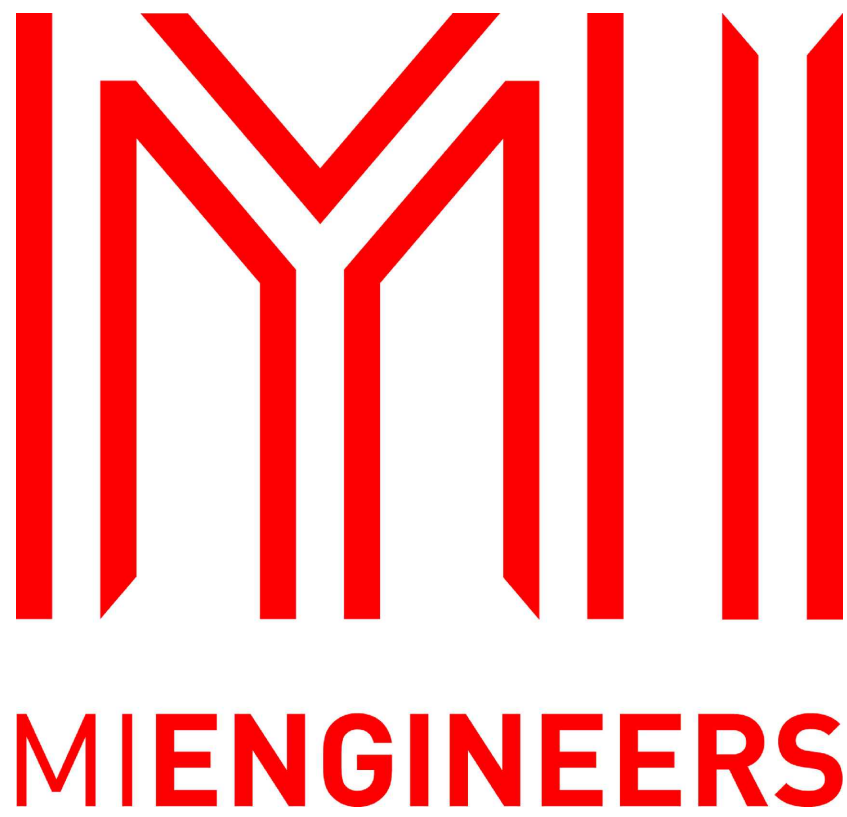


RAY BROOKS RESERVE, SANCTUARY POINT NSW

PROPOSED PUBLIC BOARDWALK

CIVIL / STRUCTURAL DESIGN

PREPARED BY



INDEX


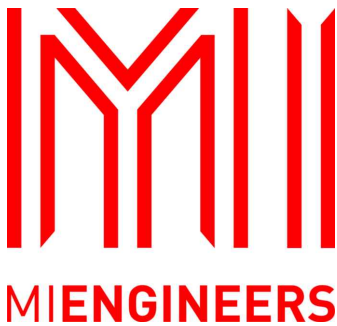
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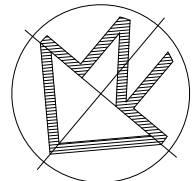
DN190088/01 - NOTES

DN190088/02 - LAYOUT PLAN & LONGITUDINAL SECTION

DN190088/03 - TYPICAL CROSS SECTIONS AND DETAILS 1

DN190088/04 - TYPICAL BOARDWALK BRACING ARRANGEMENTS

REVISION	AMENDMENTS	DATE	CHECKED	APP'D	SURVEYOR: SHOALHAVEN CITY COUNCIL	CLIENT:			PROJECT :	DESIGNED:	DRAWN:	STATUS:
2	ISSUE FOR CONSTRUCTION - AMENDMENTS FOLLOWING PRE-TENDER MEETING		09/03/21	G.S	DATE OF SURVEY:	 	<p>SYDNEY OFFICE 83 - 89 Renwick Street, Redfern 2016 Tel (02) 8396 6565</p> <p>SOUTH COAST OFFICE 49 Berry Street, Nowra NSW 2541 Tel (02) 44 230 566</p> <p>WOLLONGONG OFFICE 3a/128-134 Crown Street, Wollongong NSW 2500 Tel (02) 44 230 566</p> <p>E : admin@miengineers.com W : www.miengineers.com</p>	<p>THIS DRAWING AND THE CONCEPTS CONTAINED THEREIN ARE THE PROPERTY OF MI ENGINEERS. NO UNAUTHORISED COPYING IS PERMITTED. NOTHING IS TO BE CONSTRUCTED BASED ON THIS DRAWING OR PART OF THIS DRAWING, WITHOUT THE WRITTEN PERMISSION OF MI ENGINEERS. DRAWINGS TO BE READ IN CONJUNCTION WITH OTHER RELATED DESIGN DOCUMENTATION. FURTHERMORE, WHERE MIENGINEERS RELIES ON THE INFORMATION SUPPLIED BY OTHERS TO PRODUCE THE DESIGN, WE ACCEPT NO LIABILITY FOR ERRORS, TO THE EXTENT THAT THE DESIGN HAS MADE RELIANCE ON THIS INFORMATION.</p>	RAY BROOKS RESERVE, SANCTUARY POINT, NSW PROPOSED PUBLIC BOARDWALK STRUCTURAL DESIGN	A.J/R.M	A.J/R.M	G.S
1	ISSUE FOR CONSTRUCTION		18/07/19	G.S	ORIGIN:					SHEET SIZE:	SCALE:	DATE:
B	80% DETAILED DESIGN ISSUE		14/06/19	G.S	HEIGHT OF DATUM:					A1	-	09/03/21
A	50% CONCEPT DESIGN ISSUE FOR OPTIONS DETERMINATION		24/05/19	G.S	HORIZONTAL DATUM:					DRAWING NAME:	DRAWING NUMBER:	REVISION:
										COVER SHEET	DN190088/00	2

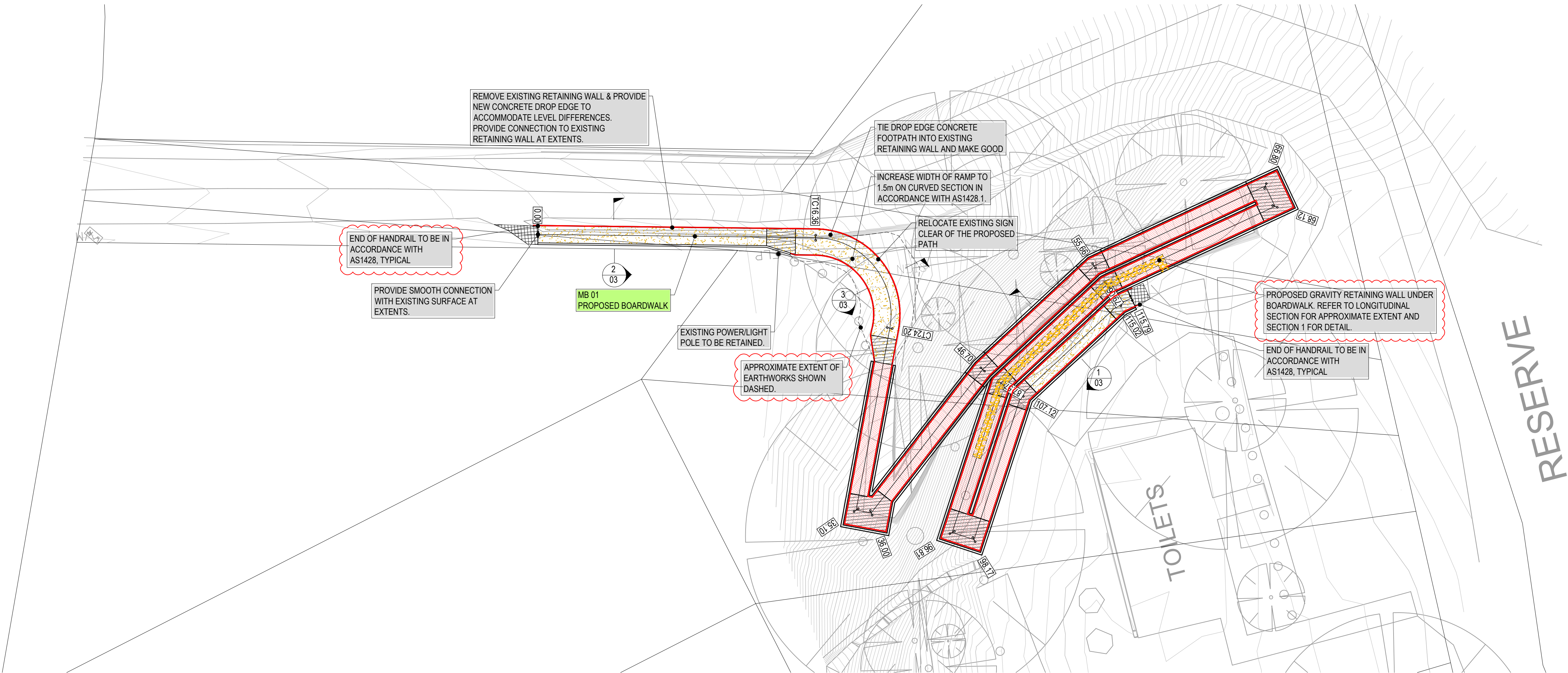


LEGEND:

