TERFOR PIER, TREFOR, GWYNEDD

Level 2/3 Building Record

Ymddiriedolaeth Archaeolegol Gwynedd
Gwynedd Archaeological Trust

TERFOR PIER, TREFOR, GWYNEDD

Level 2/3 Building Record

Prosiect Rhif / Project No. G2474

Adroddiad Rhif / Report No.1328

Prepared for: YGC

August 2016

Written by: Rob Evans & Neil McGuinness

***front cover image: General view of pier with Gyrn Ddu/Coch in the background (archive image: G2475_Trefor_Pier_012)**

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Revision History			
Rev No.	**Summary of Changes**	**Ref Section**	**Purpose of Issue**
1	Addition of Figure 12 and reference text	2.1 3.3 4	Update of report to include truss elevation drawing

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NON-TECHNICAL SUMMARY

Gwynedd Archaeological Trust was asked by YGC to carry out a building record of Trefor Pier, located in Trefor, Gwynedd in advance of demolition. The pier was located on the northern coastline of the Llŷn peninsula and was built from timber.

The pier measured 87m in length and 7m in width and was built in c.1912 as part of the local granite quarry. The pier was attached to an earlier stone pier, completed in 1870, and comprised 19 trusses, with a triangular seaward end. The pier underwent much piecemeal repair, including extra bracing work, from shortly after 1912 until the 1960s when marine transport of the quarried granite ceased. The pier was altered and repaired in the 1980s as an amenity but the timber section has subsequently fallen in to decay, with sections of the trusses having collapsed, resulting in the loss of integrity in the pier walkway.

The building record comprised desk-based research and a photographic record; elevation and plan drawings of the structure were also produced.

The pier was noted to have undergone piecemeal repair, which was carried out mainly up until the 1960s and also in the 1980s as an attempt to develop the pier as an amenity. The pier, although in a dilapidated condition was considered to be of significance as the last remaining of a number of piers on the north Llŷn coast relating to the export of stone from the local quarrying industry, which was the largest employer in the area, and resulted in the development of Trefor village.

1 INTRODUCTION

Gwynedd Archaeological Trust (GAT) was commissioned by *YGC* to complete a building record of Trefor Pier, located in Trefor, Gwynedd (NGR SH37544748; Figure 01). The record was completed in advance of demolition, in accordance with Marine Licence Application CRML1622.

The pier was built from timber and measured 87m in length and 7m in width and was located on the northern coastline of the Llŷn peninsula. The pier was built in *c.*1912 as part of the local granite quarry industry and was attached to an existing stone pier. The pier was refurbished in the in the 1980's along with the quay wall, but is now in a dilapidated state. The pier is registered in the regional Historic Environment Record (HER) as Primary Reference Number 25013.

Gwynedd Archaeological Planning Services (GAPS) requested a Level 2/3 building record as described in *Understanding Historic Buildings: A guide to good recording practice* (Historic England 2016). GAT prepared a project design in advance of works summarising project scope and methodology; the design was subsequently approved by GAPS (03/08/16; cf. Appendix I for a reproduction of the approved project design).

The building record was also completed in accordance with the *Standard and Guidance for the archaeological investigation and recording of standing buildings and structures* (Chartered Institute for Archaeologists, 2014).

1.1 Acknowledgements

The role of Jenny Emmett and Ashley Batten of GAPS throughout this project is gratefully acknowledged.

2 METHODOLOGY

The pier comprised a timber-built structure, which measured 87m in length and 7m in width, and was orientated roughly north-south.

The building record was completed to Level 2/3 standard as described in *Understanding Historic Buildings: A guide to good recording practice* (Historic England 2016). A Level 2/3 record is defined as a descriptive and analytical record and included:

- a photographic and descriptive record of the pier; and
- an analysis and account of the pier's origin, development and use

2.1 Photographic Record

The photographic record was completed in RAW format using a *Nikon* D5100 fitted with a AF-S DX Zoom-NIKKOR 18-55mm f/3.5-5.6G ED VR lens; the maximum image resolution was 16.2 effective megapixels. A total of 24 images were taken and included general views of the pier within the local environs and elevation images taken from the stone pier and foreshore. The images have been archived in TIFF format in accordance with the Royal Commission on Ancient and Historic Monuments of Wales 2015 *Guidelines for digital archives* (archive reference G2475_Trefor_Pier_001 to G2475_Trefor_Pier_024; cf. Appendix II). Detailed structural images and general plan and elevation images were also taken using an Unmanned Aerial Vehicle (UAV), piloted by a CAA licenced operator from *Orca Principle Ltd*. A total of 235 images were taken with a DJI FC350 camera with a maximum image resolution of 12 effective megapixels (archive reference DJI_001 to DJI_0235). These images were subsequently used to inform the descriptive record, and a sketch plan and elevations of the pier was produced from the digital data provided. An elevation of Truss 12 was subsequently produced from an orthoview generated from a photographic 3D model.

2.2 Descriptive Record

The descriptive record was completed on GAT pro-formas and recorded the pier in terms of building fabric, appearance and content. Individual trusses were numbered in order from the seaward to landward end (Trusses 1 to 19 respectively; cf. Figure 06). The analysis and account of the pier's origin, development and use utilised the photographic and descriptive record, along with available primary and secondary sources. Information was sourced from the following:

1. The regional Historic Environment Register (HER, Gwynedd Archaeological Trust, Craig Beuno, Garth Road, Bangor, Gwynedd LL57 2RT) will be examined for information concerning the study area. This will include an examination of the core HER, the 1:2500 County Series Ordnance Survey maps and any secondary information held;
2. Archive data and historic maps, was consulted in the regional archives at the Gwynedd Archives Service (Cyngor Gwynedd, Caernarfon LL55 1SH), and at the Bangor University Archives, College Road, Bangor, Gwynedd, LL57 2DG.

3 RESULTS

3.1 Introduction

The historical background below is substantially taken from Pierce-Jones and Davidson's 2007 *Ports and Harbours of Gwynedd: Trefor*, *A Threat Related Assessment*, in which the history of the port and its associations with Trefor Quarry is discussed in detail. This background contains however additional updated elements within it.

The section of the pier being reported on was built from timber and measures 87m in length and 7m in width and is located on the northern coastline of the Llŷn peninsula, at Trefor. It formed a landing stage for boats loading granite from Trefor Quarry to transport the material widely across Britain and beyond. The timber pier itself was built in *c.*1912 as part of the local granite quarry industry and was attached to an existing stone pier which had been built in *c.*1869 (Gwyn 2006, 76). A photograph of the timber pier in the early stages of construction, with visitor walking upon it, has been identified, showing eight rows of piers having been sunk into the sea bed, and an elaborate 'A' frame structure used to sink the piers (Figure 05; Bangor Archives; DARBAdd/72). When completed, the pier was constructed of 19 trusses, supporting a walkway with decking above it and was angled north-northwest south-southeast to the northeast southeast orientated stone pier (Plate 04). The Llanaelhaearn tithe map of 1840 shows the landscape of the area prior to its industrialization from quarrying, with no pier present (Davies 1999; Figure 02). The stone Pier, 330ft long and built in 1870 (Boyd 1981; 268-269), is shown on all 25 inch County Series editions from 1888, with the tramway from the quarry leading to it, but the timber pier is first shown on the 3rd edition map of 1918 (Figure 03).

The pier was refurbished in the in the 1980's along with the stone quay wall, but is now in a dilapidated state. For the purposes of this report the trusses have been numbered from 1 to 19, starting at the seaward end of the pier.

3.2 Historic Background

The present settlement of Trefor is a mid-nineteenth century industrial development located within an area of much older agricultural occupancy in the north-western portion of Llanaelhaearn parish and became the entrepôt for the local granite stone industry from the 1830s. Several local sites were exploited for hard rock which could be manually dressed into paving blocks, termed "sett-stones", which were being increasingly sought-after by the developing towns and cities of Britain. This was particularly the case in the north-west of England, where the demand accelerated as civic improvements were undertaken towards the end of the nineteenth century and into the opening decades of the twentieth century. Although land transport routes from the Llŷn quarries remained undeveloped, the fortuitous coastal location of suitable rock meant that the markets could be accessed by water-borne traffic (Davidson, A. & Pierce Jones, G., 2007: GAT Report 671.4).

The first commercial exploitation of the granitic rocks in the parish of Llanaelhaearn appears to have commenced on the coastal hillside of 'Gorllwyn yr Hendref' (close to the present 'Eifl Quarry') in the early 1840s, with the earliest known quarrying lease on that site was granted in March 1844. This quarry was sold to *The Welsh Granite Company* in *c. 1849-1850*, with house-building nearby commencing from 1854 for the increasing quarry workforce. The new settlement developed into a village that was named 'Trefor', in honour of the quarry's influential works manager, Trefor Jones. The partnership also opened a new quarry at an adjacent location known as 'Mynydd Garnfor'. Leased from May 1854, this new development used rail transport to carry its produce to the coast (*ibid.*).

