa)	Corresp. lateral load (kN)	BS6349.1 Uplift (kPa)
-2	2.72	MHWS	4.7	3.7	5.8	7.7	161	8.8
				2.7	4.7	6.1	110	5.4
-1	2.72	MHWS	3.7	2.9	5.2	8.3	167	6.9
				2.5	4.7	7.5	145	5.6

As seen from the tables above, both the lateral and vertical loads are greater for these smaller waves at deck level, compared to the larger "cyclonic" waves that submerge the deck.

3.2 Downward Vertical Wave loading

The peak uplift pressures tabulated above are derived from the vertical velocities and accelerations after the trough has passed under the deck and the crest approaches. For interest sake the critical pressure coincides with a wave phase angle of approx 24 degrees. At this phase angle the upward velocity and acceleration coincide to produce the worst upward pressure. As the wave crest passes, being phase angles of 180-360 degrees the wave particle velocities reverse (change sign), however, the acceleration components do not reverse. Rather they are mirrored about the 180 degree phase angle. The result is that the downward pressure is not the same as the upward and the downward pressure tends to be less because the velocities and accelerations are out of phase

with one another. The peak downward pressure corresponding to the wave that generated the peak uplift pressure of 9.9kPa above is 6.1kPa and occurs at a phase angle 342 degrees.

4 SUGGESTED WAVE DESIGN LOADS

Given the project funding constraints and the low degree of hazard to jetty damage we suggest the following wave loading:

- A lateral wave load of 25kN/m along the edge of the jetty, being notionally 250kN per bent, given a bent spacing of 10m.
- Additionally, a coincident vertical uplift or downward loading of 10kPa. For these load cases the buoyant deck dead weight should be used.
- In principle, the tabulated values above are limit state values, hence they do not require a load factor because they represent the peak wave heights. However, the assessment above has largely departed from a probabilistic assessment, to one based on wave height plausibility in certain still water depths. In this context, we suggest a live load factor of 1.5 is appropriate on both lateral and vertical wave loads.
- It should be noted that if the jetty deck levels are raised then the uplift pressures should be reassessed.

Yours faithfully
BONACCI GROUP (Qld) P/L

Terry Memory
DIRECTOR



Stephen C Day

From: Terry Memory <tmemory@bonacciqld.com>
Sent: Thursday, 18 October 2012 3:57 PM
To: David.goodman@ccrc.qld.gov.au
Cc: tony.rooks@ccrc.qld.gov.au; plyons@jukestodd.com; Stephen C Day
Subject: RE: Design criteria commentary
Attachments: image002.jpg; image003.jpg

Flag Status: Flagged

Categories: Email filed

David

For clarification purposes we'd like to highlight a couple of points pertaining to the Council's interpretation of our Design Criteria report issued last Tuesday. The points we seek to clarify relate to items 1 and 5 from your list below.

Item 1:

Design life is a necessary construct, or parameter, required to apply probability theory to design codes of practice, such as AS4997. That is, the factors of safety and probability surrounding durability are all related to the expected functional life of the structure. Conceptually, a structure which is intended to last for 100 years is more likely to see a broader loading spectrum than a structure that has a 5 year design life. This is an example of the principle behind design life. Actual asset life is not necessarily connected to, or the same as, design life. The code intent is that they are connected via probabilistic theory pertaining to deterioration rates and alike, however, this link in practice is very tenuous. This opinion is vindicated by the fact that asset owners' are rarely in a position to litigate against their designer because their structure failed to achieve a specified design life. The key reason for this is because asset owners' have maintenance obligations, and it is outside the scope of a design code to fully cover all of these obligations. Notwithstanding this, we draw the Council's attention to clause 6.2.3 of AS4997.

The Council may therefore elect to use a 50 year design life and reference AS4977 to legitimise this position, however, we must highlight that this does not mean the structure will actually last for 50 years, for the reasons discussed above. Additionally, an implied durability condition of AS4997 is that the structure shall be set at a level above a 100 year ARI storm surge event + waves, refer section 3.1 of AS4997. Based on the GHD report this would require deck levels in the order of +8.0m CD, being approx 4m and 3.6m above the levels proposed for Dunk Is and Clump Pt respectively. Given the constraints on the project's budget, and possibly the communities' expectation, it is not possible to deliver new jetties at these elevations. Accordingly, the owners of the jetties simply have to accept that whilst a 50 year design life was nominated this does not translate to a function life of 50 years. Indeed, given elements of the jetty are wetted on each tide cycle we suggest achieving a 25 year life will require constant and thorough maintenance from the outset.

Item 5:

The council seeks a 200 year ARI storm event criteria, which is also linked to the design life concept discussed above. The issues for considerations here are two fold, being:

1. GHD have not produced any 200 year ARI data, however, this problem is dwarfed by the following;
2. The key suggestion in our report is that the 100 years and 500 year ARI wave events, cited by GHD, are implausible because such waves cannot exist in the corresponding water depths. In our report, we have consequently abandoned any linkage to probability theory (the GHD report) and examined what size of wave is physically plausible. From this position, we have sought to quantify, and suggest, wave loading criteria. We acknowledge that the concepts embodied in our report are not straightforward and apologies if this conceptual "detour" was lost on any readers of the report. Nevertheless, it is somewhat "academic", or impractical, to ask STP to design to a 200 year ARI wave because the true magnitude of such an event remains unknown, despite the wave study undertaken by GHD. As a point of interest we highlight that in their 50% design report, GHD used STRAAD Pro software to assess wave loading and this software uses the same wave theory that we have been using. It would therefore have been impossible for GHD to enter peak wave heights, as required by AS4997, because the software would have rejected these waves as being too large for the prescribe water depth, as we have done. In their design report GHD elected to use the lesser

“significant wave heights” of 3.0m and 4.2m and we suggest this was done to achieve a successful analysis in STRAAD Pro and therefore quantify the wave loading. The key point, however, is that given the GHD report STP cannot comply with a 200 year ARI wave criteria, and for that matter, nor a 100year event and definitely not a 500 year event.

With respect to wave loading we view the uplift and downward wave loading as particularly important for this project. We are also aware that the proposed loading in our report is significantly less than the requirement of AS4997. However, we wish to highlight that the application of the AS4997 rule in normal circumstances would not be so critical because the deck would have been set above the 100year ARI wave event. For example, consider a general cargo wharf with a 40kPa deck load. To have the wave govern the downward load would require the wharf deck to be struck with a wave crest 2m above deck level. The owner of a wharf asset like this would typically not consent to a wave overtopping scenario like this, hence, the deck would be raised and the wave loading not govern the design. The opposite is the case for the jetties in question because they can be routinely overtopped. Accordingly, we can't accept the loading model proposed by AS4997 because it is both too simplistic and linked to a water-deck level relationship that is not consistent with this project and leads to design loads in the range of +/-70 to +/-100kPa. Heavy container wharfs are designed for 50kPa and very heavy duty MOFs are designed for 100kPa – being 10t/m2. Given the project budget and the functional description, we suggest it is unjustifiable to design the jetties to anything near the design criteria of major marine infrastructure.

Accordingly, we suggest the Council needs to be pragmatic with respect to the wave design criteria. That is, given the budget and the deck level constraints, the structures cannot be designed to comply with AS4997. Whilst this may be deemed undesirable, it is not necessarily a regulatory problem because AS4997 is, after all, entitled “Guidelines for”. In practical terms, we suggest the Jetty owner has to accept that damage to the jetties from a storm event is very real. However, we suggest the wave loading in our report is a pragmatic and justifiable balance against the project budget, the durable/usable life and the desire to maintain deck levels comparable to the existing jetties. Furthermore, we suggest this approach fulfils the intent of the TMR functional specification that emphasises the need to develop a design solution that provides optimal benefit to the local community within the project budget.

Cheers

Terry Memory

Director

tmemory@bonacciqld.com

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From: Goodman, David [mailto:David.Goodman@ccrc.qld.gov.au]

Sent: Wednesday, 17 October 2012 11:36 PM

To: 'Stephen.C.Day@tmr.qld.gov.au'; Scott Ironside; Anthony@stpconsultants.com.au

Cc: Rooks, Tony; plyons@jukestodd.com; Terry Memory

Subject: RE: Design criteria commentary

ALL

The results of the Council workshop yesterday are detailed below, formal notification of changes to the design brief will follow but I thought the sooner everyone was on the same page the better

Specifically with regard to the suggested amendments discussed at Fridays teleconference

1. The design life should remain at 50 Yrs
2. The design vessels CAN be modified to
 - o Dunk Island 20m 45 Tonne
 - o Clump Point 25m 65 Tonne ; But it would be preferred if we COULD get
 - o Dunk Island 25m 45 Tonne
 - o Clump Point 25m 65 Tonne
3. Deck Load Clump ; To be capable of handling a 23.5 Tonne Body Trucks concentrated loads or 5kPa pedestrian Loads
4. Deck Load Dunk; To be capable of handling a 45KN at 1.8 m centres concentrated loads or 5kPa pedestrian Loads
5. Adopt a 200 year ARI for the design wave event

Further Council developed a series of fall back positions in the form of a list of priorities and preferences

1. BUDGET - No new funds are available from CCRC
2. Maintain Clump Point Jetty as close as possible to the "tendered" design, with regard to deck, ie very strong preference for solid concrete deck at Clump Point
3. IF existing piles on the rehab section of Dunk cannot withstand the uplift forces - CCRC prefers a solid deck with a failure mechanism on the connectors rather than a grated deck. IF it is considered that a concrete deck designed to fail at the connectors poses a significant risk to the substructure remaining, we are comfortable with a timber deck on this section and a concrete deck on the new section.
4. IF because of additional pile lengths required at Clump because of the geotech and construction loads the project requires further savings, CCRC would consider "matching" the capacity of the new section of Dunk to the rehab section with regard to dealing with uplift forces via a failure mechanism of the connectors to the deck with the same commentary applicable with regard to risk of damage via failed concrete deck and comfortable with timber

Regards

David Goodman
Manager Civil Works
Ph 40439156
Mob

Cassowary Coast Regional Council
PO Box 887 INNISFAIL QLD 4860

From: Stephen.C.Day@tmr.qld.gov.au [mailto:Stephen.C.Day@tmr.qld.gov.au]

Sent: Friday, 12 October 2012 12:39 PM

To: Scott Ironside; Anthony@stpconsultants.com.au; Goodman, David

Cc: Rooks, Tony; plyons@jukestodd.com; Terry Memory

Subject: Fw: Design criteria commentary

Gents,

Please find attached report from Terry for discussion during the teleconference meeting.

Kind regards,

Stephen Day
Engineer (Civil) | Far North Region / Cairns Office
Program Delivery & Operations | Department of Transport and Main Roads

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----- Forwarded by Stephen C Day/Northern/QMR/Au on 12/10/2012 12:34 PM -----

From: Terry Memory <tmemory@bonacciqld.com>
To: "Stephen.C.Day@tmr.qld.gov.au" <Stephen.C.Day@tmr.qld.gov.au>
Cc: "Peter Lyons" <plyons@jukestodd.com>
Date: 12/10/2012 12:00 PM
Subject: Design criteria commentary

Stephen

Please find attached our draft letter for your consideration.

Cheers

Terry Memory
Director
tmemory@bonacciqld.com
Mobile:



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(See attached file: *B3872_TJM_Wave_report_draft.pdf*)

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Released under RTI - DTMR

Stephen C Day

From: David.goodman@ccrc.qld.gov.au
Sent: Tuesday, 30 October 2012 12:11 PM
To: tony.rooks@ccrc.qld.gov.au
Cc: Stephen C Day
Subject: Recommendation adopted by Council

Flag Status: Flagged

Categories: Email filed

That Council approve the following design element alterations to the tender awarded to Civil Plus Constructions Pty Ltd for the Dunk Island and Clump Point Jetties

- 1. Modify the design deck load classification of the Clump Point Jetty to allow for a 23.5 Tonne GVM body truck and a pedestrian crowd load**
- 2. Modify the design vessel for Clump Point Jetty to a displacement of 65 tonne**
- 3. Modify the design deck load classification of the Dunk Island Jetty to allow for a 4.5 Tonne vehicle and a pedestrian crowd load**
- 4. Modify the design vessel of the Dunk Island Jetty to a displacement of 45 Tonne**
- 5. Modify the deck on the rehabilitated section of the Dunk Island Jetty so that the failure mechanism due to wave uplift forces is the deck lifting off in preference to piles being lifted out of the sea bed, and that a timber deck may be utilised in this area if it is determined that a concrete deck failing poses a significant risk to the remaining structure**

David Goodman
Manager Civil Works
Ph 40439156
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Stephen C Day

From: Stephen C Day
Sent: Friday, 9 November 2012 9:59 AM
To: David.goodman@ccrc.qld.gov.au
Cc: tony.rooks@ccrc.qld.gov.au
Subject: RE: Lateral wave loading on repaired deck at Dunk Is.

Flag Status: Flagged

Categories: Email filed

David,

Following is recommended wording for Clump Point design criteria amendments. You did advise these by email on 17/10/12, but indicated formal notification would follow.

Anthony (STP) was uncertain whether formal notification of use of a concrete deck had been made. Can you also confirm formally with Civil+/STP?

Revised Design Criteria - Clump Point Jetty

Confirming that the following amended design criteria may be applied to the Clump Point jetty:

Wave loadings on the structure:

1. A lateral wave loading of 25kN/m along the edge of the jetty
2. A coincident vertical uplift or downward loading of 10kPa. For these load cases, buoyant deck dead weight should be used.
3. For limit states design, apply a load factor of 1.5 to both lateral and vertical loads

Deck hold downs should be designed to release the deck within a range from 0 to 10% above the design wave uplift loads.

Deck Live Loads

Desirable deck live loading is Class 15 loading per AS4997.

However, where deck live loads control design, deck live loads may be reduced to the following minimum design loads:

- 5kPa uniformly distributed load (pedestrian crowd load)
- Concentrated loads based on a 23.5 Tonne Body Truck

Design Vessel

The jetty shall be designed for the following vessel:

Length (LOA): 20m minimum, 25m preferred
Vessel Displacement: 60 Tonne (previously 100T)

Kind regards,

Stephen Day

Engineer (Civil) | Far North Region / Cairns Office

Program Delivery & Operations | Department of Transport and Main Roads

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W: www.tmr.qld.gov.au

From: "Goodman, David" <David.Goodman@ccrc.qld.gov.au>
To: "Stephen.C.Day@tmr.qld.gov.au" <Stephen.C.Day@tmr.qld.gov.au>
Cc: "Rooks, Tony" <Tony.Rooks@ccrc.qld.gov.au>
Date: 08/11/2012 11:54 AM
Subject: RE: Lateral wave loading on repaired deck at Dunk Is.

Tony I am happy for this advice to be provided to CivilPlus

From: Stephen.C.Day@tmr.qld.gov.au [mailto:Stephen.C.Day@tmr.qld.gov.au]
Sent: Thursday, 8 November 2012 11:21 AM
To: Goodman, David
Cc: Rooks, Tony
Subject: RE: Lateral wave loading on repaired deck at Dunk Is.

David,

Correction: - remove reference to the original structure from the first line (see below)

Kind regards,

Stephen Day
Engineer (Civil) | Far North Region / Cairns Office
Program Delivery & Operations | Department of Transport and Main Roads

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▼ Stephen C Day---08/11/2012 11:17:57 AM---David, Please find below my recommended wording for advising CivilPlus of amended design requirements

From: Stephen C Day/Northern/QMR/Au
To: "Goodman, David" <David.Goodman@ccrc.qld.gov.au>
Cc: "Rooks, Tony" <Tony.Rooks@ccrc.qld.gov.au>
Date: 08/11/2012 11:17 AM
Subject: RE: Lateral wave loading on repaired deck at Dunk Is.

David,

Please find below my recommended wording for advising CivilPlus of amended design requirements for Dunk Island jetty.

Revised Design Criteria

Council has reviewed the design criteria for the existing structure at Dunk Island. For purposes of design for the original structure, the following design criteria shall apply:

Wave loadings on the structure shall be:

1. A lateral wave loading of:
 - For the new extension, 25kN/m along the edge of the jetty
 - For the existing jetty section, 19kN/m along the edge of the jetty

2. A coincident vertical uplift or downward loading of 10kPa. For these load cases, buoyant deck dead weight should be used.
3. For limit states design, apply a load factor of 1.5 to both lateral and vertical loads

For the existing jetty section, the existing piles are to be retained and further structural design/analysis is not required. The remaining structure, including deck hold downs, shall be designed for the wave loads detailed above. Deck hold downs should be designed to release the deck within a range from 0 to 10% above the design wave uplift loads.

Deck Live Loads

Desirable deck live loading is Class 10 loading per AS4997.

However, where deck live loads control design, deck live loads may be reduced to the following minimum design loads:

- 5kPa uniformly distributed load (pedestrian crowd load)
- 45kN concentrated load (per Class 10 concentrated load requirements for small emergency vehicles)

Design Vessel

The jetty shall be designed for the following vessel:

Length (LOA): 20m

Vessel Displacement: 45 Tonne (previously 60T)

Kind regards,

Stephen Day

Engineer (Civil) | Far North Region / Cairns Office
Program Delivery & Operations | Department of Transport and Main Roads
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▼ "Goodman, David" ---08/11/2012 09:01:50 AM---Stephen, My head is swimming a little with the different safety factors and working vs. ultimate, c

From: "Goodman, David" <David.Goodman@ccrc.qld.gov.au>
To: "Stephen.C.Day@tmr.qld.gov.au" <Stephen.C.Day@tmr.qld.gov.au>
Cc: "Rooks, Tony" <Tony.Rooks@ccrc.qld.gov.au>
Date: 08/11/2012 09:01 AM
Subject: RE: Lateral wave loading on repaired deck at Dunk Is.

Stephen,

My head is swimming a little with the different safety factors and working vs. ultimate, could you please prepare a concise recommendation to myself and Tony on what we should advise CivilPlus with regard the capacity of the connectors on the rehab section. We will also formally need to advise that we would like them to provide a concrete deck as per tender.

I am also concerned that I have highlighted the 5KPa pedestrian load, when Terry's review has shown we can expect a 10KPa working load? from wave action.

I have already advised Scott by phone yesterday that we are reverting to concrete but given the amount of verbal to and froing I am sure they would appreciate advice in writing.

David Goodman
Manager Civil Works
Ph 40439156
Mob

Cassowary Coast Regional Council

From: Terry Memory [<mailto:tmemory@bonacciqld.com>]
Sent: Thursday, 8 November 2012 7:49 AM
To: Stephen.C.Day@tmr.qld.gov.au
Cc: Goodman, David; Peter Lyons (plyons@jukestodd.com); Rooks, Tony
Subject: Re: Lateral wave loading on repaired deck at Dunk Is.

Stephen, yes the 19kN/m is for the reused portion and the 25kN/m for the new. The 250kN/ bent is only applicable for a 10m span on the new jetty.

Cheers
Terry

On 07/11/2012, at 2:26 PM, "Stephen.C.Day@tmr.qld.gov.au" <Stephen.C.Day@tmr.qld.gov.au> wrote:

Terry,

One last clarification if I may regarding the advice below.

I assume the loads referred to below should be either 19 and 25 kN/m or 190 and 250 kN per pile bent. The latter (25kN/m and 250 kN per pile bent) are as provided in your original report for the 10m span originally proposed.

Can you please confirm or advise otherwise.

Kind regards,

Stephen Day
Engineer (Civil) | Far North Region / Cairns Office
Program Delivery & Operations | Department of Transport and Main Roads

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W: www.tmr.qld.gov.au

<graycol.gif>Terry Memory ---30/10/2012 11:35:48 PM---David Please find attached a refined lateral wave loading regime for the repaired section of Dunk Is

From: Terry Memory <tmemory@bonacciqld.com>
To: "Goodman, David" <David.Goodman@ccrc.qld.gov.au>
Cc: "Peter Lyons (plyons@jukestodd.com)" <plyons@jukestodd.com>, "Stephen.C.Day@tmr.qld.gov.au" <Stephen.C.Day@tmr.qld.gov.au>, "Rooks, Tony" <Tony.Rooks@ccrc.qld.gov.au>
Date: 30/10/2012 11:35 PM
Subject: Lateral wave loading on repaired deck at Dunk Is.

David

Please find attached a refined lateral wave loading regime for the repaired section of Dunk Island. The "saving" is two fold, being that the peak is reduced to 190kN/m, compared to 250kN/m in a report, and also the load is not constant, but variable as shown on the graph. Again the lateral loading should attract a limit state load factor of 1.5 and be applied simultaneously with the wave uplift loading.

Cheers

Terry Memory

Director

tmemory@bonacciqld.com

Mobile:

<1F364819.jpg>

<ecblank.gif>

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[attachment "B3872_TJM_Wave_loading_on_Existing_Dunk.xls" deleted by Stephen C Day/Northern/QMR/Au]

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Stephen C Day

From: Stephen C Day
Sent: Friday, 16 November 2012 3:13 PM
To: Scott Ironside
Cc: Anthony@stpconsultants.com.au; David.goodman@ccrc.qld.gov.au; 'Richard Lamb'; Stephen C Day; tony.rooks@ccrc.qld.gov.au
Subject: RE: Updated drawings for Clump Point
Flag Status: Flagged
Categories: Email filed

Thanks Scott.

The location of piles will need to allow fender cones to function as designed. The 50mm was a nominal figure, but STP will need to check deflections under load and design accordingly. The aim is to locate them as close as possible to keep the gap low. The commercial operators have previously indicated that 700mm would be a concern for them.

STP should provide advice on what gap is acceptable for the type of operations expected and how that can be provided. An option if the gap is considered too large could be to partially recess the fender piles in the deck. Similarly the stairs and landings can be designed to protrude beyond the back edge of the fender piles.

This does not need to be finalised at this stage, but will need to be sorted out for precasting deck units or fabricating stairs and landings, as well as for pile driving.

Kind regards,

Stephen Day
Engineer (Civil) | Far North Region / Cairns Office
Program Delivery & Operations | Department of Transport and Main Roads

Floor 7 | Cairns Corporate Tower | 15 Lake Street | Cairns Qld 4870
PO Box 6185 | Cairns Qld 4870
P: (07) 40505464 | F: (07) 40505550
M:
E: stephen.c.day@tmr.qld.gov.au
W: www.tmr.qld.gov.au

From: "Scott Ironside" <scott@civilplus.com.au>
To: <Stephen.C.Day@tmr.qld.gov.au>
Cc: "Goodman, David" <David.Goodman@ccrc.qld.gov.au>, "Richard Lamb" <richard@civilplus.com.au>, "Rooks, Tony" <Tony.Rooks@ccrc.qld.gov.au>, <Anthony@stpconsultants.com.au>
Date: 16/11/2012 01:28 PM
Subject: RE: Updated drawings for Clump Point

Stephen,
I am waiting for a call back from Anthony in relation to these items.

The issue of putting fender piles within 50mm of the deck is going to be a problem as when the cones compress the piles will hit the deck.

We will check the berthing loads applied to the fender cones/piles and put the piles as close as possible to the deck but still allow the fender cones to do their job.

Thanks

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From: Stephen.C.Day@tmr.qld.gov.au [mailto:Stephen.C.Day@tmr.qld.gov.au]

Sent: Friday, 16 November 2012 11:52 AM

To: Scott Ironside

Cc: Goodman, David; Richard Lamb; Stephen.C.Day@tmr.qld.gov.au; Rooks, Tony; Anthony@stpconsultants.com.au

Subject: Re: Updated drawings for Clump Point

Scott,

For submission drawings, similar comments to those for Dunk apply:

1. Reissue as "For Approval"
2. Update the details in the title block
3. Have drawings signed by the RPEQ
4. Notes to Sheet ST1.01 might be better elsewhere (ST2.02) - see also modifications
5. Review drawing titles and make consistent with Sheet list
6. Modify drawings to locate fender piles closer to jetty deck (see comments on attached drawings)
- 7.

(See attached file: *T12-058 Jetty Replacement - Clump Point (12.11.13) SCD Notes.pdf*)

Additional amendments if they can be easily included:

1. Show RL on contour lines and make light contour lines more visible (ie darker)
2. Show vertical datum as LAT, either by note or in title block
3. Lift lower landing higher and show landing/stairs to clear the middle fender cone

Additional comments for detailed design:

- The lower landings at Palm Cove jetty are at RL 1.08 and have been closed off to the public because they are submerged for the majority of time and become too slippery. The next lowest landing is at 2.03 and remains relatively clear of marine growth. The higher landing is at 2.95 and deck height is 4.5. The objective is to keep the lower landing sufficiently high that it does not rapidly attract marine growth, but not so high that too high a proportion of low tides render it unusable. My thoughts are that for 2 landings, the lower landing should be around 1.6m, with the upper landing a maximum of 1.2m higher. If 3 landings can be provided, the separation could be reduced to say 0.9m or less.
- For safety, the gap between the outside face of fender piles and the jetty deck or landing needs to be kept low, particularly for the smaller vessels likely to use the stairs and landings. Please take into account as part of the detailed design to ensure this gap meets the operational requirements of users.

Kind regards,

Stephen Day
Engineer (Civil) | Far North Region / Cairns Office
Program Delivery & Operations | Department of Transport and Main Roads

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E: stephen.c.day@tmr.qld.gov.au

W: www.tmr.qld.gov.au

▼ "Scott Ironside" ---15/11/2012 09:53:10 AM---Stephen As discussed.

From: "Scott Ironside" <scott@civilplus.com.au>

To: <Stephen.C.Day@tmr.qld.gov.au>

Cc: "Rooks, Tony" <Tony.Rooks@ccrc.qld.gov.au>, "Goodman, David" <David.Goodman@ccrc.qld.gov.au>, "Richard Lamb"

<richard@civilplus.com.au>
Date: 15/11/2012 09:53 AM
Subject: Updated drawings for Clump Point

Stephen
As discussed.

Thanks



Scott Ironside | Project Manager & Managing Director | CivilPlus Constructions Pty Ltd
30 Blakey Street, Garbutt Qld 4814 | PO Box 1402 Aitkenvale Qld 4814
p 4728 6822 | f 4728 6833 | e scott@civilplus.com.au | www.civilplus.com.au

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[attachment "T12-058 Jetty Replacement - Clump Point (12.11.13).pdf" deleted by Stephen C Day/Northern/QMR/Au]

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Stephen C Day

From: Scott Ironside <scott@civilplus.com.au>
Sent: Monday, 19 November 2012 7:50 AM
To: Stephen C Day
Cc: David.goodman@ccrc.qld.gov.au; 'Richard Lamb'; tony.rooks@ccrc.qld.gov.au; Anthony@stpconsultants.com.au
Subject: RE: Updated drawings for Clump Point
Attachments: T12-058 Jetty Replacement - Clump Point (12.11.16).pdf; image003.gif; image004.jpg; image002.jpg

Flag Status: Flagged

Categories: Email filed

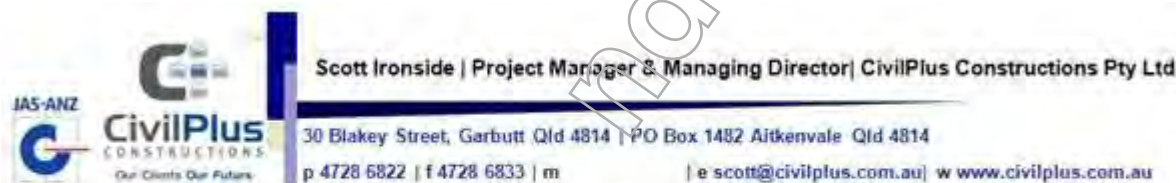
Stephen,
Updated drawings as requested.

With regard to the fender piles and the fender cones, the platforms have been extended to come further out into the fender pile area, however they are still not flush as the cones need the room to operate.

It appears as though the gap will be about 400mm to allow for the working range of the fender cones. I am not sure if this is acceptable for the operators as we have no information on what they have requested.

Can you please advise comments on this from operators when able?

Thanks



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From: Stephen.C.Day@tmr.qld.gov.au [mailto:Stephen.C.Day@tmr.qld.gov.au]
Sent: Friday, 16 November 2012 11:52 AM
To: Scott Ironside
Cc: Goodman, David; Richard Lamb; Stephen.C.Day@tmr.qld.gov.au; Rooks, Tony; Anthony@stpconsultants.com.au
Subject: Re: Updated drawings for Clump Point

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(See attached file: T12-058 Jetty Replacement - Clump Point (12.11.13) SCD Notes.pdf)

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Kind regards,

Stephen Day
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Program Delivery & Operations | Department of Transport and Main Roads

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▼ "Scott Ironside" ---15/11/2012 09:53:10 AM---Stephen As discussed.

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To: <Stephen.C.Day@tmr.qld.gov.au>
Cc: "Rooks, Tony" <Tony.Rooks@ccrc.qld.gov.au>, "Goodman, David" <David.Goodman@ccrc.qld.gov.au>, "Richard Lamb" <richard@civilplus.com.au>
Date: 15/11/2012 09:53 AM
Subject: Updated drawings for Clump Point

Stephen
As discussed.

Thanks



Scott Ironside | Project Manager & Managing Director | CivilPlus Constructions Pty Ltd

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[attachment "T12-058 Jetty Replacement - Clump Point (12.11.13).pdf" deleted by Stephen C Day/Northern/QMR/Au]

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SHEET No.	SHEET LIST
ST0.01	STRUCTURAL NOTES
ST1.01	PILING LAYOUT PLAN
ST1.03	PILING TABLE
ST1.04	FENDER PILES PILING TABLE
ST2.01	JETTY LONG SECTION
ST2.02	TYPICAL SUPPORTS SECTION
ST2.03	DETAILS
ST2.04	STAIRS DETAILS
ST5.01	FRAMING & PILING JIG PLAN VIEW
ST5.02	FRAMING & PILING JIG ELEVATIONS
ST5.03	CONSTRUCTION SEQUENCE SAGES 1 - 4
ST5.04	CONSTRUCTION SEQUENCE STAGE 5 - 8

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JETTY REPLACEMENT CLUMP POINT, MISSION BEACH QLD



CONSULTANTS

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Fax: 07 32 552 411	Fax: 07 49 441 588
<i>Cairns Office</i>	<i>Townsville Office</i>
Ph: 07 40 318 777	Ph: 07 47 242 626
Fax: 07 40 318 799	Fax: 07 47 242 417

CONCRETE AND REINFORCEMENT

- All concrete work shall be in accordance with AS 3600 Concrete Structures.
- Concrete Specifications shall be:-

ELEMENT	GRADE	SLUMP	MAX AGG
Exterior RC	S50	50-20	20
- Cover to reinforcement shall be :-
 - Footings - 75mm bottom, 65mm sides and top
 - Headstock & Girders - 65mm to all surfaces
 - Decking Slabs - 60mm to all surfaces
 - Cover shall be 65mm where surface is exterior above ground.
- Reinforcement shall be tied into position and supported on approved plastic or plastic tipped wire chair as follows:-
 - Bars up to N12 and fabric - 800mm centres.
 - Bars N16 and larger - 1200 centres.
- Welding and bending of reinforcement is not permitted unless shown on the drawings or approved by the Engineer.
- Laps unless shown otherwise:

Fabric 1 complete mesh			
N12	360	N24	720
N16	480	N28	840
N20	600		

Horizontal bars with more than 300mm concrete under then shall have laps 1.3 times these lengths.
- Construction joints shall be scabbed and cleaned and coated with a cement/water slurry immediately after prior to placing concrete.
- Concrete shall be compacted using mechanical vibrators.
- Concrete shall be cured for a minimum of 7 days by a method approved by the Engineer.
- Conduits, pipes etc. must not be placed in the concrete cover and no holes or chases other than those shown on the Structural drawings shall be made in concrete members unless approved by the Engineer.
- Formwork shall comply with AS3610 "Formwork for Concrete" and all relevant Construction Safety Legislation. Unless otherwise noted finishes shall be Class 3. Minimum formwork stripping times shall be in accordance with Table 5.4.1 of AS 3610 "Formwork of Concrete".
- Control joints shall be constructed as specified. Saw cutting shall be carried out within 6 hours of concrete hardening.
- Concrete test cylinders shall be prepared as required by the Supervisor and tested by a NATA registered laboratory.
- Allowance shall be made in all finishes for movement in construction joints and expansion joints.

HEALTH AND SAFETY

- The contractor shall develop, implement and administer a workplace health and safety program that will ensure that all construction activities are performed to the relevant workplace health and safety requirements and any other statutory requirements.
- The workplace health and safety program must be co-ordinated with adjoining property owners and all relevant parties as necessary to ensure a safe building environment at all times.

STRUCTURAL STEELWORK

- All steelwork including connectors shall be in accordance with AS 4100 Steel Structures Code and AS/NZS 4600-1996 Cold formed steel structures.
- Steel shall be: AS 3679 Grade 300 generally AS 1163 Grade 250 for circular hollow sections AS 1163 Grade for rectangular hollow sections. Bolts shall comply with AS 1110, AS 1111, AS 1112 AS 1252 as appropriate. Welds shall comply with AS 1554.
- Abrasive cleaning prior to painting shall be to AS 1627.4 Class 2.5. Painting shall be one coat .075mm two pack inorganic air cured zinc silicate coating applied within 2 hours of abrasive cleaning, unless specified otherwise. Painting shall be to manufacturer's specification and the painter shall ensure the method of application is compatible with connection type and paint specified.
- Galvanising shall be hot dipped to AS 4680.
- Bolts shall be galvanised and of sufficient length to exclude the thread from the shear plane. A suitable washer shall be used under all nuts.
- Unless otherwise specified, the following shall apply:
 - Cleats, brackets, stiffeners etc. - ex.10mm plate.
 - Welding - 6mm continuous fillet to full perimeter at contact.
 - Bolt hole clearance - 2mm.
 - Butt welds shall be qualified complete penetration in accordance with AS 1554.
 - 6mm endplates to all hollow members.
 - Connections - minimum of 2-M20 8.8/S bolts.
- All welding to be Category "SP". Consumables shall be E48xx or W50x electrodes.
- Fabricator shall allow for all cleats and other fixings required by the Supervisor.
- Mortar shall be 1 cement: 2 sand mixed "just moist" and rammed solid.
- Galvanised/hot dipped galvanized or stainless steel bolts, nuts and washer shall be in accordance with AS 1214.
- Apply Zinc rod finishing weld, such as "Boss Galvanizing Bar" to reinstafe galvanizing after welding - typical all galvanized surfaces.
- The checking of shop drawings is included in our scope of works. STP Consultants will require 5 business days after receiving all shop detail drawings for STP Consultants to return comments.

TEMPORARY WORKS

- The contractor shall allow for all costs associated with the design, supply, installation and removal of all temporary back propping, safety screens, scaffolding and other requirements of the construction process. The contractor shall engage suitably qualified engineer to design, inspect and certify all temporary works and demolition works.
- The contractor is to provide all temporary works contractor engineering drawings to the structural engineer for information.
- It is the contractor's responsibility to ensure the overall stability of the structure whilst under construction. The contractor shall obtain advice from the engineer.
- The contractor is to have the construction methodology statements prepared and submitted for general review to ensure it is in accordance with the design intent.
- All vertical displacement and movements are to be limited to ensure the structure is not subjected to loads or movements causing structural distress to any element while the structure is being temporarily supported.
- Structure to be adequately braced to prevent any horizontal movement or deflections.

NUISANCE

- The contractor shall develop, implement and administer a plan that will ensure the management of noise and vibration resulting from construction works.
- The contractor will need to ensure all adjoining property requirements relating to noise and vibration are met.
- If it is established that there are no site specific requirements, then the contractor shall refer to minimum requirements for abatement of noise and vibration nominated by relevant by statutory requirements.
- The contractor will need to prepare and advise on monitoring and management of noise and vibration based on professional advice from suitably qualified person or persons.

SERVICE LOADS

- Function Category 2 (Normal)
Structural Design Actions to AS/NZS 1170.0 & -1, AS 4997:
Deck UDL: 15.0kPa
Deck Conc. Load: 200kN
Vessel: Length (LOA) 25m
Displacement 110 Tonnes
50 years
- Design working life
- Wind Actions equivalent to AS/NZS 1170.2:
Region: C
Terrain Category: 2.0
Shielding Multiplier Ms 1.0
Topographic Multiplier Mt 1.0
Terrain/Height Multiplier Mz,cat,u 0.95
Design Gust Wind Speed Vz, ultimate: 66m/s
- Earthquake Loads to AS 1170.4:
Hazard Factor: 0.07
Probability Factor: 1.0
Design Category I
- Hand rail details are to be in accordance with manufacturer's design and certification, in accordance with AS 4997.
- The above do not include loads which may be applied during construction. The builder is to maintain stability during construction.
- Wave loading based on report B3872 by Bonacci Group (QLD) Pty. Ltd.

PILING NOTES

- All piling shall be in accordance with AS 2159 Piling Code and with notes and details as set out on the drawings.
- The detail of the pile to be used and the method of operation shall be submitted to the Engineer for approval.
- Pile testing and confirmation that piles have achieved the required depth and capacity shall be carried out by the piling contractor. The method of testing shall be submitted to the Engineer for approval.
- Load-bearing piles have been designed to withstand loads indicated on the piling plan, with a maximum settlement of 10mm and an eccentricity of 75mm.
- Piles shall be driven by approved pile driving techniques to an approved set calculated by the Hiley Formula. A certificate of adequacy for pile loads shall be submitted by the Piling Contractor to the Engineer for approval.
- All piles shall be driven in the proper position shown on the drawings with a variation of not more than 25mm in 3m from the vertical (or raking line) with a maximum variation at the head of the pile from the position shown on the drawings of 75mm in any direction at the commencing surface. Variations outside these limits shall be cause for rejection.
- Pile set out shall be by Authorised Surveyor and pile locations shall be checked and advised to Engineer after construction.
- Piles should be cut off to level. Immediately after making the final cut off, the area should be coated with an approved protective coating over the exposed surface.



Rev	Description	By	Appd	Date
F	APPROVAL ISSUE	JBG	AJF	16.11.12
E	PRELIMINARY ISSUE	JBG	AJF	13.11.12
D	FOR APPROVAL	JBG	AJF	21.09.12
C	TENDER ISSUE	JBG	AJF	30.06.12
B	PRELIMINARY ISSUE	JBG	AJF	12.06.12
A	PRELIMINARY ISSUE	JBG	AJF	31.05.12



CONSULTANTS	
Brisbane Office Ph: 07 32 552 122 Fax: 07 32 552 411	Mackay Office Ph: 07 49 441 577 Fax: 07 49 441 588
Cairns Office Ph: 07 40 318 777 Fax: 07 40 318 799	Townsville Office Ph: 07 47 242 626 Fax: 07 47 242 417

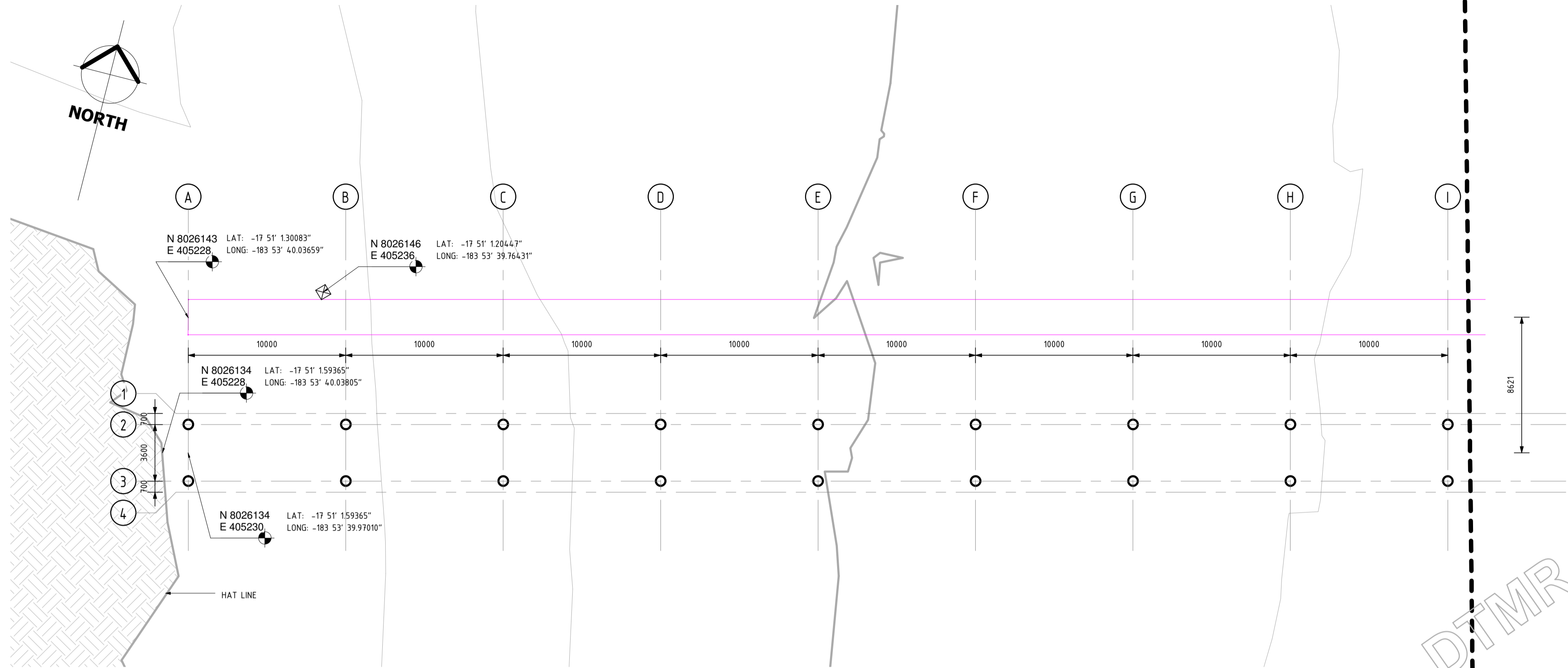
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Client:	CIVIL PLUS CONSTRUCTIONS
Project:	CLUMP POINT JETTY REPLACEMENT
Title:	STRUCTURAL NOTES

Design	Designer	Drawn	Author
Checked	Checker	Date	NOV '12
RPEU No.	Approver	Datum	-

Approved:		
Job Number:	Drawing No.	Revision
T12-058	ST0.01	F

FOR APPROVAL

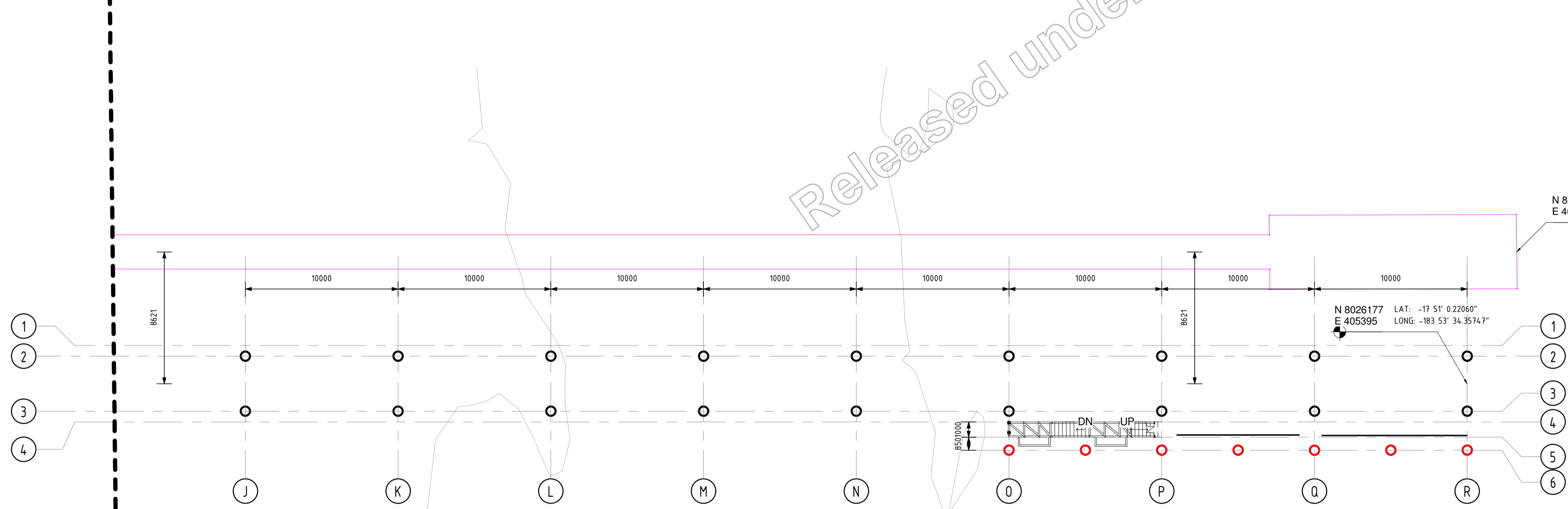


LOCATION PLAN
1: 1000

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PILING PLAN

1: 200



PILING PLAN

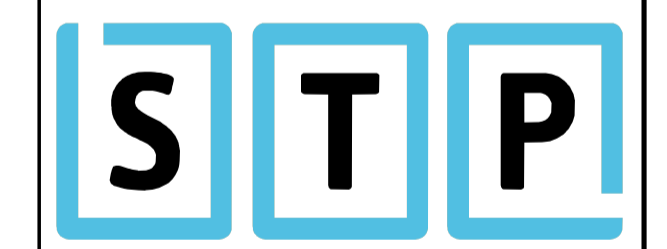
1: 200

NOTE:

- PROVIDE STORM TIDE GUAGE PLATFORM & HOUSING IN ACCORDANCE WITH DSITIA SPECIFICATION (DWG's 1748-1309-2 and MISC-1-1-5)
- PROVIDE FIRE WATER & HOSE REELS AT SERVICE LOCATIONS ALONG JETTY
- PROVIDE POWER TO JETTY HEAD
- PROVIDE LIGHTING TO JETTY HEAD
- PROVIDE POTABLE WATER AT JETTY SERVICE LOCATIONS
- PROVIDE 5 ACCESS LADDERS ALONG THE JETTY IN ACCORDANCE WITH AS4995 - 1995

Rev	Description	By	Appd	Date
G	APPROVAL ISSUE	JBG	AJF	16.11.12
F	PRELIMINARY ISSUE	JBG	AJF	13.11.12
E	GPS LOCATIONS ADDED	JBG	AJF	27.09.12
D	FOR APPROVAL	JBG	AJF	21.09.12
C	TENDER ISSUE	JBG	AJF	30.06.12
B	PRELIMINARY ISSUE	JBG	AJF	12.06.12
A	PRELIMINARY ISSUE	JBG	AJF	31.05.12

AMENDMENTS
IN ASSOCIATION WITH



CONSULTANTS

<i>Brisbane Office</i> Ph: 07 32 552 122 Fax: 07 32 552 411	<i>Mackay Office</i> Ph: 07 49 441 577 Fax: 07 49 441 588
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Client: **CIVIL PLUS CONSTRUCTIONS**

Project: **CLUMP POINT JETTY REPLACEMENT**

Title: **PILING LAYOUT PLAN**

Design	AJF	Drawn	JBG
Checked	AJF	Date	NOV '12
RPEU No.	04683	Datum	-


Approved:		
Job Number:	Drawing No.	Revision
T12-058	ST1.01	G

FOR APPROVAL

Ult. Capacity Compression: Tension:	1000 kN 700 kN	1000 kN 700 kN	1000 kN 700 kN	1000 kN 700 kN	1000 kN 700 kN	1000 kN 700 kN	1000 kN 700 kN	1000 kN 700 kN	1000 kN 700 kN	1000 kN 700 kN	1000 kN 700 kN	1000 kN 700 kN	1000 kN 700 kN	1000 kN 700 kN	1000 kN 700 kN	1000 kN 700 kN	1000 kN 700 kN	1000 kN 700 kN	
Properties Dia: Thickness: Depth (RL):	610mm 12.7 PL -16.23	610mm 12.7 PL -16.23	610mm 12.7 PL -16.23	610mm 12.7 PL -16.23	610mm 12.7 PL -16.23	610mm 12.7 PL -16.23	610mm 12.7 PL -16.54	610mm 12.7 PL -16.54	610mm 12.7 PL -16.54	610mm 12.7 PL -16.54	610mm 12.7 PL -17.44	610mm 12.7 PL -17.44	610mm 12.7 PL -17.94	610mm 12.7 PL -17.94	610mm 12.7 PL -18.44	610mm 12.7 PL -18.44	610mm 12.7 PL -18.84	610mm 12.7 PL -18.84	
Column Locations	A-2	A-3	B-2	B-3	C-2	C-3	D-2	D-3	E-2	E-3	F-2	F-3	G-2	G-3	H-2	H-3	I-2	I-3	
Properties Dia: Thickness: Depth (RL): Ult. Capacity Compression: Tension:	610mm 12.7 PL -18.94	610mm 12.7 PL -18.94	610mm 12.7 PL -19.14	610mm 12.7 PL -19.14	610mm 12.7 PL -19.14	610mm 12.7 PL -19.14	610mm 12.7 PL -19.94	610mm 12.7 PL -19.94	610mm 12.7 PL -20.44	610mm 12.7 PL -20.44	610mm 12.7 PL -20.94	610mm 12.7 PL -20.94	610mm 12.7 PL -20.94	610mm 12.7 PL -20.94	610mm 12.7 PL -20.94	610mm 12.7 PL -20.94	610mm 12.7 PL -20.94	610mm 12.7 PL -20.94	610mm 12.7 PL -20.94
Top of Pile	2770	2770	2770	2770	2770	2770	2770	2770	2770	2770	2770	2770	2770	2770	2770	2770	2770	2770	2770
LAT RL 0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Column Locations	J-2	J-3	K-2	K-3	L-2	L-3	M-2	M-3	N-2	N-3	O-2	O-3	P-2	P-3	Q-2	Q-3	R-2	R-3	

Rev	Description	By	Appd	Date
F	APPROVAL ISSUE	JBG	AJF	16.11.12
E	PRELIMINARY ISSUE	JBG	AJF	13.11.12
D	FOR APPROVAL	JBG	AJF	21.09.12
C	TENDER ISSUE	JBG	AJF	30.06.12
B	PRELIMINARY ISSUE	JBG	AJF	12.06.12
A	PRELIMINARY ISSUE	JBG	AJF	31.05.12

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Client:
CIVIL PLUS CONSTRUCTIONS

Project:
**CLUMP POINT
JETTY REPLACEMENT**

Title:
PILING SCHEDULE

Design	Designer	Drawn	Author
Checked	Checker	Date	NOV '12
RPEQ No.	Approver	Datum	-

Approved: *[Signature]*

Job Number:	Drawing No.	Revision
T12-058	ST1.03	F

FOR APPROVAL

Top of Fender Piles 5630								Top of Fender Piles 5630
Deepest point of jetty -3838								Deepest point of jetty -3838
RL -8.0 -8000								RL -8.0 -8000
Properties Dia: Thickness: Ult. Capacity Compression: Tension:	610mm 12.7 PL 250 kN 100 kN	610mm 12.7 PL 250 kN 100 kN	610mm 12.7 PL 250 kN 100 kN	610mm 12.7 PL 250 kN 100 kN	610mm 12.7 PL 250 kN 100 kN	610mm 12.7 PL 250 kN 100 kN	610mm 12.7 PL 250 kN 100 kN	610mm 12.7 PL 250 kN 100 kN
Column Locations	O-6	O(S000)-6	P-6	P(S000)-6	Q-6	O(S000)-6	R-6	

Released under RTI - DTMR

Rev	Description	By	Appd	Date
E	APPROVAL ISSUE	JBG	AJF	16.11.12
D	PRELIMINARY ISSUE	JBG	AJF	13.11.12
C	FOR APPROVAL	JBG	AJF	21.09.12
B	TENDER ISSUE	JBG	AJF	30.06.12
A	PRELIMINARY ISSUE	JBG	AJF	12.06.12

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Client:
CIVIL PLUS CONSTRUCTIONS

Project:
**CLUMP POINT
JETTY REPLACEMENT**

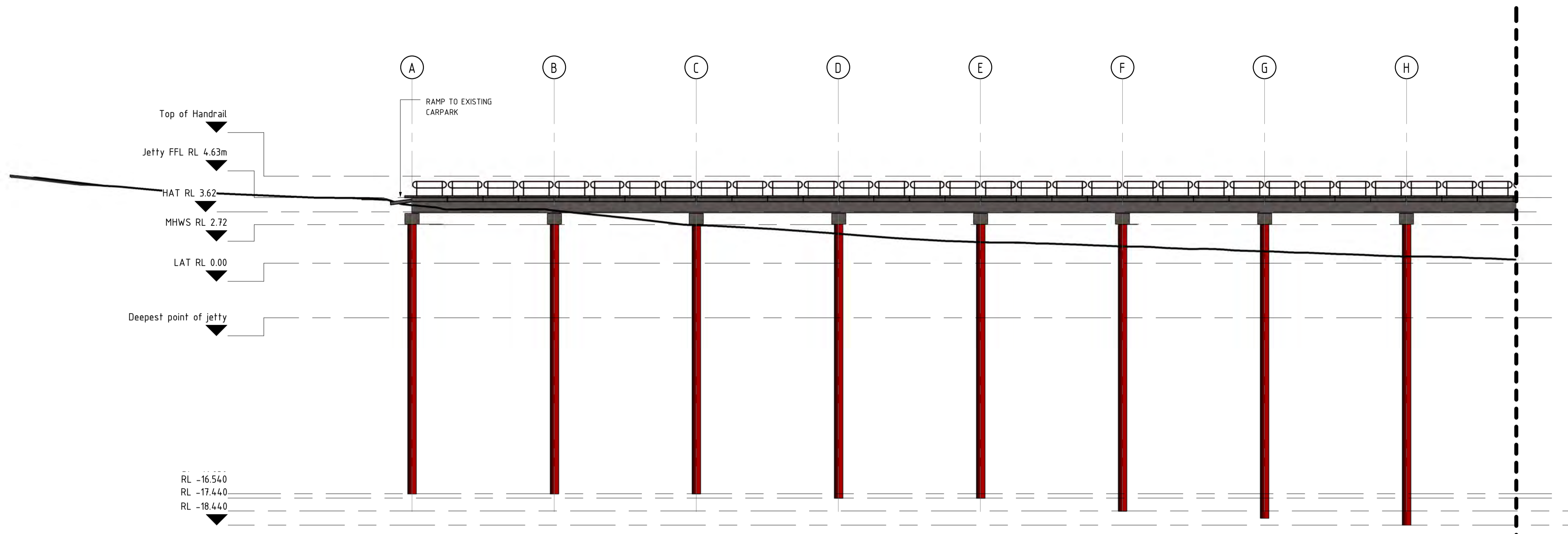
Title:
**FENDER PILES
PILING TABLE**

Design	Designer	Drawn	Author
Checked	Checker	Date	NOV '12
RPEQ No.	Approver	Datum	-

Approved:

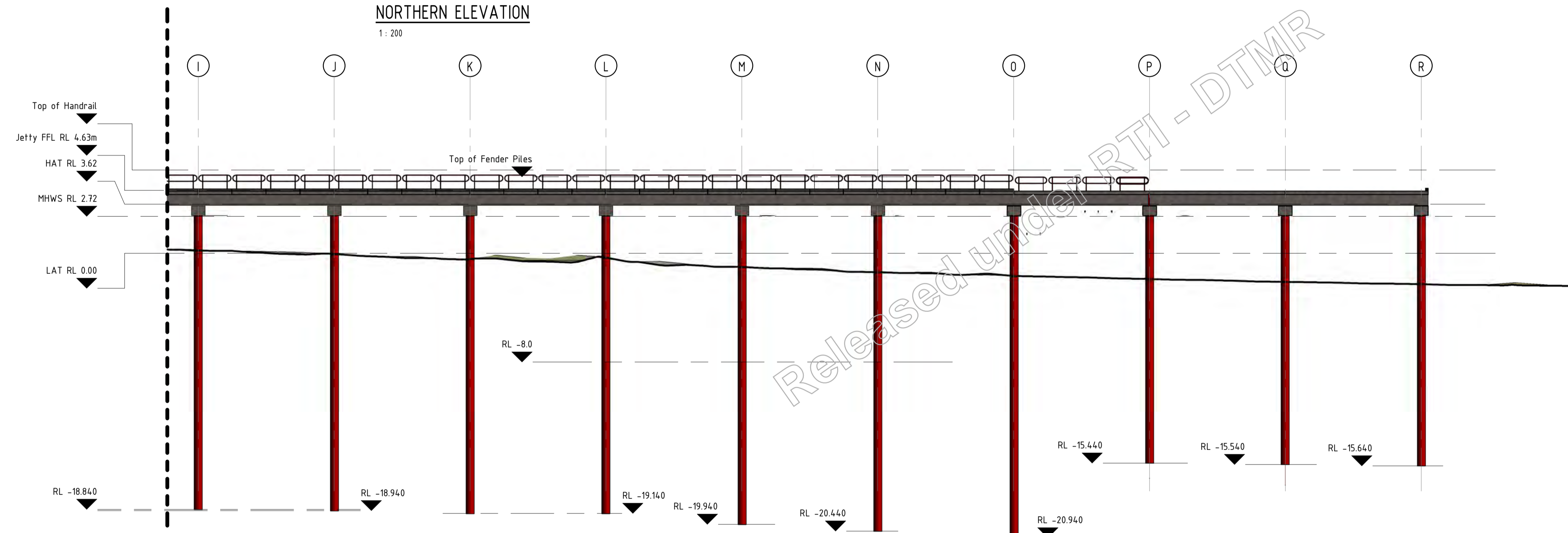
Job Number:	Drawing No.	Revision
T12-058	ST1.04	E

FOR APPROVAL



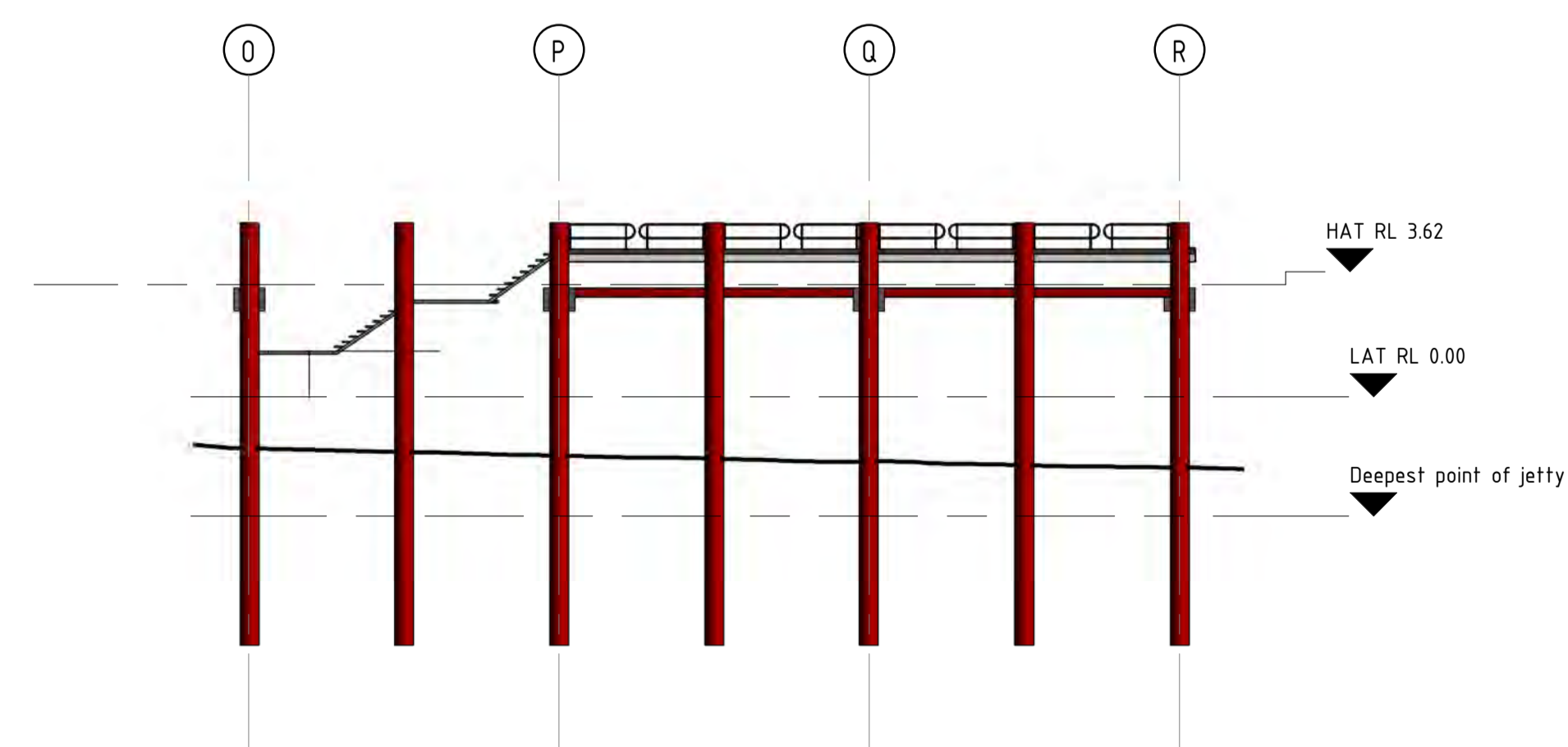
NORTHERN ELEVATION

1: 200



NORTHERN ELEVATION

1: 200



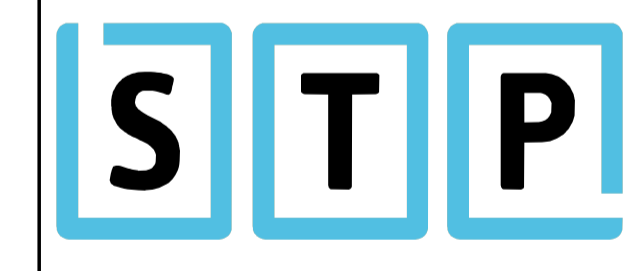
FENDER PILE ELEVATION

1: 200

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Rev	Description	By	Appd	Date
F	APPROVAL ISSUE	JBG	AJF	16.11.12
E	PRELIMINARY ISSUE	JBG	AJF	13.11.12
D	FOR APPROVAL	JBG	AJF	21.09.12
C	TENDER ISSUE	JBG	AJF	30.06.12
B	PRELIMINARY ISSUE	JBG	AJF	12.06.12
A	PRELIMINARY ISSUE	JBG	AJF	31.05.12