- PROPOSED ELEVATED BOARDWALK
- PROPOSED CONCRETE FOOTPATH
- PROPOSED LANDING TO AS1428
- PROPOSED GRAVITY RETAINING WALL
- APPROXIMATE EXTENT OF TIE-IN AT LIMIT OF NEW BOARDWALK. CONFIRM ON SITE.
- AS1428 COMPLIANT HANDRAIL AND KERB RAIL (SENTAUR ASSISTAIR) OR EQUIVALENT

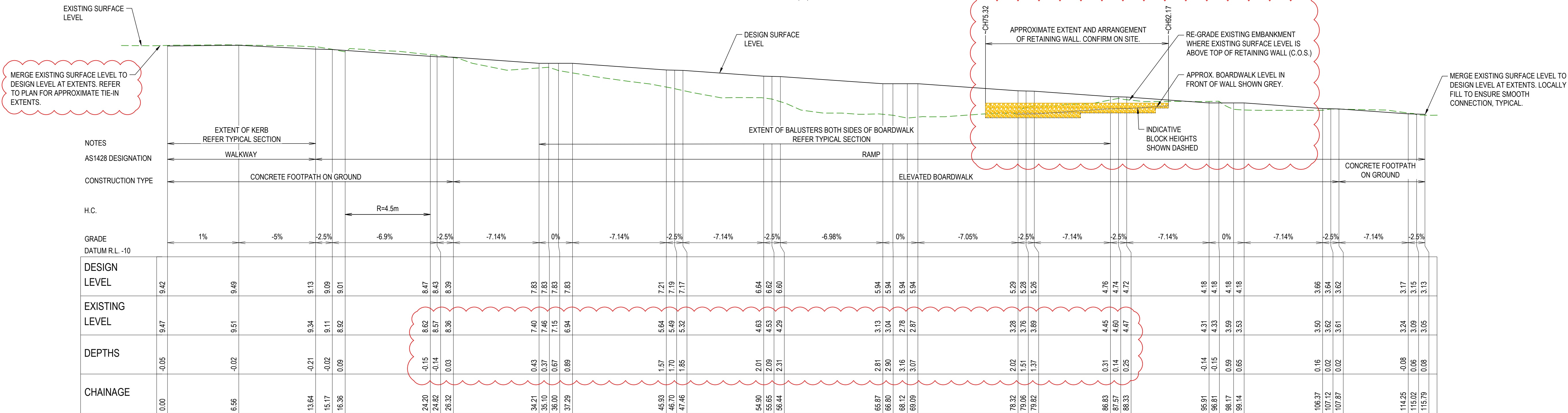
NOTES:

- REFER GENERALLY TO DRAWING DN190088/01 FOR CONSTRUCTION NOTES.
- EXISTING SERVICES HAVE NOT BEEN SHOWN ON THE DRAWINGS. THE CONTRACTOR IS TO LOCATE ALL EXISTING SERVICES ON SITE PRIOR TO THE COMMENCEMENT OF CONSTRUCTION. REFER TO EXISTING SERVICES NOTES ON DRAWING DN190088/01.



LAYOUT PLAN

SCALE 1 : 150 (A1)
SCALE 1 : 300 (A3)

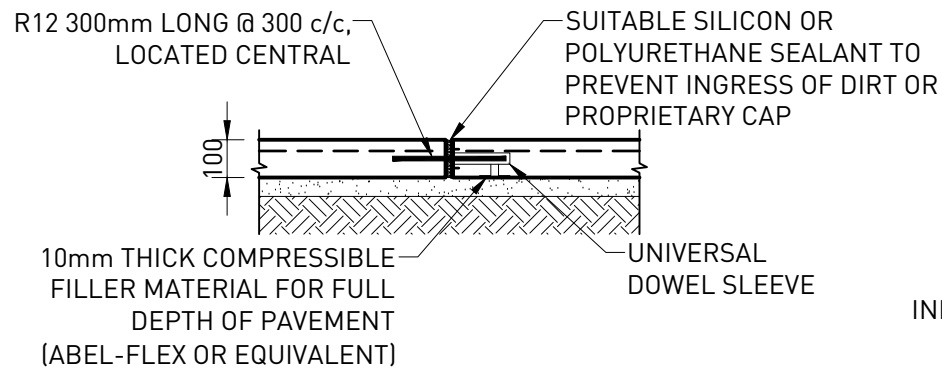


LONGITUDINAL SECTION OF MB 01

HORIZONTAL SCALE 1:200
VERTICAL SCALE 1:200

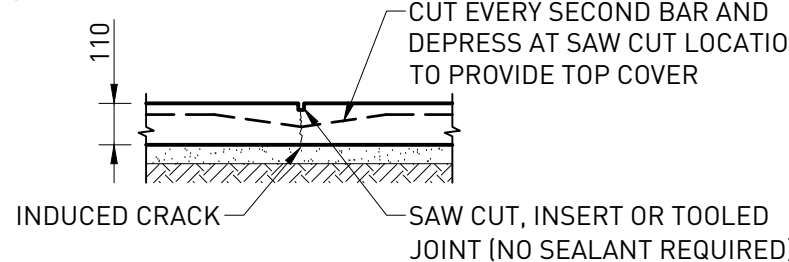
REVISION	AMENDMENTS	DATE	CHECKED	APP'D	SURVEYOR: SHOALHAVEN CITY COUNCIL	CLIENT:	SYDNEY OFFICE 83 - 89 Renwick Street, Redfern 2016 Tel (02) 8396 4565	THIS DRAWING AND THE CONCEPTS CONTAINED THEREIN ARE THE PROPERTY OF MI ENGINEERS. NO UNAUTHORISED COPYING IS PERMITTED. NOTHING IS TO BE CONSTRUCTED BASED ON THIS DRAWING OR PART OF THIS DRAWING, WITHOUT THE WRITTEN PERMISSION OF MI ENGINEERS. DRAWINGS TO BE READ IN CONJUNCTION WITH OTHER RELATED DESIGN DOCUMENTATION. FURTHERMORE, WHERE MI ENGINEERS RELIES ON THE INFORMATION SUPPLIED BY OTHERS TO PRODUCE THE DESIGN, WE ACCEPT NO LIABILITY FOR ERRORS, TO THE EXTENT THAT THE DESIGN HAS MADE RELIANCE ON THIS INFORMATION.	PROJECT : RAY BROOKS RESERVE, SANCTUARY POINT, NSW PROPOSED PUBLIC BOARDWALK STRUCTURAL DESIGN	DESIGNED: A.J/R.M	DRAWN: A.J/R.M	STATUS: G.S
2	ISSUE FOR CONSTRUCTION - AMENDMENTS FOLLOWING PRE-TENDER MEETING	09/03/21	G.S		DATE OF SURVEY:		SOUTH COAST OFFICE 49 Berry Street, Nowra NSW 2541 Tel (02) 44 230 566			SHEET SIZE: A1	SCALE: AS NOTED	DATE: 09/03/21
1	ISSUE FOR CONSTRUCTION	18/07/19	G.S		ORIGIN:		WOLLONGONG OFFICE 3a/128-134 Crown Street, Wollongong NSW 2500 Tel (02) 44 230 566			DRAWING NUMBER: DN190088 /02		REVISION: 2
B	80% DETAILED DESIGN ISSUE	14/06/19	G.S		HEIGHT OF DATUM:		E : admin@miengineers.com W : www.miengineers.com					
A	50% CONCEPT DESIGN ISSUE FOR OPTIONS DETERMINATION	24/05/19	G.S		HORIZONTAL DATUM:							