The business appears to have had financial problems by the early 1860s, and was taken over in 1864 by the newly-formed *Welsh Granite Co. Ltd.*, a concern which also initially operated other granite quarries in the contiguous Nefyn district. This Company opened the present 'Eifl Quarry' higher up the mountain than the previous working, which was subsequently abandoned. The loading facilities were also improved by the construction of the first phase of the surviving breakwater/harbour wall in 1869, raising the level of the rail/ship transhipment facility from the beach level, and providing relatively-deep water adjacent to the dock side. The quarry came into the ownership of the *Penmaenmawr & Welsh Granite Co Ltd.* in 1911 (an amalgamation of Trefor with one of the Penmaenmawr quarries), and further extensions and modifications were made to the loading quay. The market for sett-stones was diminishing in the early twentieth century (tarmacadam was increasingly being used instead), and appears to have ceased in the 1930s. Thus the quarries had to diversify into the production of crushed stone for uses such as railway ballast, although the Trefor

quarry also produced ornamental stone and slab, processed in a new sawing and polishing shed. To cope with large bulk shipments, a timber pier was added at right angles to the seaward end of the stone quay, so that the larger steam ships could be used. This pier also had the advantage of dealing with ships on both sides, whereas the original quay had only one loading face on the lee side. A small dock ('Cei Bach') was also constructed within the landward shadow of the stone quay (*ibid.*).

In the 1920s, a large concrete silo was erected on the stone quay to store sufficient crushed stone so that ships could be loaded more efficiently. This was top-fed by means of a conveyor belt 'elevator' that was itself fed from material tipped from railway wagons into a ground-level hopper. The silo was made up of individual hopper 'cells', presumably for different grades of crushed stone, and each hopper discharged via chutes directly into the ships berthed alongside. Rail transport from the quarry to the quay was discontinued in 1959 in favour of motor lorries.

In 1963, the quarry company was taken over by the *Bath & Portland Stone Co.*, which subsequently became *Kingston Minerals Ltd.*, which closed the business in October 1971, though work later resumed on part of the site on a small scale by a local concern, *Gwaith Brics (Trefor) Ltd.* It seems likely that the use of maritime transport for the produce of the quarry ceased in the 1960s, although details are uncertain. A major redevelopment scheme was undertaken on the quay in the mid-1980s, involving removing the stone hopper, redesigning part of the quay wall, and refurbishing the timber pier. This activity removed much of the archaeology of the site (*ibid.*).

3.3 Survey and Description

The stone pier at Trefor consists of a long stone section, faced on the north west side with a modern concrete facing about 0.5m wide, battered with a curved overhanging lip. On the south east side of the stone pier granite blocks of coursed stone were noted, up to 0.3m by 0.15m in size. These appear modern and to be part of the 1980s restoration of the pier. There is a walkway at a half level on this side of the pier, accessible by steps at both the north east and south west ends of the pier. This appears a modern feature, below which the original coursed stone surface of the stone pier can be seen (Plate 01).

The surface of the stone pier is covered in gravel and granite chippings, however surviving concrete elements, in the form of pads on the stone pier surface (Plate 07) probably represent the footings of former industrial structures.

The timber pier was constructed of 19 trusses (Plates 02-03), of which the fifth to seventh ones from the shore (Trusses 13 to 15) had substantially collapsed on the east northeast side, resulting in the compromising of the integrity of the surface walkway, and the adjacent trusses were also damaged (Figure 06). Truss 13 was the most damaged, being mainly absent. The trusses were constructed using three double cross-beams, bolted to both sides of the main uprights, connecting the two main posts driven into the sea bed, along with central supporting piers between them, which were in turn braced with diagonal struts between them across the two upper voids created by the cross beams. The trusses were also braced to each other with diagonal struts between the trusses. Some trusses also had vertical struts in the upper void. The trusses were also braced with diagonal beams below the walkway level to the adjacent truss, particularly at the landward end of the pier between trusses 16-19 (Plate 02, 08-10, 12, 19). At the seaward end between trusses 1 and 3 additional angled bracing had been inserted on the south eastern side of the pier, but this seems to be part of a later repair, when the lower horizontal struts were lost between trusses 1 and 3. This is a repair to the style of bracing seen on the north eastern side of the pier, where the former bracing is still noted (Plates 14, 20).

On the east northeast side of the pier cross bracing was noted between trusses 1 and 3, and vertical rubbing posts were bolted on to many of the trusses, indicating that ships tied up to the pier generally on the east north eastern side (Plate 23). This would be expected to enable convenient loading of the granite from the pier.

The north northwestern end of the pier consisted of a triangular end section with a central pier sunk into the seabed, with bracing woodwork behind (Plate 14, 16). The two triangular end surfaces had two horizontal cross beams between the end truss 1 and the central pier, attached to which were vertical rubbing boards, which appear to have been regularly replaced (Plates 16, 20). These had metal plates being used to reinforce the timber joints. The triangular section was also braced to truss 1 with horizontal timbers connected to the end central pier (Plate 16). At 5m from the end of the pier was a telegraph pole like post with a metallic bracket braced with a wire below it to the post. This relates to former telephonic communications between the pier and the quarry.

Evidence for significant repairs to the pier is clearly noted on Truss 12 (Figure 07). The decking has been braced and supported on the north-eastern side by wooden timbers, including an upright about 0.9m long, on the inside of the main pier to raise the level of the pier superstructure. This was done to level the pier decking, after it appears that the pier truss had subsided into the sea bed on the north-eastern side, making the decking of the pier slope at this point be uneven.

There was evidence of piecemeal repairs to almost all of the trusses. These were varied but had a number of common elements to them (Plates 08-14). At the intertidal level the main uprights had substantially rotted, which in places meant that they no longer provided significant support to the pier; these had in places been surrounded by a metal shoe, seen on trusses 1-3, 5, 10, 12 and 15 (Figure 06; Plate 19). Metal plates had also been attached to a number of the joints in the structure in order to provide additional support, and substantial quantities of timber had also been bolted on over elements of the structure in order to provide additional support. This includes some elaborate braced timberwork between trusses 9 and 10 on the west southwest side of the pier (Plate 13), which is also seen between trusses 8 and 9, 11 and 12 and also 14 and 15 on the north eastern side (Figure 06 [coloured yellow]; Plates 02, 21). This appears to have been a phase of repair work, although the date of this is unknown. However diagonal bracing between two struts between trusses 1 and 3 on both sides of the pier, with metal brackets used for additional support, appears to have been an original feature designed to provide additional support to the pier in an area where ships would be likely to be tied up (Plate 20).

Additional bracing in the form of horizontal beams placed along the west south western side of the pier against the internal face of the main vertical piers below the second cross beams was also noted between trusses 3 and 15 (Plate 26). This appeared to have decayed to a lesser extent and therefore is likely to have been a more recent repair. It was of a very basic

nature, bolted to the upright posts but overlapping at the ends, and had collapsed around the lost truss 13 (Figure 06 [coloured blue]).

The varied nature of the repair work and the materials used suggests that repairs were carried out piecemeal and as required to the pier, probably over much of the time that it was in use until the 1980s, and carried out according to the favoured methods of the time. This would have been done by the quarry carpenters during the time the pier remained in regular commercial use, and subsequently under the auspices of Cyngor Gwynedd and its predecessors.

A walkway superstructure was built on top of the uppermost cross-beam joining the main pier uprights, which appears to be fairly modern replacement work (Figure 06). The details of the construction technique were not noted because access to the pier was impossible, but the walkway was covered in hardwood decking, with a modern galvanised metal barrier to its edges. Seven tying up posts survived at the north northwest end of the pier, which were in fact in four cases extensions to the main vertical posts above walkway level (Figure 06; Plate 16).

4 CONCLUSION

The timber section of Trefor pier was recorded using both an UAV digital survey and ground based recording, in advance of its demolition. The pier was built from timber and measures 87m in length and 7m in width and is located on the northern coastline of the Llŷn peninsula. The pier was built in *c.*1912 as part of the local granite quarry industry and was attached to an existing stone pier. The pier was refurbished in the in the 1980's along with the quay wall, but is now in a dilapidated state.

The timber pier was noted to have consisted of 19 trusses, with a triangular seaward end, and attached to a stone pier in 1912 at an approximate right angle to the stone pier, orientated north northwest south southeast. The stone pier had been completed in 1870. It underwent much piecemeal repair, including extra bracing work, from shortly after 1912 until the 1960s when marine transport of the quarried granite ceased. Significant repairs are noted on Truss 12 to level the decking after it had partially subsided into the sea. The pier was altered and repaired in the 1980s as an amenity but the timber section has subsequently fallen in to decay, with sections of the trusses having collapsed, resulting in the loss of integrity in the walkway.

