Dunoon Pier Strategy
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Executive Summary

Background
Dunoon Pier is a Category B Listed timber structure which sits in a prominent position on the waterfront to the south of Dunoon Town Centre. Its current form evolved from a need to cater for steam ship traffic and until the end of June 2011 it served as the landing point for the Gourock – Dunoon vehicle and passenger ferry. The pier and its buildings have served in various forms and for various functions for over 150 years and today still act as a landmark feature reflecting the history of the town.

Structural Review
Based on the review of existing information from reports completed over the last fifteen years it appears that the condition of each of the four main structural member types is as follows:

- **Piles** – many thought to be sound other than outer skin. Some eroded at tidal level and seabed will require strengthening work. Attack from marine borers may be a hidden problem requiring closer study.
- **Bracing** – many thought to be sound in timber but the steel pin end connections are very corroded and likely to require replacement. Some bracings have already failed – requiring replacement.
- **Deck Beams** – deck beams are reported to be life expired and in need of replacement.
- **Timber Deck** – the deck is softwood and large areas of the deck have been reported to be in need of replacement.

Although this report has reviewed the existing information it is important to note that further investigation of the pier structure is essential to provide further information on the condition of each of the components.

It should be noted that all cost estimates relating to the remediation or maintenance of the pier have been derived from reports prepared over the last fifteen years. The accuracy of the extent of repairs and the reliability of the individual repair costs cannot be tested and further work is required to provide more reliable estimates.

Pier Options
A high level appraisal of the range of structural options has identified two broad strategies which could be taken to a more detailed technical study.

Timber Pier Restoration – Retain and restore some or all of the timber pier and buildings with the uses of the buildings and the links to the ferry service etc. to be considered throughout the study. The indicative costs for the initial repair woks ranging from circa £3.5m to over £7m depending on the extent of retention/restoration and the uses proposed.

Steel Sheet Piling – Retain a T-shaped footprint for the pier with the uses of the buildings and the links to the ferry service etc. to be considered throughout the study. The indicative costs for the sheet piling option are circa £6m to over £7m depending on the extent of works and the uses proposed.

Various uses for the pier and buildings have been considered but the range of these depends on the structural option delivered and it is suggested that full market research is undertaken closer to the time of implementation.

The Way Forward
As there will be a period of time when the existing structure and buildings will remain in their current form it is suggested that a short term maintenance plan is developed by Argyll & Bute Council in discussion with Historic Scotland to maximise the potential for the protection of historic features prior to any other works being taken forward.

The key actions which are required to take the options for the pier forward through a Business Case process are;

- Structural surveys and testing
- Outline structural design and repairs investigation
- Consultation and planning strategy
- Market research on pier and building uses
- Contractor research and detailed costing
- Funding discussions and applications

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Dunoon Pier Strategy

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1 Introduction

1.1 Project Overview

Dunoon Pier is a large Category B Listed timber structure which sits in a prominent position on the waterfront to the south of Dunoon Town Centre, its location is highlighted in **Appendix A**. Its current form evolved from a need to cater for steam ship traffic and until the end of June 2011 it served as the landing point for the Gourock – Dunoon vehicle and passenger ferry. The pier and its buildings have served in various forms and for various functions for over 150 years and today still act as a landmark feature reflecting the history of the town.

As part of the Dunoon CHORD Waterfront project the design team have taken forward the brief as defined in the Project Initiation Document which was approved by the Project Board and the Programme Management Board in May 2010 and the Executive in June 2010.

The development of a strategy for Dunoon Pier was included as one component of the project. It should be noted that no capital funds are allocated to the pier from the £8.3M CHORD allocation and the tasks taken forward as part of this component relate to the development of a strategy only.

1.2 Existing Pier Uses

As of the end of June 2011 the Gourock – Dunoon vehicle and passenger ferry service no longer uses Dunoon Pier. A new passenger only ferry uses the breakwater / link span facility to the south of Dunoon Pier and the Harbourmaster function has moved to the building at the entrance to the timber pier. The Waverley paddle steamer was given permission to berth at the timber pier for the summer 2011 season but only in adverse weather conditions or on special occasions such as the Cowal Gathering. A commercial diver training company has been given permission to use the Pier as a training facility.

In general the timber pier has no specific function and the accesses are gated with only authorised personnel allowed entry.

1.3 Purpose of Report

As noted above, the brief for the CHORD Dunoon Waterfront project included the development of a strategy for Dunoon Pier. This report reviews the history of the pier, describes the consultations which have been undertaken to define the options considered and summarises the options to allow the Project Board and Argyll & Bute Council to consider any further action.

The following chapters of this report provide information on;

- Pier History
- Consultation
- Listing Status
- Structural Assessment
- Structural Options
- Use & Management Options
- Future Actions
- Conclusions & Recommendations

2 Pier History

2.1 Introduction

The following chapter provides a brief background to the Pier in the context of local and national considerations with input provided by the conservation accredited architect appointed by the design team. This work draws on existing publications, information obtained from a review of Argyll & Bute Council Archives and discussions with the Conservation Officer.

2.2 Railways and Steam

A striking element of the history of the Clyde Estuary is the extent to which the developing railway networks and their links with steamship traffic shaped the towns and villages along this length of the west coast. 1841 saw the Glasgow, Paisley and Greenock Railway extended as far as Cathcart Street in Greenock: it was but a short stroll from there to the paddle steamer quay from which access across water could be had to Dunoon and the Cowal peninsula. In 1847, the company amalgamated with the Caledonian Railway Company, increasing links with a number of Clyde coast resorts and their shipping services. Enjoying a monopoly at Greenock until 1869 (at which stage a Glasgow and South Western Railway route was opened via Kilmacolm to Greenock's Albert Harbour), the Caledonian later opened a line to Gourock in 1889, allowing the company access to a steamer pier further west than its main competitor. Stations were constructed at Greenock West, Fort Matilda and Gourock, and the Caledonian Steam Packet Company (a subsidiary of the railway organisation) began to operate from the new pier built close to Kempock Point. At the same time, the Caledonian Railway took over the running of the older but consistently popular Wemyss Bay Line, building a new station there in 1903.

There was therefore at one time the most extraordinary number of examples of the harmonic interface between architecture and engineering that comes with great advances in industry and transportation - tunnels, bridges, station buildings, stationmaster's houses, cranes, slips, station hotels, and – of course – piers and pierhead buildings. But there are a depressingly small number of these iconic structures left from the period: very few dockside cranes, only a handful of good mainline station buildings, and virtually no piers. The commuter suburb of Helensburgh has a pier of sorts, as has nearby Kilcreggan, but Helensburgh's pierhead buildings were demolished many years ago. Similarly, on the western shore, the pier at Kirn (which had an exceptional ticket office designed by architect H E Clifford) was last used as long ago as 1963. Even Rothesay's pier – despite the attractions of its refurbished Victorian toilets – is much altered.

And so where one of these original Victorian or Edwardian structures has survived, its importance is reinforced by virtue of that very survival, and it quite often becomes a symbol for the area in which it is located. Wemyss Bay Station remains a good example, as is the Titan Crane in Clydebank, and the former sugar warehouses at James Watt Dock in Greenock. A building (or structure) that might have been almost commonplace at one time assumes a far greater importance by dint of the fact that it represents one of the last surviving examples of its kind.

For these reasons, Dunoon Pier and its buildings – the waiting rooms and pier master's office, the signal tower and tearoom, and the ticket lodge (despite the alterations) – have a significance and importance that extends beyond the local context, recognised recently through proposals by Historic Scotland to re-assess the statutory listing of the pier and proposed change to Category A.

2.3 Historical Significance

Historic Scotland acknowledge that there are a great many buildings across the country that are of interest from an historic and/or architectural point of view, but to merit the designation of "listing", the interest has to be special. Listing generally takes into account age, rarity, architectural interest and historical associations, and these four criteria allow for a very broad range of structures to be identified as of real importance and offered the statutory protection that comes with listing. Of the three categories applied in Scotland (being A, B and C), those afforded the designation of Category A are considered to be buildings of national (and often international) importance, usually with the historic features for the most part intact. In the case of Dunoon Pier, the ensemble is considered to be both rare and exceptional, representing a significant contribution to the architectural and historic interest of the town, and to the wider maritime heritage of the west coast in general. The current position with regard to the listing status is discussed in Chapter 4.