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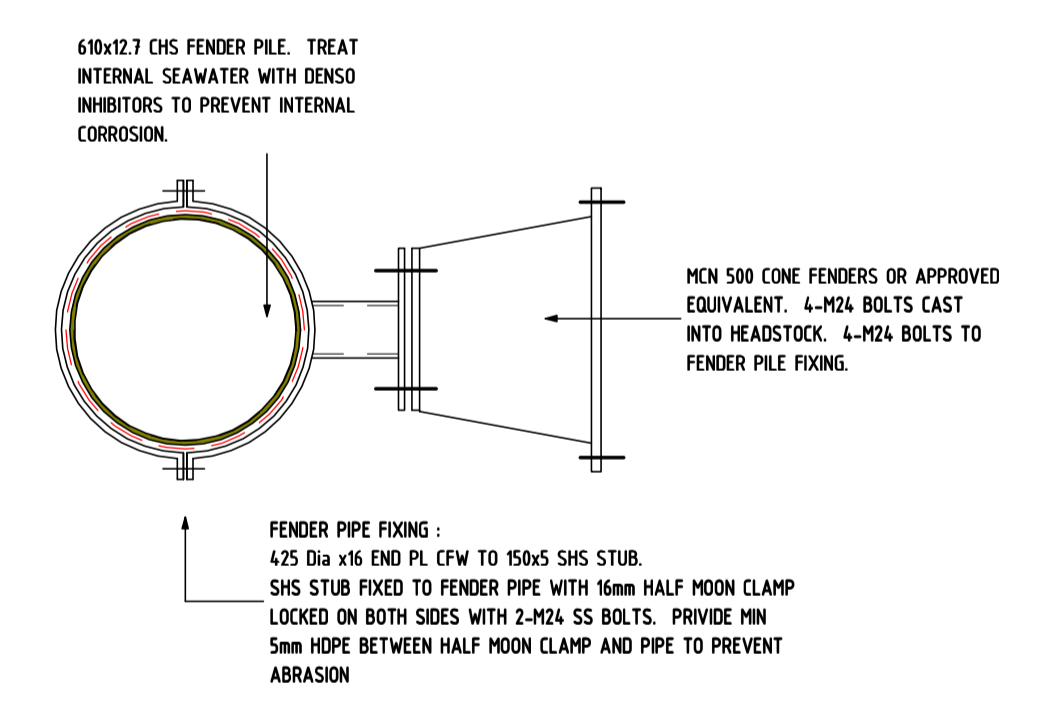
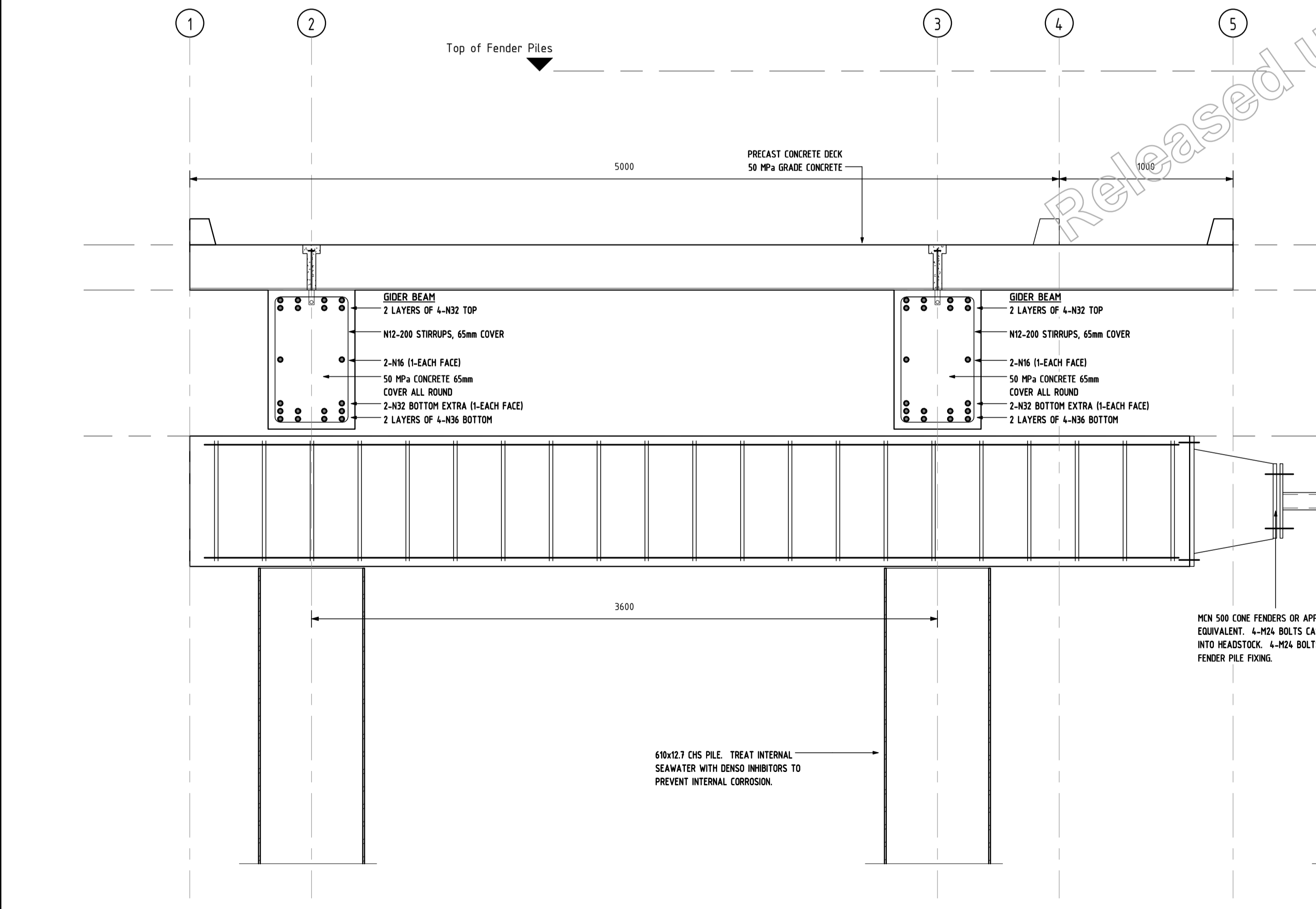
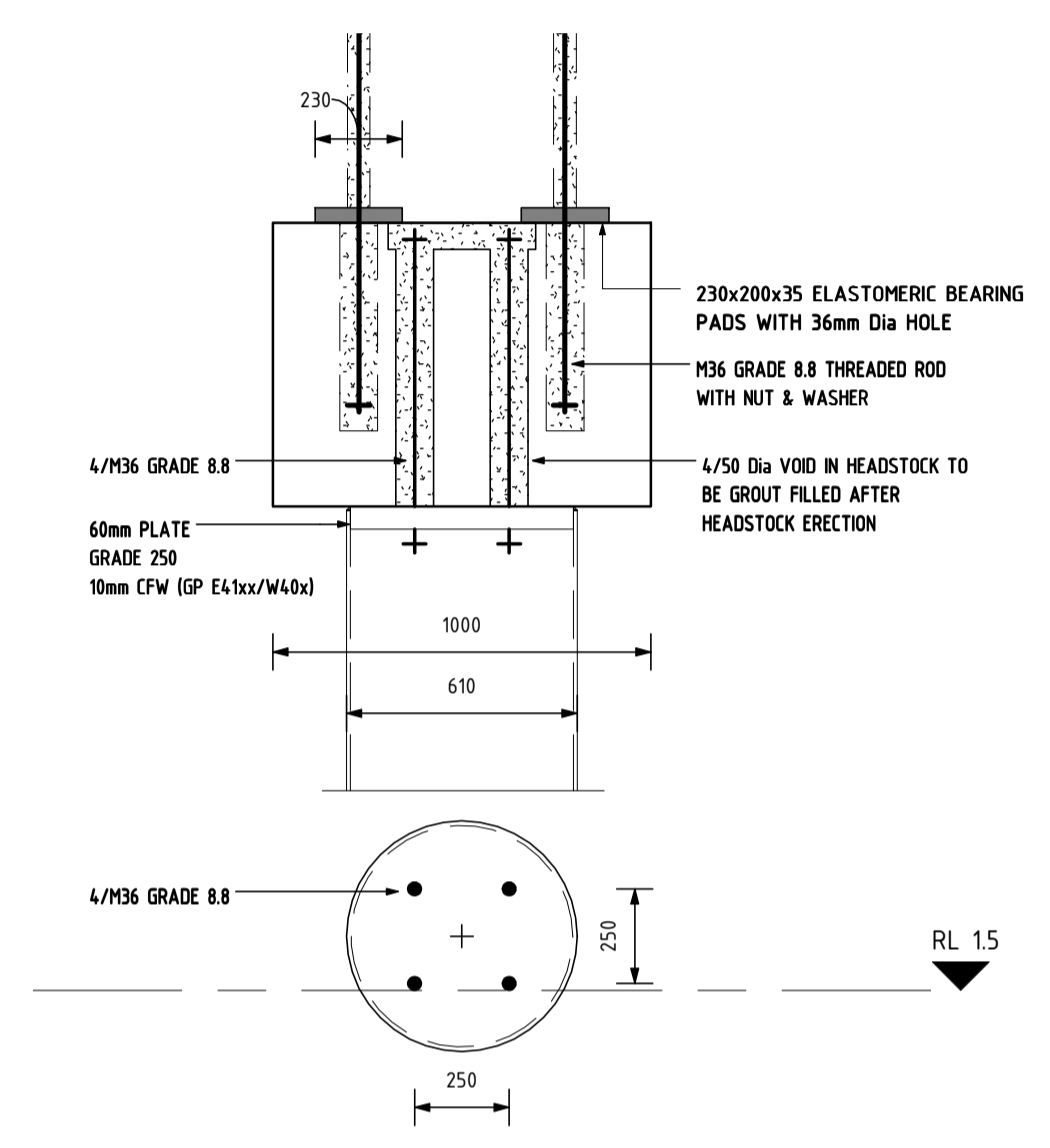
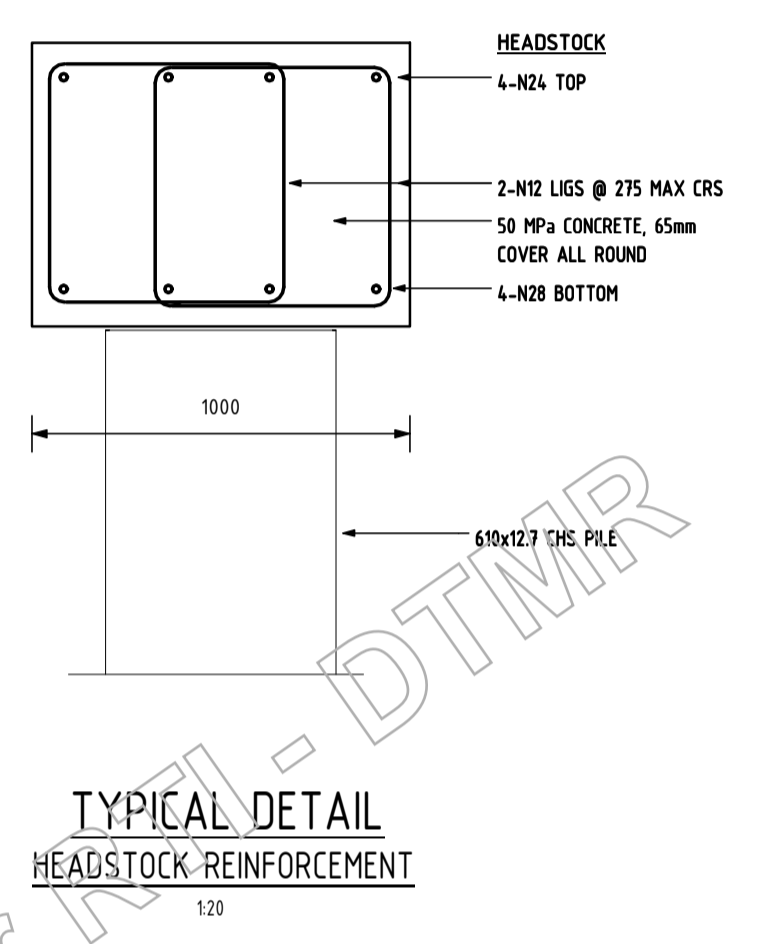
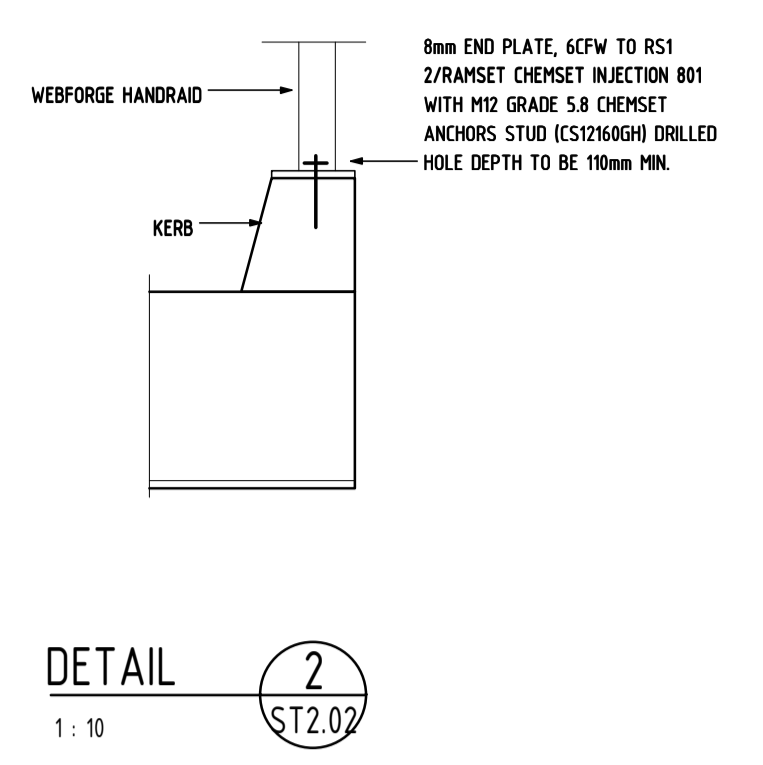
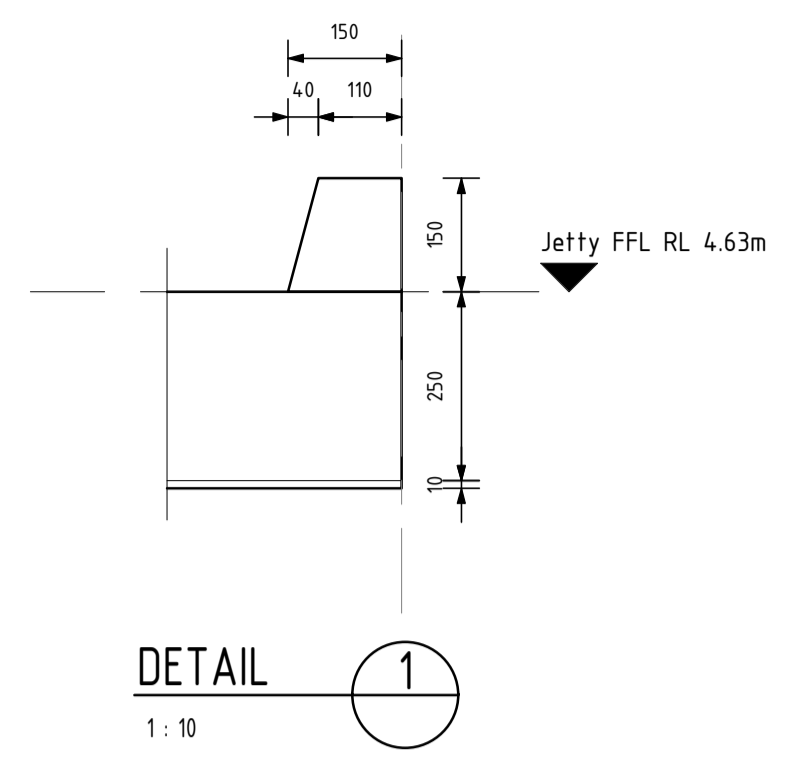
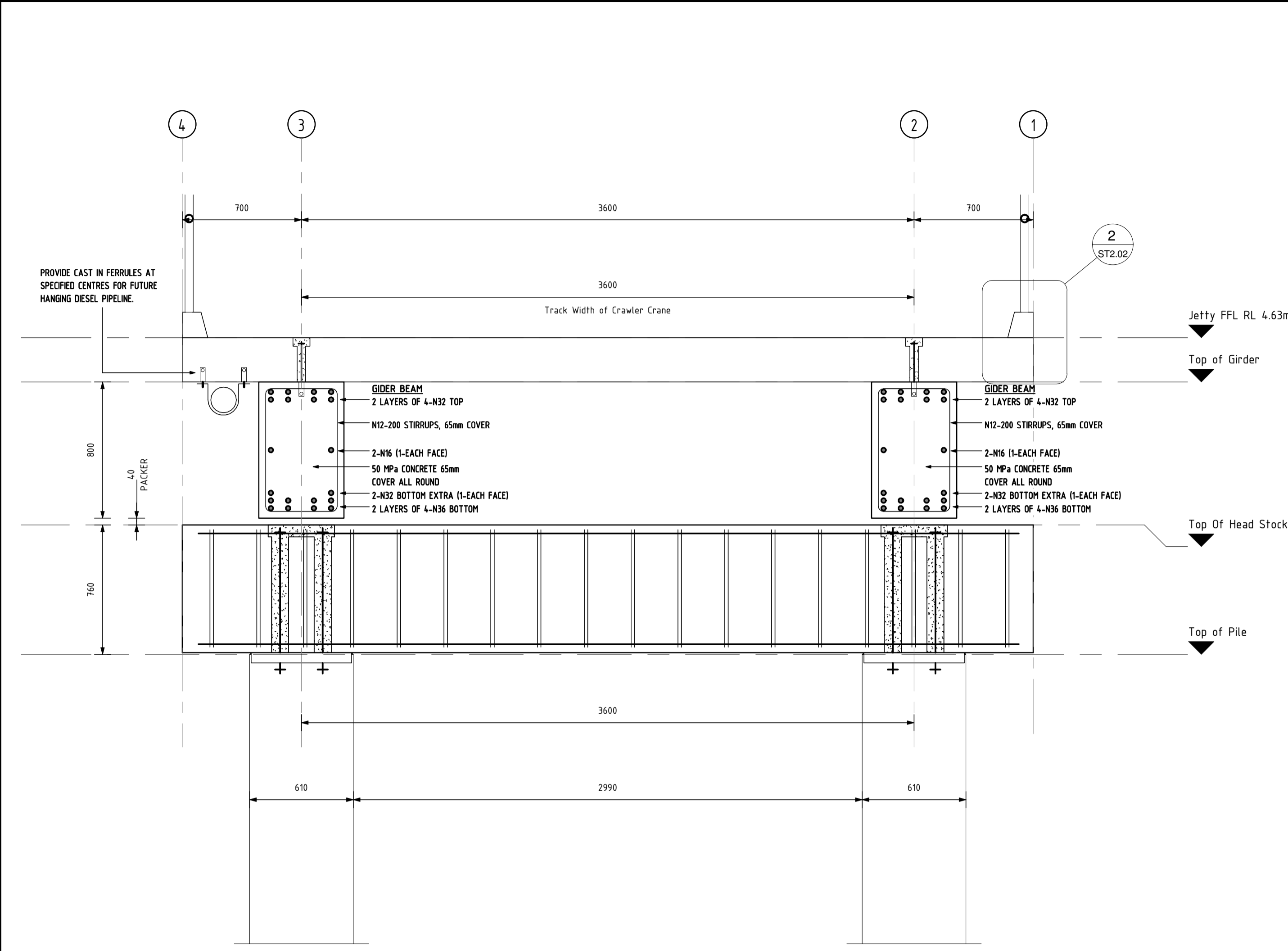
Client: CIVIL PLUS CONSTRUCTIONS
Project: CLUMP POINT JETTY REPLACEMENT
Title: JETTY LONG SECTIONS

Design	Designer	Drawn	Author
Checked	Checker	Date	Author
RPEU No.	Approver	Datum	-

Approved: *[Signature]*

Job Number	Drawing No.	Revision
T12-058	ST2.01	F

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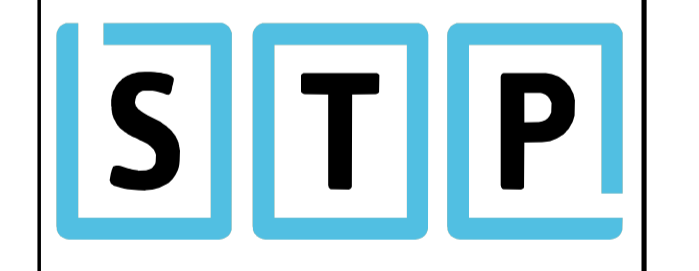


NOTE:

- PROVIDE STORM TIDE GUAGE PLATFORM & HOUSING IN ACCORDANCE WITH DSITA SPECIFICATION (DWG's 1748-1309-2 and MISC-1-1-5)
- PROVIDE FIRE WATER & HOSE REELS AT SERVICE LOCATIONS ALONG JETTY
- PROVIDE POWER TO JETTY HEAD
- PROVIDE LIGHTING TO JETTY HEAD
- PROVIDE POTABLE WATER AT JETTY SERVICE LOCATIONS
- PROVIDE 5 ACCESS LADDERS ALONG THE JETTY IN ACCORDANCE WITH AS4995 - 1995

Rev	Description	By	Appd	Date
F	APPROVAL ISSUE	JBG	AJF	16.11.12
E	PRELIMINARY ISSUE	JBG	AJF	13.11.12
D	FOR APPROVAL	JBG	AJF	21.09.12
C	TENDER ISSUE	JBG	AJF	30.06.12
B	PRELIMINARY ISSUE	JBG	AJF	12.06.12
A	PRELIMINARY ISSUE	JBG	AJF	31.05.12

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Client: **CIVIL PLUS CONSTRUCTIONS**

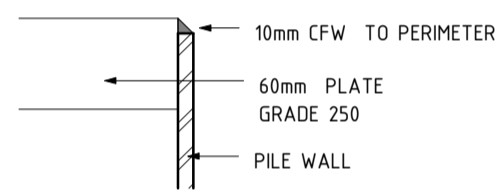
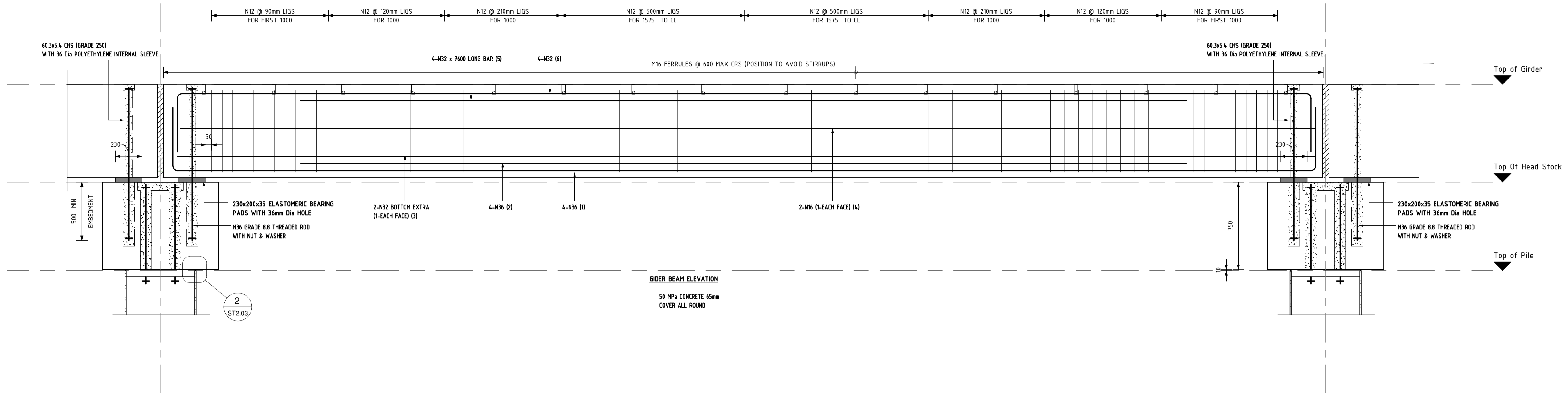
Project: **CLUMP POINT JETTY REPLACEMENT**

Title: **TYPICAL SUPPORT SECTIONS**

Design	AJF	Drawn	JBG
Checked	AJF	Date	NOV '12
RPEU No.	4683	Datum	-

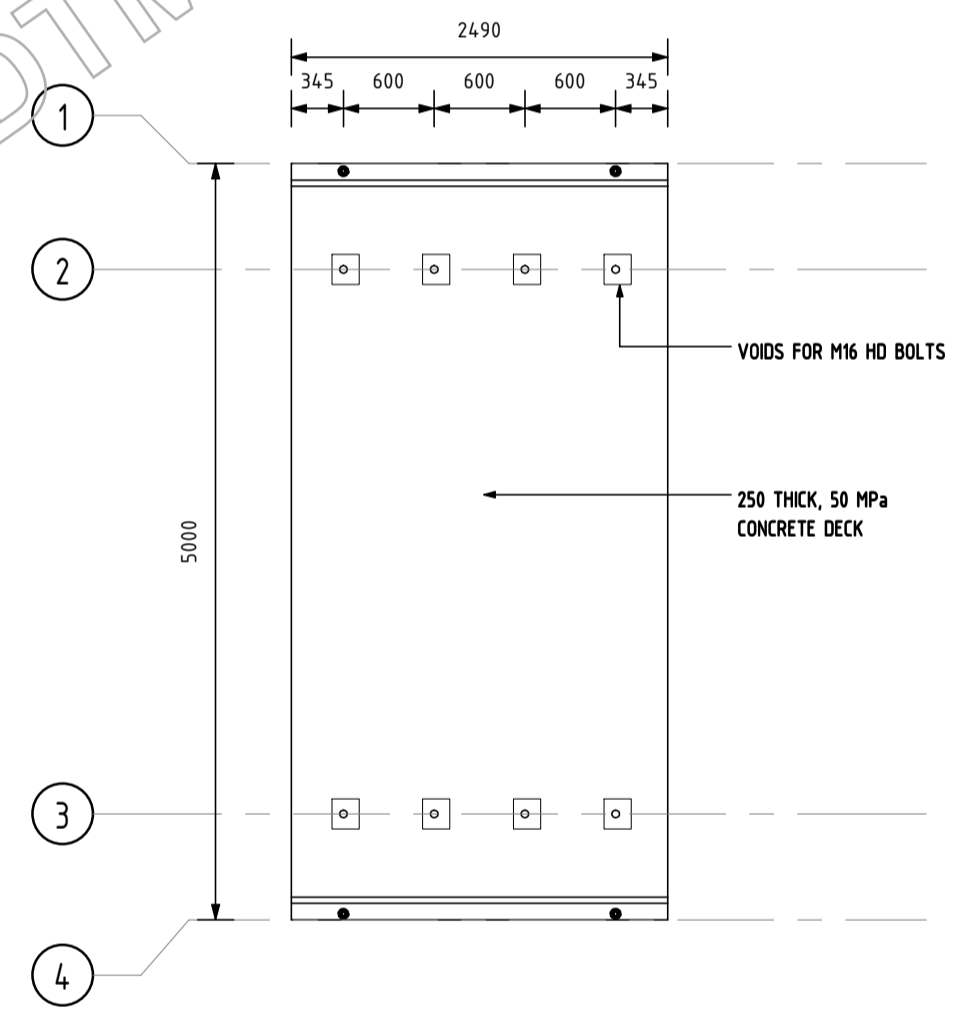
Job Number:	Drawing No.	Revision
T12-058	ST2.02	F

FOR APPROVAL



BEARING PLATE DETAIL

DETAIL 2
1:5 ST2.03

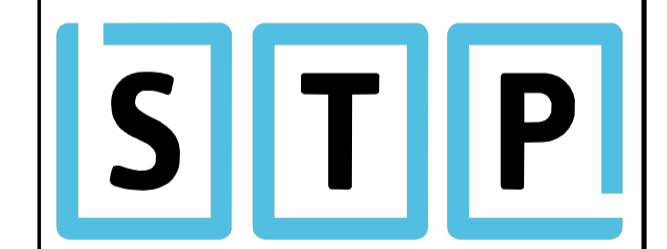


TYPICAL DETAIL
DECK UNIT
1:50

Released under RTI - DTMR

Rev	Description	By	Appd	Date
E	APPROVAL ISSUE	JBG	AJF	16.11.12
D	PRELIMINARY ISSUE	JBG	AJF	13.11.12
C	FOR APPROVAL	JBG	AJF	21.09.12
B	TENDER ISSUE	JBG	AJF	30.06.12
A	PRELIMINARY ISSUE	JBG	AJF	12.06.12

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Client: **CIVIL PLUS CONSTRUCTIONS**

Project: **CLUMP POINT JETTY REPLACEMENT**

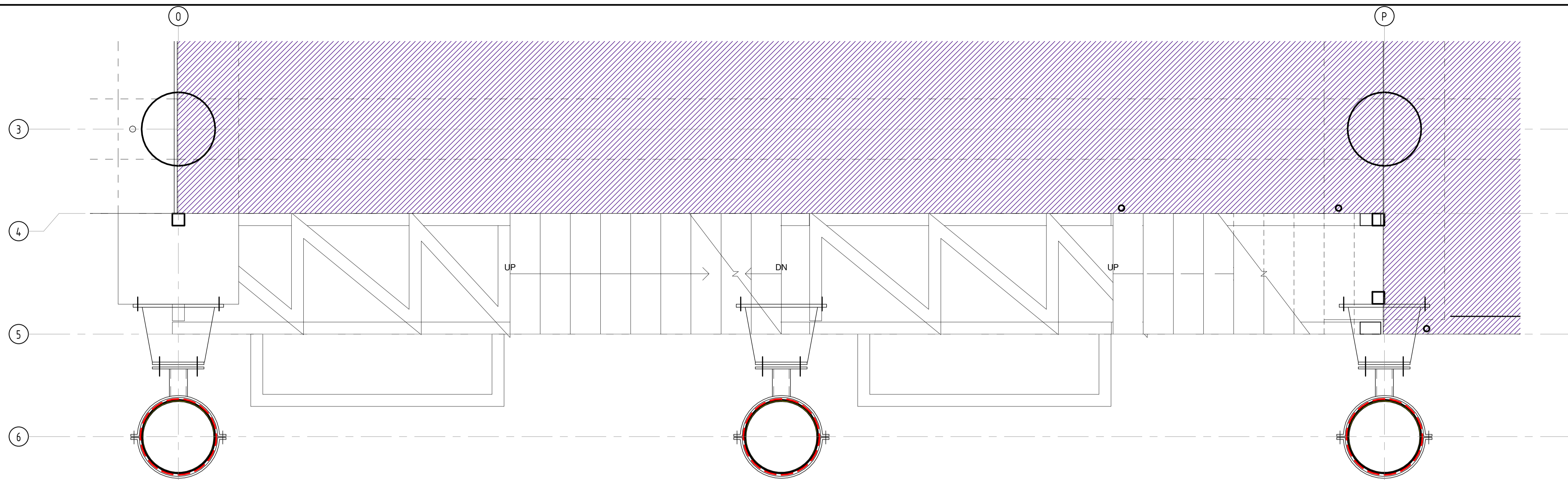
Title: **DETAILS**

Design	Designer	Drawn	Author
Checked	Checker	Date	Author
RPEQ No.	Approver	Datum	-

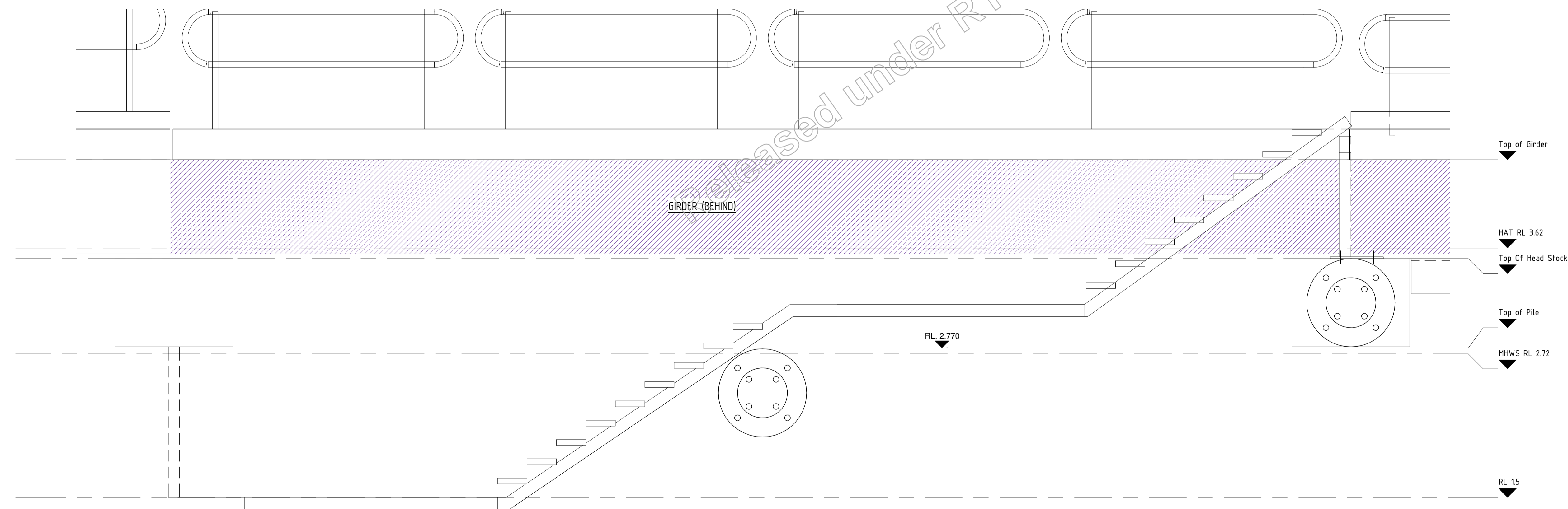
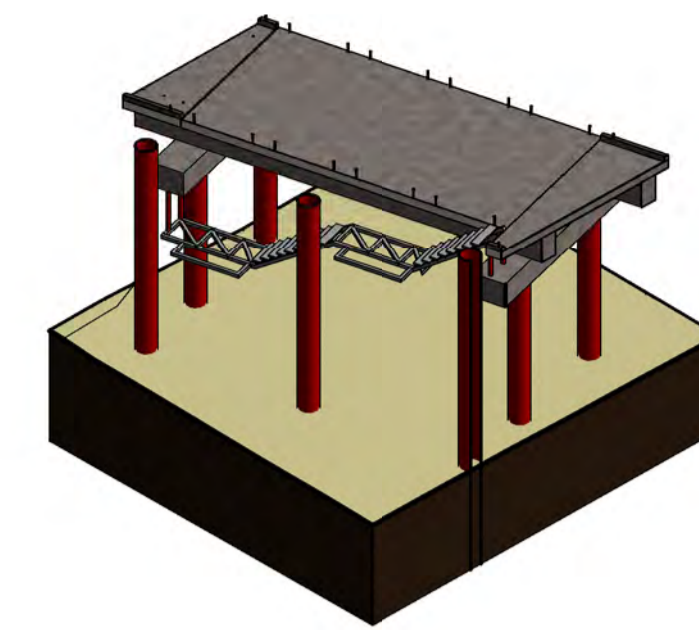
Approved:

Job Number:	Drawing No.	Revision
T12-058	ST2.03	E

FOR APPROVAL



STAIR LAYOUT PLAN
1:20

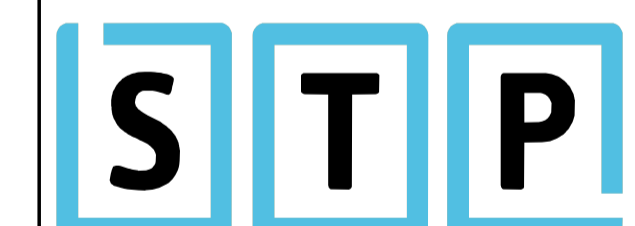


TYPICAL STAIR SECTION
1:20

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Rev	Description	By	Appd	Date
E	APPROVAL ISSUE	JBG	AJF	16.11.12
D	PRELIMINARY ISSUE	JBG	AJF	13.11.12
C	FOR APPROVAL	JBG	AJF	21.09.12
B	TENDER ISSUE	JBG	AJF	30.06.12
A	PRELIMINARY ISSUE	JBG	AJF	12.06.12

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Client:
CIVIL PLUS CONSTRUCTIONS
 Project:
**CLUMP POINT
JETTY REPLACEMENT**

Title:
STAIR DETAILS

Design	Designer	Drawn	Author
Checked	Checker	Date	Author
RPEQ No.	Approver	Date	-

Approved:

Job Number	Drawing No.	Revision
T12-058	ST2.04	E

FOR APPROVAL

Stephen C Day


From: Scott Ironside <Scott@civilplus.com.au>
Sent: Wednesday, 30 January 2013 3:54 PM
To: Stephen C Day; tony.rooks@ccrc.qld.gov.au; David.goodman@ccrc.qld.gov.au
Cc: Richard Lamb; Dane Blackford; Luke Vandesande; Peter Lyons
Subject: Clump Point - Updated Construction Drawings
Attachments: T12-058 ST1.01 (2).pdf; T12-058 ST1.03 (1).pdf; T12-058 ST1.04 (1).pdf; T12-058 ST1.11 (2).pdf; T12-058 ST2.01 (1).pdf; T12-058 ST2.02 (1).pdf; T12-058 ST2.03 (1).pdf; T12-058 ST2.04 (2).pdf; T12-058 ST3.01 (1).pdf; T12-058 ST3.03 (2).pdf; T12-058 ST3.05 (1).pdf; T12-058 Cover Page - Clump Point.pdf; T12-058 ST0.01 (1).pdf; image003.jpg

Flag Status: Flagged

Categories: Email filed

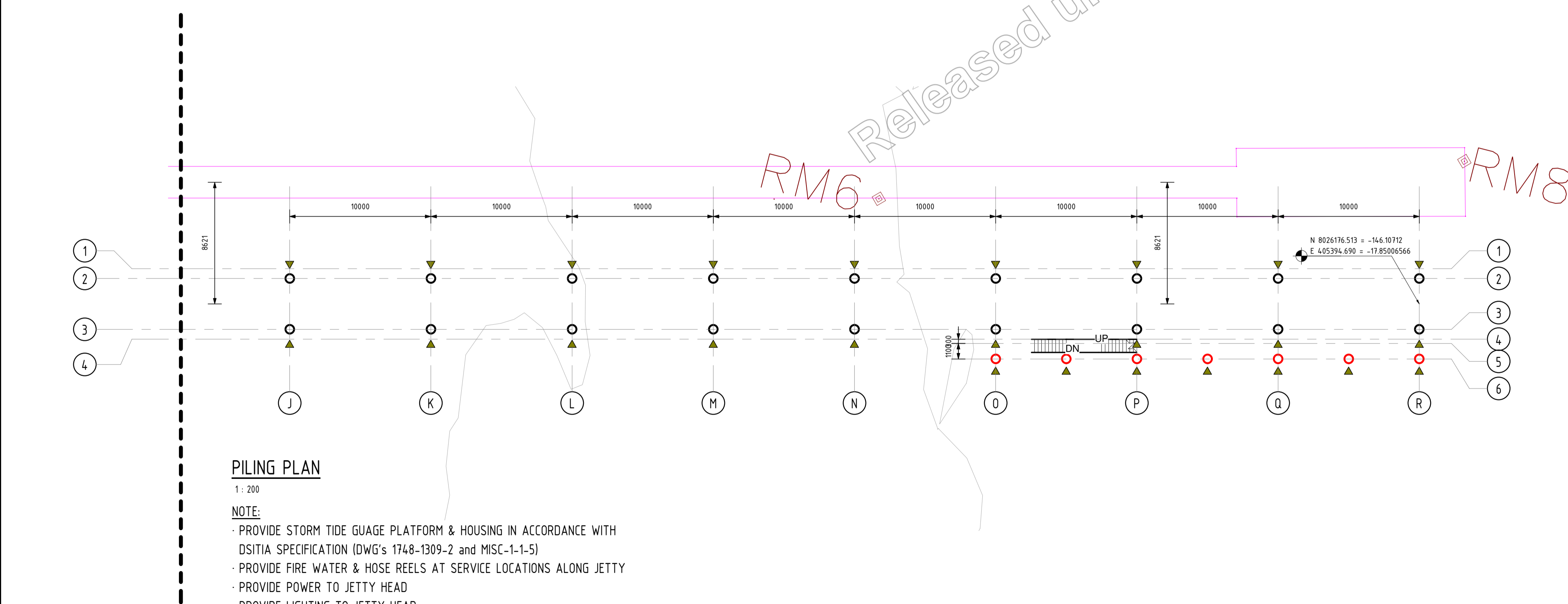
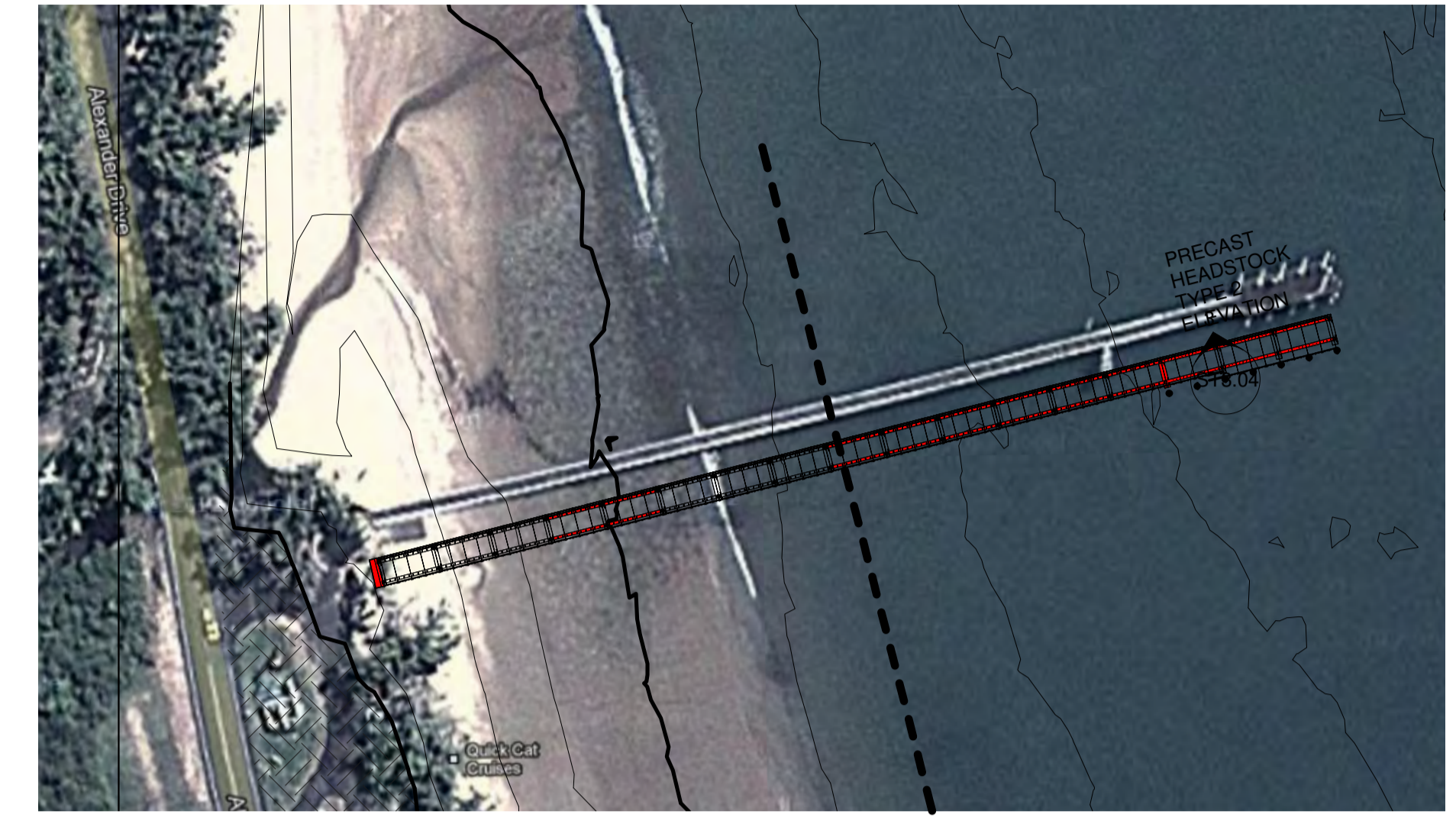
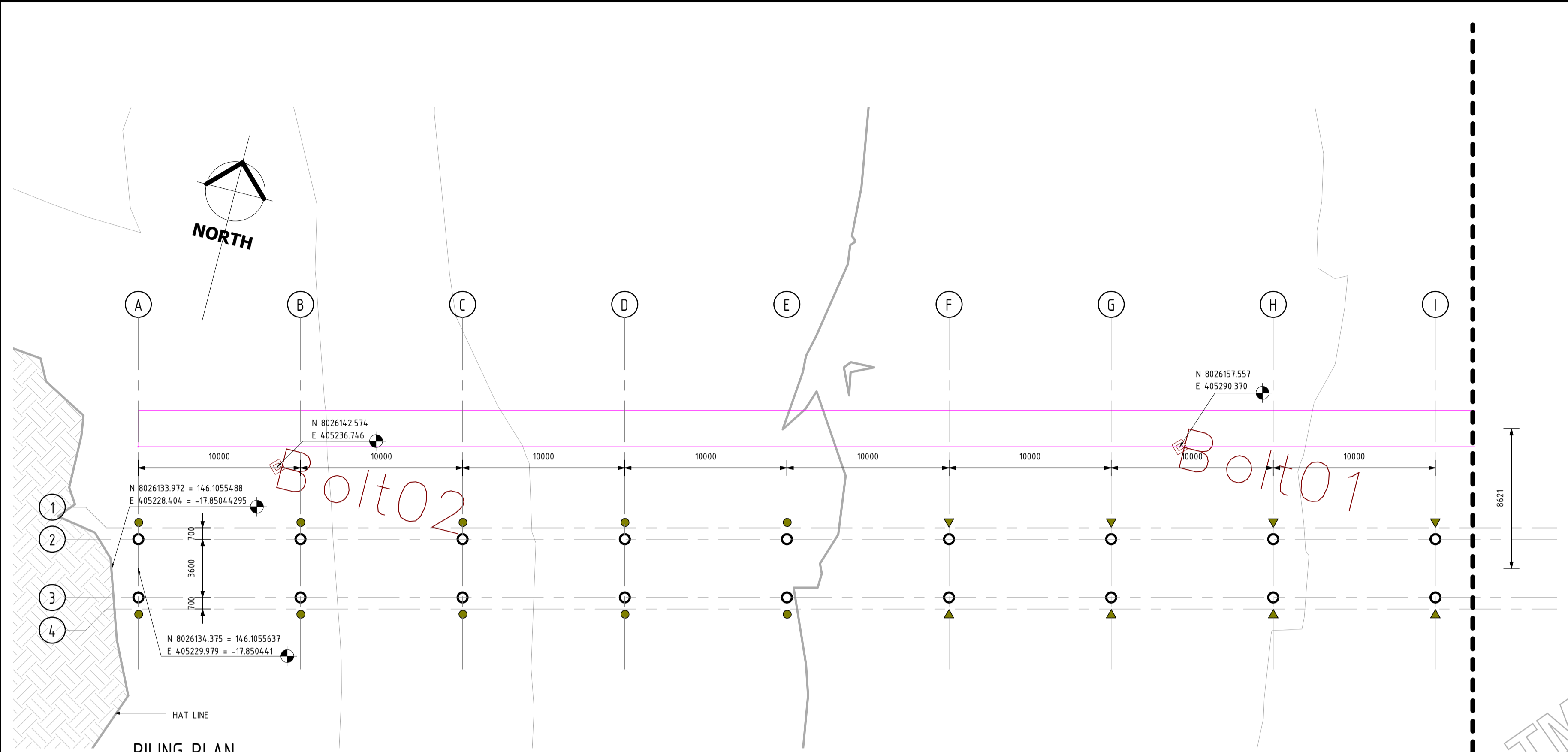
Gents,
Please find attached updated construction drawings for Clump Point for review.

Thanks



Scott Ironside | Project Manager & Managing Director | CivilPlus Constructions Pty Ltd
30 Blakey Street, Garbutt Qld 4814 | PO Box 1482 Aitkenvale Qld 4814
p 4728 6822 | f 4728 6833 | m | e scott@civilplus.com.au | w www.civilplus.com.au

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NOTE:

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- PROVIDE FIRE WATER & HOSE REELS AT SERVICE LOCATIONS ALONG JETTY
- PROVIDE POWER TO JETTY HEAD
- PROVIDE LIGHTING TO JETTY HEAD
- PROVIDE POTABLE WATER AT JETTY SERVICE LOCATIONS
- PROVIDE 5 ACCESS LADDERS ALONG THE JETTY IN ACCORDANCE WITH AS4995 - 1995

Structural Column Schedule		
Column Location Mark	Easting	Northing
A-2	405229.552757	8026136.123710
A-3	405230.440214	8026132.634807
B-2	405239.235868	8026138.601086
B-3	405240.128169	8026135.113422
C-2	405248.923823	8026141.079700
C-3	405249.816124	8026137.592037
D-2	405258.611777	8026143.558315
D-3	405259.504079	8026140.070651
E-2	405268.299732	8026146.036930
E-3	405269.192034	8026142.549266
F-2	405277.987687	8026148.515545
F-3	405278.879988	8026145.027881
G-2	405287.675642	8026150.994160
G-3	405288.567943	8026147.506496
H-2	405297.363597	8026153.472774
H-3	405298.255898	8026149.985111
I-2	405307.051552	8026155.951389
I-3	405307.943853	8026152.463725
J-2	405316.739506	8026158.430004
J-3	405317.631808	8026154.942340
K-2	405326.427461	8026160.908619
K-3	405327.319762	8026157.420955
L-2	405336.115416	8026163.387234
L-3	405337.007717	8026159.899570
M-2	405345.803371	8026165.865848
M-3	405346.695672	8026162.378185
N-2	405355.491326	8026168.344463
N-3	405356.383627	8026164.856799
O(5.000)-6	405371.436068	8026166.535407
O-2	405365.179280	8026170.823078
O-3	405366.071582	8026167.335414
O-6	405366.592091	8026165.2961
P(5.000)-6	405381.124023	8026169.014022
P-2	405374.867235	8026173.301693
P-3	405375.759537	8026169.814029
P-6	405376.280046	8026167.774715
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Q-2	405384.555190	8026175.780308
Q-3	405385.447491	8026172.292644
Q-6	405385.968001	8026170.253329
R-2	405394.243145	8026178.258922
R-3	405395.135446	8026174.771259
R-6	405395.655955	8026172.731944

2	CONSTRUCTION ISSUE	JBG	AJF	25.01.13
1	CONSTRUCTION ISSUE	JBG	AJF	17.01.13
G	APPROVAL ISSUE	JBG	AJF	16.11.12
F	PRELIMINARY ISSUE	JBG	AJF	13.11.12
E	GPS LOCATIONS ADDED	JBG	AJF	27.09.12
D	FOR APPROVAL	JBG	AJF	21.09.12
C	TENDER ISSUE	JBG	AJF	30.06.12
B	PRELIMINARY ISSUE	JBG	AJF	12.06.12
A	PRELIMINARY ISSUE	JBG	AJF	31.05.12

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Client:
CIVIL PLUS CONSTRUCTIONS

Project:
CLUMP POINT JETTY REPLACEMENT

Title:
PILING LAYOUT PLAN

Design	AJF	Drawn	JBG
Checked	AJF	Date	NOV '12
RPEU No.	04683	Datum	-

Approved: [Signature]

Job Number:	T12-058	Drawing No.:	ST1.01	Revision:	2
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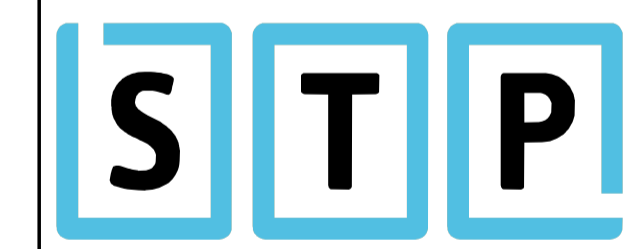
CONSTRUCTION

Ult. Capacity Compression: Tension:	1000 kN 700 kN	1000 kN 700 kN	1000 kN 700 kN	1000 kN 700 kN	1000 kN 700 kN	1000 kN 700 kN	1000 kN 700 kN	1000 kN 700 kN	1000 kN 700 kN	1000 kN 700 kN	1000 kN 700 kN	1000 kN 700 kN	1000 kN 700 kN	1000 kN 700 kN	1000 kN 700 kN	1000 kN 700 kN	1000 kN 700 kN	1000 kN 700 kN	
Properties Dia: Thickness: Depth (RL):	610mm 12.7 PL -16.23	610mm 12.7 PL -16.23	610mm 12.7 PL -16.23	610mm 12.7 PL -16.23	610mm 12.7 PL -16.23	610mm 12.7 PL -16.23	610mm 12.7 PL -16.54	610mm 12.7 PL -16.54	610mm 12.7 PL -16.54	610mm 12.7 PL -16.54	610mm 12.7 PL -17.44	610mm 12.7 PL -17.44	610mm 12.7 PL -17.94	610mm 12.7 PL -18.44	610mm 12.7 PL -18.44	610mm 12.7 PL -18.84	610mm 12.7 PL -18.84	610mm 12.7 PL -18.84	
Column Locations	A-2	A-3	B-2	B-3	C-2	C-3	D-2	D-3	E-2	E-3	F-2	F-3	G-2	G-3	H-2	H-3	I-2	I-3	
Properties Dia: Thickness: Depth (RL): Ult. Capacity Compression: Tension: Top of Pile	610mm 12.7 PL -18.94 1000 kN 700 kN 2.770	610mm 12.7 PL -18.94 1000 kN 700 kN 2.770	610mm 12.7 PL -19.14 1000 kN 700 kN 2.770	610mm 12.7 PL -19.14 1000 kN 700 kN 2.770	610mm 12.7 PL -19.14 1000 kN 700 kN 2.770	610mm 12.7 PL -19.14 1000 kN 700 kN 2.770	610mm 12.7 PL -19.94 1000 kN 700 kN 2.770	610mm 12.7 PL -19.94 1000 kN 700 kN 2.770	610mm 12.7 PL -20.44 1000 kN 700 kN 2.770	610mm 12.7 PL -20.44 1000 kN 700 kN 2.770	610mm 12.7 PL -20.94 1000 kN 700 kN 2.770	610mm 12.7 PL -20.94 1000 kN 700 kN 2.770	610mm 12.7 PL -20.94 1000 kN 700 kN 2.770	610mm 12.7 PL -16.54 1000 kN 700 kN 2.770	610mm 12.7 PL -15.44 1000 kN 700 kN 2.770	610mm 12.7 PL -16.54 1000 kN 700 kN 2.770	610mm 12.7 PL -15.44 1000 kN 700 kN 2.770	610mm 12.7 PL -15.44 1000 kN 700 kN 2.770	610mm 12.7 PL -15.44 1000 kN 700 kN 2.770
LAT RL 0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Column Locations	J-2	J-3	K-2	K-3	L-2	L-3	M-2	M-3	N-2	N-3	O-2	O-3	P-2	P-3	Q-2	Q-3	R-2	R-3	

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Rev	Description	By	Appd	Date
1	CONSTRUCTION ISSUE	JBG	AJF	25.01.13
F	APPROVAL ISSUE	JBG	AJF	16.11.12
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D	FOR APPROVAL	JBG	AJF	21.09.12
C	TENDER ISSUE	JBG	AJF	30.06.12
B	PRELIMINARY ISSUE	JBG	AJF	12.06.12
A	PRELIMINARY ISSUE	JBG	AJF	31.05.12

AMENDMENTS
IN ASSOCIATION WITH

CONSULTANTS

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Client:
CIVIL PLUS CONSTRUCTIONS

Project:
**CLUMP POINT
JETTY REPLACEMENT**

Title:
PILING SCHEDULE

-
-

Design	Designer	Drawn	Author
Checked	Checker	Date	NOV '12
RPEQ No.	Approver	Datum	-

Job Number:	Drawing No.	Revision
T12-058	ST1.03	1

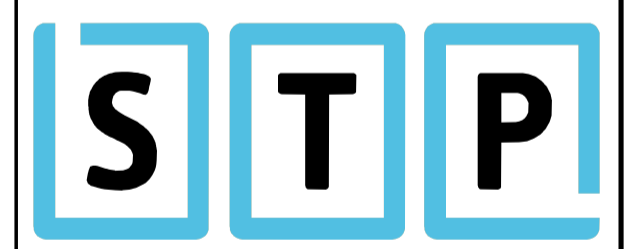
CONSTRUCTION

RL 5.76m 5.760								RL 5.76m 5.760
Deepest point of jetty -3.838								Deepest point of jetty -3.838
RL -8.0 -8.000								RL -8.0 -8.000
Properties Dia: Thickness: Ult. Capacity Compression: Tension:	610mm 12.7 PL 250 kN 100 kN	610mm 12.7 PL 250 kN 100 kN	610mm 12.7 PL 250 kN 100 kN	610mm 12.7 PL 250 kN 100 kN	610mm 12.7 PL 250 kN 100 kN	610mm 12.7 PL 250 kN 100 kN	610mm 12.7 PL 250 kN 100 kN	610mm 12.7 PL 250 kN 100 kN
Column Locations	Q-6	O(5.000)-6	P-6	P(5.000)-6	Q-6	Q(5.000)-6	R-6	

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Rev	Description	By	Appd	Date
1	CONSTRUCTION ISSUE	JBG	AJF	25.01.13
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A	PRELIMINARY ISSUE	JBG	AJF	12.06.12

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Client:
CIVIL PLUS CONSTRUCTIONS

Project:
**CLUMP POINT
JETTY REPLACEMENT**

Title:
**FENDER PILES
PILING TABLE**

Design	Designer	Drawn	Author
Checked	Checker	Date	NOV '12
RPEQ No.	Approver	Datum	-

Approved:

Job Number:	Drawing No.	Revision
T12-058	ST1.04	1

CONSTRUCTION

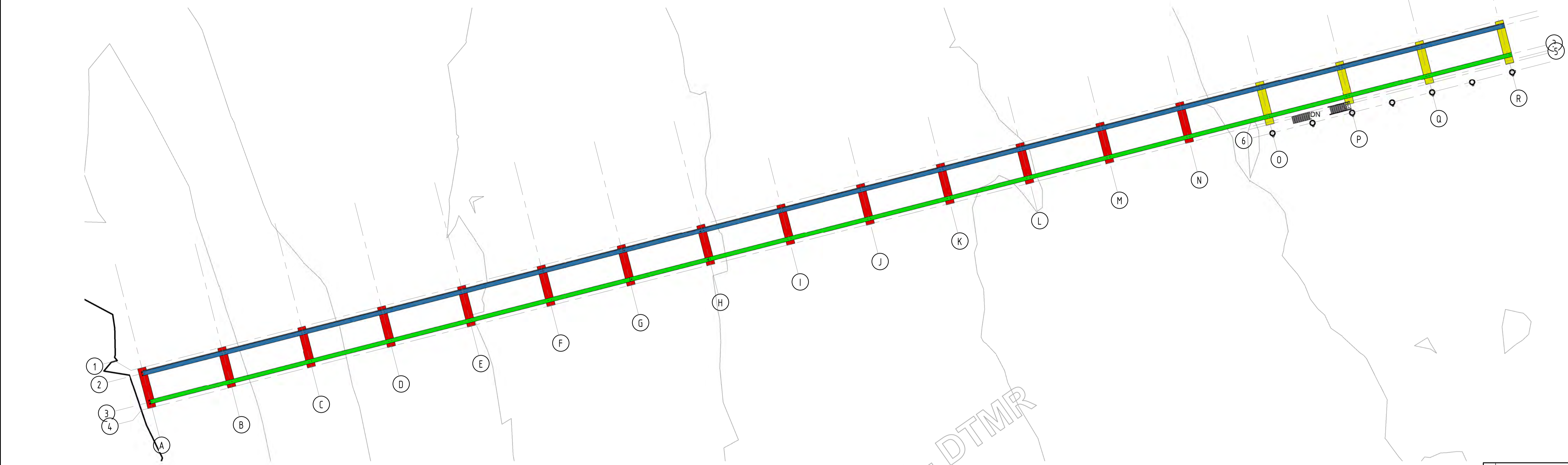
JETTY FRAMING PLAN

1 : 250

- HEADSTOCK TYPE 1 (14)
- HEADSTOCK TYPE 2 (4)
- GIRDER BEAM TYPE 1 (17)
- GIRDER BEAM TYPE 2 (17)
- PRECAST DECK PANEL TYPE 1 (60)
- PRECAST DECK PANEL TYPE 2 (16)

FH - FIRE HYDRANT LOCATION (REFER HYDRAULIC CONSULTANTS FOR REQUIREMENTS)

FHR - FIRE HYDRANT REEL LOCATION REFER HYDRAULIC CONSULTANTS FOR REQUIREMENTS)



JETTY DECK LAYOUT PLAN

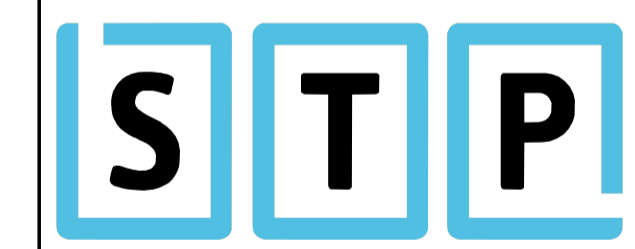
1 : 250

Released under RTI - DTMR

Rev	Description	By	Appd	Date
2	REVISED CONSTRUCTION	JBG	AJF	30.01.13
1	CONSTRUCTION ISSUE	JBG	AJF	25.01.13

AMENDMENTS

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Client: **CIVIL PLUS CONSTRUCTIONS**

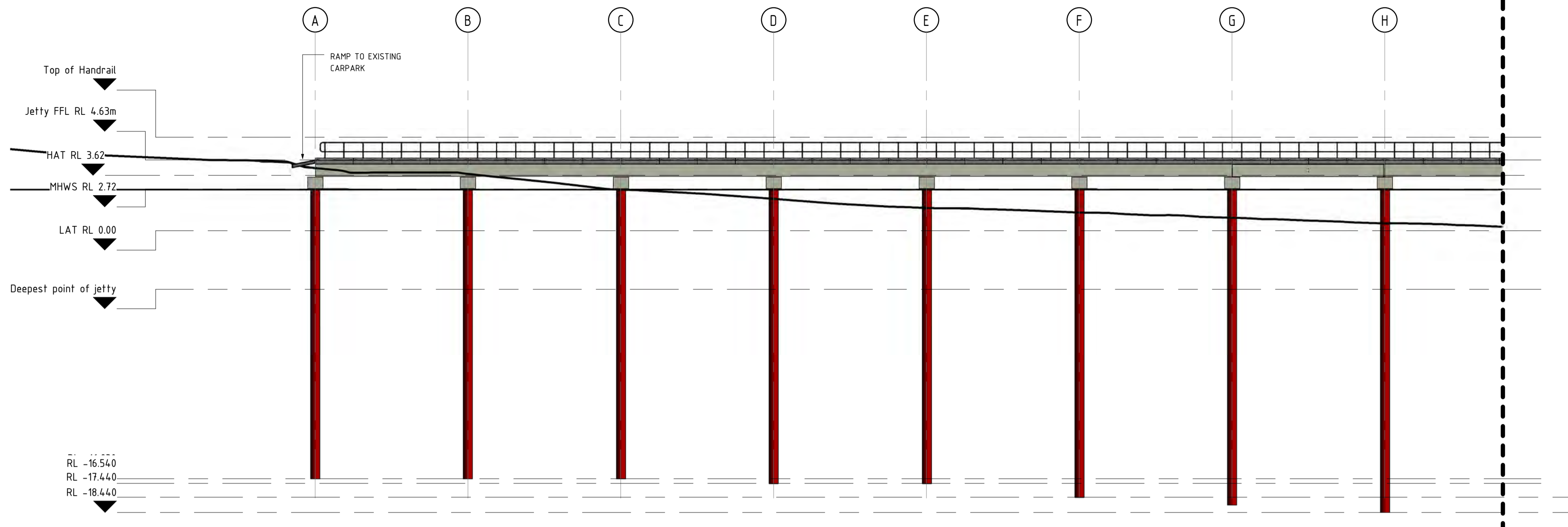
Project: **CLUMP POINT JETTY REPLACEMENT**

Title: **JETTY FRAMING PLAN**

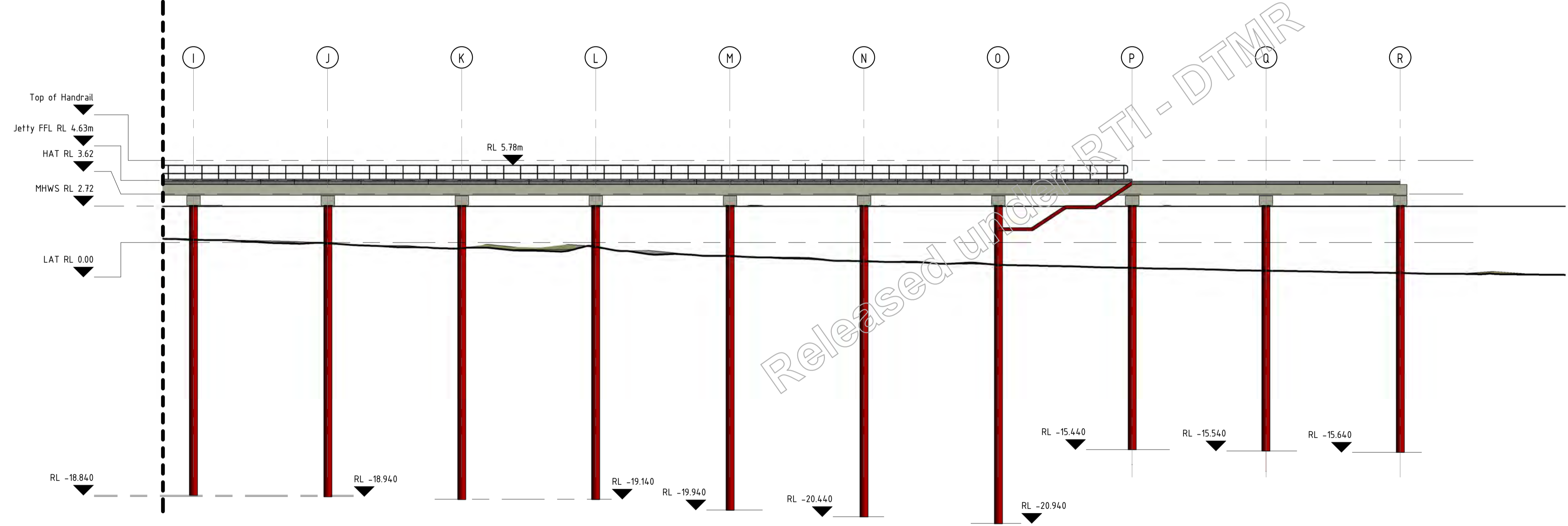
Design	Designer	Drawn	Author
Checked	Checker	Date	NOV '12
RPEU No.	Approver	Datum	-

Job Number:	Drawing No.	Revision
T12-058	ST1.11	2

CONSTRUCTION



NORTHERN ELEVATION
1: 200



NORTHERN ELEVATION
1: 200

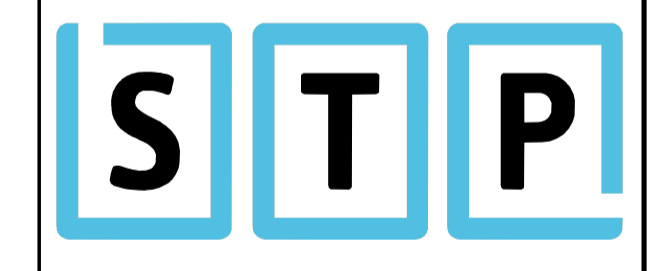


FENDER PILE ELEVATION
1: 200

Released under RTI - DTMR

Rev	Description	By	Appd	Date
1	CONSTRUCTION ISSUE	JBG	AJF	25.01.13
F	APPROVAL ISSUE	JBG	AJF	16.11.12
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C	TENDER ISSUE	JBG	AJF	30.06.12
B	PRELIMINARY ISSUE	JBG	AJF	12.06.12
A	PRELIMINARY ISSUE	JBG	AJF	31.05.12