The timber section of Trefor Pier is of historic significance as it was built at a time that Trefor Quarry was trying to improve its infrastructure and work practices. Larger steamships were able to dock at the pier, at a time when an increased volume of crushed granite was required to be exported, with the manufacture of traditional granite setts for roadmaking in decline. Marine transport was often seen as a preferable method of export to land transport owing to the hilly terrain and lack of good transport links to the quarries, although motor transport was also used. The pier is the last surviving of three piers along this section of the north Llŷn coast, all serving local stone quarries, with Trefor Pier serving the largest quarry on Yr Eifl. The pier was important as a significant symbol of an important aspect the industrial past of the area of north Llŷn in the early 20th century, when the granite produced was widely used. The pier has in more recent times been used as an amenity.

Along with infrastructure such as the pier, the village of Trefor was built to house the workforce of the quarry. The pier was a very significant element for the quarry and the settlement associated with it, being the last point from which much of the quarried stone left the industrial complex at Trefor.

5 SOURCES CONSULTED

5.1 Primary Sources

Gwynedd Archives, Caernarfon

First Edition 25 inch Caernarvonshire County Series Ordnance Survey Map Sheet XXV.11, XXV.12, XXV.15 and XXV.16 (1888-1889).

Second Edition 25 inch Caernarvonshire County Series Ordnance Survey Map Sheet XXV.11, XXV.12, XXV.15 and XXV.16 (1900).

Third Edition 25 inch Caernarvonshire County Series Ordnance Survey Map Sheet XXV.11, XXV.12, XXV.15 and XXV.16 (1918).

Tithe map and apportionment of the Parish of Llanaelhaearn of 1842

Gwynedd Historic Environment Record, Bangor

Bangor University Archives

Darbishire Additional MSS DARBAdd/72 *A View of Trefor Pier under Construction c.1912*

5.2 Secondary Sources

Boyd, J.I.C 1981 *Narrow Gauge Railways in North Caernarvonshire. Vol I The West*

Chartered Institute for Archaeologists 2014 *Standard and Guidance for the archaeological investigation and recording of standing buildings and structures;*

Davies, R. 1999 *The Tithe Maps of Wales*

English Heritage 1991 *Management of Archaeological Projects;*

English Heritage '*Understanding Historic Buildings: a guide to good recording practice*' (2006).

Gwyn, D. 2006 *Gwynedd. Inheriting a Revolution. The Archaeology of Industrialisation in North-West Wales*

Haslam, R., Orbach, J. and Voelcker, A. 2009 *Buildings of Wales; Gwynedd* (Pevsner Architectural Series)

Pierce-Jones, G. and Davidson, A. 2007 *Ports and Harbours of Gwynedd: Trefor. A Threat Related Assessment.* Unpublished GAT Report No. **671.4**

Royal Commission on Ancient and Historic Monuments of Wales 2015 *Guidelines for digital archives.*

Figure 01: Site Location Map, based on 1:10000 Ordnance Survey County Series Map Sheet SH34NE. Scale: 1:4500@A4.

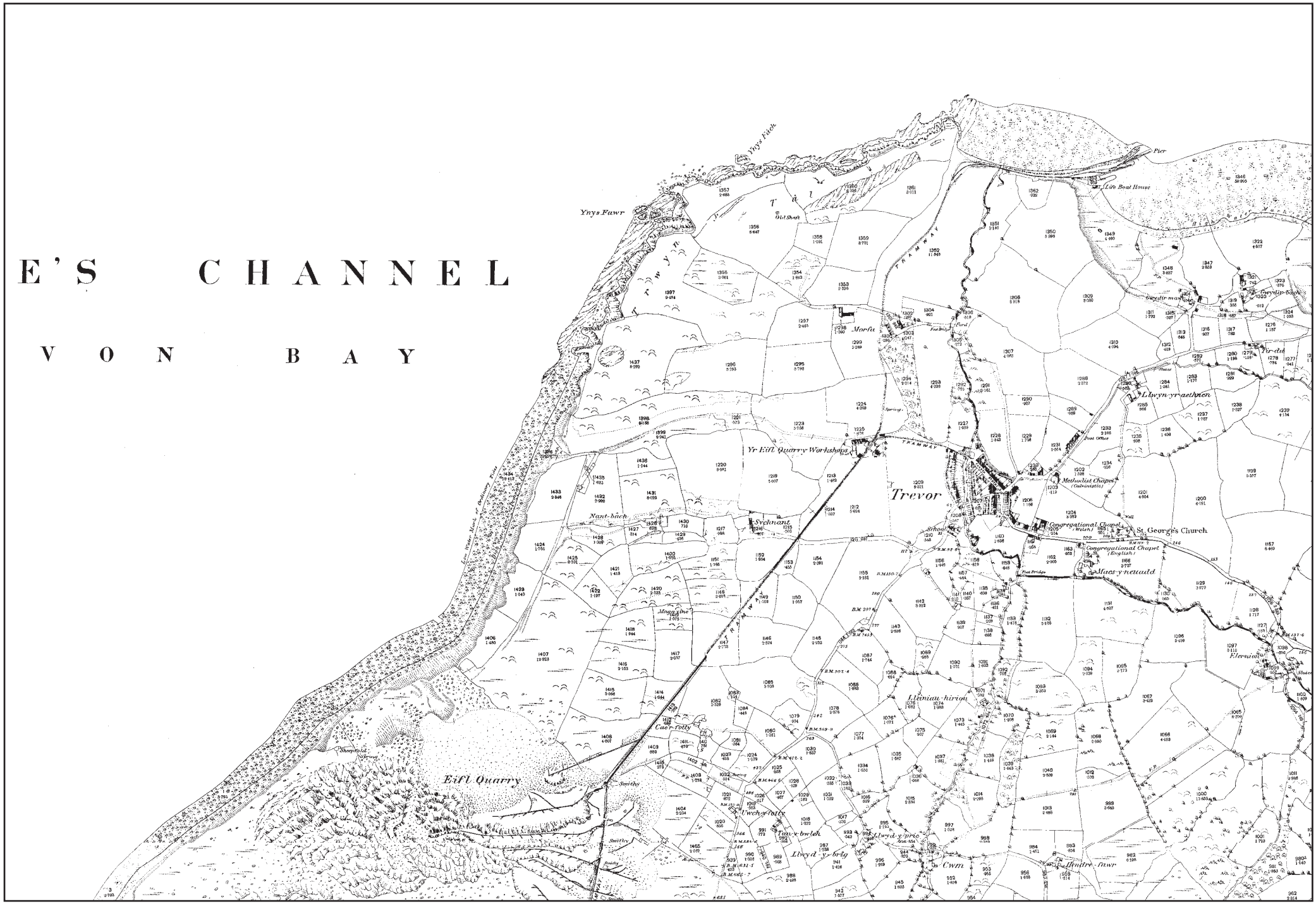


Figure 02: Reproduction of 1st edition 25 inch Caernarvonshire County Series Ordnance Survey Map Sheet XXV.11, XXV.12, XXV.15 and XXV.16 (1888-1889). Scale 1:10000@A4.

Figure 03: Reproduction of 2nd edition 25 inch Caernarvonshire County Series Ordnance Survey Map Sheet XXV.11, XXV.12, XXV.15 and XXV.16 (1900). Scale 1:10000@A4.

Figure 04: Reproduction of 3rd edition 25 inch Caernarvonshire County Series Ordnance Survey Map Sheet XXV.11, XXV.12, XXV.15 and XXV.16 (1918). Scale 1:10000@A4.