2.4 The 1800's

Dunoon first had a timber jetty in 1835, constructed by a private joint-stock company with an interest in encouraging paddle steamer traffic to divert to the area. With the launch in

1812 of Henry Bell's "Comet", travel by steamboat had become commercially viable, and the potential benefits to the parish in having a pier could no longer be ignored. Ten years later, the first pier having become inadequate, a new structure was erected, albeit this one was all but destroyed in a storm in the winter of 1848. With the rail link from Glasgow to Greenock having increased levels of tourism in and around the estuary, it was important that the town had a pier capable of supporting goods and pedestrian traffic across water, and so in 1867 Glasgow architect Campbell Douglas was commissioned to design a more substantial jetty, this time with offices and a waiting room. Extended by an additional fifty feet in 1881, this structure became part of the pier that exists today, and took its full length from the shore to 390 feet. By this time, the population of the resort had swelled to over 3000, with the pier critical to the livelihood of many of its inhabitants.

In June 1895, Dunoon Burgh Council succeeded in negotiating the purchase of the pier and its associated land (including a skating rink) from the Hafton Trustees who owned it, paying the princely sum of £27,000 for the privilege. The pier changed hands at midnight on Hogmanay 1895 amidst much celebration, although there was at this time still some debate over whether the pier should be extended to the north or to the south. Concluding that expansion south was more easily accommodated, the Burgh Pier Committee appointed contractor James Watson of Glasgow to commence work, first with the remodelling of the esplanade from the castle to the existing pier (which included the construction of a concrete and rubble retaining wall with an ashlar cope and ornamental iron railing), and then on the driving of the greenheart timber piles (steam-hammered into the rock-bed), with the first pile installed successfully on 20 May 1896.

From the outset it was intended that the original pier be retained in use for goods traffic only, with a broad pedestrian gangway sited at a new location on the esplanade, extending 203 feet out to meet a new pierhead (itself 440 feet long). The 'T-Plan' arrangement was devised by the engineer William Robertson Copland, whose elegant drawings from January 1896 onwards formed the basis of the work undertaken. At the junction of the gangway, pierhead and original jetty was to be constructed the waiting rooms and harbour master's office, while the shore access onto the gangway was to be marked by a ticket office (or "pay office") built in matching materials. Indeed, this layout survives largely intact today; the buildings constructed mainly of lightweight timber with shingle-clad walls and tiled roofs to details prepared by Robert Bryden of the Glasgow firm of architects Clarke and Bell. In addition, since by this time the ingenious signalling apparatus devised by Charles Allan in 1887 was in use on every pier operating on the firth, the enlarged pier at Dunoon was to include an unusual timber signal tower complete with fog bell and ogee-roofed cupola.

Work took almost two years and was frequently slowed by severe weather conditions. Around 450 piles were required, the structure secured together by iron bolts and in places sheathed with iron plating. Fenders and coping were made of substantial sections of American rock elm, and the planking was creosote-coated pitch pine. At the time of construction it was estimated that at low tide the depth of the water would be 10 feet, and at high tide 20 feet.

Built by Kirn-based joiner James Drummond, the waiting rooms and ticket office were both extremely elegant structures, surprisingly so given the exposed nature of their location. Cast iron standards were used to create the basic framework, but the principal materials were otherwise red pine, glass, Swiss-style shingles (so popular on the stations of the West Highland Railway Line) and red clay (rosemary) tiles. There was a great deal of intricately turned timber, a lead-clad clock tower, and delicate iron finials and weather vanes.

Finally opened for business on 3 June 1898, the accommodation comprised of the cruciform-shaped ticket pavilion (with a pay booth, left luggage office and – eventually - turnstiles); the main building, in which there were first and third class waiting rooms, a ladies retiring room (all three with gas fires), toilets and a "refreshment" room, and - at first floor level - the harbour master's office; the signal tower (complete with small newsagent's booth); and a double-domed goods store framed in lightweight steel but finished externally to match its neighbours. The main building - in particular - with its twin verandas, round-arched windows, pretty cupola ventilators, and shallow gabled oriels, underlined the commitment to quality and service that the venture represented.

2.5 The 1900's

From thereon, few alterations were made to the pier until the late 1930s, although the goods gangway appears to have been strengthened in 1924, tram lines proposed in 1926, and a number of additional goods sheds erected in 1927 and 1932 (including a tiny mobile office on axled wheels designed by James Young, an architect based at nearby Hunter's Quay). In 1937, however, Dunoon Town Council (who had been responsible for the pier since 1901), agreed to erect a shelter

on the pierhead to better accommodate the huge numbers of visitors making a trip “doon the watter”. Steel-framed, the 220 feet long “promenade” linked the waiting rooms and re-located signal tower (which was altered to incorporate a tearoom at ground floor). Providing shelter at pierhead level, the structure was flat-roofed and finished in bitumen to provide an elevated walking surface from which visitors could enjoy the views both out to water and across town. A new harbour master’s office was built at the north end of this deck, a tiny information kiosk erected on the esplanade, and a new screen erected along the length of the passenger gangway.

A major change in the way in which the pier served the community came with the introduction of ferries carrying vehicular traffic - first witnessed between Gourock and Dunoon in January 1954. By the end of that month over 400 vehicles were recorded as having crossed and while the 1950s saw excursion traffic begin to fall (bringing the closure of most of the piers on the peninsula), Dunoon maintained its popularity. Indeed, extensive repairs (including partial re-piling and re-surfacing) were implemented in 1961 and 1962, and a vehicular ramp and causeway built at the goods entrance to the pier in 1972. With responsibility for its upkeep transferred to Strathclyde Regional Council in 1975, the existing facilities were in due course upgraded, although the promenade balcony was dismantled in 1982, separating the much-altered signal tower (which became the property of the coastguard) and the refurbished waiting rooms.

Much of the daintiness of the waiting rooms and ticket pavilion has been lost through re-modelling: decorative timbers that rotted through exposure to wind, wave and rain have not been replaced, and the ticket lodge has lost its remarkable free-standing frame, but the form of both buildings has been retained, and they remain singularly distinctive. The signal tower, sitting as it does on the rump of the tearoom, does not have the extraordinary architectural form of its 1896 predecessor, but is still a rare and characterful structure with elements of the signalling mechanism surviving inside the tower.

Since 1995, a series of storms have seen areas of the pier reduced in use, but its significance as a key focal point for the area remains undiminished. Underlining its importance, the National Piers Society, established for the specific purpose of celebrating seaside piers around the coast of Britain, make mention of only two merit-worthy piers in Scotland, being Rothesay and Dunoon. With the pier at Rothesay in large part re-developed (and the Baronial pier buildings long destroyed by fire), Dunoon Pier stands alone as a rare and valuable maritime resource not just for the immediate area, but also for the whole country.

2.6 2000 and Beyond

In 2005 a section of the south end of the pier was removed and the new breakwater and linkspan was built with the intention to remove the transport function of the timber pier but at the same time afford some protection to the structure by protecting from the prevailing and damaging south westerly wind and waves.

As of the end of June 2011 the Gourock – Dunoon vehicle and passenger ferry service no longer uses Dunoon Pier and in general the timber pier has no specific function with the accesses gated and only authorised personnel allowed. The ticket office at the entrance to the pier is in temporary use by the harbourmaster.

2.7 Potential Further Study

Through recent discussions with the Dunoon and Cowal Heritage Society and as a result of the recent cataloguing of the Argyll & Bute Archive more drawings and documents have been identified which may give further information and aid any future restoration of the buildings or the pier structure.

3 Consultation

3.1 Introduction

The following section provides information on the discussion and consultations which have been undertaken during the course of the study and provides a summary of the feedback received.

To inform the development of the Pier Strategy the following events have been undertaken;

- Pier Strategy Workshop
- Pier Conservation Meeting
- Trust Open Day
- Dunoon Waterfront Public Event
- Update Meeting with Historic Scotland
- Dunoon Waterfront Public Event 2

Throughout the process a feedback function has been available through the Argyll & Bute Council website and members of the public have been sending comments on the wider project and on the options for the pier.