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Client:
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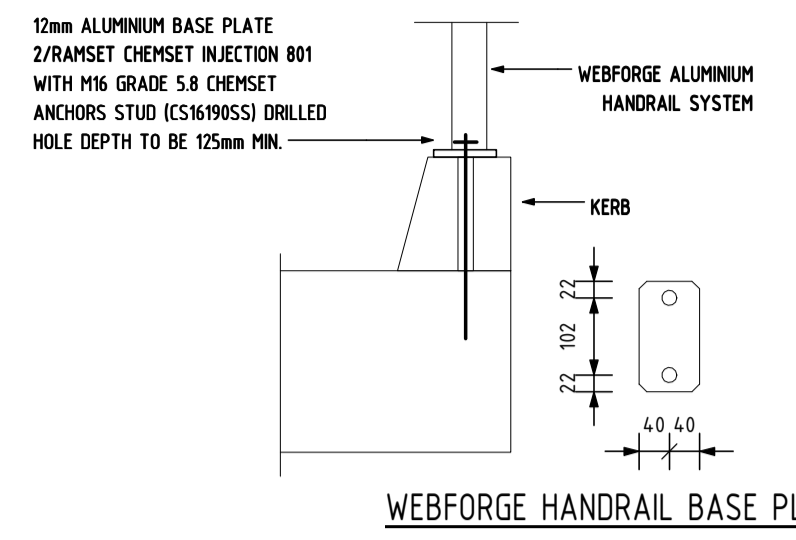
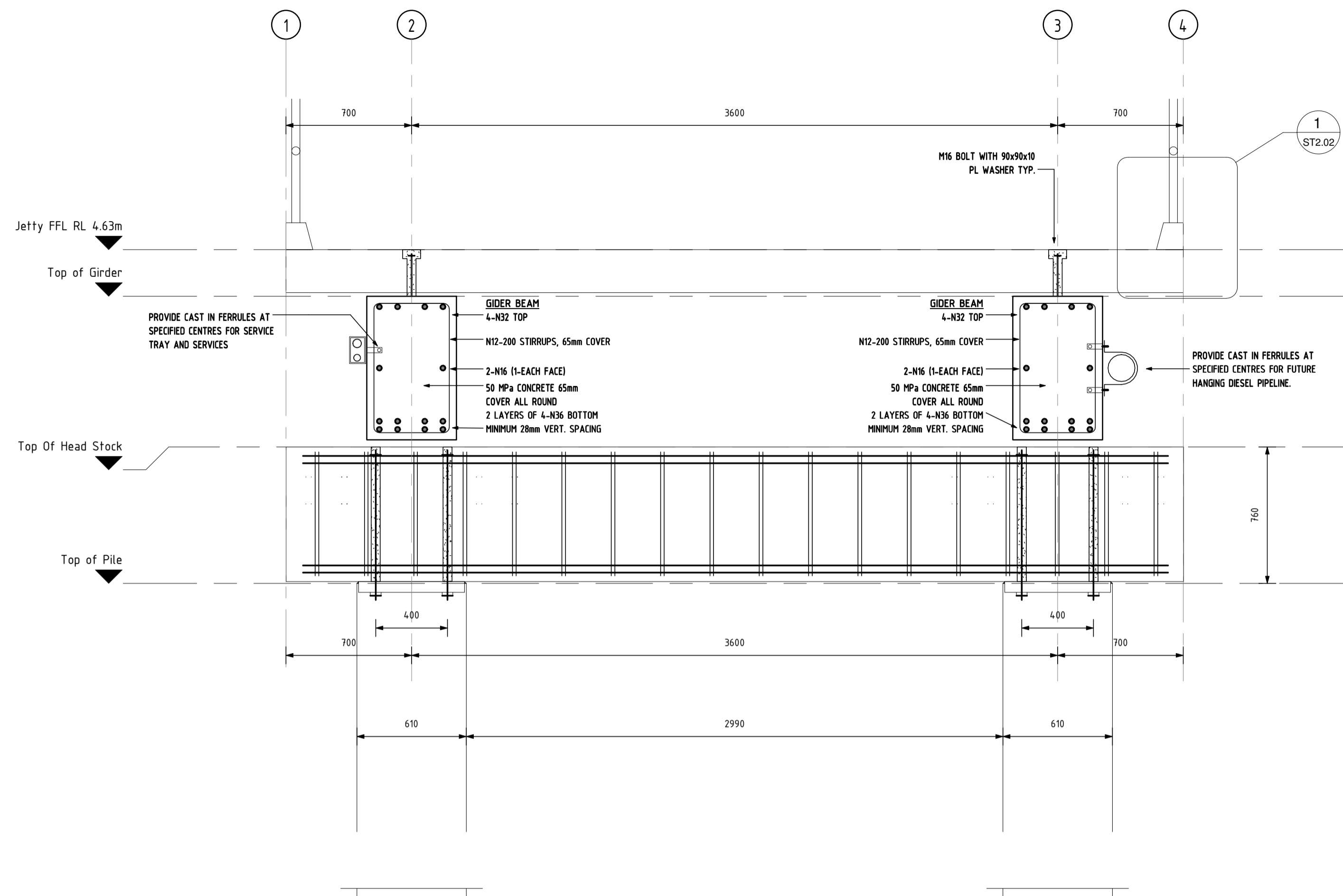
Project:
**CLUMP POINT
JETTY REPLACEMENT**

Title:
JETTY LONG SECTIONS

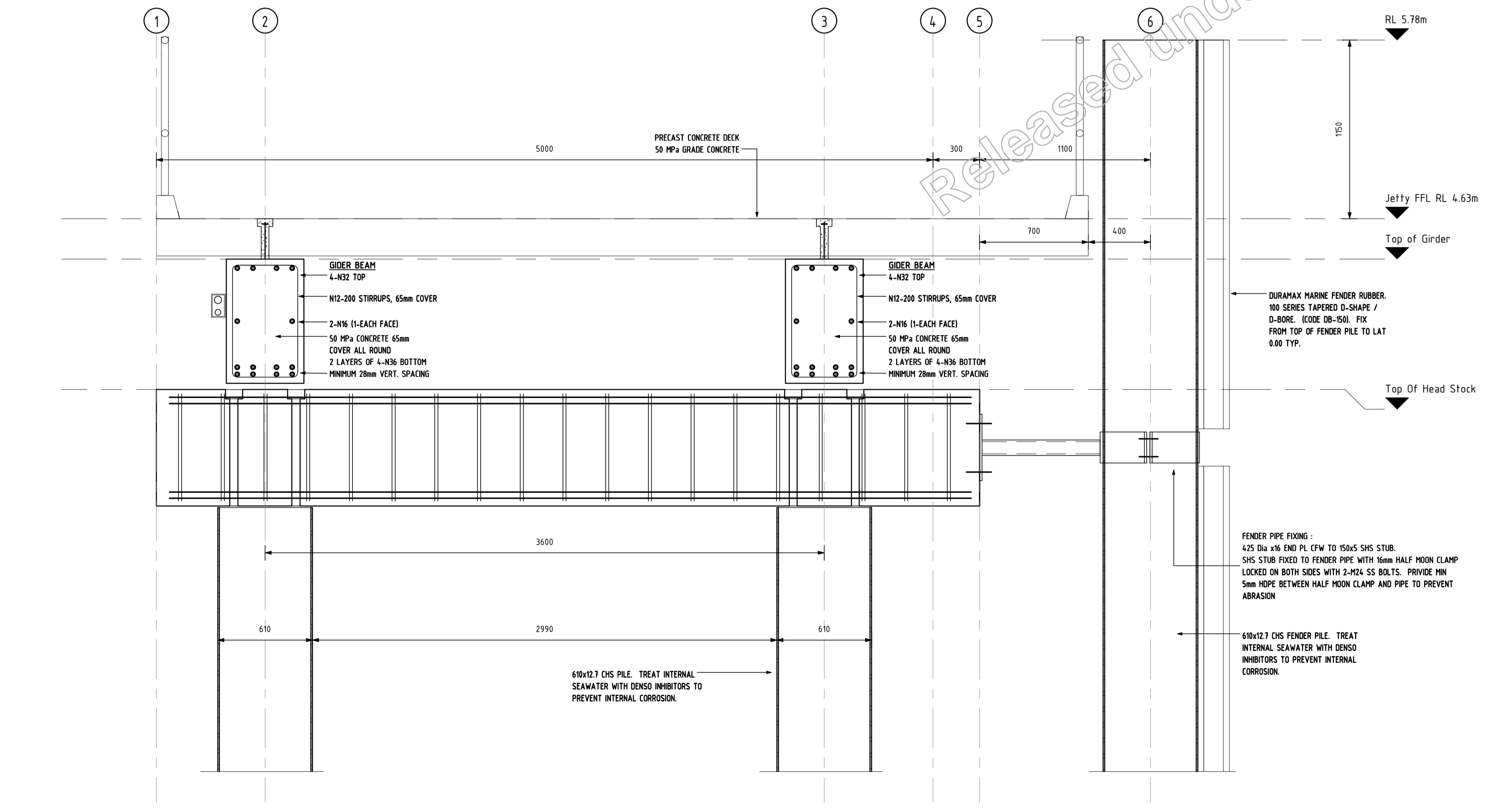
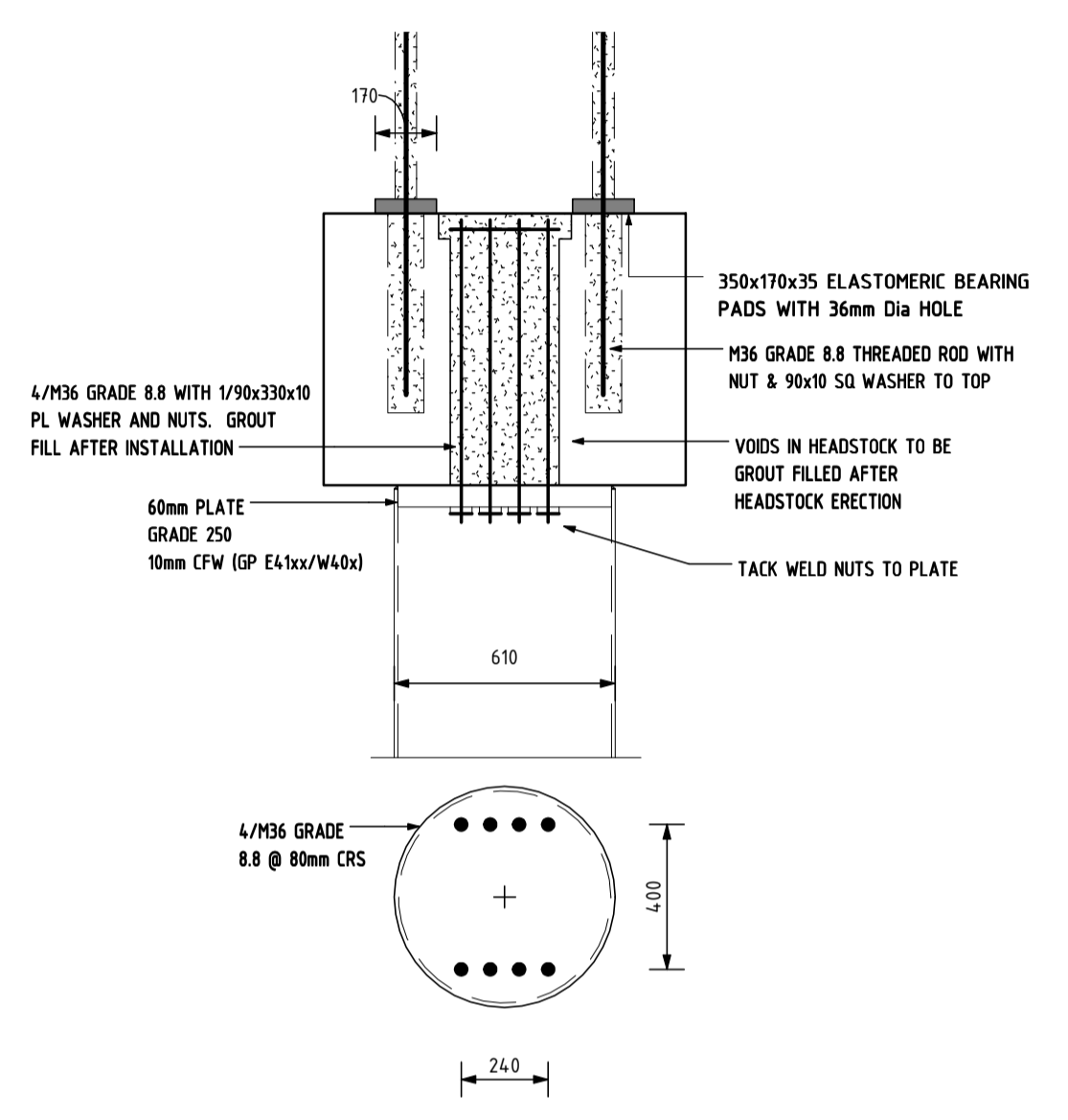
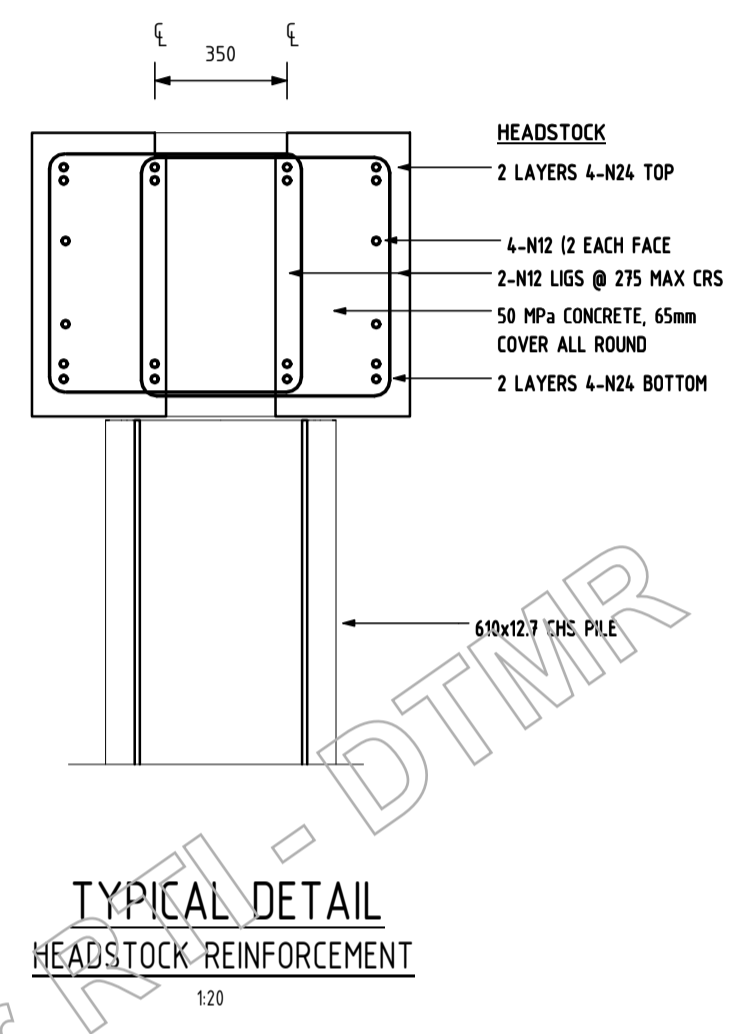
Design	Designer	Drawn	Author
Checked	Checker	Date	Author
RPEU No.	Approver	Date	-

Job Number:	Drawing No.	Revision
T12-058	ST2.01	1

CONSTRUCTION



DETAIL 1
1:10
ST2.02



FENDER PIPE FIXING:
425 Dia x16 END PL CFW TO 150x5 SHS STUB.
SHS STUB FIXED TO FENDER PIPE WITH 16mm HALF MOON CLAMP
LOCKED ON BOTH SIDES WITH 2-M24 SS BOLTS. PROVIDE MIN
5mm HDPE BETWEEN HALF MOON CLAMP AND PIPE TO PREVENT
ABRASION

610x12.7 CHS FENDER PILE. TREAT INTERNAL SEAWATER WITH DENSO INHIBITORS TO PREVENT INTERNAL CORROSION.

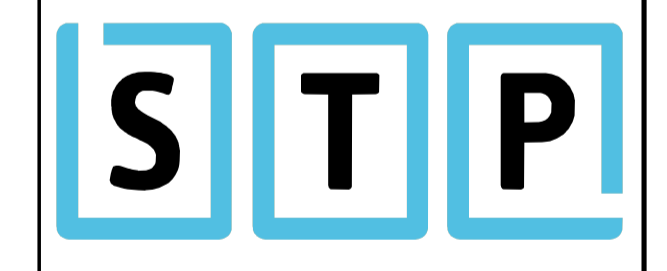
NOTE:

- PROVIDE STORM TIDE GAUGE PLATFORM & HOUSING IN ACCORDANCE WITH DSITIA SPECIFICATION (DWG's 1748-1909-2 and MSC-1-1-5)
- PROVIDE FIRE WATER & HOSE REELS AT SERVICE LOCATIONS ALONG JETTY
- PROVIDE POWER TO JETTY HEAD
- PROVIDE LIGHTING TO JETTY HEAD
- PROVIDE POTABLE WATER AT JETTY SERVICE LOCATIONS
- PROVIDE 5 ACCESS LADDERS ALONG THE JETTY IN ACCORDANCE WITH AS4995 - 1995

Rev	Description	By	Appd	Date
1	CONSTRUCTION ISSUE	JBG	AJF	25.01.13
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B	PRELIMINARY ISSUE	JBG	AJF	12.06.12
A	PRELIMINARY ISSUE	JBG	AJF	31.05.12

AMENDMENTS

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Client: CIVIL PLUS CONSTRUCTIONS

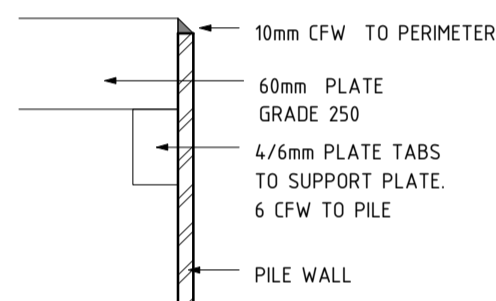
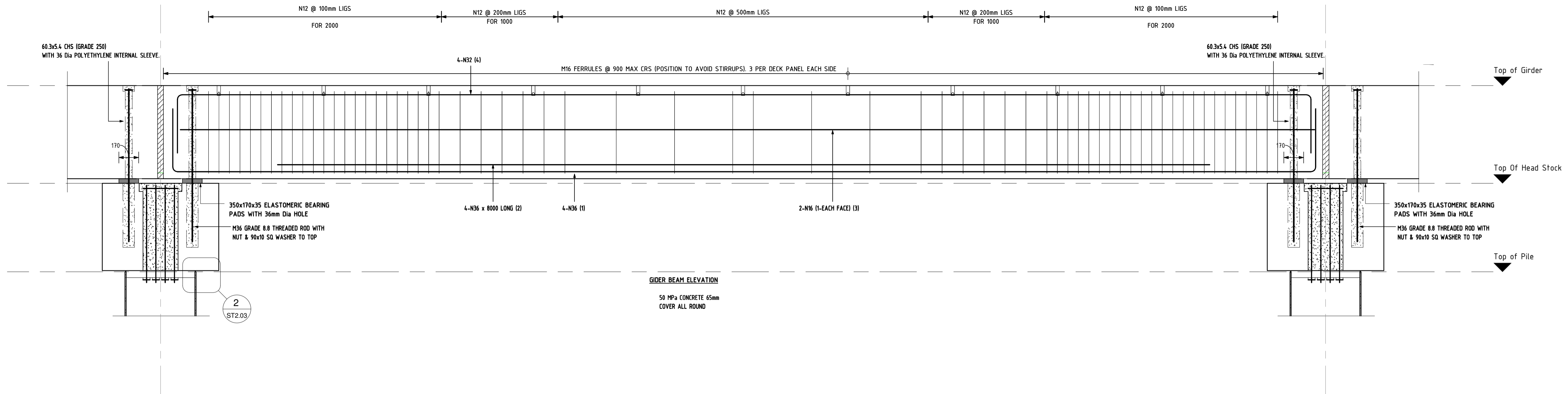
Project: CLUMP POINT JETTY REPLACEMENT

Title: TYPICAL SUPPORT SECTIONS

Design	AJF	Drawn	JBG
Checked	AJF	Date	NOV '12
RPEU No.	4683	Datum	-

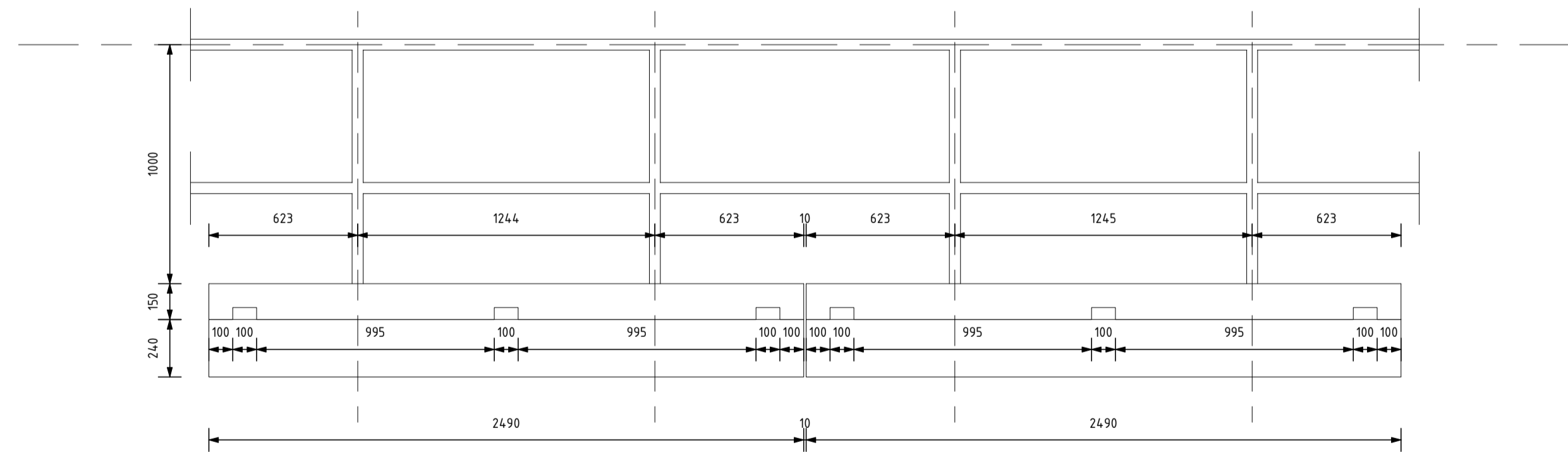
Job Number:	Drawing No.	Revision
T12-058	ST2.02	1

CONSTRUCTION



BEARING PLATE DETAIL

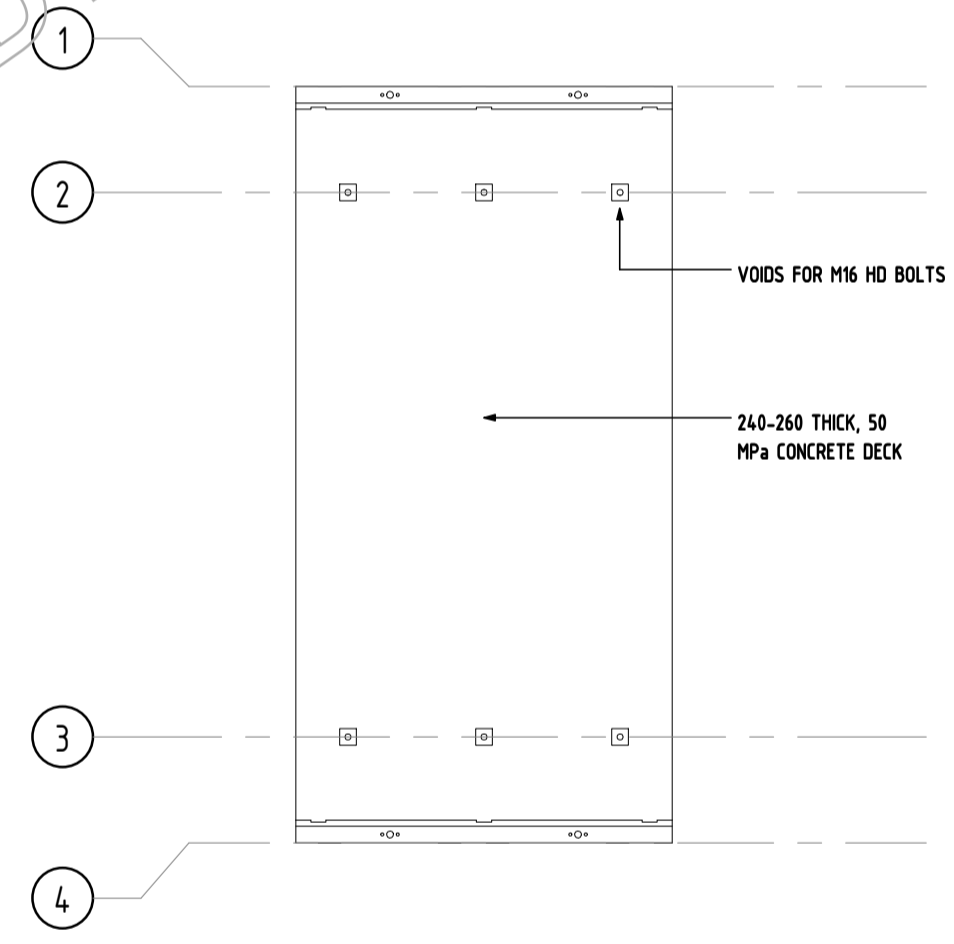
DETAIL 2
1:5 ST2.03



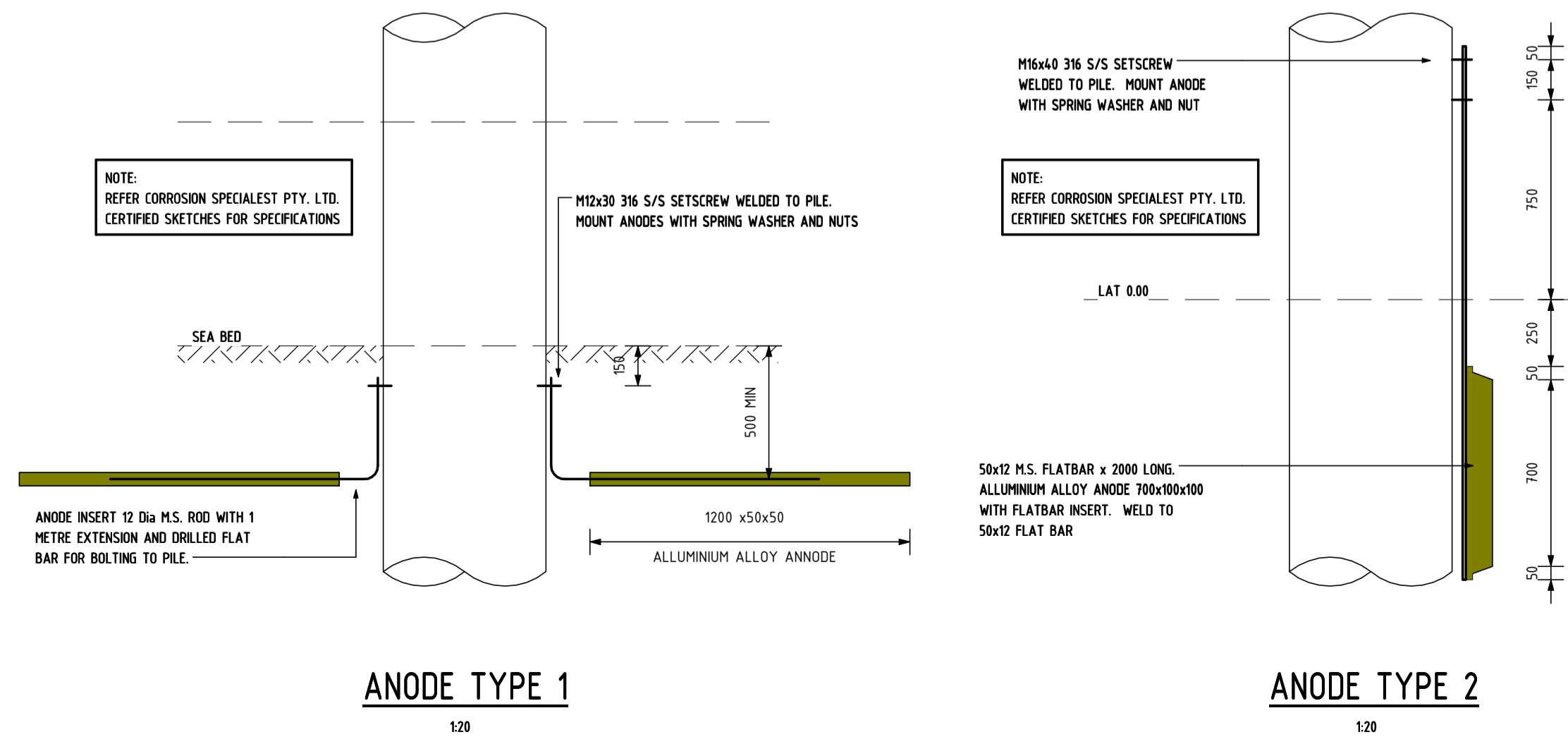
TYPICAL HANDRAIL DETAIL

1:20

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TYPICAL DETAIL
DECK UNIT
150

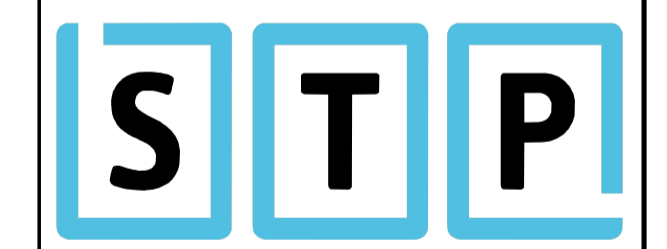


ANODE TYPE 1
120

ANODE TYPE 2
120

Rev	Description	By	Appd	Date
1	CONSTRUCTION ISSUE	JBG	AJF	25.01.13
E	APPROVAL ISSUE	JBG	AJF	16.11.12
D	PRELIMINARY ISSUE	JBG	AJF	13.11.12
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B	TENDER ISSUE	JBG	AJF	30.06.12
A	PRELIMINARY ISSUE	JBG	AJF	12.06.12

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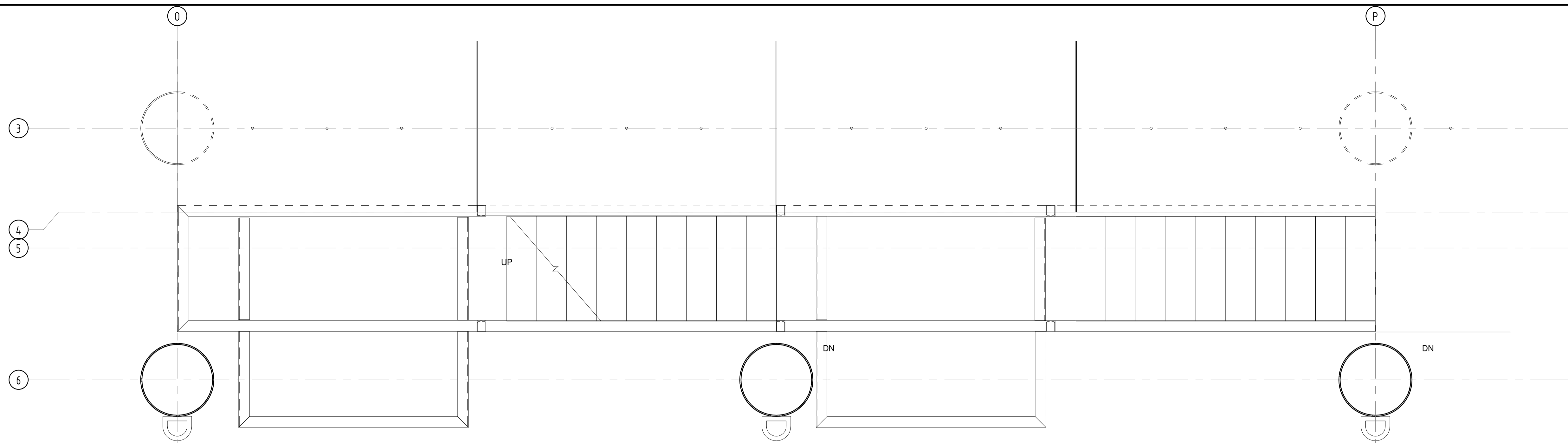
Client:
CIVIL PLUS CONSTRUCTIONS
 Project:
CLUMP POINT JETTY REPLACEMENT

Title:
DETAILS

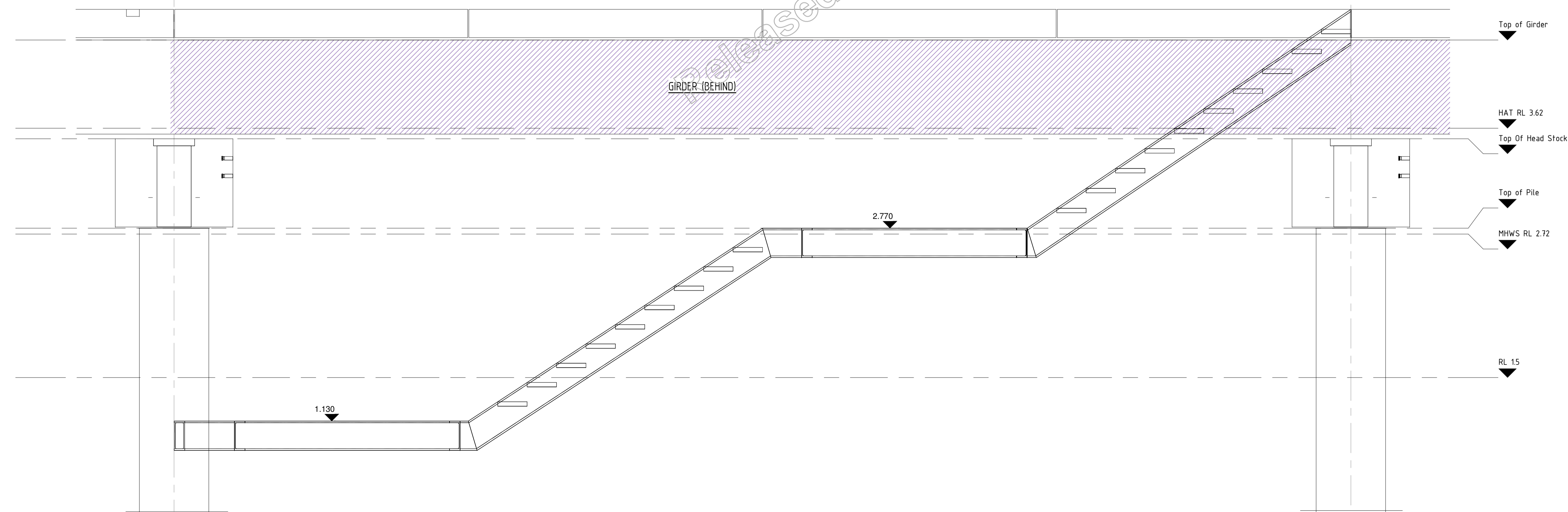
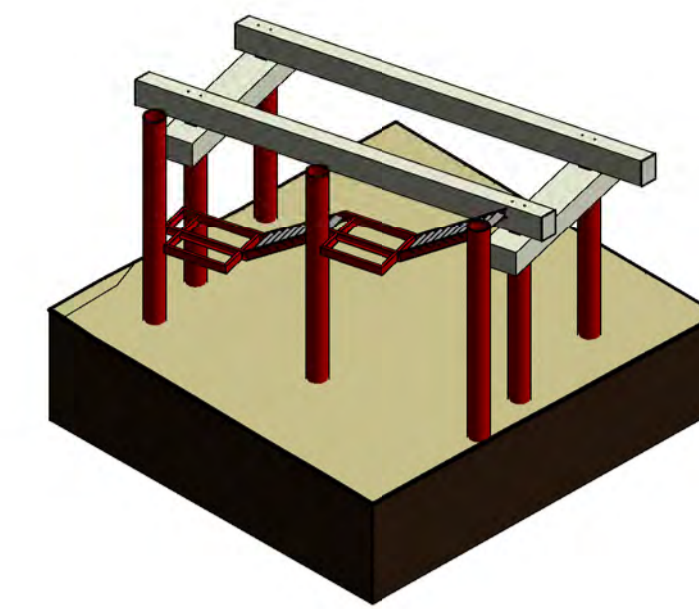
Design Checked	Designer	Drawn	Author
RPEU No.	Approver	Date	NOV '12

Job Number:	Drawing No.	Revision
T12-058	ST2.03	1

CONSTRUCTION



STAIR LAYOUT PLAN
1:20

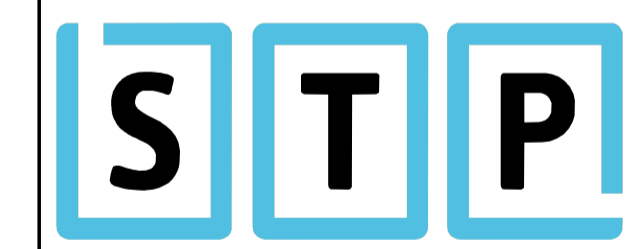


TYPICAL STAIR SECTION
1:20

Released under RTI - DTMR

Rev	Description	By	Appd	Date
2	REVISED CONSTRUCTION	JBG	AJF	30.01.13
1	CONSTRUCTION ISSUE	JBG	AJF	25.01.13
E	APPROVAL ISSUE	JBG	AJF	16.11.12
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B	TENDER ISSUE	JBG	AJF	30.06.12
A	PRELIMINARY ISSUE	JBG	AJF	12.06.12

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Client:
CIVIL PLUS CONSTRUCTIONS

Project:
**CLUMP POINT
JETTY REPLACEMENT**

Title:
STAIR DETAILS

Design	Designer	Drawn	Author
Checked	Checker	Date	Author
RPEQ No.	Approver	Datum	-

Approved:

Job Number:	Drawing No.	Revision
T12-058	ST2.04	2

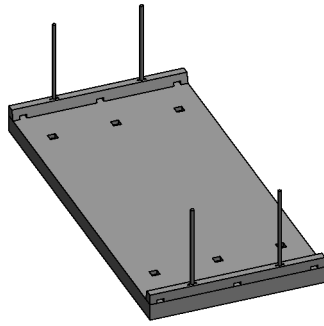
CONSTRUCTION

CENTROID
 X - 2500
 Y - 1245

LEGEND

2.5 DENOTES SWIFT LIFT 2.5 TONNE x 90mm SHORT FOOT ANCHOR. MINIMUM 20MPa CONCRETE STRENGTH AT LIFT

1.3 DENOTES SWIFT LIFT 1.3 TONNE x 85mm SHORT FOOT ANCHOR. MINIMUM 15MPa CONCRETE STRENGTH AT LIFT

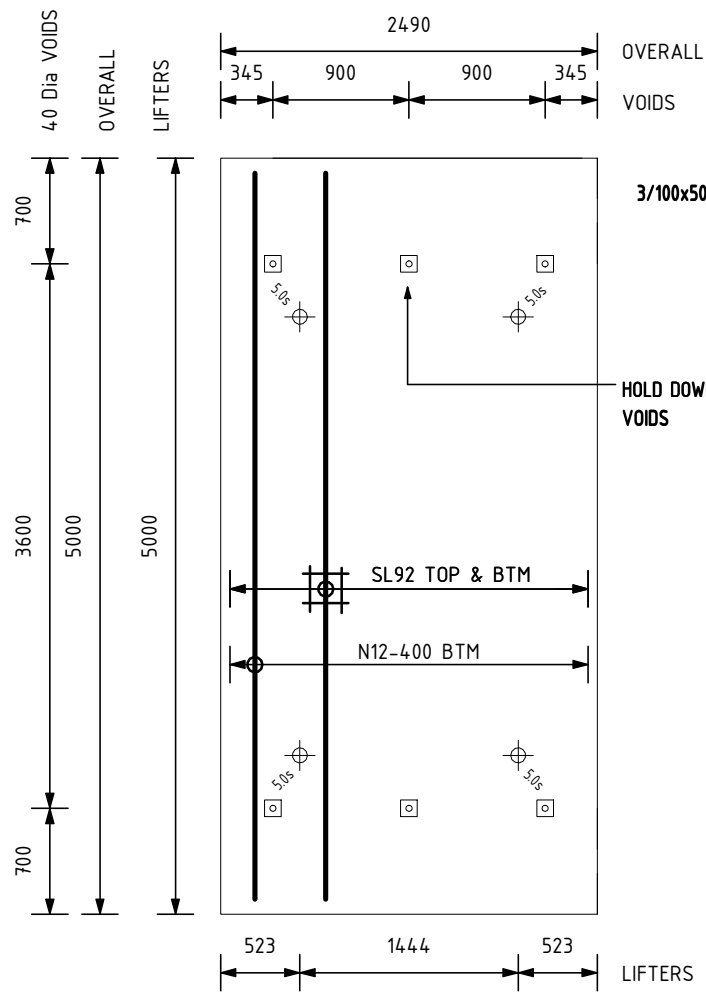


TYPICAL CONFIGURATION
 NTS

5.0 DENOTES SWIFT LIFT 5.0 TONNE x 240mm ANCHOR. MINIMUM 20MPa CONCRETE STRENGTH AT LIFT

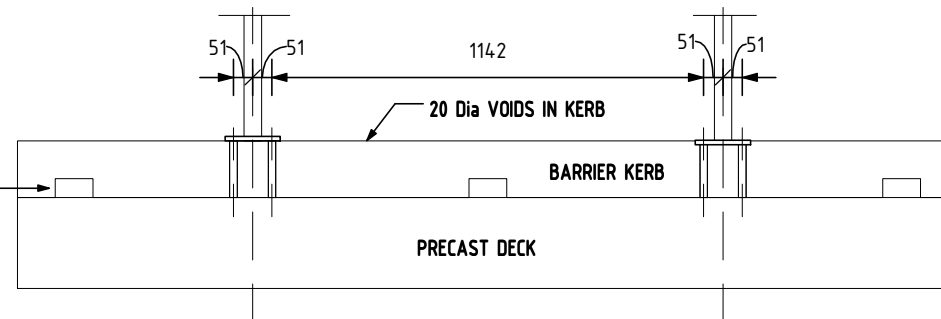
10.0 DENOTES SWIFT LIFT 10.0 TONNE x 340mm ANCHOR. MINIMUM 20MPa CONCRETE STRENGTH AT LIFT

5.0s DENOTES SWIFT LIFT 5.0 TONNE x 120mm SHORT FOOT ANCHOR. MINIMUM 20MPa CONCRETE STRENGTH AT LIFT



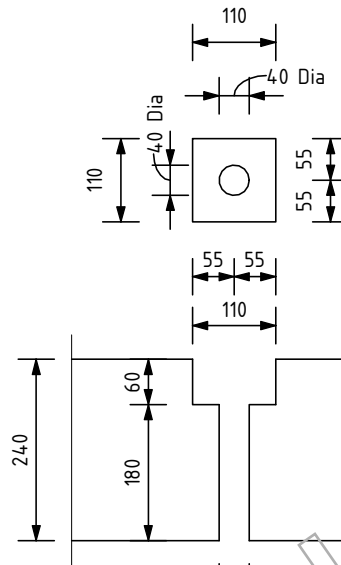
PANEL PLAN

1 : 50



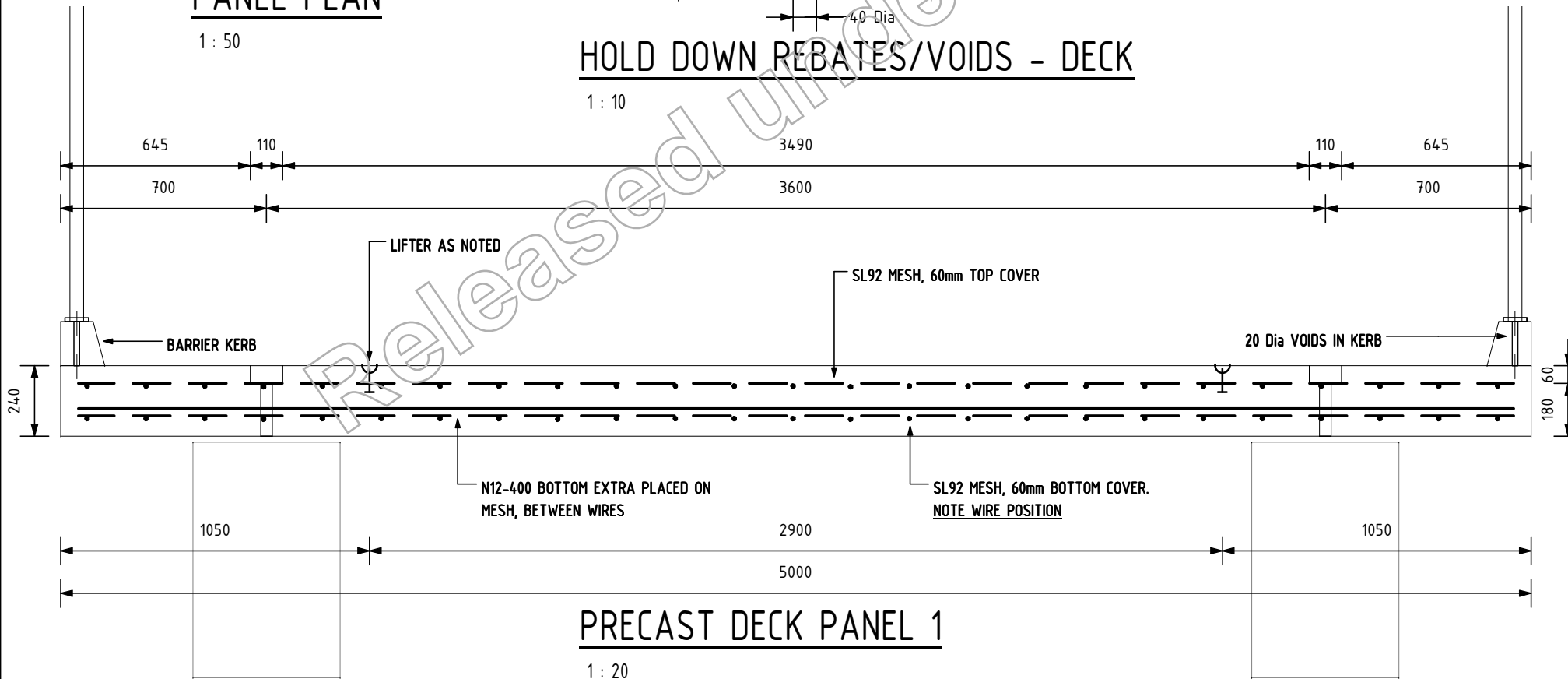
TYPICAL END ELEVATIONS

1 : 20



HOLD DOWN REBATES/VOIDS - DECK

1 : 10



PRECAST DECK PANEL 1

1 : 20

INSTALL REINFORCEMENT	CHECKED REINFORCEMENT
AS NOTED	
ALTERNATIVE REINF.	ALTERNATIVE REINF.
ADDITIONAL REINFORCEMENT	ADDITIONAL REINFORCEMENT
PERIMETER BARS	PERIMETER BARS
MIN. CONCRETE COVER	MIN. CONCRETE COVER
60mm	
f _{ct} (@ LIFT)	f _{ct} (@ LIFT)
20 MPa	
f' _c	f' _c
50 MPa	
PANEL THICKNESS	PANEL THICKNESS
AS NOTED	
AREA SQUARE METERS	AREA SQUARE METERS
12.45	
VOLUME CUBIC METERS	VOLUME CUBIC METERS
2.99	
WEIGHT - TONNES	WEIGHT - TONNES
7.47	
EDGE LIFTS	EDGE LIFTS
2.5x90 - 1.3x85-	
FACE LIFTS	FACE LIFTS
2.5x90 - 1.3x85- 5.0x240- 10.0x340- 5.0x120- 4	2.5x90 - 1.3x85- 5.0x240- 10.0x340- 5.0x120-
REID REBATED FERRULES	REID REBATED FERRULES
RB12 RI - RB16 RI - RB20 RI -	RB12 RI - RB16 RI - RB20 RI -
REID THREADED FERRULES	REID THREADED FERRULES
RB12 TI - RB16 TI - RB20 TI - RB24 TI -	RB12 TI - RB16 TI - RB20 TI - RB24 TI -
COUPLER & REIDBAR	COUPLER & REIDBAR
RB20C -	RB20C -
PVC SLEEVE	PVC SLEEVE
TOP -	TOP -
50mm GROUT TUBE	50mm GROUT TUBE
BTM -	BTM -
REBATES (mm)	REBATES (mm)
PROP TYPE	PROP TYPE
PROP EFFECTIVE LENGTH	PROP EFFECTIVE LENGTH
FERRULES	FERRULES
FH16096GH - FH20096SS -	FH16096GH - FH20096SS -
PROP TYPE: PROP TYPE 1 - N/A PROP TYPE 2 - N/A	



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Client: CIVIL PLUS CONSTRUCTIONS
Project: CLUMP POINT
Title: PRECAST DECK PANEL TYPE 1

Rev	Description	By	Appd	Date	Approved	RPEQ No.
1	CONSTRUCTION ISSUE	JBG	AJF	22.01.13	AJF	04683

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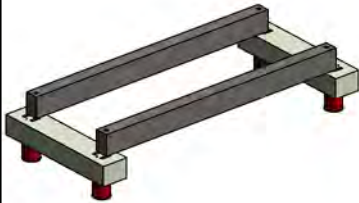
CONSTRUCTION	
Job Number. T12-058	Drawing No. ST3.01
Approved:	Revision 1

CENTROID
 X - 4990
 Y - 250

LEGEND

2.5
 DENOTES SWIFT LIFT 2.5 TONNE x 90mm SHORT FOOT ANCHOR. MINIMUM 20MPa CONCRETE STRENGTH AT LIFT

1.3
 DENOTES SWIFT LIFT 1.3 TONNE x 85mm SHORT FOOT ANCHOR. MINIMUM 15MPa CONCRETE STRENGTH AT LIFT

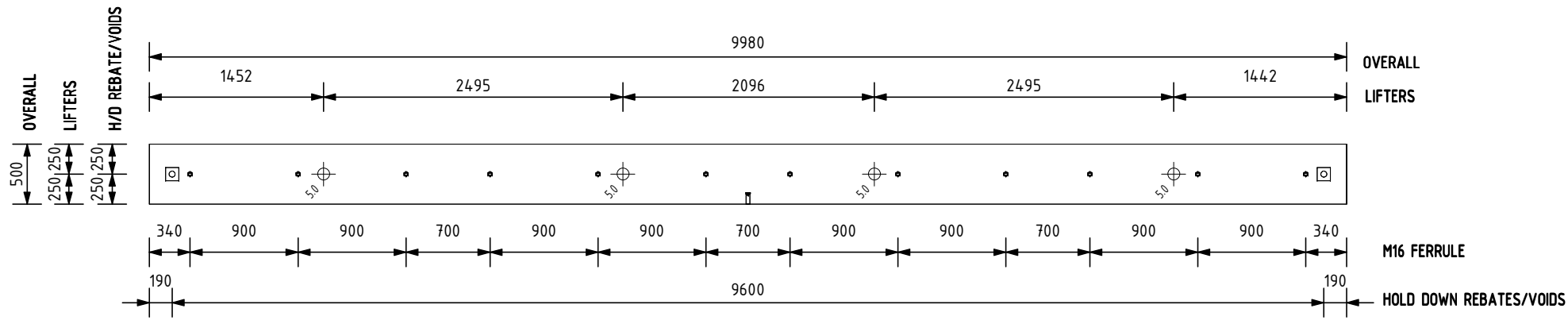


TYPICAL CONFIGURATION
 NTS

5.0
 DENOTES SWIFT LIFT 5.0 TONNE x 240mm ANCHOR. MINIMUM 20MPa CONCRETE STRENGTH AT LIFT

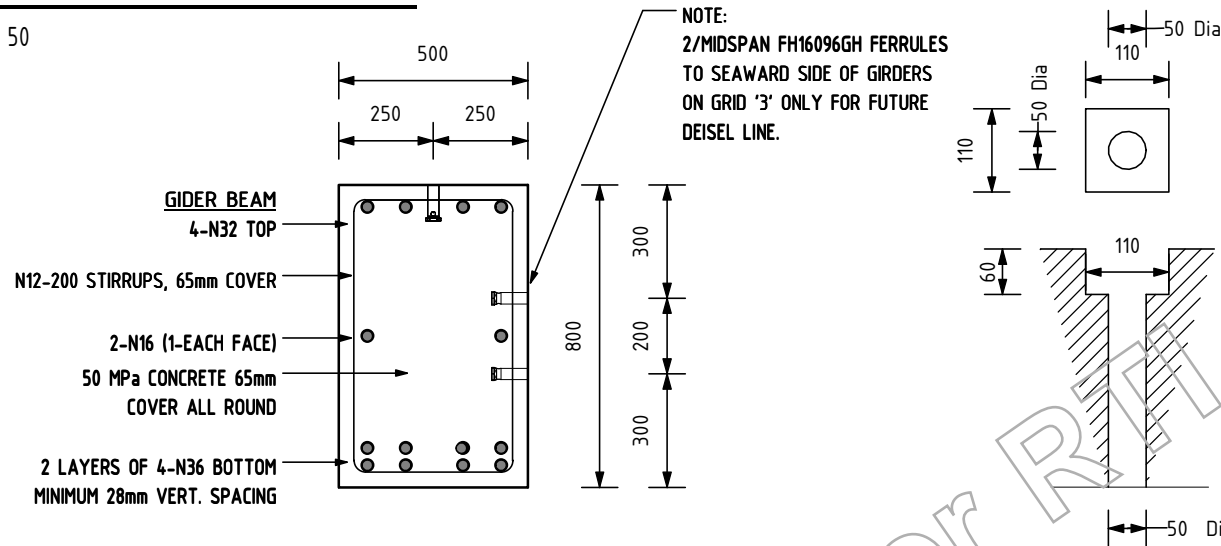
10.0
 DENOTES SWIFTLIFT 10.0 TONNE x 340mm ANCHOR. MINIMUM 20MPa CONCRETE STRENGTH AT LIFT

5.0s
 DENOTES SWIFT LIFT 5.0 TONNE x 120mm SHORT FOOT ANCHOR. MINIMUM 20MPa CONCRETE STRENGTH AT LIFT



PRECAST GIRDER BEAM

1 : 50

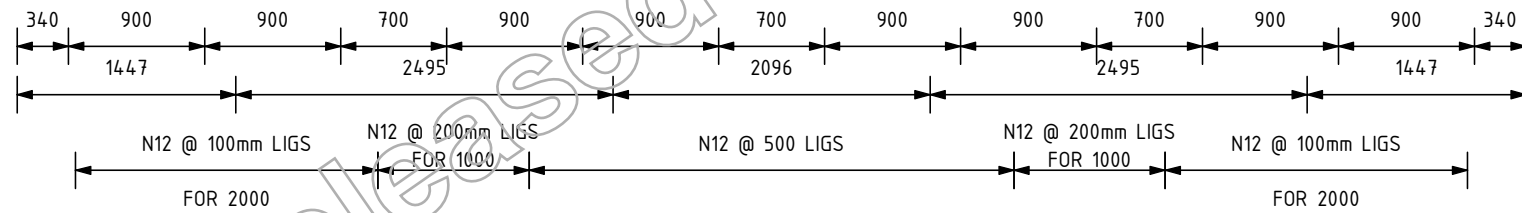


PRECAST GIRDER BEAM SECTION

1 : 20

HOLD DOWN REBATES/VOIDS - GIRDER

1 : 10



PRECAST GIRDER BEAM ELEVATION

1 : 50

INSTALL REINFORCEMENT	CHECKED REINFORCEMENT
AS NOTED	
ALTERNATIVE REINF.	ALTERNATIVE REINF.
ADDITIONAL REINFORCEMENT	ADDITIONAL REINFORCEMENT
PERIMETER BARS	PERIMETER BARS
MIN. CONCRETE COVER	MIN. CONCRETE COVER
65mm	
fct (@ LIFT)	fct (@ LIFT)
20 MPa	
f'c	f'c
50 MPa	
PANEL THICKNESS	PANEL THICKNESS
AS NOTED	
AREA SQUARE METERS	AREA SQUARE METERS
4.99	
VOLUME CUBIC METERS	VOLUME CUBIC METERS
3.992	
WEIGHT - TONNES	WEIGHT - TONNES
9.98	
EDGE LIFTS	EDGE LIFTS
2.5x90 - 1.3x85-	
FACE LIFTS	FACE LIFTS
2.5x90 - 1.3x85- 5.0x240- 4 10.0x340- 5.0x120-	2.5x90 - 1.3x85- 5.0x240- 10.0x340- 5.0x120-
REID REBATED FERRULES	REID REBATED FERRULES
RB12 RI - RB16 RI - RB20 RI -	RB12 RI - RB16 RI - RB20 RI -
REID THREADED FERRULES	REID THREADED FERRULES
RB12 TI - RB16 TI - RB20 TI - RB24 TI -	RB12 TI - RB16 TI - RB20 TI - RB24 TI -
COUPLER & REIDBAR	COUPLER & REIDBAR
RB20C -	RB20C -
PVC SLEEVE	PVC SLEEVE
TOP -	TOP -
50mm GROUT TUBE	50mm GROUT TUBE
BTM -	BTM -
REBATES (mm)	REBATES (mm)
PROP TYPE	PROP TYPE
PROP EFFECTIVE LENGTH	PROP EFFECTIVE LENGTH
FERRULES	FERRULES
FH16096GH - 14 FH20096SS -	FH16096GH - FH20096SS -
PROP TYPE: PROP TYPE 1 - N/A PROP TYPE 2 - N/A	



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Client: CIVIL PLUS CONSTRUCTIONS
Project: CLUMP POINT
Title: PRECAST GIRDER BEAM TYPE 1

Rev	Description	By	Appd	Date	Approved	RPEQ No.
1	CONSTRUCTION ISSUE	JBG	AJF	22.01.13	AJF	04683

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CONSTRUCTION	
Job Number. T12-058	Drawing No. ST3.05
Approved:	Revision 1



SHEET No.	SHEET LIST
ST0.01	STRUCTURAL NOTES
ST1.01	PILING LAYOUT PLAN
ST1.03	PILING TABLE
ST1.04	FENDER PILES PILING TABLE
ST1.11	JETTY FRAMING PLAN
ST2.01	JETTY LONG SECTION
ST2.02	TYPICAL SUPPORTS SECTION
ST2.03	DETAILS
ST2.04	STAIRS DETAILS
ST3.01	PRECAST DECK PANEL 1
ST3.02	PRECAST DECK PANEL TYPE 2
ST3.03	PRECAST HEADSTOCK TYPE 1
ST3.04	PRECAST HEADSTOCK TYPE 2
ST3.05	PRECAST GIRDER BEAM TYPE 1
ST5.01	FRAMING & PILING JIG PLAN VIEW
ST5.02	FRAMING & PILING JIG ELEVATIONS
ST5.03	CONSTRUCTION SEQUENCE SAGES 1 - 4
ST5.04	CONSTRUCTION SEQUENCE STAGE 5 - 8

Released under RTI - DTMR

JETTY REPLACEMENT CLUMP POINT, MISSION BEACH QLD



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Fax: 07 40 318 799	Fax: 07 47 242 417

CONCRETE AND REINFORCEMENT

- All concrete work shall be in accordance with AS 3600 Concrete Structures.
- Concrete Specifications shall be:-

ELEMENT	GRADE	SLUMP	MAX AGG
Exterior RC	50 MPa	80 +/- 15	20mm

Minimum 360 kg/m³ cement w/c ratio 0.45
maximum 25% fly ash by mass of binder
- Cover to reinforcement shall be :-
 - Footings - 75mm bottom, 65mm sides and top
 - Headstock & Girders - 65mm to all surfaces
 - Decking Slabs - 60mm to all surfaces
 - Cover shall be 60mm where surface is exterior above ground.
- Reinforcement shall be tied into position and supported on approved plastic as follows:-
 - Bars up to N12 and fabric - 800mm centres.
 - Bars N16 and larger - 1200mm centres.
- Welding and bending of reinforcement is not permitted unless shown on the drawings or approved by the Engineer.
- Laps unless shown otherwise:

Fabric 1 complete mesh			
N12	360	N24	720
N16	480	N28	840
N20	600		

Horizontal bars with more than 300mm concrete under then shall have laps 1.3 times these lengths.
- Construction joints shall be scabbed and cleaned and coated with a cement/water slurry immediately after prior to placing concrete.
- Concrete shall be compacted using mechanical vibrators.
- Concrete shall be cured for a minimum of 7 days by a method approved by the Engineer.
- Conduits, pipes etc. must not be placed in the concrete cover and no holes or chases other than those shown on the Structural drawings shall be made in concrete members unless approved by the Engineer.
- Formwork shall comply with AS3610 "Formwork for Concrete" and all relevant Construction Safety Legislation. Unless otherwise noted finishes shall be Class 3. Minimum formwork stripping times shall be in accordance with Table 5.4.1 of AS 3610 "Formwork of Concrete".
- Control joints shall be constructed as specified. Saw cutting shall be carried out within 6 hours of concrete hardening.
- Concrete test cylinders shall be prepared as required by the Supervisor and tested by a NATA registered laboratory.
- Allowance shall be made in all finishes for movement in construction joints and expansion joints.

HEALTH AND SAFETY

- The contractor shall develop, implement and administer a workplace health and safety program that will ensure that all construction activities are performed to the relevant workplace health and safety requirements and any other statutory requirements.
- The workplace health and safety program must be co-ordinated with adjoining property owners and all relevant parties as necessary to ensure a safe building environment at all times.

STRUCTURAL STEELWORK

- All steelwork including connectors shall be in accordance with AS 4100 Steel Structures Code and AS/NZS 4600-1996 Cold formed steel structures.
- Steel shall be: AS 3679 Grade 300 generally AS 1163 Grade 250 for circular hollow sections AS 1163 Grade for rectangular hollow sections. Bolts shall comply with AS 1110, AS 1111, AS 1112 AS 1252 as appropriate. Welds shall comply with AS 1554.
- Abrasive cleaning prior to painting shall be to AS 1627.4 Class 2.5. Painting shall be one coat .075mm two pack inorganic air cured zinc silicate coating applied within 2 hours of abrasive cleaning, unless specified otherwise. Painting shall be to manufacturer's specification and the painter shall ensure the method of application is compatible with connection type and paint specified.
- Galvanising shall be hot dipped to AS 4680.
- Bolts shall be galvanised and of sufficient length to exclude the thread from the shear plane. A suitable washer shall be used under all nuts.
- Unless otherwise specified, the following shall apply:
 - Cleats, brackets, stiffeners etc. - ex.10mm plate.
 - Welding - 6mm continuous fillet to full perimeter at contact.
 - Bolt hole clearance - 2mm.
 - Butt welds shall be qualified complete penetration in accordance with AS 1554.
 - 6mm endplates to all hollow members.
 - Connections - minimum of 2-M20 8.8/S bolts.
- All welding to be Category "SP". Consumables shall be E48xx or W50x electrodes.
- Fabricator shall allow for all cleats and other fixings required by the Supervisor.
- Mortar shall be 1 cement: 2 sand mixed "just moist" and rammed solid.
- Galvanised/hot dipped galvanized or stainless steel bolts, nuts and washer shall be in accordance with AS 1214.
- Apply Zinc rod finishing weld, such as "Boss Galvanizing Bar" to reinstafe galvanizing after welding - typical all galvanized surfaces.
- The checking of shop drawings is included in our scope of works. STP Consultants will require 5 business days after receiving all shop detail drawings for STP Consultants to return comments.

TEMPORARY WORKS

- The contractor shall allow for all costs associated with the design, supply, installation and removal of all temporary back propping, safety screens, scaffolding and other requirements of the construction process. The contractor shall engage suitably qualified engineer to design, inspect and certify all temporary works and demolition works.
- The contractor is to provide all temporary works contractor engineering drawings to the structural engineer for information.
- It is the contractor's responsibility to ensure the overall stability of the structure whilst under construction. The contractor shall obtain advice from the engineer.
- The contractor is to have the construction methodology statements prepared and submitted for general review to ensure it is in accordance with the design intent.
- All vertical displacement and movements are to be limited to ensure the structure is not subjected to loads or movements causing structural distress to any element while the structure is being temporarily supported.
- Structure to be adequately braced to prevent any horizontal movement or deflections.

NUISANCE

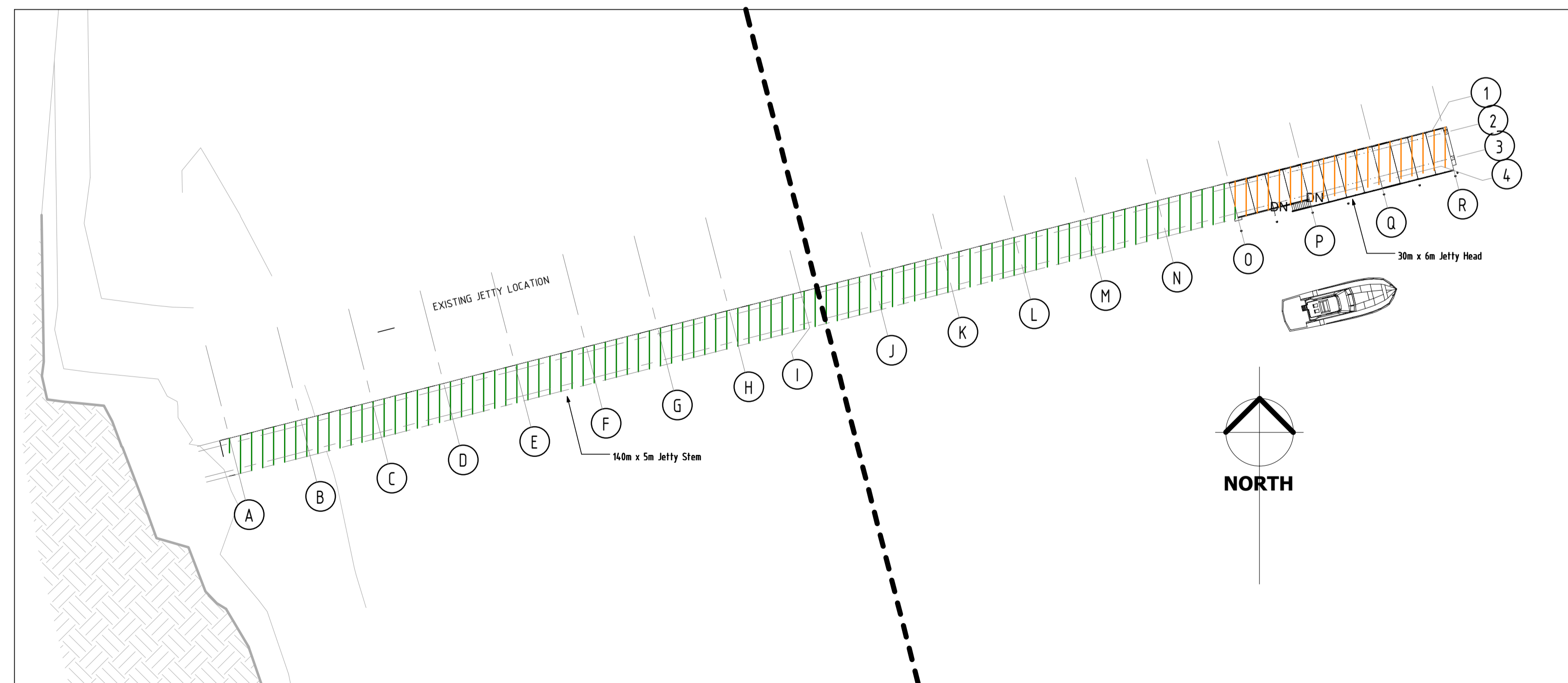
- The contractor shall develop, implement and administer a plan that will ensure the management of noise and vibration resulting from construction works.
- The contractor will need to ensure all adjoining property requirements relating to noise and vibration are met.
- If it is established that there are no site specific requirements, then the contractor shall refer to minimum requirements for abatement of noise and vibration nominated by relevant by statutory requirements.
- The contractor will need to prepare and advise on monitoring and management of noise and vibration based on professional advice from suitably qualified person or persons.

