LOCH ETIVE PIER – REMEDIATION REPORT

Dawnfresh Loch Etive Trout Farm, Taynuilt, PA35 1HU

CLIENT
Dawnfresh Farming

Author
Will Rudd Davidson

Will Rudd Davidson Ltd
Consulting Civil & Structural Engineers
43 York Place
Edinburgh, EH1 3HP
0131 557 5255
edinburgh@ruddconsult.com

Document Information & History

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Revision	Date	Remarks	Prepared by	Reviewed by
P01	15/02/22	First Issue	Michael Clutton	Chris Milne
P02	05/04/22	Final Issue	Michael Clutton	Chris Milne

Table of Contents

1 Introduction

1.1 Introduction

Will Rudd Davidson have carried out an inspection at Loch Etive Trout Farm at the request of their client Dawnfresh Farming Ltd. The initial inspection was carried out on 7th December 2021 by a representative of WRD. A further follow-up inspection carried out at low tide on 18th January 2022 as it was reported that there had been movement in the rock armour.

The sole purpose of the inspections was to provide comment from a structural perspective on the existing pier serving fish farms at Loch Etive. The findings are presented in the context of conclusions and further recommendations.

1.2 Supporting information

The following information has been included within the appendices to be viewed in conjunction with this report:

Appendix A – Arch Henderson Condition Report

Appendix B – Site Photographs

Appendix C – WRD Pier Proposals

2 Existing Structure

The existing pier is located on the site of Dawnfresh Loch Etive Trout farm on the south shore of Loch Etive in North West Scotland, approximately 700m east of the mouth of the River Awe. It is located to the north of the site on the south shore of the loch, and the pier extends in the north easterly direction into the water. The pier measures approximately 12m by 4m with the longer edge forming the berthing face.

The shoreline is delineated by rock fill of varying size forming a wave break. The existing pier topping is mass concrete and appears to have been cast directly onto the underlying rockfill. A 250mm high concrete upstand (400mm wide) runs along the berthing face of the pier, with a steel upstand measuring 150mm square runs down the west return. A mass concrete block is situated to the east return of the pier which forms an ad-hoc mooring point.

3 Site Observations

A previous inspection was carried out by Arch Henderson LLP in March 2018 which is contained within Appendix A. Structural issues noted within the report were as follows:

- Existing upstands not being securely fixed to the concrete pier.
- Evidence of exposed and corroding reinforcement to the pier slab.
- Evidence of abrasive contact causing deterioration of the pier concrete.
- Evidence of erosion to both berthing face and west return below the low water mark.
- Voids observed between the pier slab and the underlying rock fill below the low water mark in various locations

From our subsequent inspections on 7th December 2021 and 18th January 2022 these issues were found to be consistent with the previous report, but it was apparent that further deterioration had occurred, and voids noted by Arch Henderson in 2018 had increased in size.

It appeared that the voids observed to the base of the pier are likely to have been caused by movement of the underlying rock armour substrate to the concrete topped pier.

The pier is in continual use as it serves multiple fish farms placed in Loch Etive.

Photographs taken at the time of our site inspections are contained within Appendix B.

4 Conclusions

The existing pier is noted to be in a state of disrepair and is deteriorating more rapidly following the attentions of Storm Arwen. It is not possible to remove and replace the pier whilst maintaining the necessary upkeep and support to the ongoing fish farms within Loch Etive. As there are voids below the pier structure it is not considered desirable to add substantial weight on top of the pier to facilitate strengthening.

Various options have been explored to allow the farming operation in Loch Etive to retain operational capacity. It is thought that the creation of a small extension to the existing pier adjacent to the main body of the pier would be the optimum solution and provide many benefits.

The building of the extension to the existing pier, positioned adjacent to it would provide some shelter and support to it, extending the usable life of the main body of the pier.
When this was complete the main body of the pier could be repaired while the new extension was providing access for all ongoing fish related activities.

The top level of the extended pier would be a positioned so that its height would allow operatives to load and unload fish, feed etc. without operatives and machines being in the water at high tides.

Following discussions with the site operating staff, the positioning of the pier extension would be best suited to the North east of the main body of the pier. This would have several benefits in that it would aesthetically less obtrusive than on the North West side. Also, there would be an advantage in separating planned pedestrian and vehicle movements to ensure that the operations may be carried out as safely as possible.

5 Recommendations

It is recommended that a small extension to the existing pier is constructed adjacent to the main body of the pier, to the east side, by the use of driven sheet piles and a concrete topping. The pier extension would be positioned so as to provide shelter to the existing arrangement. It is proposed to be constructed from sheet piled walls infilled and capped in a new concrete slab. Proprietary fenders, mooring bollards and rings would be incorporated within the new structure to serve the operational boats. Crucially, this pier could be constructed while the existing arrangement remains operational.

Once construction of the extension is complete, we would recommend that additional strengthening works are carried out on the main body of the pier to resurface and provide appropriate wheelstop and mooring points. This following the repositioning of rock armour and infilling any voids that are apparent in the substructure. The works are intended to have the effect of slowing further degradation and increasing the operational life of the pier.

Due to climate change it is considered that future storms could easily be more violent than the recent ones, and without remediation the damage is likely to become progressively worse.

For this reason we recommend that this work is undertaken as soon as possible.

Following detailed discussion with the site operations team, WRD have developed proposals which we believe provides a cost effective and safe solution for maintaining of fish farm related activities at this location. WRD proposal drawings are contained within Appendix C.

It is anticipated that the proposed pier extension and remedial works will form a workable medium-term solution to allow activities of the adjacent trout farm to continue. In due course it is likely that the wholesale replacement of the existing pier will become necessary.

Until the works are carried out the pier should be closely monitored for any further degradation, particularly following any storm events. See Appendix D for hole monitoring information.

Appendix A – Arch Henderson Condition Report

Dawnfresh Farming

175066

Loch Etive Pier Inspection

March 2018

Arch Henderson LLP
142 St. Vincent Street,
Glasgow G2 5LA

Arch Henderson 1919

Document Control

Notice

This document has been produced by Arch Henderson LLP for Dawnfresh Farming solely for the purpose of reporting on the inspection of Loch Etive Pier, Inverawe.
It may not be used by any person for any other purpose other than that specified without the express written permission of Arch Henderson LLP. Any liability arising out of use by a third party of this document for purposes not wholly connected with the above shall be the responsibility of that party who shall indemnify Arch Henderson against all claims costs damages and losses arising out of such use.

Document Information

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Document Approvals

Role	Name	Signature	Date
Project Partner	G Bowie		*04.05.18*
Project Review Group			
Project Manager	W Jamieson		*04.05.18*

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Table of Contents

Arch Henderson

1 Executive Summary

Arch Henderson LLP carried out a Condition Survey Inspection of Loch Etive Trout Farm pier, Inverawe on Thursday 29th March 2018.

The inspection was undertaken only above the low water mark.

Although the concrete pier and slabs are showing no signs of significant movement, the survey has highlighted areas of localised voids and erosion of concrete to the berthing face at and below low water level.

It is recommended that the voids are infilled and the erosion to the concrete berthing face is repaired within the next 12 months to stabilise the pier.

It is also recommended that the above should be monitored as part of a proactive maintenance regime to ensure that the pier remains operational.

2 Introduction

Loch Etive Trout Farm pier lies approx. 4km to north of Bridge of Awe village and 700m to the east of the mouth of River Awe.

The pier extends out from the shore in the direction of just east of north into Loch Etive. The pier appears to be constructed with a concrete slab laid on varying sized rock fill and measures approx. 12m long at the berthing face x 4m wide at the shore returns.

Access to the pier is via a natural slope which is surfaced with small stones and whin dust forming an informal surfacing.

The shoreline either side of the pier is protected by varying sized rock fill.

A 400mm wide x 250mm high concrete upstand runs parallel to the berthing face and is not fixed securely to the concrete slab.

A 150mm wide x 150mm high steel upstand runs along the west return of the pier towards the shoreline and is securely fixed to the concrete slab.

A mass concrete block measuring 1.3m x 1.2m x 550mm high is situated at the east side of the pier sits on top of the concrete slab and is currently used to help moor the work boat alongside the pier.

2.1 Scope of Analysis

Arch Henderson carried out a visual survey on Thursday 29th March 2018 on the existing pier at Loch Etive Trout Farm, Inverawe and is focused on providing a record of the current condition of the pier.

2.2 Assessment Criteria

Urgent

Severe defects resulting in complete performance failures i.e. loss of life, collapse of asset. Defects to be addressed within 6 months.

Critical

Defects that would significantly reduce the performance of asset i.e. likely to cause injury, operational restrictions to asset. Defects to be addressed within 12 months.

Minor

Minor defects that will not reduce the overall performance of asset. Defects to be addressed within 3 years.

Superficial

Superficial defects that if left unrepaired will deteriorate. Defects to be addressed within 5 years.

3 Observations

3.1 Introduction

The observations will be separated into visual topside inspection and visual waterside inspection.

3.2 Visual Topside Inspection

- Concrete upstand which runs parallel to the berthing face is not securely fixed to concrete slab.
- Damage to concrete upstand at north of pier. Refer to photos 22 & 23.
- Mass concrete block used to tie off boat when berthed is not securely fixed to concrete slab. Refer to photo 21.
- Evidence of exposed and corroding reinforcement at junction between the informal surface and concrete slabs. Refer to photo 24.
- Evidence of exposed and corroding reinforcement on north return at cope level. Refer to photo 16.
- Evidence of erosion to concrete from excessive chain rub at west return. Refer to photo 19.

3.3 Visual Waterside Inspection

- Evidence of erosion to concrete wall below low water mark on west return. Refer to photos 18 & 27.
- Missing tyres from fender system on berthing face. Refer to photos 13, 14 & 15.
- Evidence of erosion to concrete below low water mark on berthing face. Refer to photos 29 to 42 (incl.).
- 2 No. areas of voiding between exposed rock fill below low water mark. North west void maximum dimensions 750mm long x 1000mm high x 1000mm deep. Refer to photos 15, 38, 40 & 42. South east void maximum dimensions 1200mm wide x 1000mm high x 750mm deep. Refer to photos 13, 32 & 33.