DO NOT SCALE



EXPANSION JOINT (EJ)

SCALE 1:20
MAXIMUM SPACING AT 4.5m CENTRE
+/- 0.6m



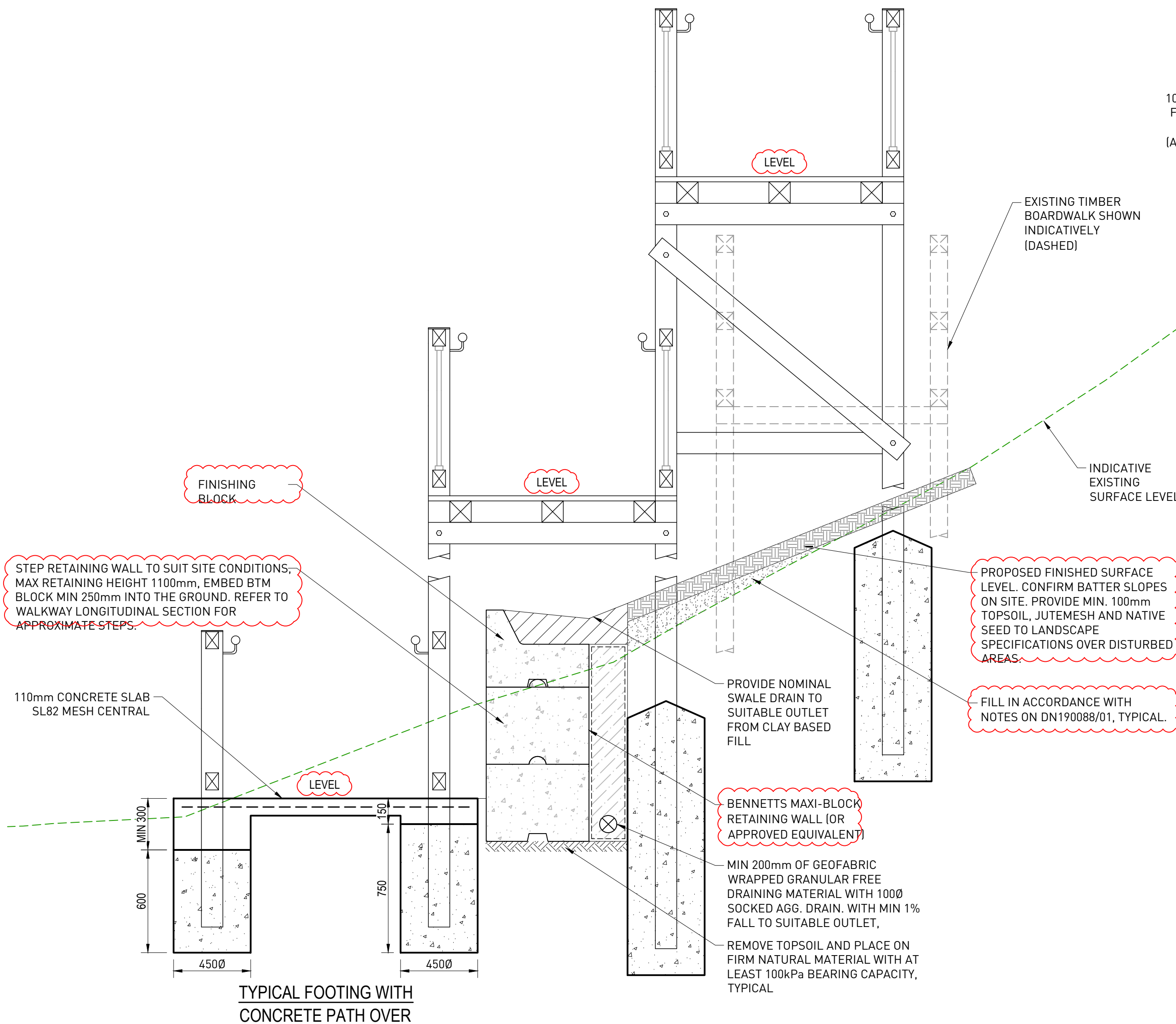
SAW CUT (SC)

SCALE 1:20
MAXIMUM SPACING AT 1.5m CENTRE
+/- 0.2m

- NOTE

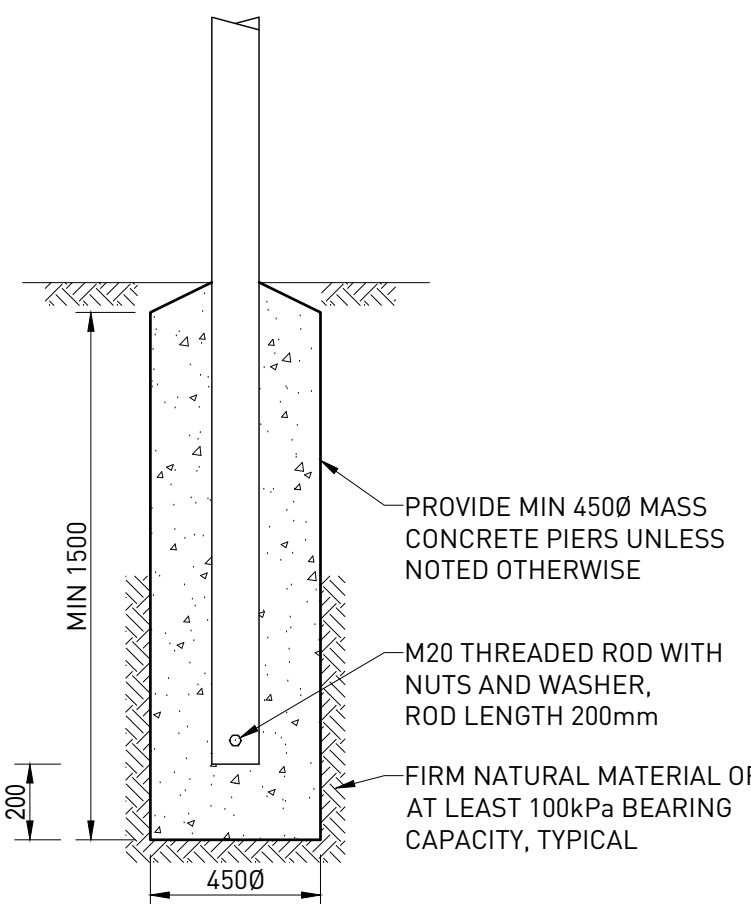
1. ALL BOLTED CONNECTIONS TO HAVE WCFT INSERTS
2. ALL BOLTS, BRACKETS, RIVETS & SCREWS TO BE GRADE A4/316 STAINLESS STEEL, REFER TO NOTES ON S002.
3. ALL CHS HANDRAIL RAILS AND ASSOCIATED BRACKETS TO BE GRADE 316 STAINLESS STEEL

FRP MEMBER SCHEDULE		
TAG	DESCRIPTION	MEMBER
C1	COLUMN	125x125x6 WAGNERS COMPOSITE FIBRE HOLLOW SECTION - N61 BLACK
B1	BEARER	125x125x6 WAGNERS COMPOSITE FIBRE HOLLOW SECTION - N61 BLACK
J1	JOIST @ 600 MAX CRS	125x125x6 WAGNERS COMPOSITE FIBRE HOLLOW SECTION CONTINUOUS OVER SPANS, OR MAX 2.5m IF SIMPLY SUPPORTED - N1 BLACK
H1	HANDRAIL MEMBER	100x75x5 WAGNERS COMPOSITE FIBRE HOLLOW SECTION - N61 BLACK
H2	HANDRAIL	500 STAINLESS STEEL
BL1	BALUSTER	ALUMINUM 25x3mm CHS - POWDER COATED BLACK
M1	FLOOR MESH	WAGNERS MICRO-MESH DGS-VMIC-13x30