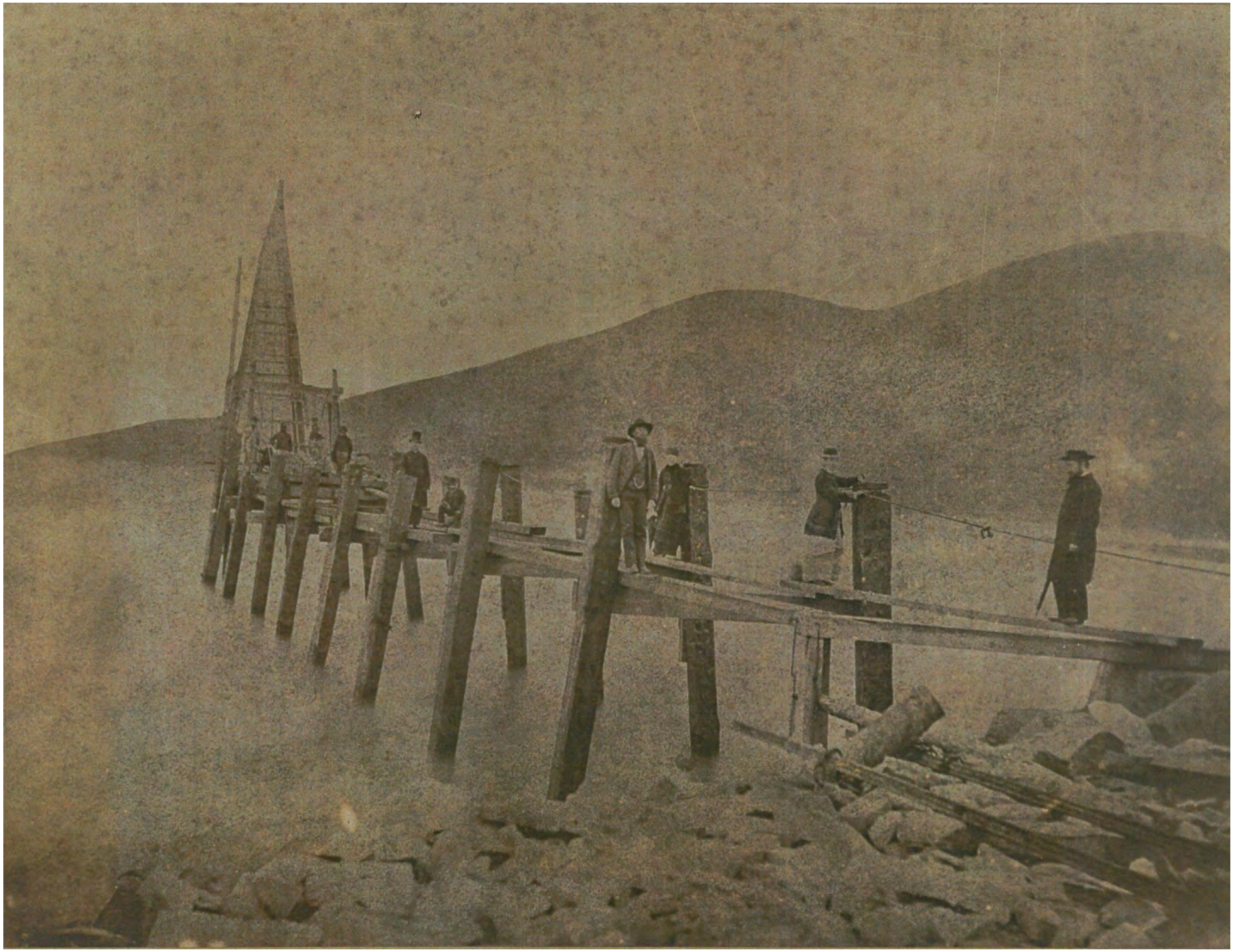
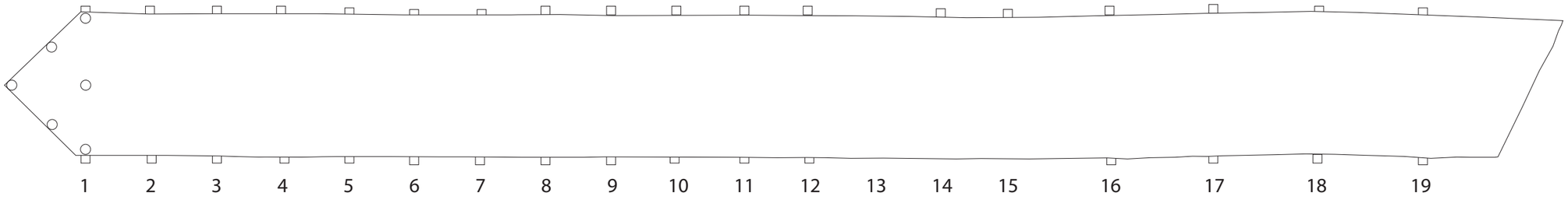


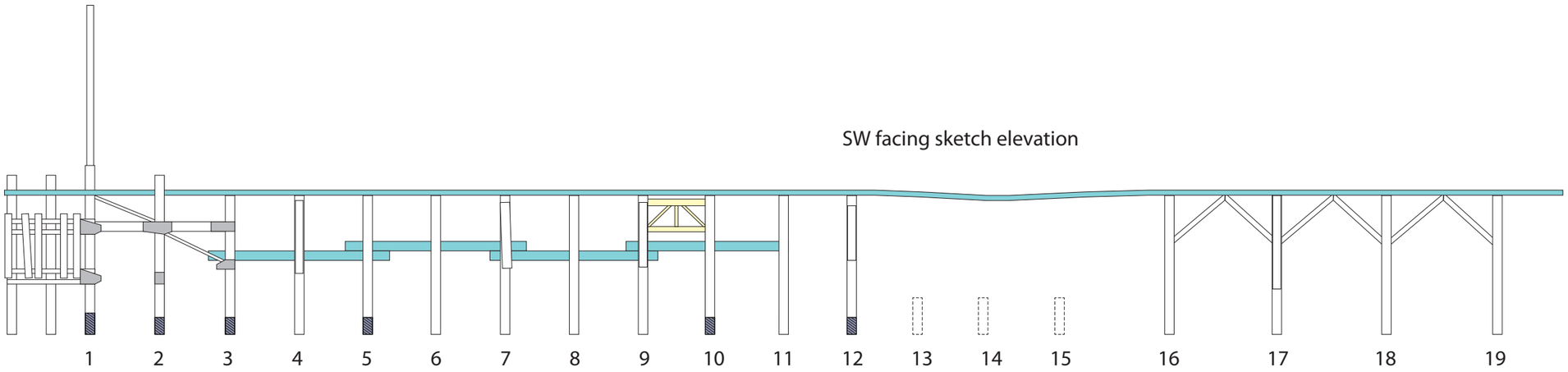
Figure 05: Historic image of Trefor pier under construction c.1912 (source: Bangor University Archives ref. DARB Add/72)

Trefor Pier 1:250@A3 sketch plan

0 25m



SW facing sketch elevation



NE facing sketch elevation

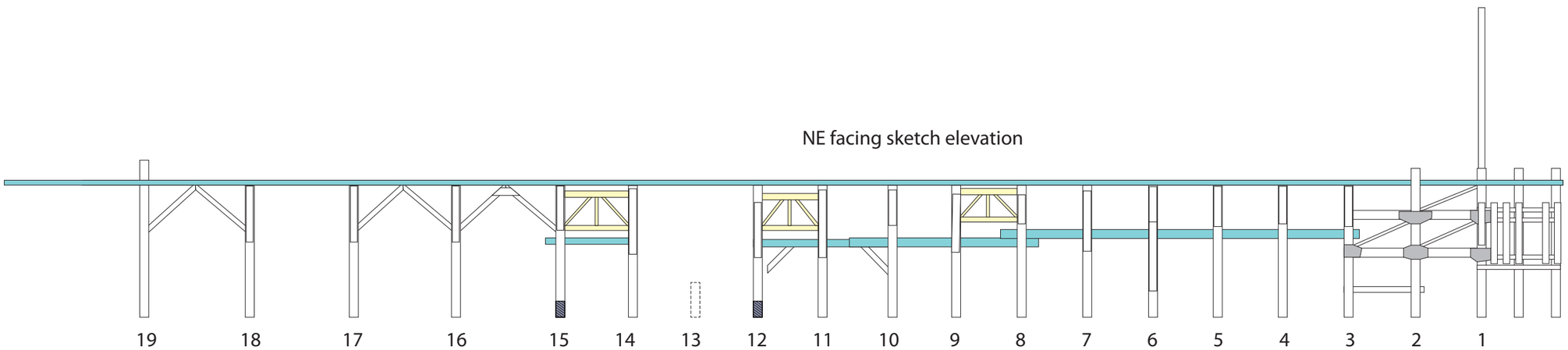


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Figure 06: Trefor Pier sketch plan and elevations