4 Summary of Survey

The survey shows that general condition of the pier is in a stable but deteriorating state.

A regular maintenance and inspection regime should be implemented to ensure that any defects which develop are noted, monitored and repaired as required to prolong the operational use of the pier.

5 Conclusion and Recommendations

It is recommended that all voids are infilled, the erosion to the concrete on the berthing face and north west return are repaired and a reactive maintenance plan is implemented, followed by a proactive maintenance plan to ensure the operational use of the pier.

It is also recommended that a dive survey be carried out to ascertain the extent of any damage to the pier below the water level.

The critical repairs should be carried out within the next 12 months to maintain operational use of the pier.

The minor repairs should be carried out within the next 3 years to ensure that the existing defects do not deteriorate further.

Arch Henderson

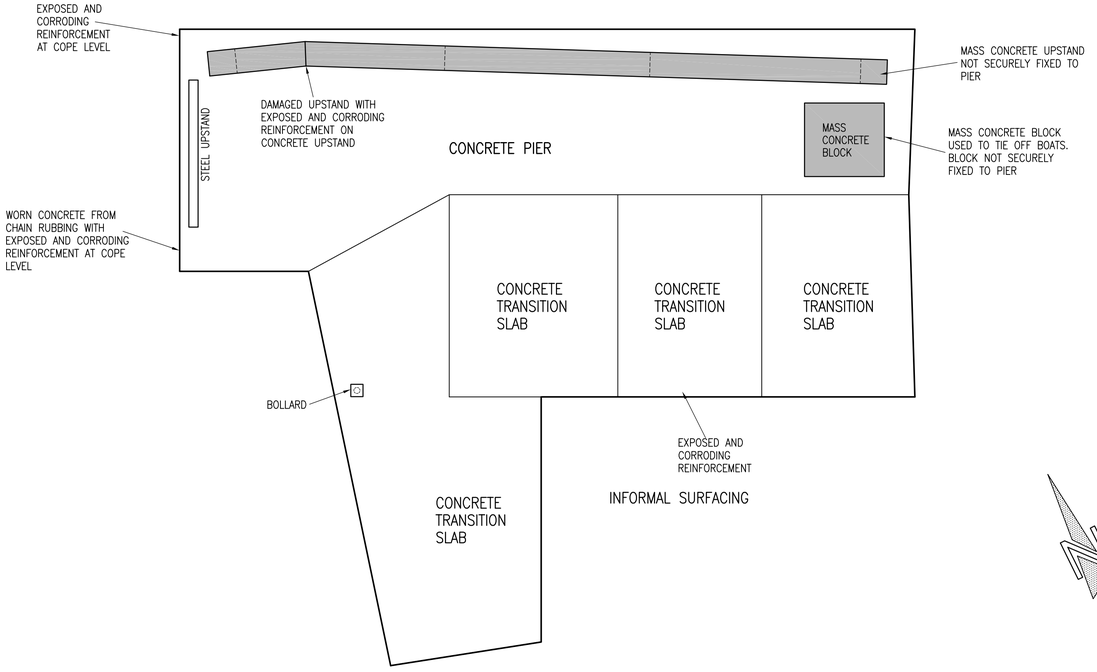
List of Appendices

Appendix A – Drawings

175066/Figure 001 - Existing Layout Showing Locations of Defects
175066/Figure 002 - Existing Layout Showing Location of Photographs

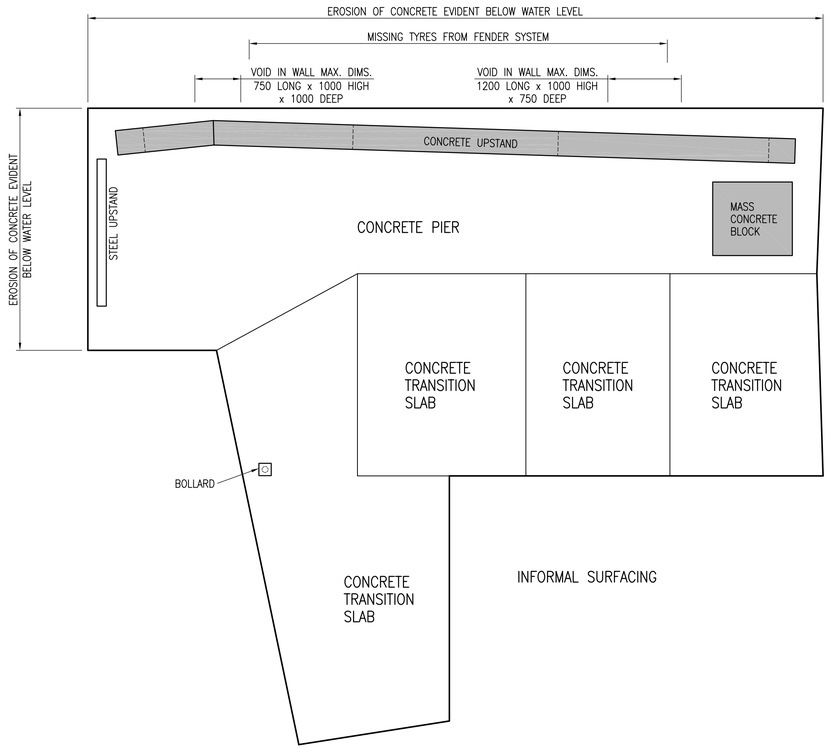
NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE FOLLOWING ARCH HENDERSON REPORT '175066 LOCH ETIVE PIER INSPECTION REPORT MARCH 2018'.



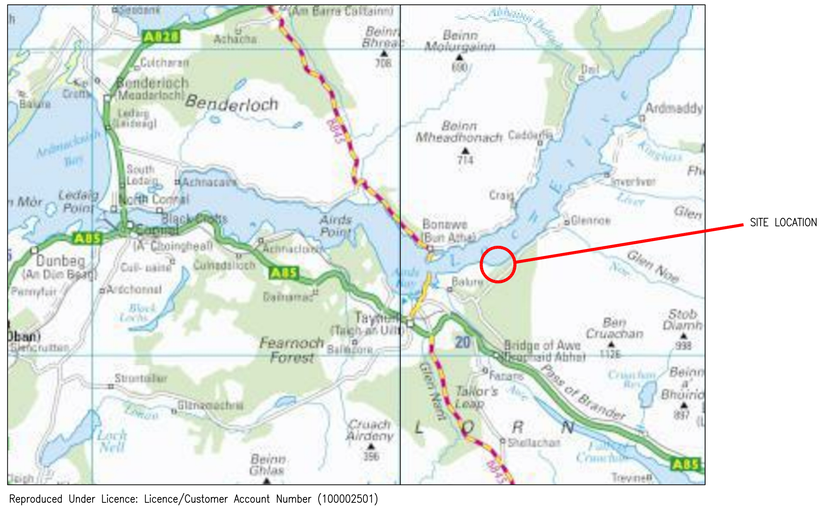
TOPSIDE INSPECTION PLAN

SCALE 1 : 50



WATERSIDE INSPECTION PLAN

SCALE 1 : 50



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LOCATION PLAN

NOT TO SCALE

DRAFT

REV	DATE	REVISION DESCRIPTION	DRN	VER

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Civil Engineers
Structural Engineers
Principal Designers
Architects
Geotechnical services
Environmental services

142 St. Vincent Street, Glasgow G2 5LA.
Tel : 0141 227 3060 • Fax : 0141 248 9542
www.arch-henderson.co.uk • email : glasgow@arch-henderson.co.uk

Offices in : Aberdeen, Dundee, Falkland Islands, Glasgow, Inverness, Lerwick, Southampton, Stromness and Thurso

PROJECT :
DAWNFRESH FARMING
LOCH ETIVE PIER INSPECTION

TITLE :
EXISTING LAYOUT SHOWING LOCATIONS OF DEFECTS

DRAWN :	DATE :	VERIFIED :	APPROVED :
W.J.	20.04.18	G.B.	G.B.