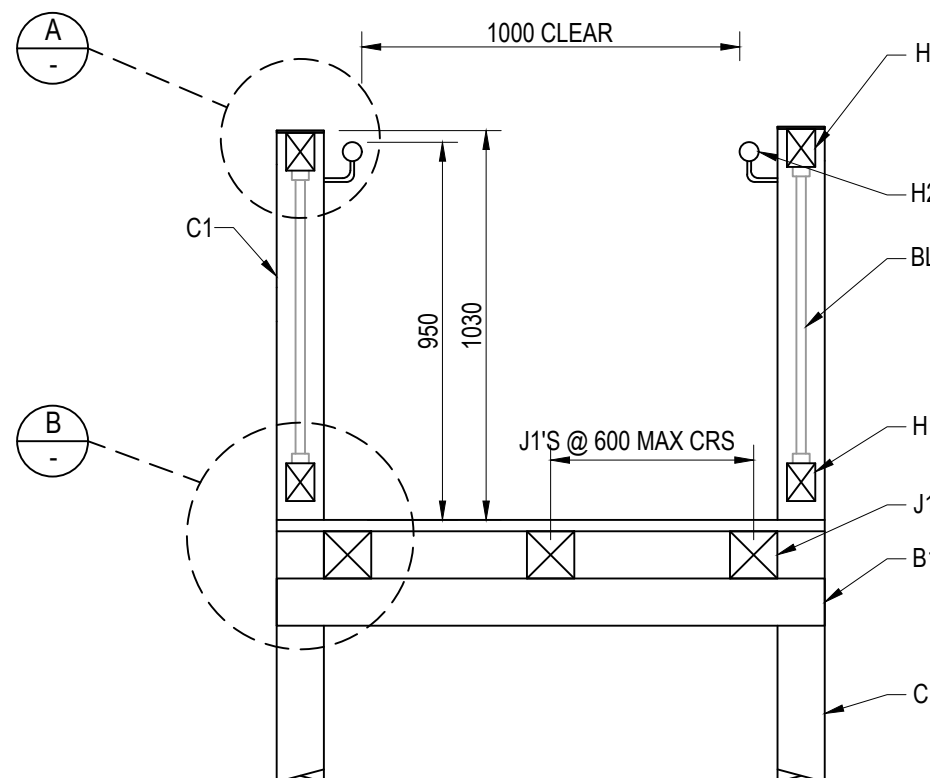
TYPICAL CROSS SECTION

SCALE 1:2



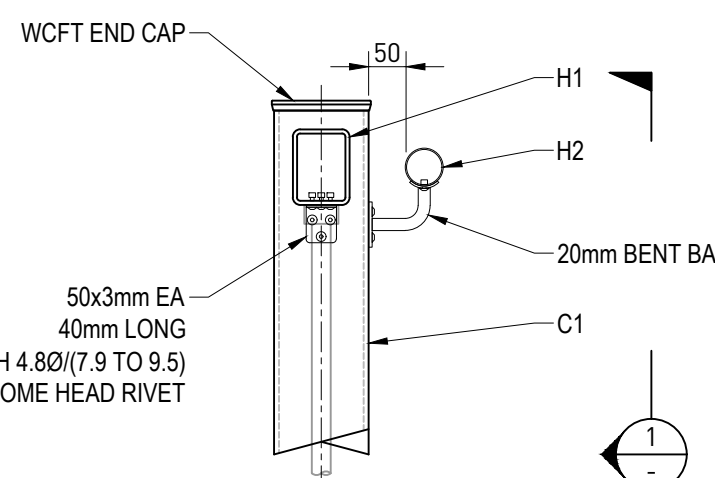
TYPICAL BOARDWALK
FOOTING DETAIL U.N.C.