3.2 Focus Groups

On 1st April 2011 a Pier Workshop was held with invitees ranging from the Project Board and Design Team members to local groups and users of the pier. This meeting considered the existing use and condition of the pier and started the process of generating options for review. A note of the meeting is provided in **Appendix B.**

A meeting was held with Historic Scotland, Argyll & Bute Council's Conservation Officer, the project Conservation Architect and Structural Engineer on the 13th of June 2011. The group discussed the feedback and actions from the workshop and the previous consideration of options for the Pier. It was noted during discussions that the description of the pier in the current listing notice was not correct and should be updated. A note of the meeting is provided in **Appendix B.**

On the 21st of June 2011 a number of trust organisations were invited to view the Pier and discuss the possibilities with regard to potential options for use and management. The Harbourmaster provided access to the buildings and talked through the current conditions and relevant history. A note of the meeting is provided in **Appendix B.**

A further meeting was held with Historic Scotland to outline the options which were being conceded as part of this study and the initial response to this discussion is shown in **Appendix B.**

Feedback

The key points which emerged from the focus group feedback were that there was a desire to retain the timber pier and the buildings in some form with the understanding that funding and future management would be challenging. Discussions highlighted the potential to move the status of the pier in the wider sense up the agenda from a local to a national issue with a view to generating interest and potentially increasing the availability of funding.

There were however concerns raised in terms of the cost involved in retaining the timber pier, especially when funds could effectively be taken from other council service areas to fund this.

Further feedback regarding the management options which was provided by Strathclyde Building Preservation Trust suggested that the costs and complexity of repairing, maintaining managing and insuring a structure of this type would make it very challenging for a third sector organisation (Trust) to take on the responsibility.

3.3 Public Consultation

On the 21st of June and the 20th of September 2011 open events were held in the Queens Hall and members of the public were invited to review information on the Dunoon Waterfront project and to provide comment on the various project components, including the Pier Strategy. In total, over 260 people attended the events, some providing direct feedback to the design team, some leaving feedback forms and others choosing to use the website feedback option.

Feedback

The feedback received during and after the public events was overwhelmingly supportive of the of the principal of retaining the Pier due to its historic significance and the feature/experience it provides on the waterfront. As selection of specific comments is provided below to give an indication of the strength of feeling shown by some of the respondents;

- "The Pier is Dunoon, unique."
- "The lovely Victorian building should still be the first thing visitors see."
- "The only good building on Dunoon Waterfront along with Castle House and should be maintained at all cost."

- “Iconic Building, only one of its kind in Scotland. Excellent space and position with very attractive features.”

Various uses were also suggested which mainly focussed on five areas:

- Cafe / Restaurant Facility
- Museum / Heritage / Visitor Function
- Arts / Exhibition Space
- Public Space
- Maritime use (Waverley and Private Boats)

3.4 Summary

From the focus group and public consultations undertaken the key outcomes are;

- A strong desire to retain the timber pier and buildings in some form due to the historical significance and the iconic image they give Dunoon Waterfront
- Concerns over the project cost and how it might be funded
- A wide range of potential options have been suggested

4 Listing Status

4.1 Existing Listed Status

The pier and it's buildings are currently Category B Listed. This listing was processed in the 1970s and only a brief description of the buildings was provided at this time.

The definition of a category B listing given by Historic Scotland is as follows;

'Category B - buildings of regional or more than local importance, or major examples of some particular period, style or building type'

4.2 Listing Review

Historic Scotland have reviewed the listing of the Pier and its buildings following a request from Argyll & Bute Council's Conservation Officer. The review was requested as the current listing is inaccurate, referring to parts of the structure which are no longer in place.

Historic Scotland have completed their site visit and internal review and have consulted with Argyll & Bute Council. The updated description and the change of listing category from B to A is proposed due to the significance of the pier in the national context. The consultation letter from Historic Scotland summarises the reasons for the change of category as follows;

'...we understand Dunoon Pier to be the best surviving example of a timber ferry steamer pier in Scotland. The architectural interest of the pier and its key buildings and the wider historic role of this now rare building type in the economic and social development of coastal and island communities in the west of Scotland suggest that Dunoon Pier may be considered of national significance.'

Following approval at a Local Area Committee meeting, Argyll & Bute Council have confirmed support for the proposed change of listing category and it is understood that Historic Scotland are currently processing the formal change of status from B to A.

4.3 Impact of Listed Category Status

Historic Scotland have stated in workshops and meetings that their consideration of any proposed options for the pier would be on the basis that that the pier structure and buildings are of significant historical importance regardless of the listing category and that the listing would most likely have been reviewed if/when proposed changes to the pier were put forward. Therefore, the change of category will not affect the range of options being considered.

However, it is understood that when the listing category is changed from B to A, there may be a beneficial impact on future applications for funding if certain conservation approaches were proposed. The recognition of the structure's national importance and the reference to it being the best surviving example of its type in Scotland would certainly lend support any funding applications if progressed.

5 Structural Assessment

5.1 Introduction

The structural condition of the existing pier is a key consideration in developing the options for the Pier Strategy.

The initial structural review has been based on thirteen previous reports supplied to AECOM and has been issued to A&BC officers for detailed consideration with no adverse feedback on the process or the results received to date.

A summary of the consideration given to each structural element type is provided in **Appendix C**.

Although this report has reviewed the existing information it is important to note that further investigation of the pier structure is essential to provide furtherinformation on the condition of each of the components. The following description of the pier condition is drawn from earlier work by others. Due allowance must be made for continued deterioration since the work was carried out and for the unwarranted accuracy of the original work.

5.2 Review of Pier Condition Reports

AECOM completed a review of thirteen reports on Dunoon Pier, carried out between 1995 and 2008. Each report had a different scope and examined a different element of the pier.

The intention of the review was to draw from each report information on the layout and condition of the pier which might provide an overview of the current condition. It was found that each report provided a different picture on the condition of the pier. It was also the case that some reports made statements on condition without providing evidence of work on site to substantiate the statement. Other reports cited previous work to substantiate a statement.

The review therefore ranked the reliability of statements in the reports in relation to the substantiation provided.

The review is in the form of a spreadsheet for each report, using an identical layout for each sheet and colour coding the most reliable information. Hyperlinks provide abstracts from the original reports.

5.3 Overview of the Pier Condition

Any overview is a simplification of the greater detail available in the full documentation.

The pier structure has four types of members:

- **Piles** – vertical timbers driven into the seabed.
- **Bracing** – horizontal and 'diagonal' timbers connected to the piles which brace the piles into position.
- **Deck Beams** – horizontal timbers which support the timber deck
- **Timber Deck** – the visible deck on the pier.

The condition of the pier varies throughout because it was built at different times and has been subject to varying conditions. Any summary is therefore a snapshot only. It appears that the condition of each member type is as follows:

- **Piles** – many thought to be sound other than outer skin. Some eroded at tidal level and seabed will require strengthening work. Attack from marine borers may be a hidden problem requiring closer study.
- **Bracing** – many thought to be sound in timber but the steel pin end connections are very corroded and likely to require replacement. Some bracings have already failed – requiring replacement.
- **Deck Beams** – deck beams are reported to be life expired and in need of replacement.
- **Timber Deck** – the deck is softwood and large areas of the deck have been reported to be in need of replacement.

Due to the age of the reference information and due to the exposed location and type of use the structure has endured the above statements on the various components of the pier will need to be checked through the course of any further assessment or study.

5.4 Structural Loadings

It should be noted that the structure was originally designed to accommodate ships and storms in an exposed location and that the potential loadings from both have changed over recent years. The normal landing point for the passenger ferry and the Waverley is the new linkspan/breakwater structure, removing the vast majority of the daily loads. The breakwater provides some level of protection to the pier which will reduce the impact of severe weather events. Hence the existing sub structure is potentially capable of carrying these much lighter loads and any future repair of the structural elements may not need to be on a like-for-like basis.

5.5 Summary

Based on the review of existing information from reports completed over the last fifteen years it appears that the condition of each of the four main structural member types is as follows:

- **Piles** – many thought to be sound other than outer skin. Some eroded at tidal level and seabed will require strengthening work. Attack from marine borers may be a hidden problem requiring closer study.
- **Bracing** – many thought to be sound in timber but the steel pin end connections are very corroded and likely to require replacement. Some bracings have already failed – requiring replacement.
- **Deck Beams** – deck beams are reported to be life expired and in need of replacement.
- **Timber Deck** – the deck is softwood and large areas of the deck have been reported to be in need of replacement.

Although this report has reviewed the existing information it is important to note that further investigation of the pier structure is essential to provide current information on the condition of each of the components.

6 Pier Structure Options

6.1 Introduction

There are a number of potential scenarios in terms of the pier structure and buildings, many of which have been suggested in consultation and in previous reports. The potential scope is effectively broken down into five main categories;

- Do-Nothing.
- Complete Demolition.
- Timber Pier Conservation.
- New Timber Pier
- Sheet Piling Options

A summary of the advantages, disadvantages and costs associated with the options is provided in **Appendix D** and the reminder of this chapter provides detail on the consideration given to each option.