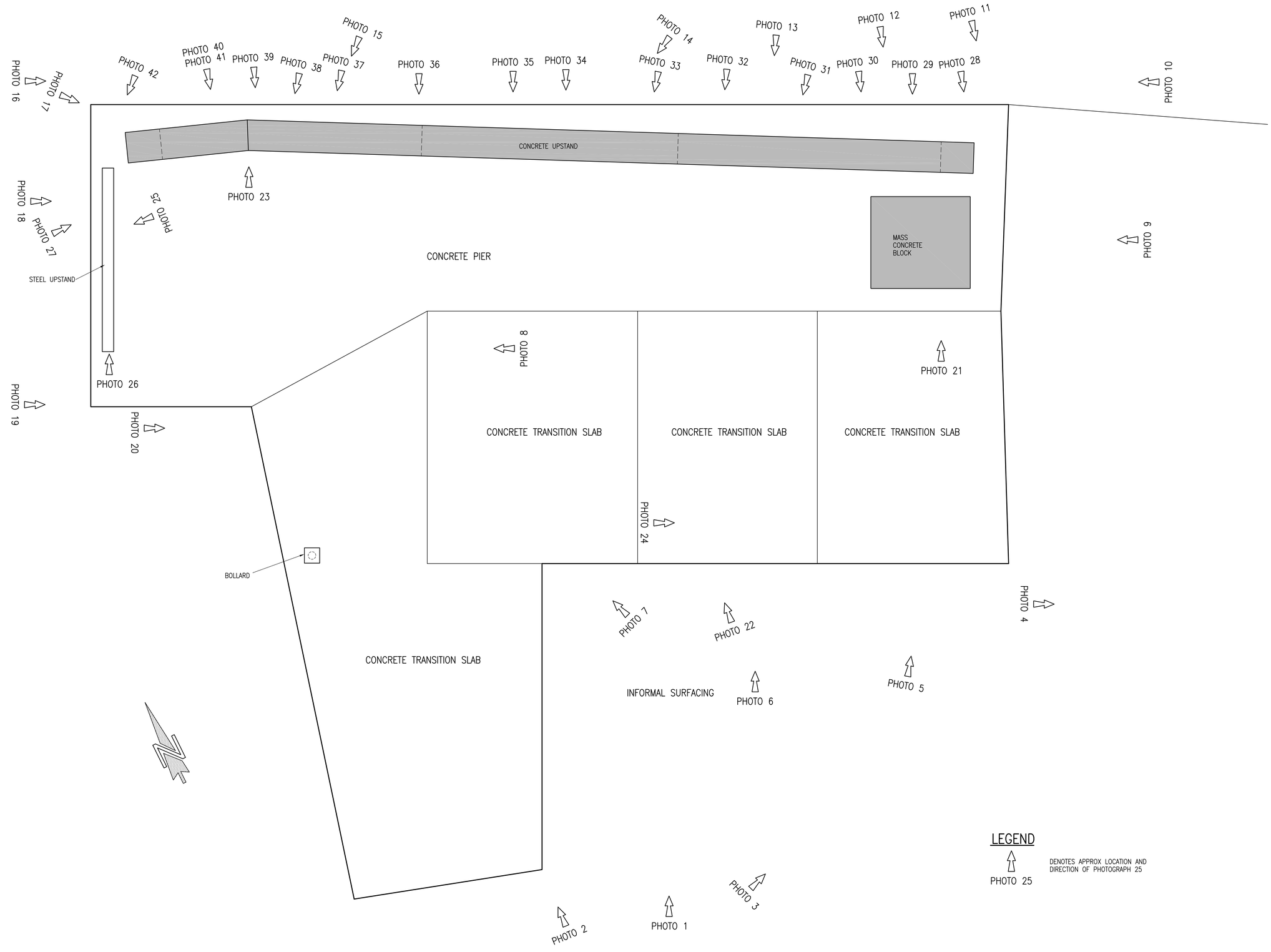
SCALE : (A1)	DRAWING STATUS :
AS SHOWN	REPORT

DO NOT SCALE

DRAWING No : 175066/FIGURE 01 REV : /

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE FOLLOWING ARCH HENDERSON REPORT '175066 LOCH ETIVE PIER INSPECTION REPORT MARCH 2018'.
2. REFER TO APPENDIX B OF 175066 LOCH ETIVE PIER INSPECTION REPORT DATED MARCH 2018 FOR DETAILS OF PHOTOGRAPHS.



LEGEND

PHOTO 25 — DENOTES APPROX LOCATION AND DIRECTION OF PHOTOGRAPH 25

EXISTING LAYOUT

SCALE 1 : 25

DRAFT

REV	DATE	REVISION DESCRIPTION	DRN	VER

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PROJECT :
DAWNFRESH FARMING
LOCH ETIVE PIER INSPECTION

TITLE :
EXISTING LAYOUT SHOWING
LOCATION OF PHOTOGRAPHS

DRAWN :	DATE :	VERIFIED :	APPROVED :
W.J.	20.04.18	G.B.	G.B.

SCALE : (A1)	DRAWING STATUS :
AS SHOWN	REPORT

DRAWING No : 175066/FIGURE 02 REV : /

DO NOT SCALE

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Appendix B – Photographs

Photo 1 – Looking north east toward berthing face

Photo 2 – Looking north

Photo 3 – Looking north east

Photo 4 – Looking east along shoreline

Photo 5 – Looking north east toward shoreline and pier return

Photo 6 – Looking down slope to berthing face

Photo 7 – Looking north toward pier return

Photo 8 – Looking north west toward pier return

Photo 9 – Looking north west showing informal surfacing, concrete transition slabs and concrete pier

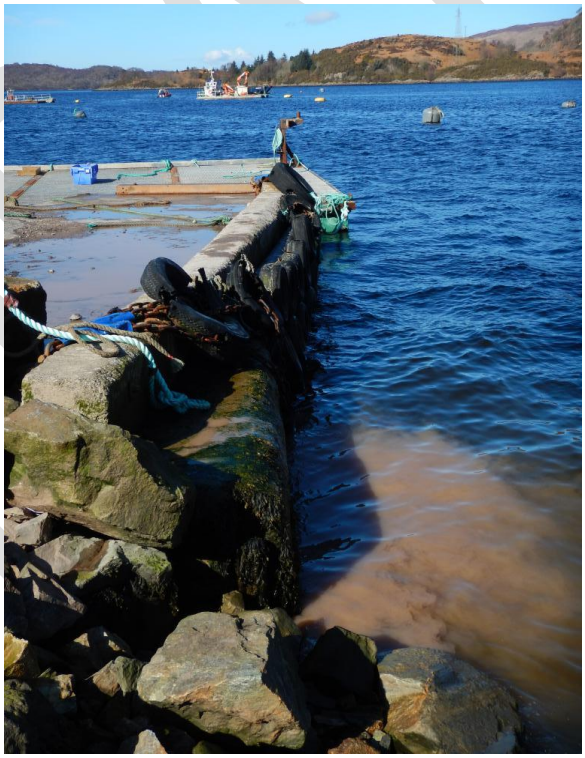


Photo 10 – Looking north west along berthing face

Photo 11 – Showing north east extent of berthing face

Photo 12 – Showing berthing face and fender arrangement

Photo 13 - Showing berthing face and fender arrangement with missing tyres along bottom chain

Photo 14 - Showing berthing face and fender arrangement with missing tyres along bottom chain

Photo 15 - Showing berthing face and fender arrangement with missing tyres along bottom chain

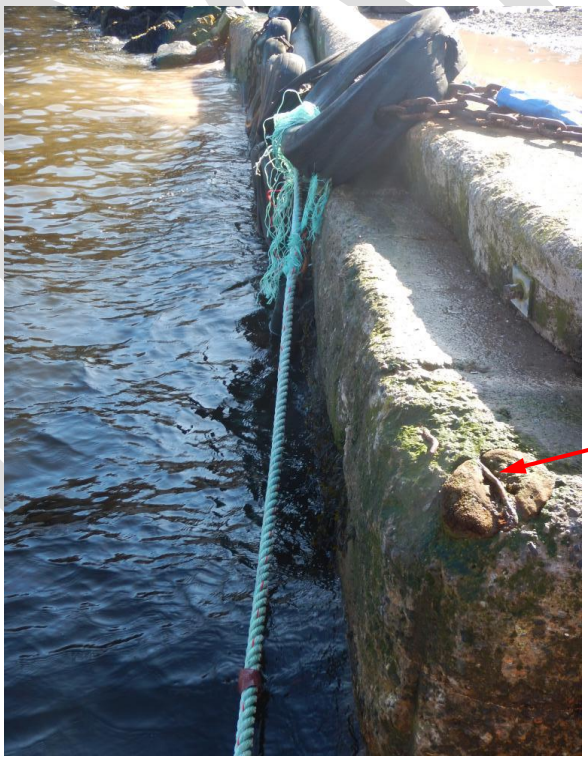


Photo 16 – Looking west along berthing face

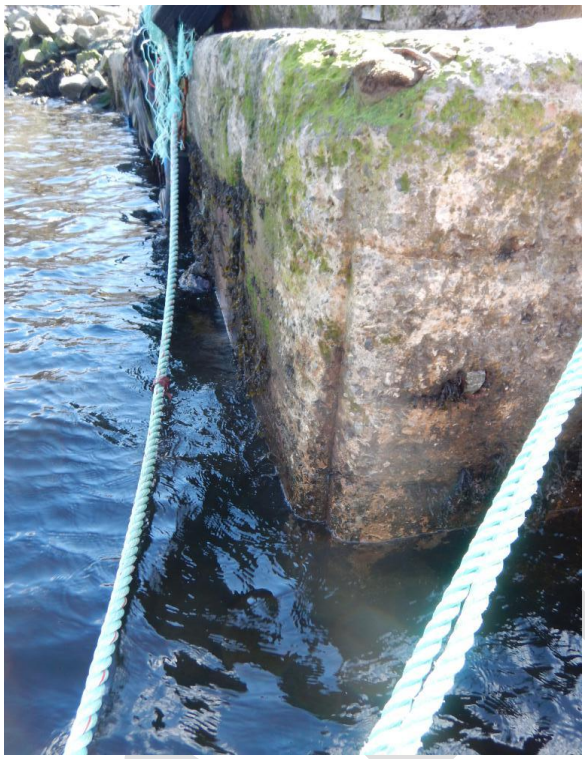


Photo 17 – Showing north west return

Photo 18 – Showing north west return

Photo 19 – showing north west return to shoreline

Photo 20 – Showing shoreline at north west return

Photo 21 – Showing mass concrete block

Photo 22 – Showing damaged concrete upstand

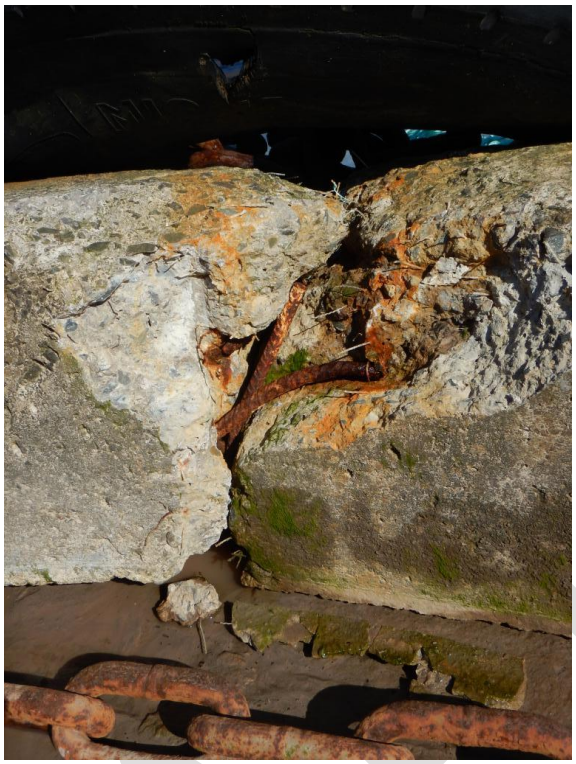


Photo 23 – Showing close up of damaged concrete upstand

Photo 24 – Showing transition from informal surfacing to concrete transition slab