SCALE 1:2



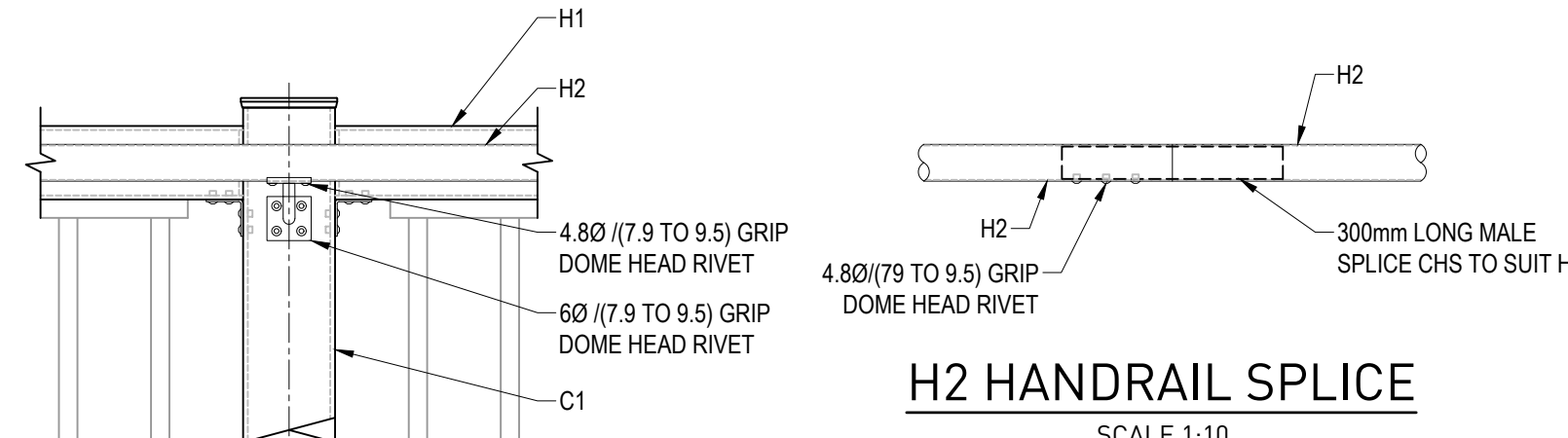
TYPICAL BOARDWALK SECTION

SCALE 1:20
MAX DISTANCE BETWEEN FRAMES 3



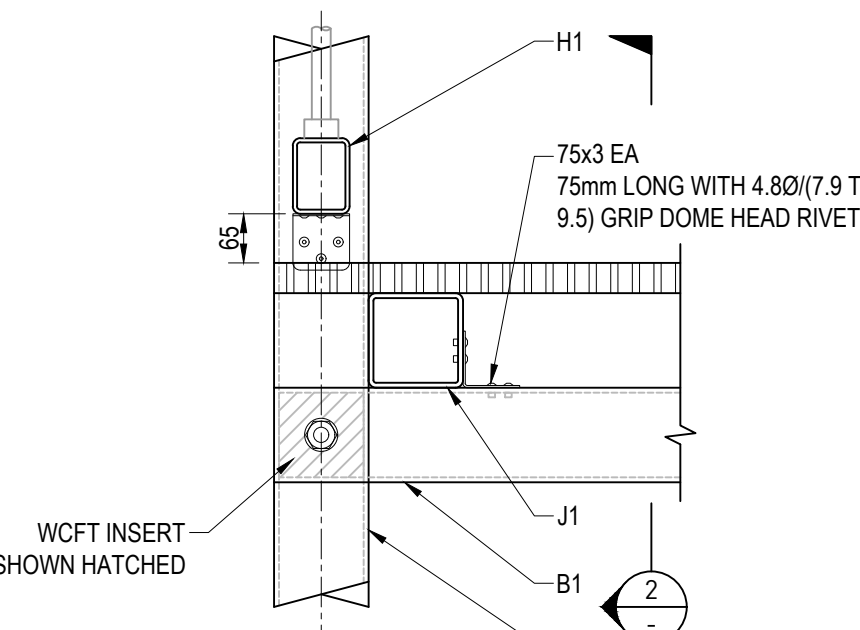
DETAIL

SCALE 1:10



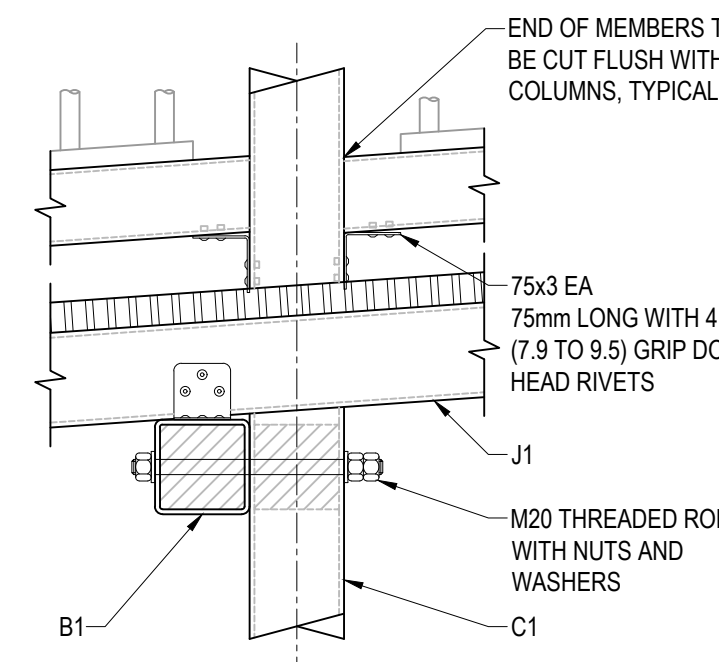
H2 HANDRAIL SPLICE

SCALE 1:10
SPLICE LOCATED AT THIRD POINT BETWEEN H2 SUPPORT



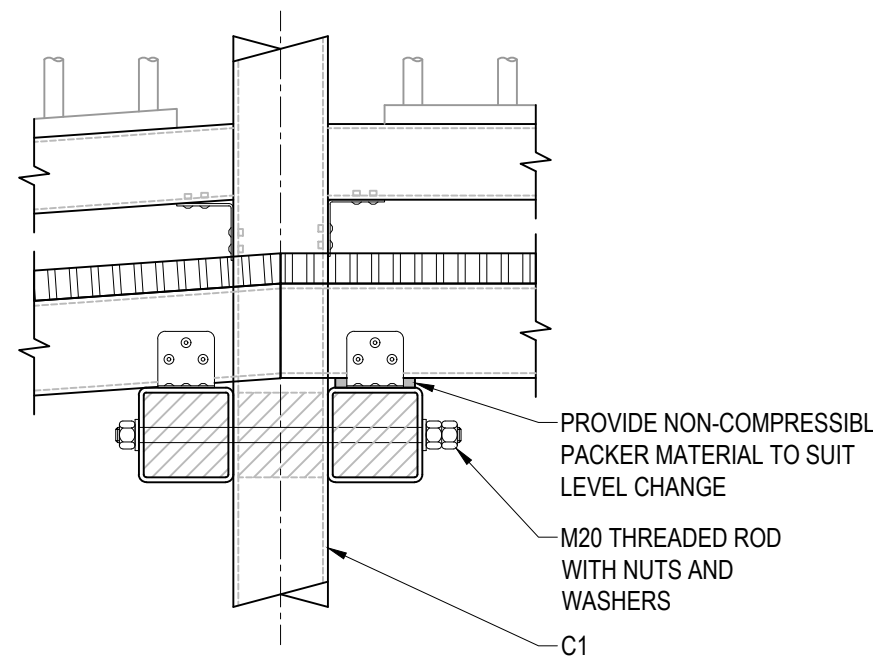
DETAIL

SCALE 1:10



SINGLE BEARE

SECTION



DOUBLE BEAREF

SECTION

REVISION	AMENDMENTS	DATE	CHECKED	APP'D	SURVEYOR: SHOALHAVEN CITY COUNCIL
2	ISSUE FOR CONSTRUCTION - AMENDMENTS FOLLOWING PRE-TENDER MEETING		09/03/21	G.S	
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					HEIGHT OF DATUM:
					HORIZONTAL DATUM:

CLIENT



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PROJECT :
RAY BROOKS RESERVE, SANCTUARY POINT, NSW
PROPOSED PUBLIC BOARDWALK
STRUCTURAL DESIGN

DRAWING NAME: TYPICAL CROSS SECTIONS AND DETAILS 1

DESIGNED:	DRAWN:	STATUS:
A I/R M	A I/R M	G S

SHEET SIZE:	SCALE:	DATE:
A1	AS NOTED	09/03/2

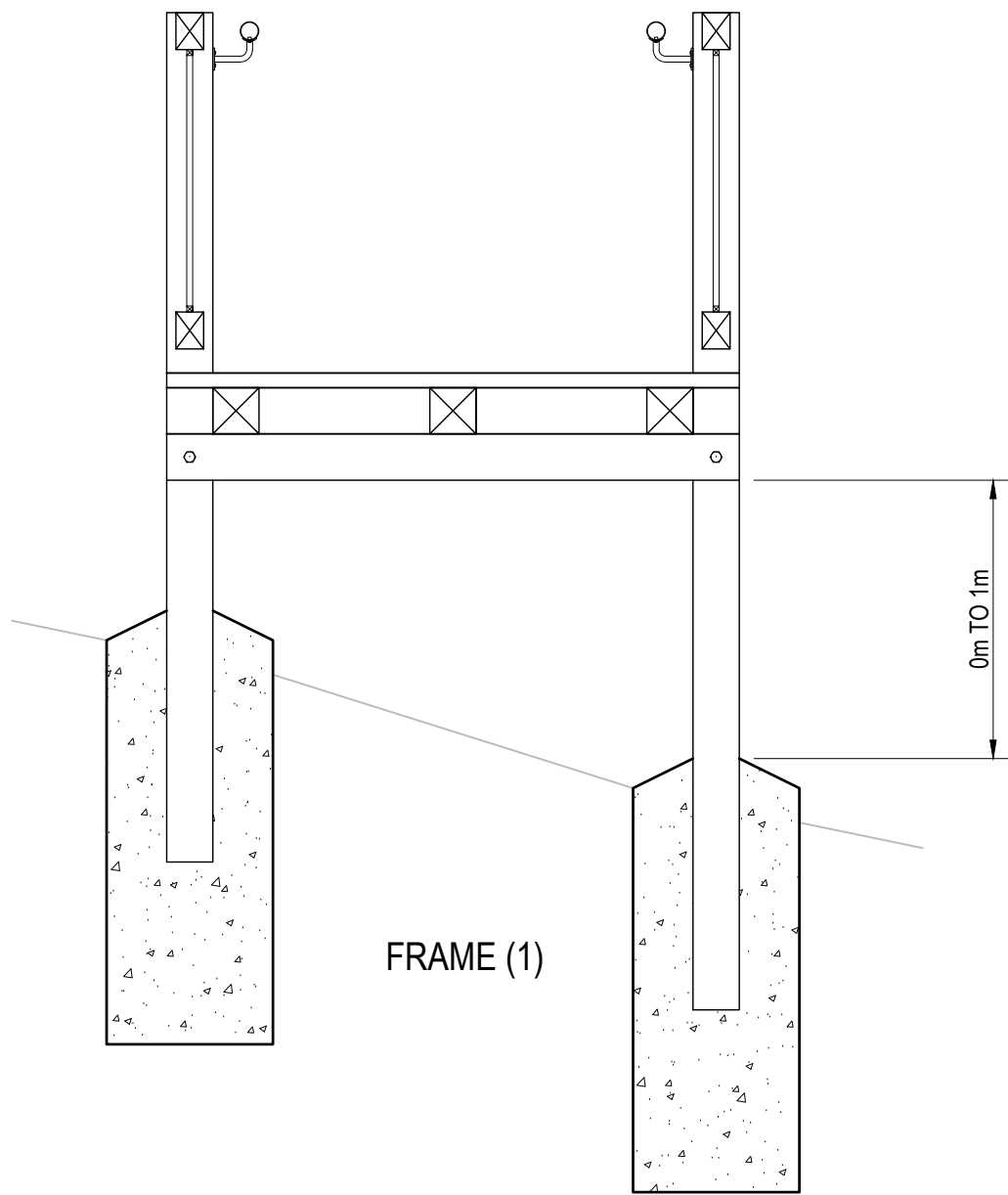
DRAWING NUMBER:	REVISION:
DN190088/03	

- NOTE
1.