6.2 Do Nothing

The options to continue the current position of ongoing maintenance with no attempt to significantly improve the pier condition or change the function of the buildings would effectively incur increasing costs with no return and ever increasing risks of partial or full collapse. While this option would retain the image of the waterfront in the short to medium term it is not considered a viable long term solution. There will however be a period of time between now and the delivery of a chosen course of action that this will effectively be the default position.

Although there would no initial capital investment for this option the maintenance costs, insurances and potential emergency repairs over the coming years are likely to be significant. An estimate of the maintenance costs has been made with reference to the 2006 Argyll & Bute Council Options Appraisal report.

Due to the ongoing maintenance, limited benefits to the town and increased risks of collapse, this is not a preferred option.

6.3 Complete Demolition

To remove the ongoing maintenance burden and risks the option of completely demolishing the pier and its buildings is available. This would remove the maintenance burden on A&BC but remove a historic landmark, completely change the waterfront image and remove a range of potential uses in doing so.

Due to the loss of heritage, limited funding and removal of the potential tourist attraction, this is not a preferred option.

6.4 Timber Pier Conservation

This options would seek to repair the various structural components of the pier and the buildings on it in an effort to conserve the timber structure in a way which is sympathetic to the historical importance.

Within the timber conservation category there are a number of sub options which could be progressed relating to how much of the existing structure is retained. For the purpose of this report three options have been considered;

Full restoration

This option assumes that the full timber pier is retained and repaired

Partial Restoration – Option 1

Option 1 proposes the demolition of the original north jetty of the pier and the berthing dolphin at the seaward end of that jetty. The area to be demolished is shown in **Appendix D**.

As a consequence of its greater age and of the need to strengthen the structure to maintain safe use under vehicle loading, this section of the pier is in the poorest condition and features a range of strengthening measures, many of which are visually incompatible with the construction of the pier.

Other than the section of pier proposed for demolition, the pier will be refurbished. The remedial work will include the replacement of components such as deck boards, deck beams, diagonal bracings and fixings to structural elements. It will include the repair of beams and piles.

Partial Restoration – Option 2

Option 2 proposes the demolition of the original north jetty of the pier along with an adjacent section of the pier head. The southern extent of the pier head is reduced.

The retained pier footprint, comprising the southern jetty and pier head, will present a symmetrical ‘figure T’ in plan.

As in Option 1, remaining sections of the pier will be refurbished.

6.4.1 Timber Pier Remediation Works

The following description of the pier condition is drawn from earlier work by others. Due allowance must be made for

continued deterioration since the work was carried out and for the unwarranted accuracy of the original work.

Deck boards
The timber planking of the pier deck is constructed from softwood, the condition of which has deteriorated faster than would a hardwood element. This deterioration was evident in reported inspection covering many years. It may be expected that significant areas of the planks will require to be replaced. The cost estimates for Options 1 and 2 suggest that 20% of the deck boards will require replacement. As the service life of softwood is low, it is feasible that future investigation will reveal a higher proportion requiring replacement.

Piles
From earlier reports it has been determined that the outer skin of the piles comprises sapwood, a younger and softer skin, inside which is a denser and stronger core. On many piles, the outer layer of sapwood has deteriorated significantly, but the inner hardwood appears to be largely unaffected. Earlier work suggests that, if the structural contribution of the sapwood zone is neglected, the structural integrity of most of the piles is sufficient.

We assume that piles which have insufficient capacity can be spliced with timber. In most cases, driving a replacement pile is not feasible, due to the density of adjacent piles and the existence of structures on the pier. The estimate assumes that between 15% and 20% of piles will require to be repaired. An earlier survey of the piles at the water line has been used as a guide in this case.

Other structural elements and their fixings
Other structural elements comprise the framework of beams and diagonal bracing pieces which support the deck or which stabilise the piles. Earlier work indicates that these have suffered rot in places where water has collected.

Steel fixings between these timber components have suffered severe corrosion. Corrosion of the steel pins passing through timber members has lead to splitting of the timber causing the connections to be weakened or to have failed in the worst affected areas. Weakening of the joint derives from both corrosion section losses in the steel pin and from splitting of the timber. The defect is more severe at the lower levels of the pier at water level.

It is assumed for the estimate that a high proportion of the connection pins will require to be replaced close to the water level, with about 15% of timbers being replaced.

6.4.2 Indicative Timber Pier Repair Costs

It is important to stress that the cost estimates for the timber conservation options are derived from an assessment of necessary repairs based solely upon historic reports. **The estimate must therefore be considered as approximate.** In order to obtain a more reliable cost estimate, the current nature and extent of defects must be determined.

Overview of Repair Cost Estimates
The cost estimates within this report have been developed from the cost estimate produced for Dunoon Pier by Morham & Brotchie in March 2009 and presented in the 2009 Conservation Management Plan by Martin Hadlington. The estimate used approximate costs and an approximate assessment of the extent of defects. This bill of quantities prepared by Morcham and Brotchiehas been reviewed by the structural review team and the cost consultant and a spreadsheet version has been produced. Details of the original estimate and the updated estimates are provided in **Appendix D**.

The Morham & Brotchie estimate assumed that the entire pier would be repaired, with no demolition. Additional items and associated reductions have been included in the estimates for Partial Restoration Option 1 and Option 2. Replacement of piles has been excluded from the current estimates as replacement of a pile may not be feasible.

The current cost estimate amends the quantities to reflect our view on the work required. The number of fixings which will be replaced is higher in the current estimate. The quantity of repair is less than is presented in the Morham & Brotchie estimate where the pier is reduced in size by demolition in the partial retention options.

The rates used in the cost estimate have been reviewed by our cost consultant to confirm they are a fair assessment of rates for incorporation into the cost estimate within this report. Davis Langdon assessed the rates against similar work internationally but stressed that a more accurate estimate will require more detailed work to be carried out using local costs.

As noted on the spreadsheet, the change in cost is in relation to the assumptions on pile replacements and on the volume of structural members which need to be replaced. A further associated reduction is seen as the additional allowances have been factored from the cost of physical works.

6.4.3 Timber Pier Conservation Summary

Due to the potential for conserving the important historic structure and iconic buildings, maintaining the waterfront image and leveraging additional funding it is suggested that the options for restoration are tested further.

6.5 New timber Pier

The option of demolishing the existing timber structure and building a new timber pier was mentioned in the 2006 A&BC Options Appraisal report issued to Historic Scotland. This would require the removal of the buildings on the pier, demolition of the timber structure and building of a new timber pier to support the buildings. The new pier would be subject to the same harsh environment as the existing pier however with lower initial maintenance costs. The historic structure would be replaced and it is unlikely that third party funding would be available for this option.

Due to the cost of delivering a new timber structure, the loss of heritage and the lack of additional funding it is suggested that this is not a preferred option.

6.6 Sheet Piling Options

Within the sheet piling option there are three sub options which have been reported previously in the 2006 A&BC report to Historic Scotland, these being;

6.6.1 Steel Sheet Piles

This options would see a line of sheet piles installed around a t-shaped perimeter of the main pier buildings and public access which would then be in-filled to create a solid platform. The buildings would be preserved and protected during construction and the finished structure would be similar in appearance to the piled face of the breakwater to the south.

On initial review this options appears to offer benefit in retaining the iconic buildings and the footprint of the pier and would also provide a sheltered area where boats may be able to tie up. The construction would be a more robust form that the timber pier and therefore would have significantly lower ongoing maintenance costs.

The drawbacks of this option relate to the image of the piles (particularly at low tide), the limited opportunity for additional funding due to the removal of the vast majority of the listed structure and the loss of heritage.

It is suggested that this option is a potential alternative to the retention of the timber pier and as such should be included in further study for comparison purposes.

6.6.2 Steel Sheet Piles with timber facing

This is a sub option of the sheet piling which would retain or construct a timber facade more in keeping with the existing pier and have many of the benefits of the previous options. There would be a distinct disadvantage from a maintenance point of view as the combination of solid piles with the open face structure would lead to waves hitting the structure and being forced upwards through the open structure then damaging the timber face.

As the impact of the visual improvements would be countered by the increased damage to part of the proposed structure and therefore maintenance costs it is suggested that this option is not considered further.

6.6.3 Open Sheet Piles in place of the timber structure

This would be an alternative to the fully sheet piled options and effectively a more robust equivalent of a timber piled pier using areas created by steel sheet piles for support rather than a solid footprint.

This would be more expensive that the solid sheet pile option with limited additional benefit other than potentially minor improvements to the appearance of the sub structure. It is suggested that this option is not considered further.