Photo 25 – Showing steel upstand

Photo 26 – Showing steel upstand securely fixed to concrete pier

Photo 27 – Showing erosion below water line on north west return

Photo 28 – Showing erosion to concrete below water line along berthing face starting at north east of pier

Photo 29 - Showing erosion to concrete below water line along berthing face

Photo 30 - Showing erosion to concrete below water line along berthing face

Photo 31 - Showing erosion to concrete below water line along berthing face

Photo 32 - Showing erosion to concrete below water line along berthing face

Photo 33 - Showing erosion to concrete below water line along berthing face

Photo 34 - Showing erosion to concrete below water line along berthing face

Photo 35 - Showing erosion to concrete below water line along berthing face

Photo 36 - Showing erosion to concrete below water line along berthing face

Photo 37 - Showing erosion to concrete below water line along berthing face

Photo 38 – Showing location of void

Photo 39 – Showing continuation of void

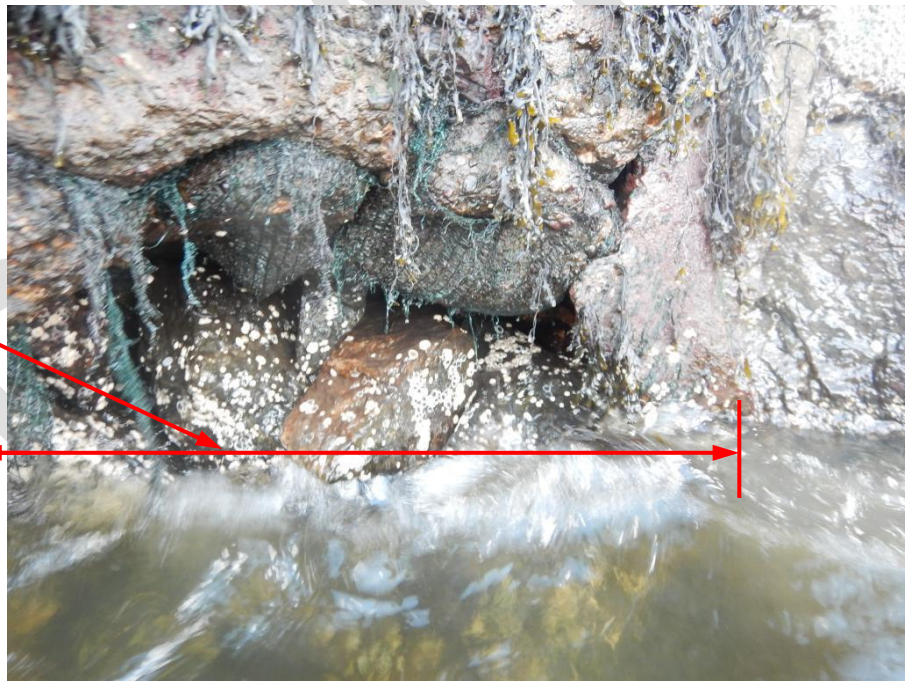
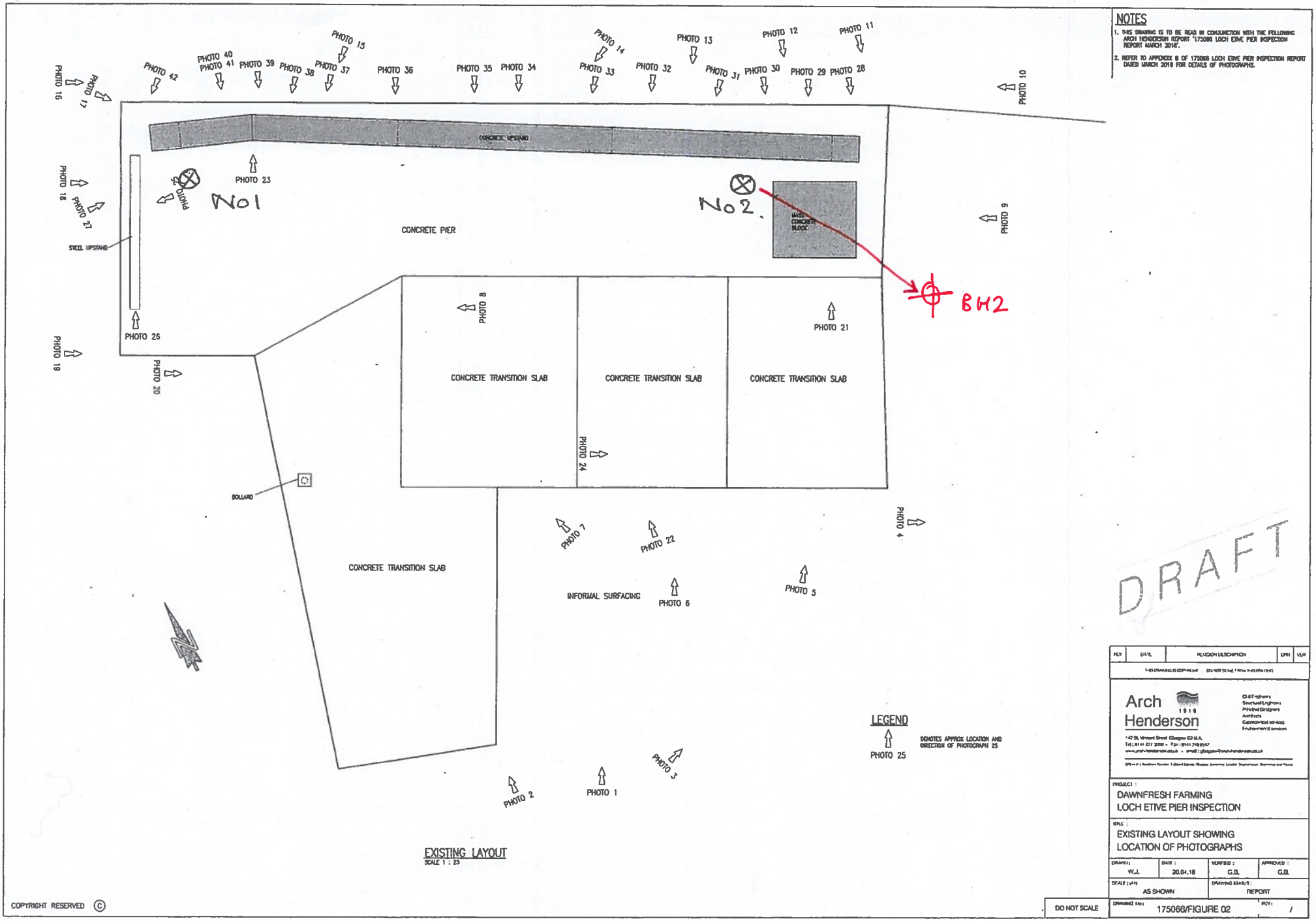


Photo 40 – Showing continuation of void

Photo 41 - Showing close up of void

Photo 42 – Showing north corner of berthing face



EXISTING LAYOUT
SCALE 1 : 25

BOREHOLE LOG

Project				BOREHOLE No
Pier at Dawnfresh, Loch Etive, Taynuilt				1
Job No	Date	Ground Level (m)	Co-Ordinates ()	
20016-01	02-03-20			
Contractor				Sheet
Blake Geoservices Ltd - www.blake-geoservices.co.uk -				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
			1			(0.65) 0.65	CONCRETE		
						(0.85) 1.50	BOULDERS of granite and schist		
						(1.20) 2.70	Granite BOULDER		
						(2.20) 4.90	Dark grey, shelly, SAND & GRAVEL, sand is medium to course, gravel is coarse, subangular of mixed lithologies. ...terminated upon bedrock or boulder, poor returns...		
						(0.60) 5.50	Brown, SAND & GRAVEL, sand is medium to course, gravel is coarse, subangular of mixed lithologies. ...terminated upon bedrock or boulder, poor returns...		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
03-03-20	12.00	5.50	2.50		0.50						Borehole backfilled with arisings. Groundwater strikes are tidal. Casing unable to progress through granite boulders, open hole drilling below 2.50m.

All dimensions in metres Scale 1:50	Client North West Marine Ltd	Method/ Plant Used 2.5t Rotary	Logged By CLB/DM

AGS3 UK BH 20016 DAWNFRESH ETIVE.GPJ AGS3_1.GDT 4/3/20

BOREHOLE LOG

Project				BOREHOLE No
Pier at Dawnfresh, Loch Etive, Taynuilt				2
Job No	Date	Ground Level (m)	Co-Ordinates ()	
20016-01	02-03-20			
Contractor				Sheet
Blake Geoservices Ltd - www.blake-geoservices.co.uk -				1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
						(1.30) 1.30	Brown SAND & GRAVEL with frequent angular cobbles and boulders of mixed lithologies, sand is medium to course, gravel is coarse, subangular of mixed lithologies.		
						(1.40) 2.70	Granite BOULDER		
						(2.60) 5.30	Dark grey, shelly, SAND & GRAVEL, sand is medium to course, gravel is coarse, subangular of mixed lithologies. ...terminated upon bedrock or boulder, poor returns...		