SERVICE LOADS

- Function Category: 2 (Normal)
Structural Design Actions to AS/NZS 1170.0 & -1, AS 4997:
Deck UDL: 15.0kPa
Deck Conc. Load: 200kN
Class 15
Vessel: Length (LOA) 25m
Displacement 110 Tonnes
50 years
- Design working life
- Wind Actions equivalent to AS/NZS 1170.2:
Region: C
Terrain Category: 2.0
Shielding Multiplier Ms 1.0
Topographic Multiplier Mt 1.0
Terrain/Height Multiplier Mz,cat,u 0.95
Design Gust Wind Speed Vz, ultimate: 66m/s
- Earthquake Loads to AS 1170.4:
Hazard Factor: 0.07
Probability Factor: 1.0
Design Category: I
- Hand rail details are to be in accordance with manufacturer's design and certification, in accordance with AS 4997.
- The above do not include loads which may be applied during construction. The builder is to maintain stability during construction.
- Wave loading based on report B3872 by Bonacci Group (QLD) Pty. Ltd.

PILING NOTES

- All piling shall be in accordance with AS 2159 Piling Code and with notes and details as set out on the drawings.
- The detail of the pile to be used and the method of operation shall be submitted to the Engineer for approval.
- Pile testing and confirmation that piles have achieved the required depth and capacity shall be carried out by the piling contractor. The method of testing shall be submitted to the Engineer for approval.
- Load-bearing piles have been designed to withstand loads indicated on the piling plan, with a maximum settlement of 10mm and an eccentricity of 75mm.
- Piles shall be driven by approved pile driving techniques to an approved set calculated by the Hiley Formula. A certificate of adequacy for pile loads shall be submitted by the Piling Contractor to the Engineer for approval.
- All piles shall be driven in the proper position shown on the drawings with a variation of not more than 25mm in 3m from the vertical (or raking line) with a maximum variation at the head of the pile from the position shown on the drawings of 75mm in any direction at the commencing surface. Variations outside these limits shall be cause for rejection.
- Pile set out shall be by Authorised Surveyor and pile locations shall be checked and advised to Engineer after construction.
- Piles should be cut off to level. Immediately after making the final cut off, the area should be coated with an approved protective coating over the exposed surface.



Rev	Description	By	Appd	Date
1	CONSTRUCTION ISSUE	JBG	AJF	25.01.13
F	APPROVAL ISSUE	JBG	AJF	16.11.12
E	PRELIMINARY ISSUE	JBG	AJF	13.11.12
D	FOR APPROVAL	JBG	AJF	21.09.12
C	TENDER ISSUE	JBG	AJF	30.06.12
B	PRELIMINARY ISSUE	JBG	AJF	12.06.12
A	PRELIMINARY ISSUE	JBG	AJF	31.05.12



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Client: CIVIL PLUS CONSTRUCTIONS

Project: CLUMP POINT JETTY REPLACEMENT

Title: STRUCTURAL NOTES

Design	Designer	Drawn	Author
Checked	Checker	Date	NOV '12
RPEU No.	Approver	Datum	-
Approved: [Signature]			
Job Number:	Drawing No.	Revision	
T12-058	ST0.01	1	

CONSTRUCTION

Stephen C Day

From: Dane Blackford <Dane@civilplus.com.au>
Sent: Thursday, 28 March 2013 9:13 AM
To: Stephen C Day
Cc: Luke Vandesande; Scott Ironside; tony.rooks@ccrc.qld.gov.au; David.goodman@ccrc.qld.gov.au; Brett Micola; Admin
Subject: RFI 004
Attachments: CLIENT - RFI004.pdf; T12-058 ST3.06a (1).pdf; T12-058 ST0.01 (2).pdf; T12-058 ST1.01 (3).pdf; T12-058 ST1.03 (2).pdf; T12-058 ST1.04 (2).pdf; T12-058 ST1.11 (7).pdf; T12-058 ST2.01 (2).pdf; T12-058 ST2.02 (3).pdf; T12-058 ST2.03 (3).pdf; T12-058 ST2.04 (3).pdf; T12-058 ST2.05 (2).pdf; T12-058 ST3.01 (2).pdf; T12-058 ST3.02 (3).pdf; T12-058 ST3.03 (3).pdf; T12-058 ST3.05 (3).pdf; T12-058 ST3.05a (1).pdf; T12-058 ST3.06 (2).pdf; image001.png


Flag Status: Flagged


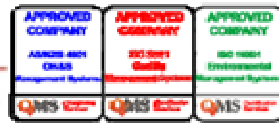
Categories: Email filed

Stephen,

Please find attached RFI 004 for your review and response thanks

Regards,

 **Dane Blackford | Project Manager | CivilPlus Constructions Pty Ltd**
30 Blakey Street, Garbutt Qld 4814 | PO Box 1482 Aitkenvale Qld 4814
p 4728 6822 | f 4728 6833 | m 0457 286 822 | e dane@civilplus.com.au | w www.civilplus.com.au

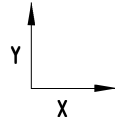
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REQUEST FOR INFORMATION					
Project:	C089 - Clump Point & Dunk Island Jetties	Date:	28/03/13	RFI #	004
RFI To:	Stephen Day	Company:	Program Delivery & Operations Department of Transport and Main Roads		
RFI From:	Dane Blackford				
Subject:	Current Drawings				
Request for Information:					
<p>Stephen,</p> <p>Please find attached the current drawings for Clump Point.</p> <p>Could you please advise on any changes required by the 8th of April 2013 as we are now approaching the jetty head with our precast works. This means we have to have options finalised including the stair design as they may affect the precast members.</p> <p>If you require any more information please let me know.</p> <p>Regards,</p> <p>Dane Blackford</p>					

Received:	
Signature	
Name	
Date	
Project Manager Confirmation:	
Signature	
Name	
Date	

CENTROID

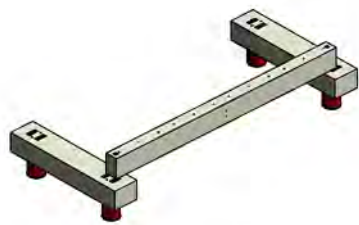
X - 4990
Y - 245



LEGEND

2.5 DENOTES SWIFT LIFT 2.5 TONNE x 90mm SHORT FOOT ANCHOR. MINIMUM 20MPa CONCRETE STRENGTH AT LIFT

1.3 DENOTES SWIFT LIFT 1.3 TONNE x 85mm SHORT FOOT ANCHOR. MINIMUM 15MPa CONCRETE STRENGTH AT LIFT

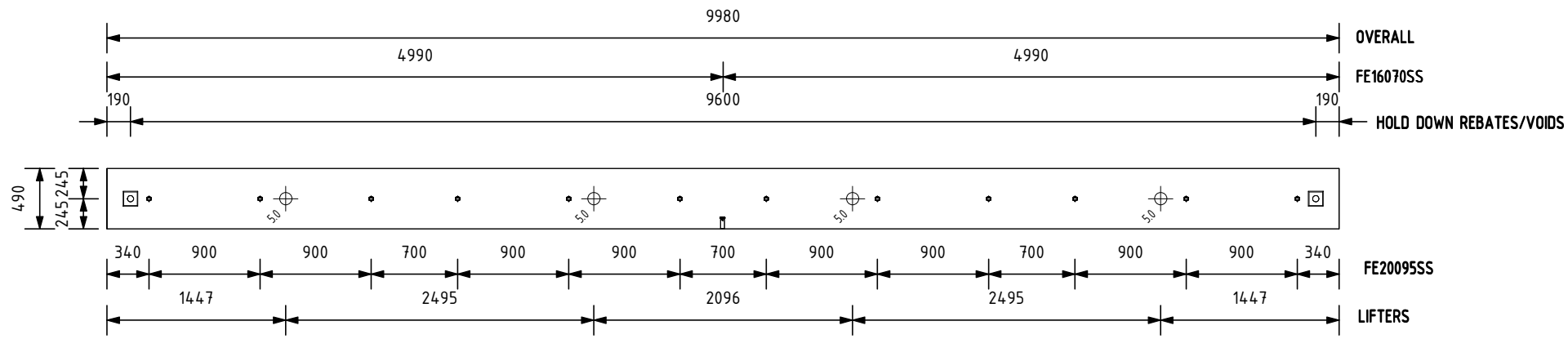


TYPICAL CONFIGURATION
NTS

5.0 DENOTES SWIFT LIFT 5.0 TONNE x 240mm ANCHOR. MINIMUM 20MPa CONCRETE STRENGTH AT LIFT

10.0 DENOTES SWIFT LIFT 10.0 TONNE x 340mm ANCHOR. MINIMUM 20MPa CONCRETE STRENGTH AT LIFT

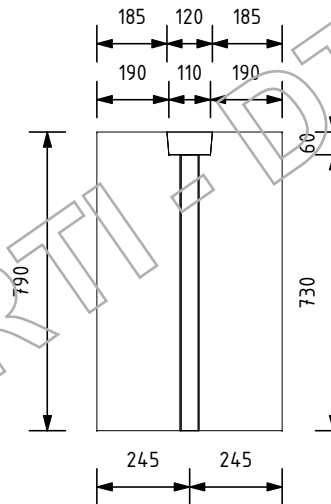
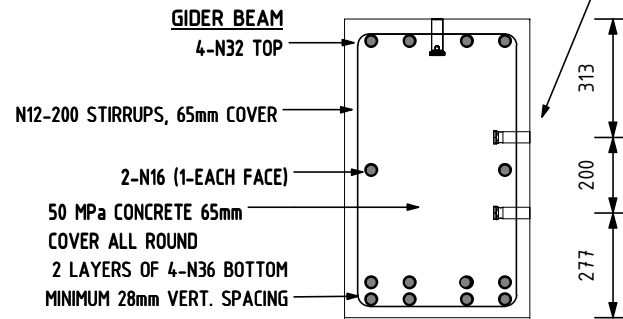
5.0s DENOTES SWIFT LIFT 5.0 TONNE x 120mm SHORT FOOT ANCHOR. MINIMUM 20MPa CONCRETE STRENGTH AT LIFT



PRECAST GIRDER BEAM TYPE 2a

1 : 50

NOTE:
2/MIDSPAN FE16070SS FERRULES TO SEAWARD SIDE OF GIRDERS ON GRID '3' ONLY FOR FUTURE DIESEL LINE.

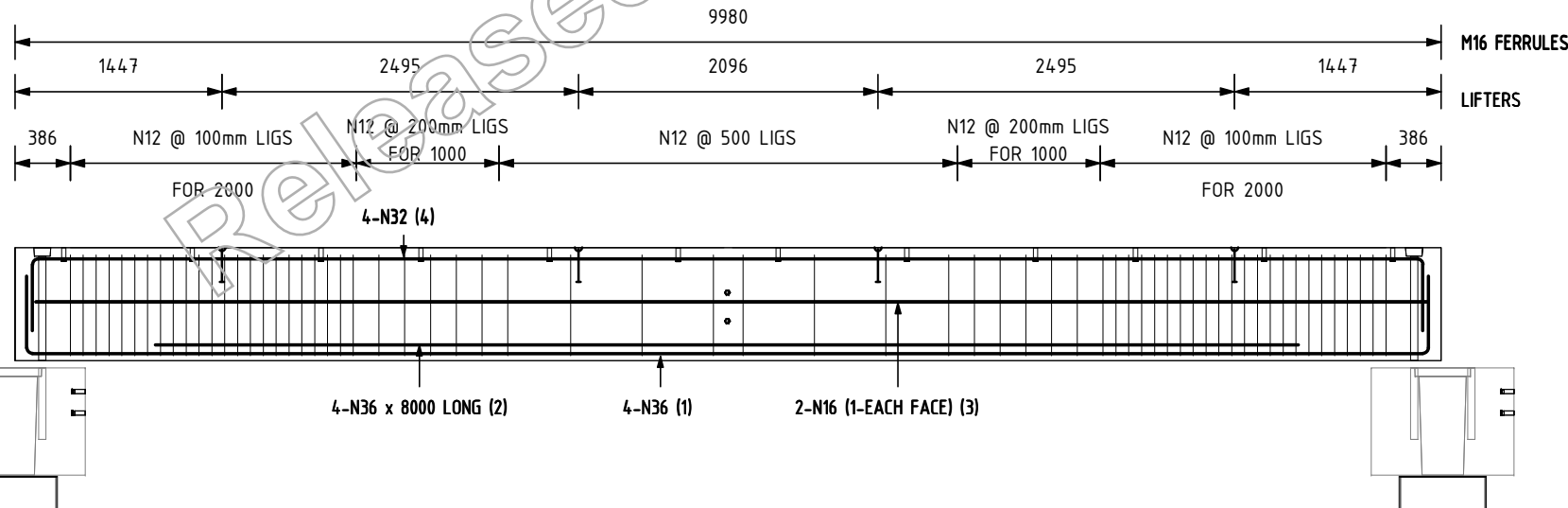


PRECAST GIRDER BEAM SECTION

1 : 20

HOLD DOWN VOID DIMENSIONS

1 : 20



PRECAST GIRDER BEAM ELEVATION

1 : 50

INSTALL REINFORCEMENT	CHECKED REINFORCEMENT
AS NOTED	
ALTERNATIVE REINF.	ALTERNATIVE REINF.
ADDITIONAL REINFORCEMENT	ADDITIONAL REINFORCEMENT
PERIMETER BARS	PERIMETER BARS
MIN. CONCRETE COVER	MIN. CONCRETE COVER
65mm	
f _{ct} (@ LIFT)	f _{ct} (@ LIFT)
20 MPa	
f' _c	f' _c
50 MPa	
PANEL THICKNESS	PANEL THICKNESS
AS NOTED	
AREA SQUARE METERS	AREA SQUARE METERS
0.387	
VOLUME CUBIC METERS	VOLUME CUBIC METERS
3.86	
WEIGHT - TONNES	WEIGHT - TONNES
9.66	
EDGE LIFTS	EDGE LIFTS
2.5x90 - 1.3x85-	
FACE LIFTS	FACE LIFTS
2.5x90 - 1.3x85- 5.0x240- 4 10.0x340- 5.0x120-	2.5x90 - 1.3x85- 5.0x240- 10.0x340- 5.0x120-
REID REBATED FERRULES	REID REBATED FERRULES
RB12 RI - RB16 RI - RB20 RI -	RB12 RI - RB16 RI - RB20 RI -
REID THREADED FERRULES	REID THREADED FERRULES
RB12 TI - RB16 TI - RB20 TI - RB24 TI -	RB12 TI - RB16 TI - RB20 TI - RB24 TI -
COUPLER & REIDBAR	COUPLER & REIDBAR
RB20C -	RB20C -
PVC SLEEVE	PVC SLEEVE
TOP -	TOP -
50mm GROUT TUBE	50mm GROUT TUBE
BTM -	BTM -
REBATES (mm)	REBATES (mm)
-	
PROP TYPE	PROP TYPE
PROP EFFECTIVE LENGTH	PROP EFFECTIVE LENGTH
FERRULES	FERRULES
FE20095SS - 12 FE16070SS - 2	FE20095SS - FE16070SS -



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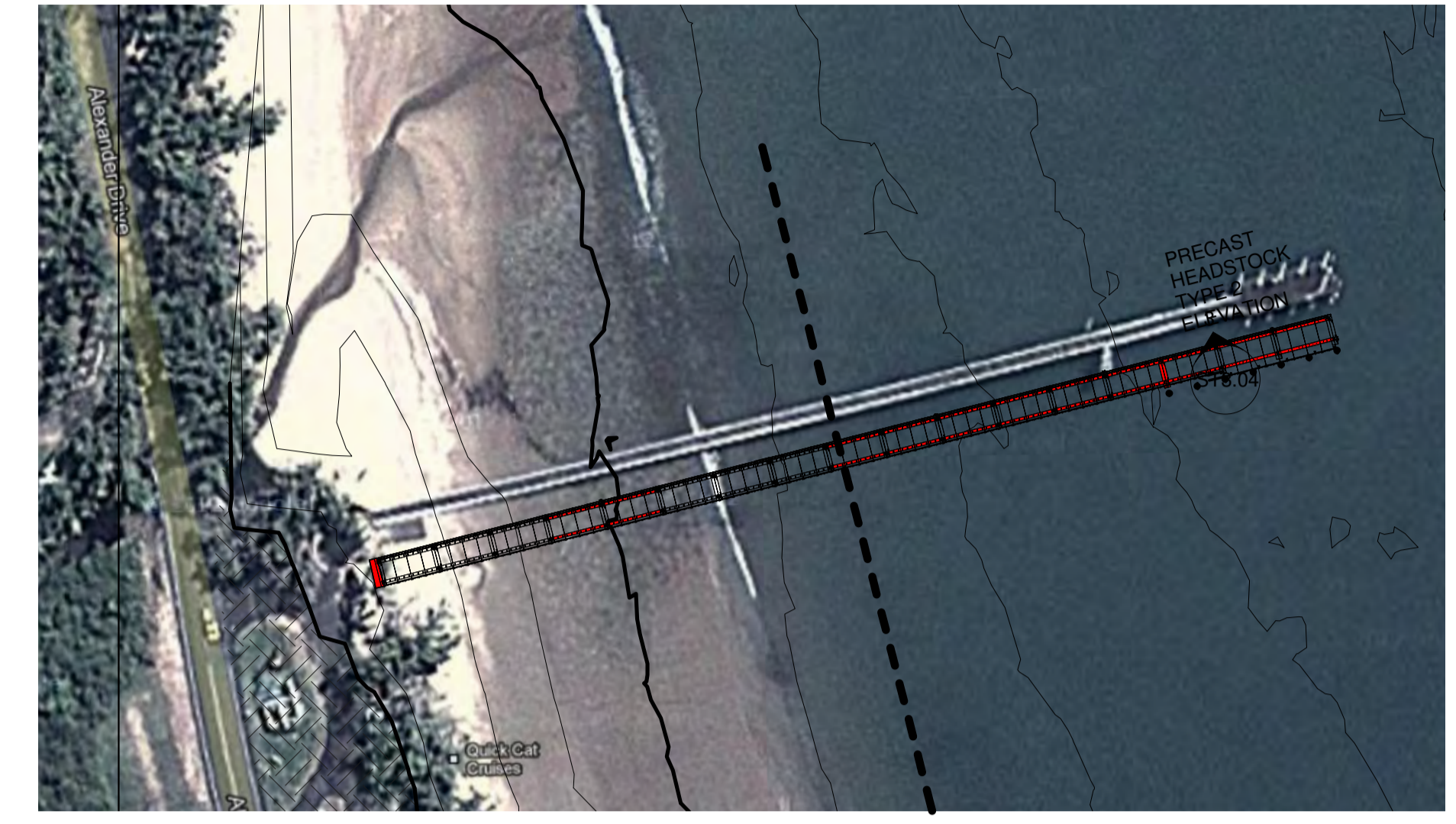
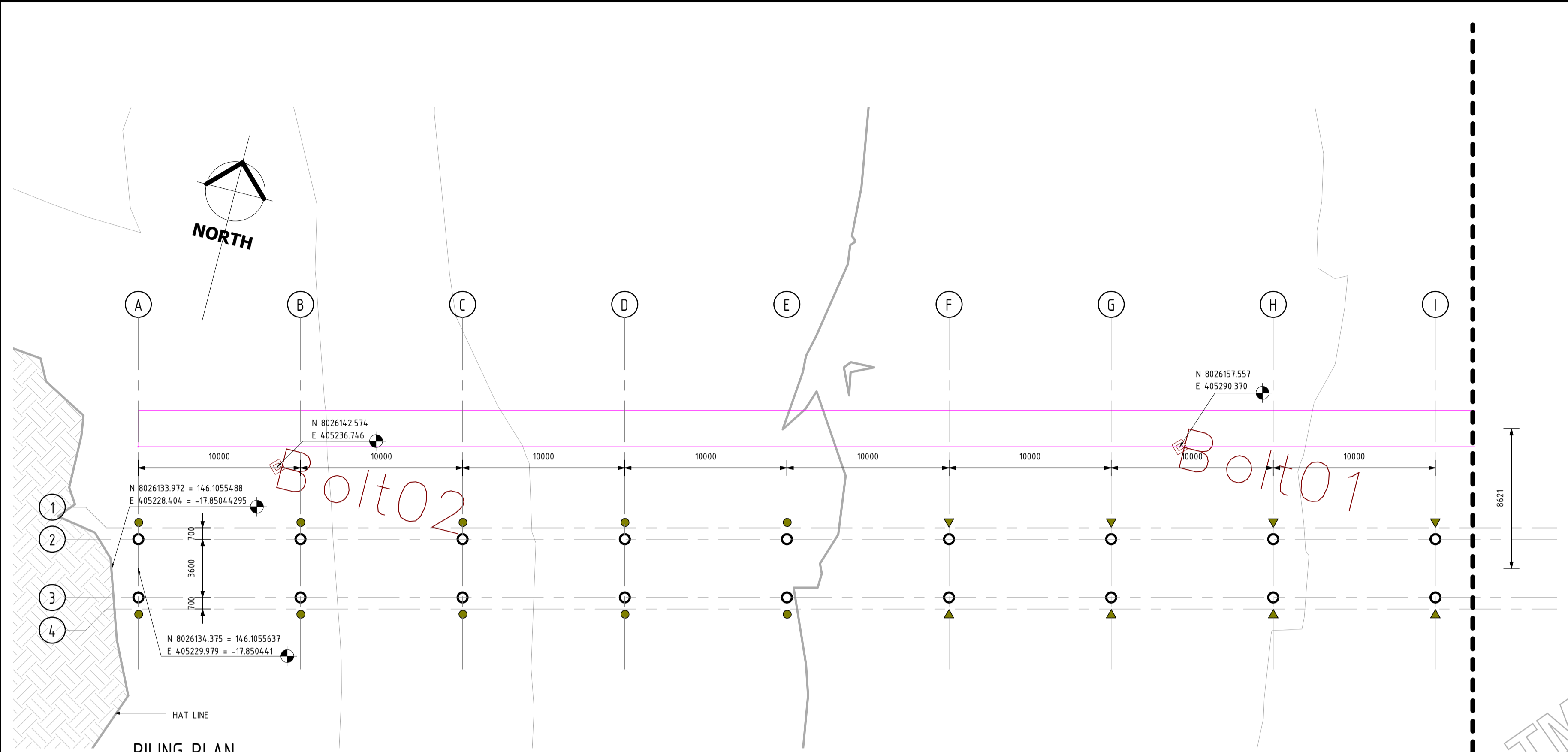
Townsville Office
Ph: 07 47 242 626
Ph: 07 47 242 417

Client: CIVIL PLUS CONSTRUCTIONS
Project: CLUMP POINT
Title: PRECAST GIRDER BEAM TYPE 2a

Rev	Description	By	Appd	Date	Approved	RPEQ No.
1	REVISED CONSTRUCTION	JBG	AJF	8.03.13	AJF	04683

Design: AJF
Drawn: JBG
Date: JAN '13
Checked: AJF
Approved: AJF
RPEQ No. 04683

CONSTRUCTION	
Job Number: T12-058	Drawing No. ST3.06a
Approved:	Revision 1

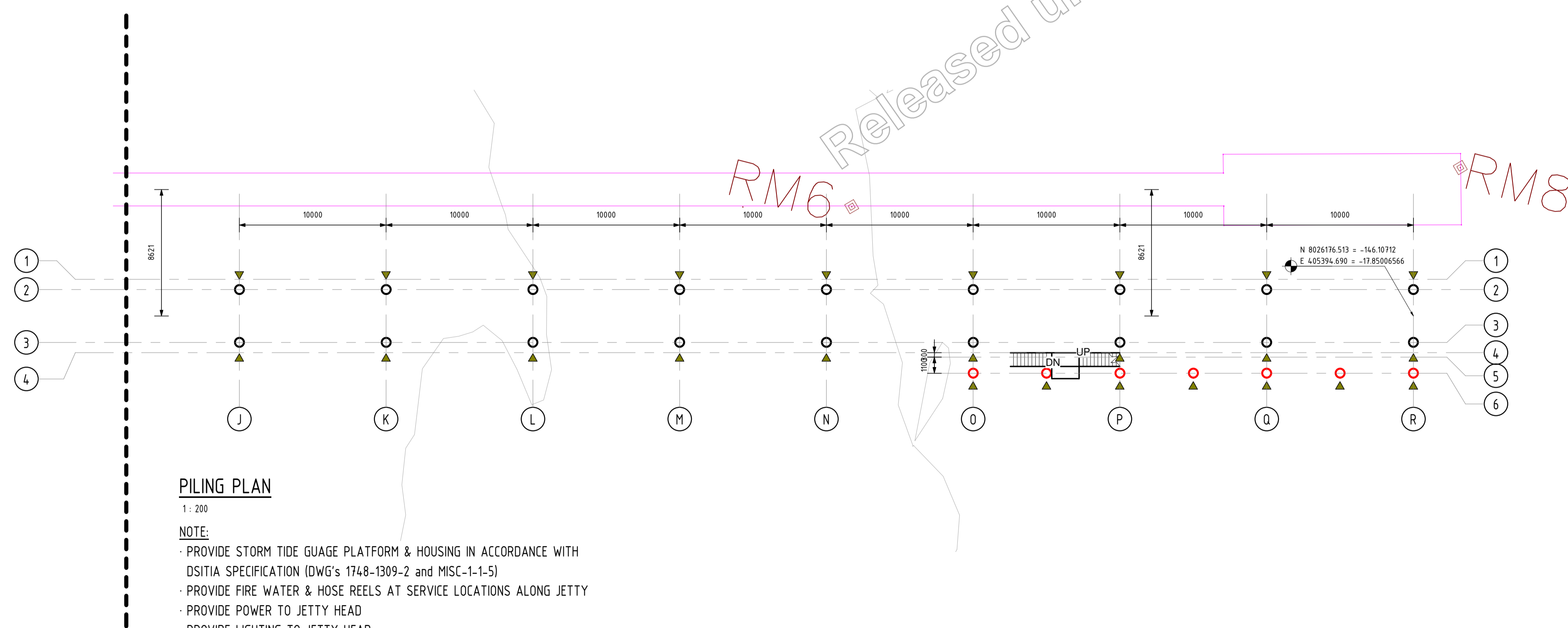


LOCATION PLAN
1: 1000

PILING PLAN
1: 200

- ANODE TYPE 1
- ▲ ANODE TYPE 2

Released under RTI - DTMR



PILING PLAN
1: 200

NOTE:

- PROVIDE STORM TIDE GAUGE PLATFORM & HOUSING IN ACCORDANCE WITH DSITIA SPECIFICATION (DWG's 1748-1309-2 and MISC-1-1-5)
- PROVIDE FIRE WATER & HOSE REELS AT SERVICE LOCATIONS ALONG JETTY
- PROVIDE POWER TO JETTY HEAD
- PROVIDE LIGHTING TO JETTY HEAD
- PROVIDE POTABLE WATER AT JETTY SERVICE LOCATIONS
- PROVIDE 5 ACCESS LADDERS ALONG THE JETTY IN ACCORDANCE WITH AS4995 - 1995

Structural Column Schedule		
Column Location Mark	Easting	Northing
A-2	405229.552757	8026136.123710
A-3	405230.440214	8026132.634807
B-2	405239.235868	8026138.601086
B-3	405240.128169	8026135.113422
C-2	405248.923823	8026141.079700
C-3	405249.816124	8026137.592037
D-2	405258.611777	8026143.558315
D-3	405259.504079	8026140.070651
E-2	405268.299732	8026146.036930
E-3	405269.192034	8026142.549266
F-2	405277.987687	8026148.515545
F-3	405278.879988	8026145.027881
G-2	405287.675642	8026150.994160
G-3	405288.567943	8026147.506496
H-2	405297.363597	8026153.472774
H-3	405298.255898	8026149.985111
I-2	405307.051552	8026155.951389
I-3	405307.943853	8026152.463725
J-2	405316.739506	8026158.430004
J-3	405317.631808	8026154.942340
K-2	405326.427461	8026160.908619
K-3	405327.319762	8026157.420955
L-2	405336.115416	8026163.387234
L-3	405337.007717	8026159.899570
M-2	405345.803371	8026165.865848
M-3	405346.695672	8026162.378185
N-2	405355.491326	8026168.344463
N-3	405356.383627	8026164.856799
O(5.000)-6	405371.436068	8026166.535407
O-2	405365.179280	8026170.823078
O-3	405366.071582	8026167.335414
O-6	405366.592091	8026165.2961
P(5.000)-6	405381.124023	8026169.014022
P-2	405374.867235	8026173.301693
P-3	405375.759537	8026169.814029
P-6	405376.280046	8026167.774715
Q(5.000)-6	405390.811978	8026171.492637
Q-2	405384.555190	8026175.780308
Q-3	405385.447491	8026172.292644
Q-6	405385.968001	8026170.253329
R-2	405394.243145	8026178.258922
R-3	405395.135446	8026174.771259
R-6	405395.655955	8026172.731944

Rev	Description	By	Appd	Date
3	CONSTRUCTION ISSUE	JBG	AJF	8.02.13
2	CONSTRUCTION ISSUE	JBG	AJF	25.01.13
1	CONSTRUCTION ISSUE	JBG	AJF	17.01.13
G	APPROVAL ISSUE	JBG	AJF	16.11.12
F	PRELIMINARY ISSUE	JBG	AJF	13.11.12
E	GPS LOCATIONS ADDED	JBG	AJF	27.09.12
D	FOR APPROVAL	JBG	AJF	21.09.12
C	TENDER ISSUE	JBG	AJF	30.06.12
B	PRELIMINARY ISSUE	JBG	AJF	12.06.12
A	PRELIMINARY ISSUE	JBG	AJF	31.05.12

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IN ASSOCIATION WITH

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Client: **CIVIL PLUS CONSTRUCTIONS**

Project: **CLUMP POINT JETTY REPLACEMENT**

Title: **PILING LAYOUT PLAN**

Design	AJF	Drawn	JBG
Checked	AJF	Date	NOV '12
RPEU No.	04683	Datum	-

Job Number:	Drawing No.	Revision
T12-058	ST1.01	3

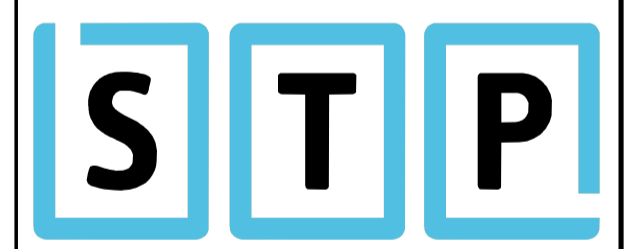
CONSTRUCTION

RL 5.76m 5.760								RL 5.76m 5.760
Deepest point of jetty -3.838								Deepest point of jetty -3.838
RL -8.0 -8.000								RL -8.0 -8.000
Properties Dia: Thickness: Ult. Capacity Compression: Tension:	610mm 12.7 PL 250 kN 100 kN	610mm 12.7 PL 250 kN 100 kN	610mm 12.7 PL 250 kN 100 kN	610mm 12.7 PL 250 kN 100 kN	610mm 12.7 PL 250 kN 100 kN	610mm 12.7 PL 250 kN 100 kN	610mm 12.7 PL 250 kN 100 kN	610mm 12.7 PL 250 kN 100 kN
Column Locations	0-6	O(5.000)-6	P-6	P(5.000)-6	Q-6	Q(5.000)-6	R-6	

Released under RTI - DTMR

Rev	Description	By	Appd	Date
2	CONSTRUCTION ISSUE	JBG	AJF	8.02.13
1	CONSTRUCTION ISSUE	JBG	AJF	25.01.13
E	APPROVAL ISSUE	JBG	AJF	16.11.12
D	PRELIMINARY ISSUE	JBG	AJF	13.11.12
C	FOR APPROVAL	JBG	AJF	21.09.12
B	TENDER ISSUE	JBG	AJF	30.06.12
A	PRELIMINARY ISSUE	JBG	AJF	12.06.12

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Client:
CIVIL PLUS CONSTRUCTIONS

Project:
**CLUMP POINT
JETTY REPLACEMENT**

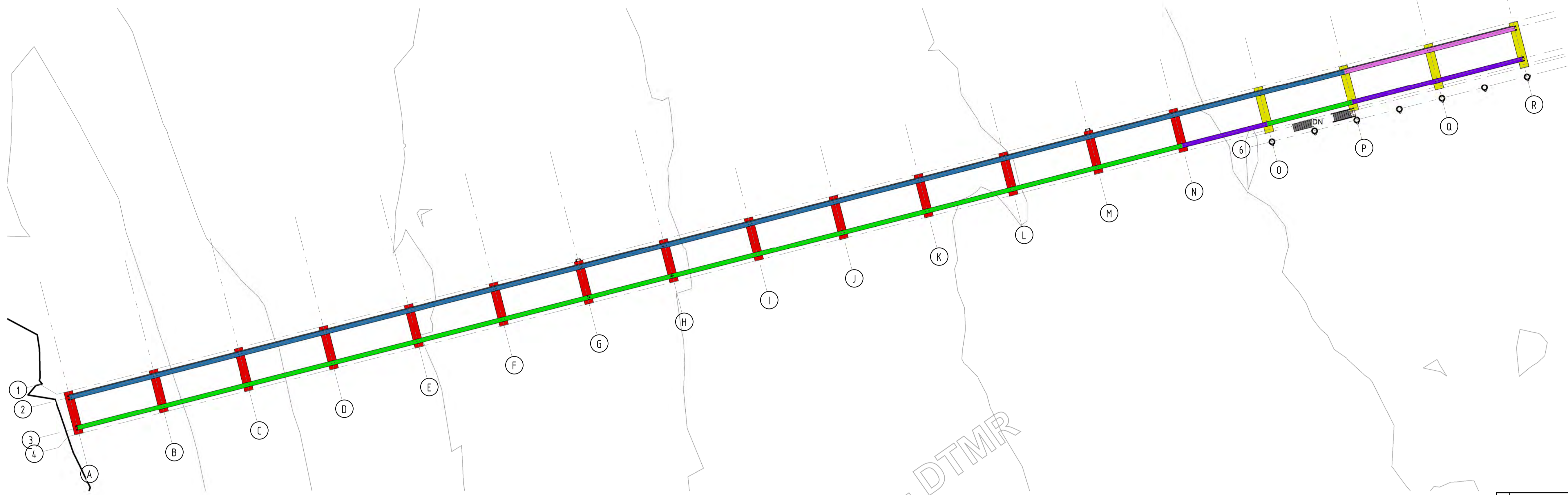
Title:
**FENDER PILES
PILING TABLE**

Design	Designer	Drawn	Author
Checked	Checker	Date	NOV '12
RPEQ No.	Approver	Datum	-

Approved:

Job Number:	Drawing No.	Revision
T12-058	ST1.04	2

APPROVAL ISSUE

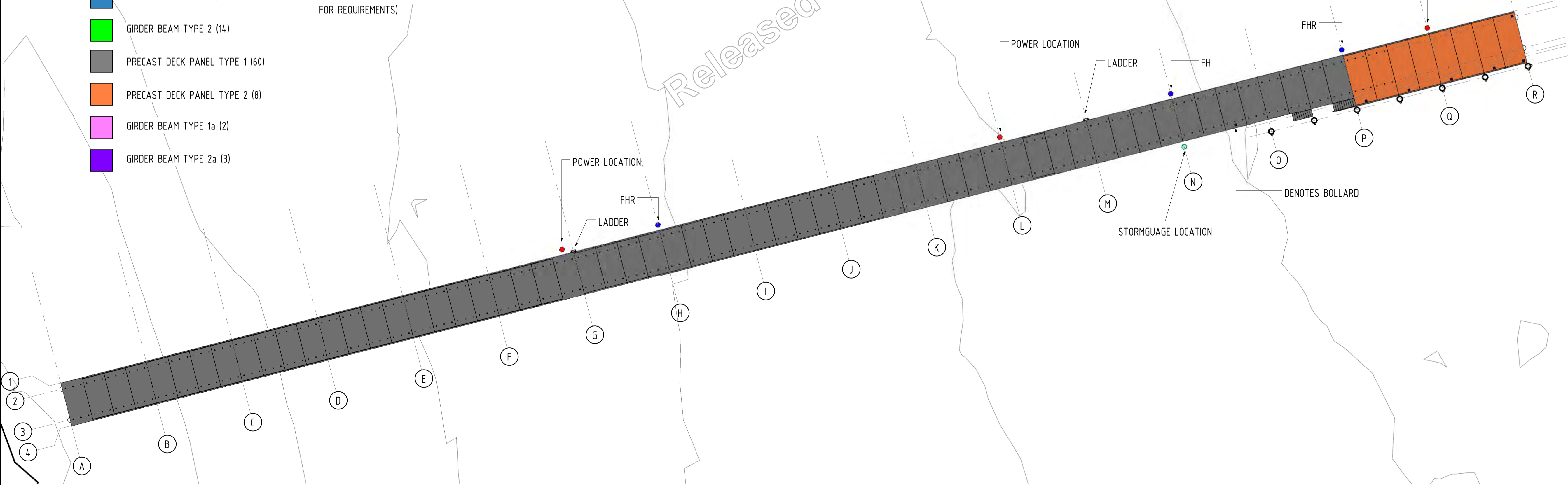


JETTY FRAMING PLAN

1: 250

- HEADSTOCK TYPE 1 (14)
- HEADSTOCK TYPE 2 (4)
- GIRDER BEAM TYPE 1 (15)
- GIRDER BEAM TYPE 2 (14)
- PRECAST DECK PANEL TYPE 1 (60)
- PRECAST DECK PANEL TYPE 2 (8)
- GIRDER BEAM TYPE 1a (2)
- GIRDER BEAM TYPE 2a (3)

- FH - FIRE HYDRANT LOCATION (REFER HYDRAULIC CONSULTANTS FOR REQUIREMENTS)
- FHR - FIRE HYDRANT REEL LOCATION (REFER HYDRAULIC CONSULTANTS FOR REQUIREMENTS)



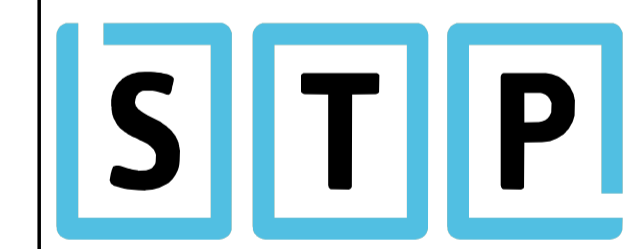
JETTY DECK LAYOUT PLAN

1: 250

Released under RTI - DTMR

Rev	Description	By	Appd	Date
7	REVISED CONSTRUCTION	JBG	AJF	8.03.13
6	REVISED CONSTRUCTION	JBG	AJF	27.02.13
5	REVISED CONSTRUCTION	JBG	AJF	25.02.13
4	CONSTRUCTION ISSUE	JBG	AJF	8.02.13
3	REVISED CONSTRUCTION	JBG	AJF	1.02.13
2	REVISED CONSTRUCTION	JBG	AJF	30.01.13
1	CONSTRUCTION ISSUE	JBG	AJF	25.01.13

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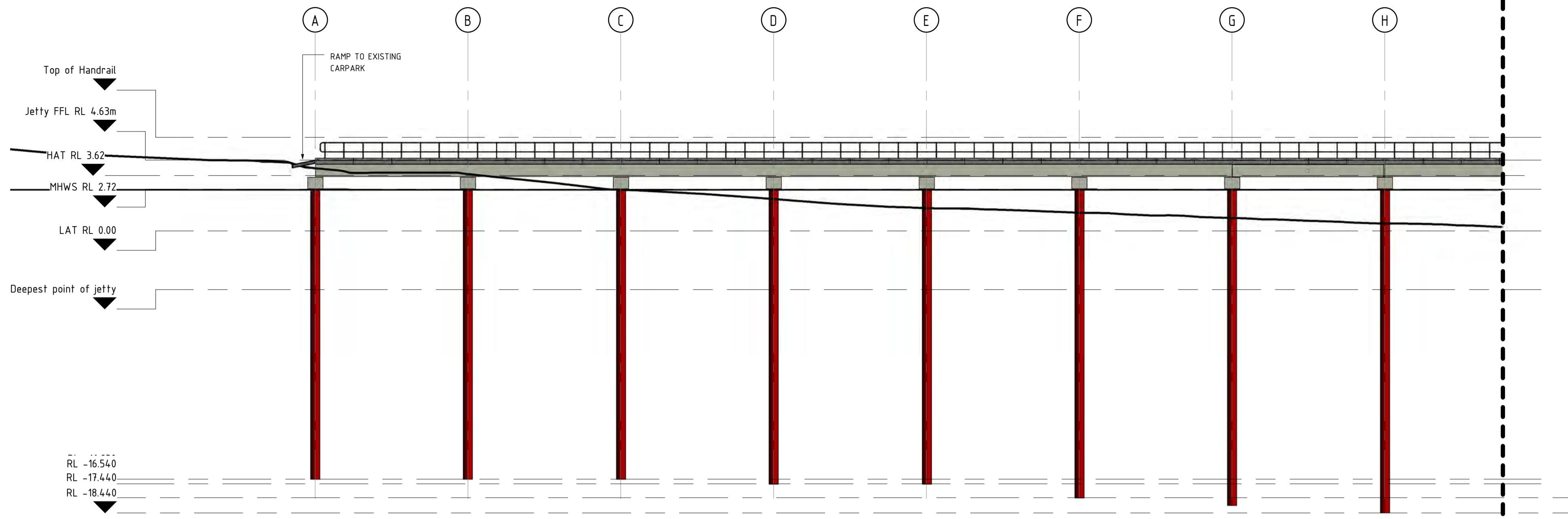
Project:
**CLUMP POINT
JETTY REPLACEMENT**

Title:
JETTY FRAMING PLAN

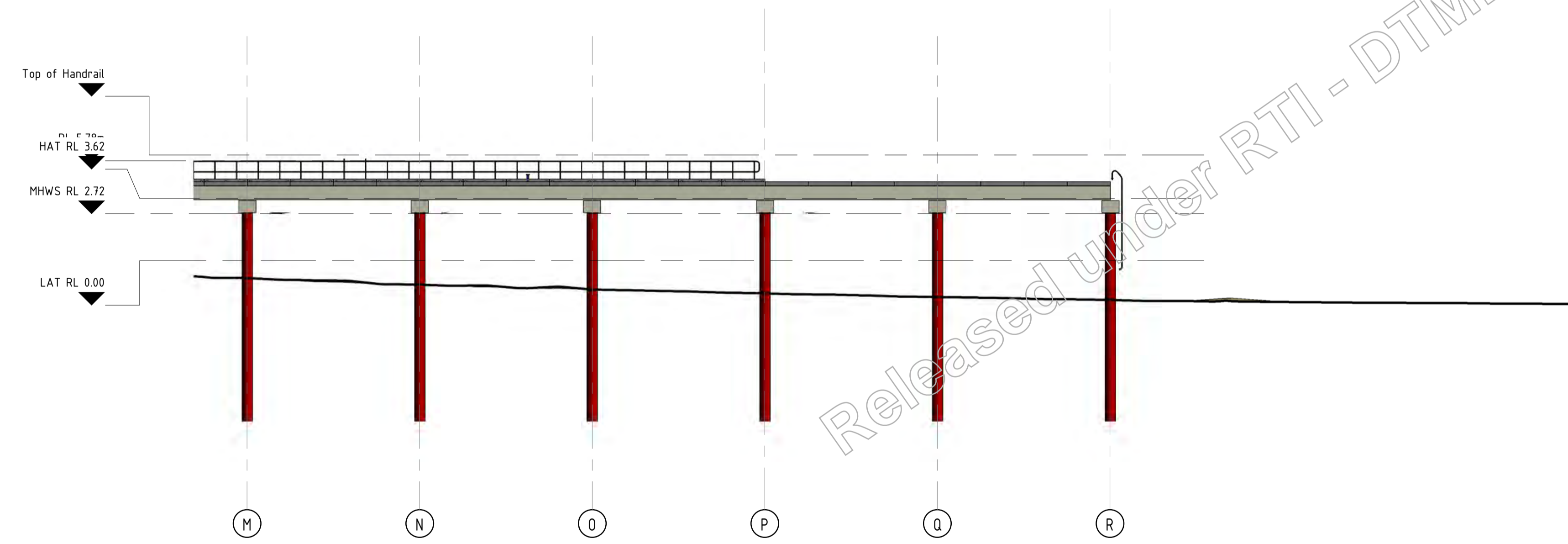
Design	Designer	Drawn	Author
Checked	Checker	Date	NOV '12
RPEU No.	Approver	Datum	-

Job Number:	Drawing No.	Revision
T12-058	ST1.11	7

CONSTRUCTION



NORTHERN ELEVATION
1: 200



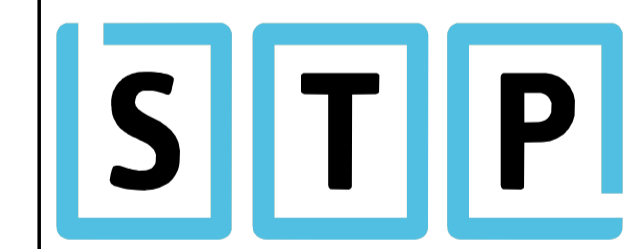
NORTHERN ELEVATION
1: 200



FENDER PILE ELEVATION
1: 200

Rev	Description	By	Appd	Date
2	CONSTRUCTION ISSUE	JBG	AJF	8.02.13
1	CONSTRUCTION ISSUE	JBG	AJF	25.01.13
F	APPROVAL ISSUE	JBG	AJF	16.11.12
E	PRELIMINARY ISSUE	JBG	AJF	13.11.12
D	FOR APPROVAL	JBG	AJF	21.09.12
C	TENDER ISSUE	JBG	AJF	30.06.12
B	PRELIMINARY ISSUE	JBG	AJF	12.06.12
A	PRELIMINARY ISSUE	JBG	AJF	31.05.12

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CIVIL PLUS CONSTRUCTIONS

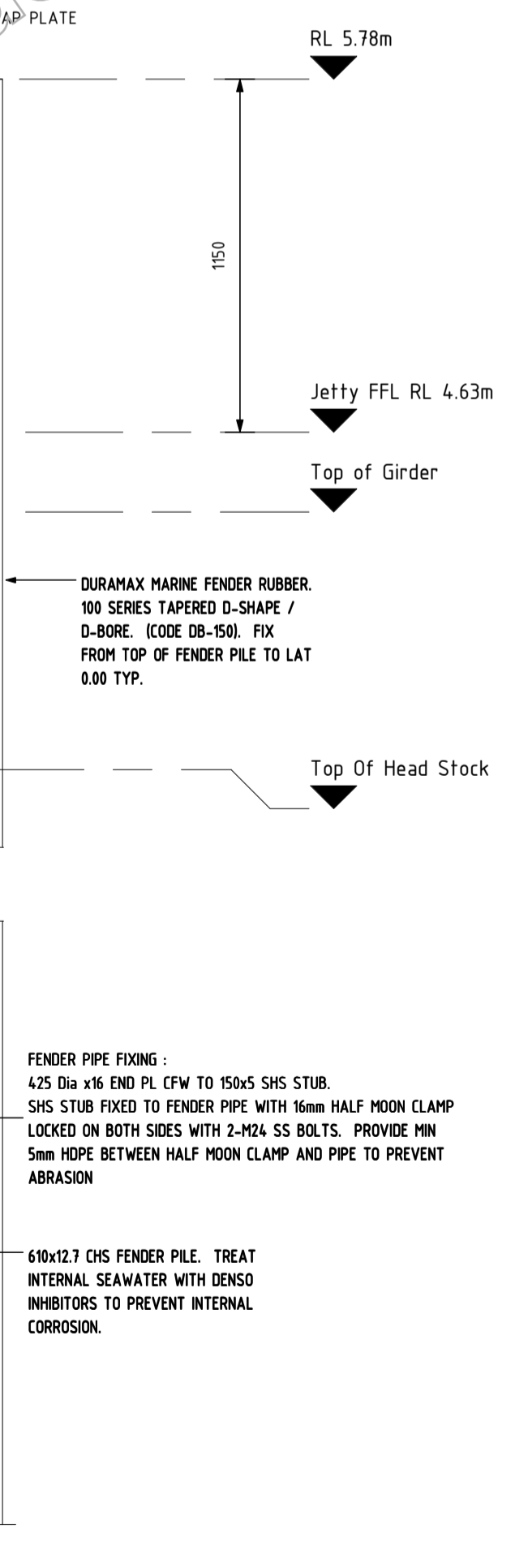
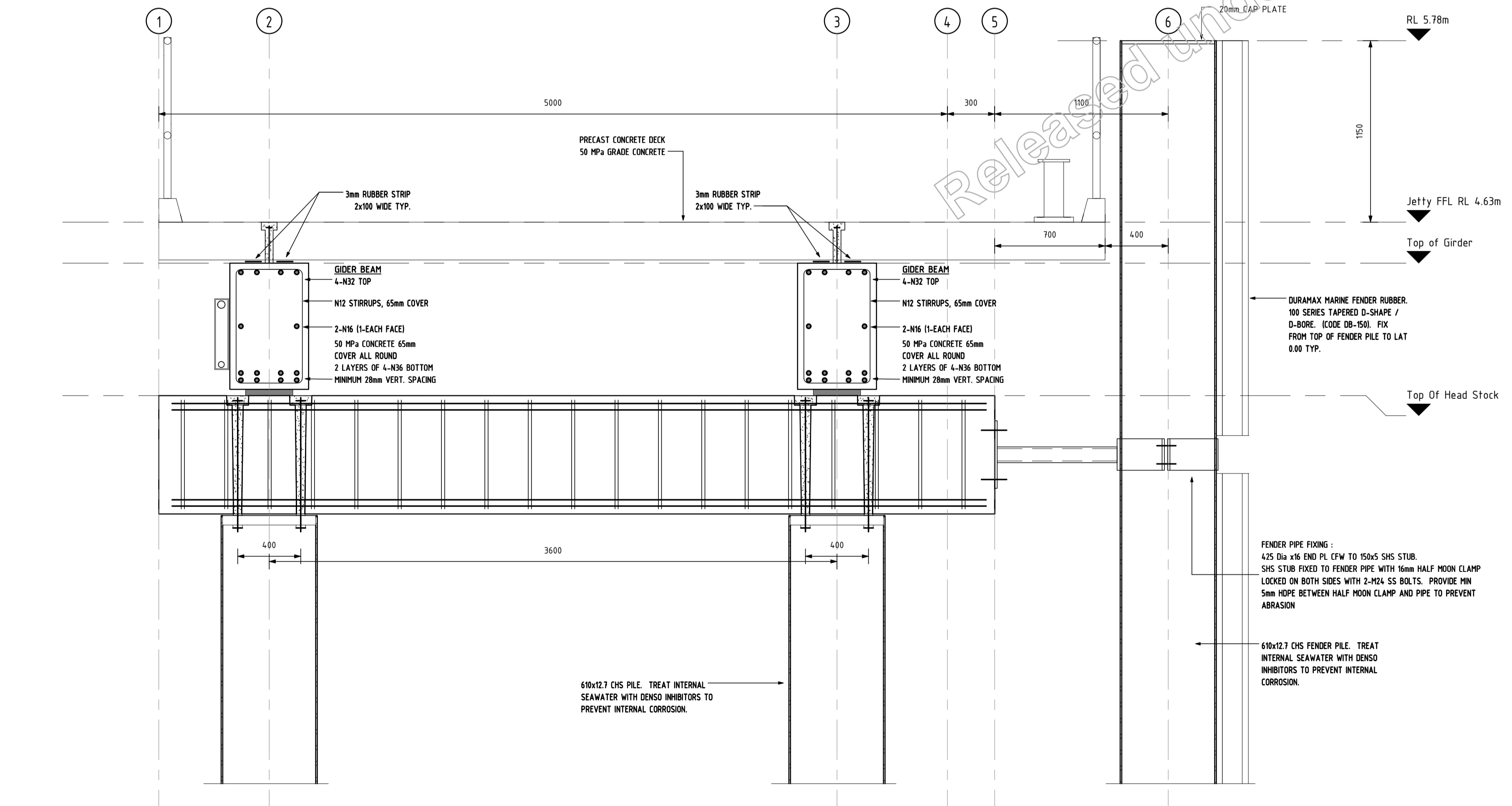
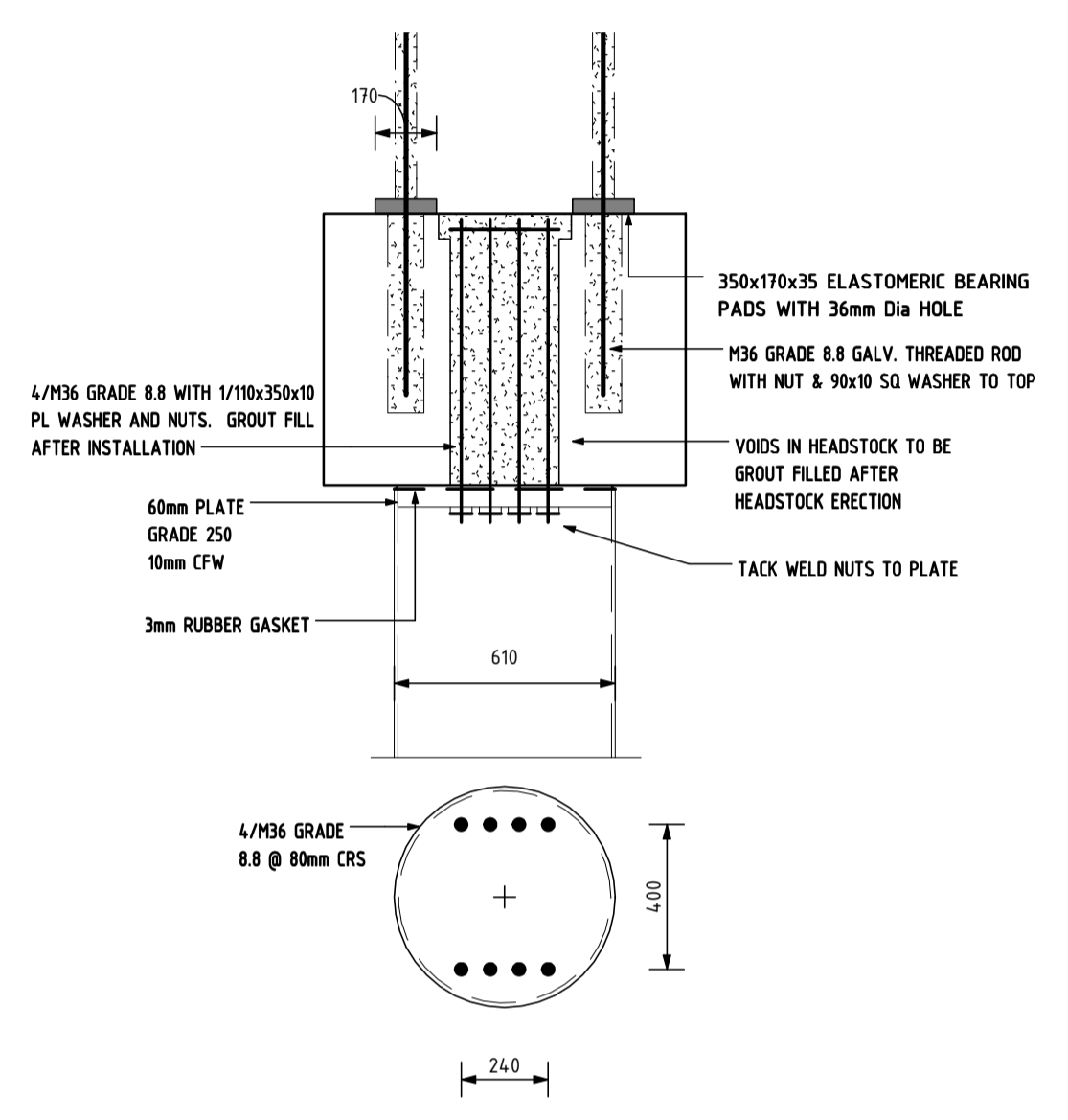
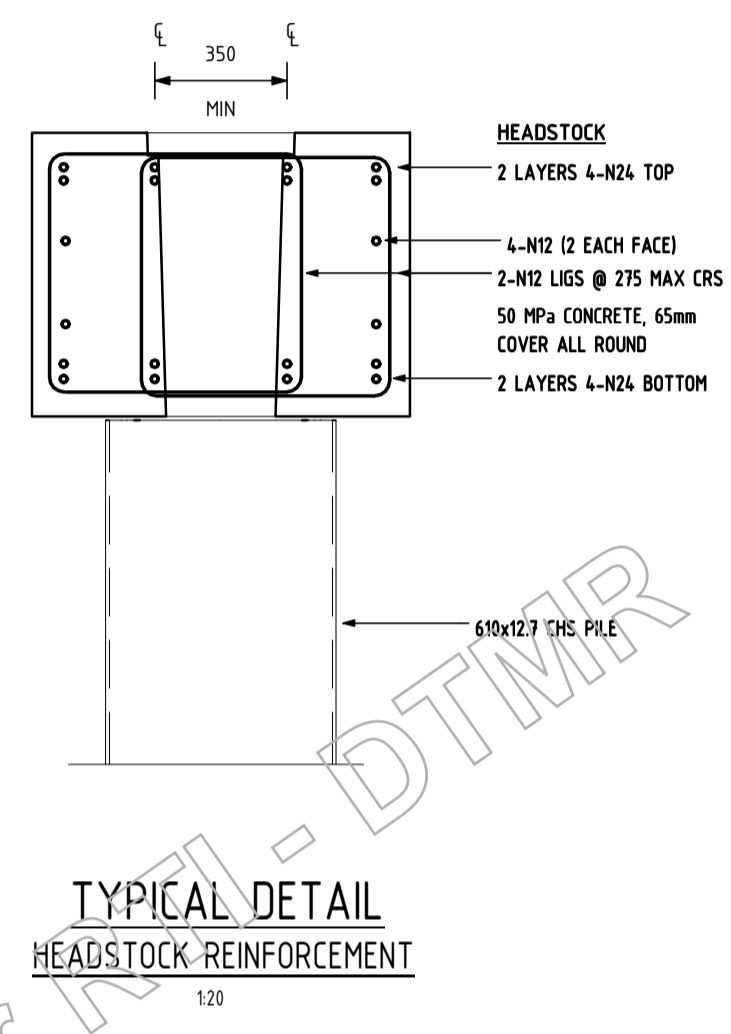
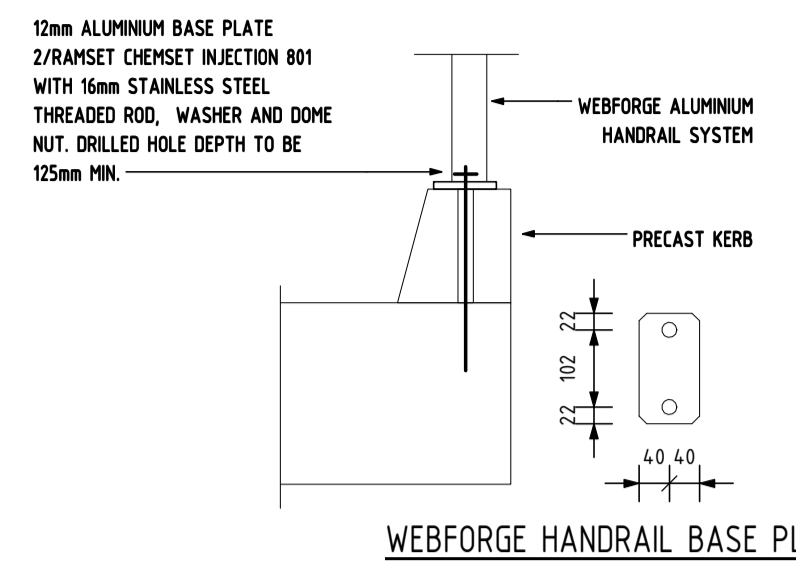
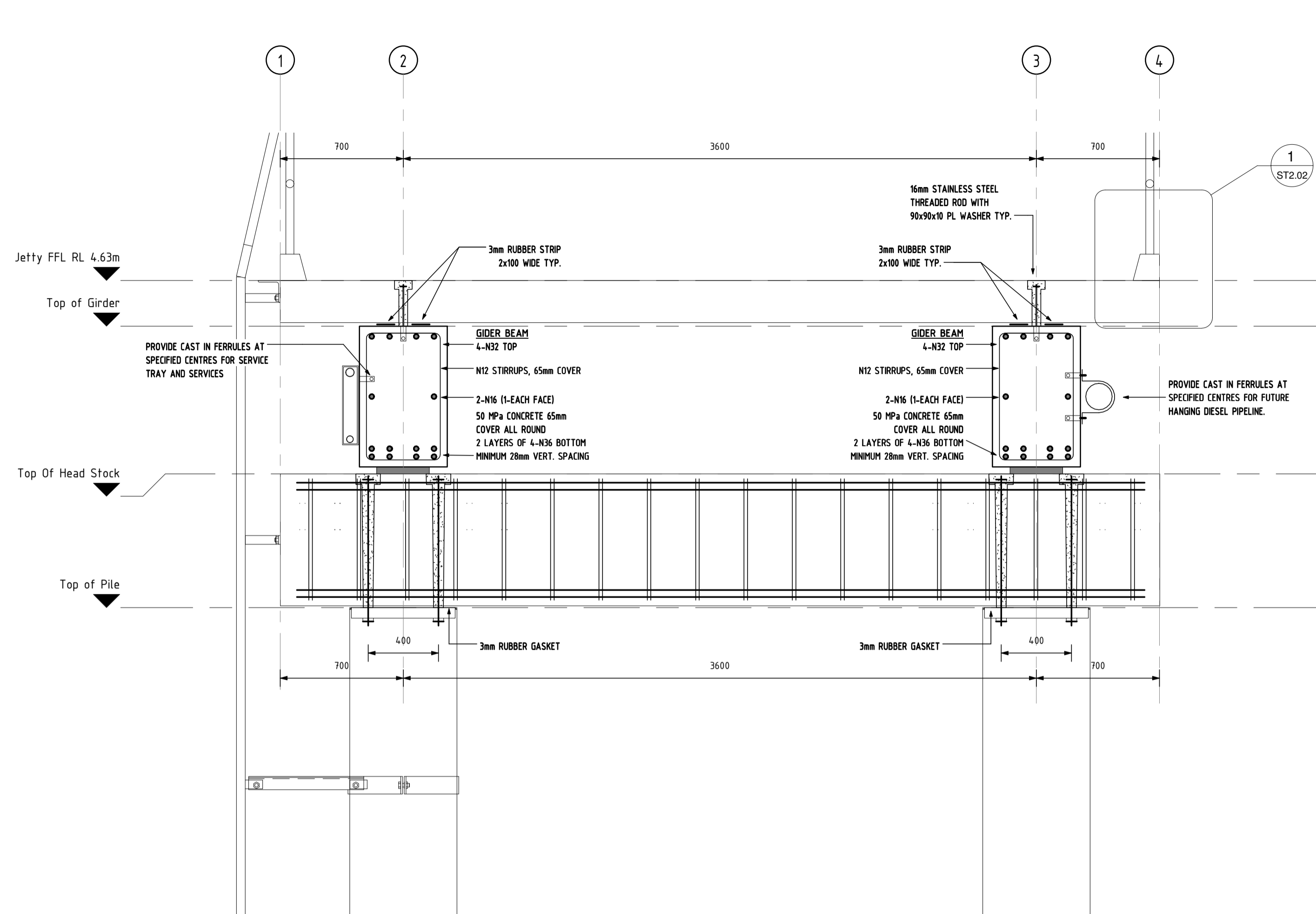
Project:
**CLUMP POINT
JETTY REPLACEMENT**

Title:
JETTY LONG SECTIONS

Design	Designer	Drawn	Author
Checked	Checker	Date	NOV '12
RPEU No.	Approver	Datum	-

Job Number:	Drawing No.	Revision
T12-058	ST2.01	2

CONSTRUCTION

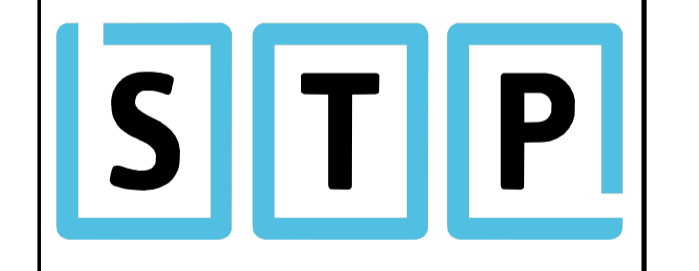


NOTE:

- PROVIDE STORM TIDE GAUGE PLATFORM & HOUSING IN ACCORDANCE WITH DSITIA SPECIFICATION (DWG'S 1748-1909-2 and MSC-1-1-5)
- PROVIDE FIRE WATER & HOSE REELS AT SERVICE LOCATIONS ALONG JETTY
- PROVIDE POWER TO JETTY HEAD
- PROVIDE LIGHTING TO JETTY HEAD
- PROVIDE POTABLE WATER AT JETTY SERVICE LOCATIONS
- PROVIDE 5 ACCESS LADDERS ALONG THE JETTY IN ACCORDANCE WITH AS4997 - 1995

Rev	Description	By	Appd	Date
3	REVISED CONSTRUCTION	JBG	AJF	25.02.13
2	CONSTRUCTION ISSUE	JBG	AJF	8.02.13
1	CONSTRUCTION ISSUE	JBG	AJF	25.01.13
F	APPROVAL ISSUE	JBG	AJF	16.11.12
E	PRELIMINARY ISSUE	JBG	AJF	13.11.12
D	FOR APPROVAL	JBG	AJF	21.09.12
C	TENDER ISSUE	JBG	AJF	30.06.12
B	PRELIMINARY ISSUE	JBG	AJF	12.06.12
A	PRELIMINARY ISSUE	JBG	AJF	31.05.12