6.7 Summary

A summary of the structural options along with indicative costs are provided in **Appendix D**. From the range of alternatives considered it is suggested that the following two broad options should be taken to a more detailed technical and costing study.

Timber Pier Restoration – Retain and restore some or all of the timber pier and buildings with the uses of the buildings and the links to the ferry service etc. to be considered throughout the study. The indicative costs for the initial repair woks ranging from circa £3.5m to £7m + depending on the extent of retention/restoration and the uses proposed.

Steel Sheet Piling – Retain a T-shaped footprint for the pier with the uses of the buildings and the links to the ferry service etc. to be considered throughout the study. The indicative costs for the sheet piling option are circa £6m to £7m + depending on the extent of works and the uses proposed.

7 Use & Management Options

7.1 Introduction

During the consultation process feedback was sought on the potential future uses for the pier and its buildings. This section outlines the suggestions made and provides high level comments which may be considered further in a more detailed manner in tandem with the structural options being developed.

7.2 Potential Uses

The following potential uses grouped in broad categories have been suggested during consultation;

7.2.1 Food and Drink

The potential for a restaurant on the pier has been mentioned in almost all of the consultations at some point and the location would certainly lend its self to a special experience. Seafood Restaurant, Cafe / Tea Room and Bar have all be suggested and given the correct form of market interest this could be an attractive option. The type of facility which should be considered cannot be limited at this time and a full market analysis and testing should be allowed for in the next stages of work.

It is noted that the pier had in the past been used for these purposes but it should also be noted that current standards for health and safety and buildings may require significant works to the access and buildings to make these uses possible, again adding to the potential costs.

7.2.2 Heritage and Visitor Attractions

Many of the feedback suggestions made reference to the potential for a heritage or visitor centre on the pier with various themes from the history of the Clyde Steamers to the Holy Loch American Naval base being highlighted. Initial discussions with the Curator of the Riverside Museum in Glasgow has suggested that there are many object and models which could be made available for loan if suitable display conditions could be provided. Contact was made with the American Naval Museum in Washington but after e-mail exchanges and provision of further contact details which failed to return correspondence this line of enquiry has been left for the time being. It is possible that this discussion could be taken forward if/when a heritage option is progressed.

Other ideas for themes included natural heritage and costal wildlife, ‘doon the watter’ and cultural heritage and various combinations of these. It is likely that any heritage or visitor function would need the support of Argyll & Bute Council in a similar way to the existing Castle House Museum, i.e. provision of a facility for a nominal rate and this should be considered in any further study along with the potential set up costs and ongoing maintenance. The advantages of this type of facility may lie in securing additional funds and in increasing tourism to the area.

7.2.3 Arts and Culture

Arts and culture potions, from exhibition space and artists studios to a radio station and recording studio have been suggested in the past, indeed, it is understood that a planning application for use of the building on the south side of the pier has been made in the past. The art exhibition space and studios could be a reasonably cost effective use of the building with limited facilities and flexible space requiring reasonably limited changes to the existing buildings. The radio / recording studio would require more work and the additional cost may be prohibitive given the potentially limited return and use generated.

When considering the arts and culture options it will be important to engage with the Burgh Hall team .The focus of the Burgh Hall development is very much aimed at this market and while complementary uses may be found it would be important to avoid any conflict or over provision of specific types of space.

7.2.4 Public Space

The deck area is seen by many as an additional and unique public space for Dunoon Town centre. Any work to repair or replace the pier should not ignore the potential events which could be accommodated or even the daily use which could be as simple as allowing fishing.

7.2.5 Maritime Uses

While the requirement for the linkspan on the pier has been removed by the relocation of the ferry to the new linkspan / breakwater, the pier has recently been the berthing place of the Waverley paddle steamer. The continued use by this vessel (and others) would be an option to be considered as part of the assessment of the structural options. Strengthening works in addition to the repairs may be required to accommodate the berthing loads and protect the pier.

It should be noted that discussions are being progressed in regard to the improvement of the current ferry infrastructure provision and that the pier and it's buildings will need to be accounted for in this process. It may be that options for using one of the buildings and/or the pier are considered as part of this process but until details become clear it is not possible to rule this, and associated options, in or out. Other uses such as day tie up points, water safari / guided tours and the berthing of cruise ship shuttle boats should be included in any further study.

7.3 Market Conditions

It should be noted that the ever evolving market conditions for the various uses described in this section will ultimately dictate what viable uses will be for the pier and it's buildings. Given that there will no doubt be a fairly significant lead in time to any works being completed due to the investigation required, design and approval process, panning considerations and funding issues it is suggested that the options for uses are reviewed on a regular basis.

The above comment should also be borne in mind when considering removing any areas of the pier as part of the structural options as areas which may be redundant and considered a maintenance burden now may present opportunity for development under improved economic conditions.

It should be noted that no offers or enquiries regarding specific uses were received during the course of the study and that it is unlikely that this type of approach will be seen until the structural options are refined, a specific course of action undertaken and the discussions regarding the ferry infrastructure clarified.

7.4 Ownership/Management Options

The pier is currently owned and managed by Argyll & Bute Council. For the purpose of the report four main options have been considered:

- Retained by Argyll & Bute Council
- Owned and managed by a national body (Historic Scotland, The National Trust for Scotland)
- Owned and managed by a private company
- Owned and managed by a community trust or other Third Sector party.

Feedback regarding the management options which was provide by Strathclyde Building Preservation Trust suggested that the costs and complexity of repairing, maintaining managing and insuring a structure of this type would make it very challenging for a third sector organisation (Trust) to take on the responsibility.

This same consideration above are also likely to apply to private ownership and ownership by a national body i.e. the significant funds and maintenance combined with the ongoing risks and associated insurance requirements significantly reduce the potential for this option.

It is therefore suggested that the future of the pier is most likely to lie in the hands of Argyll & Bute Council and that any further plans or studies are progressed on this basis.

7.5 Short Term Considerations

Given the range of potential options available for the structure and the buildings and the timescales for planning associated with any change, there will be a period of time where the current management and use of the pier will remain with Argyll & Bute Council.

There may be options for short term uses of the existing building, such as the ongoing use by the Harbourmaster, the continued use by the diver training company and or use of the building or deck space for occasional events or exhibitions.

It is suggested that Argyll & Bute Council through discussion between the Conservation Officer, the Facilities Manager, the Harbourmaster, and the Ports and Harbours Manager develop a maintenance plan to protect the pier and it's buildings in the short term. Consultation with Historic Scotland should also be progressed in this regard.

7.6 Summary

Various uses have been suggested for the pier and it is clear that the area and buildings available could accommodate a wide mix of uses assuming that structural improvements can be delivered. It is suggested that the potential uses are reviewed and studied in more detail in tandem with the structural options to ensure that the implications and interactions of each are understood. Due to the lead in times for completion of any works to the pier it is clear that changing economic and market conditions relating to each of the potential uses should be reviewed.

The level of structural costs, risks and ongoing maintenance strongly suggest that it is unlikely that a third party (Trust, national body or private investor) will be in a position to take over responsibility for the pier. It is therefore suggested that any further plans or studies are progressed on the basis that Argyll & Bute Council retains ownership.

As there will be a period of time when the existing structure and buildings will remain in their current form it is suggested that a short term maintenance plan is developed by Argyll & Bute Council in discussion with Historic Scotland to maximise the potential for the protection of historic features prior to any other works being taken forward.

8 Future Actions

8.1 Introduction

This chapter outlines the future actions required to define the options being taken forward and crucially to provide some cost certainty to the potential/preferred options.

8.2 Need for Further Structural Investigation.

The work of AECOM to date, including this report, is based upon earlier reported work carried out over the last fifteen years.

In order to provide greater assurance as to the cost of repair work, it is necessary to re-examine the pier to confirm the nature and extent of the work required and to take account of the continued deterioration of the pier since the original reported work was carried out.

8.2.1 Scope of Further Investigation.

The pier comprises a set of members and connections, the layout of which is repeated throughout the pier. In reality the arrangement has a number of detailed variations, as the pier was developed over a period of time.

An investigation will select samples of each member and connection and will examine the condition of each, with a view to developing an improved estimate of the number of members and joints which require repair or replacement.

The investigation may reveal areas of the pier which have suffered greater deterioration than others. Should this be apparent, the information may be useful in determining areas of the pier to retain.