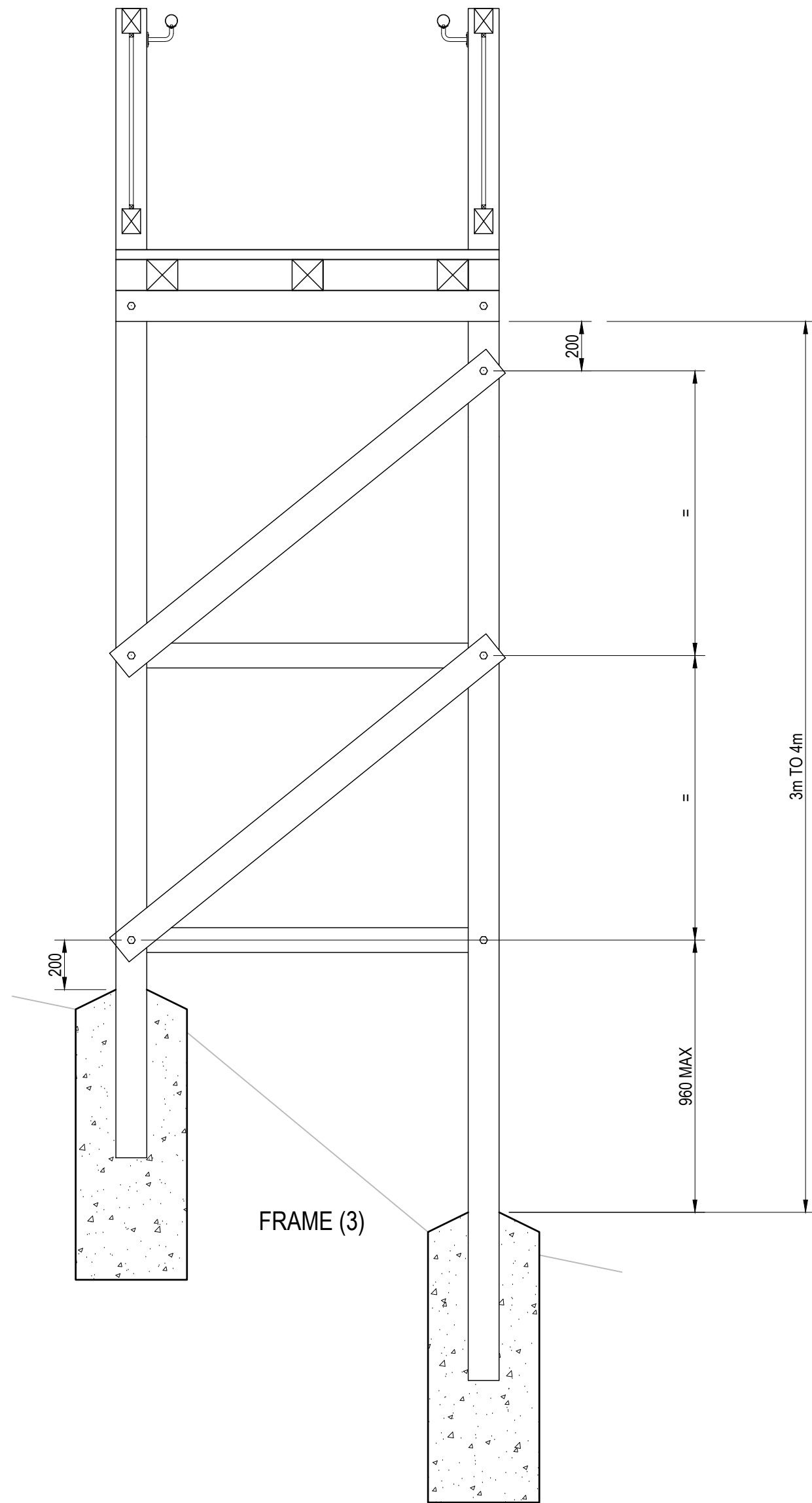
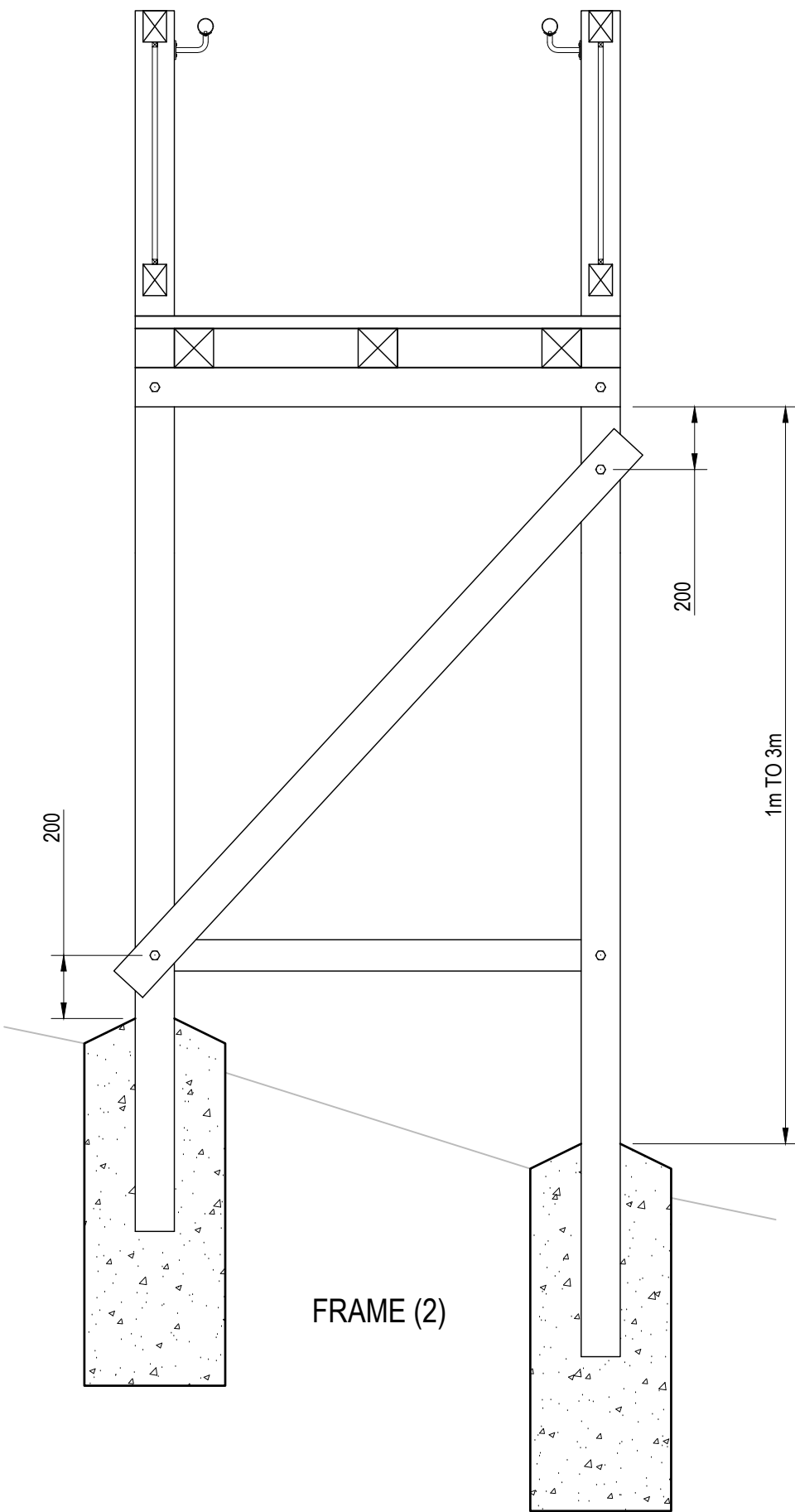
ALL BOLTED CONNECTIONS TO HAVE WCFT INSERTS
2.