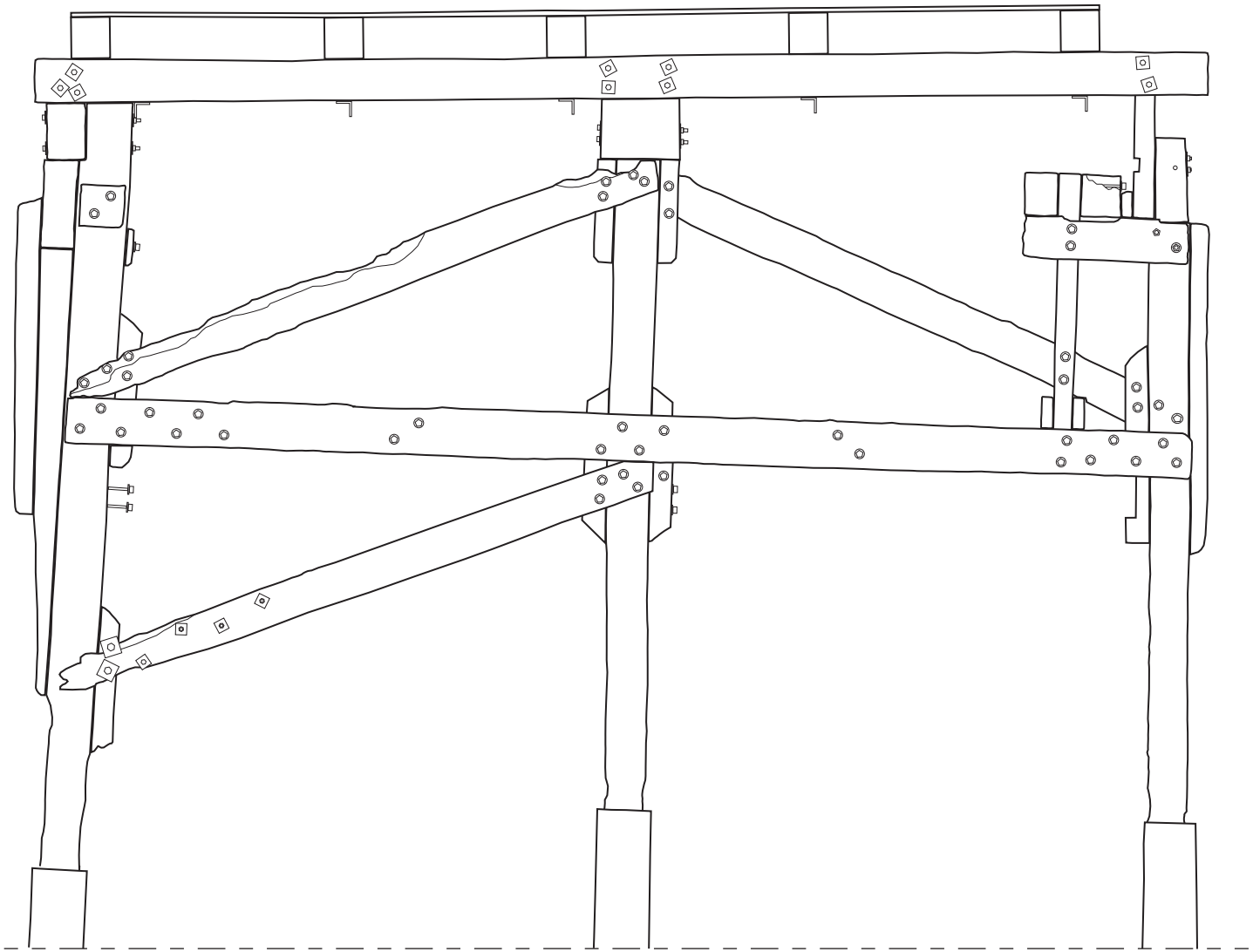
1980's repair
Probable 1960's metal feet
1912 - 1960's work
Metal plates

Date: 06/09/2015
Author: NMC
Office:
Drawing: G2475/F5

Plan 1:250 @ A3
Elevations not to scale

SW

NE



SEA LEVEL
AT TIME
OF SURVEY

0 1 2 3 4 5m

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Figure 07: South-east facing elevation of Truss 12

Scale: 1:50 @ A4

Surveyed at Low Tide, 23/11/2016

Date: 01/12/2016	
Author: NMC	
Office:	
Drawing: G2475/ FIG0X	
Scale: 1:50 @ A4	

Plate 01: General view from the south of stone pier viewed (archive image: G2475_Trefor_Pier_001)

Plate 02: View of from the west of the southeastern side of timber pier (archive image: G2475_Trefor_Pier_020)

Plate 03: General view of the pier from the east (archive image: G2475_Trefor_Pier_015)

Plate 04: View of Trefor pier from the beach showing damaged northwestern side of the timber pier (archive image: G2475_Trefor_Pier_016)

Plate 05: General view from the southwest of the wooden pier looking from the stone pier section (archive image: G2475_Trefor_Pier_004)

Plate 06: View from the southwest of the site of former cottages and lifeboat house (archive image: G2475_Trefor_Pier_018)

Plate 07 Detail of concrete pads in stone pier surface (Scale: 1 x1m; archive image: G2475_Trefor_Pier_010)

Plate 08: Detail of timber pier showing collapsed section (archive image: G2475_Trefor_Pier_005)

Plate 09: Detail of timber pier showing collapsed section (archive image: G2475_Trefor_Pier_006)

Plate 10: View from the west of the northeastern side of the timber pier (archive image: G2475_Trefor_Pier_021)

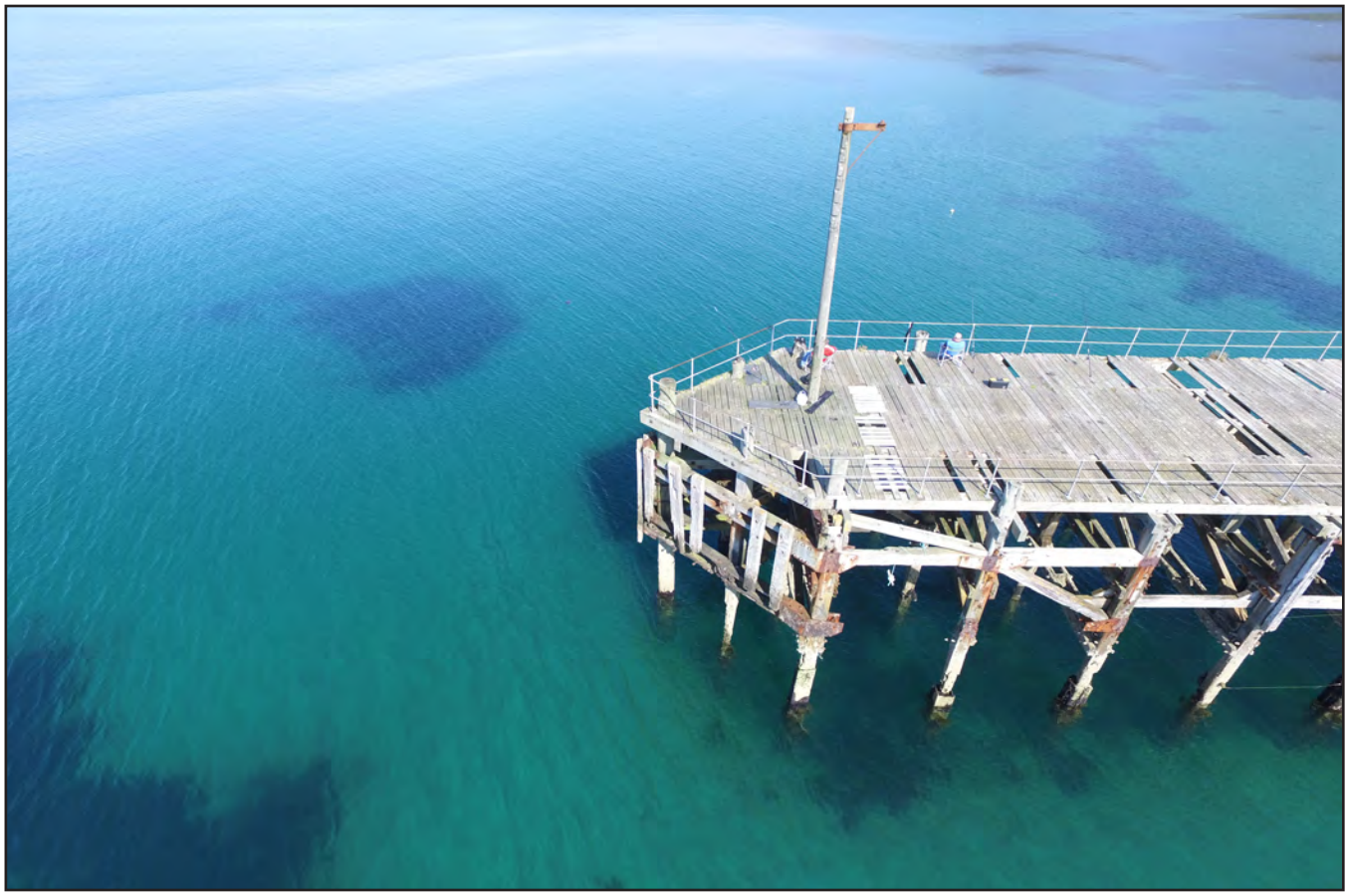

Plate 11: Aerial view of the north-northwest end of the pier (Trusses 1 to 4) (UAV image: DJI_0121)

Plate 12: Aerial view of Trefor Pier from the east-southeast showing the condition of timber decking over collapsed trusses (Trusses 12 to 18) (UAV image: DJI_0108)

Plate 13: View of Trefor pier from the east-southeast showing the detail of the truss construction (Trusses 5 to 10) (UAV image: DJI_0146)

Plate 14: View of Trefor pier from the northwest showing the terminus and the truesses on the west-southwest side of the pier (UAV image: UAV image: DJI_0153)