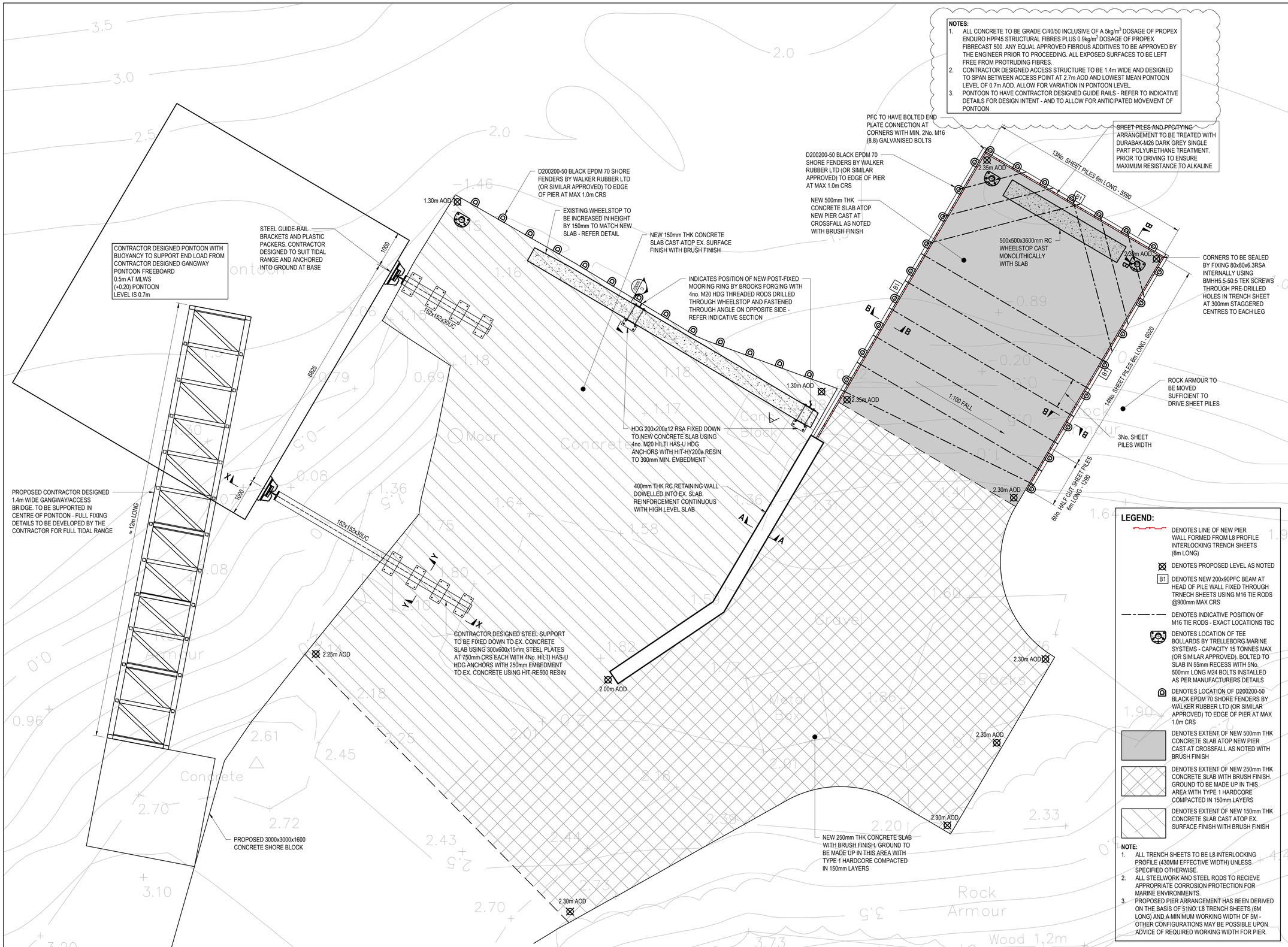
Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
02-03-20	15.00	5.30	2.50		0.20						Borehole backfilled with arisings. Groundwater strikes are tidal. Casing unable to progress through granite boulders, open hole drilling below 2.50m.

All dimensions in metres Scale 1:50	Client North West Marine Ltd	Method/ Plant Used 2.5t Rotary	Logged By CLB/DM

AGS3 UK BH 20016 DAWNFRESH ETIVE.GPJ AGS3_1.GDT 4/3/20

Appendix B – Site Photographs

Appendix C – WRD Drawing Proposals



LEGEND:

- DENOTES LINE OF NEW PIER WALL FORMED FROM L8 PROFILE INTERLOCKING TRENCH SHEETS (6m LONG)
- DENOTES PROPOSED LEVEL AS NOTED
- B1 DENOTES NEW 200x90PFC BEAM AT HEAD OF PILE WALL FIXED THROUGH TRNECH SHEETS USING M16 TIE RODS @900mm MAX CRS
- DENOTES INDICATIVE POSITION OF M16 TIE RODS - EXACT LOCATIONS TBC
- DENOTES LOCATION OF TEE BOLLARDS BY TRELLEBORG MARINE SYSTEMS - CAPACITY 15 TONNES MAX (OR SIMILAR APPROVED). BOLTED TO SLAB IN 55mm RECESS WITH 5No. 500mm LONG M24 BOLTS INSTALLED AS PER MANUFACTURERS DETAILS
- DENOTES LOCATION OF D200200-50 BLACK EPDM 70 SHORE FENDERS BY WALKER RUBBER LTD (OR SIMILAR APPROVED) TO EDGE OF PIER AT MAX 1.0m CRS
- DENOTES EXTENT OF NEW 500mm THK CONCRETE SLAB ATOP NEW PIER CAST AT CROSSFALL AS NOTED WITH BRUSH FINISH
- DENOTES EXTENT OF NEW 250mm THK CONCRETE SLAB WITH BRUSH FINISH. GROUND TO BE MADE UP IN THIS AREA WITH TYPE 1 HARDCORE COMPACTED IN 150mm LAYERS
- DENOTES EXTENT OF NEW 150mm THK CONCRETE SLAB CAST ATOP EX. SURFACE FINISH WITH BRUSH FINISH

NOTE:
1. ALL TRENCH SHEETS TO BE L8 INTERLOCKING PROFILE (430MM EFFECTIVE WIDTH) UNLESS SPECIFIED OTHERWISE.
2. ALL STEELWORK AND STEEL RODS TO RECIEVE APPROPRIATE CORROSION PROTECTION FOR MARINE ENVIRONMENTS.
3. PROPOSED PIER ARRANGEMENT HAS BEEN DERIVED ON THE BASIS OF 51NO. L8 TRENCH SHEETS (6M LONG) AND A MINIMUM WORKING WIDTH OF 5M - OTHER CONFIGURATIONS MAY BE POSSIBLE UPON ADVICE OF REQUIRED WORKING WIDTH FOR PIER.

GENERAL NOTES

1. DO NOT SCALE FROM THIS DRAWING - IF IN DOUBT CONTACT PROJECT ENGINEER.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.
3. ALL LEVELS ARE IN METRES.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTURAL, STRUCTURAL AND SERVICES DRAWINGS.
5. ALL SETTING OUT TO BE AS PER THE ARCHITECT'S DRAWINGS.
6. THE CONTRACTOR IS TO VERIFY ALL DIMENSIONS ON SITE AND IS RESPONSIBLE FOR ACCURATE SETTING OUT.
7. THE CONTRACTOR IS TO CONFIRM THE EXISTING BOUNDARY AND SITE STRUCTURES ETC. PRIOR TO COMMENCING THE WORKS AND IMMEDIATELY INFORM THE SUPERVISING OFFICER SHOULD THESE BE AT VARIANCE WITH THE ASSUMPTIONS SHOWN ON THE DRAWING.

CONSTRUCTION (DESIGN AND MANAGEMENT) REGULATIONS 2015

THE DESIGNS ON THIS DRAWING ARE PREPARED WITH CONSIDERATION OF THE NEED TO IDENTIFY HAZARDS AND GIVE REGARD TO THEIR ELIMINATION OR MINIMISATION. REFERENCE MUST BE MADE TO HEALTH AND SAFETY INFORMATION PREPARED BY THE PRINCIPAL DESIGNER.

ISSUE	DETAILS	DATE	BY	CHK
P03	NOTES CHANGED	26/01/2022	MDB	MC
P02	BOLLARD RELOCATED. NEW BOLLARD ADDED	17/01/2022	GAL	CM
P01	FIRST ISSUE	21/12/2021	GAL	MC

STATUS / PURPOSE OF ISSUE: **INFORMATION**

SUITABILITY: **S0**

Will Rudd Davidson (Edinburgh) Ltd
Consulting Civil & Structural Engineers
43 York Place
Edinburgh EH1 3HP
T: 0131 557 5355
E: edinburgh@ruddconsult.com
www.ruddconsult.com