The recent information provided by the Professional Dive Academy for piles on the north east extent of the pier is included in **Appendix E.** It should be noted that the measurement taken on Pile 4 at the 3.5m mark has been confirmed as a typo and the measurement should be similar to those taken above and below.

It should be noted that the sample information provided is for information only at this stage and that much more detailed work will be required to inform a further study.

8.2.2 Developing the estimate.

Repair and replacement of pier members of a timber pier is a specialist construction operation for which limited historical cost information is available. The particular location, details and constraints of Dunoon Pier will further affect the reliability of historical cost information.

The intention is that work to provide greater assurance for the cost of remediation work will be taken forward with the assistance of specialist contractors. An outline remediation design should be prepared and used to develop a budget estimate for each repair or member replacement. Should the investigation establish high volume work, economy of scale will be taken into account in the estimate.

The outline design should seek to identify critical loading conditions for the pier, which will relate to vessel and storm loading. This will inform the strength requirement for remediation design.

8.2.3 Timescales

The following is an outline timetable for the work to provide greater assurance for the cost of remediation work.

- Prepare tender for pier investigation - 4 weeks
- Investigation Tender Period – 3 weeks
- Investigation appointment and site work – 5 weeks
- Investigation Report Preparation – 2 weeks
- Review Investigation Report – 1 week
- Remediation Outline Design – 4 weeks
- Prepare Remediation Estimate – 3 weeks
- Total 22 weeks.

8.3 Market Research and Testing

Once a course of action has been decided with regard to the pier structure it is suggested that the initial review of options for use is progressed to market research and testing. This could be run in parallel with the structural investigations to confirm suitable uses and potential costs for delivering suitable facilities.

8.4 Funding Options

The previous studies for the pier identified a number of potential sources of funding for works to the pier the main bodies being;

- Argyll & Bute Council
- Historic Scotland
- Scottish Government
- European Funding
- Heritage Lottery Fund
- Enterprise Companies
- Crown Estates
- Private Investment

The proposed approach to the future strategy and repair/reconstruction will define to a certain extent which if any of these sources would be available and to what extent. If the demolition or replacement of the timber structure options were advanced it is unlikely that funding from outside Argyll & Bute Council would be available. If the options to retain the timber structure or parts of the timber structure were to be advanced then funds for proportion of the capital costs may be available from some or all of the sources. The potential funding package will only become clear when more detailed proposals and costings are available and can be discussed with the various bodies but it is likely that the majority of the funding for any of the options would need to come from Argyll & Bute Council.

8.5 Business Case Development

It is suggested that the further work suggested above is progressed and reported in the form of a Business Case which could be considered by Argyll & Bute Council and discussed with the relevant third party organisations that may be able to provide funding for specific options or studies.

9 Conclusions & Recommendations

9.1 Background

Dunoon Pier is a Category B Listed timber structure which sits in a prominent position on the waterfront to the south of Dunoon Town Centre. Its current form evolved from a need to cater for steam ship traffic and until the end of June 2011 it served as the landing point for the Gourock – Dunoon vehicle and passenger ferry. The pier and its buildings have served in various forms and for various functions for over 150 years and today still act as a landmark feature reflecting the history of the town.

As part of the Dunoon CHORD Waterfront project the design team have taken forward the brief as defined in the Project Initiation Document which was approved by the Project Board and the Programme Management Board in May 2010 and the Executive in June 2010.

The development of a strategy for Dunoon Pier was included as one component of the project. It should be noted that no capital funds are allocated to the pier from the £8.3M CHORD allocation and the tasks taken forward as part of this component relate to the development of a strategy only.

9.2 Consultation

The following section provides information on the discussion and consultations which have been undertaken during the course of the study and provides a summary of the feedback received.

To inform the development of the Pier Strategy the following events have been undertaken;

- Pier Strategy Workshop
- Pier Conservation Meeting
- Trust Open Day
- Dunoon Waterfront Public Event
- Update Meeting with Historic Scotland
- Dunoon Waterfront Public Event 2

Throughout the process a feedback function has been available through the Argyll & Bute Council website and members of the public have been sending comments on the wider project and on the options for the pier.

From the focus group and public consultations undertaken the key outcomes are;

- A strong desire to retain the timber pier and buildings in some form due to the historical significance and the iconic image they give Dunoon Waterfront
- Concerns over the project cost and how it might be funded

A wide range of potential options have been suggested.

9.3 Structural Review

Based on the review of existing information from reports completed over the last fifteen years it appears that the condition of each of the four main structural member types is as follows:

- **Piles** – many thought to be sound other than outer skin. Some eroded at tidal level and seabed will require strengthening work. Attack from marine borers may be a hidden problem requiring closer study.
- **Bracing** – many thought to be sound in timber but the steel pin end connections are very corroded and likely to require replacement. Some bracings have already failed – requiring replacement.
- **Deck Beams** – deck beams are reported to be life expired and in need of replacement.
- **Timber Deck** – the deck is softwood and large areas of the deck have been reported to be in need of replacement.

Although this report has reviewed the existing information it is important to note that further investigation of the pier structure is essential to provide further information on the condition of each of the components.

It should be noted that all cost estimates relating to the remediation or maintenance of the pier have been derived from reports prepared over the last fifteen years. The accuracy of the extent of repairs and the reliability of the individual repair costs cannot be tested and further work is required to provide more reliable estimates.

9.4 Pier Options

A high level appraisal of the range of structural options has identified two broad strategies which could be taken to a more detailed technical study.

Timber Pier Restoration – Retain and restore some or all of the timber pier and buildings with the uses of the buildings and the links to the ferry service etc. to be considered throughout the study. The indicative costs for the initial repair woks ranging from circa £3.5m to over £7m depending on the extent of retention/restoration and the uses proposed.

Steel Sheet Piling – Retain a T-shaped footprint for the pier with the uses of the buildings and the links to the ferry service

etc. to be considered throughout the study. The indicative costs for the sheet piling option are circa £6m to over £7m depending on the extent of works and the uses proposed.

Various use for the pier and buildings have been considered but the range of these depends on the structural option delivered.

9.5 The Way Forward

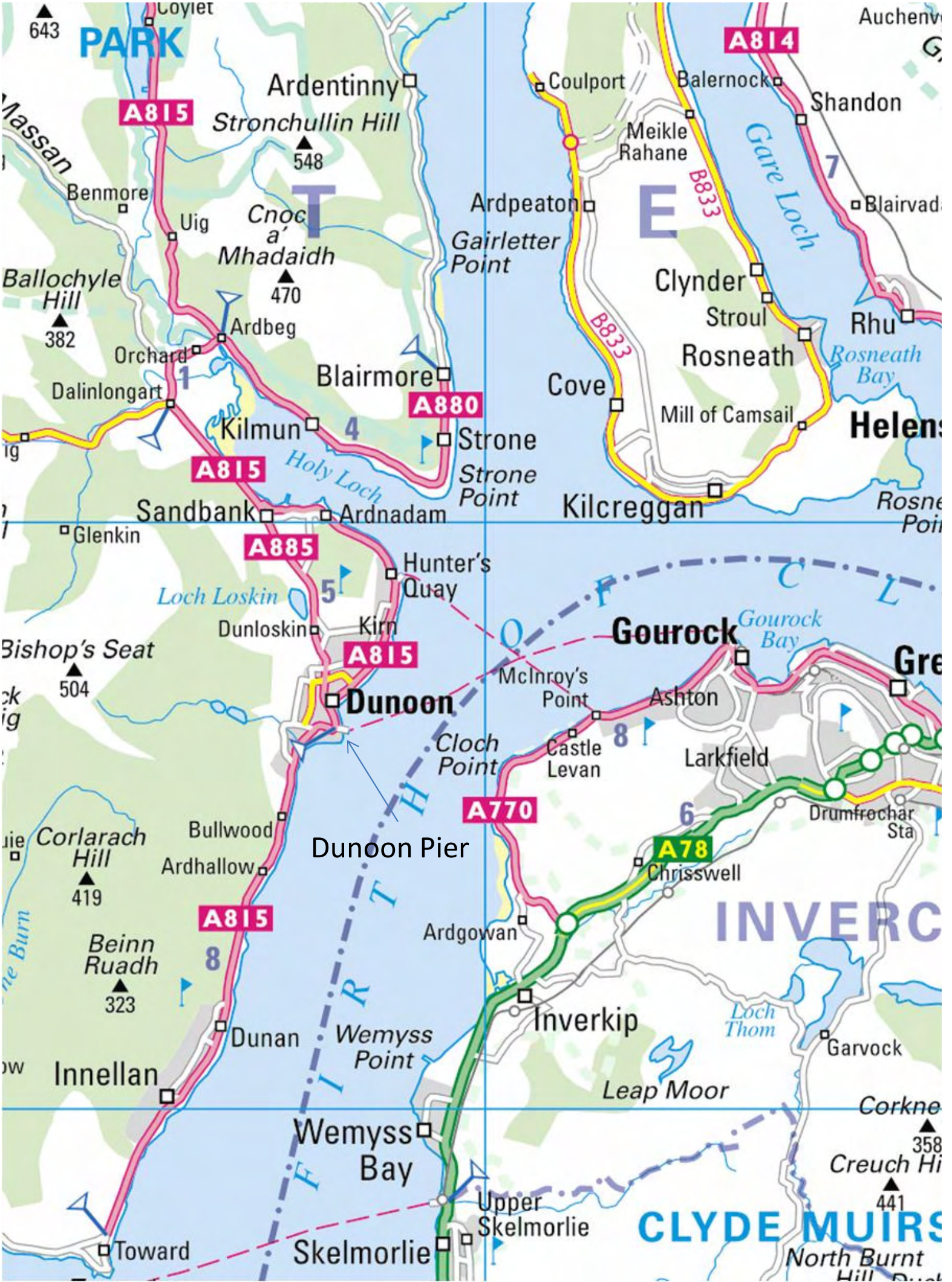
As there will be a period of time when the existing structure and buildings will remain in their current form it is suggested that a short term maintenance plan is developed by Argyll & Bute Council in discussion with Historic Scotland to maximise the potential for the protection of historic features prior to any other works being taken forward.