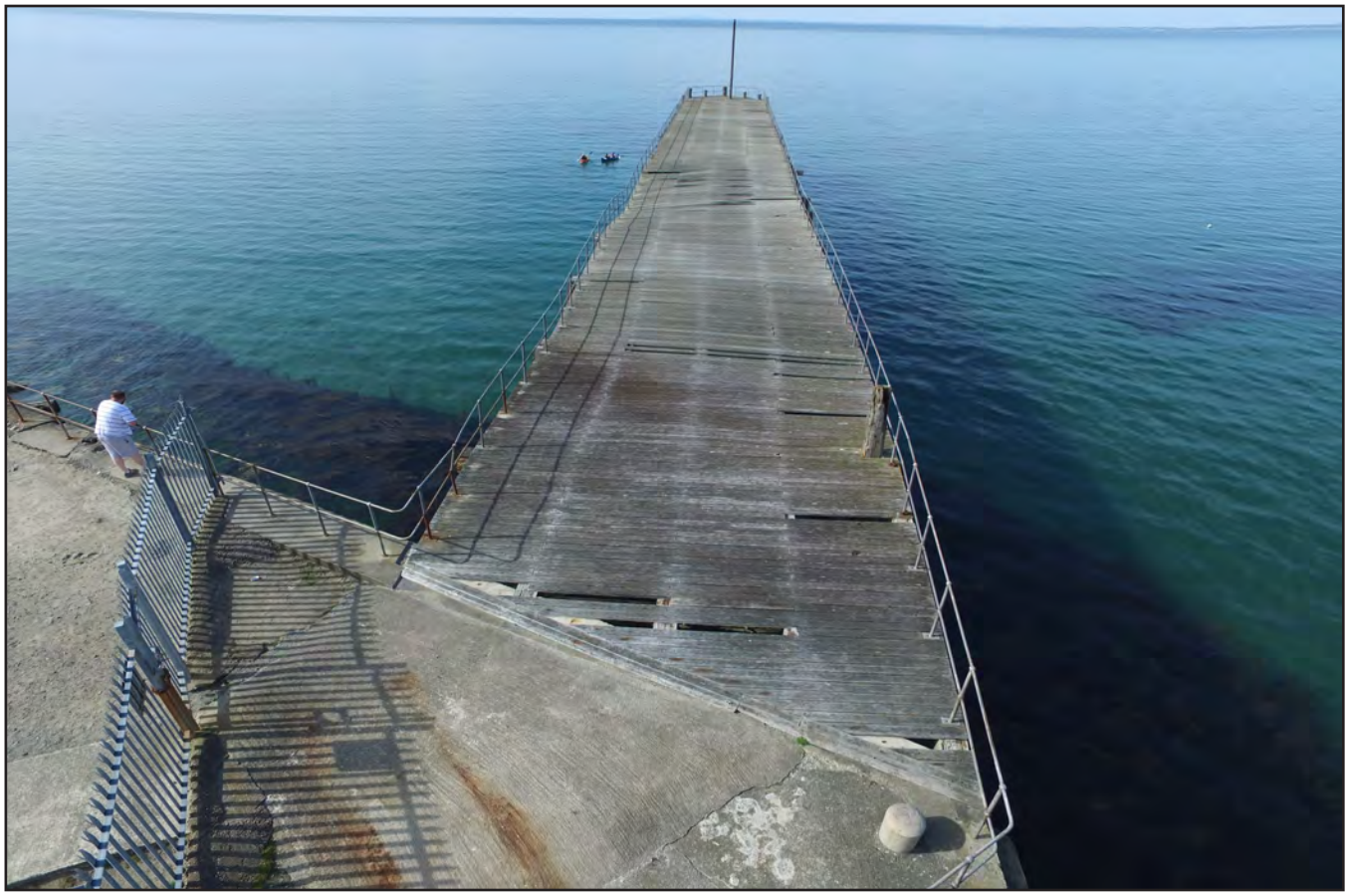

Plate 15: View of the pier from the south-southeast showing the timber decking (UAV image: DJI_0725)

Plate 16: View of Trefor pier from the north showing the triangular pointed end of the pier (UAV image: DJI_0156)

Plate 17: View of Trefor pier from the east southeast showing the damaged section of the pier from trusses 13 to 15 (UAV image: DJI_0143)

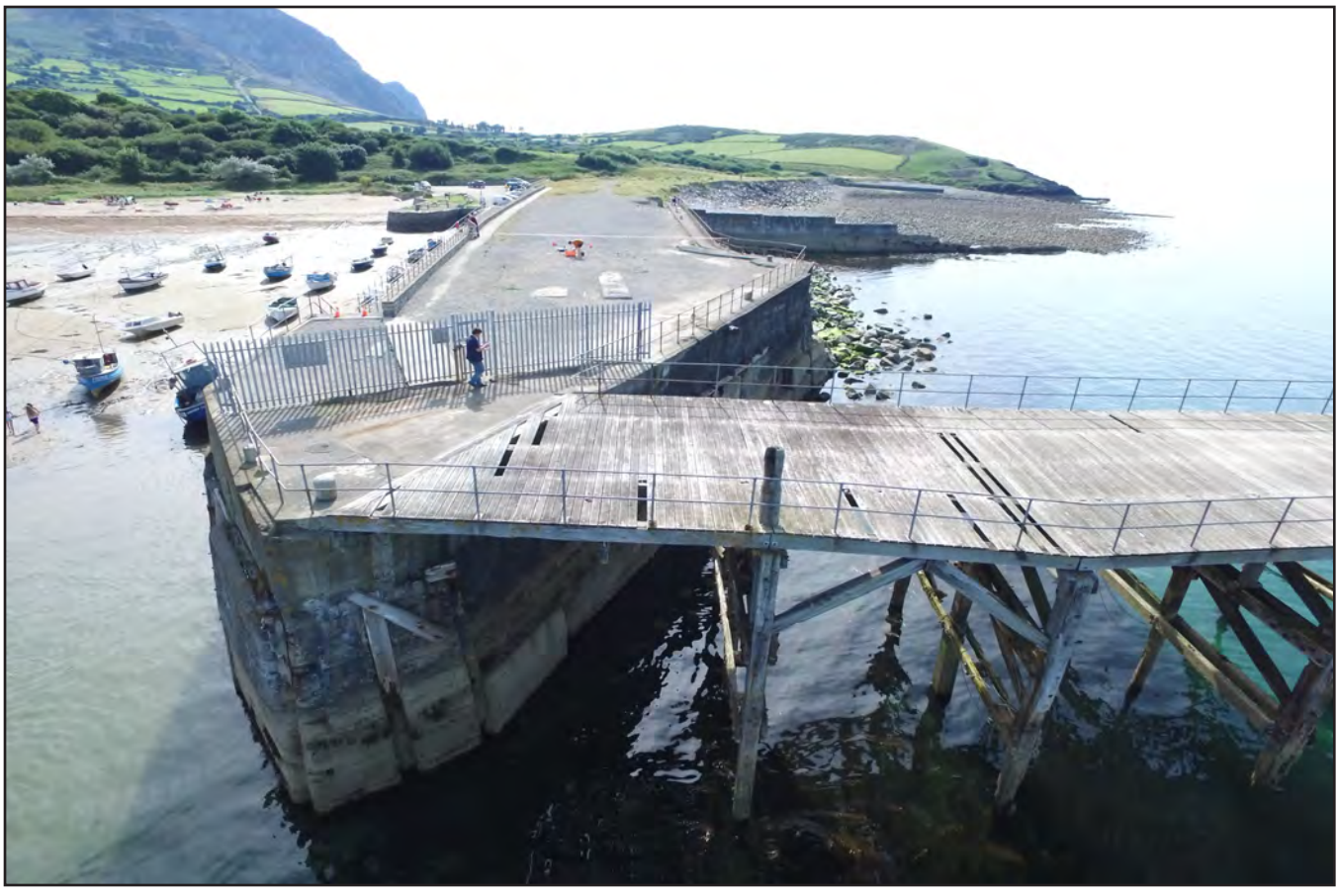

Plate 18: View of pier from the northeast detailing the construction of the stone quay and pier at the connection point (UAV image: DJI_0695)

Plate 19: View of north-northwest side of Trefor pier shoiwng rotted timber in the intertidal zone, most notably on Truss 17 (UAV image: DJI_0233)

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APPENDIX I

Reproduction of Gwynedd Archaeological Project Design for Archaeological Mitigation (August 2016)

TREFOR PIER, GWYNEDD (G2475)

PROJECT SPECIFICATION FOR A LEVEL 2/3 BUILDING RECORD

Prepared for

YGC

July 2016

Ymddiriedolaeth Archaeolegol Gwynedd
Gwynedd Archaeological Trust

Approvals Table				
	Role	**Printed Name**	**Signature**	**Date**
Originated by	Document Author	JOHN ROBERTS		28/07/16
Reviewed by	Document Reviewer	STUART REILLY	Stuart Reilly	28/07/16
Approved by	Principal Archaeologist	JOHN ROBERTS		28/07/16

Revision History			
Rev No.	**Summary of Changes**	**Ref Section**	**Purpose of Issue**

TREFOR PIER, GWYNEDD

PROJECT SPECIFICATION FOR A LEVEL 2/3 BUILDING RECORD

Prepared for *YGC*, July 2016

CONTENTS

1 INTRODUCTION

Gwynedd Archaeological Trust (GAT) has been asked by *YGC* to prepare a project specification for a building record of Trefor Pier, located in Trefor, Gwynedd (NGR SH37544748; Figure 01). The record will be completed in advance of demolition, in accordance with Marine Licence Application CRML1622.