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Client: **CIVIL PLUS CONSTRUCTIONS**

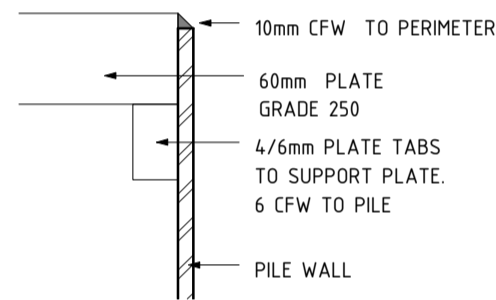
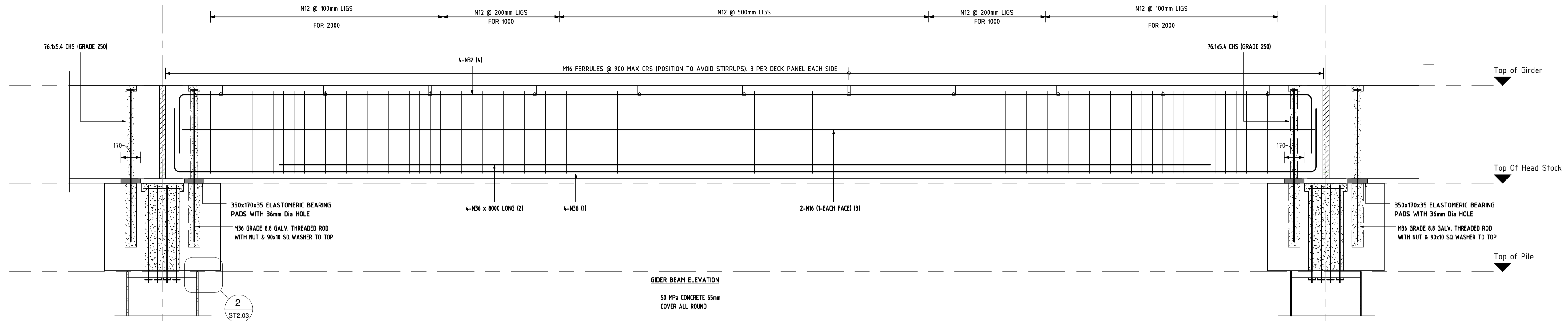
Project: **CLUMP POINT JETTY REPLACEMENT**

Title: **TYPICAL SUPPORT SECTIONS**

Design	AJF	Drawn	JBG
Checked	AJF	Date	NOV '12
RPEQ No.	4683	Datum	-

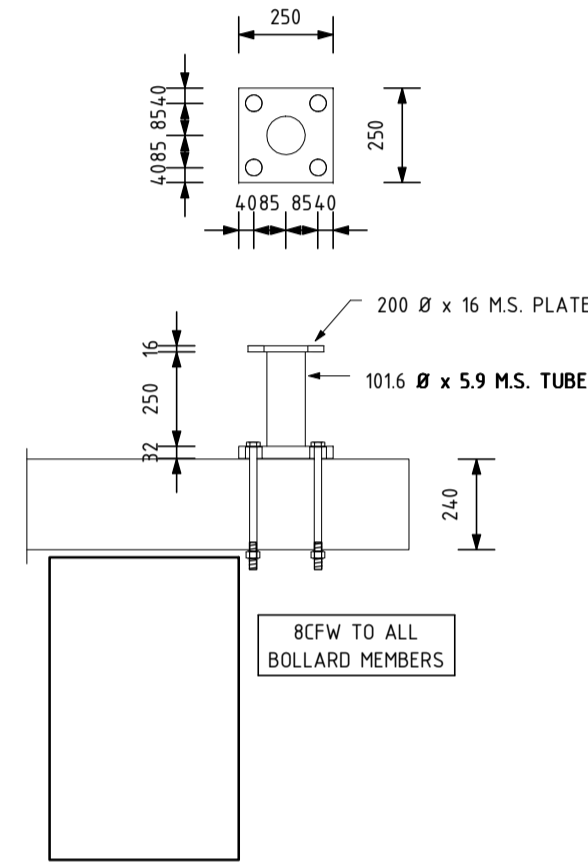
Job Number:	T12-058	Drawing No.	ST2.02	Revision	3
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CONSTRUCTION

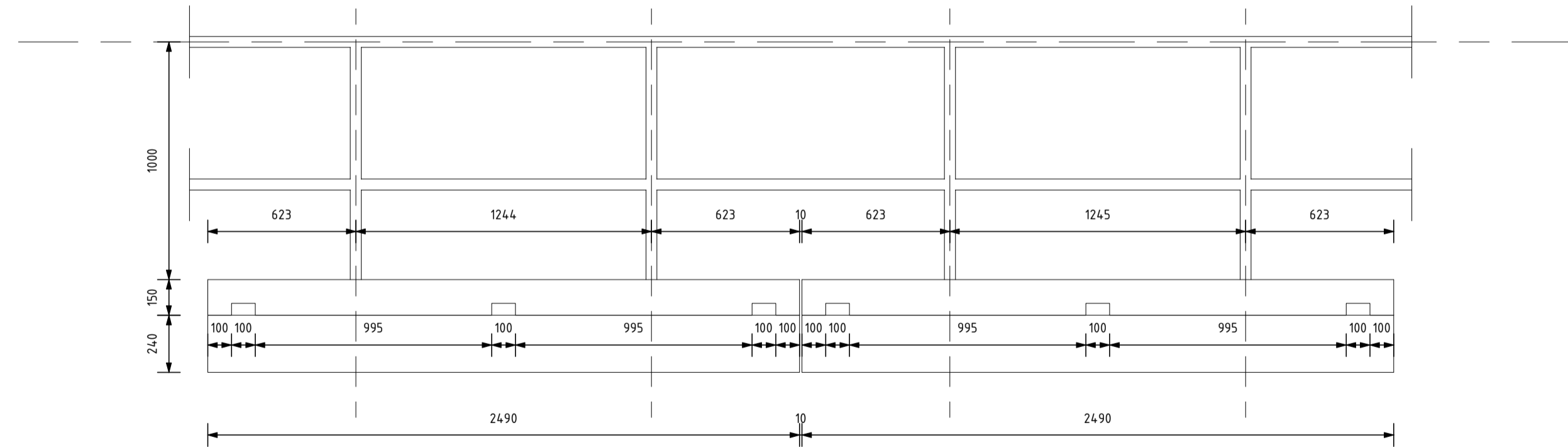


BEARING PLATE DETAIL

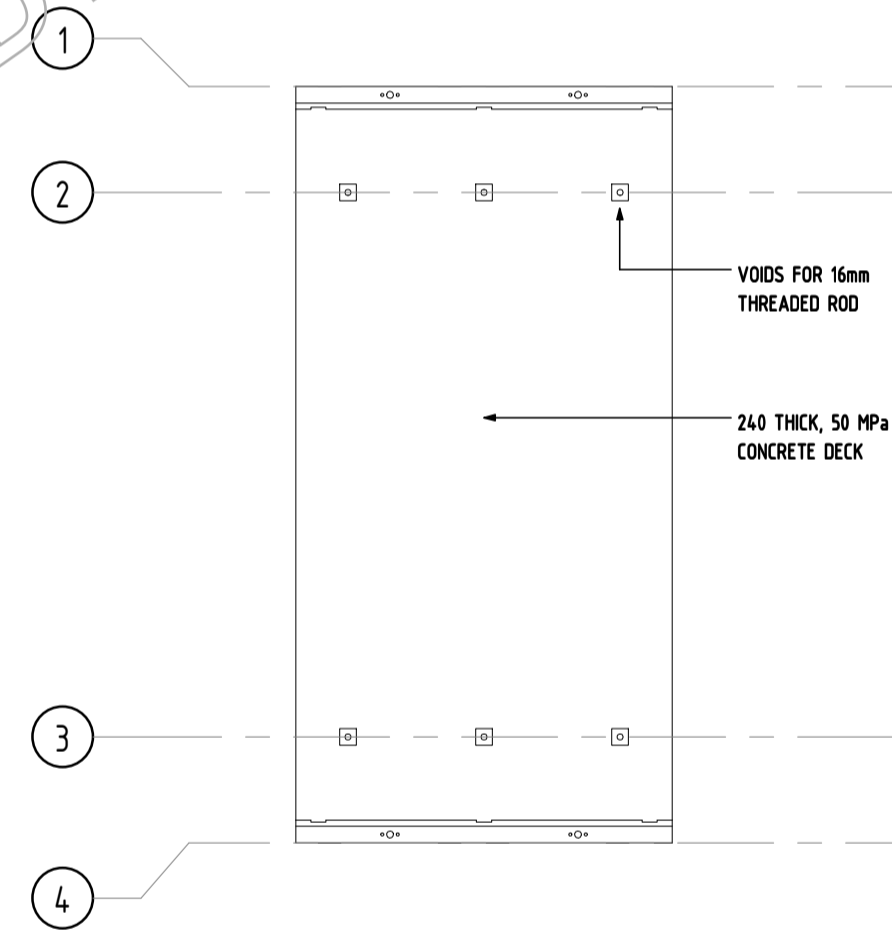
DETAIL 2
1:5 ST2.03



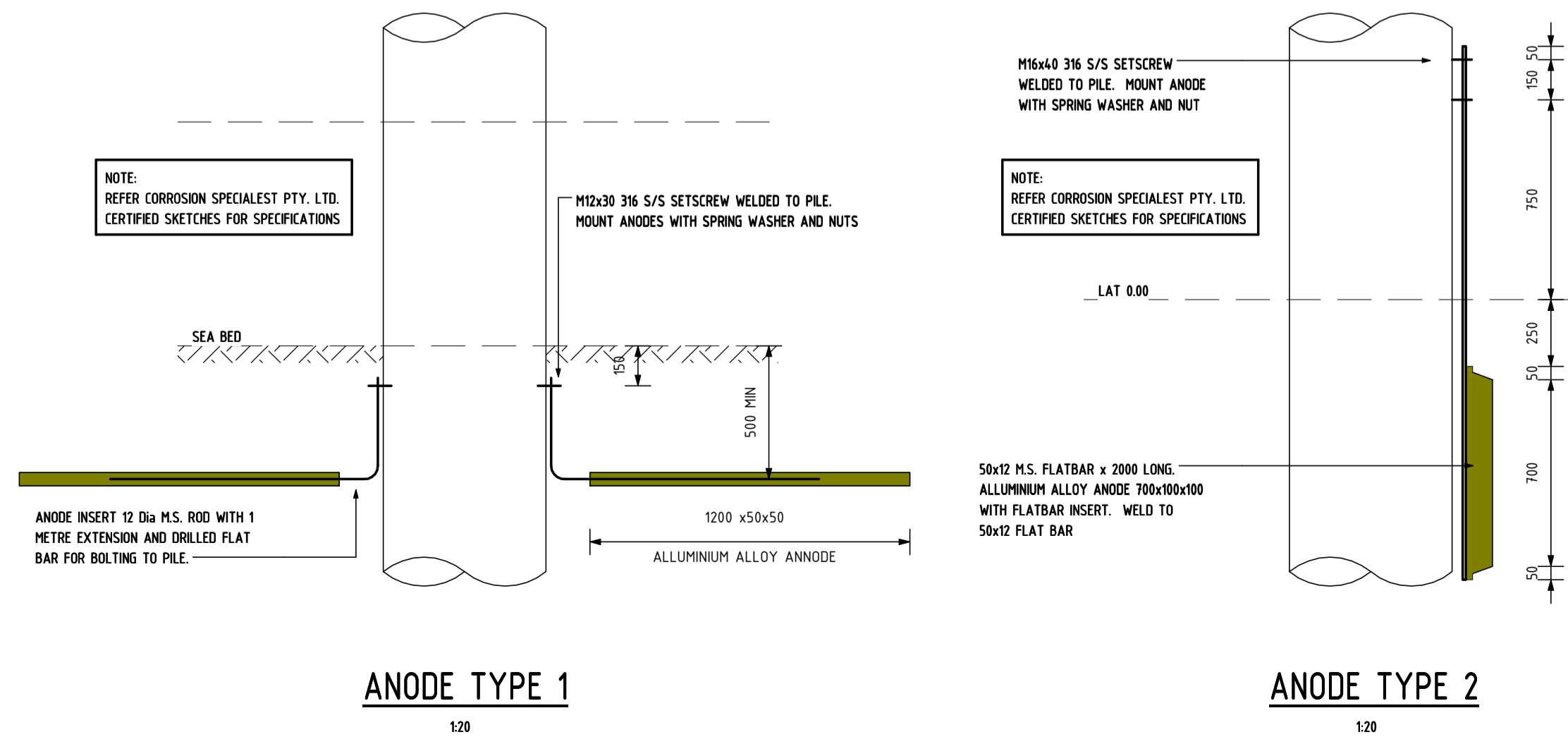
TYPICAL BOLLARD SECTION
1:20



TYPICAL HANDRAIL DETAIL
1:20



TYPICAL DETAIL
DECK UNIT
1:50



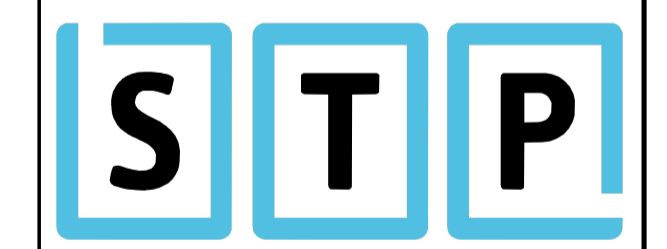
ANODE TYPE 1
1:20

ANODE TYPE 2
1:20

Released under RTI - DTMR

Rev	Description	By	Appd	Date
3	REVISED CONSTRUCTION	JBG	AJF	25.02.13
2	CONSTRUCTION ISSUE	JBG	AJF	8.02.13
1	CONSTRUCTION ISSUE	JBG	AJF	25.01.13
E	APPROVAL ISSUE	JBG	AJF	16.11.12
D	PRELIMINARY ISSUE	JBG	AJF	13.11.12
C	FOR APPROVAL	JBG	AJF	21.09.12
B	TENDER ISSUE	JBG	AJF	30.06.12
A	PRELIMINARY ISSUE	JBG	AJF	12.06.12

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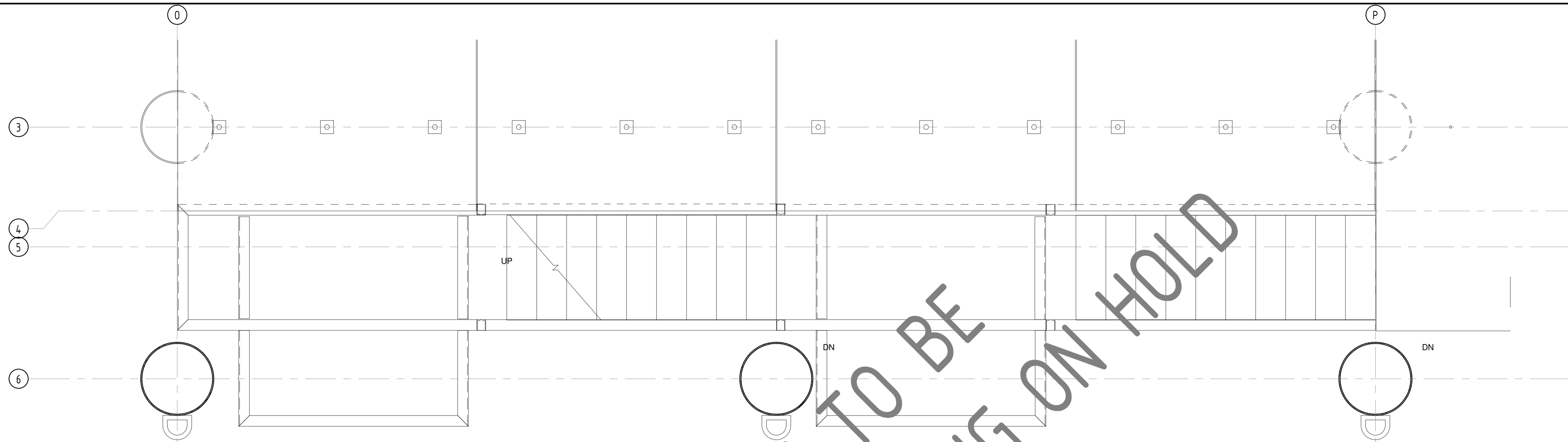
Client:
CIVIL PLUS CONSTRUCTIONS
 Project:
CLUMP POINT JETTY REPLACEMENT

Title:
DETAILS

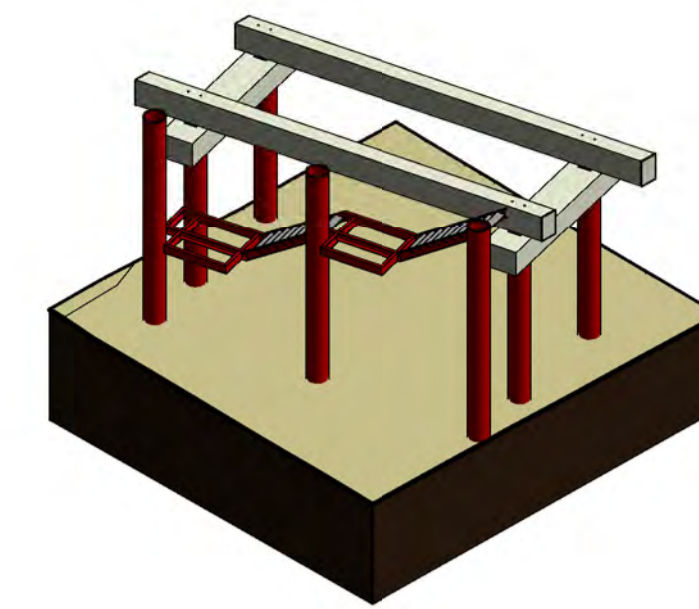
Design	Designer	Drawn	Author
Checked	Checker	Date	NOV '12
RPEU No.	Approver	Datum	-

Job Number:	Drawing No.	Revision
T12-058	ST2.03	3

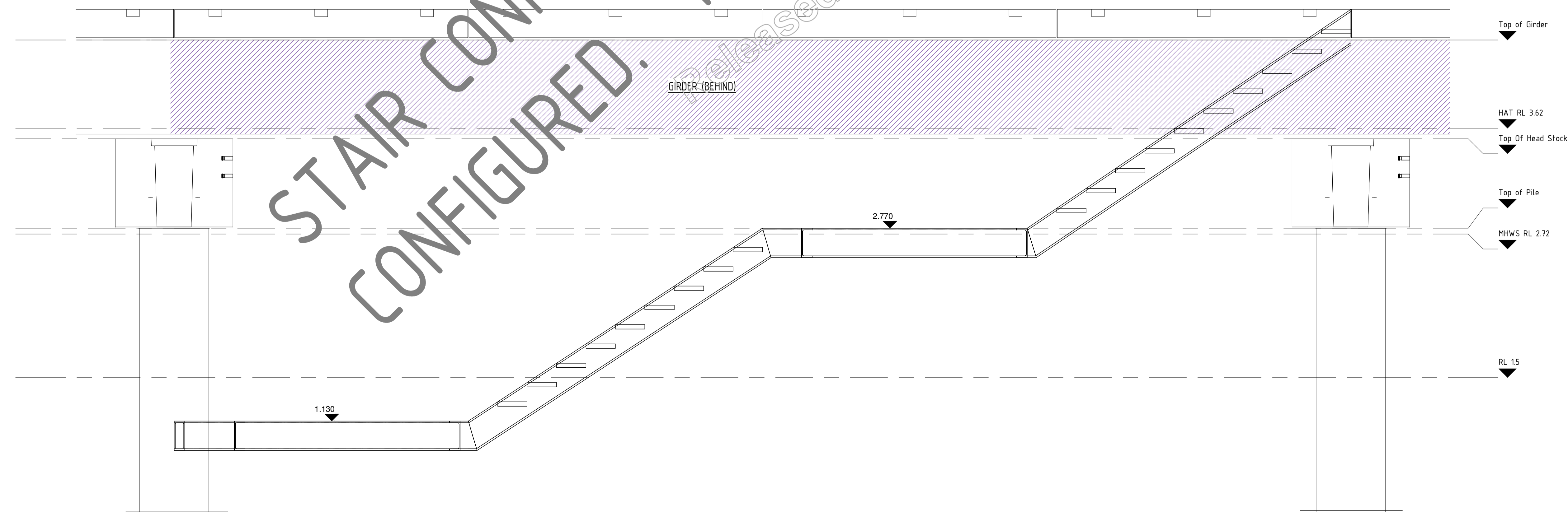
CONSTRUCTION



STAIR LAYOUT PLAN
1:20



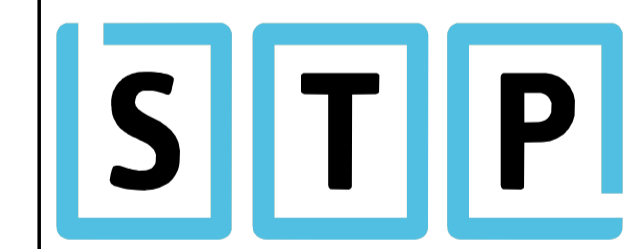
STAIR CONFIGURATION TO BE CONFIGURED. THIS DRAWING ON HOLD



TYPICAL STAIR SECTION
1:20

Rev	Description	By	Appd	Date
3	CONSTRUCTION ISSUE	JBG	AJF	8.02.13
2	REVISED CONSTRUCTION	JBG	AJF	30.01.13
1	CONSTRUCTION ISSUE	JBG	AJF	25.01.13
E	APPROVAL ISSUE	JBG	AJF	16.11.12
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B	TENDER ISSUE	JBG	AJF	30.06.12
A	PRELIMINARY ISSUE	JBG	AJF	12.06.12

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Client:
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Project:
**CLUMP POINT
JETTY REPLACEMENT**

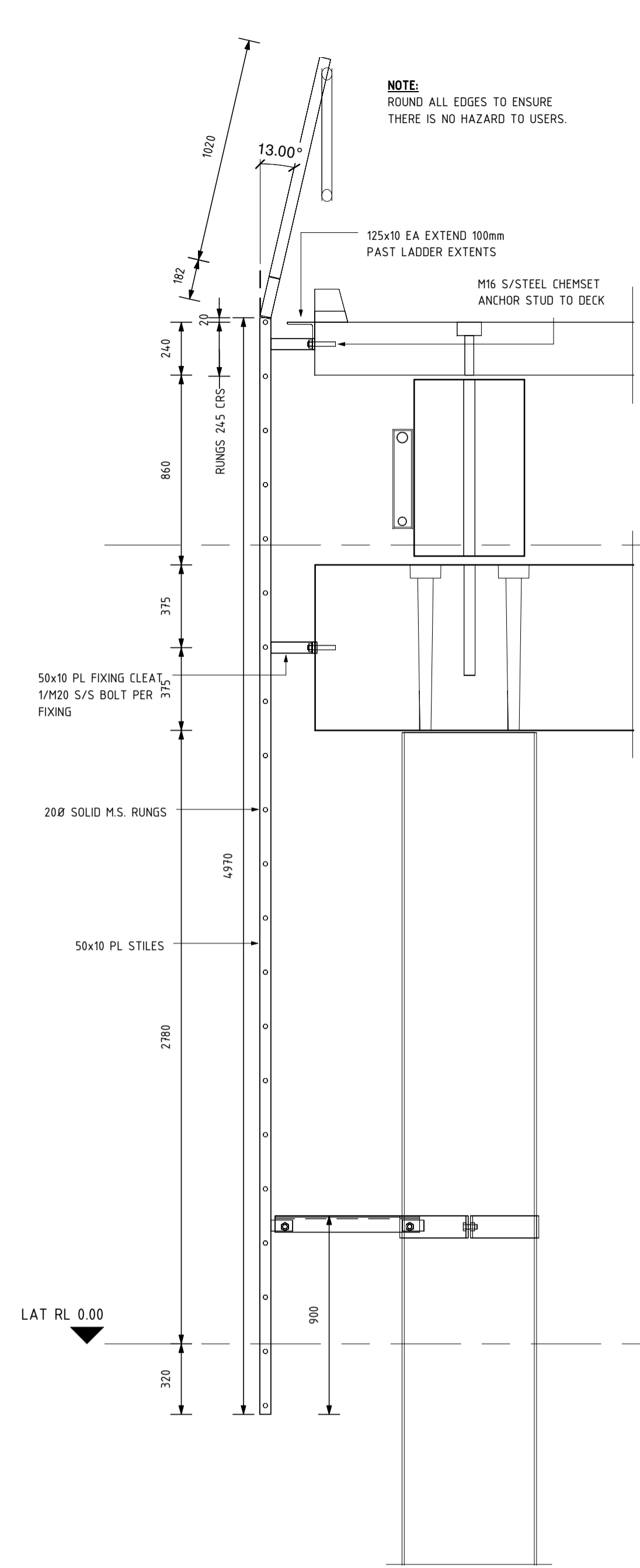
Title:
STAIR DETAILS

Design	Designer	Drawn	Author
Checked	Checker	Date	NOV '12
RPEQ No.	Approver	Datum	-

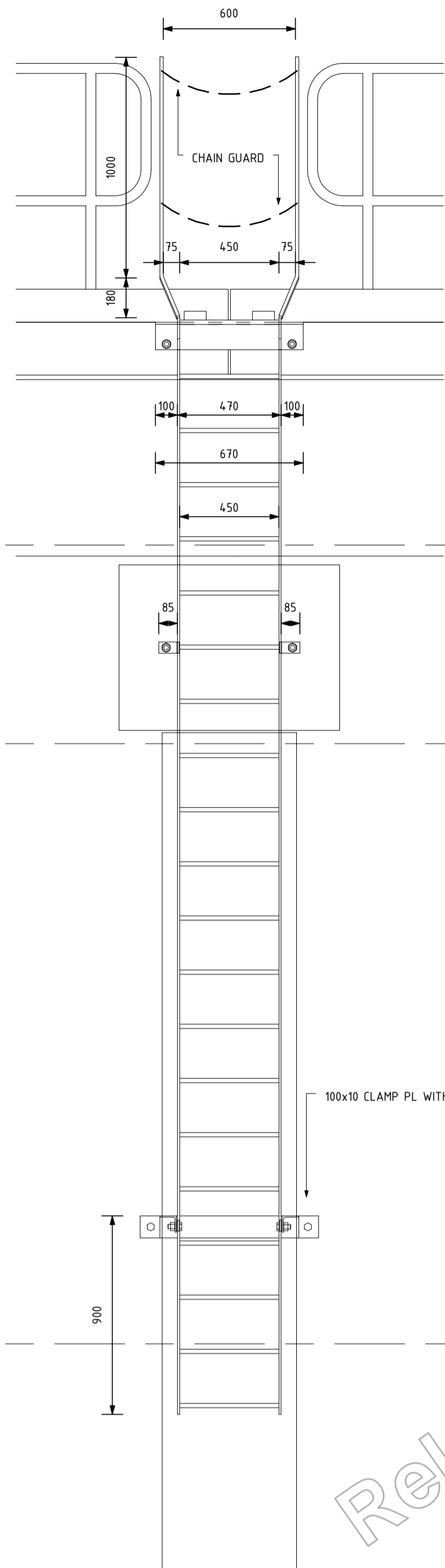
Approved:

Job Number:	Drawing No.	Revision
T12-058	ST2.04	3

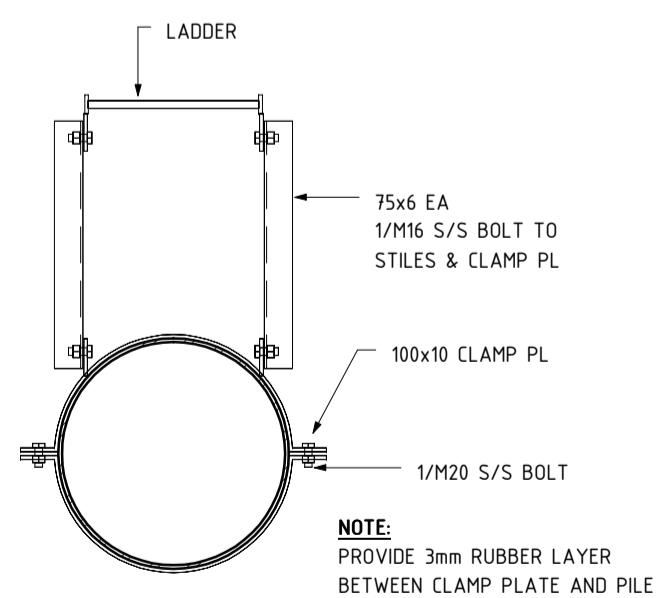
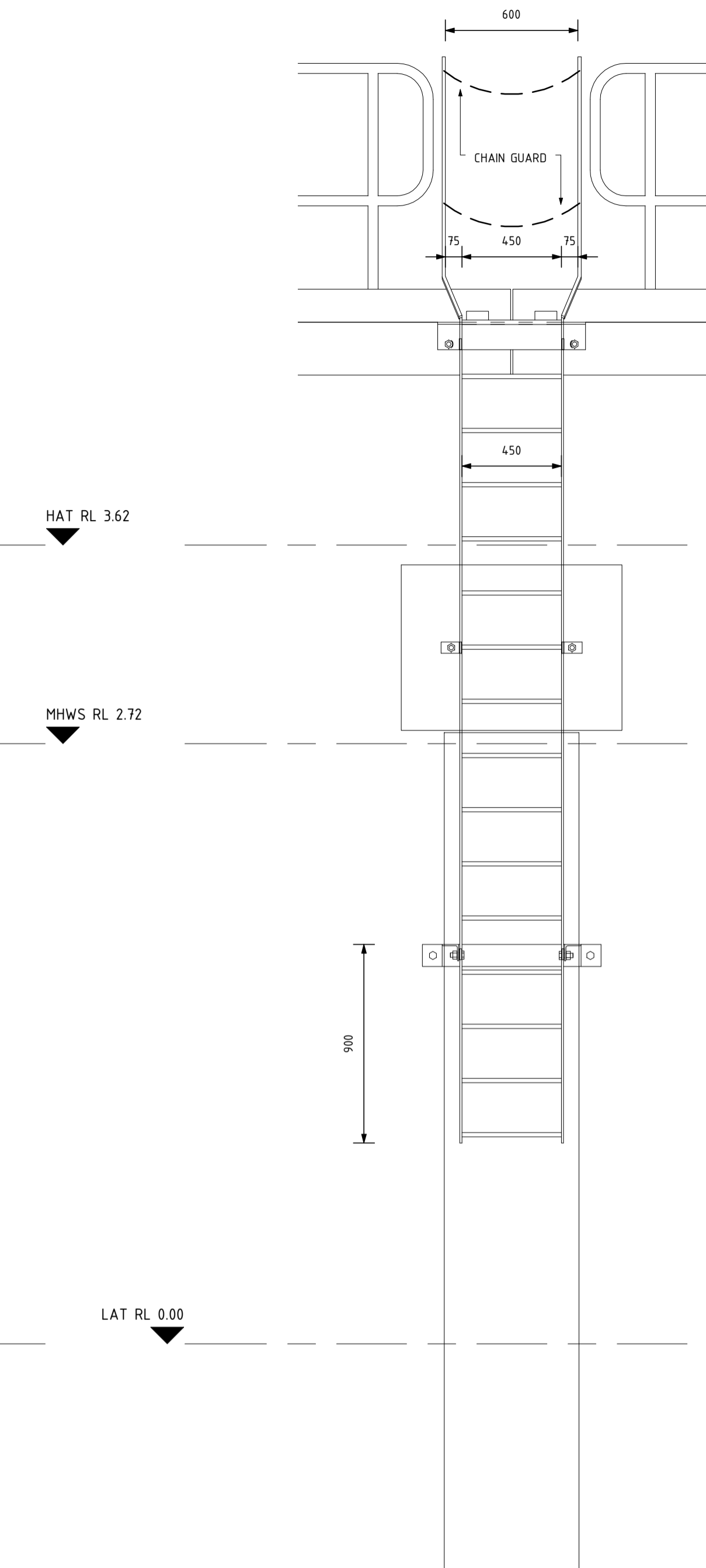
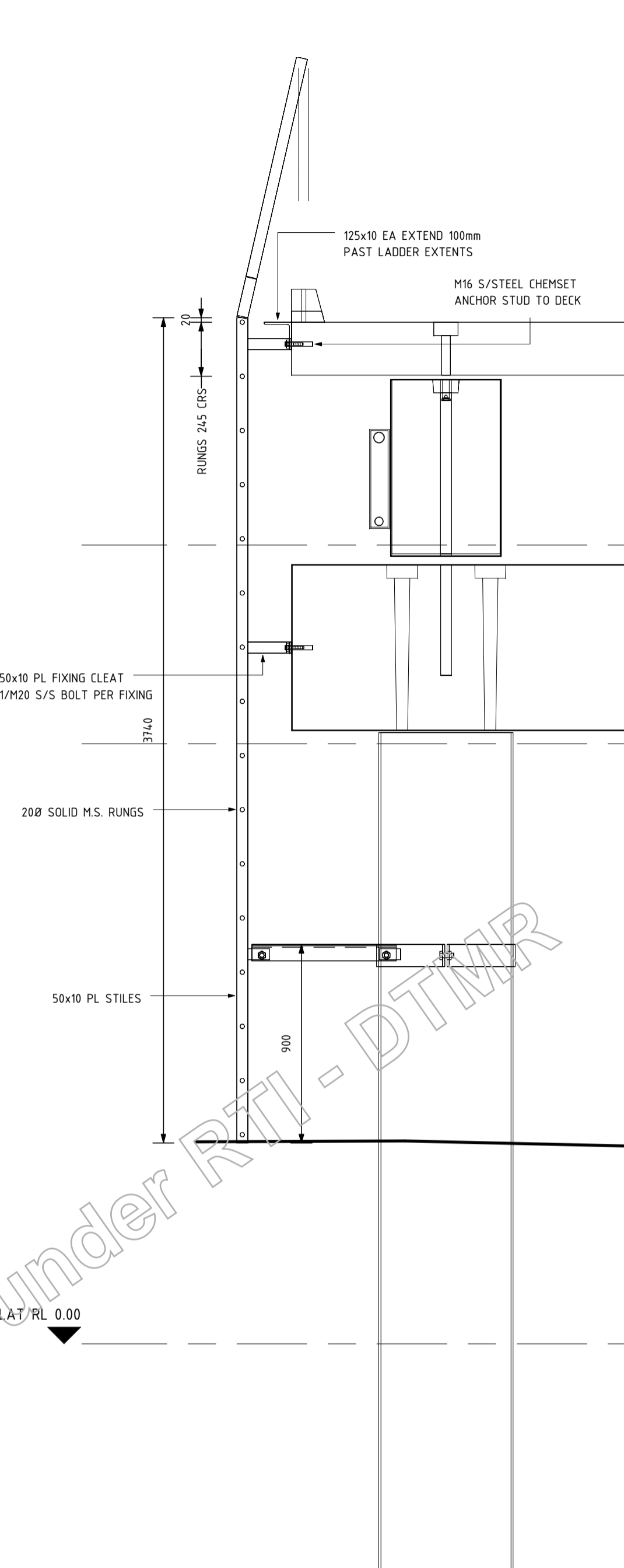
CONSTRUCTION



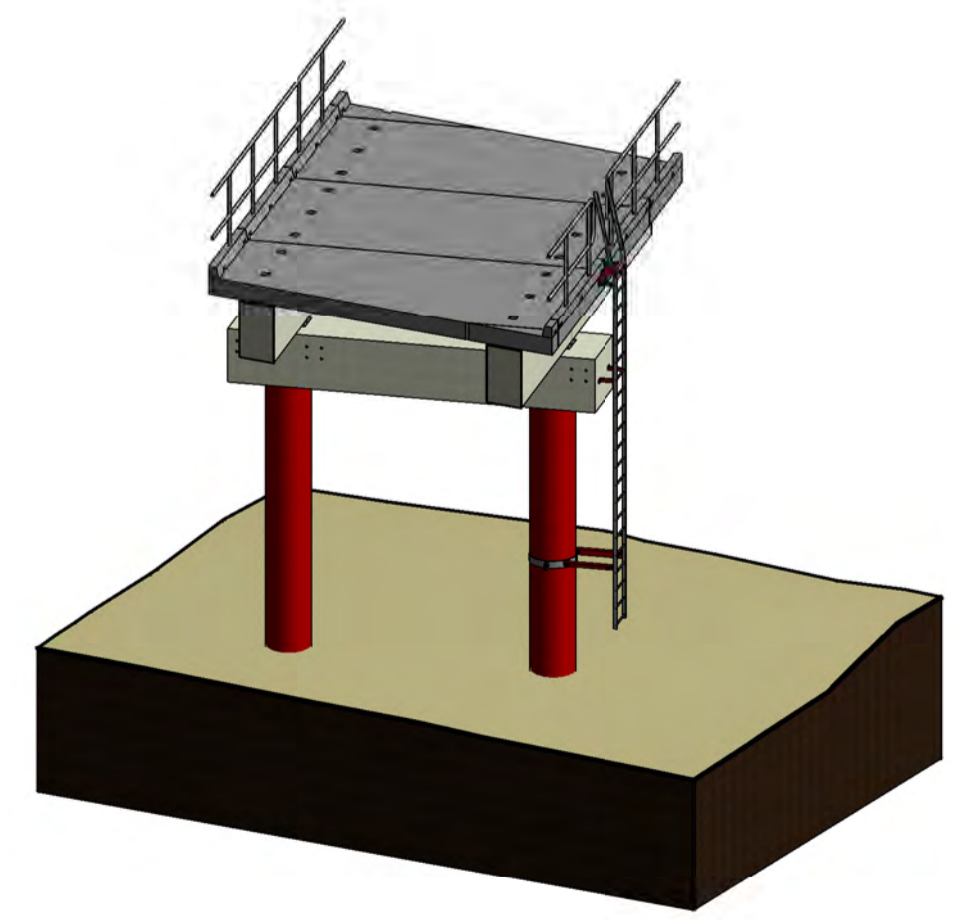
LADDER TYPE 1
1: 20



LADDER TYPE 2
1: 20



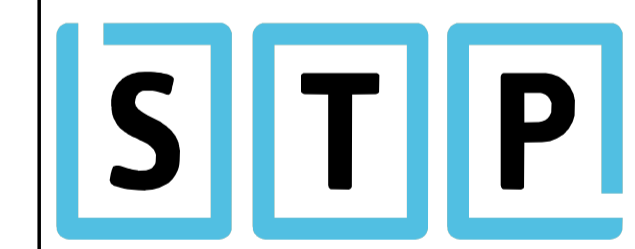
LADDER CLAMP PLATE
1: 20



Released under RTI - DTMR

Rev	Description	By	Appd	Date
2	REVISED CONSTRUCTION	JBG	AJF	25.02.13
1	REVISED CONSTRUCTION	JBG	AJF	18.02.13
B	FOR APPROVAL	JBG	AJF	13.02.13
A	FOR APPROVAL	JBG	AJF	12.02.13

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Client:
CIVIL PLUS CONSTRUCTIONS

Project:
**CLUMP POINT
JETTY REPLACEMENT**

Title:
LADDERS

Design	Designer	Drawn	Author
Checked	Checker	Date	NOV '12
RPEQ No.	Approver	Datum	-

Approved:

Job Number:	Drawing No.	Revision
T12-058	ST2.05	2

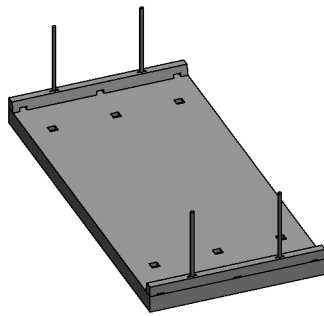
CONSTRUCTION

CENTROID
 X - 2500
 Y - 1245

LEGEND

25 DENOTES SWIFT LIFT 2.5 TONNE x 90mm SHORT FOOT ANCHOR. MINIMUM 20MPa CONCRETE STRENGTH AT LIFT

13 DENOTES SWIFT LIFT 1.3 TONNE x 85mm SHORT FOOT ANCHOR. MINIMUM 15MPa CONCRETE STRENGTH AT LIFT

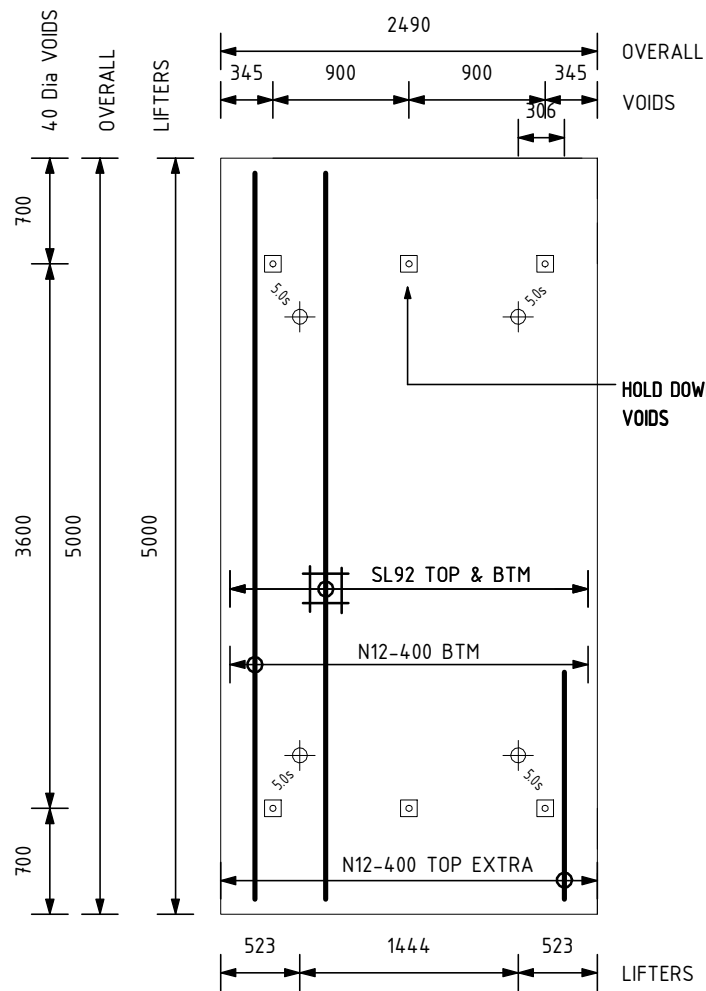


TYPICAL CONFIGURATION
 NTS

5.0 DENOTES SWIFT LIFT 5.0 TONNE x 240mm ANCHOR. MINIMUM 20MPa CONCRETE STRENGTH AT LIFT

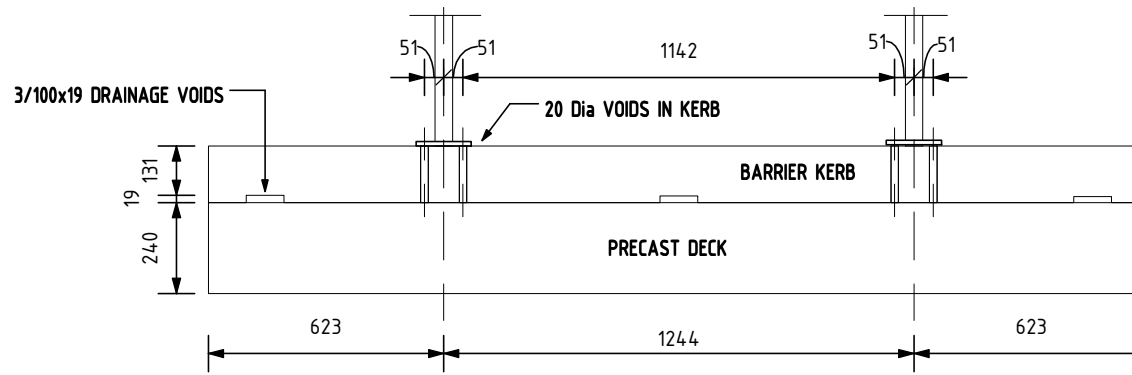
10.0 DENOTES SWIFT LIFT 10.0 TONNE x 340mm ANCHOR. MINIMUM 20MPa CONCRETE STRENGTH AT LIFT

5.0s DENOTES SWIFT LIFT 5.0 TONNE x 120mm SHORT FOOT ANCHOR. MINIMUM 20MPa CONCRETE STRENGTH AT LIFT



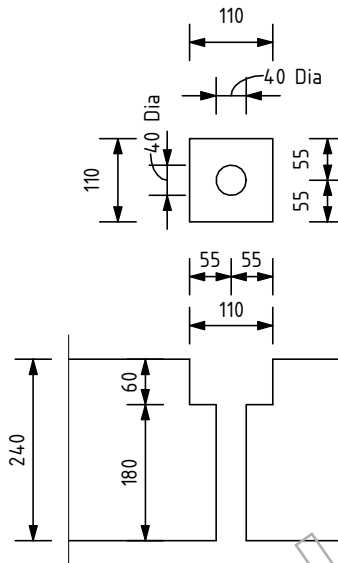
PANEL PLAN

1 : 50



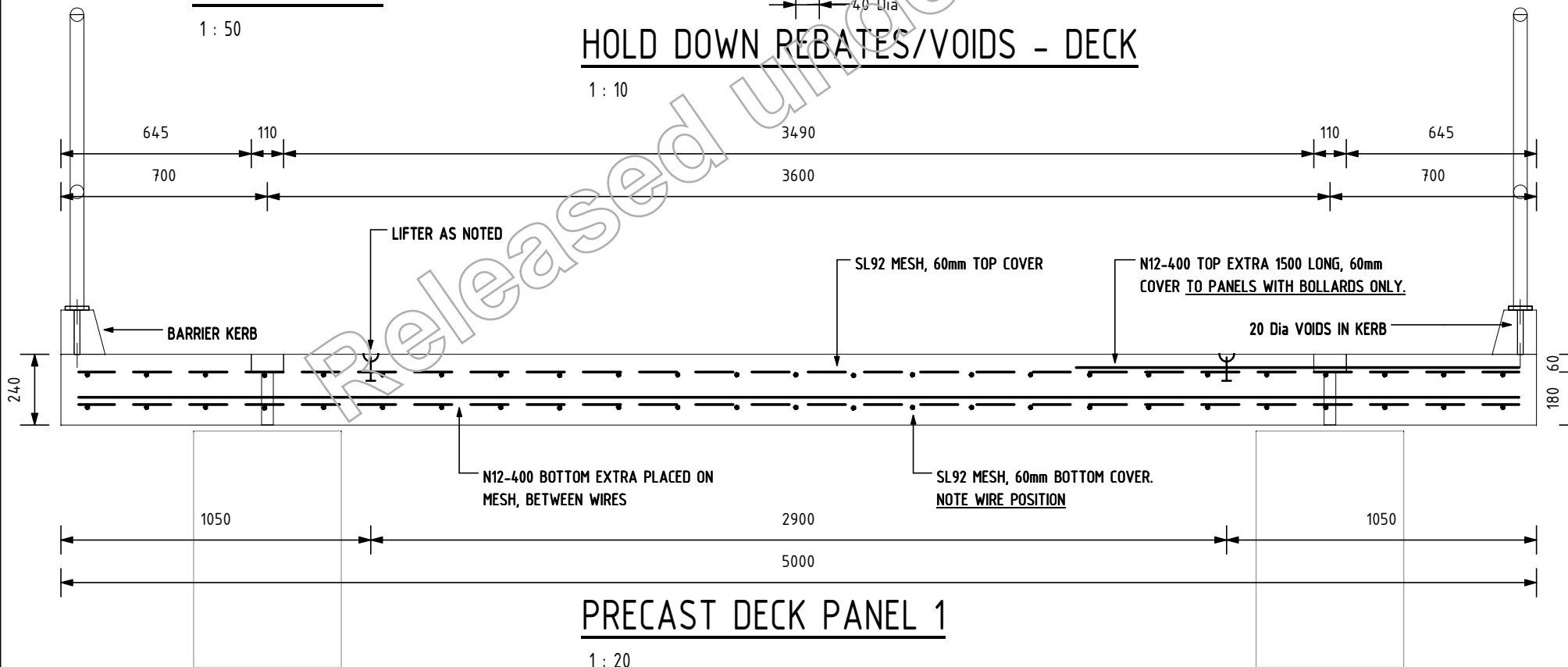
TYPICAL END ELEVATIONS

1 : 20



HOLD DOWN REBATES/VOIDS - DECK

1 : 10



PRECAST DECK PANEL 1

1 : 20

INSTALL REINFORCEMENT	CHECKED REINFORCEMENT
AS NOTED	
ALTERNATIVE REINF.	ALTERNATIVE REINF.
ADDITIONAL REINFORCEMENT	ADDITIONAL REINFORCEMENT
PERIMETER BARS	PERIMETER BARS
MIN. CONCRETE COVER	MIN. CONCRETE COVER
60mm	
f _{ct} (@ LIFT)	f _{ct} (@ LIFT)
20 MPa	
f' _c	f' _c
50 MPa	
PANEL THICKNESS	PANEL THICKNESS
AS NOTED	
AREA SQUARE METERS	AREA SQUARE METERS
12.45	
VOLUME CUBIC METERS	VOLUME CUBIC METERS
2.99	
WEIGHT - TONNES	WEIGHT - TONNES
7.47	
EDGE LIFTS	EDGE LIFTS
2.5x90 - 1.3x85-	
FACE LIFTS	FACE LIFTS
2.5x90 - 1.3x85- 5.0x240- 10.0x340- 5.0x120- 4	2.5x90 - 1.3x85- 5.0x240- 10.0x340- 5.0x120-
REID REBATED FERRULES	REID REBATED FERRULES
RB12 RI - RB16 RI - RB20 RI -	RB12 RI - RB16 RI - RB20 RI -
REID THREADED FERRULES	REID THREADED FERRULES
RB12 TI - RB16 TI - RB20 TI - RB24 TI -	RB12 TI - RB16 TI - RB20 TI - RB24 TI -
COUPLER & REIDBAR	COUPLER & REIDBAR
RB20C -	RB20C -
PVC SLEEVE	PVC SLEEVE
TOP -	TOP -
50mm GROUT TUBE	50mm GROUT TUBE
BTM -	BTM -
REBATES (mm)	REBATES (mm)
-	
PROP TYPE	PROP TYPE
PROP EFFECTIVE LENGTH	PROP EFFECTIVE LENGTH
FERRULES	FERRULES



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Townsville Office
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Client: CIVIL PLUS CONSTRUCTIONS
Project: CLUMP POINT
Title: PRECAST DECK PANEL TYPE 1

Rev	Description	By	Appd	Date	Approved	RPEQ No.
2	REVISED CONSTRUCTION	JBG	AJF	8.03.13	AJF	
1	CONSTRUCTION ISSUE	JBG	AJF	22.01.13	AJF	

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CONSTRUCTION	
Job Number. T12-058	Drawing No. ST3.01
Approved:	Revision 2

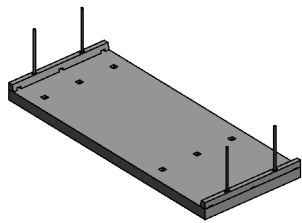
CENTROID

X - 3000
Y - 1245

LEGEND

2.5 DENOTES SWIFT LIFT 2.5 TONNE x 90mm SHORT FOOT ANCHOR. MINIMUM 20MPa CONCRETE STRENGTH AT LIFT

1.3 DENOTES SWIFT LIFT 1.3 TONNE x 85mm SHORT FOOT ANCHOR. MINIMUM 15MPa CONCRETE STRENGTH AT LIFT

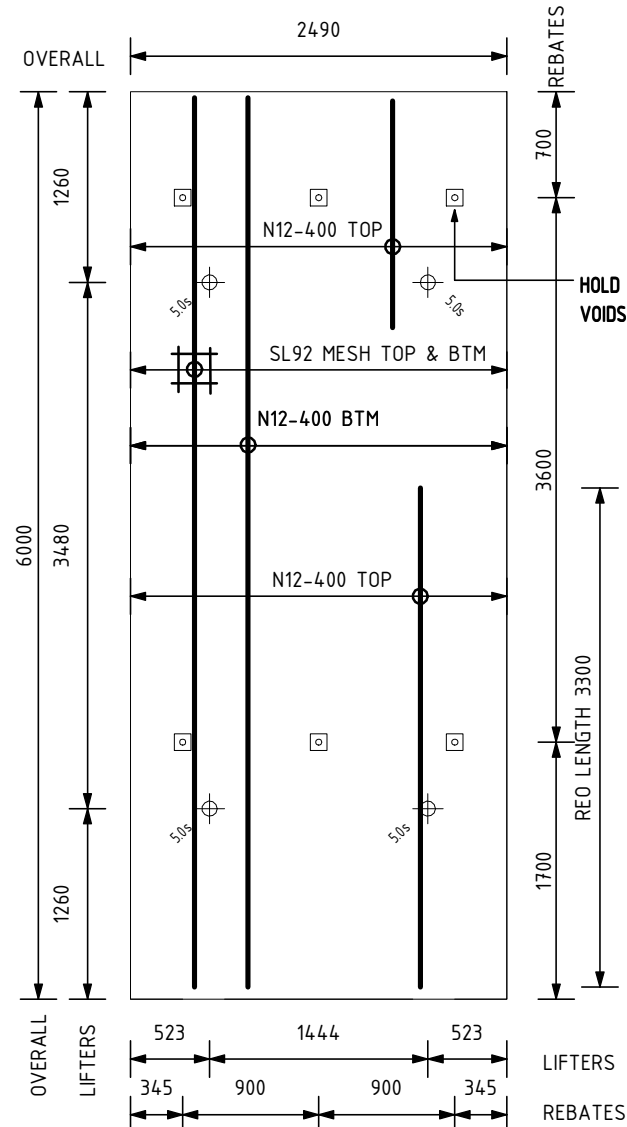


TYPICAL CONFIGURATION
NTS

5.0 DENOTES SWIFT LIFT 5.0 TONNE x 240mm ANCHOR. MINIMUM 20MPa CONCRETE STRENGTH AT LIFT

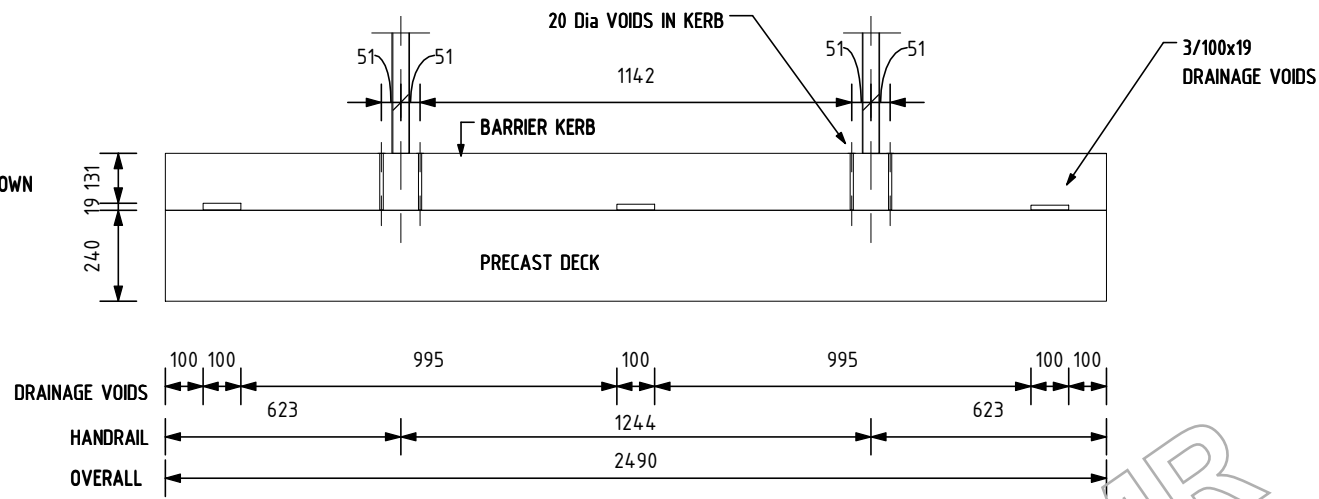
10.0 DENOTES SWIFT LIFT 10.0 TONNE x 340mm ANCHOR. MINIMUM 20MPa CONCRETE STRENGTH AT LIFT

5.0 DENOTES SWIFT LIFT 5.0 TONNE x 120mm SHORT FOOT ANCHOR. MINIMUM 20MPa CONCRETE STRENGTH AT LIFT



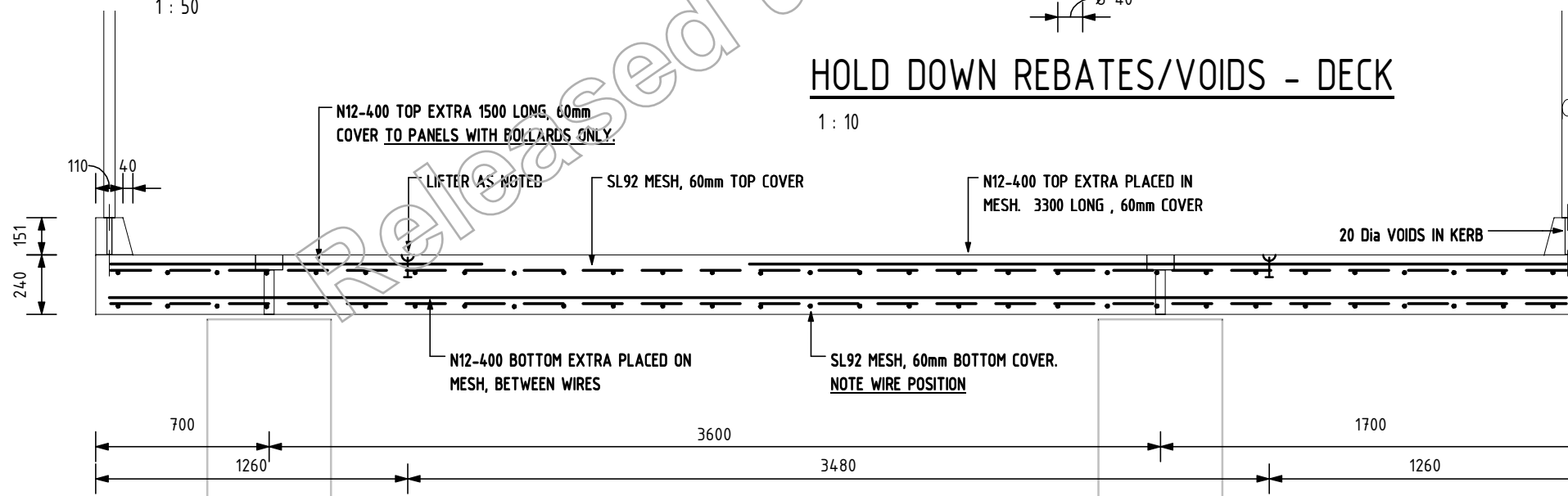
PANEL PLAN

1 : 50



TYPICAL END ELEVATIONS

1 : 20



HOLD DOWN REBATES/VOIDS - DECK

1 : 10

TYPICAL SECTION

1 : 25

INSTALL REINFORCEMENT	CHECKED REINFORCEMENT
AS NOTED	
ALTERNATIVE REINF.	ALTERNATIVE REINF.
ADDITIONAL REINFORCEMENT	ADDITIONAL REINFORCEMENT
PERIMETER BARS	PERIMETER BARS
MIN. CONCRETE COVER	MIN. CONCRETE COVER
60mm	
f _{ct} (@ LIFT)	f _{ct} (@ LIFT)
20 MPa	
f' _c	f' _c
PANEL THICKNESS	PANEL THICKNESS
AS NOTED	
AREA SQUARE METERS	AREA SQUARE METERS
14.94	
VOLUME CUBIC METERS	VOLUME CUBIC METERS
3.586	
WEIGHT - TONNES	WEIGHT - TONNES
8.964	
EDGE LIFTS	EDGE LIFTS
2.5x90 - 1.3x85-	
FACE LIFTS	FACE LIFTS
2.5x90 - 1.3x85- 5.0x240- 10.0x340- 5.0x120- 4	2.5x90 - 1.3x85- 5.0x240- 10.0x340- 5.0x120-
REID REBATED FERRULES	REID REBATED FERRULES
RB12 RI - RB16 RI - RB20 RI -	RB12 RI - RB16 RI - RB20 RI -
REID THREADED FERRULES	REID THREADED FERRULES
RB12 TI - RB16 TI - RB20 TI - RB24 TI -	RB12 TI - RB16 TI - RB20 TI - RB24 TI -
COUPLER & REIDBAR	COUPLER & REIDBAR
RB20C -	RB20C -
PVC SLEEVE	PVC SLEEVE
TOP -	TOP -
50mm GROUT TUBE	50mm GROUT TUBE
BTM -	BTM -
REBATES (mm)	REBATES (mm)
-	
PROP TYPE	PROP TYPE
PROP EFFECTIVE LENGTH	PROP EFFECTIVE LENGTH
FERRULES	FERRULES



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Client: CIVIL PLUS CONSTRUCTIONS
Project: CLUMP POINT
Title: PRECAST DECK PANEL TYPE 2

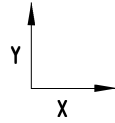
Rev	Description	By	Appd	Date	Approved	RPEQ No.
3	REVISED CONSTRUCTION	JBG	AJF	8.03.13	AJF	
2	REVISED CONSTRUCTION	JBG	AJF	27.02.13	JBG	
1	REVISED CONSTRUCTION	JBG	AJF	18.02.13	AJF	

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CONSTRUCTION	
Job Number: T12-058	Drawing No. ST3.02
Approved:	Revision 3

CENTROID

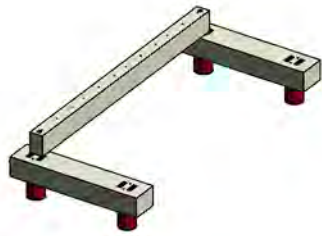
X - 4990
Y - 245



LEGEND

25 DENOTES SWIFT LIFT 2.5 TONNE x 90mm SHORT FOOT ANCHOR. MINIMUM 20MPa CONCRETE STRENGTH AT LIFT

13 DENOTES SWIFT LIFT 1.3 TONNE x 85mm SHORT FOOT ANCHOR. MINIMUM 15MPa CONCRETE STRENGTH AT LIFT

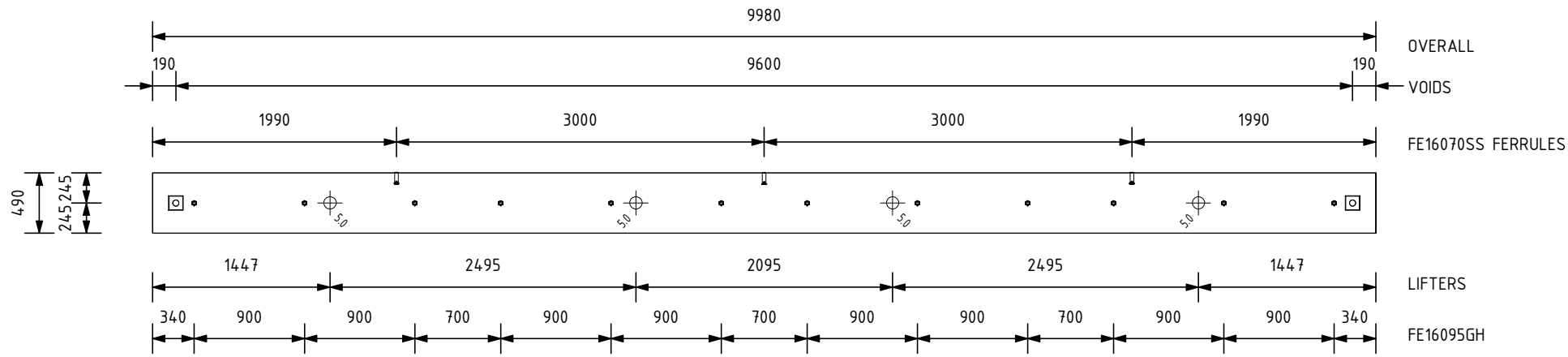


TYPICAL CONFIGURATION
NTS

5.0 DENOTES SWIFT LIFT 5.0 TONNE x 240mm ANCHOR. MINIMUM 20MPa CONCRETE STRENGTH AT LIFT

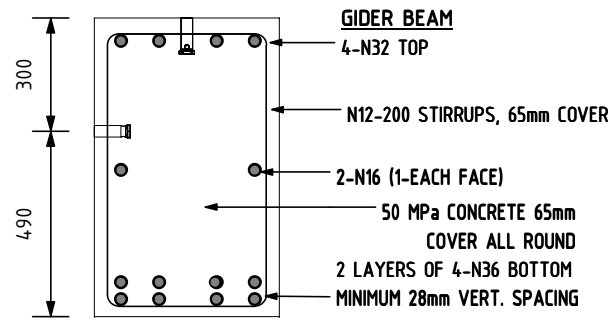
10.0 DENOTES SWIFTLIFT 10.0 TONNE x 340mm ANCHOR. MINIMUM 20MPa CONCRETE STRENGTH AT LIFT