The key actions which are required to take the options for the pier forward through a Business Case process are;

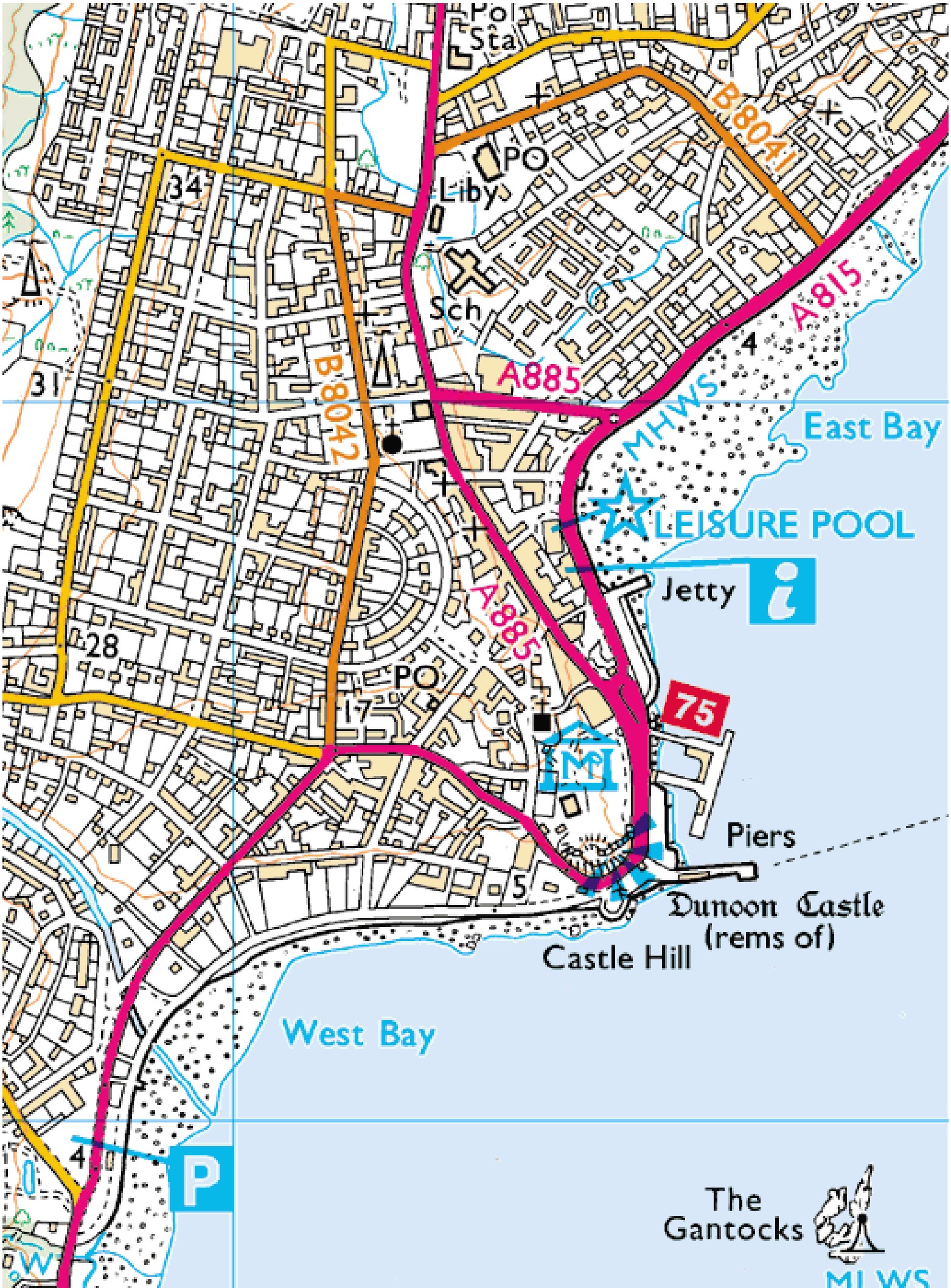
- Structural surveys and testing
- Outline structural design and repairs investigation
- Consultation and planning strategy
- Market research on pier and building uses
- Contractor research and detailed costing
- Funding discussions and applications