The pier is built from timber and measures 87m in length and 7m in width and is located on the northern coastline of the Llŷn peninsula. The pier was built in *c.*1912 as part of the local granite quarry industry and was attached to an existing stone pier. The pier was refurbished in the in the 1980's along with the quay wall, but is now in a dilapidated state. The pier is registered in the regional Historic Environment Record (HER) as Primary Reference Number 25013.

Gwynedd Archaeological Planning Services (GAPS) have requested a Level 2/3 building record as described in *Understanding Historic Buildings: A guide to good recording practice* (Historic England 2016). The building record will also be completed in accordance with the *Standard and Guidance for the archaeological investigation and recording of standing buildings and structures* (Chartered Institute for Archaeologists, 2014).

2 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

The present settlement of Trefor is a mid-nineteenth century industrial development located within an area of much older agricultural occupancy in the north-western portion of Llanaelhaearn parish and became the entrepôt for the local granite stone industry from the 1830s. Several local sites were exploited for hard rock which could be manually dressed into paving blocks, termed "sett-stones", which were being increasingly sought-after by the developing towns and cities of Britain. This was particularly the case in the north-west of England, where the demand accelerated as civic improvements were undertaken towards the end of the nineteenth century and into the opening decades of the twentieth century. Although land transport routes from the Llŷn quarries remained undeveloped, the fortuitous coastal location of suitable rock meant that the markets could be accessed by water-borne traffic (Davidson, A. & Pierce Jones, G., 2007: GAT Report 671.4).

The first commercial exploitation of the granitic rocks in the parish of Llanaelhaearn appears to have commenced on the coastal hillside of 'Gorllwyn yr Hendref' (close to the present 'Eifl Quarry') in the early 1840s, with the earliest known quarrying lease on that site was granted in March 1844. This quarry was sold to *The Welsh Granite Company* in *c. 1849-1850*, with house-building nearby commencing from 1854 for the increasing quarry workforce. The new settlement developed into a village that was named 'Trefor', in honour of the quarry's influential works manager, Trefor Jones. The partnership also opened a new quarry at an adjacent location known as 'Mynydd Garnfor'. Leased from May 1854, this new development used rail transport to carry its produce to the coast (*ibid.*).

The business appears to have had financial problems by the early 1860s, and was taken over in 1864 by the newly-formed *Welsh Granite Co. Ltd.*, a concern which also initially operated other granite quarries in the contiguous Nefyn district. This Company opened the present 'Eifl Quarry' higher up the mountain than the previous working, which was subsequently abandoned. The loading facilities were also improved by the construction of the first phase of the surviving breakwater/harbour wall in 1869, raising the level of the rail/ship transhipment facility from the beach level, and providing relatively-deep water adjacent to the dock side. The quarry came into the ownership of the *Penmaenmawr & Welsh Granite Co Ltd.* in 1911 (an amalgamation of Trefor with one of the Penmaenmawr quarries), and further extensions and modifications were made to the loading quay. The market for sett-stones was diminishing in the early twentieth century (tarmacadam was

increasingly being used instead), and appears to have ceased in the 1930s. Thus the quarries had to diversify into the production of crushed stone for uses such as railway ballast, although the Trefor quarry also produced ornamental stone and slab, processed in a new sawing and polishing shed. To cope with large bulk shipments, a timber pier was added at right angles to the seaward end of the stone quay, so that the larger steam ships could be used. This pier also had the advantage of dealing with ships on both sides, whereas the original quay had only one loading face on the lee side. A small dock ('Cei Bach') was also constructed within the landward shadow of the stone quay (*ibid.*).

In the 1920s, a large concrete silo was erected on the stone quay to store sufficient crushed stone so that ships could be loaded more efficiently. This was top-fed by means of a conveyor belt 'elevator' that was itself fed from material tipped from railway wagons into a ground-level hopper. The silo was made up of individual hopper 'cells', presumably for different grades of crushed stone, and each hopper discharged via chutes directly into the ships berthed alongside. Rail transport from the quarry to the quay was discontinued in 1959 in favour of motor lorries.

In 1963, the quarry Company was taken over by the *Bath & Portland Stone Co.*, which subsequently became *Kingston Minerals Ltd.*, which closed the business in October 1971, though work later resumed on part of the site on a small scale by a local concern, *Gwaith Brics (Trefor) Ltd.* It seems likely that the use of maritime transport for the produce of the quarry ceased in the 1960s, although details are uncertain. A major redevelopment scheme was undertaken on the quay in the mid-1980s, involving removing the stone hopper, redesigning part of the quay wall, and refurbishing the timber pier. This activity removed much of the archaeology of the site (*ibid.*).

3 METHODOLOGY

The pier comprises a timber-built structure, which measures 87m in length and 7m in width, and is orientated roughly north-south.

The building record will be completed to Level 2/3 as described in *Understanding Historic Buildings: A guide to good recording practice* (Historic England 2016). A Level 2/3 record is described as a descriptive and analytical record and will include:

- a photographic and descriptive record of the pier; and
- an analysis and account of the pier's origin, development and use.

3.1 Photographic Record

The photographic record will include general views of pier within the local environs, particularly in relation to the stone quay and surviving industrial archaeological remains (where present/identifiable). This record will include elevation photographs of the pier with oblique shots used where direct elevation shots are not practical as well as visible details related to construction forms and techniques, including any phasing associated with original construction and later refurbishment. The pier is in a dilapidated state with no direct access for recording, therefore the photographic record will combine land based photographs taken from the foreshore and multiple images recorded using an Unmanned Aerial Vehicle (UAV), piloted by a CAA licenced operator. The following methodology will apply:

1. Stationary land based photographs will be taken by GAT with a *Nikon* D5100 fitted with a AF-S DX Zoom-NIKKOR 18-55mm f/3.5-5.6G ED VR lens; the maximum image resolution will be 16.2 effective megapixels. The photographs will be taken in RAW format and recorded on GAT proformas (cf. Appendix I). A photographic metadata table will be completed and included in the report; photographic images will be archived in TIFF format in accordance with the Royal Commission on Ancient and Historic Monuments of Wales 2015 *Guidelines for digital archives*.

2. UAV images will be taken by *Orca Principle Ltd.* using a *DJI Inspire* UAV fitted with a 12 megapixel camera and brushless gimbal and 4K video capture.

    - Cones will be placed throughout the site which will be used to provide a more accurately georeferenced final product, rather than relying on the GPS in the UAV. The position of these cones will be recorded using a traditional GPS (the data from which will be post processed later for higher accuracy).

    - Once on site the UAV will fly a pre-determined waypoint flight which will take top down photographs of the entire site to be surveyed. These photos are automatically spaced to provide the optimal overlap to generate a 3D model.

    - After this the UAV will be flown again on the same pre-programmed mission but with the camera angled at 45 degrees to collect information from a different axis.

    - Following this the UAV will be flown manually and pictures will be taken from all aspects at 90 degrees to the ground.

- The high resolution photographs taken during the survey will be utilised by Orca Principle Ltd. to produce a georeferenced scaled and rendered 3D model using Pix4D software. The photographs, and the resulting model in a suitable format for GAT to process in-house, will then be supplied to GAT for the processing: The photographs and georeferenced scaled 3D model created by Orca Principle Ltd. will be supplied to GAT on permanent storage media and imported into Agisoft Photoscan Professional by a suitably experienced GAT archaeologist. The model will then be used to extract images of orthorectified scaled views of the main elevations. The resulting orthorectified images will be imported into an appropriate vector drawing package by a suitably experienced GAT archaeologist and traced to produce 1:50 scale elevation vector drawings.

3.2 Descriptive Record

The descriptive record will be completed on GAT pro-formas and will record the pier in terms of building fabric, appearance and content.

The analysis and account of the pier's origin, development and use will utilise the photographic and descriptive record, along with available primary and secondary sources. Information will be sourced from the following:

1. The regional Historic Environment Register (HER, Gwynedd Archaeological Trust, Craig Beuno, Garth Road, Bangor, Gwynedd LL57 2RT) will be examined for information concerning the study area. This will include an examination of the core HER, the 1:2500 County Series Ordnance Survey maps and any secondary information held;
2. Archive data and historic maps, will be consulted in the regional archives at the Gwynedd Archives Service (Cyngor Gwynedd, Caernarfon LL55 1SH)

3.3 Report

The Level 2/3 photographic, descriptive and analytical record will be completed in August 2016; the results will be prepared in a report that will include the following:

1. A non-technical summary;
2. Introduction;
3. Results of the photographic, descriptive and analytical record;
4. Conclusions;
5. Sources;
6. Figures (location map, elevations and plans);
7. Plates (plates selected from the photographic record and historic images (if available))
8. Approved Project specification (Appendix I);
9. Photographic index (Appendix II)

A draft copy of the report will be sent to Gwynedd Archaeological Planning Services and YGC within one month of completing the record on site. Once approved, a copy of the report will be submitted immediately to Gwynedd Archaeological Planning Services and YGC and to the Historic Environment Record located at the Gwynedd Archaeological Trust. Submission of digital information to the Royal Commission on the Ancient and Historical Monuments of Wales will be undertaken in accordance with the RCAHMW Guidelines for Digital Archives Version 1 (2015). Digital information will include the photographic archive and associated metadata.