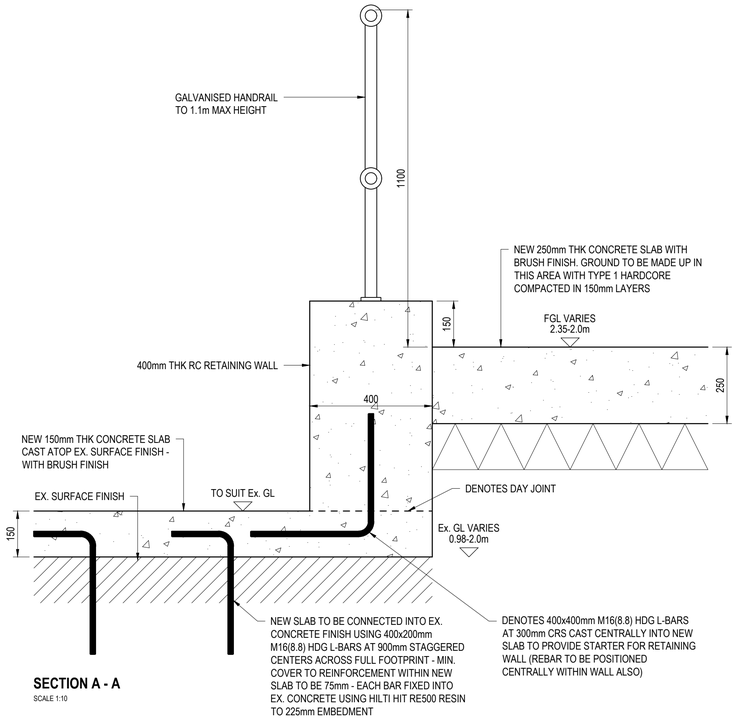
CLIENT: **DAWNFRESH**

PROJECT NAME: **LOCH ETIVE PIER**

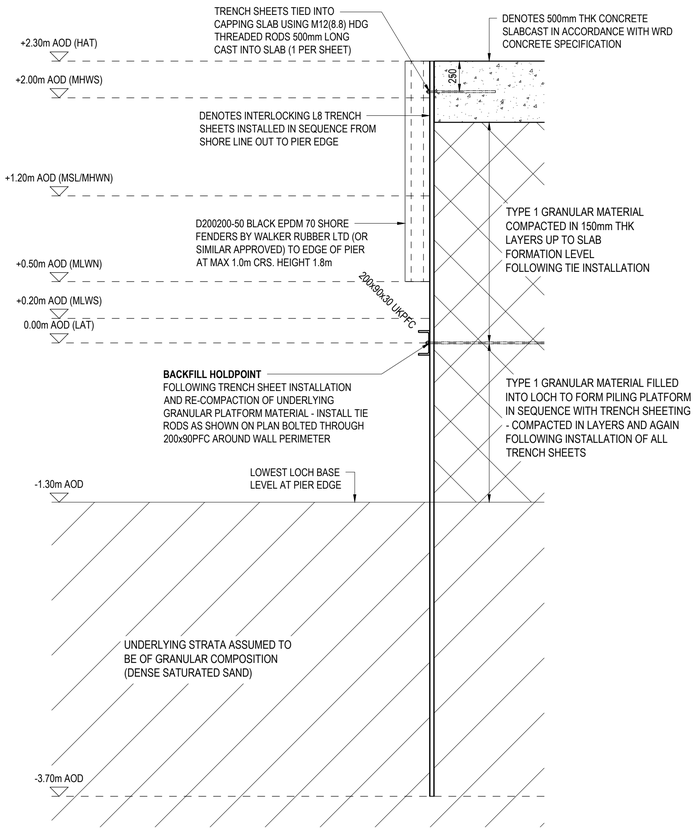
TITLE / DESCRIPTION: **SHEET PILED PIER PROPOSAL**

WRD PROJECT REF: **E13537** SCALE AT A1 : **1:50**

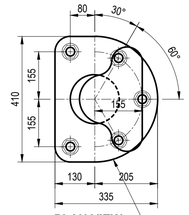
PROJECT	ORIG.	VOL.	LEVEL	TYPE	ROLE	No.	REV
E13537 -	WRD -	XX -	XX -	DR -	S -	**00001**	P03



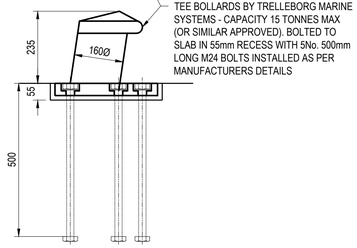
SECTION A - A
SCALE 1:10



TYPICAL SECTION THROUGH PIER CONSTRUCTION
SCALE 1:25

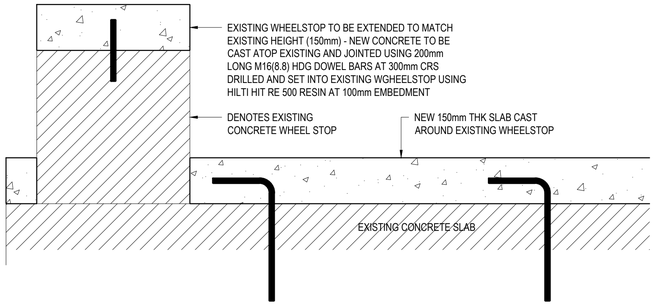


PLAN VIEW

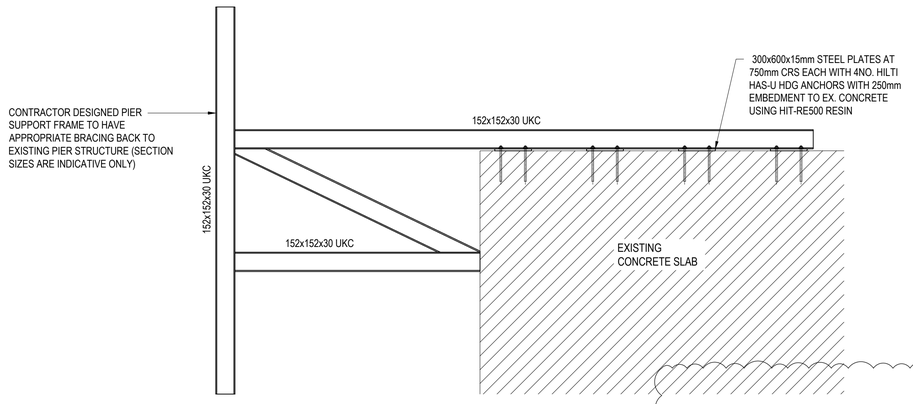


SECTION

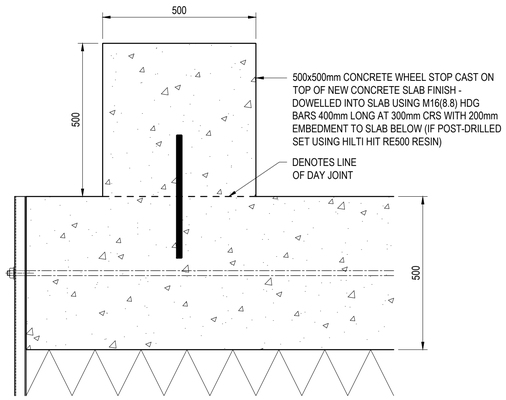
TYPICAL TEE BOLLARD DETAIL
SCALE 1:10



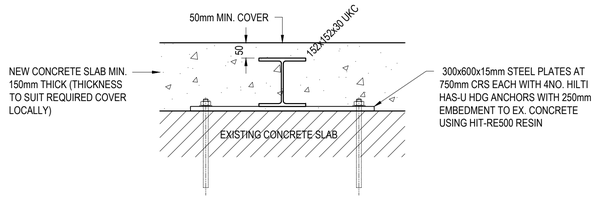
SECTION THROUGH EXISTING CONCRETE WHEELSTOP
SCALE 1:10



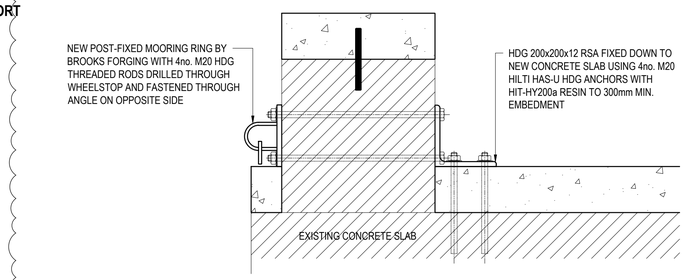
SECTION X-X
INDICATIVE ELEVATION ON CONTRACTOR DESIGNED PONTOON SUPPORT
SCALE 1:25



SECTION THROUGH NEW CONCRETE WHEELSTOP
SCALE 1:10



SECTION Y-Y
SECTION THROUGH PONTOON SUPPORT FIXING
SCALE 1:10



SECTION C
SCALE 1:10

GENERAL NOTES

1. DO NOT SCALE FROM THIS DRAWING - IF IN DOUBT CONTACT PROJECT ENGINEER.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.
3. ALL LEVELS ARE IN METRES.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTURAL, STRUCTURAL AND SERVICES DRAWINGS.
5. ALL SETTING OUT TO BE AS PER THE ARCHITECT'S DRAWINGS.
6. THE CONTRACTOR IS TO VERIFY ALL DIMENSIONS ON SITE AND IS RESPONSIBLE FOR ACCURATE SETTING OUT.
7. THE CONTRACTOR IS TO CONFIRM THE EXISTING BOUNDARY AND SITE STRUCTURES ETC. PRIOR TO COMMENCING THE WORKS AND IMMEDIATELY INFORM THE SUPERVISING OFFICER SHOULD THESE BE AT VARIANCE WITH THE ASSUMPTIONS SHOWN ON THE DRAWING.

CONSTRUCTION (DESIGN AND MANAGEMENT) REGULATIONS 2015

THE DESIGNS ON THIS DRAWING ARE PREPARED WITH CONSIDERATION OF THE NEED TO IDENTIFY HAZARDS AND GIVE REGARD TO THEIR ELIMINATION OR MINIMISATION. REFERENCE MUST BE MADE TO HEALTH AND SAFETY INFORMATION PREPARED BY THE PRINCIPAL DESIGNER.