5.0s DENOTES SWIFT LIFT 5.0 TONNE x 120mm SHORT FOOT ANCHOR. MINIMUM 20MPa CONCRETE STRENGTH AT LIFT



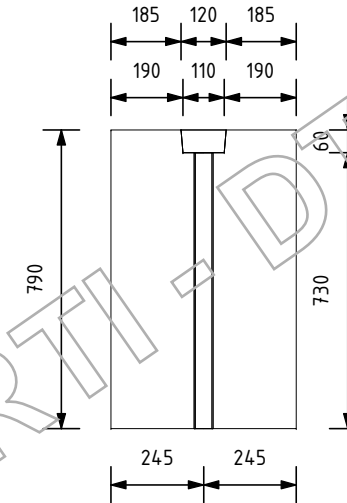
PRECAST GIRDER BEAM TYPE 2

1 : 50



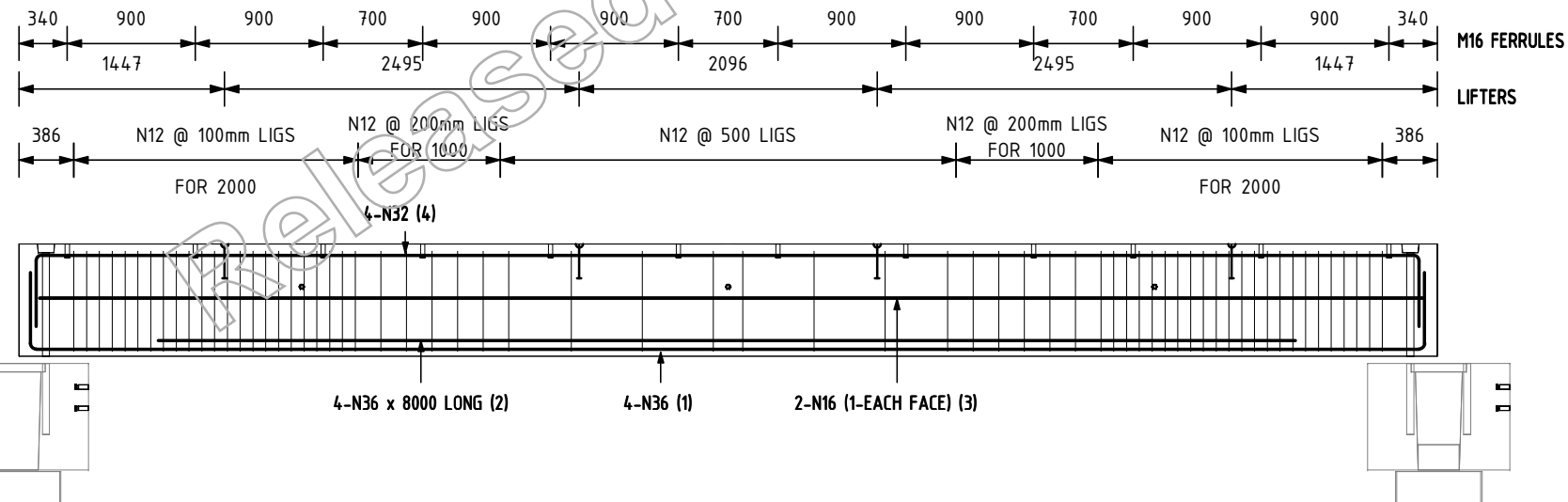
PRECAST GIRDER BEAM SECTION

1 : 20



HOLD DOWN VOID DIMENSIONS

1 : 20



PRECAST GIRDER BEAM ELEVATION

1 : 50

INSTALL REINFORCEMENT	CHECKED REINFORCEMENT
AS NOTED	
ALTERNATIVE REINF.	ALTERNATIVE REINF.
ADDITIONAL REINFORCEMENT	ADDITIONAL REINFORCEMENT
PERIMETER BARS	PERIMETER BARS
MIN. CONCRETE COVER	MIN. CONCRETE COVER
65mm	
fct (@ LIFT)	fct (@ LIFT)
20 MPa	
f'c	f'c
50 MPa	
PANEL THICKNESS	PANEL THICKNESS
AS NOTED	
AREA SQUARE METERS	AREA SQUARE METERS
0.387	
VOLUME CUBIC METERS	VOLUME CUBIC METERS
3.86	
WEIGHT - TONNES	WEIGHT - TONNES
9.66	
EDGE LIFTS	EDGE LIFTS
2.5x90 - 1.3x85-	
FACE LIFTS	FACE LIFTS
2.5x90 - 1.3x85- 5.0x240- 4 10.0x340- 5.0x120-	2.5x90 - 1.3x85- 5.0x240- 10.0x340- 5.0x120-
REID REBATED FERRULES	REID REBATED FERRULES
RB12 RI - RB16 RI - RB20 RI -	RB12 RI - RB16 RI - RB20 RI -
REID THREADED FERRULES	REID THREADED FERRULES
RB12 TI - RB16 TI - RB20 TI - RB24 TI -	RB12 TI - RB16 TI - RB20 TI - RB24 TI -
COUPLER & REIDBAR	COUPLER & REIDBAR
RB20C -	RB20C -
PVC SLEEVE	PVC SLEEVE
TOP -	TOP -
50mm GROUT TUBE	50mm GROUT TUBE
BTM -	BTM -
REBATES (mm)	REBATES (mm)
-	
PROP TYPE	PROP TYPE
PROP EFFECTIVE LENGTH	PROP EFFECTIVE LENGTH
FERRULES	FERRULES
FE16095GH - 12 FE16070SS - 3	FE16095GH - FE16070SS -



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Client: CIVIL PLUS CONSTRUCTIONS
Project: CLUMP POINT
Title: PRECAST GIRDER BEAM TYPE 1

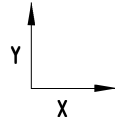
Rev	Description	By	Appd	Date	Approved	RPEQ No.
3	REVISED CONSTRUCTION	JBG	AJF	18.02.13	AJF	
2	REVISED CONSTRUCTION	JBG	AJF	1.02.13	JBG	
1	CONSTRUCTION ISSUE	JBG	AJF	22.01.13	AJF	

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CONSTRUCTION	
Job Number. T12-058	Drawing No. ST3.05
Approved:	Revision 3

CENTROID

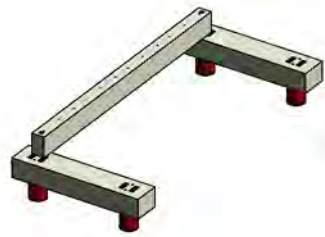
X - 4990
Y - 245



LEGEND

2.5 DENOTES SWIFT LIFT 2.5 TONNE x 90mm SHORT FOOT ANCHOR. MINIMUM 20MPa CONCRETE STRENGTH AT LIFT

1.3 DENOTES SWIFT LIFT 1.3 TONNE x 85mm SHORT FOOT ANCHOR. MINIMUM 15MPa CONCRETE STRENGTH AT LIFT

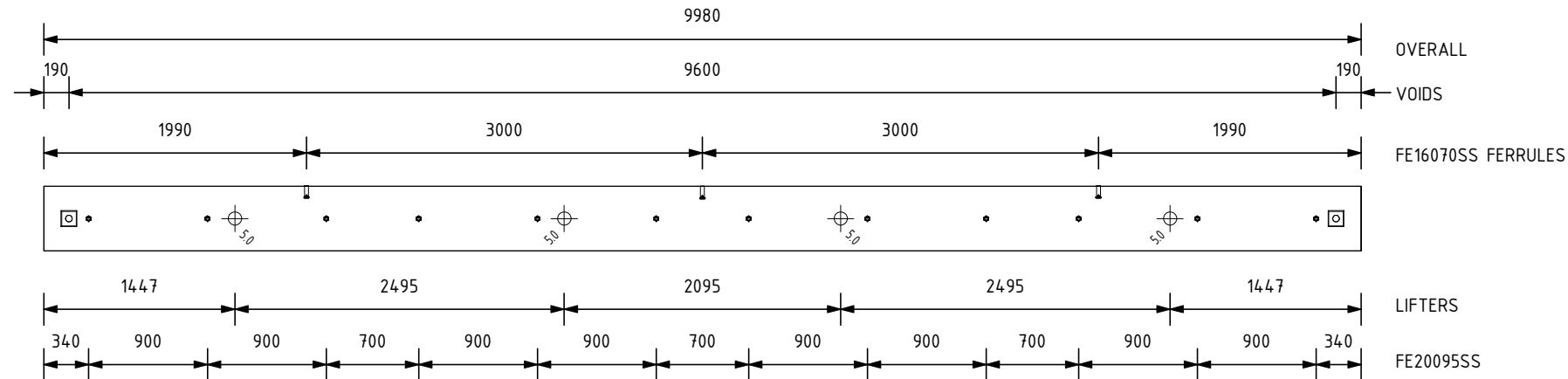


TYPICAL CONFIGURATION
NTS

5.0 DENOTES SWIFT LIFT 5.0 TONNE x 240mm ANCHOR. MINIMUM 20MPa CONCRETE STRENGTH AT LIFT

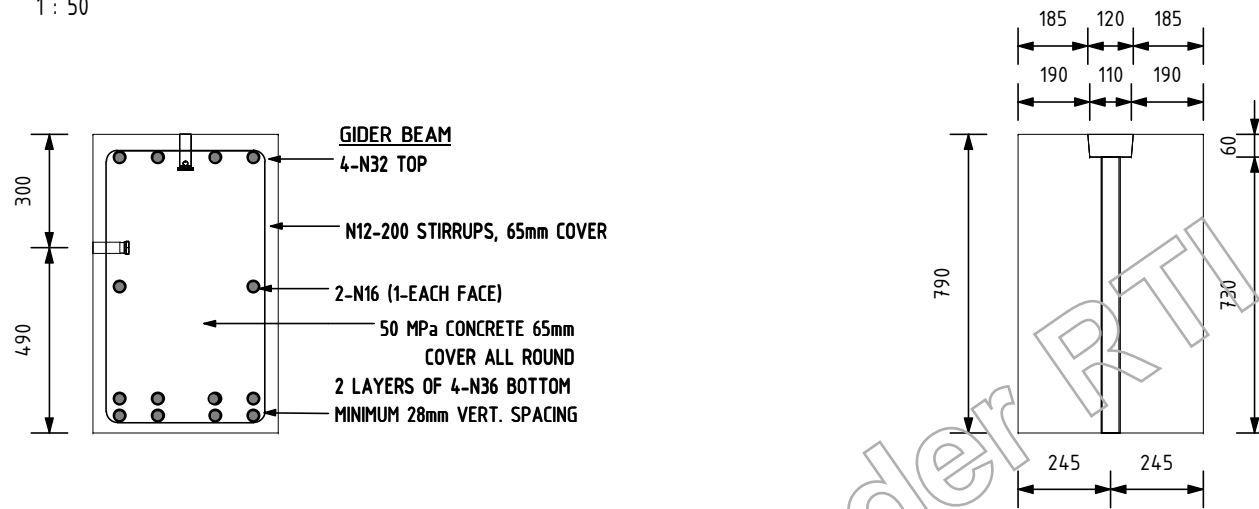
10.0 DENOTES SWIFT LIFT 10.0 TONNE x 340mm ANCHOR. MINIMUM 20MPa CONCRETE STRENGTH AT LIFT

5.0s DENOTES SWIFT LIFT 5.0 TONNE x 120mm SHORT FOOT ANCHOR. MINIMUM 20MPa CONCRETE STRENGTH AT LIFT



PRECAST GIRDER BEAM TYPE 1a

1 : 50

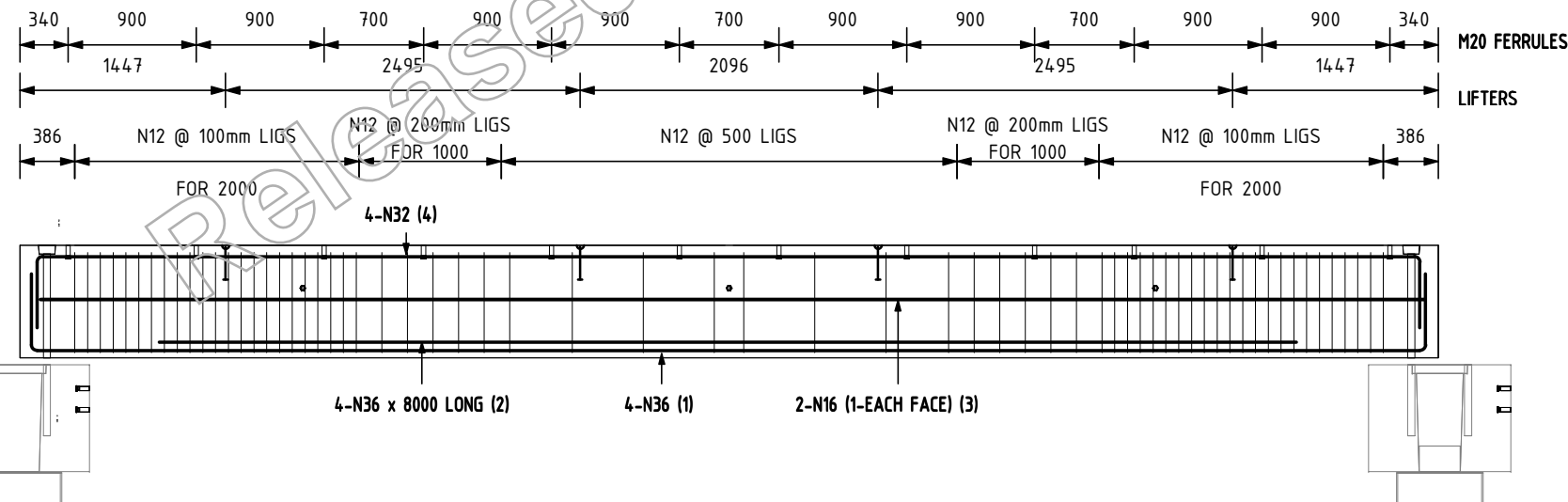


PRECAST GIRDER BEAM SECTION

1 : 20

HOLD DOWN VOID DIMENSIONS

1 : 20



INSTALL REINFORCEMENT	CHECKED REINFORCEMENT
AS NOTED	
ALTERNATIVE REINF.	ALTERNATIVE REINF.
ADDITIONAL REINFORCEMENT	ADDITIONAL REINFORCEMENT
PERIMETER BARS	PERIMETER BARS
MIN. CONCRETE COVER	MIN. CONCRETE COVER
65mm	
f _{ct} (@ LIFT)	f _{ct} (@ LIFT)
20 MPa	
f _c	f _c
50 MPa	
PANEL THICKNESS	PANEL THICKNESS
AS NOTED	
AREA SQUARE METERS	AREA SQUARE METERS
0.387	
VOLUME CUBIC METERS	VOLUME CUBIC METERS
3.86	
WEIGHT - TONNES	WEIGHT - TONNES
9.66	
EDGE LIFTS	EDGE LIFTS
2.5x90 - 1.3x85-	
FACE LIFTS	FACE LIFTS
2.5x90 - 1.3x85- 5.0x240- 4 10.0x340- 5.0x120-	2.5x90 - 1.3x85- 5.0x240- 10.0x340- 5.0x120-
REID REBATED FERRULES	REID REBATED FERRULES
RB12 RI - RB16 RI - RB20 RI -	RB12 RI - RB16 RI - RB20 RI -
REID THREADED FERRULES	REID THREADED FERRULES
RB12 TI - RB16 TI - RB20 TI - RB24 TI -	RB12 TI - RB16 TI - RB20 TI - RB24 TI -
COUPLER & REIDBAR	COUPLER & REIDBAR
RB20C -	RB20C -
PVC SLEEVE	PVC SLEEVE
TOP -	TOP -
50mm GROUT TUBE	50mm GROUT TUBE
BTM -	BTM -
REBATES (mm)	REBATES (mm)
-	
PROP TYPE	PROP TYPE
PROP EFFECTIVE LENGTH	PROP EFFECTIVE LENGTH
FERRULES	FERRULES
FE20095SS - 12 FE16070SS - 3	FE20095SS - FE16070SS -



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Client: CIVIL PLUS CONSTRUCTIONS
Project: CLUMP POINT
Title: PRECAST GIRDER BEAM TYPE 1a

Rev	Description	By	Appd	Date	Approved	RPEQ No.
1	REVISED CONSTRUCTION	JBG	AJF	8.03.13	AJF	04683

Design: AJF
Drawn: JBG
Date: JAN '13
Checked: AJF
Approved: AJF
RPEQ No. 04683

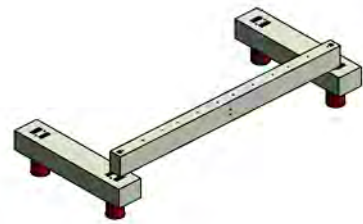
CONSTRUCTION	
Job Number: T12-058	Drawing No. ST3.05a
Approved:	Revision 1

CENTROID
 X - 4990
 Y - 245

LEGEND

2.5 DENOTES SWIFT LIFT 2.5 TONNE x 90mm SHORT FOOT ANCHOR. MINIMUM 20MPa CONCRETE STRENGTH AT LIFT

1.3 DENOTES SWIFT LIFT 1.3 TONNE x 85mm SHORT FOOT ANCHOR. MINIMUM 15MPa CONCRETE STRENGTH AT LIFT

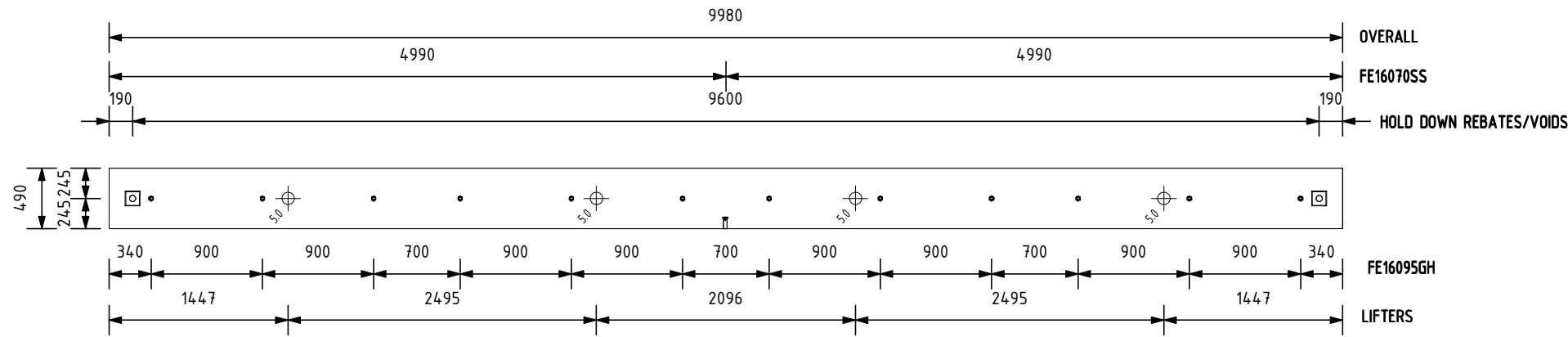


TYPICAL CONFIGURATION
 NTS

5.0 DENOTES SWIFT LIFT 5.0 TONNE x 240mm ANCHOR. MINIMUM 20MPa CONCRETE STRENGTH AT LIFT

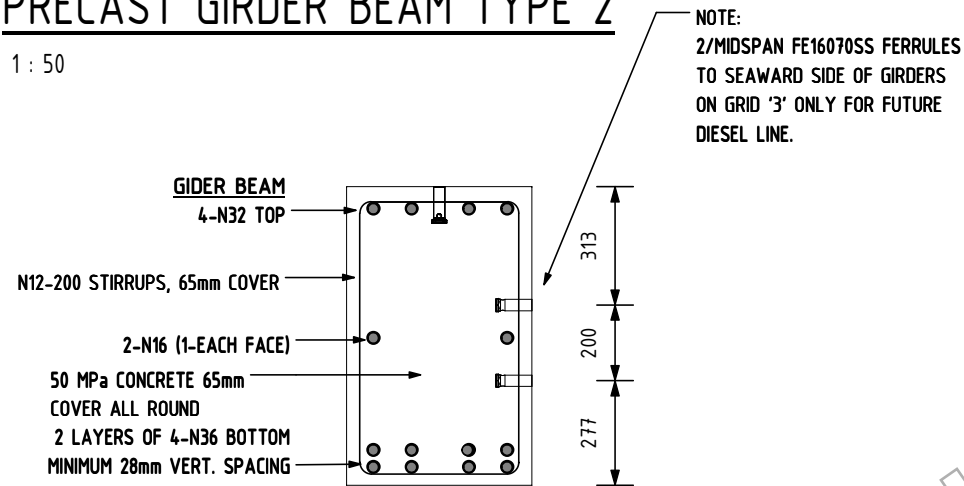
10.0 DENOTES SWIFTLIFT 10.0 TONNE x 340mm ANCHOR. MINIMUM 20MPa CONCRETE STRENGTH AT LIFT

5.0s DENOTES SWIFT LIFT 5.0 TONNE x 120mm SHORT FOOT ANCHOR. MINIMUM 20MPa CONCRETE STRENGTH AT LIFT

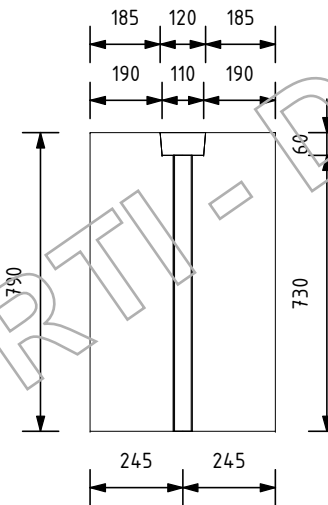


PRECAST GIRDER BEAM TYPE 2

1: 50



NOTE:
 2/MIDSPAN FE16070SS FERRULES TO SEAWARD SIDE OF GIRDERS ON GRID '3' ONLY FOR FUTURE DIESEL LINE.

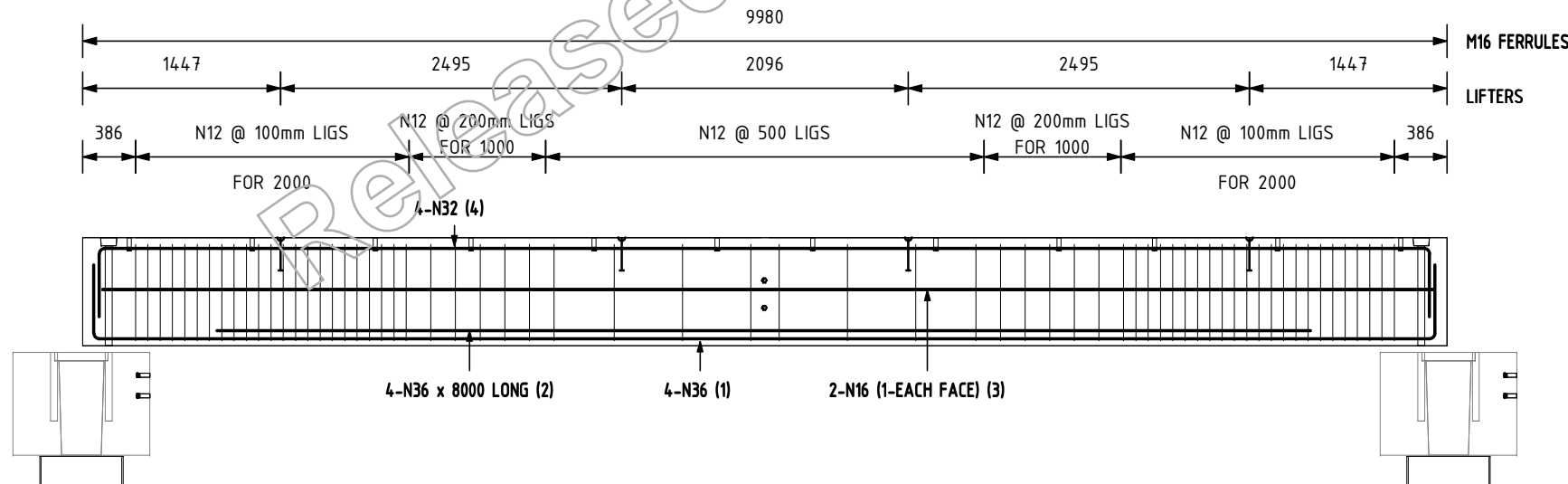


PRECAST GIRDER BEAM SECTION

1: 20

HOLD DOWN VOID DIMENSIONS

1: 20



PRECAST GIRDER BEAM ELEVATION

1: 50

INSTALL REINFORCEMENT	CHECKED REINFORCEMENT
AS NOTED	
ALTERNATIVE REINF.	ALTERNATIVE REINF.
ADDITIONAL REINFORCEMENT	ADDITIONAL REINFORCEMENT
PERIMETER BARS	PERIMETER BARS
MIN. CONCRETE COVER	MIN. CONCRETE COVER
65mm	
fct (@ LIFT)	fct (@ LIFT)
20 MPa	
f'c	f'c
50 MPa	
PANEL THICKNESS	PANEL THICKNESS
AS NOTED	
AREA SQUARE METERS	AREA SQUARE METERS
0.387	
VOLUME CUBIC METERS	VOLUME CUBIC METERS
3.86	
WEIGHT - TONNES	WEIGHT - TONNES
9.66	
EDGE LIFTS	EDGE LIFTS
2.5x90 - 1.3x85-	
FACE LIFTS	FACE LIFTS
2.5x90 - 1.3x85- 5.0x240- 4 10.0x340- 5.0x120-	2.5x90 - 1.3x85- 5.0x240- 10.0x340- 5.0x120-
REID REBATED FERRULES	REID REBATED FERRULES
RB12 RI - RB16 RI - RB20 RI -	RB12 RI - RB16 RI - RB20 RI -
REID THREADED FERRULES	REID THREADED FERRULES
RB12 TI - RB16 TI - RB20 TI - RB24 TI -	RB12 TI - RB16 TI - RB20 TI - RB24 TI -
COUPLER & REIDBAR	COUPLER & REIDBAR
RB20C -	RB20C -
PVC SLEEVE	PVC SLEEVE
TOP -	TOP -
50mm GROUT TUBE	50mm GROUT TUBE
BTM -	BTM -
REBATES (mm)	REBATES (mm)
-	
PROP TYPE	PROP TYPE
PROP EFFECTIVE LENGTH	PROP EFFECTIVE LENGTH
FERRULES	FERRULES
FE16095GH - 12 FE16070SS - 2	FE16095GH - FE16070SS -



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Client: CIVIL PLUS CONSTRUCTIONS
Project: CLUMP POINT
Title: PRECAST GIRDER BEAM TYPE 2

Rev	Description	By	Appd	Date	Approved	RPEQ No.
2	REVISED CONSTRUCTION	JBG	AJF	18.02.13	AJF	
1	REVISED CONSTRUCTION	JBG	AJF	1.02.13	AJF	

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CONSTRUCTION	
Job Number.	Drawing No.
T12-058	ST3.06
Approved:	Revision 2

Stephen C Day

From: David.goodman@ccrc.qld.gov.au
Sent: Friday, 8 November 2013 8:45 AM
To: Stephen C Day
Cc: tony.rooks@ccrc.qld.gov.au
Subject: RE: Loads for jetty
Attachments: graycol.gif; 25226916.gif; 25771574.jpg

Stephen

I am glad you are on to this , Anthony is correct in that the Bonacci loads review did recommend the loads quoted , however it is my strong opinion / recollection that we only reduced the design loads on the Clump Point Jetty to that of a Heavy Rigid vehicle (around the 24 t) and that as construction loads governed we had ended up with a T44 capacity structure. This is what I have advised Council so we will all look very silly if I need to put up a 6 tonne load limit on the Jetty.

David Goodman
Manager Civil Works
Ph 40439156
Mob

Cassowary Coast Regional Council
PO Box 887 INNISFAIL QLD 4860

From: Stephen.C.Day@tmr.qld.gov.au [mailto:Stephen.C.Day@tmr.qld.gov.au]
Sent: Friday, 8 November 2013 8:00 AM
To: Scott Ironside
Cc: Goodman, David; Rooks, Tony; Dane Blackford
Subject: Re: Loads for jetty

Scott,

The latest drawings for Clump Point forwarded on 28 March 2013 indicate the jetty design loads were Class 15 as originally planned with a concentrated loading of 200kN and distributed load of 15kPa. It was my understanding that this was retained as the construction loads controlled the design.

Can you please check and advise.

Stephen Day
Engineer (Civil) | Far North Queensland Region
Program Delivery And Operations | Department of Transport and Main Roads

Floor 7 | Cairns Corporate Tower | 15 Lake Street | Cairns Qld 4870
PO Box 6185 | Cairns Qld 4870
P: (07) 40457322 | F: (07) 40457250
M
E: stephen.c.day@tmr.qld.gov.au
W: www.tmr.qld.gov.au

▼ Dane Blackford ---08/11/2013 07:34:03 AM---Stephen, Response from the designer on load restrictions for both Jetties.

From: Dane Blackford <Dane@civilplus.com.au>
To: "Stephen.C.Day@tmr.qld.gov.au" <Stephen.C.Day@tmr.qld.gov.au>
Cc: Scott Ironside <Scott@civilplus.com.au>, Tony Rooks <tony.rooks@ccrc.qld.gov.au>, "Goodman, David" <David.Goodman@ccrc.qld.gov.au>

Stephen,

Response from the designer on load restrictions for both Jetties.

I also couldn't get any photos of the cracks after they had been cleaned up as the guys had already left site.

Let me know if you require any other information in the short term.

Regards,



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From: Anthony Florence [<mailto:Anthony@stpconsultants.com.au>]

Sent: Thursday, 7 November 2013 3:59 PM

To: Dane Blackford

Cc: Scott Ironside

Subject: RE: Loads for jetty

Dane,

Dunk Island was designed for a 5kPa (Class 5) uniformly distributed load and a maximum vehicle mass of 5 tonnes. However, the 45kN (class 10) point load was also included for strength.

Clump Point was designed for a 10kPa (Class 10) uniformly distributed load and a maximum vehicle axle load of 6 tonnes. Note vehicles up to 12 tonnes (dual rear axle) are permitted, provided any one (1) axle load does not exceed 6 tonnes. The 45kN (class 10) point load was also included for strength.

The design loads are consistent with the Design Criteria Review dated 16 October 2012 by Bonacci as provided by Dept. of Transport and Main Roads.

Regards,

Anthony Florence
BEng, MIEAust, RPEQ
Partner, Structural Manager - Townsville



Level 1 Master Builders House

316 Sturt Street, Townsville

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From: Dane Blackford [mailto:Dane@civilplus.com.au]

Sent: Thursday, 7 November 2013 3:24 PM

To: Anthony Florence

Cc: Scott Ironside

Subject: Loads for jetty

Anthony,

Are you able to supply to me the loads that Dunk and Clump have been designed to.

Stephen Day was after a load limit for Dunk in particular and I said to him that it may be an axle load. He then went on to say that the jetty was designed for a Class 5 load and a concentrated Class 10 load.

Can you confirm for me the loads for the jetties, I know Clump was for the single axle fuel truck but does that convert back to an axle load or load limit?

They are after the loads limits as soon as I can get them to them.

Let me know if you need any more information.

Regards,

Dane Blackford | Project Manager | CivilPlus Constructions Pty Ltd
 30 Blakey Street, Garbutt Qld 4814 | PO Box 1482 Aitkenvale Qld 4814

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Released under RTI - DTMR

Stephen C Day

From: Scott Ironside <Scott@civilplus.com.au>
Sent: Monday, 11 November 2013 3:03 PM
To: Stephen C Day
Cc: David.goodman@ccrc.qld.gov.au; tony.rooks@ccrc.qld.gov.au; Dane Blackford; Anthony Florence
Subject: RE: FW: Loads for jetty
Attachments: image003.gif; image004.jpg; image005.jpg; image006.png; image002.jpg

Flag Status: Flagged

Categories: DMS, Email filed

Stephen,

No a 23.5 Tonne body truck cannot travel on the jetty fully loaded assuming 3 axles. However if this truck was loaded such that axle loads did not exceed 6 tonne, which would mean a gross of 18 tonne, this would not be a problem.

Also for example if you wanted to back a semi-trailer down the jetty over the 6 sets of axles (3 on trailer and 3 on truck) the deck would be able to support a gross load of 36 tonne or 6 tonne per axle.

From my understanding there was a phone conference with all parties during which the Bonnaci report was discussed and the loads recommended in this report be adopted as there was no further funding available from council. As far as I am aware the reduced load on the deck was a fall-back position due to the funding constraints on the project, we never actually received a copy of the fall back positions as during this period there were a number of options being considered for both jetties. We even looked at grid mesh inserts for the deck at one point.

This is why the loads for the fuel truck as per Anthony's email was utilised for the design loads as it was considered that this truck would be sufficient for the vessels coming to the jetty.

Thanks



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From: Stephen.C.Day@tmr.qld.gov.au [mailto:Stephen.C.Day@tmr.qld.gov.au]
Sent: Monday, 11 November 2013 12:54 PM
To: Scott Ironside
Cc: Goodman, David; Tony Rooks; Dane Blackford; Anthony Florence
Subject: RE: FW: Loads for jetty

Scott,

Attached email from David Goodman provided advice regarding modified design loads.

The minimum design load requirement if Class 15 could not be achieved was for a 23.5 Tonne body truck.

The reduction was primarily related to reducing foundations loads.

Can you please advise if this design requirement has been achieved?

Stephen Day
Engineer (Civil) | Far North Queensland Region
Program Delivery And Operations | Department of Transport and Main Roads

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E: stephen.c.day@tmr.qld.gov.au
W: www.tmr.qld.gov.au

----- Forwarded by Stephen C Day/Northern/QMR/Au on 11/11/2013 12:37 PM -----

From: "Goodman, David" <David.Goodman@ccrc.qld.gov.au>
To: "Stephen.C.Day@tmr.qld.gov.au" <Stephen.C.Day@tmr.qld.gov.au>, Scott Ironside <scott@civilplus.com.au>, "Anthony@stpconsultants.com.au" <Anthony@stpconsultants.com.au>
Cc: "Rooks, Tony" <Tony.Rooks@ccrc.qld.gov.au>, "plyons@jukestodd.com" <plyons@jukestodd.com>, Terry Memory <tmemory@bonacciqld.com>
Date: 17/10/2012 11:36 PM
Subject: RE: Design criteria commentary

ALL

The results of the Council workshop yesterday are detailed below, formal notification of changes to the design brief will follow but I thought the sooner everyone was on the same page the better

Specifically with regard to the suggested amendments discussed at Fridays teleconference

1. The design life should remain at 50 Yrs
2. The design vessels CAN be modified to

- Dunk Island 20m 45 Tonne
- Clump Point 25m 65 Tonne ; But it would be preferred if we COULD get
- Dunk Island 25m 45 Tonne
- Clump Point 25m 65 Tonne

3. Deck Load Clump ; To be capable of handling a 23.5 Tonne Body Trucks concentrated loads or 5kPa pedestrian Loads
4. Deck Load Dunk; To be capable of handling a 45KN at 1.8 m centres concentrated loads or 5kPa pedestrian Loads
5. Adopt a 200 year ARI for the design wave event

Further Council developed a series of fall back positions in the form of a list of priorities and preferences

1. BUDGET - No new funds are available from CCRC
2. Maintain Clump Point Jetty as close as possible to the "tendered" design, with regard to deck, ie very strong preference for solid concrete deck at Clump Point
3. IF existing piles on the rehab section of Dunk cannot withstand the uplift forces - CCRC prefers a solid deck with a failure mechanism on the connectors rather than a grated deck. IF it is considered that a concrete deck designed to fail at the connectors poses a significant risk to the substructure remaining, we are comfortable with a timber deck on this section and a concrete deck on the new section.
4. IF because of additional pile lengths required at Clump because of the geotech and construction loads the project requires further savings, CCRC would consider "matching" the capacity of the new section of Dunk to the rehab section with regard to dealing with uplift forces via a failure mechanism of the connectors to the deck with the same commentary applicable with regard to risk of damage via failed concrete deck and comfortable with timber

Regards

David Goodman
Manager Civil Works
Ph 40439156
Mo

Cassowary Coast Regional Council
PO Box 887 INNISFAIL QLD 4860

From: Stephen.C.Day@tmr.qld.gov.au [<mailto:Stephen.C.Day@tmr.qld.gov.au>]
Sent: Friday, 12 October 2012 12:39 PM
To: Scott Ironside; Anthony@stpconsultants.com.au; Goodman, David
Cc: Rooks, Tony; plyons@jukestodd.com; Terry Memory
Subject: Fw: Design criteria commentary
Gents,

Please find attached report from Terry for discussion during the teleconference meeting.

Kind regards,

Stephen Day
Engineer (Civil) | Far North Region / Cairns Office
Program Delivery & Operations | Department of Transport and Main Roads

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▼ Anthony Florence ---11/11/2013 11:49:23 AM---Stephen/Scott, Clump Point can support a 15kPa UDL.

From: Anthony Florence <Anthony@stpconsultants.com.au>
To: Scott Ironside <Scott@civilplus.com.au>, "Stephen.C.Day@tmr.qld.gov.au" <Stephen.C.Day@tmr.qld.gov.au>
Cc: "Goodman, David" <David.Goodman@ccrc.qld.gov.au>, Tony Rooks <tony.rooks@ccrc.qld.gov.au>, Dane Blackford <Dane@civilplus.com.au>
Date: 11/11/2013 11:49 AM
Subject: RE: FW: Loads for jetty

Stephen/Scott,

Clump Point can support a 15kPa UDL.

The 200kN concentrated load (at spacing $s = 4.0\text{m}$) as specified for a class 15 structure can be supported provided the concentrated loads are located over the girder beams, as is achievable with $s = 4.0\text{m}$. The 200kN load cannot be located off the girder beam positions. The concentrated load is based on outrigger positions for a small mobile crane.

The deck units were not designed for a 200kN concentrated load however and we would be hesitant to nominate a class 15 classification to the structure as this could imply other loadings (W7, W8, A160 and T44 for example) could be supported. The revised deck unit design did not allow for these loads and were limited to class 10. This allows small emergency vehicles and small trucks (3000-5000 litre fuel vehicle for example as attached) to use the jetty.

Regards,

Anthony Florence
BEng, MIEAust, RPEQ
Partner, Structural Manager - Townsville



Level 1 Master Builders House
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From: Scott Ironside [<mailto:Scott@civilplus.com.au>]

Sent: Friday, 8 November 2013 8:39 AM

To: Stephen.C.Day@tmr.qld.gov.au

Cc: Goodman, David; Tony Rooks; Dane Blackford; Anthony Florence

Subject: RE: FW: Loads for jetty

Stephen,


Anthony is in a conference today and cannot reply in detail, however please note my understanding below:

- The jetty was revised back from class 15 to class 10 as per the bonacci report, however was designed to allow a small diesel fuel truck access to the jetty head for fuelling of vessels as per the axle loads that Anthony has previously advised
- The jetty was design for a 15kpa UDL as this was the wave load governing factor
- The larger loads are able to be applied to the deck, however these need to be directly above a beam, hence this is how the crane was walked along as it was loading directly above the beams

When Anthony is available on Monday further information will be provided.

I will give you a quick call shortly to discuss.

Thanks



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From: Stephen.C.Day@tmr.qld.gov.au [<mailto:Stephen.C.Day@tmr.qld.gov.au>]

Sent: Friday, 8 November 2013 8:00 AM

To: Scott Ironside

Cc: Goodman, David; Tony Rooks; Dane Blackford

Subject: Re: FW: Loads for jetty

Scott,

The latest drawings for Clump Point forwarded on 28 March 2013 indicate the jetty design loads were Class 15 as originally planned with a concentrated loading of 200kN and distributed load of 15kPa. It was my understanding that this was retained as the construction loads controlled the design.

Can you please check and advise.

Stephen Day
Engineer (Civil) | Far North Queensland Region
Program Delivery And Operations | Department of Transport and Main Roads

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▼ Dane Blackford ---08/11/2013 07:34:03 AM---Stephen, Response from the designer on load restrictions for both Jetties.

From: Dane Blackford <Dane@civilplus.com.au>
To: "Stephen.C.Day@tmr.qld.gov.au" <Stephen.C.Day@tmr.qld.gov.au>
Cc: Scott Ironside <Scott@civilplus.com.au>, Tony Rooks <tony.rooks@ccrc.qld.gov.au>, "Goodman, David" <David.Goodman@ccrc.qld.gov.au>
Date: 08/11/2013 07:34 AM
Subject: FW: Loads for jetty

Stephen,

Response from the designer on load restrictions for both Jetties.

I also couldn't get any photos of the cracks after they had been cleaned up as the guys had already left site.

Let me know if you require any other information in the short term.

Regards,

CivilPlus
Dane Blackford | Project Manager | CivilPlus Constructions Pty Ltd
30 Blakey Street, Garbutt Qld 4814 | PO Box 1482 Aitkenvale Qld 4814

IAS-ANZ
APPROVED COMPANY
AS/NZS 4801
OHS
Management System
QMS
APPROVED COMPANY
ISO 9001
Quality
Management System
QMS
APPROVED COMPANY
ISO 14001
Environment
Management System
QMS

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The design loads are consistent with the Design Criteria Review dated 16 October 2012 by Bonacci as provided by Dept. of Transport and Main Roads.

Regards,

Anthony Florence
BEng, MIEAust, RPEQ
Partner, Structural Manager - Townsville



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Let me know if you need any more information.

Regards,



Dane Blackford | Project Manager | CivilPlus Constructions Pty Ltd
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[attachment "fuel vehicles.pdf" deleted by Stephen C Day/Northern/QMR/Au]

Released under RTI - DTMR

ISUZU Mini Refueling Truck (3000-5000liter)

Item Name		Specifications		
Chassis	Chassis Brand	ISUZU		
	Chassis Model	MKR77LNACJAY		
	Drive Mode	4X2		
Engine	Tire	7.00-16		
	Brake	oil brake		
	Engine Model	4KH1-TC		
	Horsepower (Hp)	130		
	Displacement(ml)/Power(kw)	2999/96		
	Emission Standard	Euro III		
	Overall dimension (mm)	Approx. L*W*H	5900*1860*2380	
Main Parameter		wheelbase	3360	
		Axles No.	2	
	Oil Tank		Material of the tank	carbon steel
			Thickness of the tank	4mm
			Capacity	3000-5000L
	Weight (kg)		Approx. Gross weight	6961
			Approx. Kerb weight	3931
	Leaf spring No		8/6+5	
	Approaching/Departure Angle(°)		19/16	
	Front/Rear Track(mm)		1504/1425	
Max speed(km/h)		95		
Gear Box		MSB 5 speed gearbox		
Front/Rear Axle Load		2-2.5T/4.8T		

↑ 4.8kN REAR AXLE LOAD
 TRACK WIDTH 1.425m
 24kN / WHEEL.

Foton Aumark 3000-5000L Refueling Truck

Description		Specifications	
Chassis	Chassis Brand	Foton Aumark	
	Chassis Model	BJ1051VCJEA (RHD)	
	Drive Mode	4x2	
	Tire	7.00R16	
	Brake	Air brake	
Engine	Engine Model	ISF3.8s3141	
	Horsepower (Hp)	141	
	Displacement/power(ml/kw)	3760/105	
	Emission Standard	Euro III	
Main Parameter	Overall dimension (mm)	Approx. L*W*H	5995*2030*2350
		wheelbase	3360
		Axles No.	2
	Oil Tank	Material of the tank	carbon steel
		Thickness of the tank	4mm
		Thickness of seal head	5mm
		Oil pump	60-30
		Capacity	4500L
	Weight (kg)	Approx. Gross weight	6400
		Approx. Payload weight	2800
		Approx. Kerb weight	3500
	Leaf spring No.		3+1/6+7
	Front/Rear Track(mm)		1730/1590
	Max speed(km/h)		85
	Gear Box		6 speed gearbox
Front/Rear Axle Load		2.2T/5.5T	
15m reel, oiling machine			
Cab	Flat Roof Cab, with A/C, power steering, high quality paint		

55 kN REAR AXLE LOAD
TRACK WIDTH 1.59m
27.5W/WHEEL

Stephen C Day

From: Stephen C Day
Sent: Monday, 11 November 2013 12:54 PM
To: Scott Ironside
Cc: David.goodman@ccrc.qld.gov.au; tony.rooks@ccrc.qld.gov.au; Dane Blackford; Anthony Florence
Subject: RE: FW: Loads for jetty

Flag Status: Flagged

Categories: Email filed

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Stephen Day

Engineer (Civil) | Far North Queensland Region

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Cc: "Rooks, Tony" <Tony.Rooks@ccrc.qld.gov.au>, "plyons@jukestodd.com" <plyons@jukestodd.com>, Terry Memory <tmemory@bonacciqld.com>
Date: 17/10/2012 11:36 PM
Subject: RE: Design criteria commentary

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2. Maintain Clump Point Jetty as close as possible to the "tendered" design, with regard to deck, ie very strong preference for solid concrete deck at Clump Point
3. IF existing piles on the rehab section of Dunk cannot withstand the uplift forces - CCRC prefers a solid deck with a failure mechanism on the connectors rather than a grated deck. IF it is considered that a concrete deck designed to fail at the connectors poses a significant risk to the substructure remaining, we are comfortable with a timber deck on this section and a concrete deck on the new section.
4. IF because of additional pile lengths required at Clump because of the geotech and construction loads the project requires further savings, CCRC would consider "matching" the capacity of the new section of Dunk to the rehab section with regard to dealing with uplift forces via a failure mechanism of the connectors to the deck with the same commentary applicable with regard to risk of damage via failed concrete deck and comfortable with timber

Regards

David Goodman
Manager Civil Works
Ph 40439156
Mob

Cassowary Coast Regional Council
PO Box 887 INNISFAIL QLD 4860

From: Stephen.C.Day@tmr.qld.gov.au [mailto:Stephen.C.Day@tmr.qld.gov.au]
Sent: Friday, 12 October 2012 12:39 PM
To: Scott Ironside; Anthony@stpconsultants.com.au; Goodman, David
Cc: Rooks, Tony; plyons@jukestodd.com; Terry Memory
Subject: Fw: Design criteria commentary
Gents,

Please find attached report from Terry for discussion during the teleconference meeting.

Kind regards,

Stephen Day
Engineer (Civil) | Far North Region / Cairns Office
Program Delivery & Operations | Department of Transport and Main Roads

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E: stephen.c.day@tmr.qld.gov.au
W: www.tmr.qld.gov.au

From: Anthony Florence <Anthony@stpconsultants.com.au>
To: Scott Ironside <Scott@civilplus.com.au>, "Stephen.C.Day@tmr.qld.gov.au" <Stephen.C.Day@tmr.qld.gov.au>
Cc: "Goodman, David" <David.Goodman@ccrc.qld.gov.au>, Tony Rooks <tony.rooks@ccrc.qld.gov.au>, Dane Blackford <Dane@civilplus.com.au>
Date: 11/11/2013 11:49 AM
Subject: RE: FW: Loads for jetty

Stephen/Scott,

Clump Point can support a 15kPa UDL.

The 200kN concentrated load (at spacing $s = 4.0\text{m}$) as specified for a class 15 structure can be supported provided the concentrated loads are located over the girder beams, as is achievable with $s = 4.0\text{m}$. The 200kN load cannot be located off the girder beam positions. The concentrated load is based on outrigger positions for a small mobile crane.

The deck units were not designed for a 200kN concentrated load however and we would be hesitant to nominate a class 15 classification to the structure as this could imply other loadings (W7, W8, A160 and T44 for example) could be supported. The revised deck unit design did not allow for these loads and were limited to class 10. This allows small emergency vehicles and small trucks (3000-5000 litre fuel vehicle for example as attached) to use the jetty.

Regards,

Anthony Florence
BEng, MIEAust, RPEQ
Partner, Structural Manager - Townsville



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From: Scott Ironside [mailto:Scott@civilplus.com.au]

Sent: Friday, 8 November 2013 8:39 AM

To: Stephen.C.Day@tmr.qld.gov.au

Cc: Goodman, David; Tony Rooks; Dane Blackford; Anthony Florence

Subject: RE: FW: Loads for jetty

Stephen,

Anthony is in a conference today and cannot reply in detail, however please note my understanding below:

- The jetty was revised back from class 15 to class 10 as per the bonacci report, however was designed to allow a small diesel fuel truck access to the jetty head for fuelling of vessels as per the axle loads that Anthony has previously advised
- The jetty was design for a 15kpa UDL as this was the wave load governing factor
- The larger loads are able to be applied to the deck, however these need to be directly above a beam, hence this is how the crane was walked along as it was loading directly above the beams

When Anthony is available on Monday further information will be provided.

I will give you a quick call shortly to discuss.

Thanks



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To: Scott Ironside
Cc: Goodman, David; Tony Rooks; Dane Blackford
Subject: Re: FW: Loads for jetty

Scott,

The latest drawings for Clump Point forwarded on 28 March 2013 indicate the jetty design loads were Class 15 as originally planned with a concentrated loading of 200kN and distributed load of 15kPa. It was my understanding that this was retained as the construction loads controlled the design.

Can you please check and advise.

Stephen Day
Engineer (Civil) | Far North Queensland Region
Program Delivery And Operations | Department of Transport and Main Roads

Floor 7 | Cairns Corporate Tower | 15 Lake Street | Cairns Qld 4870

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W: www.tmr.qld.gov.au

▼ Dane Blackford ---08/11/2013 07:34:03 AM---Stephen, Response from the designer on load restrictions for both Jetties.

From: Dane Blackford <Dane@civilplus.com.au>

To: "Stephen.C.Day@tmr.qld.gov.au" <Stephen.C.Day@tmr.qld.gov.au>

Cc: Scott Ironside <Scott@civilplus.com.au>, Tony Rooks <tony.rooks@ccrc.qld.gov.au>, "Goodman, David" <David.Goodman@ccrc.qld.gov.au>

Date: 08/11/2013 07:34 AM

Subject: FW: Loads for jetty

Stephen,

Response from the designer on load restrictions for both Jetties.

I also couldn't get any photos of the cracks after they had been cleaned up as the guys had already left site.

Let me know if you require any other information in the short term.

Regards,

From: Anthony Florence [<mailto:Anthony@stpconsultants.com.au>]
Sent: Thursday, 7 November 2013 3:59 PM
To: Dane Blackford
Cc: Scott Ironside
Subject: RE: Loads for jetty

Dane,

Dunk Island was designed for a 5kPa (Class 5) uniformly distributed load and a maximum vehicle mass of 5 tonnes. However, the 45kN (class 10) point load was also included for strength.

Clump Point was designed for a 10kPa (Class 10) uniformly distributed load and a maximum vehicle axle load of 6 tonnes. Note vehicles up to 12 tonnes (dual rear axle) are permitted, provided any one (1) axle load does not exceed 6 tonnes. The 45kN (class 10) point load was also included for strength.

The design loads are consistent with the Design Criteria Review dated 16 October 2012 by Bonacci as provided by Dept. of Transport and Main Roads.

Regards,

Anthony Florence
BEng, MIEAust, RPEQ
Partner, Structural Manager - Townsville



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From: Dane Blackford [<mailto:Dane@civilplus.com.au>]

Sent: Thursday, 7 November 2013 3:24 PM

To: Anthony Florence

Cc: Scott Ironside

Subject: Loads for jetty

Anthony,

Are you able to supply to me the loads that Dunk and Clump have been designed to.

Stephen Day was after a load limit for Dunk in particular and I said to him that it may be an axle load. He then went on to say that the jetty was designed for a Class 5 load and a concentrated Class 10 load.

Can you confirm for me the loads for the jetties, I know Clump was for the single axle fuel truck but does that convert back to an axle load or load limit?

They are after the loads limits as soon as I can get them to them.

Let me know if you need any more information.

Regards,

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[attachment "fuel vehicles.pdf" deleted by Stephen C Day/Northern/QMR/Au]

Released under RTI - DTMR

Stephen C Day

From: tony.rooks@ccrc.qld.gov.au
Sent: Tuesday, 12 November 2013 10:33 AM
To: Stephen C Day; David.goodman@ccrc.qld.gov.au
Subject: RE: FW: Loads for jetty
Attachments: image001.gif; image002.jpg; image003.jpg; image004.png

Flag Status: Flagged

Categories: Email filed

We have a problem that needs our combined attention. I am away tomorrow, back Thursday, however that is council meeting day.

Regards

Tony Rooks
Manager Major Projects and Fleet
07 40302296

tony.rooks@ccrc.qld.gov.au

From: Stephen.C.Day@tmr.qld.gov.au [mailto:Stephen.C.Day@tmr.qld.gov.au]
Sent: Tuesday, 12 November 2013 10:04 AM
To: Rooks, Tony; Goodman, David; David <David....Goodman@ccrc.qld.gov.au/O=, /, , , @tmr.qld.gov.au
Subject: RE: FW: Loads for jetty

Timeline from my records of relevant events at which issues discussed:

12/10/12 Bonacci draft report dated 11/10/12 circulated
12/10/12 Teleconference (DG, TR, SD, SI, RL, AF, PL, TM) to discuss wave loadings
16/10/12 Final Bonacci report circulated
17/10/12 Email by DG advising outcomes of Council workshop to amend design vessel size and design live load to 23.5T at Clump
19/10/12 Teleconference organised PL (DG, TR, SD, SI, RL, AF, PL, TM) - Follow up to 12th -

"Purpose of this teleconference is to review revised design loads and pile lths in light of Bonacci report and confirm lths for Dunk to allow placement of order"

26/10/12 Teleconference (ex C+) (TM, PL, DG, TR, SD, DT) - Dunk Island existing pile capacities
26/10/12 Teleconference (with C+) (DG, TR, SD, SI, PL) - discussion topics - Clump piles and Dunk deck loads

My recollection and notes from the teleconferences regarding the Bonacci report are that discussions related primarily to wave loadings, with David Goodman's email of 17 October addressing the reduction in vehicle and vessel loadings.

Subsequent to these discussions, drawings were issued as follows:

- Preliminary drawings for Clump Point forwarded on 13/11/12, 16/11/12 and 30/01/13 continued to show design loads unchanged from original specification.
- Construction drawings for Clump Point forwarded on 28/03/13 showed reduced vessel loads but no reduction in live loads (ie jetty deck loading to Class 15).

Stephen Day
Engineer (Civil) | Far North Queensland Region
Program Delivery And Operations | Department of Transport and Main Roads

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W: www.tmr.qld.gov.au

▼ "Rooks, Tony" ---12/11/2013 05:55:26 AM---Likely around October and Peter Lyons for QRA was involved, I can contact him if required he usually

From: "Rooks, Tony" <Tony.Rooks@ccrc.qld.gov.au>
To: "Scott Ironside" <Scott@civilplus.com.au>, "Stephen.C.Day@tmr.qld.gov.au" <Stephen.C.Day@tmr.qld.gov.au>
Cc: "Goodman, David" <David.Goodman@ccrc.qld.gov.au>, Dane Blackford <Dane@civilplus.com.au>, Anthony Florence <Anthony@stpconsultants.com.au>
Date: 12/11/2013 05:55 AM
Subject: RE: FW: Loads for jetty

Likely around October and Peter Lyons for QRA was involved, I can contact him if required he usually keeps copious notes of meetings.

Regards

Tony Rooks
Manager Major Projects and Fleet
07 40302296

tony.rooks@ccrc.qld.gov.au

From: Scott Ironside [<mailto:Scott@civilplus.com.au>]
Sent: Monday, 11 November 2013 3:03 PM
To: Stephen.C.Day@tmr.qld.gov.au
Cc: Goodman, David; Rooks, Tony; Dane Blackford; Anthony Florence
Subject: RE: FW: Loads for jetty

Stephen,

No a 23.5 Tonne body truck cannot travel on the jetty fully loaded assuming 3 axles. However if this truck was loaded such that axle loads did not exceed 6 tonne, which would mean a gross of 18 tonne, this would not be a problem.

Also for example if you wanted to back a semi-trailer down the jetty over the 6 sets of axles (3 on trailer and 3 on truck) the deck would be able to support a gross load of 36 tonne or 6 tonne per axle.

From my understanding there was a phone conference with all parties during which the Bonnaci report was discussed and the loads recommended in this report be adopted as there was no further funding available from council. As far as I am aware the reduced load on the deck was a fall-back position due to the funding constraints on the project, we never actually received a copy of the fall back positions as during this period there were a number of options being considered for both jetties. We even looked at grid mesh inserts for the deck at one point.

This is why the loads for the fuel truck as per Anthony's email was utilised for the design loads as it was considered that this truck would be sufficient for the vessels coming to the jetty.

Thanks



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From: Stephen.C.Day@tmr.qld.gov.au [<mailto:Stephen.C.Day@tmr.qld.gov.au>]

Sent: Monday, 11 November 2013 12:54 PM

To: Scott Ironside

Cc: Goodman, David; Tony Rooks; Dane Blackford; Anthony Florence

Subject: RE: FW: Loads for jetty

Scott,

Attached email from David Goodman provided advice regarding modified design loads.

The minimum design load requirement if Class 15 could not be achieved was for a 23.5 Tonne body truck. The reduction was primarily related to reducing foundations loads.

Can you please advise if this design requirement has been achieved?

Stephen Day

Engineer (Civil) | Far North Queensland Region

Program Delivery And Operations | Department of Transport and Main Roads

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----- Forwarded by Stephen C Day/Northern/QMR/AU on 11/11/2013 12:37 PM -----

From: "Goodman, David" <David.Goodman@ccrc.qld.gov.au>

To: "Stephen.C.Day@tmr.qld.gov.au" <Stephen.C.Day@tmr.qld.gov.au>, Scott Ironside <scott@civilplus.com.au>, "Anthony@stpconsultants.com.au" <Anthony@stpconsultants.com.au>

Cc: "Rooks, Tony" <Tony.Rooks@ccrc.qld.gov.au>, "plyons@juketodd.com" <plyons@juketodd.com>, Terry Memory <tmemory@bonacciqld.com>

Date: 17/10/2012 11:36 PM

Subject: RE: Design criteria commentary

ALL

The results of the Council workshop yesterday are detailed below, formal notification of changes to the design brief will follow but I thought the sooner everyone was on the same page the better

Specifically with regard to the suggested amendments discussed at Fridays teleconference

1. The design life should remain at 50 Yrs
2. The design vessels CAN be modified to

- Dunk Island 20m 45 Tonne

- Clump Point 25m 65 Tonne ; But it would be preferred if we COULD get
- Dunk Island 25m 45 Tonne
- Clump Point 25m 65 Tonne

3. Deck Load Clump ; To be capable of handling a 23.5 Tonne Body Trucks concentrated loads or 5kPa pedestrian Loads

4. Deck Load Dunk; To be capable of handling a 45KN at 1.8 m centres concentrated loads or 5kPa pedestrian Loads

5. Adopt a 200 year ARI for the design wave event

Further Council developed a series of fall back positions in the form of a list of priorities and preferences

1. BUDGET - No new funds are available from CCRC

2. Maintain Clump Point Jetty as close as possible to the "tendered" design, with regard to deck, ie very strong preference for solid concrete deck at Clump Point

3. IF existing piles on the rehab section of Dunk cannot withstand the uplift forces - CCRC prefers a solid deck with a failure mechanism on the connectors rather than a grated deck. IF it is considered that a concrete deck designed to fail at the connectors poses a significant risk to the substructure remaining, we are comfortable with a timber deck on this section and a concrete deck on the new section.

4. IF because of additional pile lengths required at Clump because of the geotech and construction loads the project requires further savings, CCRC would consider "matching" the capacity of the new section of Dunk to the rehab section with regard to dealing with uplift forces via a failure mechanism of the connectors to the deck with the same commentary applicable with regard to risk of damage via failed concrete deck and comfortable with timber

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▼ Anthony Florence ---11/11/2013 11:49:23 AM---Stephen/Scott, Clump Point can support a 15kPa UDL.

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 To: Scott Ironside <Scott@civilplus.com.au>, "Stephen.C.Day@tmr.qld.gov.au" <Stephen.C.Day@tmr.qld.gov.au>
 Cc: "Goodman, David" <David.Goodman@ccrc.qld.gov.au>, Tony Rooks <tony.rooks@ccrc.qld.gov.au>, Dane Blackford <Dane@civilplus.com.au>
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 Subject: RE: FW: Loads for jetty

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Clump Point can support a 15kPa UDL.

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When Anthony is available on Monday further information will be provided.

I will give you a quick call shortly to discuss.

Thanks



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Cc: Goodman, David; Tony Rooks; Dane Blackford

Subject: Re: FW: Loads for jetty

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Cc: Scott Ironside <Scott@civilplus.com.au>, Tony Rooks <tony.rooks@ccrc.qld.gov.au>, "Goodman, David" <David.Goodman@ccrc.qld.gov.au>

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Dane,

Dunk Island was designed for a 5kPa (Class 5) uniformly distributed load and a maximum vehicle mass of 5 tonnes. However, the 45kN (class 10) point load was also included for strength.

Clump Point was designed for a 10kPa (Class 10) uniformly distributed load and a maximum vehicle axle load of 6 tonnes. Note vehicles up to 12 tonnes (dual rear axle) are permitted, provided any one (1) axle load does not exceed 6 tonnes. The 45kN (class 10) point load was also included for strength.

The design loads are consistent with the Design Criteria Review dated 16 October 2012 by Bonacci as provided by Dept. of Transport and Main Roads.

Regards,

Anthony Florence
BEng, MIEAust, RPEQ
Partner, Structural Manager - Townsville



Level 1 Master Builders House
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M:

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From: Dane Blackford [<mailto:Dane@civilplus.com.au>]

Sent: Thursday, 7 November 2013 3:24 PM

To: Anthony Florence

Cc: Scott Ironside

Subject: Loads for jetty

Anthony,

Are you able to supply to me the loads that Dunk and Clump have been designed to.

Stephen Day was after a load limit for Dunk in particular and I said to him that it may be an axle load. He then went on to say that the jetty was designed for a Class 5 load and a concentrated Class 10 load.

Can you confirm for me the loads for the jetties, I know Clump was for the single axle fuel truck but does that convert back to an axle load or load limit?

They are after the loads limits as soon as I can get them to them.

Let me know if you need any more information.

Regards,



Dane Blackford | Project Manager | CivilPlus Constructions Pty Ltd

30 Blakey Street, Garbutt Qld 4814 | PO Box 1482 Aitkenvale Qld 4814



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[attachment "fuel vehicles.pdf" deleted by Stephen C Day/Northern/QMR/Au]

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Released under RTI - DTMR

Stephen C Day

From: tony.rooks@ccrc.qld.gov.au
Sent: Tuesday, 12 November 2013 5:55 AM
To: 'Scott Ironside'; Stephen C Day
Cc: David.goodman@ccrc.qld.gov.au; Dane Blackford; Anthony Florence
Subject: RE: FW: Loads for jetty
Attachments: image001.jpg; image002.gif; image003.jpg; image004.png

Flag Status: Flagged

Categories: DMS, Email filed

Likely around October and Peter Lyons for QRA was involved, I can contact him if required he usually keeps copious notes of meetings.

Regards

Tony Rooks
Manager Major Projects and Fleet
07 40302296

tony.rooks@ccrc.qld.gov.au

From: Scott Ironside [mailto:Scott@civilplus.com.au]
Sent: Monday, 11 November 2013 3:03 PM
To: Stephen.C.Day@tmr.qld.gov.au
Cc: Goodman, David; Rooks, Tony; Dane Blackford; Anthony Florence
Subject: RE: FW: Loads for jetty

Stephen,

No a 23.5 Tonne body truck cannot travel on the jetty fully loaded assuming 3 axles. However if this truck was loaded such that axle loads did not exceed 6 tonne, which would mean a gross of 18 tonne, this would not be a problem.

Also for example if you wanted to back a semi-trailer down the jetty over the 6 sets of axles (3 on trailer and 3 on truck) the deck would be able to support a gross load of 36 tonne or 6 tonne per axle.

From my understanding there was a phone conference with all parties during which the Bonnaci report was discussed and the loads recommended in this report be adopted as there was no further funding available from council. As far as I am aware the reduced load on the deck was a fall-back position due to the funding constraints on the project, we never actually received a copy of the fall back positions as during this period there were a number of options being considered for both jetties. We even looked at grid mesh inserts for the deck at one point.

This is why the loads for the fuel truck as per Anthony's email was utilised for the design loads as it was considered that this truck would be sufficient for the vessels coming to the jetty.

Thanks

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From: Stephen.C.Day@tmr.qld.gov.au [<mailto:Stephen.C.Day@tmr.qld.gov.au>]
Sent: Monday, 11 November 2013 12:54 PM
To: Scott Ironside
Cc: Goodman, David; Tony Rooks; Dane Blackford; Anthony Florence
Subject: RE: FW: Loads for jetty

Scott,

Attached email from David Goodman provided advice regarding modified design loads.

The minimum design load requirement if Class 15 could not be achieved was for a 23.5 Tonne body truck. The reduction was primarily related to reducing foundations loads.

Can you please advise if this design requirement has been achieved?

Stephen Day
Engineer (Civil) | Far North Queensland Region
Program Delivery And Operations | Department of Transport and Main Roads

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----- Forwarded by Stephen C Day/Northern/QMR/AU on 11/11/2013 12:37 PM -----

From: "Goodman, David" <David.Goodman@ccrc.qld.gov.au>
To: "Stephen.C.Day@tmr.qld.gov.au" <Stephen.C.Day@tmr.qld.gov.au>, Scott Ironside <scott@civilplus.com.au>, "Anthony@stpconsultants.com.au" <Anthony@stpconsultants.com.au>
Cc: "Rooks, Tony" <Tony.Rooks@ccrc.qld.gov.au>, "plyons@jukestodd.com" <plyons@jukestodd.com>, Terry Memory <tmemory@bonacciqld.com>
Date: 17/10/2012 11:36 PM
Subject: RE: Design criteria commentary

ALL

The results of the Council workshop yesterday are detailed below, formal notification of changes to the design brief will follow but I thought the sooner everyone was on the same page the better

Specifically with regard to the suggested amendments discussed at Fridays teleconference

1. The design life should remain at 50 Yrs
2. The design vessels CAN be modified to

- Dunk Island 20m 45 Tonne

- Clump Point 25m 65 Tonne ; But it would be preferred if we COULD get
- Dunk Island 25m 45 Tonne
- Clump Point 25m 65 Tonne

3. Deck Load Clump ; To be capable of handling a 23.5 Tonne Body Trucks concentrated loads or 5kPa pedestrian Loads
4. Deck Load Dunk; To be capable of handling a 45KN at 1.8 m centres concentrated loads or 5kPa pedestrian Loads
5. Adopt a 200 year ARI for the design wave event

Further Council developed a series of fall back positions in the form of a list of priorities and preferences

1. BUDGET - No new funds are available from CCRC
2. Maintain Clump Point Jetty as close as possible to the "tendered" design, with regard to deck, ie very strong preference for solid concrete deck at Clump Point
3. IF existing piles on the rehab section of Dunk cannot withstand the uplift forces - CCRC prefers a solid deck with a failure mechanism on the connectors rather than a grated deck. IF it is considered that a concrete deck designed to fail at the connectors poses a significant risk to the substructure remaining, we are comfortable with a timber deck on this section and a concrete deck on the new section.
4. IF because of additional pile lengths required at Clump because of the geotech and construction loads the project requires further savings, CCRC would consider "matching" the capacity of the new section of Dunk to the rehab section with regard to dealing with uplift forces via a failure mechanism of the connectors to the deck with the same commentary applicable with regard to risk of damage via failed concrete deck and comfortable with timber

Regards

David Goodman
 Manager Civil Works
 Ph 40439156
 Mob

Cassowary Coast Regional Council
 PO Box 887 INNISFAIL QLD 4860

From: Stephen.C.Day@tmr.qld.gov.au [<mailto:Stephen.C.Day@tmr.qld.gov.au>]

Sent: Friday, 12 October 2012 12:39 PM

To: Scott Ironside; Anthony@stpconsultants.com.au; Goodman, David

Cc: Rooks, Tony; plyons@jukestodd.com; Terry Memory

Subject: Fw: Design criteria commentary Gents,

Please find attached report from Terry for discussion during the teleconference meeting.