ALL BOLTS, BRACKETS, RIVETS & SCREWS TO BE GRADE A4/316 STAINLESS STEEL, REFER TO NOTES ON S002.
3.

ALL CH5 HANDRAIL RAILS AND ASSOCIATED BRACKETS TO BE GRADE 316 STAINLESS STEEL



NOTES:
FRAME (1): 0m TO 1m, NO BRACING REQUIRED
FRAME (2): 1m TO 3m, SINGLE DIAGONAL BRACE REQUIRED
FRAME (3): 3m TO 4m, TWO DIAGONAL BRACES AND SINGLE HORIZONTAL BRACE REQUIRED
ALL BRACING MEMBERS TO BE WCFT 125x125x6 COMPOSITE FIBRE



TYPICAL BOARDWALK BRACING ARRANGEMENTS
SCALE 1:50

REVISION	AMENDMENTS	DATE	CHECKED	APP'D	SURVEYOR: SHOALHAVEN CITY COUNCIL	CLIENT:			PROJECT :	DESIGNED:	DRAWN:	STATUS:
2	ISSUE FOR CONSTRUCTION - AMENDMENTS FOLLOWING PRE-TENDER MEETING		09/03/21	G.S	DATE OF SURVEY:				RAY BROOKS RESERVE, SANCTUARY POINT, NSW	A.J/R.M	A.J/R.M	G.S
1	ISSUE FOR CONSTRUCTION		18/07/19	G.S	ORIGIN:				PROPOSED PUBLIC BOARDWALK	SHEET SIZE:	SCALE:	DATE:
B	80% DETAILED DESIGN ISSUE		14/06/19	G.S	HEIGHT OF DATUM:				STRUCTURAL DESIGN	A1	1 : 20	09/03/21
A	50% CONCEPT DESIGN ISSUE FOR OPTIONS DETERMINATION		24/05/19	G.S	HORIZONTAL DATUM:				DRAWING NAME:	DRAWING NUMBER:		REVISION:
									TYPICAL BOARDWALK BRACING ARRANGEMENTS	DN190088/04		2



DESIGN REPORT

RAY BROOKS RESERVE, SANCTUARY POINT, NSW

Public Boardwalk

Prepared for: Shoalhaven City Council

Report Number: DN190088.R01

Date: 18/07/2019



DESIGN | COST | DELIVER

Company Details

Leckring Pty Ltd T/as MIEngineers (ABN 64 003 012 324)

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Document Control

Issue No.	Date	Prepared by	Checked by	Final Approval
1	18/07/2019	A Jones	A Stokes	

Reference Documents

RFQ Title	Boardwalk Design – Ray Brooks Reserve – Greville Avenue, Sanctuary Point – Design & Documentation
RFQ Number	DES92-01

Limitations Statement

The sole purpose of this report and the associated services performed by MIEngineers is in accordance with the scope of services set out in the contract between MIEngineers and the Client. That scope of services was defined by the requests of the Client, by the time and budgetary constraints imposed by the Client, and by the availability of access to the site.

MIEngineers derived the data in this report primarily from site visits, discussions with the Client, information provided by the client and/or Government Authority and current methodologies. The passage of time, manifestation of latent conditions or impacts of future events may require further exploration at the site, subsequent data analysis, and re-evaluation of the findings, observations and conclusions expressed in this report.

In preparing this report, MIEngineers has relied upon and presumed accurate information (or absence thereof) provided by the Client and others identified herein. Except as otherwise stated in the report, MIEngineers has not attempted to verify the accuracy or completeness of any such information.

The findings, observations and conclusions expressed by MIEngineers in this report are not, and should not be considered, an opinion concerning anything other than as outlined in the scope of works. No warranty or guarantee, whether express or implied, is made with respect to the data reported or to the findings, observations and conclusions expressed in this report. Further, such data, findings, observations and conclusions are based solely upon site conditions and information in existence at the time of the investigation.

Table of Contents

LIST OF FIGURES 1

LIST OF TABLES 1

OBJECTIVES OF THE BRIEF 2

EXISTING SITE CONSIDERATIONS 2

 Site Description 2

 Infrastructure 3

 Services 3

 Environmental Considerations 3

 Geotechnical Characteristics 4

DESCRIPTION OF THE WORKS 4

DESIGN CONSIDERATIONS 4

 Access/Boardwalk Design 4

 Design Assumptions 5

CONSULTATION 5

BILL OF QUANTITIES 6

List of Figures

Figure 1 - Site Locality 2

Figure 2 - Services 3

List of Tables

Table 1 – Bill of Quantities

Appendices

Appendix A | Drawings

Objectives of the Brief

Council has identified that the existing pedestrian access to Ray Brooks Reserve from Greville Avenue (between properties 256 & 258 Greville Ave) is to be upgraded. The existing access comprises of a short section of asphalt and gravel path on existing ground then follows a timber boardwalk structure that does not meet current standards for accessible grades.

The scope of the design is to detail the alignment, construction materials and detailed fixings of the proposed boardwalk system constructed from non-timber products along with connecting paths and infrastructure impacted by the works.

Whilst the alignment is envisaged to follow the approximate alignment, an alternative alignment that could reduce the number of switch-backs and maximise single-run lengths may be considered.

The new boardwalk structure should not impede vehicle access to the sewage pump-out that currently services the existing amenities building.

Existing Site Considerations

Site Description

Sanctuary Point is located approximately 30km South of Nowra. The site of work is located at the eastern end of Greville Avenue.

The proposed site of work is highlighted in Figure 1 – Site Locality.

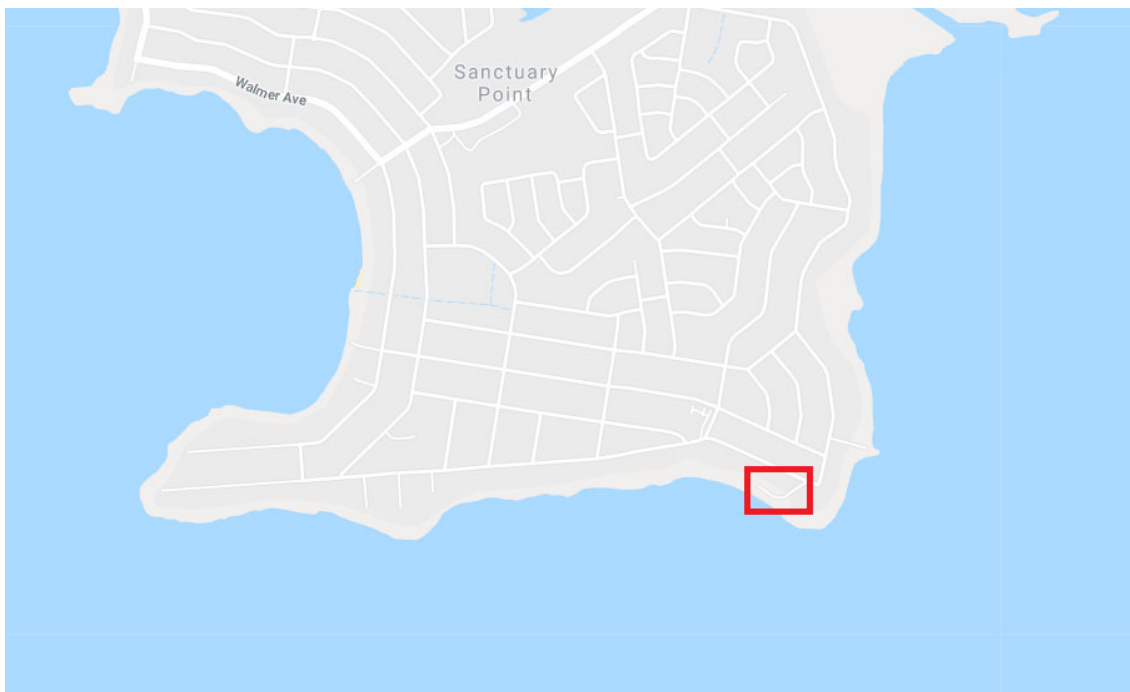


Figure 1 - Site Locality

Infrastructure

Infrastructure impacted as a result of the works includes:

- Existing timber boardwalk;
- Existing asphalt path;
- Existing rock retaining wall adjacent to access road;
- Existing timber retaining wall at bottom of boardwalk;
- TBC following potholing of 25mm UPVC rising main

Services

A Dial Before You Dig has been carried out and has highlighted that a 25mm UPVC rising main is in the area. Potholing of this sewer line will need to occur to ensure that the proposed boardwalk does not affect this service.