ISSUE	DETAILS	DATE	BY	CHK
P02	DETAIL ADDED	17/01/2022	MDB	MC
P01	FIRST ISSUE	05/02/2022	GAL	MC

STATUS / PURPOSE OF ISSUE: **INFORMATION**

SUITABILITY: **S0**

Will Rudd Davidson (Edinburgh) Ltd
Consulting Civil & Structural Engineers
43 York Place
Edinburgh EH1 3HP
T: 0131 557 5355
E: edinburgh@ruddconsult.com
www.ruddconsult.com

CLIENT: **DAWNFRESH**

PROJECT NAME: **LOCH ETIVE PIER**

TITLE / DESCRIPTION: **SHEET PILED PIER DETAILS**

WRD PROJECT REF: **E13537** | SCALE AT A1: **AS NOTED**

PROJECT	ORIG.	VOL.	LEVEL	TYPE	ROLE	No.	REV
E13537	WRD	XX	XX	DR	S	00002	P02

GENERAL NOTES

1. THE ABBREVIATION 'U.N.O' DENOTES A STATEMENT THAT IS APPLICABLE 'UNLESS NOTED OTHERWISE'.
2. ALL DIMENSIONS ARE IN mm U.N.O.
3. ALL LEVELS ARE IN METRES U.N.O.
4. LEVELS ARE TIED INTO ORDNANCE DATUM U.N.O.
5. ALL SETTING OUT IS TO BE TO ARCHITECT'S DRAWINGS.
6. ALL DIMENSIONAL INFORMATION CONTAINED ON WRD DRAWINGS IS TO BE CHECKED AGAINST THE CURRENT ARCHITECT'S DRAWINGS BY THE CONTRACTOR PRIOR TO CONSTRUCTION, AND THE ENGINEER IMMEDIATELY NOTIFIED OF ANY VARIATIONS.
7. THIS DRAWING TO BE READ IN CONJUNCTION WITH THE PROJECT SPECIFICATION, ALL RELEVANT ARCHITECT'S AND M&E ENGINEER'S DRAWINGS, TOGETHER WITH ASSOCIATED WRD LAYOUTS AND DETAILS.
8. ALL DETAILS WHICH RELATE TO EXISTING FEATURES OR BOUNDARIES ARE TO BE CONFIRMED ON SITE BY THE CONTRACTOR AND THE ENGINEER IMMEDIATELY NOTIFIED OF ANY VARIATIONS.
9. ALL BOUNDARIES AND LOCATIONS OF EXISTING BUILDINGS ADJOINING AND WITHIN THE SITE TO BE CHECKED AND VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION.
10. THE CONTRACTOR IS RESPONSIBLE FOR LIAISON WITH BUILDING CONTROL AND SCOTTISH WATER ETC DURING THE COURSE OF WORKS IN RESPECT OF:
    - 10.1. COMMENCEMENT NOTIFICATION (MINIMUM 7 DAYS NOTICE)
    - 10.2. DRAIN TEST NOTIFICATION
    - 10.3. CONNECTION PERMITS
    - 10.4. ONGOING INSPECTIONS
    - 10.5. ANY OTHER NOTIFIABLE ASPECT

STRUCTURAL CONCRETE

1. ALL CONCRETE AND ITS CONSTITUENTS ARE TO COMPLY WITH BS EN 206 & BS 8500.
2. ALL REBAR IS TO BE CUT AND BENT IN COMPLIANCE WITH BS 8666.
3. FULL DETAILING OF THE REINFORCEMENT, INCLUDING THE ASSOCIATED BAR BENDING SCHEDULE(S) IS NORMALLY EXCLUDED FROM OUR DESIGN SERVICES. ALLOWANCE SHOULD BE MADE FOR OBTAINING THIS INFORMATION SEPARATELY.
3. COVER SPACERS ARE TO BE BY AN APPROVED PROPRIETARY MANUFACTURER, INERT AND BOND ADEQUATELY WITH CONCRETE.
4. ALL HIGH YIELD STEEL BARS ARE TO BE WELDABLE GRADE 500N/mm² TO BS 4449, DEFORMED BARS.
5. ALL PLAIN ROUND STEEL BARS TO BE WELDABLE GRADE 250N/mm² TO BS 4449.
7. ALL MESH FABRIC REINFORCEMENT TO COMPLY WITH BS 4483.
8. ALL REBAR MUST BE FREE OF OIL AND GREASE OR ANY OTHER DELETERIOUS MATERIAL.
9. ALL REBAR AND CAGES TO BE ROBUSTLY TIED TO SUSTAIN CONSTRUCTION LOADINGS AND PROTECTED FROM ACCIDENTAL DAMAGE.
10. MINIMUM LAP LENGTHS ARE TO BE AS FOLLOWS, UNLESS NOTED OTHERWISE:

DIAMETER	HY BARS	FABRIC
8 & BELOW	320	320
10	400	400
12	480	480
16	640	N/A
20	800	N/A

11. ALL FORMWORK TIES AND SUPPORTS ARE TO DESIGNED AND INSTALLED BY THE CONTRACTOR TO SAFELY SUSTAIN WET CONCRETE WEIGHTS AND PRESSURES TOGETHER WITH ANY OTHER APPLIED CONSTRUCTION LOADING.
12. CONCRETE MIXES/GRADES ARE TO BE AS FOLLOWS TO BS EN 206:
    - 12.1 GROUND BEARING SLABS C40/50
13. ADMIXTURES WILL NOT BE PERMITTED WITHOUT APPROVAL BY THE ENGINEER. ADMIXTURES MUST COMPLY WITH BS EN 480 & BS EN 934.
14. PLACING CONCRETE IS TO BE CARRIED OUT ENSURING FULL COMPACTION AND AIR EXPULSION USING VIBRATORS AND WITH DUE REGARD TO SEGREGATION RISKS.
15. CONCRETE FINISH IS TO BE AS PER ARCHITECT'S DETAILS AND THE PROJECT SPECIFICATION.
16. CUBES TO BE TAKEN AT MIN OF 4No. PER DAY OR PER 60m³ PER GRADE. ADDITIONAL CUBES ARE TO BE TAKEN AT EVERY CHANGE OF SUPPLIER. SAMPLES TO COMPRISE OF 4No. CUBES, ONE TESTED AT *7* DAYS, TWO AT 28 DAYS AND ONE RETAINED AS SPARE. DO NOT TEST OR DISPOSE OF SPARES WITHOUT AGREEMENT OF ENGINEER.

STRUCTURAL STEELWORK (HOT-ROLLED): GENERAL REQUIREMENTS

1. ALL PRODUCTS ARE TO BE CE-MARKED ON THE BASIS OF THE RELEVANT STANDARD AS FOLLOWS:
    - 1.1. OPEN SECTIONS AND PLATES BS EN 10025-1
    - 1.2. HOLLOW SECTIONS BS EN 10210-1
2. ALL FABRICATED STRUCTURAL STEELWORK IS TO FABRICATED BY A SUITABLY QUALIFIED SPECIALIST STEELWORK FABRICATOR AND CE-MARKED ON THE BASIS OF BS EN 1090-1 & BS EN 1090-2 WITH AN EXECUTION CLASS OF *EXC2*.
3. ALL STEELWORK MATERIAL, FABRICATION & ERECTION IS TO BE IN ACCORDANCE WITH THE LATEST EDITION OF THE NATIONAL STRUCTURAL STEELWORK SPECIFICATION.
4. THE FOLLOWING MATERIAL GRADES APPLY UNLESS NOTED OTHERWISE:
    - 4.1. OPEN SECTIONS *S355JR*
    - 4.2. HOLLOW SECTIONS *S355J2H*
    - 4.3. PLATE & BAR *S275JR*
5. UNLESS SPECIFIED OTHERWISE, STEELWORK IS TO BE PAINTED WITH A ZINC PHOSPHATE EPOXY PRIMER TO A TOTAL THICKNESS OF 80 MICRONS. STEELWORK THAT IS TO RECEIVE PAINTED COATINGS IS TO BE BLAST-CLEANED TO ACHIEVE SURFACE CLEANLINESS OF SA2.5 IN ACCORDANCE WITH BS EN ISO 8501.
6. STEELWORK THAT IS EXPOSED TO THE EXTERNAL ENVIRONMENT IS TO BE HOT-DIP GALVANISED IN ACCORDANCE WITH BS EN ISO 1461 TO A THICKNESS OF 85 MICRONS. STEELWORK THAT IS TO RECEIVE GALVANISED COATINGS IS TO BE CLEANED BY ACID-PICKLING.
7. GALVANISED OR OTHER METAL-COATED STEELWORK THAT IS TO RECEIVE PROTECTIVE OR DECORATIVE PAINTED COATINGS ARE TO BE SPECIALLY PREPARED IN ACCORDANCE WITH BS EN ISO 12944-4.
8. STEELWORK IN CONTACT (OR SEPARATED BY LESS THAN 40mm AIR-GAP) WITH OUTER LEAF OF PERMEABLE EXTERNAL WALLS IS TO BE COATED IN HIGH-BUILD SOLVENT-FREE EPOXY TO A THICKNESS OF 450 MICRONS.
9. STEELWORK THAT IS TO BE FULLY ENCASED IN CONCRETE NEED NOT BE COATED.
10. AREAS OF ACCIDENTALLY DAMAGED COATINGS ARE TO BE PAINTED ON SITE TO ACHIEVE THE REQUIRED SPECIFICATION AND FULLY DOCUMENTED.
11. STEELWORK THAT IS TO BE LEFT VISIBLE SHALL BE FREE OF MARKINGS AND HARD-STAMPING ON VISIBLE SURFACES.
12. DECORATIVE COATINGS ARE TO THE ARCHITECT'S SPECIFICATION, BUT MUST BE CHECKED FOR COMPATIBLITY WITH UNDERLYING COATINGS.
13. FIRE PROTECTION OF STEELWORK TO ACHIEVE A FIRE RESISTANCE OF *1 HOUR* IS TO BE ACHIEVED BY APPLICATION OF INTUMESCENT PAINT COATING COMPATIBLE WITH ANY UNDERLYING COATINGS.
14. BOLT, WASHER & NUT ASSEMBLIES TO BE IN ACCORDANCE WITH BS EN 15048.
15. WELDED CONNECTIONS TO BE COMPOSED OF FULL PROFILE FILLET WELDS WITH *8mm LEG LENGTH* UNLESS SPECIFIED OTHERWISE.
16. BOLTED CONNECTIONS TO INCORPORATE A MINIMUM OF 2 No. GRADE 8.8 *M20* BOLTS UNLESS SPECIFIED OTHERWISE.
17. GALVANISED OR SHERARDISED BOLTS ARE TO BE USED IN BOLTED CONNECTIONS OF GALVANISED STEELWORK..
18. BASEPLATES ARE TO BE FASTENED TO THE FOUNDATION WITH *M20 GRADE 8.8 BOLTS* FITTED WITH 100mm x 100mm x 10mm SQUARE WASHER AND GROUT TUBES, ALL CAST INTO THE FOUNDATION CONCRETE, TYPICAL *4No.* PER BASEPLATE, NOMINAL 100mm BOLT PROJECTION ABOVE TOP OF FOUNDATION.
19. THE STEELWORK CONTRACTOR MUST SUPPLY COPIES OF MANUFACTURING INFORMATION TO THE DESIGN TEAM FOR REVIEW & COMMENT. THE INFORMATION SHOULD INCLUDE ALL LAYOUTS, DETAILS, SCHEDULES AND SPECIFICATIONS NECESSARY TO ALLOW A FULL REVIEW AGAINST THE ORIGINAL DESIGN. DRAWINGS SHOULD BE PROVIDED IN PDF FORMAT, PREFERABLY SUPPORTED BY 2D AND/OR 3D MODELS IN CAD, REVIT OR OTHER FREELY VIEWABLE FORMAT.
20. THE REVIEW PROCESS MUST INCLUDE THE ARCHITECTURAL DESIGNER FOR REVIEW & COMMENT ON DIMENSIONAL ASPECTS OF SETTING-OUT AND COMPATIBILITY (FIT) WITH THE ARCHITECTURAL DESIGN.
21. THE CONTRACTOR IS RESPONSIBLE FOR ALL TEMPORARY SUPPORTS AND BRACING NECESSARY TO MAINTAIN THE PLUMB, LINE, LEVEL AND STABILITY OF THE STEELWORK DURING CONSTRUCTION.
22. UNDERSIDE OF COLUMN BASES ARE TO BE A NOMINAL *25mm* CLEAR OF THE TOP OF FOUNDATION, LEVELLED AND PLUMBED ON A STABLE ARRANGEMENT OF STEEL SHIMS AND THE SPACE BENEATH THE BASEPLATE FILLED WITH A NON-SHRINK CEMENTITIOUS GROUT OF MINIMUM STRENGTH 40N/mm2
23. THE CONTRACTOR MUST CHECK DIMENSIONS AND LEVELS OF EXISTING FEATURES ON SITE AS NECESSARY TO ENSURE CORRECT FIT OF NEW STEELWORK.
24. SITE-WELDING IS NOT PERMITTED UNLESS BY AGREEMENT WITH THE STRUCTURAL ENGINEER, IN WHICH CASE IT MUST BE IN ACCORDANCE WITH SCI PUBLICATION P161 "GUIDE TO SITE WELDING".
25. THERE MUST BE NO CUTTING OR REMOVING OF PERMANENT STEELWORK WITHOUT PRIOR AGREEMENT WITH THE STRUCTURAL ENGINEER.