Kind regards,

Stephen Day
 Engineer (Civil) | Far North Region / Cairns Office
 Program Delivery & Operations | Department of Transport and Main Roads

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 E: stephen.c.day@tmr.qld.gov.au
 W: www.tmr.qld.gov.au

▼ Anthony Florence ---11/11/2013 11:49:23 AM---Stephen/Scott, Clump Point can support a 15kPa UDL.

From: Anthony Florence <Anthony@stpconsultants.com.au>
 To: Scott Ironside <Scott@civilplus.com.au>, "Stephen.C.Day@tmr.qld.gov.au" <Stephen.C.Day@tmr.qld.gov.au>
 Cc: "Goodman, David" <David.Goodman@ccrc.qld.gov.au>, Tony Rooks <tony.rooks@ccrc.qld.gov.au>, Dane Blackford <Dane@civilplus.com.au>
 Date: 11/11/2013 11:49 AM
 Subject: RE: FW: Loads for jetty

Stephen/Scott,

Clump Point can support a 15kPa UDL.

The 200kN concentrated load (at spacing $s = 4.0\text{m}$) as specified for a class 15 structure can be supported provided the concentrated loads are located over the girder beams, as is achievable with $s = 4.0\text{m}$. The 200kN load cannot be located off the girder beam positions. The concentrated load is based on outrigger positions for a small mobile crane.

The deck units were not designed for a 200kN concentrated load however and we would be hesitant to nominate a class 15 classification to the structure as this could imply other loadings (W7, W8, A160 and T44 for example) could be supported. The revised deck unit design did not allow for these loads and were limited to class 10. This allows small emergency vehicles and small trucks (3000-5000 litre fuel vehicle for example as attached) to use the jetty.

Regards,

Anthony Florence
BEng, MIEAust, RPEQ
Partner, Structural Manager - Townsville



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From: Scott Ironside [<mailto:Scott@civilplus.com.au>]

Sent: Friday, 8 November 2013 8:39 AM

To: Stephen.C.Day@tmr.qld.gov.au

Cc: Goodman, David; Tony Rooks; Dane Blackford; Anthony Florence

Subject: RE: FW: Loads for jetty

Stephen,

Anthony is in a conference today and cannot reply in detail, however please note my understanding below:

- The jetty was revised back from class 15 to class 10 as per the bonacci report, however was designed to allow a small diesel fuel truck access to the jetty head for fuelling of vessels as per the axle loads that Anthony has previously advised
- The jetty was design for a 15kpa UDL as this was the wave load governing factor
- The larger loads are able to be applied to the deck, however these need to be directly above a beam, hence this is how the crane was walked along as it was loading directly above the beams

When Anthony is available on Monday further information will be provided.

I will give you a quick call shortly to discuss.

Thanks



Scott Ironside | Project Manager & Managing Director | CivilPlus Constructions Pty Ltd

30 Blakey Street, Garbutt Qld 4814 | PO Box 1482 Aitkenvale Qld 4814

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e scott@civilplus.com.au | w www.civilplus.com.au

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From: Stephen.C.Day@tmr.qld.gov.au [<mailto:Stephen.C.Day@tmr.qld.gov.au>]

Sent: Friday, 8 November 2013 8:00 AM

To: Scott Ironside

Cc: Goodman, David; Tony Rooks; Dane Blackford

Subject: Re: FW: Loads for jetty

Scott,

The latest drawings for Clump Point forwarded on 28 March 2013 indicate the jetty design loads were Class 15 as originally planned with a concentrated loading of 200kN and distributed load of 15kPa. It was my understanding that this was retained as the construction loads controlled the design.

Can you please check and advise.

Stephen Day

Engineer (Civil) | Far North Queensland Region

Program Delivery And Operations | Department of Transport and Main Roads

Floor 7 | Cairns Corporate Tower | 15 Lake Street | Cairns Qld 4870

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M:

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W: www.tmr.qld.gov.au

▼ Dane Blackford ---08/11/2013 07:34:03 AM-- Stephen, Response from the designer on load restrictions for both Jetties.

From: Dane Blackford <Dane@civilplus.com.au>

To: "Stephen.C.Day@tmr.qld.gov.au" <Stephen.C.Day@tmr.qld.gov.au>

Cc: Scott Ironside <Scott@civilplus.com.au>, Tony Rooks <tony.rooks@ccrc.qld.gov.au>, "Goodman, David" <David.Goodman@ccrc.qld.gov.au>

Date: 08/11/2013 07:34 AM

Subject: FW: Loads for jetty

Stephen,

Response from the designer on load restrictions for both Jetties.

I also couldn't get any photos of the cracks after they had been cleaned up as the guys had already left site.

Let me know if you require any other information in the short term.

Regards,



Dane Blackford | Project Manager | CivilPlus Constructions Pty Ltd

30 Blakey Street, Garbutt Qld 4814 | PO Box 1482 Aitkenvale Qld 4814



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From: Anthony Florence [<mailto:Anthony@stpconsultants.com.au>]
Sent: Thursday, 7 November 2013 3:59 PM
To: Dane Blackford
Cc: Scott Ironside
Subject: RE: Loads for jetty

Dane,

Dunk Island was designed for a 5kPa (Class 5) uniformly distributed load and a maximum vehicle mass of 5 tonnes. However, the 45kN (class 10) point load was also included for strength.

Clump Point was designed for a 10kPa (Class 10) uniformly distributed load and a maximum vehicle axle load of 6 tonnes. Note vehicles up to 12 tonnes (dual rear axle) are permitted, provided any one (1) axle load does not exceed 6 tonnes. The 45kN (class 10) point load was also included for strength.

The design loads are consistent with the Design Criteria Review dated 16 October 2012 by Bonacci as provided by Dept. of Transport and Main Roads.

Regards,

Anthony Florence
BEng, MIEAust, RPEQ
Partner, Structural Manager - Townsville



Level 1 Master Builders House
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M

E: anthony@stpconsultants.com.au
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From: Dane Blackford [<mailto:Dane@civilplus.com.au>]
Sent: Thursday, 7 November 2013 3:24 PM
To: Anthony Florence
Cc: Scott Ironside
Subject: Loads for jetty

Anthony,

Are you able to supply to me the loads that Dunk and Clump have been designed to.

Stephen Day was after a load limit for Dunk in particular and I said to him that it may be an axle load. He then went on to say that the jetty was designed for a Class 5 load and a concentrated Class 10 load.

Can you confirm for me the loads for the jetties, I know Clump was for the single axle fuel truck but does that convert back to an axle load or load limit?

They are after the loads limits as soon as I can get them to them.

Let me know if you need any more information.

Regards,



Dane Blackford | Project Manager | CivilPlus Constructions Pty Ltd

30 Blakey Street, Garbutt Qld 4814 | PO Box 1482 Aitkenvale Qld 4814



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[attachment "fuel vehicles.pdf" deleted by Stephen C Day/Northern QMR/Au]

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Stephen C Day

From: Stephen C Day
Sent: Wednesday, 27 November 2013 11:30 AM
To: tony.rooks@ccrc.qld.gov.au
Cc: David.goodman@ccrc.qld.gov.au
Subject: Issue of Drawings for Clump Point

Categories: Red Category

Below are copies of emails forwarding drawings for Clump Point.

Drawings issues were dated 28/03/13, 31/01/13, 16/11/12 and 13/11/12. Earlier issue was dated 21/09/12.

A full set of the latest issue is included. Also attached below are the design notes pages for each of the issues. Up until the issue on 31/01/13 both vessel and deck live loading remained per the original design criteria. The final issue (28/03/13 - issued for construction) showed reduced vessel load (65T reduced from 110T), but live loads remained unaltered. Reference is made to the Bonacci report for wave loadings only on all drawings issued after October 2012..



Stephen Day

Engineer (Civil) | Far North Queensland Region
Program Delivery And Operations | Department of Transport and Main Roads

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E: stephen.c.day@tmr.qld.gov.au

W: www.tmr.qld.gov.au

----- Forwarded by Stephen C Day/Northern/QMR/Au on 27/11/2013 10:35 AM -----

From: Dane Blackford <Dane@civilplus.com.au>
To: "Stephen.C.Day@tmr.qld.gov.au" <Stephen.C.Day@tmr.qld.gov.au>
Cc: Luke Vandesande <Luke@civilplus.com.au>, Scott Ironside <Scott@civilplus.com.au>, "Rooks, Tony" <Tony.Rooks@ccrc.qld.gov.au>, "Goodman, David" <David.Goodman@ccrc.qld.gov.au>, Brett Micola <Brett@civilplus.com.au>, Admin <Admin@civilplus.com.au>
Date: 28/03/2013 09:25 AM
Subject: RFI 004

Stephen,

Please find attached RFI 004 for your review and response thanks.

Regards,



----- Forwarded by Stephen C Day/Northern/QMR/Au on 27/11/2013 10:35 AM -----

From: Scott Ironside <Scott@civilplus.com.au>
To: "Stephen.C.Day@tmr.qld.gov.au" <Stephen.C.Day@tmr.qld.gov.au>, "tony.rooks@ccrc.qld.gov.au" <tony.rooks@ccrc.qld.gov.au>, "Goodman, David" <David.Goodman@ccrc.qld.gov.au>
Cc: Richard Lamb <Richard@civilplus.com.au>, Dane Blackford <Dane@civilplus.com.au>, Luke Vandesande <Luke@civilplus.com.au>, Peter Lyons <plyons@jukestodd.com>
Date: 30/01/2013 04:05 PM
Subject: Clump Point - Updated Construction Drawings

Gents,
Please find attached updated construction drawings for Clump Point for review.

Thanks



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[attachment "T12-058 ST1.01 (2).pdf" deleted by Stephen C Day/Northern/QMR/Au] [attachment "T12-058 ST1.03 (1).pdf" deleted by Stephen C Day/Northern/QMR/Au] [attachment "T12-058 ST1.04 (1).pdf" deleted by Stephen C Day/Northern/QMR/Au] [attachment "T12-058 ST1.11 (2).pdf" deleted by Stephen C Day/Northern/QMR/Au] [attachment "T12-058 ST2.01 (1).pdf" deleted by Stephen C Day/Northern/QMR/Au] [attachment "T12-058 ST2.02 (1).pdf" deleted by Stephen C Day/Northern/QMR/Au] [attachment "T12-058 ST2.03 (1).pdf" deleted by Stephen C Day/Northern/QMR/Au] [attachment "T12-058 ST2.04 (2).pdf" deleted by Stephen C Day/Northern/QMR/Au] [attachment "T12-058 ST3.01 (1).pdf" deleted by Stephen C Day/Northern/QMR/Au] [attachment "T12-058 ST3.03 (2).pdf" deleted by Stephen C Day/Northern/QMR/Au] [attachment "T12-058 ST3.05 (1).pdf" deleted by Stephen C Day/Northern/QMR/Au] [attachment "T12-058 Cover Page - Clump Point.pdf" deleted by Stephen C Day/Northern/QMR/Au] [attachment "T12-058 ST0.01 (1).pdf" deleted by Stephen C Day/Northern/QMR/Au]

----- Forwarded by Stephen C Day/Northern/QMR/Au on 27/11/2013 10:35 AM -----

From: Stephen C Day/Northern/QMR/Au
To: Scott Ironside <scott@civilplus.com.au>

Cc: tony.rooks@ccrc.qld.gov.au, Anthony@stpconsultants.com.au, "Goodman, David" <David.Goodman@ccrc.qld.gov.au>
Date: 24/01/2013 11:10 AM
Subject: Fw: Clump Point Design drawings [SEC=UNCLASSIFIED]

Scott,

GBRMFA have requested that drawings for Clump Point be amended to show correct DGPS coordinates in decimal format (see below).

Can you please:

1. amend the relevant drawings as required
2. prepare an updated set of drawings for approval by CCRC and submission to GBRMFA
3. advise when you expect to have a full set of design drawings for final approval by CCRC

In the interim, can you please forward you latest proposal for the layout of the stairs and landings and provide the design rationale behind the proposal, including assumptions made about how the smaller boats currently operating at Mission Beach will use the stairs and landings. We can discuss further at the meeting next week, but I need to provide some details of the current proposal before then.

Can you also advise on the status of design of the storm tide gauge housing.

Stephen Day

Engineer (Civil) | Far North Region / Cairns Office
Program Delivery & Operations | Department of Transport and Main Roads

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M:

E: stephen.c.day@tmr.qld.gov.au

W: www.tmr.qld.gov.au ----- Forwarded by Stephen C Day/Northern/QMR/Au on 27/11/2013 10:35 AM -----

----- Forwarded by Stephen C Day/Northern/QMR/Au on 27/11/2013 10:34 AM -----

From: "Scott Ironside" <scott@civilplus.com.au>
To: <Stephen.C.Day@tmr.qld.gov.au>
Cc: "Goodman, David" <David.Goodman@ccrc.qld.gov.au>, "Richard Lamb" <richard@civilplus.com.au>, "Rooks, Tony" <Tony.Rooks@ccrc.qld.gov.au>, <Anthony@stpconsultants.com.au>
Date: 19/11/2012 07:59 AM
Subject: RE: Updated drawings for Clump Point

Stephen,

Updated drawings as requested.

With regard to the fender piles and the fender cones, the platforms have been extended to come further out into the fender pile area, however they are still not flush as the cones need the room to operate.

It appears as though the gap will be about 400mm to allow for the working range of the fender cones. I am not sure if this is acceptable for the operators as we have no information on what they have requested.

Can you please advise comments on this from operators when able?

Thanks

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[attachment "T12-058 Jetty Replacement - Clump Point (12.11.16).pdf" deleted by Stephen C Day/Northern/QMR/Au]

----- Forwarded by Stephen C Day/Northern/QMR/Au on 27/11/2013 10:35 AM -----

From: Stephen C Day/Northern/QMR/Au
To: "Scott Ironside" <scott@civilplus.com.au>
Cc: Anthony@stpconsultants.com.au, "Goodman, David" <David.Goodman@ccrc.qld.gov.au>, "Richard Lamb" <richard@civilplus.com.au>, Stephen.C.Day@tmr.qld.gov.au, "Rooks, Tony" <Tony.Rooks@ccrc.qld.gov.au>
Date: 16/11/2012 03:12 PM
Subject: RE: Updated drawings for Clump Point

Thanks Scott.

The location of piles will need to allow fender cones to function as designed. The 50mm was a nominal figure, but STP will need to check deflections under load and design accordingly. The aim is to locate them as close as possible to keep the gap low. The commercial operators have previously indicated that 700mm would be a concern for them.

STP should provide advice on what gap is acceptable for the type of operations expected and how that can be provided. An option if the gap is considered too large could be to partially recess the fender piles in the deck. Similarly the stairs and landings can be designed to protrude beyond the back edge of the fender piles.

This does not need to be finalised at this stage, but will need to be sorted out for precasting deck units or fabricating stairs and landings, as well as for pile driving.

Kind regards,

Stephen Day
Engineer (Civil) | Far North Region / Cairns Office
Program Delivery & Operations | Department of Transport and Main Roads

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To: <Stephen.C.Day@tmr.qld.gov.au>
Cc: "Goodman, David" <David.Goodman@ccrc.qld.gov.au>, "Richard Lamb" <richard@civilplus.com.au>, "Rooks, Tony" <Tony.Rooks@ccrc.qld.gov.au>, <Anthony@stpconsultants.com.au>
Date: 16/11/2012 01:28 PM
Subject: RE: Updated drawings for Clump Point

Stephen,
I am waiting for a call back from Anthony in relation to these items.

The issue of putting fender piles within 50mm of the deck is going to be a problem as when the cones compress the piles will hit the deck.

We will check the berthing loads applied to the fender cones/piles and put the piles as close as possible to the deck but still allow the fender cones to do their job.

Thanks



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From: Stephen.C.Day@tmr.qld.gov.au [mailto:Stephen.C.Day@tmr.qld.gov.au]
Sent: Friday, 16 November 2012 11:52 AM
To: Scott Ironside
Cc: Goodman, David; Richard Lamb; Stephen.C.Day@tmr.qld.gov.au; Rooks, Tony; Anthony@stpconsultants.com.au
Subject: Re: Updated drawings for Clump Point

Scott,

For submission drawings, similar comments to those for Dunk apply:
1. Reissue as "For Approval"

2. Update the details in the title block
3. Have drawings signed by the RPEQ
4. Notes to Sheet ST1.01 might be better elsewhere (ST2.02) - see also modifications
5. Review drawing titles and make consistent with Sheet list
6. Modify drawings to locate fender piles closer to jetty deck (see comments on attached drawings)
- 7.

(See attached file: T12-058 Jetty Replacement - Clump Point (12.11.13) SCD Notes.pdf)

Additional amendments if they can be easily included:

1. Show RL on contour lines and make light contour lines more visible (ie darker)
2. Show vertical datum as LAT, either by note or in title block
3. Lift lower landing higher and show landing/stairs to clear the middle fender cone

Additional comments for detailed design:

- The lower landings at Palm Cove jetty are at RL 1.08 and have been closed off to the public because they are submerged for the majority of time and become too slippery. The next lowest landing is at 2.03 and remains relatively clear of marine growth. The higher landing is at 2.95 and deck height is 4.5. The objective is to keep the lower landing sufficiently high that it does not rapidly attract marine growth, but not so high that too high a proportion of low tides render it unusable. My thoughts are that for 2 landings, the lower landing should be around 1.6m, with the upper landing a maximum of 1.2m higher. If 3 landings can be provided, the separation could be reduced to say 0.9m or less.
- For safety, the gap between the outside face of fender piles and the jetty deck or landing needs to be kept low, particularly for the smaller vessels likely to use the stairs and landings. Please take into account as part of the detailed design to ensure this gap meets the operational requirements of users.

Kind regards,

Stephen Day

Engineer (Civil) | Far North Region / Cairns Office
Program Delivery & Operations | Department of Transport and Main Roads

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Cc: "Rooks, Tony" <Tony.Rooks@ccrc.qld.gov.au>, "Goodman, David" <David.Goodman@ccrc.qld.gov.au>, "Richard Lamb" <richard@civilplus.com.au>
Date: 15/11/2012 09:53 AM
Subject: Updated drawings for Clump Point

Stephen
As discussed.

Thanks



Scott Ironside | Project Manager & Managing Director | CivilPlus Constructions Pty Ltd

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[attachment "T12-058 Jetty Replacement - Clump Point (12.11.13).pdf" deleted by Stephen C Day/Northern/QMR/Au]

Released under RTI - DTMR

CONCRETE AND REINFORCEMENT

- All concrete work shall be in accordance with AS 3600 Concrete Structures.
- Concrete Specifications shall be:-

ELEMENT	GRADE	SLUMP	MAX AGG
Exterior RC	50 MPa	80 +/- 15	20mm

Minimum 360 kg/m³ cement w/c ratio 0.45
maximum 25% fly ash by mass of binder
- Cover to reinforcement shall be :-
 - Footings - 75mm bottom, 65mm sides and top
 - Headstock & Girders - 65mm to all surfaces
 - Decking Slabs - 60mm to all surfaces
 - Cover shall be 60mm where surface is exterior above ground.
- Reinforcement shall be tied into position and supported on approved plastic as follows:-
 - Bars up to N12 and fabric - 800mm centres.
 - Bars N16 and larger - 1200mm centres.
- Welding and bending of reinforcement is not permitted unless shown on the drawings or approved by the Engineer.
- Laps unless shown otherwise:

Fabric	1 complete mesh		
N12	360	N24	720
N16	480	N28	840
N20	600		

Horizontal bars with more than 300mm concrete under then shall have laps 1.3 times these lengths.
- Construction joints shall be scabbed and cleaned and coated with a cement/water slurry immediately after prior to placing concrete.
- Concrete shall be compacted using mechanical vibrators.
- Concrete shall be cured for a minimum of 7 days by a method approved by the Engineer.
- Conduits, pipes etc. must not be placed in the concrete cover and no holes or chases other than those shown on the Structural drawings shall be made in concrete members unless approved by the Engineer.
- Formwork shall comply with AS3610 "Formwork for Concrete" and all relevant Construction Safety Legislation. Unless otherwise noted finishes shall be Class 3. Minimum formwork stripping times shall be in accordance with Table 5.4.1 of AS 3610 "Formwork of Concrete".
- Control joints shall be constructed as specified. Saw cutting shall be carried out within 6 hours of concrete hardening.
- Concrete test cylinders shall be prepared as required by the Supervisor and tested by a NATA registered laboratory.
- Allowance shall be made in all finishes for movement in construction joints and expansion joints.

HEALTH AND SAFETY

- The contractor shall develop, implement and administer a workplace health and safety program that will ensure that all construction activities are performed to the relevant workplace health and safety requirements and any other statutory requirements.
- The workplace health and safety program must be co-ordinated with adjoining property owners and all relevant parties as necessary to ensure a safe building environment at all times.

STRUCTURAL STEELWORK

- All steelwork including connectors shall be in accordance with AS 4100 Steel Structures Code and AS/NZS 4600-1996 Cold formed steel structures.
- Steel shall be: AS 3679 Grade 300 generally AS 1163 Grade 250 for circular hollow sections AS 1163 Grade for rectangular hollow sections. Bolts shall comply with AS 1110, AS 1111, AS 1112 AS 1252 as appropriate. Welds shall comply with AS 1554.
- Abrasive cleaning prior to painting shall be to AS 1627.4 Class 2.5. Painting shall be a two component high solids epoxy coating applied in two coats to achieve a minimum dry film thickness of 500 microns. Coating applied within 2 hours of abrasive cleaning, unless specified otherwise. Painting shall be to manufacturer's specification and the painter shall ensure the method of application is compatible with connection type and paint specified.
- Galvanising shall be hot dipped to AS 4680.
- Bolts shall be galvanised and of sufficient length to exclude the thread from the shear plane. A suitable washer shall be used under all nuts.
- Unless otherwise specified, the following shall apply:
 - Cleats, brackets, stiffeners etc. - ex.10mm plate.
 - Welding - 6mm continuous fillet to full perimeter at contact.
 - Bolt hole clearance - 2mm.
 - Butt welds shall be qualified complete penetration in accordance with AS 1554.
 - 6mm endplates to all hollow members.
 - Connections - minimum of 2-M20 8.8/S bolts.
- All welding to be Category "SP". Consumables shall be E48xx or W50x electrodes.
- Fabricator shall allow for all cleats and other fixings required by the Supervisor.
- Mortar shall be 1 cement: 2 sand mixed "just moist" and rammed solid.
- Galvanised/hot dipped galvanized or stainless steel bolts, nuts and washer shall be in accordance with AS 1214.
- Apply Zinc rod finishing weld, such as "Boss Galvanizing Bar" to restate galvanizing after welding - typical all galvanized surfaces.
- The checking of shop drawings is included in our scope of works. STP Consultants will require 5 business days after receiving all shop detail drawings for STP Consultants to return comments.

TEMPORARY WORKS

- The contractor shall allow for all costs associated with the design, supply, installation and removal of all temporary back propping, safety screens, scaffolding and other requirements of the construction process. The contractor shall engage suitably qualified engineer to design, inspect and certify all temporary works and demolition works.
- The contractor is to provide all temporary works contractor engineering drawings to the structural engineer for information.
- It is the contractor's responsibility to ensure the overall stability of the structure whilst under construction. The contractor shall obtain advice from the engineer.
- The contractor is to have the construction methodology statements prepared and submitted for general review to ensure it is in accordance with the design intent.
- All vertical displacement and movements are to be limited to ensure the structure is not subjected to loads or movements causing structural distress to any element while the structure is being temporarily supported.
- Structure to be adequately braced to prevent any horizontal movement or deflections.

NUISANCE

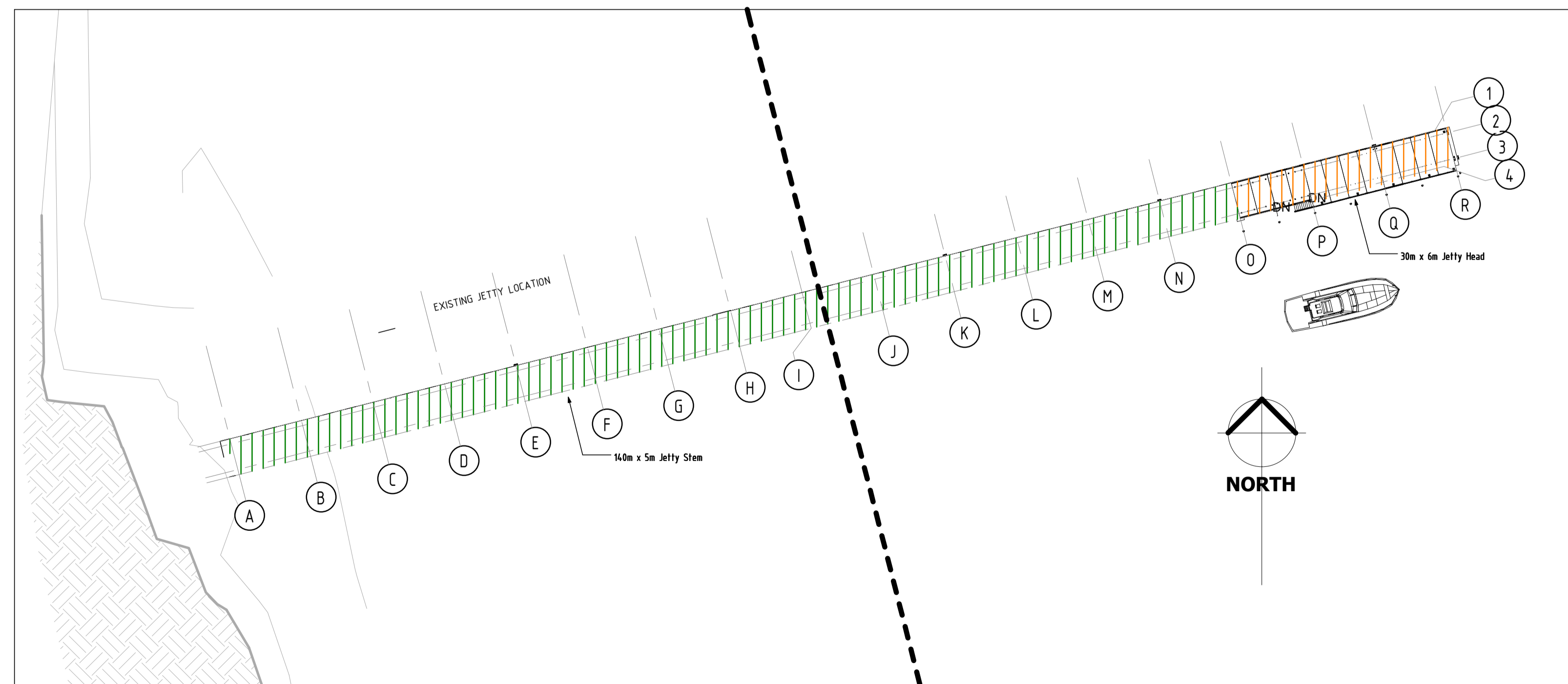
- The contractor shall develop, implement and administer a plan that will ensure the management of noise and vibration resulting from construction works.
- The contractor will need to ensure all adjoining property requirements relating to noise and vibration are met.
- If it is established that there are no site specific requirements, then the contractor shall refer to minimum requirements for abatement of noise and vibration nominated by relevant by statutory requirements.
- The contractor will need to prepare and advise on monitoring and management of noise and vibration based on professional advice from suitably qualified person or persons.

SERVICE LOADS

- Function Category 1
Structural Design Actions to AS/NZS 1170.0 & -1, AS 4997:
Deck UDL: 15.0kPa
Deck Conc. Load: 200kN
Class 15
Vessel: Length (LOA) 25m
Displacement 65 Tonnes
50 years
- Design working life
- Wind Actions equivalent to AS/NZS 1170.2:
Region: C
Terrain Category: 2.0
Shielding Multiplier Ms 1.0
Topographic Multiplier Mt 1.0
Terrain/Height Multiplier Mz,cat,u 0.95
Design Gust Wind Speed Vz, ultimate: 66m/s
- Earthquake Loads to AS 1170.4:
Hazard Factor: 0.07
Probability Factor: 1.0
Design Category I
- Hand rail details are to be in accordance with manufacturer's design and certification, in accordance with AS 4997.
- The above do not include loads which may be applied during construction. The builder is to maintain stability during construction.
- Wave loading based on report B3872 by Bonacci Group (QLD) Pty. Ltd.

PILING NOTES

- All piling shall be in accordance with AS 2159 Piling Code and with notes and details as set out on the drawings.
- The detail of the pile to be used and the method of operation shall be submitted to the Engineer for approval.
- Pile testing and confirmation that piles have achieved the required depth and capacity shall be carried out by the piling contractor. The method of testing shall be submitted to the Engineer for approval.
- Load-bearing piles have been designed to withstand loads indicated on the piling plan, with a maximum settlement of 10mm and an eccentricity of 75mm.
- Piles shall be driven by approved pile driving techniques to an approved set calculated by the Hiley Formula. A certificate of adequacy for pile loads shall be submitted by the Piling Contractor to the Engineer for approval.
- All piles shall be driven in the proper position shown on the drawings with a variation of not more than 25mm in 3m from the vertical (or raking line) with a maximum variation at the head of the pile from the position shown on the drawings of 75mm in any direction at the commencing surface. Variations outside these limits shall be cause for rejection.
- Pile set out shall be by Authorised Surveyor and pile locations shall be checked and advised to Engineer after construction.
- Piles should be cut off to level. Immediately after making the final cut off, the area should be coated with an approved protective coating over the exposed surface.



Rev	Description	By	Appd	Date
2	CONSTRUCTION ISSUE	JBG	AJF	8.02.13
1	CONSTRUCTION ISSUE	JBG	AJF	25.01.13
F	APPROVAL ISSUE	JBG	AJF	16.11.12
E	PRELIMINARY ISSUE	JBG	AJF	13.11.12
D	FOR APPROVAL	JBG	AJF	21.09.12
C	TENDER ISSUE	JBG	AJF	30.06.12
B	PRELIMINARY ISSUE	JBG	AJF	12.06.12
A	PRELIMINARY ISSUE	JBG	AJF	31.05.12



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Client:
CIVIL PLUS CONSTRUCTIONS

Project:
**CLUMP POINT
JETTY REPLACEMENT**

Title:
STRUCTURAL NOTES

Design	Designer	Drawn	Author
Checked	Checker	Date	NOV '12
RPEU No.	Approver	Datum	-

Approved:

Job Number:	Drawing No.	Revision
T12-058	ST0.01	2

CONSTRUCTION

CONCRETE AND REINFORCEMENT

- All concrete work shall be in accordance with AS 3600 Concrete Structures.
- Concrete Specifications shall be:-

ELEMENT	GRADE	SLUMP	MAX AGG
Exterior RC	50 MPa	80 +/- 15	20mm

Minimum 360 kg/m³ cement w/c ratio 0.45
maximum 25% fly ash by mass of binder
- Cover to reinforcement shall be :-
 - Footings - 75mm bottom, 65mm sides and top
 - Headstock & Girders - 65mm to all surfaces
 - Decking Slabs - 60mm to all surfaces
 - Cover shall be 60mm where surface is exterior above ground.
- Reinforcement shall be tied into position and supported on approved plastic as follows:-
 - Bars up to N12 and fabric - 800mm centres.
 - Bars N16 and larger - 1200mm centres.
- Welding and bending of reinforcement is not permitted unless shown on the drawings or approved by the Engineer.
- Laps unless shown otherwise:

Fabric 1 complete mesh			
N12	360	N24	720
N16	480	N28	840
N20	600		

Horizontal bars with more than 300mm concrete under then shall have laps 1.3 times these lengths.
- Construction joints shall be scabbed and cleaned and coated with a cement/water slurry immediately after prior to placing concrete.
- Concrete shall be compacted using mechanical vibrators.
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- Conduits, pipes etc. must not be placed in the concrete cover and no holes or chases other than those shown on the Structural drawings shall be made in concrete members unless approved by the Engineer.
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- All steelwork including connectors shall be in accordance with AS 4100 Steel Structures Code and AS/NZS 4600-1996 Cold formed steel structures.
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- Abrasive cleaning prior to painting shall be to AS 1627.4 Class 2.5. Painting shall be one coat .075mm two pack inorganic air cured zinc silicate coating applied within 2 hours of abrasive cleaning, unless specified otherwise. Painting shall be to manufacturer's specification and the painter shall ensure the method of application is compatible with connection type and paint specified.
- Galvanising shall be hot dipped to AS 4680.
- Bolts shall be galvanised and of sufficient length to exclude the thread from the shear plane. A suitable washer shall be used under all nuts.
- Unless otherwise specified, the following shall apply:
 - Cleats, brackets, stiffeners etc. - ex.10mm plate.
 - Welding - 6mm continuous fillet to full perimeter at contact.
 - Bolt hole clearance - 2mm.
- Butt welds shall be qualified complete penetration in accordance with AS 1554.
- 6mm endplates to all hollow members.
- Connections - minimum of 2-M20 8.8/S bolts.
- All welding to be Category "SP". Consumables shall be E48xx or W50x electrodes.
- Fabricator shall allow for all cleats and other fixings required by the Supervisor.
- Mortar shall be 1 cement: 2 sand mixed "just moist" and rammed solid.
- Galvanised/hot dipped galvanized or stainless steel bolts, nuts and washer shall be in accordance with AS 1214.
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- It is the contractor's responsibility to ensure the overall stability of the structure whilst under construction. The contractor shall obtain advice from the engineer.
- The contractor is to have the construction methodology statements prepared and submitted for general review to ensure it is in accordance with the design intent.
- All vertical displacement and movements are to be limited to ensure the structure is not subjected to loads or movements causing structural distress to any element while the structure is being temporarily supported.
- Structure to be adequately braced to prevent any horizontal movement or deflections.

NUISANCE

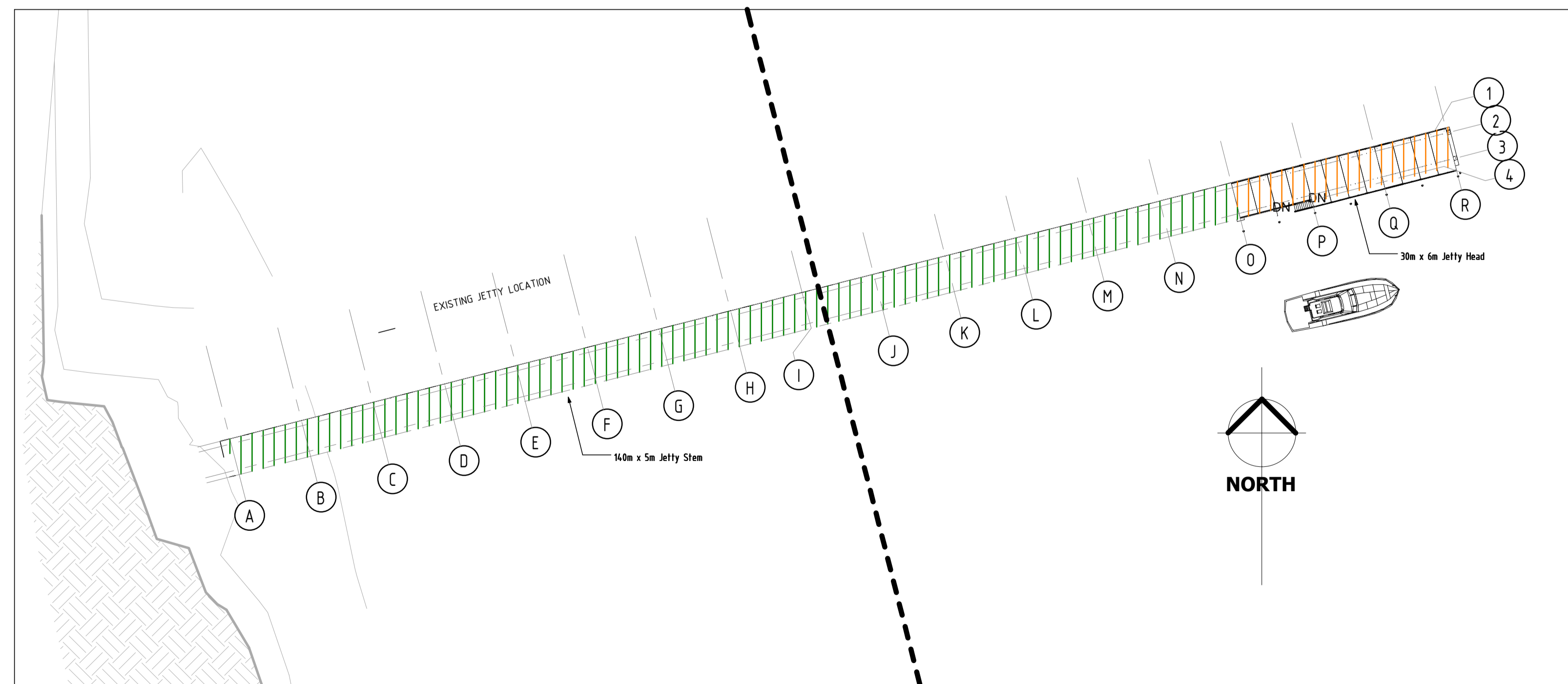
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- The contractor will need to prepare and advise on monitoring and management of noise and vibration based on professional advice from suitably qualified person or persons.

SERVICE LOADS

- Function Category: 2 (Normal)
Structural Design Actions to AS/NZS 1170.0 & -1, AS 4997:
Deck UDL: 15.0kPa
Deck Conc. Load: 200kN
Class 15
Vessel: Length (LOA) 25m
Displacement 110 Tonnes
50 years
- Design working life
- Wind Actions equivalent to AS/NZS 1170.2:
Region: C
Terrain Category: 2.0
Shielding Multiplier Ms 1.0
Topographic Multiplier Mt 1.0
Terrain/Height Multiplier Mz,cat,u 0.95
Design Gust Wind Speed Vz, ultimate: 66m/s
- Earthquake Loads to AS 1170.4:
Hazard Factor: 0.07
Probability Factor: 1.0
Design Category: I
- Hand rail details are to be in accordance with manufacturer's design and certification, in accordance with AS 4997.
- The above do not include loads which may be applied during construction. The builder is to maintain stability during construction.
- Wave loading based on report B3872 by Bonacci Group (QLD) Pty. Ltd.

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- Pile testing and confirmation that piles have achieved the required depth and capacity shall be carried out by the piling contractor. The method of testing shall be submitted to the Engineer for approval.
- Load-bearing piles have been designed to withstand loads indicated on the piling plan, with a maximum settlement of 10mm and an eccentricity of 75mm.
- Piles shall be driven by approved pile driving techniques to an approved set calculated by the Hiley Formula. A certificate of adequacy for pile loads shall be submitted by the Piling Contractor to the Engineer for approval.
- All piles shall be driven in the proper position shown on the drawings with a variation of not more than 25mm in 3m from the vertical (or raking line) with a maximum variation at the head of the pile from the position shown on the drawings of 75mm in any direction at the commencing surface. Variations outside these limits shall be cause for rejection.
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Rev	Description	By	Appd	Date
1	CONSTRUCTION ISSUE	JBG	AJF	25.01.13
F	APPROVAL ISSUE	JBG	AJF	16.11.12
E	PRELIMINARY ISSUE	JBG	AJF	13.11.12
D	FOR APPROVAL	JBG	AJF	21.09.12
C	TENDER ISSUE	JBG	AJF	30.06.12
B	PRELIMINARY ISSUE	JBG	AJF	12.06.12
A	PRELIMINARY ISSUE	JBG	AJF	31.05.12



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Client: CIVIL PLUS CONSTRUCTIONS

Project: CLUMP POINT JETTY REPLACEMENT

Title: STRUCTURAL NOTES

Design	Designer	Drawn	Author
Checked	Checker	Date	NOV '12
RPEU No.	Approver	Datum	-
Approved: [Signature]			
Job Number: T12-058	Drawing No. ST0.01	Revision	1

CONSTRUCTION

CONCRETE AND REINFORCEMENT

- All concrete work shall be in accordance with AS 3600 Concrete Structures.
- Concrete Specifications shall be:-

ELEMENT	GRADE	SLUMP	MAX AGG
Exterior RC	S50	50-20	20
- Cover to reinforcement shall be :-
 - Footings - 75mm bottom, 65mm sides and top
 - Headstock & Girders - 65mm to all surfaces
 - Decking Slabs - 60mm to all surfaces
 - Cover shall be 65mm where surface is exterior above ground.
- Reinforcement shall be tied into position and supported on approved plastic or plastic tipped wire chair as follows:-
 - Bars up to N12 and fabric - 800mm centres.
 - Bars N16 and larger - 1200 centres.
- Welding and bending of reinforcement is not permitted unless shown on the drawings or approved by the Engineer.
- Laps unless shown otherwise:

Fabric 1 complete mesh			
N12	360	N24	720
N16	480	N28	840
N20	600		

Horizontal bars with more than 300mm concrete under then shall have laps 1.3 times these lengths.
- Construction joints shall be scabbed and cleaned and coated with a cement/water slurry immediately after prior to placing concrete.
- Concrete shall be compacted using mechanical vibrators.
- Concrete shall be cured for a minimum of 7 days by a method approved by the Engineer.
- Conduits, pipes etc. must not be placed in the concrete cover and no holes or chases other than those shown on the Structural drawings shall be made in concrete members unless approved by the Engineer.
- Formwork shall comply with AS3610 "Formwork for Concrete" and all relevant Construction Safety Legislation. Unless otherwise noted finishes shall be Class 3. Minimum formwork stripping times shall be in accordance with Table 5.4.1 of AS 3610 "Formwork of Concrete".
- Control joints shall be constructed as specified. Saw cutting shall be carried out within 6 hours of concrete hardening.
- Concrete test cylinders shall be prepared as required by the Supervisor and tested by a NATA registered laboratory.
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HEALTH AND SAFETY

- The contractor shall develop, implement and administer a workplace health and safety program that will ensure that all construction activities are performed to the relevant workplace health and safety requirements and any other statutory requirements.
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STRUCTURAL STEELWORK

- All steelwork including connectors shall be in accordance with AS 4100 Steel Structures Code and AS/NZS 4600-1996 Cold formed steel structures.
- Steel shall be: AS 3679 Grade 300 generally AS 1163 Grade 250 for circular hollow sections AS 1163 Grade for rectangular hollow sections. Bolts shall comply with AS 1110, AS 1111, AS 1112 AS 1252 as appropriate. Welds shall comply with AS 1554.
- Abrasive cleaning prior to painting shall be to AS 1627.4 Class 2.5. Painting shall be one coat .075mm two pack inorganic air cured zinc silicate coating applied within 2 hours of abrasive cleaning, unless specified otherwise. Painting shall be to manufacturer's specification and the painter shall ensure the method of application is compatible with connection type and paint specified.
- Galvanising shall be hot dipped to AS 4680.
- Bolts shall be galvanised and of sufficient length to exclude the thread from the shear plane. A suitable washer shall be used under all nuts.
- Unless otherwise specified, the following shall apply:
 - Cleats, brackets, stiffeners etc. - ex.10mm plate.
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 - Bolt hole clearance - 2mm.
 - Butt welds shall be qualified complete penetration in accordance with AS 1554.
 - 6mm endplates to all hollow members.
 - Connections - minimum of 2-M20 8.8/S bolts.
- All welding to be Category "SP". Consumables shall be E48xx or W50x electrodes.
- Fabricator shall allow for all cleats and other fixings required by the Supervisor.
- Mortar shall be 1 cement: 2 sand mixed "just moist" and rammed solid.
- Galvanised/hot dipped galvanized or stainless steel bolts, nuts and washer shall be in accordance with AS 1214.
- Apply Zinc rod finishing weld, such as "Boss Galvanizing Bar" to reinstafe galvanizing after welding - typical all galvanized surfaces.
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- Structure to be adequately braced to prevent any horizontal movement or deflections.

NUISANCE

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SERVICE LOADS

- Function Category 2 (Normal)
Structural Design Actions to AS/NZS 1170.0 & -1, AS 4997:
Deck UDL: 15.0kPa
Deck Conc. Load: 200kN
Vessel: Length (LOA) 25m
Displacement 110 Tonnes
50 years
- Design working life
- Wind Actions equivalent to AS/NZS 1170.2:
Region: C
Terrain Category: 2.0
Shielding Multiplier Ms 1.0
Topographic Multiplier Mt 1.0
Terrain/Height Multiplier Mz,cat,u 0.95
Design Gust Wind Speed Vz, ultimate: 66m/s
- Earthquake Loads to AS 1170.4:
Hazard Factor: 0.07
Probability Factor: 1.0
Design Category I
- Hand rail details are to be in accordance with manufacturer's design and certification, in accordance with AS 4997.
- The above do not include loads which may be applied during construction. The builder is to maintain stability during construction.
- Wave loading based on report B3872 by Bonacci Group (QLD) Pty. Ltd.

PILING NOTES

- All piling shall be in accordance with AS 2159 Piling Code and with notes and details as set out on the drawings.
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F	APPROVAL ISSUE	JBG	AJF	16.11.12
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D	FOR APPROVAL	JBG	AJF	21.09.12
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Client: CIVIL PLUS CONSTRUCTIONS
Project: CLUMP POINT JETTY REPLACEMENT

Title: STRUCTURAL NOTES

Design	Designer	Drawn	Author
Checked	Checker	Date	NOV '12
RPEU No.	Approver	Datum	-

Approved: [Signature]

Job Number:	Drawing No.	Revision
T12-058	ST0.01	F

FOR APPROVAL

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NUISANCE

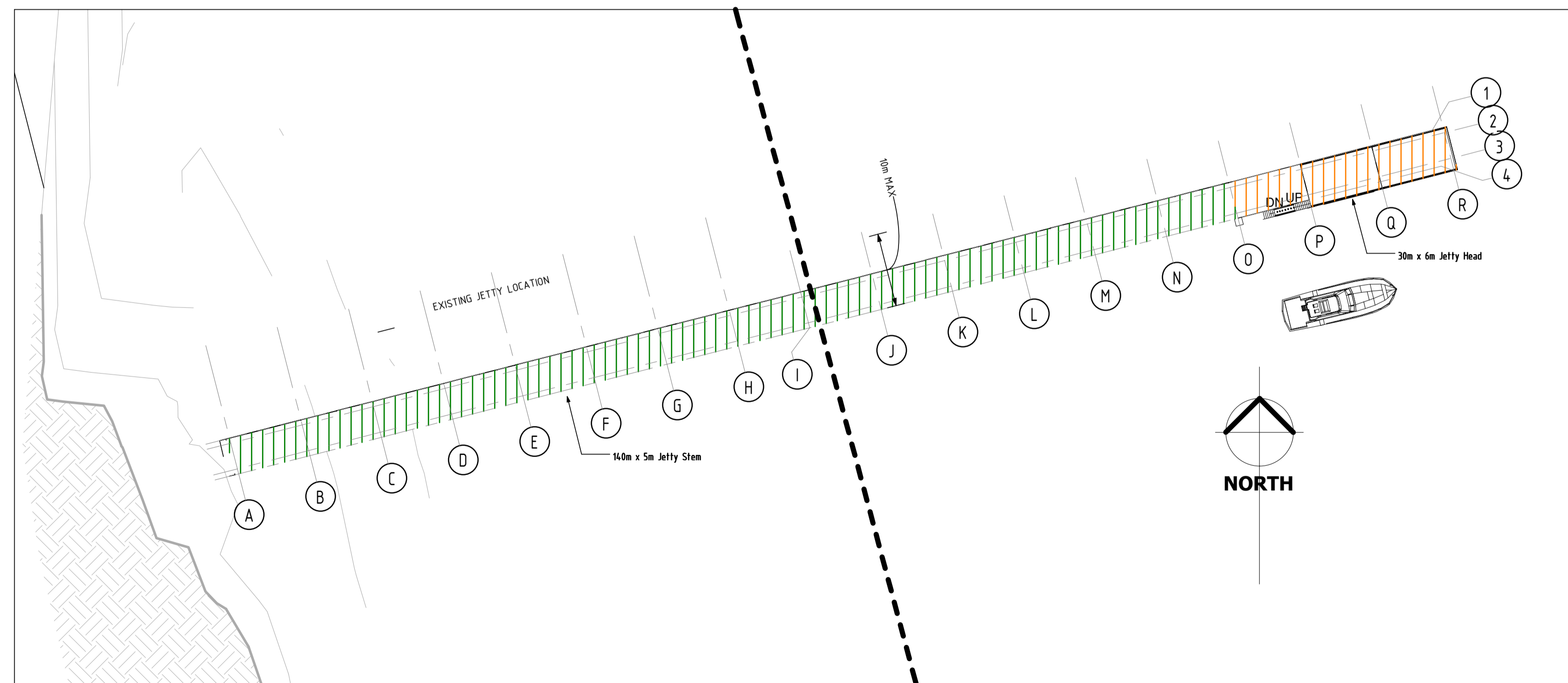
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Deck UDL: 15.0kPa
Deck Conc. Load: 200kN
Vessel: Length (LOA) 25m
Displacement 110 Tonnes
50 years
- Design working life
- Wind Actions equivalent to AS/NZS 1170.2:
Region: C
Terrain Category: 2.0
Shielding Multiplier Ms 1.0
Topographic Multiplier Mt 1.0
Terrain/Height Multiplier Mz,cat,u 0.95
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Client:
CIVIL PLUS CONSTRUCTIONS

Project:
**CLUMP POINT
JETTY REPLACEMENT**

Title:
STRUCTURAL NOTES

Design	Designer	Drawn	Author
Checked	Checker	Date	
RPEU No.	Approver	Datum	-

Approved:		
Job Number:	Drawing No.	Revision
T12-058	ST0.01	E

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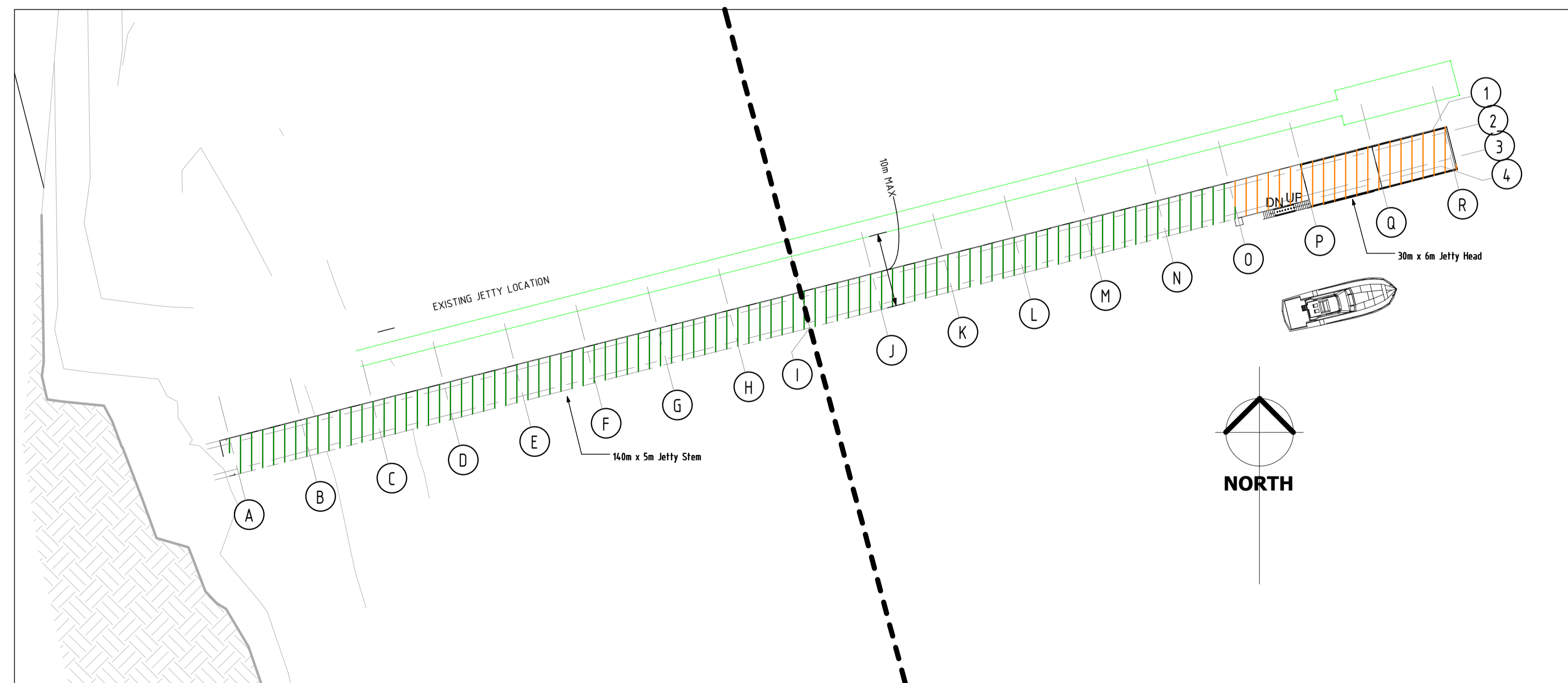
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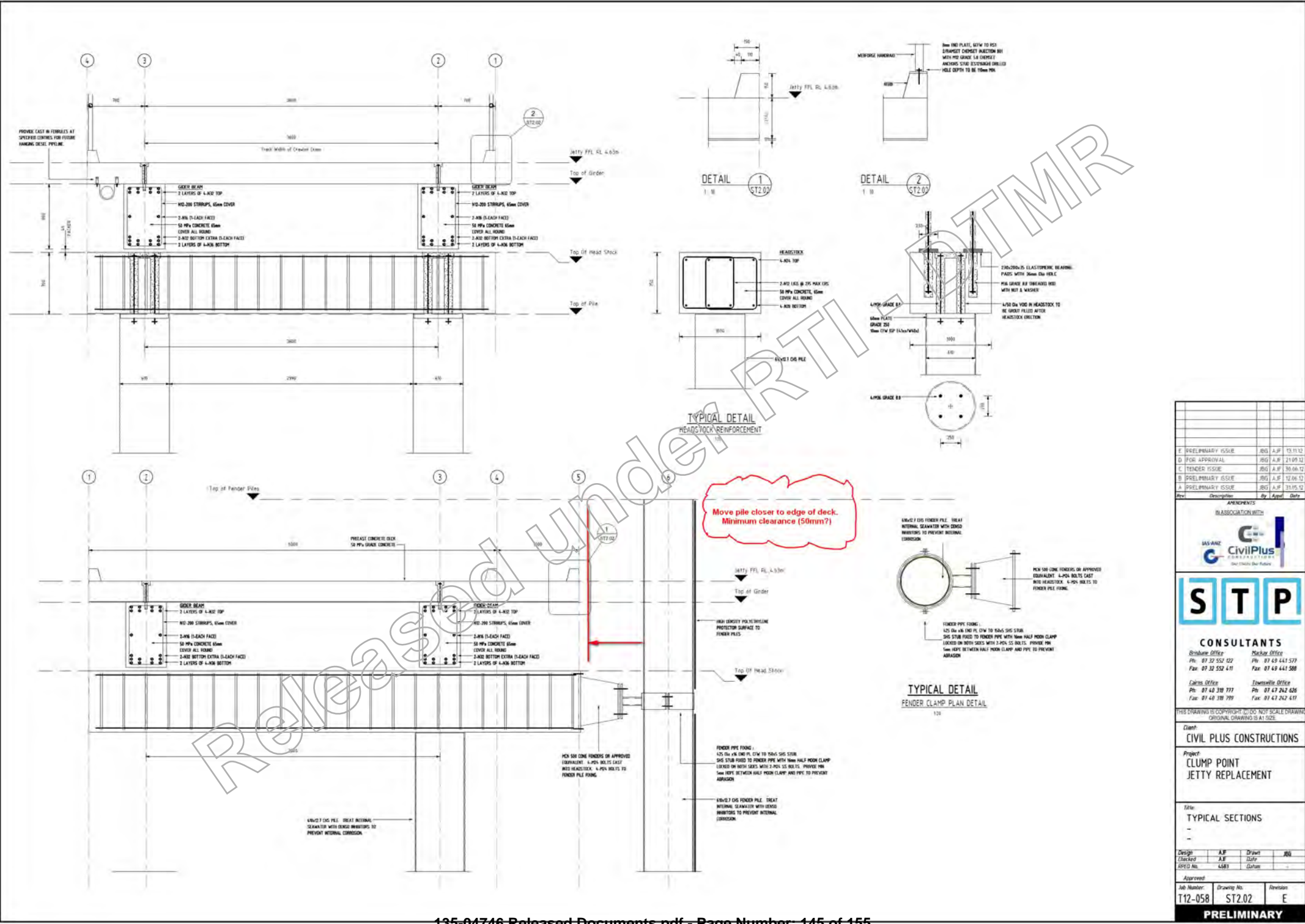
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Project:	CLUMP POINT JETTY REPLACEMENT
Title:	STRUCTURAL NOTES

Design	Designer	Drawn	Author
Checked	Checker	Date	
RPEU No.	Approver	Datum	-

Approved:		
Job Number:	Drawing No.	Revision
T12-058	ST0.01	D

APPROVAL



DETAIL 1
1/B

DETAIL 2
1/B

TYPICAL DETAIL
HEADSTOCK REINFORCEMENT

TYPICAL DETAIL
FENDER CLAMP PLAN DETAIL

Move pile closer to edge of deck.
Minimum clearance (50mm?)

Rev	Description	By	Appr	Date
A	PRELIMINARY ISSUE	JBG	A.J.F.	13.11.12
B	PRELIMINARY ISSUE	JBG	A.J.F.	31.05.12
C	TENDER ISSUE	JBG	A.J.F.	30.06.12
D	FOR APPROVAL	JBG	A.J.F.	21.09.12
E	PRELIMINARY ISSUE	JBG	A.J.F.	12.06.12

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Client: CIVIL PLUS CONSTRUCTIONS

Project: CLUMP POINT JETTY REPLACEMENT

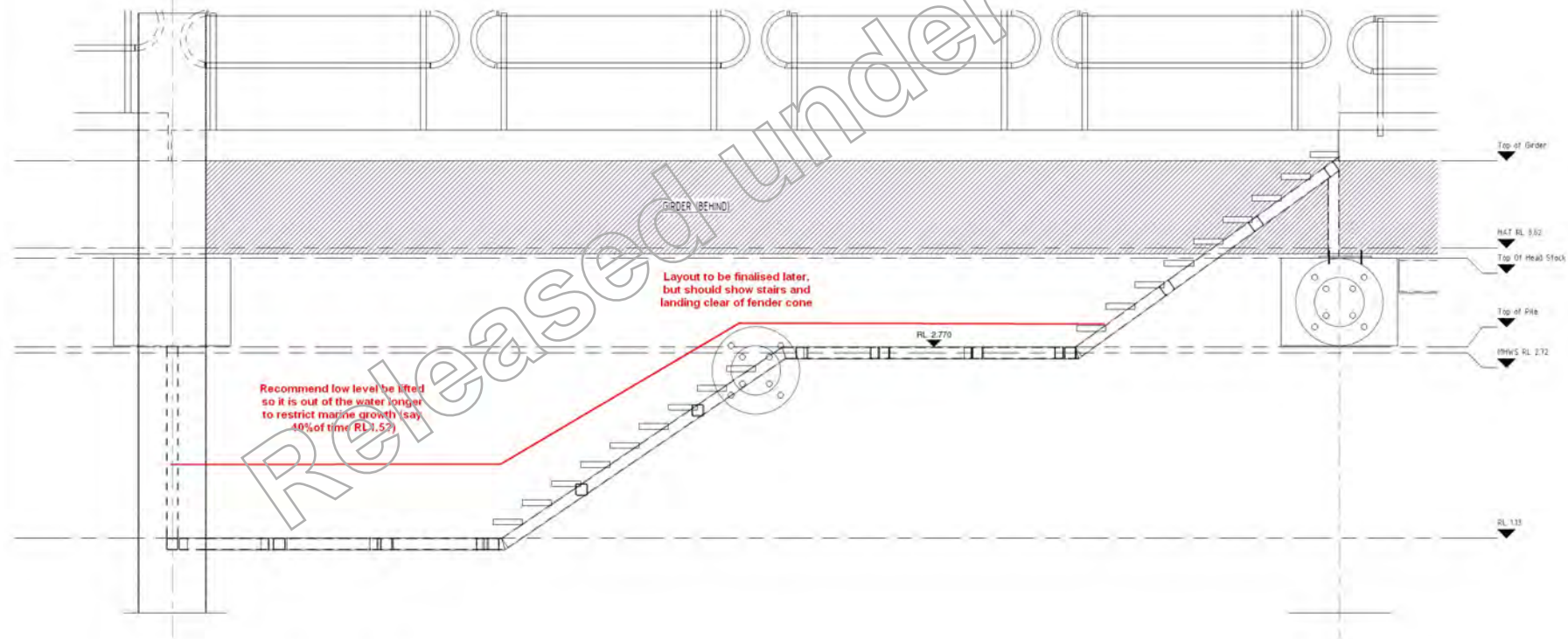
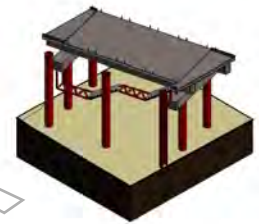
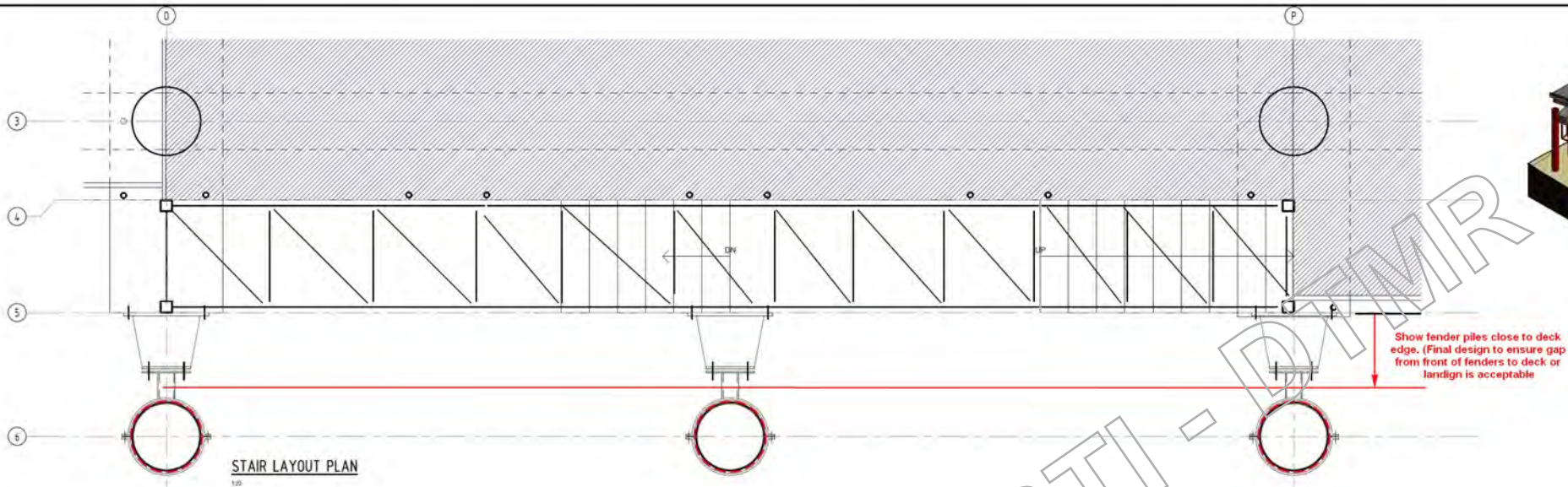
Title: TYPICAL SECTIONS

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Checked	A.J.F.	Scale	-
REVISED No.	4481	Scale	-

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Job Number	Drawing No.	Revision
T12-058	ST2.02	E

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Client: **CIVIL PLUS CONSTRUCTIONS**

Project: **CLUMP POINT JETTY REPLACEMENT**

Title: **STAIR DETAILS**

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Job Number	Drawing No.	Revision
T12-058	ST2.04	D

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SHEET No.	SHEET LIST	SHEET NAME
ST0.01	STRUCTURAL NOTES	
ST1.01	PILING PLAN	
ST1.03	PILING SCHEDULE	
ST1.04	FENDER PILES	
ST2.01	JETTY LONG SECTION	
ST2.02	TYPICAL SUPPORTS SECTION	
ST2.03	DETAILS	
ST2.04	STAIRS DETAILS	
ST5.01	FRAMING & PILING JIG PLAN VIEW	
ST5.02	FRAMING & PILING JIG ELEVATIONS	
ST5.03	CONSTRUCTION SEQUENCE SAGES 1 - 4	
ST5.04	CONSTRUCTION SEQUENCE STAGE 5 - 8	

JETTY REPLACEMENT CLUMP POINT, MISSION BEACH QLD



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CONCRETE AND REINFORCEMENT

- All concrete work shall be in accordance with AS 3600 Concrete Structures.
- Concrete Specifications shall be:-

ELEMENT	GRADE	SLUMP	MAX AGG
Exterior RC	S50	50-20	20
- Cover to reinforcement shall be :-
 - Footings - 75mm bottom, 65mm sides and top
 - Headstock & Girders - 65mm to all surfaces
 - Decking Slabs - 60mm to all surfaces
 - Cover shall be 65mm where surface is exterior above ground.
- Reinforcement shall be tied into position and supported on approved plastic or plastic tipped wire chair as follows:-
 - Bars up to N12 and fabric - 800mm centres.
 - Bars N16 and larger - 1200 centres.
- Welding and bending of reinforcement is not permitted unless shown on the drawings or approved by the Engineer.
- Laps unless shown otherwise:

Fabric 1 complete mesh			
N12	360	N24	720
N16	480	N28	840
N20	600		

 Horizontal bars with more than 300mm concrete under then shall have laps 1.3 times these lengths.
- Construction joints shall be scabbed and cleaned and coated with a cement/water slurry immediately after prior to placing concrete.
- Concrete shall be compacted using mechanical vibrators.
- Concrete shall be cured for a minimum of 7 days by a method approved by the Engineer.
- Conduits, pipes etc. must not be placed in the concrete cover and no holes or chases other than those shown on the Structural drawings shall be made in concrete members unless approved by the Engineer.
- Formwork shall comply with AS3610 "Formwork for Concrete" and all relevant Construction Safety Legislation. Unless otherwise noted finishes shall be Class 3. Minimum formwork stripping times shall be in accordance with Table 5.4.1 of AS 3610 "Formwork of Concrete".
- Control joints shall be constructed as specified. Saw cutting shall be carried out within 6 hours of concrete hardening.
- Concrete test cylinders shall be prepared as required by the Supervisor and tested by a NATA registered laboratory.
- Allowance shall be made in all finishes for movement in construction joints and expansion joints.