4 PERSONNEL

The project will be managed by John Roberts, Principal Archaeologist GAT Contracts Section. The building record will be completed by a team of project archaeologists who will have responsibility for completing the site recording, maintaining the site archive, liaising with GAPS and YGC and submitting the draft report and final report. The project manager will be responsible for reviewing and approving the report prior to submission.

5 HEALTH AND SAFETY

The GAT project archaeologists will be CSCS certified. A site specific risk assessment will be prepared prior to the start of fieldwork and the project archaeologists will be issued with required personal safety equipment.

6 INSURANCE

Public Liability

Limit of Indemnity- £5,000,000 any one event in respect of Public Liability

INSURER Aviva Insurance Limited

POLICY TYPE Public Liability

POLICY NUMBER 24765101CHC/000405

EXPIRY DATE 22/06/2017

Employers Liability

Limit of Indemnity- £10,000,000 any one occurrence.

The cover has been issued on the insurers standard policy form and is subject to their usual terms and conditions. A copy of the policy wording is available on request.

INSURER Aviva Insurance Limited

POLICY TYPE Employers Liability

POLICY NUMBER 24765101CHC/000405

EXPIRY DATE 22/06/2017

Professional Indemnity

Limit of Indemnity- £5,000,000 in respect of each and every claim

INSURER Hiscox Insurance Company Limited

POLICY TYPE Professional Indemnity

POLICY NUMBER

HU PI 9129989/1208

EXPIRY DATE 23/07/2017

7 SOURCES CONSULTED

1. Chartered Institute for Archaeologists, 2014.*Standard and Guidance for the archaeological investigation and recording of standing buildings and structures*.

2. Davidson, A. & Pierce Jones, G., 2007: GAT Report 671.4

3. Gwynedd Archaeological Planning Services email correspondence dated 05/02/2016.

4. Historic England, 2016. *Understanding Historic Buildings: A guide to good recording practice.*

5. Royal Commission on Ancient and Historic Monuments of Wales 2015 *Guidelines for digital archives*

FIGURE 01

Location Map

Figure 01: Site Location Map, based on 1:10000 Ordnance Survey County Series Map Sheet SH34NE. Scale: 1:4500@A4.

APPENDIX I

Reproduction of Gwynedd Archaeological Trust photographic record pro-forma

Ymddiriedolaeth Archaeolegol Gwynedd
Gwynedd Archaeological Trust

Digital Photographic Record

Include main context numbers for each shot, drawing numbers for sections and any other relevant numbers for cross referencing.
Delete any unwanted photos **immediately** from the camera. Regularly upload photographs to computer.

Project Name:			Project Number:				
Photo No.	**Trench**	**Description**	**Contexts**	**Scales**	**View From**	**Initials**	**Date**

APPENDIX II

Photographic Metadata

File reference	Project name	Project phase	Description	View from	Scale (s)	Type	Date	Originating person	Originating organisation	Plates
G2475_Trefor_Pier_001	G2475_Trefor_Pier	Building Recording	General view of stone pier	s	-	Photograph	15/08/2016	Robert Evans	Gwynedd Archaeological Trust	
G2475_Trefor_Pier_002	G2475_Trefor_Pier	Building Recording	General view of stone pier	SSW	-	Photograph	15/08/2016	Robert Evans	Gwynedd Archaeological Trust	
G2475_Trefor_Pier_003	G2475_Trefor_Pier	Building Recording	View of timber pier from the SW and the stone pier , showing damage	SW	-	Photograph	15/08/2016	Robert Evans	Gwynedd Archaeological Trust	
G2475_Trefor_Pier_004	G2475_Trefor_Pier	Building Recording	General view of wooden pier from the stone pier section	SW	-	Photograph	15/08/2016	Robert Evans	Gwynedd Archaeological Trust	
G2475_Trefor_Pier_005	G2475_Trefor_Pier	Building Recording	Detail of timber pier showing collapsed section	SSW	-	Photograph	15/08/2016	Robert Evans	Gwynedd Archaeological Trust	
G2475_Trefor_Pier_006	G2475_Trefor_Pier	Building Recording	Detail of timber pier showing collapsed section	S	-	Photograph	15/08/2016	Robert Evans	Gwynedd Archaeological Trust	

File reference	Project name	Project phase	Description	View from	Scale (s)	Type	Date	Originating person	Originating organisation	Plates
G2475_Trefor_Pier_007	G2475_Trefor_Pier	Building Recording	View of SSE side of pier	NE	-	Photograph	15/08/2016	Robert Evans	Gwynedd Archaeological Trust	
G2475_Trefor_Pier_008	G2475_Trefor_Pier	Building Recording	General view of stone pier	NE	2 x1m	Photograph	15/08/2016	Robert Evans	Gwynedd Archaeological Trust	
G2475_Trefor_Pier_009	G2475_Trefor_Pier	Building Recording	General view of stone and timber pier from the foreshore, showing damaged section	ESE	1 x1m	Photograph	15/08/2016	Robert Evans	Gwynedd Archaeological Trust	
G2475_Trefor_Pier_010	G2475_Trefor_Pier	Building Recording	Detail of concrete pads in stone pier surface	ENE	1 x1m	Photograph	15/08/2016	Robert Evans	Gwynedd Archaeological Trust	
G2475_Trefor_Pier_011	G2475_Trefor_Pier	Building Recording	General view of pier with Gyrn Ddu/Coch in the background	W	-	Photograph	15/08/2016	Robert Evans	Gwynedd Archaeological Trust	

File reference	Project name	Project phase	Description	View from	Scale (s)	Type	Date	Originating person	Originating organisation	Plates
G2475_Trefor_Pier_012	G2475_Trefor_Pier	Building Recording	General view of pier with Gyrn Ddu/Coch in the background	W	-	Photograph	15/08/2016	Robert Evans	Gwynedd Archaeological Trust	
G2475_Trefor_Pier_013	G2475_Trefor_Pier	Building Recording	General view of pier with Trefor beach	E	-	Photograph	15/08/2016	Robert Evans	Gwynedd Archaeological Trust	
G2475_Trefor_Pier_014	G2475_Trefor_Pier	Building Recording	General view of pier with Trefor beach	E	-	Photograph	15/08/2016	Robert Evans	Gwynedd Archaeological Trust	
G2475_Trefor_Pier_015	G2475_Trefor_Pier	Building Recording	General view of pier with Trefor beach	E	-	Photograph	15/08/2016	Robert Evans	Gwynedd Archaeological Trust	
G2475_Trefor_Pier_016	G2475_Trefor_Pier	Building Recording	View of Trefor pier from the beach showing damaged NNW side of timber pier	SSE	-	Photograph	15/08/2016	Robert Evans	Gwynedd Archaeological Trust	
G2475_Trefor_Pier_017	G2475_Trefor_Pier	Building Recording	View of stone pier	S	-	Photograph	15/08/2016	Robert Evans	Gwynedd Archaeological Trust	

File reference	Project name	Project phase	Description	View from	Scale (s)	Type	Date	Originating person	Originating organisation	Plates
G2475_Trefor_Pier_018	G2475_Trefor_Pier	Building Recording	Site of former cottages and lifeboat house	WSW	-	Photograph	15/08/2016	Robert Evans	Gwynedd Archaeological Trust	
G2475_Trefor_Pier_019	G2475_Trefor_Pier	Building Recording	View of ESE side of timber pier	W	-	Photograph	15/08/2016	Robert Evans	Gwynedd Archaeological Trust	
G2475_Trefor_Pier_020	G2475_Trefor_Pier	Building Recording	View of ESE side of timber pier	W	-	Photograph	15/08/2016	Robert Evans	Gwynedd Archaeological Trust	
G2475_Trefor_Pier_021	G2475_Trefor_Pier	Building Recording	View of ENE side of timber pier (as much at 90 degrees as possible	W	-	Photograph	15/08/2016	Robert Evans	Gwynedd Archaeological Trust	
G2475_Trefor_Pier_022	G2475_Trefor_Pier	Building Recording	General shot showing work in progress	SE	-	Photograph	15/08/2016	Robert Evans	Gwynedd Archaeological Trust	
G2475_Trefor_Pier_023	G2475_Trefor_Pier	Building Recording	General shot showing stone pier and Trefor and Yr Eifl in background	NE	-	Photograph	15/08/2016	Robert Evans	Gwynedd Archaeological Trust	

File reference	Project name	Project phase	Description	View from	Scale (s)	Type	Date	Originating person	Originating organisation	Plates
G2475_Trefor_Pier_024	G2475_Trefor_Pier	Building Recording	View of Trefor Pier (timber section) fropm the south showing the drone at work	S	-	Photograph	15/08/2016	Robert Evans	Gwynedd Archaeological Trust	

Gwynedd Archaeological Trust
Ymddiriedolaeth Archaeolegol Gwynedd

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