CONTRACTOR DESIGNED SHEET PILING NOTES

1. THE DESIGN AND INSTALLATION OF PILES MUST COMPLY WITH THIS SPECIFICATION AND THE LATEST EDITION OF THE INSTITUTION OF CIVIL ENGINEERS SPECIFICATION FOR PILING AND EMBEDDED RETAINING WALLS (SPERW).
2. OUTLINE PILE DESIGN BASED ON L8 INTERLOCKING PILE WITH AN AVERAGE LENGTH OF 6m. FOR PILE DESIGN THE GROUND IS TAKEN AS COMPRISING DENSE GRANULAR MATERIAL OVERLAYING ROCKHEAD AT UNKNOWN DEPTH

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CONSTRUCTION (DESIGN AND MANAGEMENT) REGULATIONS 2015

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ISSUE	DETAILS	DATE	BY	CHK
P01	FIRST ISSUE	05/01/2022	GAL	MC

STATUS / PURPOSE OF ISSUE: **INFORMATION**

SUITABILITY: **S0**

Will Rudd

Will Rudd Davidson (Edinburgh) Ltd
Consulting Civil & Structural Engineers
43 York Place
Edinburgh EH1 3HP
T: 0131 557 5255
E: edinburgh@ruddconsult.com
www.ruddconsult.com

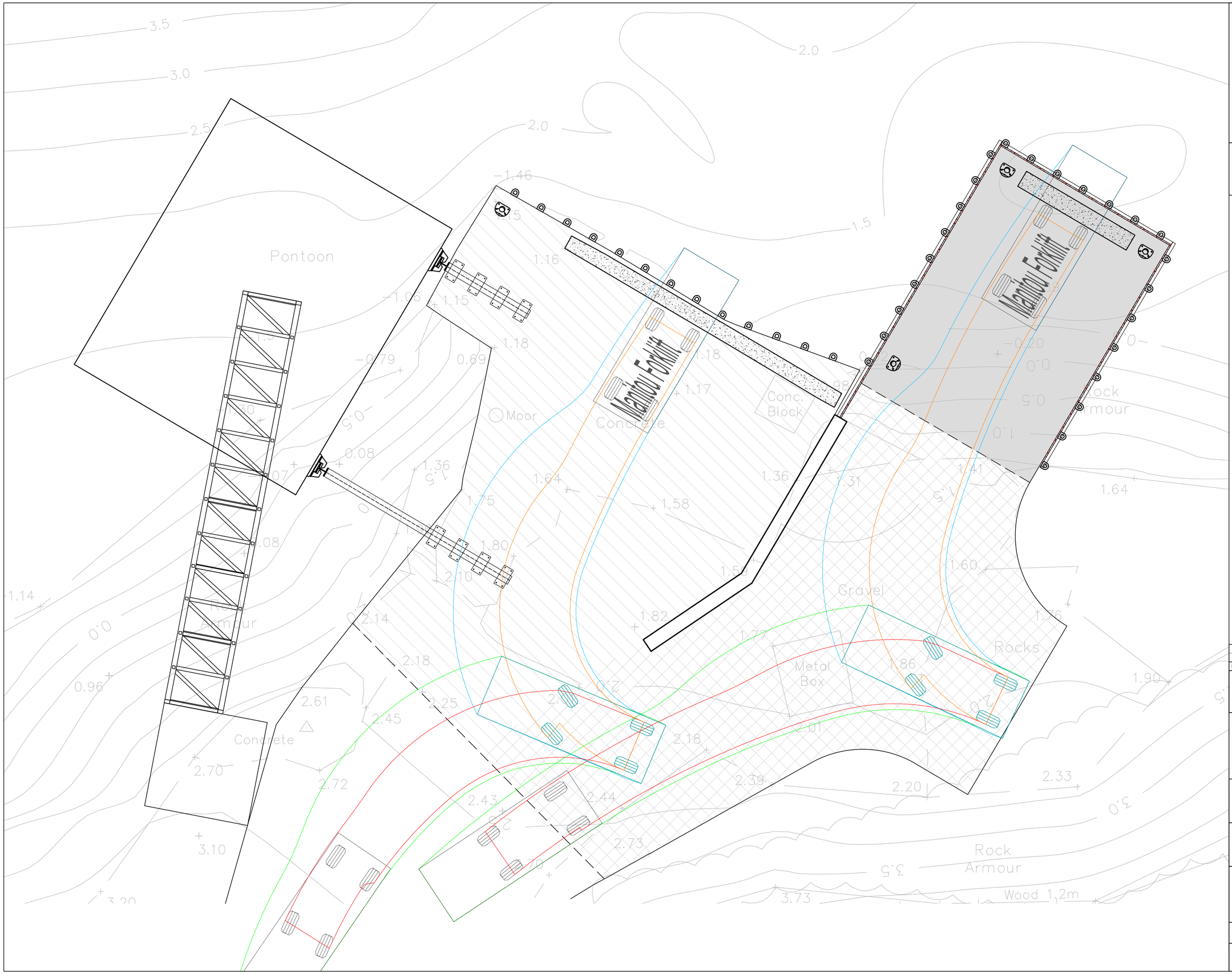
CLIENT: **DAWNFRESH**

PROJECT NAME: **LOCH ETIVE PIER**

TITLE / DESCRIPTION: **NOTES AND SPECIFICATIONS**

WRD PROJECT REF: **E13537** SCALE AT A1 : **N/A**

PROJECT	ORIG.	VOL.	LEVEL	TYPE	ROLE	No.	REV
E13537 -	WRD -	XX -	XX -	DR -	S -	**09001**	P01



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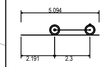
LEGEND:

- VEHICLE PATH BODY (FORWARD)
- VEHICLE PATH BODY (REVERSE)
- VEHICLE PATH WHEELS (FORWARD)
- VEHICLE PATH WHEELS (REVERSE)



Manitou Forklift	
Overall Length	5.094m
Overall Width	1.813m
Overall Body Height	0.330m
Min Body Ground Clearance	0.330m
Track Width	1.492m
Lock to lock time	4.00s
Wall to Wall Turning Radius	6.652m

ISSUE	DETAILS	DATE	BY	CHK
P01	FIRST ISSUE	05/01/2022	GAL	MC

STATUS / PURPOSE OF ISSUE: **INFORMATION**

SUITABILITY: **S0**

Will Rudd Davidson (Edinburgh) Ltd
Consulting Civil & Structural Engineers
43 York Place
Edinburgh EH1 3HP
T: 0131 557 5255
E: edinburgh@ruddconsult.com
www.ruddconsult.com

CLIENT: **DAWNFRESH**

PROJECT NAME: **LOCH ETIVE PIER**

TITLE / DESCRIPTION: **PIER VEHICLE TRACKING ANALYSIS**

WRD PROJECT REF: **E13537** | SCALE AT A1 : **1:50**

PROJECT	ORIG.	VOL.	LEVEL	TYPE	ROLE	No.	REV
E13537 -	WRD -	XX -	XX -	DR -	S -	**80001**	P01

Appendix D – Hole Monitoring

Hole Monitoring

March 2018
750mm long void below water line on berthing face

5th April 2022
Void is now more than 1500mm

1.2m long void below water line on berthing face