HEALTH AND SAFETY

- The contractor shall develop, implement and administer a workplace health and safety program that will ensure that all construction activities are performed to the relevant workplace health and safety requirements and any other statutory requirements.
- The workplace health and safety program must be co-ordinated with adjoining property owners and all relevant parties as necessary to ensure a safe building environment at all times.

STRUCTURAL STEELWORK

- All steelwork including connectors shall be in accordance with AS 4100 Steel Structures Code and AS/NZS 4600-1996 Cold formed steel structures.
- Steel shall be: AS 3679 Grade 300 generally AS 1163 Grade 250 for circular hollow sections AS 1163 Grade for rectangular hollow sections. Bolts shall comply with AS 1110, AS 1111, AS 1112 AS 1252 as appropriate. Welds shall comply with AS 1554.
- Abrasive cleaning prior to painting shall be to AS 1627.4 Class 2.5. Painting shall be one coat .075mm two pack inorganic air cured zinc silicate coating applied within 2 hours of abrasive cleaning, unless specified otherwise. Painting shall be to manufacturer's specification and the painter shall ensure the method of application is compatible with connection type and paint specified.
- Galvanising shall be hot dipped to AS 4680.
- Bolts shall be galvanised and of sufficient length to exclude the thread from the shear plane. A suitable washer shall be used under all nuts.
- Unless otherwise specified, the following shall apply:
 - Cleats, brackets, stiffeners etc. - ex.10mm plate.
 - Welding - 6mm continuous fillet to full perimeter at contact.
 - Bolt hole clearance - 2mm.
 - Butt welds shall be qualified complete penetration in accordance with AS 1554.
 - 6mm endplates to all hollow members.
 - Connections - minimum of 2-M20 8.8/S bolts.
- All welding to be Category "SP". Consumables shall be E48xx or W50x electrodes.
- Fabricator shall allow for all cleats and other fixings required by the Supervisor.
- Mortar shall be 1 cement: 2 sand mixed "just moist" and rammed solid.
- Galvanised/hot dipped galvanized or stainless steel bolts, nuts and washer shall be in accordance with AS 1214.
- Apply Zinc rod finishing weld, such as "Boss Galvanizing Bar" to reinstafe galvanizing after welding - typical all galvanized surfaces.
- The checking of shop drawings is included in our scope of works. STP Consultants will require 5 business days after receiving all shop detail drawings for STP Consultants to return comments.

TEMPORARY WORKS

- The contractor shall allow for all costs associated with the design, supply, installation and removal of all temporary back propping, safety screens, scaffolding and other requirements of the construction process. The contractor shall engage suitably qualified engineer to design, inspect and certify all temporary works and demolition works.
- The contractor is to provide all temporary works contractor engineering drawings to the structural engineer for information.
- It is the contractor's responsibility to ensure the overall stability of the structure whilst under construction. The contractor shall obtain advice from the engineer.
- The contractor is to have the construction methodology statements prepared and submitted for general review to ensure it is in accordance with the design intent.
- All vertical displacement and movements are to be limited to ensure the structure is not subjected to loads or movements causing structural distress to any element while the structure is being temporarily supported.
- Structure to be adequately braced to prevent any horizontal movement or deflections.

NUISANCE

- The contractor shall develop, implement and administer a plan that will ensure the management of noise and vibration resulting from construction works.
- The contractor will need to ensure all adjoining property requirements relating to noise and vibration are met.
- If it is established that there are no site specific requirements, then the contractor shall refer to minimum requirements for abatement of noise and vibration nominated by relevant by statutory requirements.
- The contractor will need to prepare and advise on monitoring and management of noise and vibration based on professional advice from suitably qualified person or persons.

SERVICE LOADS

- Function Category: 2 (Normal)
Structural Design Actions to AS/NZS 1170.0 & -1, AS 4997:
Deck UDL: 15.0kPa
Deck Conc. Load: 200kN
Vessel: Length (LOA) 25m
Displacement 110 Tonnes
50 years
- Design working life
- Wind Actions equivalent to AS/NZS 1170.2:
Region: C
Terrain Category: 2.0
Shielding Multiplier Ms 1.0
Topographic Multiplier Mt 1.0
Terrain/Height Multiplier Mz,cat,u 0.95
Design Gust Wind Speed Vz, ultimate: 66m/s
- Earthquake Loads to AS 1170.4:
Hazard Factor: 0.07
Probability Factor: 1.0
Design Category: I
- Hand rail details are to be in accordance with manufacturer's design and certification, in accordance with AS 4997.
- The above do not include loads which may be applied during construction. The builder is to maintain stability during construction.
- Wave loading based on report B3872 by Bonacci Group (QLD) Pty. Ltd.

PILING NOTES

- All piling shall be in accordance with AS 2159 Piling Code and with notes and details as set out on the drawings.
- The detail of the pile to be used and the method of operation shall be submitted to the Engineer for approval.
- Pile testing and confirmation that piles have achieved the required depth and capacity shall be carried out by the piling contractor. The method of testing shall be submitted to the Engineer for approval.
- Load-bearing piles have been designed to withstand loads indicated on the piling plan, with a maximum settlement of 10mm and an eccentricity of 75mm.
- Piles shall be driven by approved pile driving techniques to an approved set calculated by the Hiley Formula. A certificate of adequacy for pile loads shall be submitted by the Piling Contractor to the Engineer for approval.
- All piles shall be driven in the proper position shown on the drawings with a variation of not more than 25mm in 3m from the vertical (or raking line) with a maximum variation at the head of the pile from the position shown on the drawings of 75mm in any direction at the commencing surface. Variations outside these limits shall be cause for rejection.
- Pile set out shall be by Authorised Surveyor and pile locations shall be checked and advised to Engineer after construction.
- Piles should be cut off to level. Immediately after making the final cut off, the area should be coated with an approved protective coating over the exposed surface.



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E	PRELIMINARY ISSUE	JBG	AJF	13.11.12
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B	PRELIMINARY ISSUE	JBG	AJF	12.06.12
A	PRELIMINARY ISSUE	JBG	AJF	31.05.12



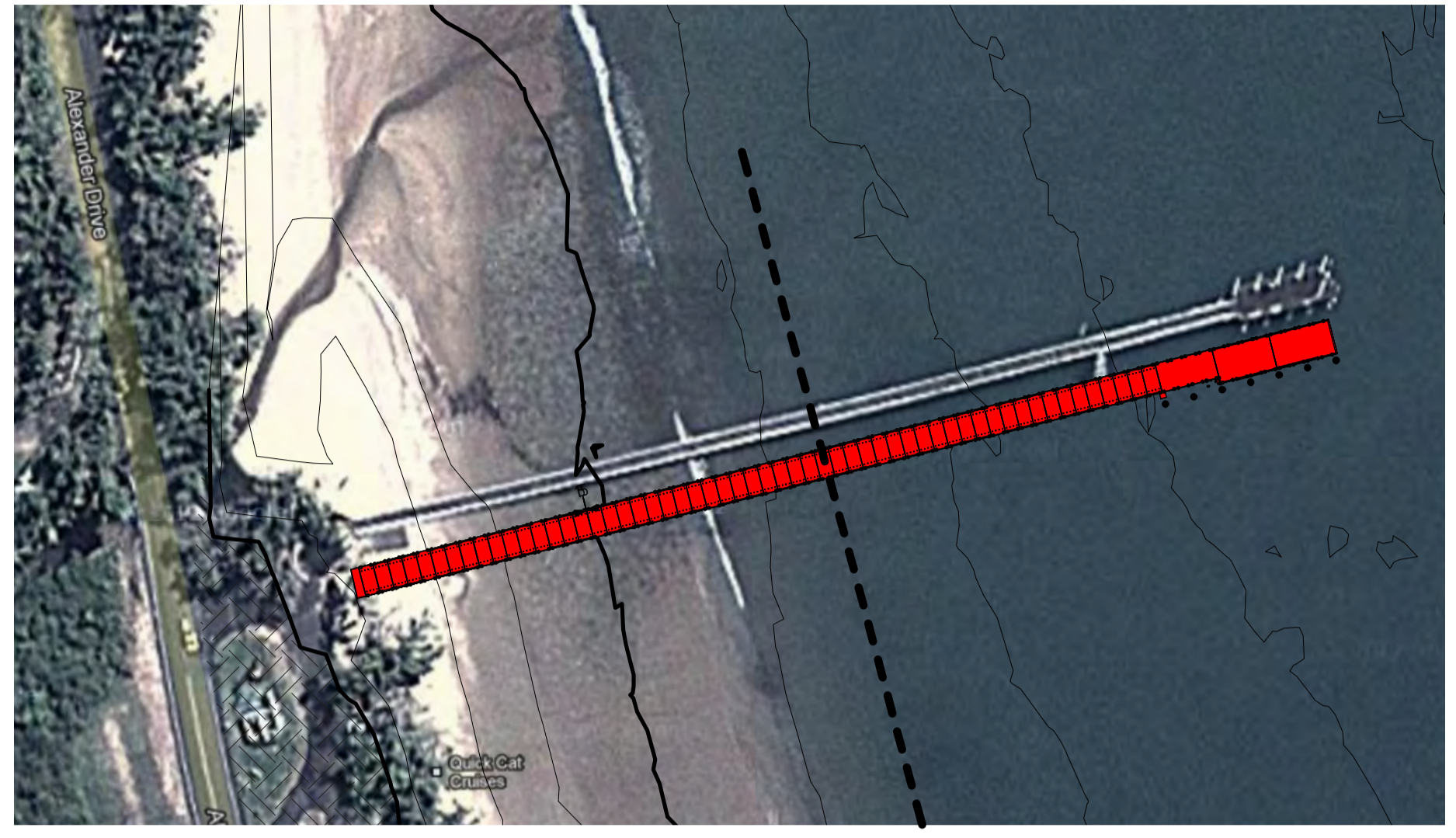
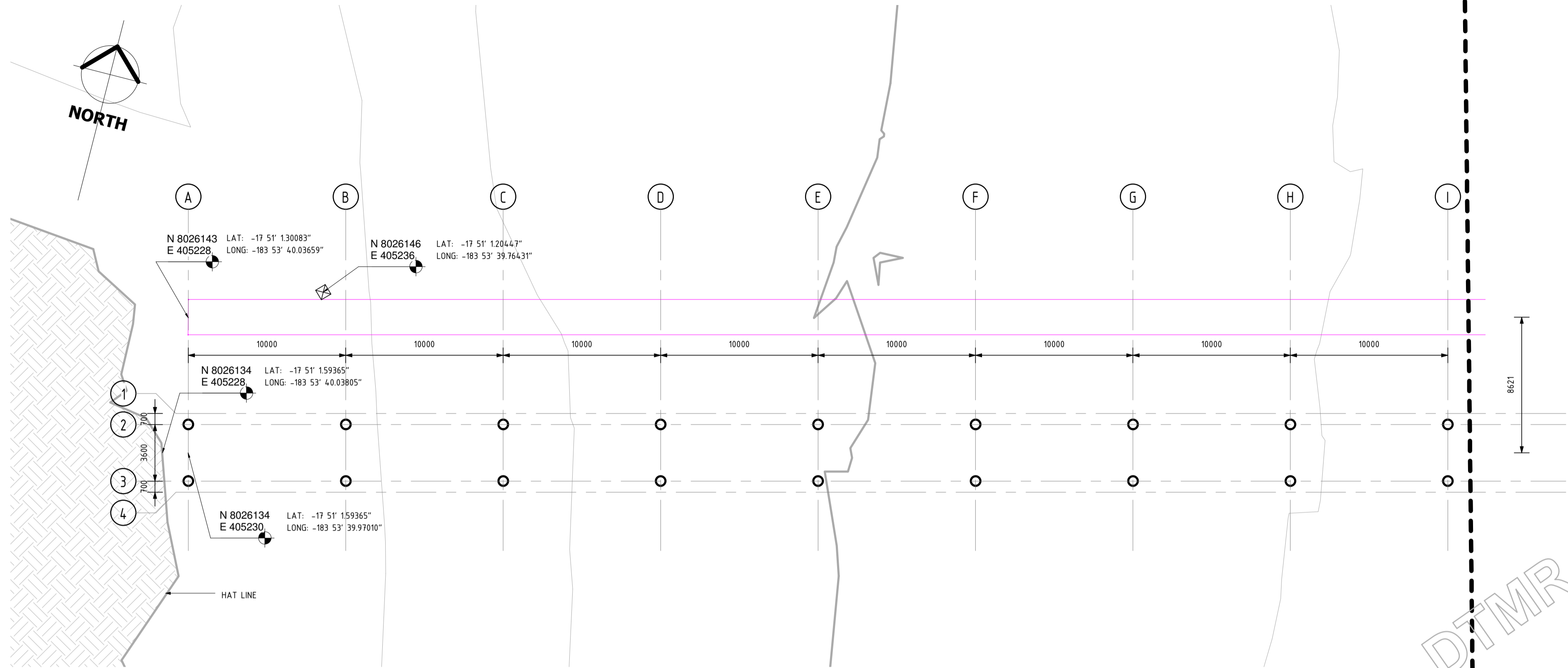
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Client:	CIVIL PLUS CONSTRUCTIONS
Project:	CLUMP POINT JETTY REPLACEMENT
Title:	STRUCTURAL NOTES

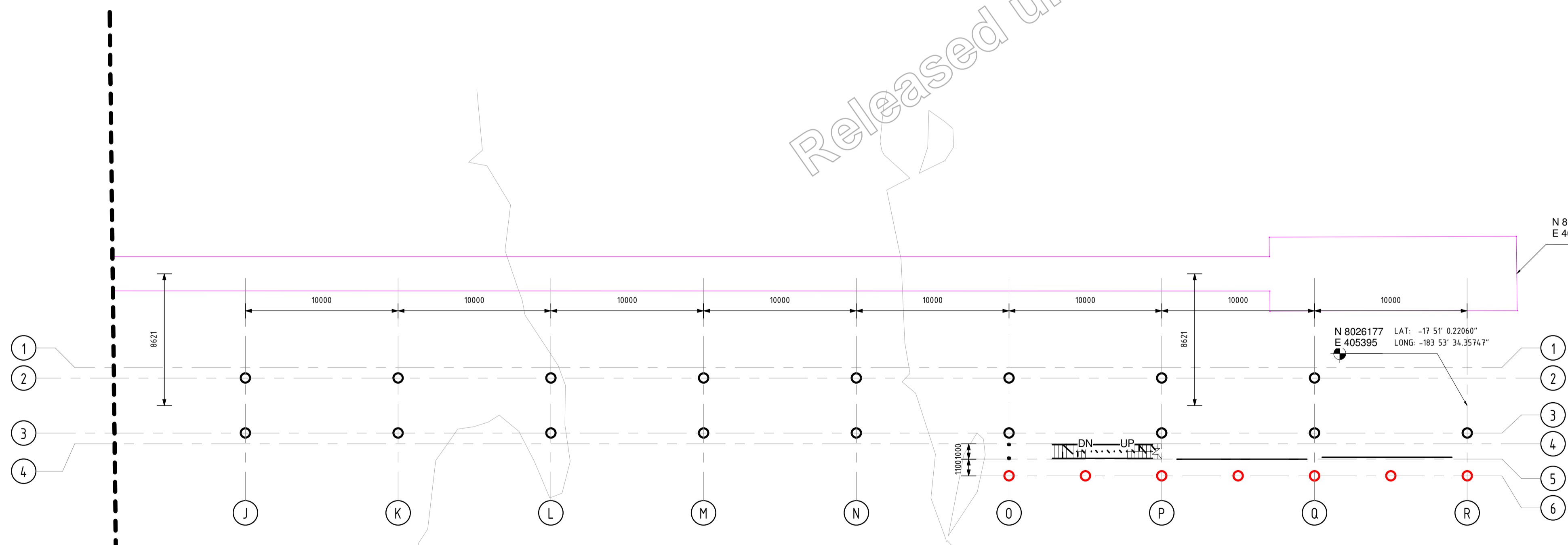
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Checked	Checker	Date	
RPEU No.	Approver	Datum	-
Approved:			
Job Number:	Drawing No.	Revision	
T12-058	ST0.01	E	

PRELIMINARY



LOCATION PLAN
1: 1000

PILING PLAN
1: 200



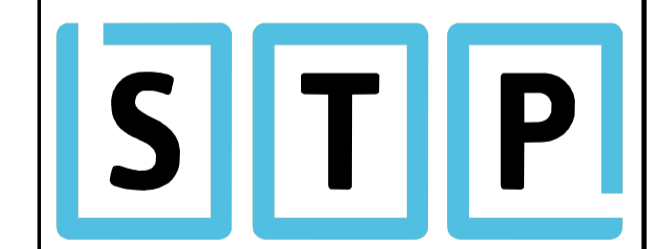
PILING PLAN
1: 200

- NOTE:**
- PROVIDE WEATHER OBSERVATION INSTRUMENTATION (STORM GAUGE) AT APPROPRIATE LOCATION ON JETTY
 - PROVIDE FIRE WATER & HOSE REELS AT SERVICE LOCATIONS ALONG JETTY
 - PROVIDE POWER TO JETTY HEAD
 - PROVIDE LIGHTING TO JETTY HEAD
 - PROVIDE POTABLE WATER AT JETTY SERVICE LOCATIONS
 - PROVIDE 5 ACCESS LADDERS ALONG THE JETTY

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Rev	Description	By	Appd	Date
F	PRELIMINARY ISSUE	JBG	AJF	13.11.12
E	GPS LOCATIONS ADDED	JBG	AJF	27.09.12
D	FOR APPROVAL	JBG	AJF	21.09.12
C	TENDER ISSUE	JBG	AJF	30.06.12
B	PRELIMINARY ISSUE	JBG	AJF	12.06.12
A	PRELIMINARY ISSUE	JBG	AJF	31.05.12

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Client: **CIVIL PLUS CONSTRUCTIONS**

Project: **CLUMP POINT JETTY REPLACEMENT**

Title: **PILING LAYOUT PLAN**

Design	AJF	Drawn	JBG
Checked	AJF	Date	-
RPEQ No.	4683	Datum	-

Approved:	Job Number: T12-058	Drawing No. ST1.01	Revision F
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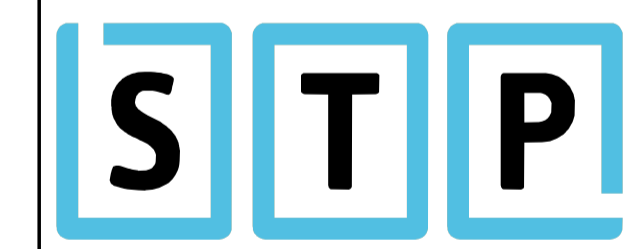
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Top of Fender Piles								Top of Fender Piles
5630								5630
Deepest point of jetty								Deepest point of jetty
-3838								-3838
RL -8.0								RL -8.0
-8000								-8000
Properties								
Dia:	610mm	610mm	610mm	610mm	610mm	610mm	610mm	
Thickness:	12.7 PL	12.7 PL	12.7 PL	12.7 PL	12.7 PL	12.7 PL	12.7 PL	
Ult. Capacity								
Compression:	250 kN	250 kN	250 kN	250 kN	250 kN	250 kN	250 kN	
Tension:	100 kN	100 kN	100 kN	100 kN	100 kN	100 kN	100 kN	
RL -17.440								RL -17.440
-17440								-17440
RL -18.440								RL -18.440
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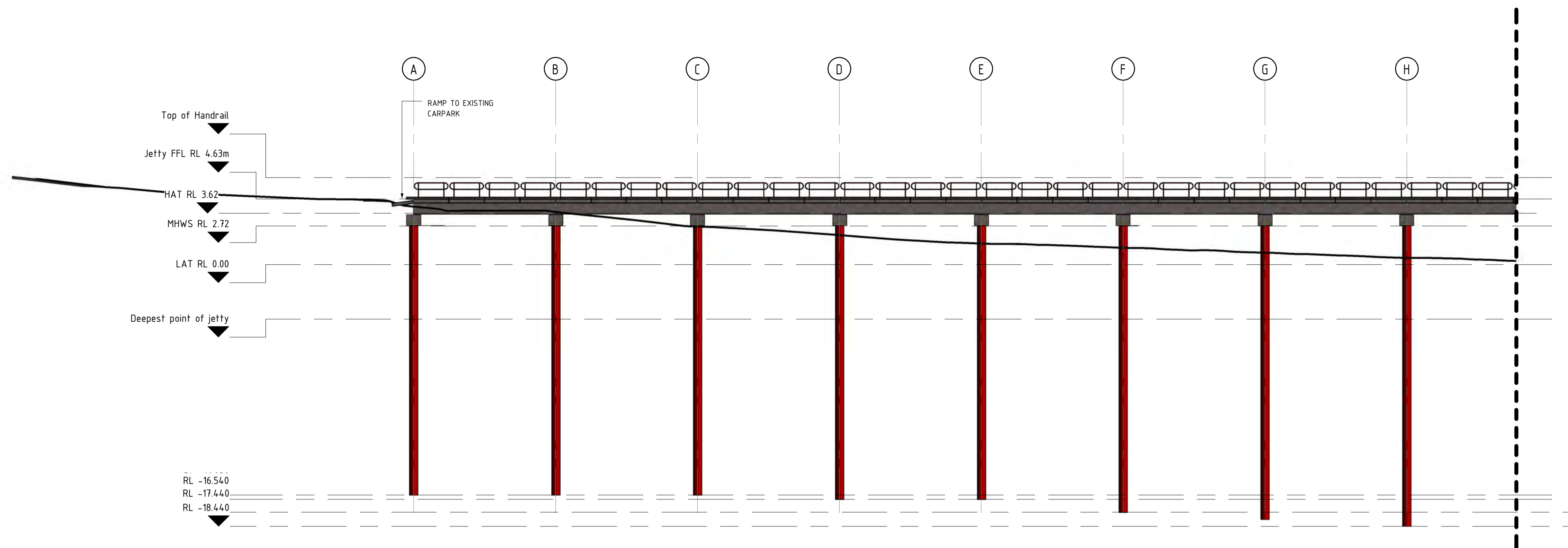
Project:
**CLUMP POINT
JETTY REPLACEMENT**

Title:
**FENDER PILES
PILING TABLE**

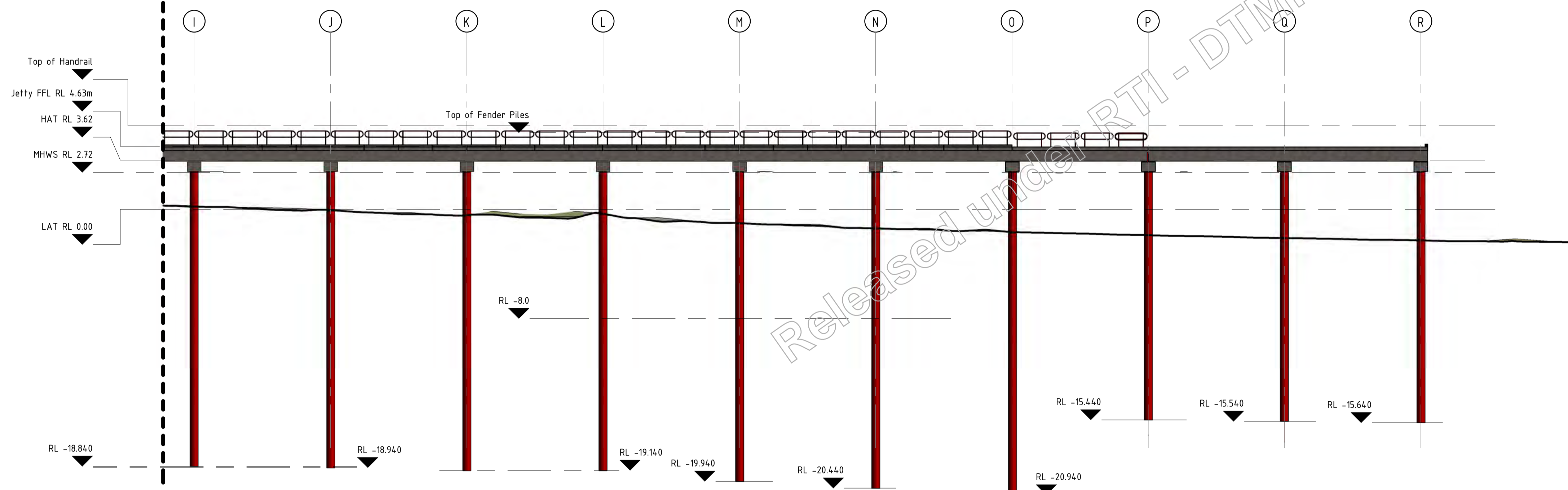
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T12-058	ST1.04	D

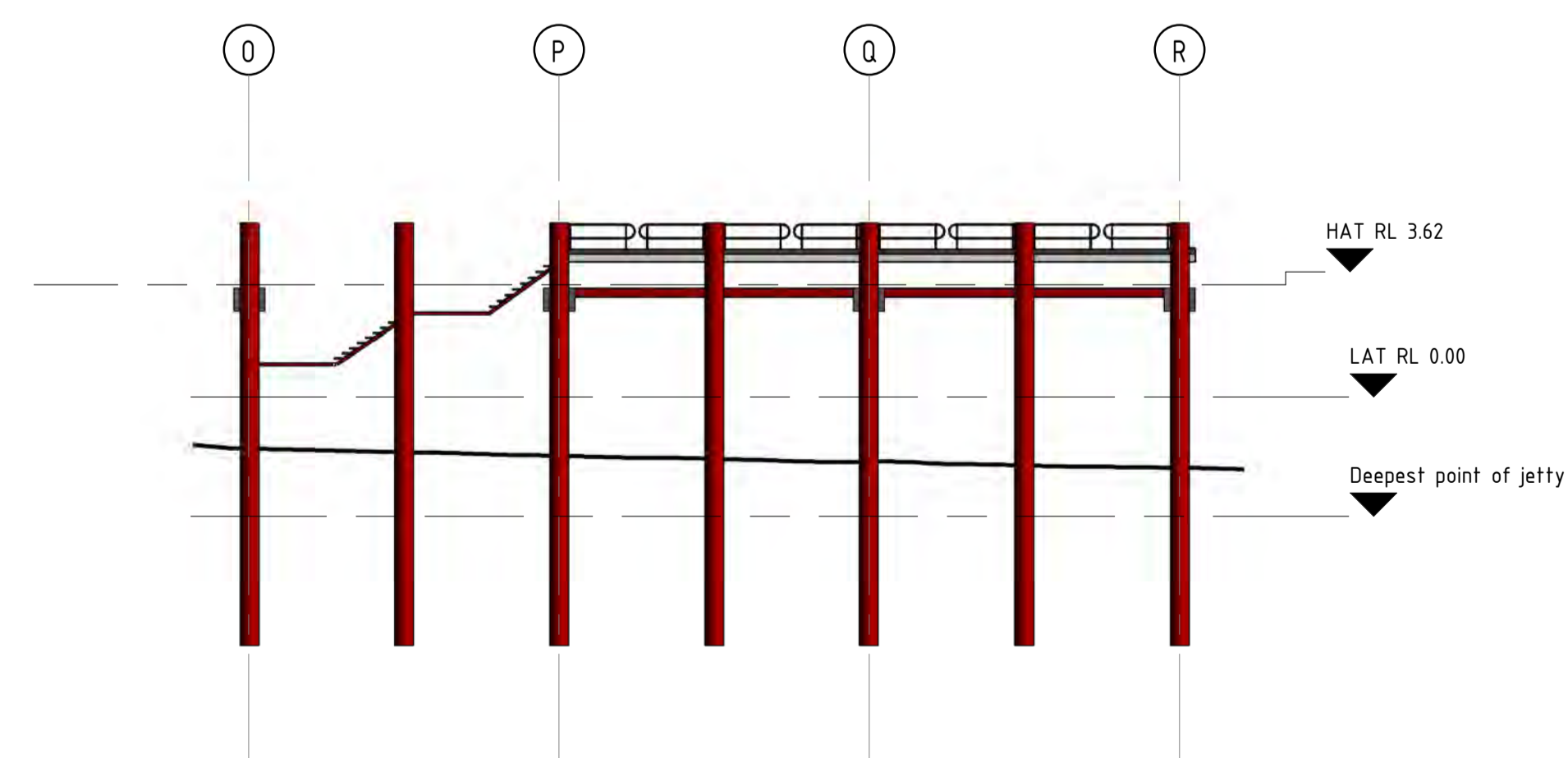
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NORTHERN ELEVATION
1: 200



NORTHERN ELEVATION
1: 200

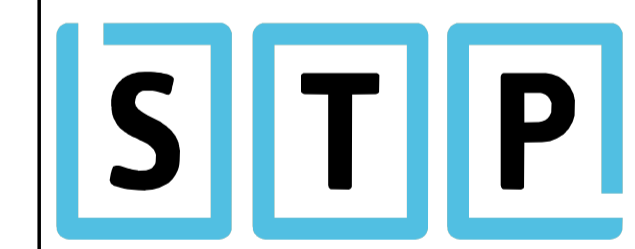


FENDER PILE ELEVATION
1: 200

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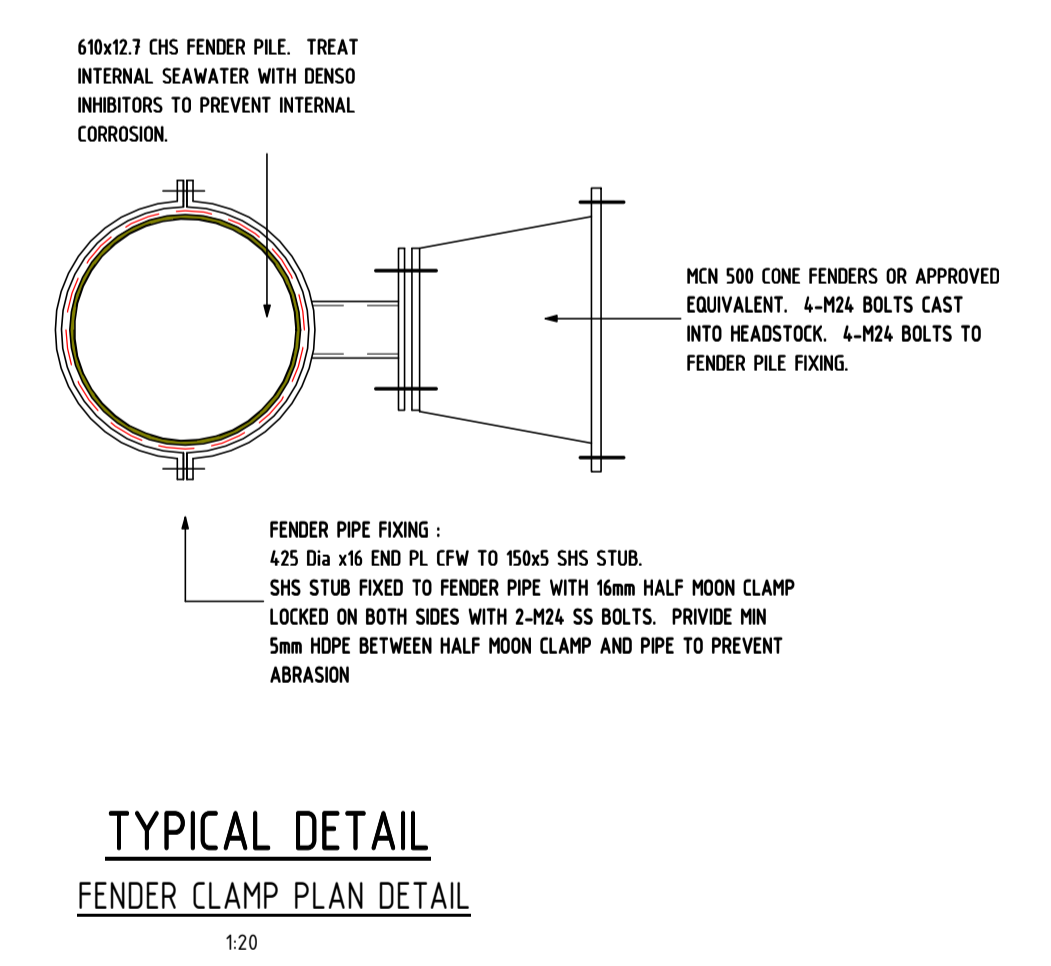
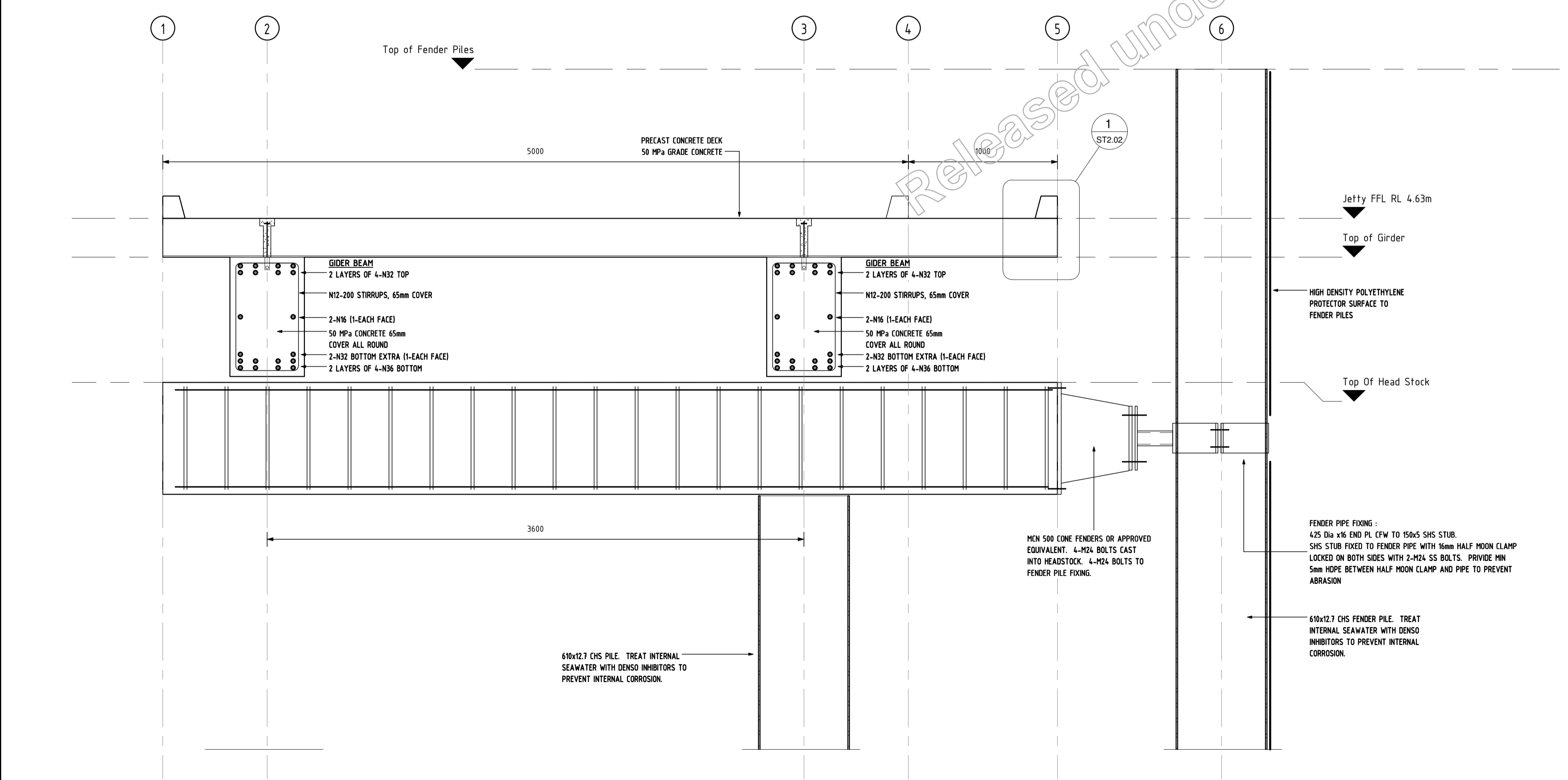
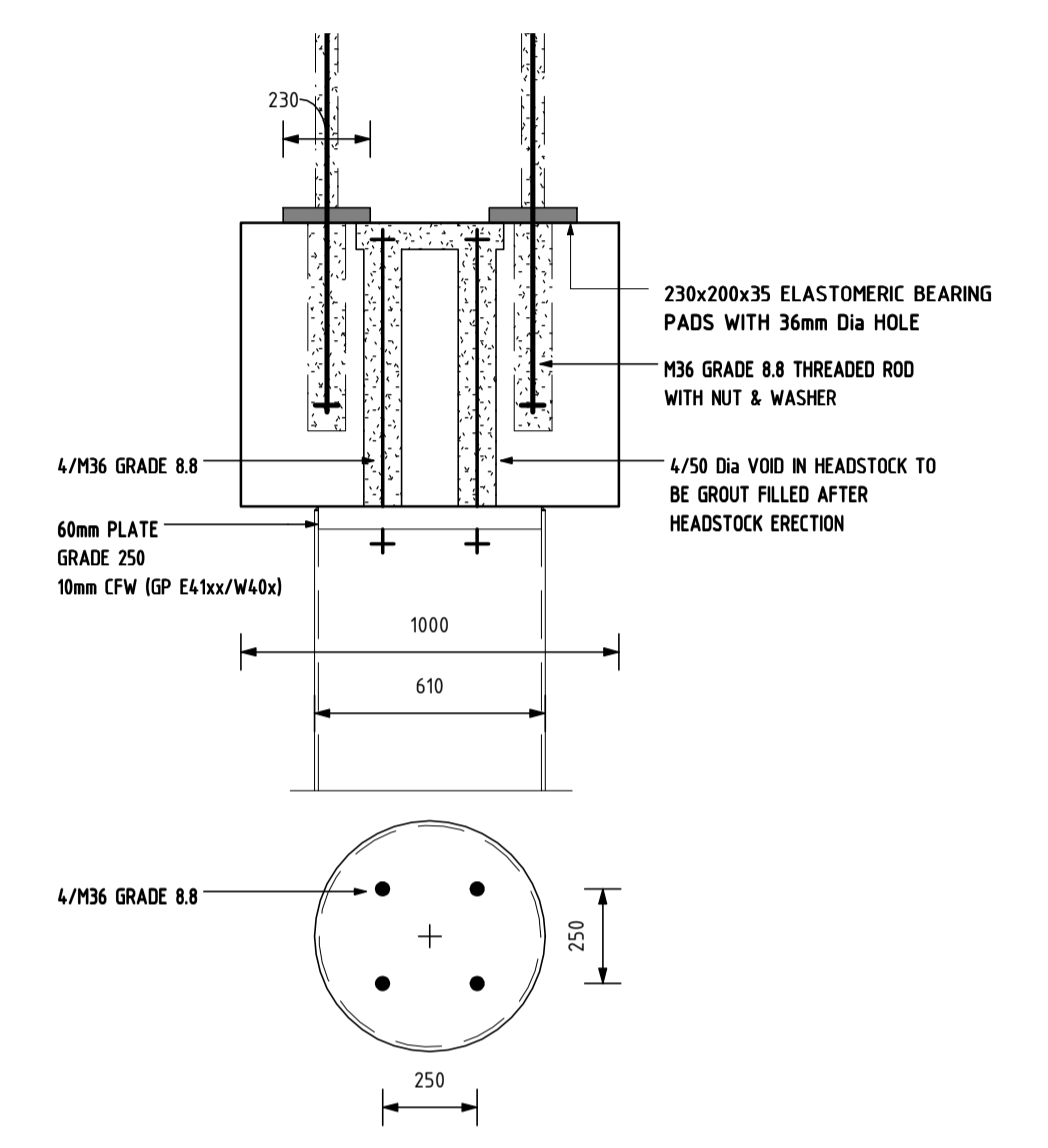
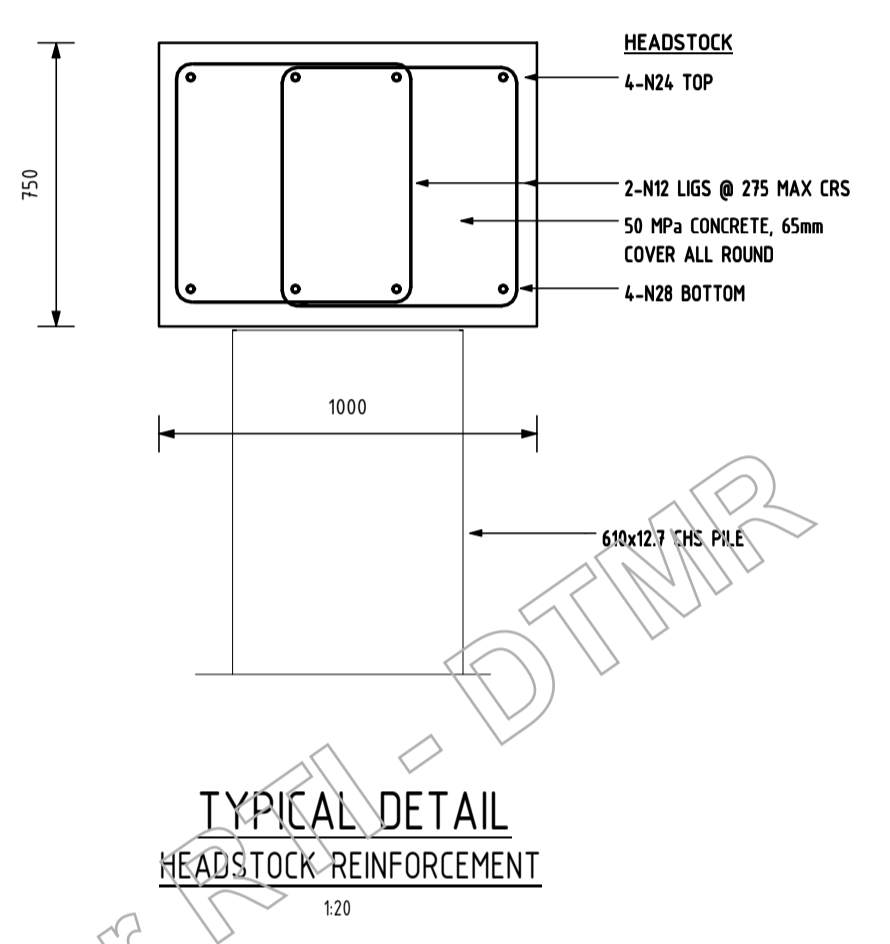
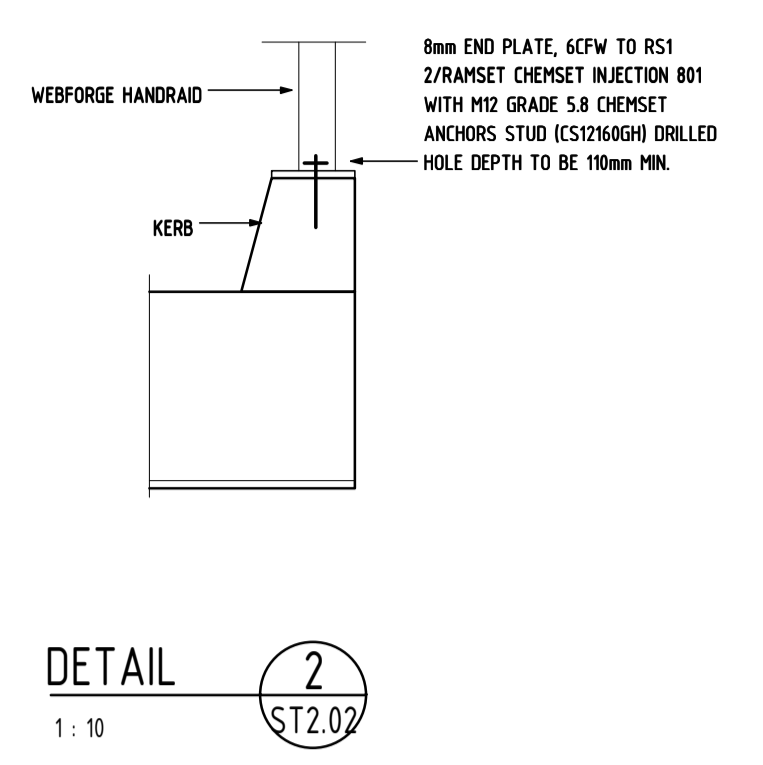
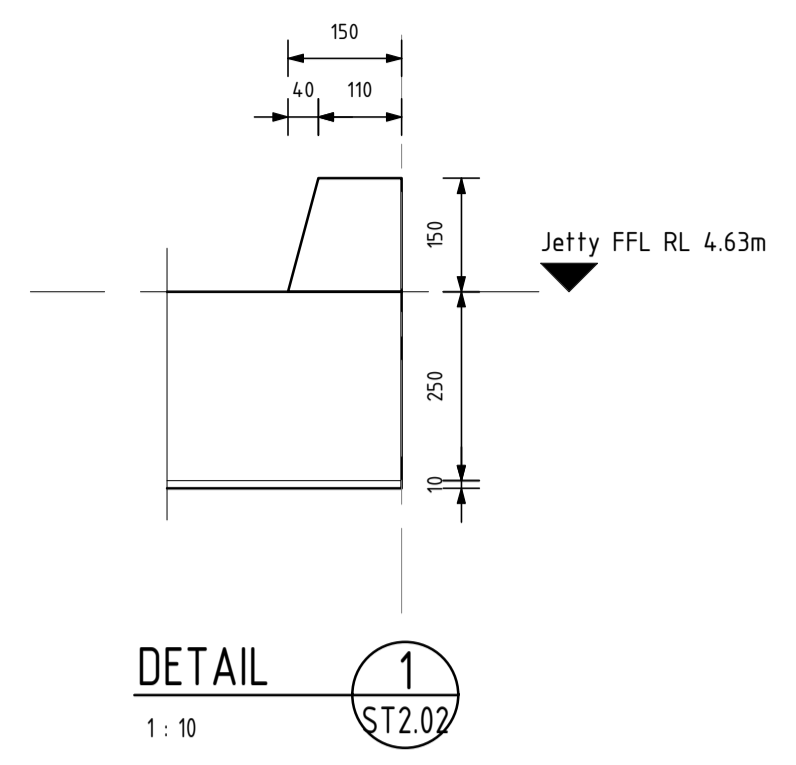
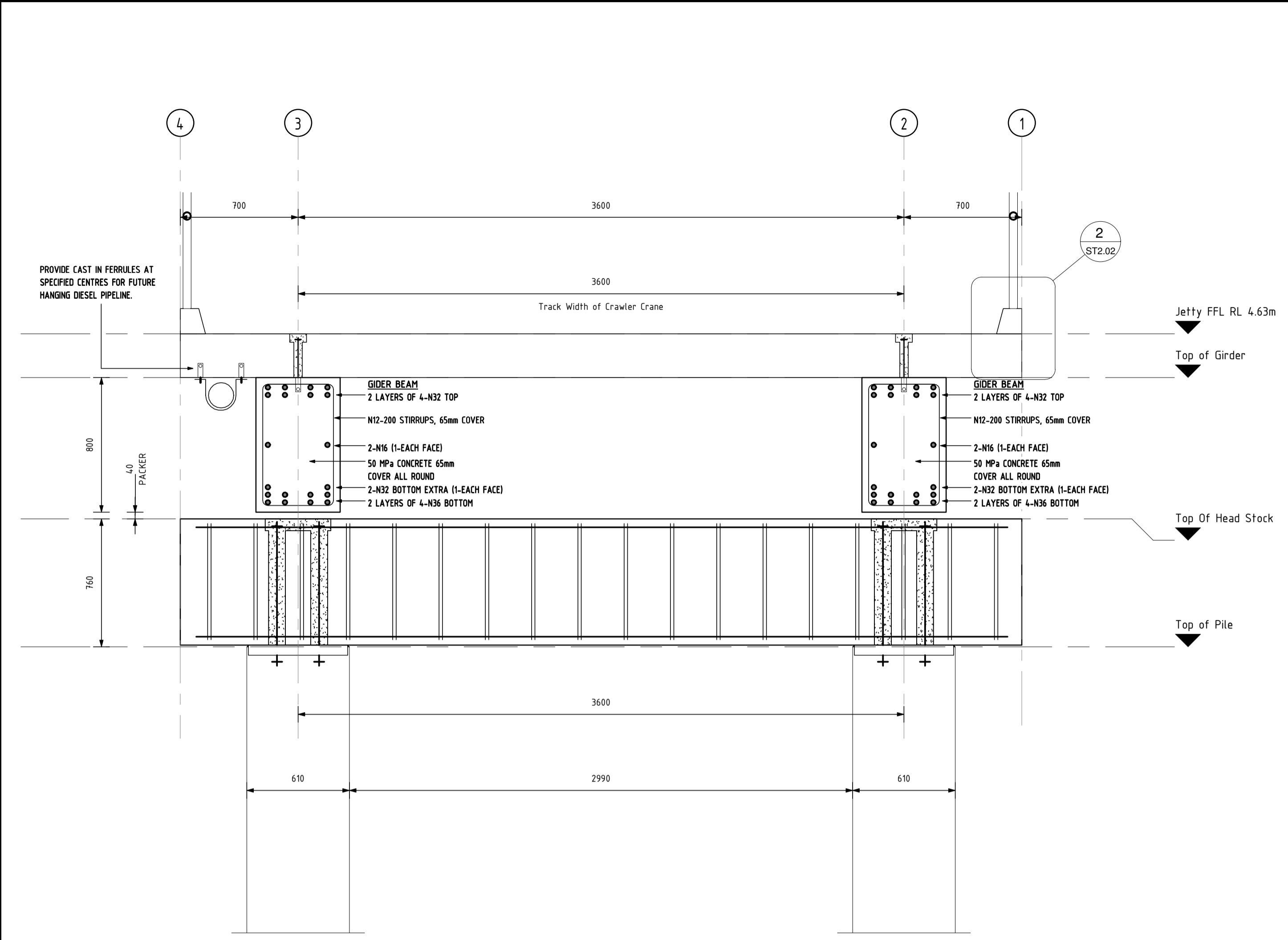
Project:
**CLUMP POINT
JETTY REPLACEMENT**

Title:
JETTY ELEVATIONS

Design	Designer	Drawn	Author
Checked	Checker	Date	
RPEU No.	Approver	Datum	-

Job Number:	Drawing No.	Revision
T12-058	ST2.01	E

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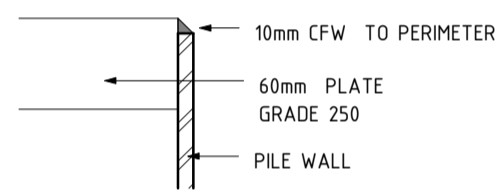
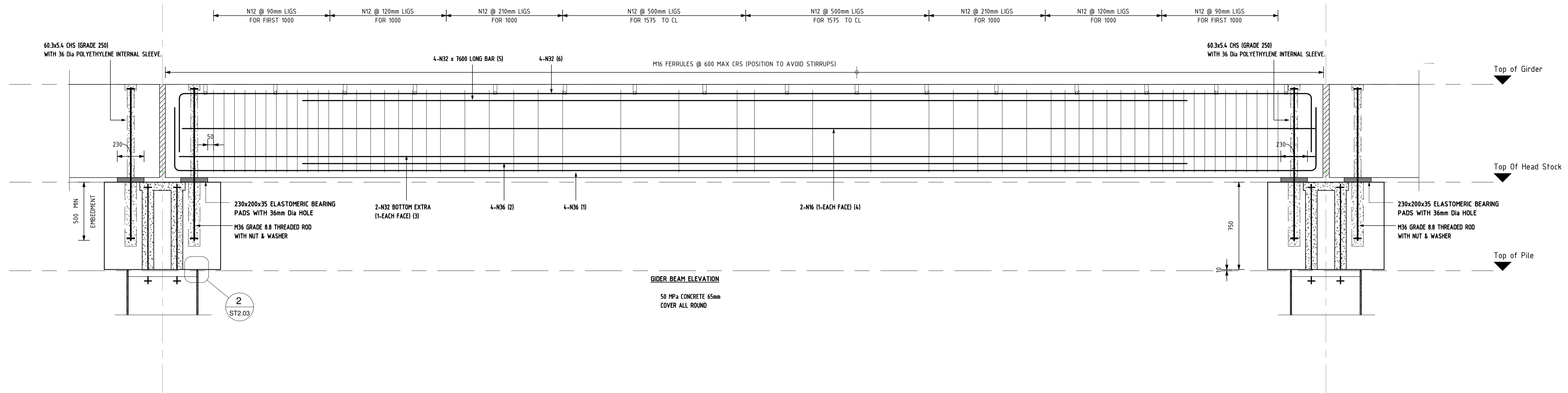
Project: CLUMP POINT JETTY REPLACEMENT

Title: TYPICAL SECTIONS

Design	Checked	Checked	Drawn	Drawn
AJF	AJF	4683	JBG	-

Approved: Job Number: T12-058 Drawing No: ST2.02 Revision: E

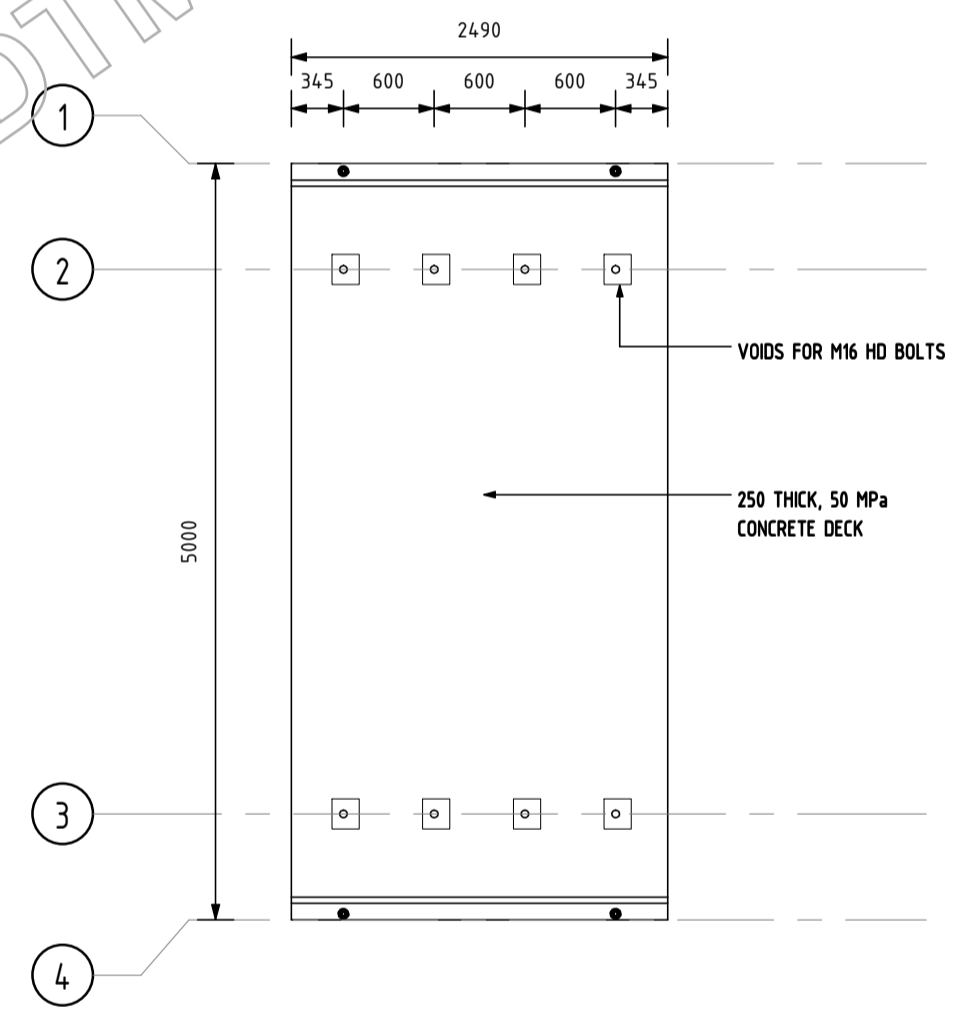
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BEARING PLATE DETAIL

DETAIL 2
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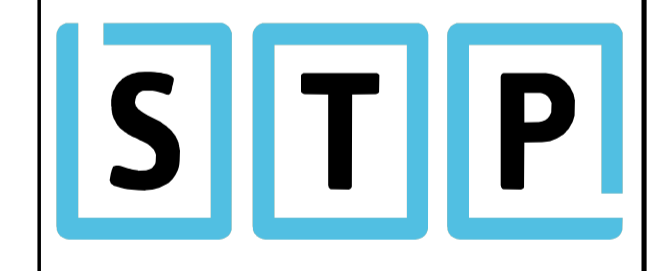
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TYPICAL DETAIL
DECK UNIT
1:50

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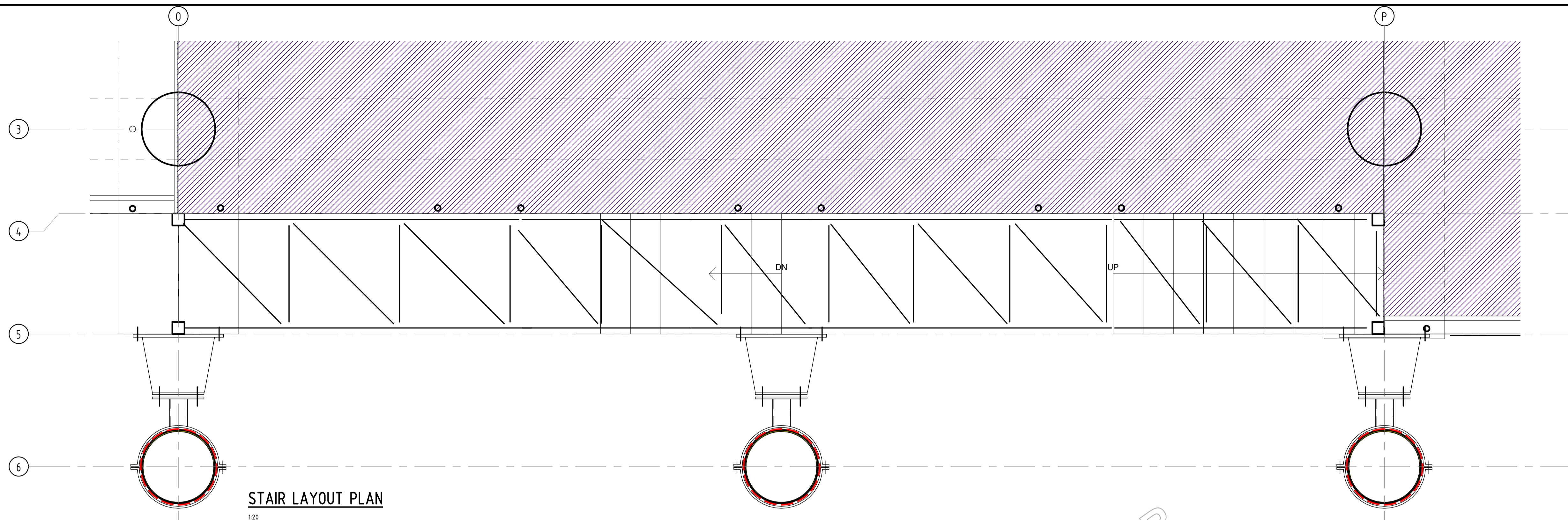
Project: **CLUMP POINT JETTY REPLACEMENT**

Title: **DETAILS**

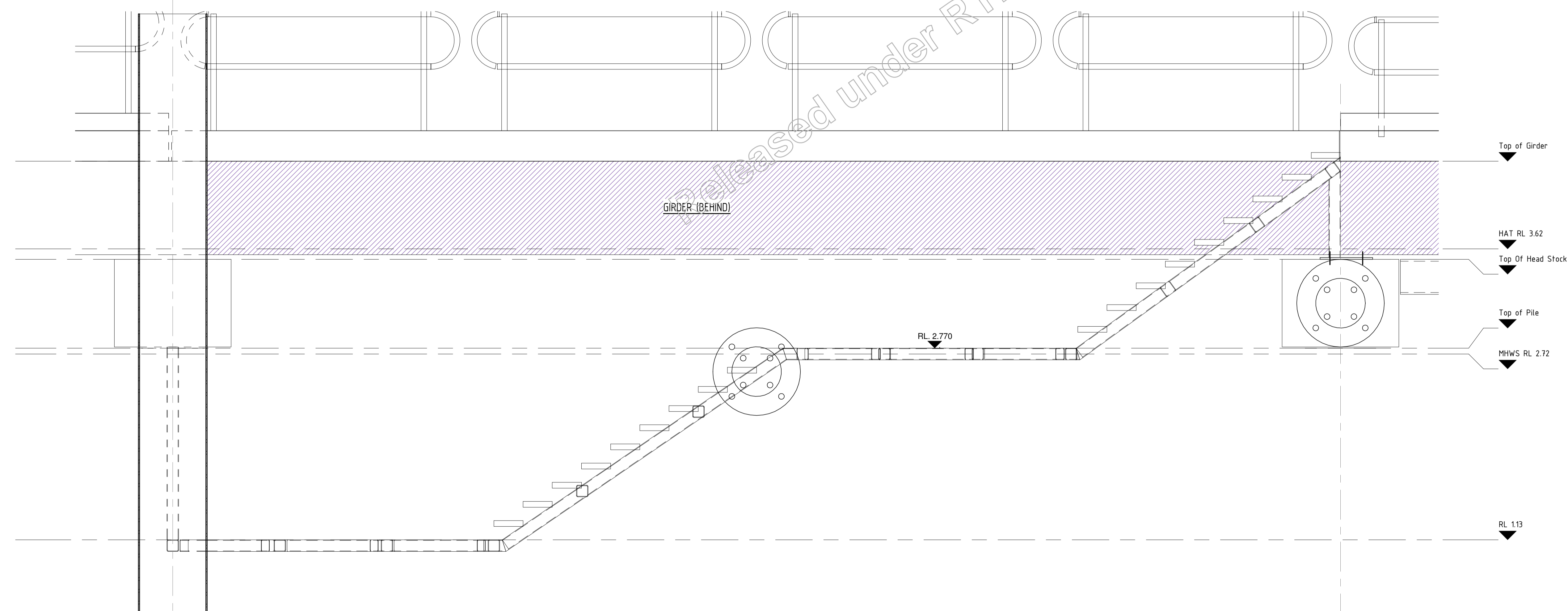
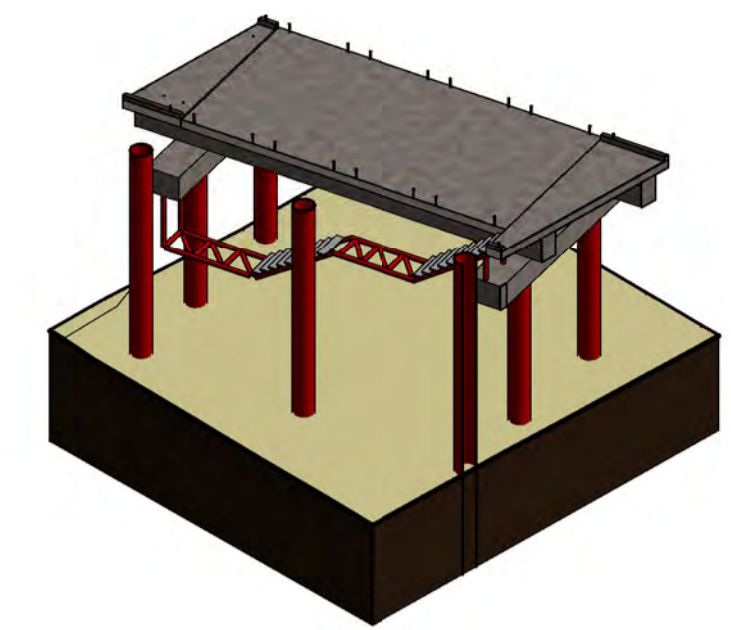
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T12-058	ST2.03	D

PRELIMINARY



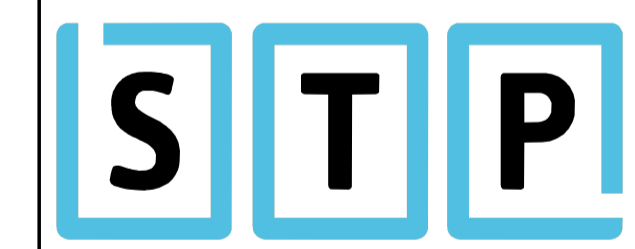
STAIR LAYOUT PLAN
1:20



TYPICAL STAIR SECTION
1:20

Rev	Description	By	Appd	Date
D	PRELIMINARY ISSUE	JBG	AJF	13.11.12
C	FOR APPROVAL	JBG	AJF	21.09.12
B	TENDER ISSUE	JBG	AJF	30.06.12
A	PRELIMINARY ISSUE	JBG	AJF	12.06.12

AMENDMENTS
IN ASSOCIATION WITH



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Client:
CIVIL PLUS CONSTRUCTIONS

Project:
**CLUMP POINT
JETTY REPLACEMENT**

Title:
STAIR DETAILS

Design	Designer	Drawn	Author
Checked	Checker	Date	
RPEQ No.	Approver	Datum	-

Approved:

Job Number:	Drawing No.	Revision
T12-058	ST2.04	D

PRELIMINARY