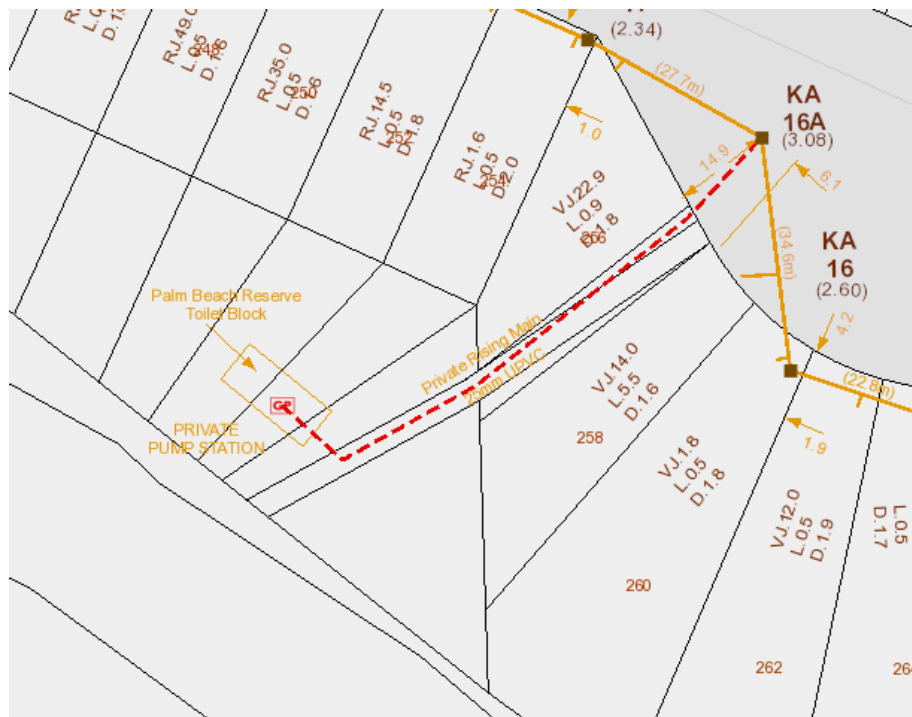


Figure 2 - Services

Environmental Considerations

Not in MEngineers scope of works.

Geotechnical Characteristics

A visual walkover of the site was undertaken by a Senior Engineer of MIEngineers. The following observations were witnessed:

- The lower side of the embankment was observed to be a gravel sand material.
- Rock outcropping was observed within the embankment

Based on similar localities in Sanctuary Point, the material above the embankment is assumed to be clay overlaying weathered rock.

Description of the Works

The scope of works generally consists of:

- Creating a base survey model and establish a natural surface DTM that is fit for purpose from the Detailed Survey provided.
- Geometric design of the proposed works including the layout design showing extents of work and highlighting impacts to existing infrastructure provided from the detailed survey, including vegetation, vertical design of the proposed paths and boardwalk alignments are to be designed vertically to ascertain compliance with standards for access and mobility (AS1428) and typical sections of proposed boardwalk construction are to be provided for a minimum of two different material selections/alternatives and indicative lineal meterage construction costs for each.
- Bill of materials and quantities
- Design report highlighting design assumptions and standards as a result of the proposed works (This report)

Design Considerations

Access/Boardwalk Design

Access paths/boardwalk design was undertaken for both horizontal and vertical geometry as follows:

Horizontal Geometry

- The horizontal alignment provided by Shoalhaven City Council was utilised in the development of the geometry.
- Best fit geometry was designed for the access pathways to tie into the existing surrounding ground levels.

Vertical Geometry

- The proposed paths and boardwalk vertical alignment was designed to ascertain compliance with the Australian Standard for access and mobility (AS1428).
- Due to the construction materials, no fall has been provided at switch-backs locations.

Structures

- Concrete slab on ground was designed where natural ground levels were appropriate
- Retaining walls were utilised where natural ground lines were altered and/or were required to be retained.
- All structures were designed in accordance with the relevant Australian Standards.
- Existing signage to be relocated as required.

Design Assumptions

Design assumptions were as follows:

- 1m wide boardwalk adopted
- The design has not allowed for wheelchair passing bays. Wheelchairs can pass at the three switch-back locations.
- As per clause 10.8.1(b) of AS1428.1, as the change of direction is less than 30°, the internal corner has not been truncated for a minimum of 500mm in both directions (Refer to Figure 4 of AS1428.1).
- No large trees to be removed. Clearing to be of small trees, ground vegetation, shrubs and stumps.

Consultation

Documentation reviews have occurred throughout the design period with reviews occurring at 50% concept design and 80% concept design. At the 50% concept design review stage, the boardwalk structure material was confirmed to be the FRP Composite Material (as approved by M.Apolo 04/06/2019). At the 80% concept design review stage, feedback of the drawings was provided (email dated 02/07/2019) with a brief summary of comments below:

- Revise proposed sandstone gravity retaining wall to precast concrete blocks;
- Nominate FRP boardwalk material colours
- Amend landings to be square to the path of travel
- Miscellaneous comments and questions

Outcomes from the documentation reviews were incorporated into the final design drawings.

Bill of Quantities

A Bill of Quantities has been prepared based on the design drawings:

Table 1 – Bill of Quantities

Number	Description	Quantity	Unit
1	Earthworks		
1.1	Clearing & Grubbing	1	Lump Sum
1.2	Cut to Fill	150	m ³
1.3	Strip Topsoil/leaf litter	63	m ³
2	Demolition		
2.1	Remove existing retaining wall	1	Lump Sum
3	Elevated Boardwalk – Wagner Composite		
3.1	C1 - Columns	260	m
3.2	B1 - Bearers	80	m
3.3	J1 - Joists	266	m
3.4	H1 – Handrail Member	364	m
3.5	H2 – Handrail Member + Splice Member	192	m
3.6	BL1 - Balusters	108	m
3.7	Bracing Members	74	m
3.8	M1 – Floor Mesh	118	m ²
3.9	SS fixing bolts and brackets	1	Lump Sum
3.10	0.6m Deep Bored Pier (450 Dia.)	5	No.
3.11	0.75m Deep Bored Pier (450 Dia.)	5	No.
3.12	1.5m Deep Bored Pier (450 Dia.)	55	No.
4	Concrete Works		
4.1	Concrete Footpath (110mm thick, SL82 Mesh, 40MPa)	54.6	m ²
4.2	Concrete Kerb (150mm high x 150mm wide)	13.5	m
4.3	Concrete drop edge beam including subsurface drain	20	m
4.4	Saw Cut/tooled joint (min 20mm depth)	22	m
4.5	Expansion Joint (R12 Galv dowel at 300 c/c)	8	m
5	Retaining Wall		
5.1	Retaining Wall (Quickstone Concrete Blocks)	18	m
5.2	Subsurface drain and granular free draining backfill	18	m
6	Handrail ‘Sentaaur Assistaur’		
6.1	Sentaaur Assistaur handrail on concrete footpath	35.4	m
7	Relocate Existing Sign	1	Lump Sum

Appendix A | Drawings

Table 2 - Drawings

Drawing No.	Description
DN180180/C00	COVER SHEET
DN180180/C01	NOTES
DN180180/C02	LAYOUT PLAN & LONGITUDINAL SECTION
DN180180/C03	TYPICAL CROSS SECTIONS AND DETAILS 1
DN180180/C04	TYPICAL BOARDWALK BRACING ARRANGEMENTS