Appendix A
Pier Location & Layout

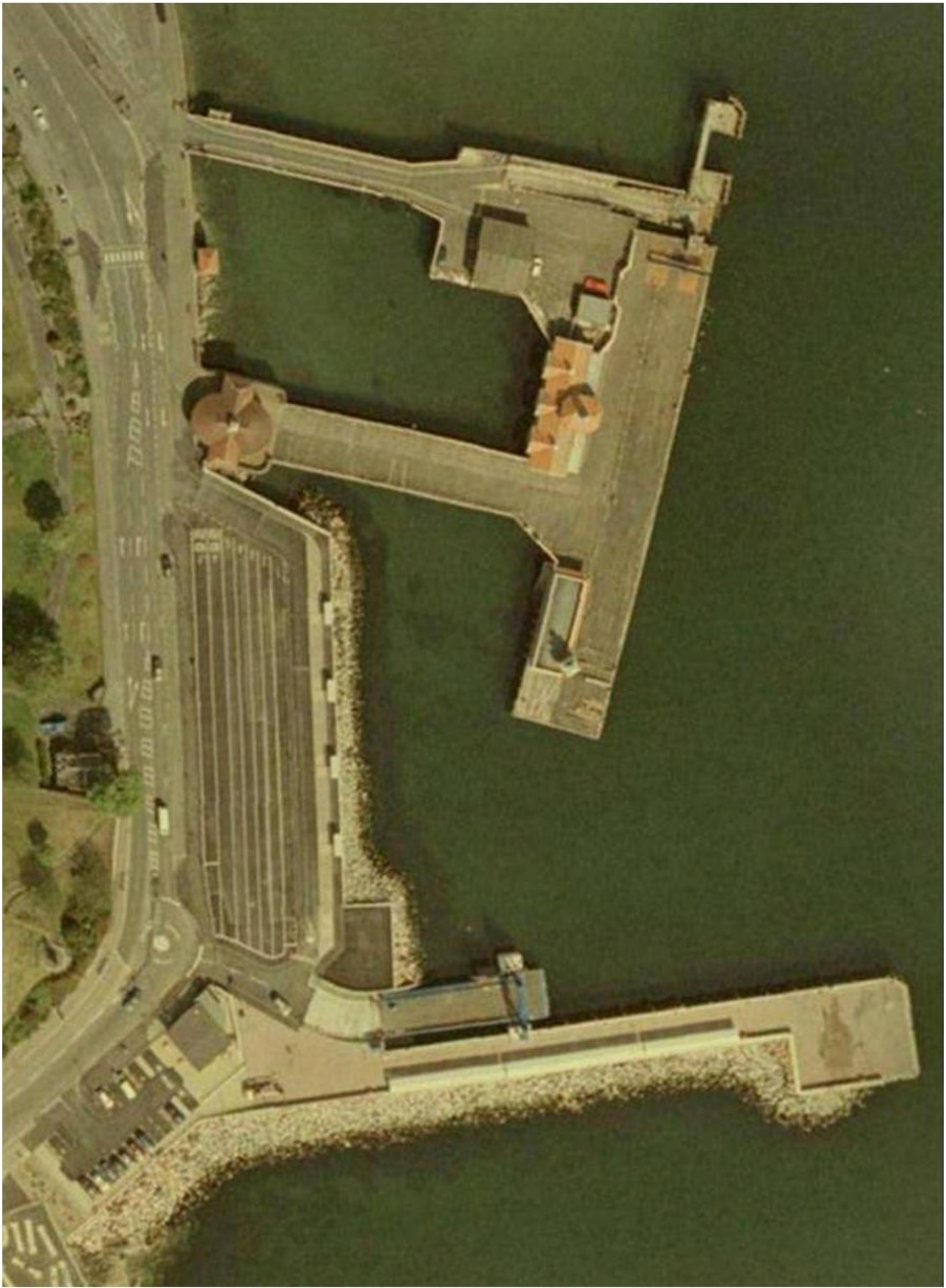
Pier Location



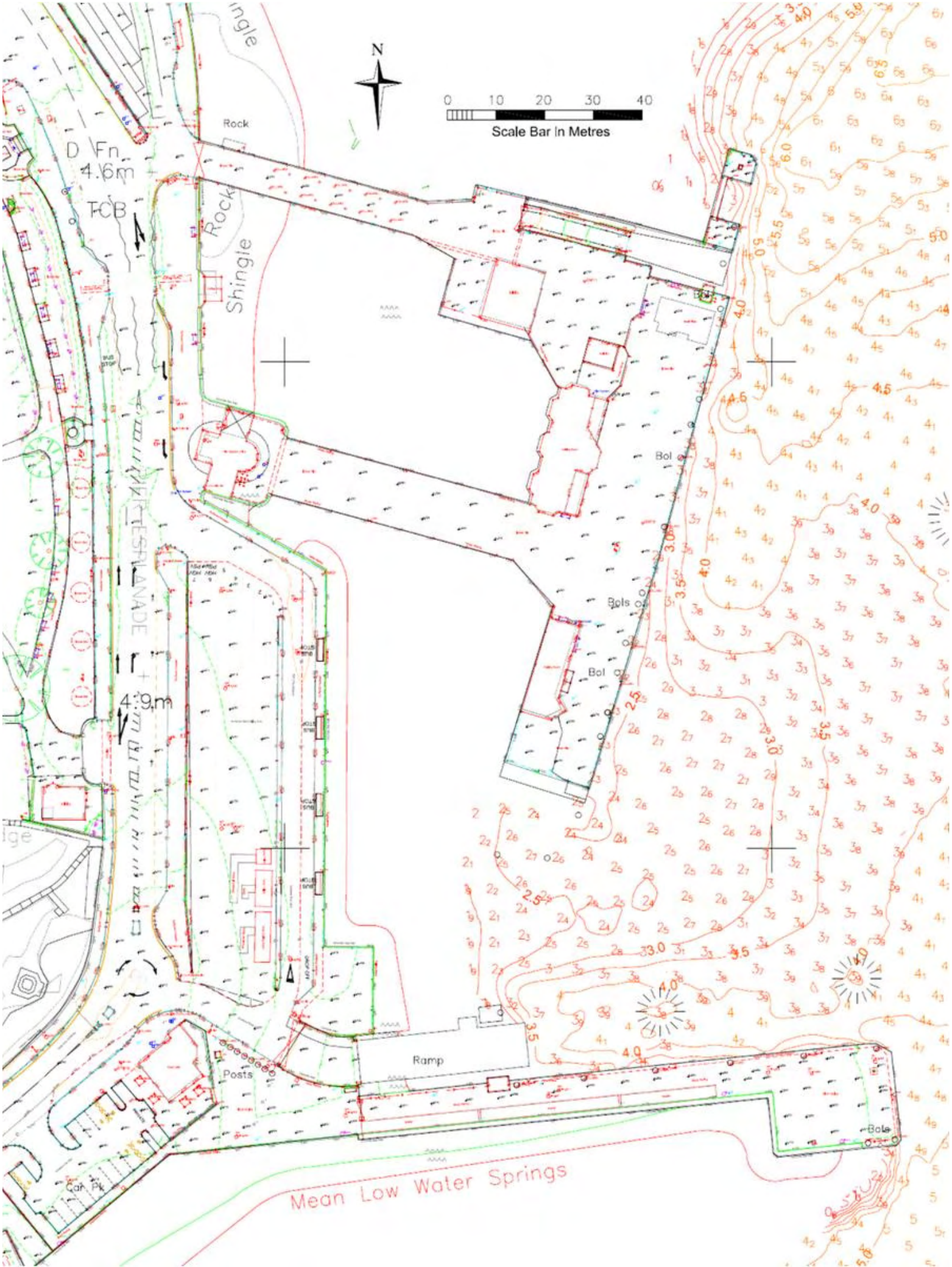
Pier Location



Pier Aerial View



Pier Topographic and Bathometric Survey



Appendix B
Notes & Correspondence

Note of Workshop

Project:	**Dunoon Waterfront - Pier Strategy**	Job No/Ref:	**60190768**
Purpose:	**Options Consultation**	Date held:	**01 April 2011**
Held at:	Queens Hall, Dunoon	Made by:	**David Torrance**

Distribution:
All Invitees
Project Board
AECOM Design Team

No.	Item	Action By
1	**Introductions** Welcome remarks were made by Cllr Bruce Marshall (BM) (Chair of the Project Board) thanking attendees for their support and outlining the project background. David Torrance (Project Manager) thanked those attending and outlined the agenda for the workshop.	
2	**Pier Strategy Report Overview** DT provided a brief breakdown of the project background, highlighting that the current work packages (Structural Assessment, Needs Analysis, Options, Sifting, Assessment) will result in the Pier Strategy Report which will feed into the wider Dunoon Waterfront project. The allocation of CHORD funding was queried and it was noted that none of the capital budget would be spent on the pier, only a strategy report will be delivered as part of the project.	
3	**Pier - Current Situation** DT gave a brief run down of the current uses on the pier and the noted that the study will assume that any new ferry service will move to the linkspan facility. DT went on to outline the current work in progress on the review of the Pier structure noting that all available sources of information will be investigated to gather as full a picture as possible on the condition of the pier. Fiona Sinclair (FS) (project Conservation Architect) provided background on the history of the pier and its current listing status (category B). It was noted that the pier is the last example of its kind in the country and that the structure and the buildings on it could be a national consideration. The current listing of the pier was discussed and it was highlighted that the description contained in the current listing (completed in the 1980s) is out of date.	
4	**Workshop Briefing** DT gave a brief introduction to the group discussion sessions, highlighting the areas which were to be covered in each. Three groups of six/seven people were formed (led by Fiona Sinclair, Nicola Debnam and Paul Finch) and discussed the topics defined by the session..	

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5 **Group Session 1**

Brief:

- Identify existing problems with the pier and its use.
- Identify opportunities.
- Identify potential constraints for implementing opportunities.
- Identify sources of information to inform the study.

Key Feedback

Problems

- Condition of the pier structure
- Ageing timber structure
- Damaged and broken piles
- Weight restrictions
- Exposed location
- Cost of repairs
- Tidal range
- Ongoing maintenance costs
- Safety concerns
- Lack of sustainable uses

Opportunities

- Key location on Dunoon Waterfront
- Tourist attraction
- Waterfront arrival feature
- Removal and redevelopment
- Historic connections with Glasgow and west coast towns
- Significant historic structure (listed status)
- Potential uses in the existing buildings
- Project of national significance

Constraints

- Budget
- Statutory consents
- Listed status
- Public opinion / council reputation

Additional Information

- Video survey
- Additional reports and analysis identified
- Historic drawings

It was noted that many of the issues raised sat across two or more headings, for example the location was considered in many ways as an opportunity but also gave problems in terms of the exposure to the elements and could be a constraint on options to redevelop.

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6 **Group Sessions 2**

Brief:

- Identify a range of options to be developed/considered by the study.
- Identify alternative strategies for management / funding etc.
- Suggest scope and objectives of the study.

Key Feedback

Options

- Full restoration by trust group
- Links with national pier groups
- Museum with links to Glasgow Transport Museum and/or Washington US Naval Museum
- Restaurant within existing building
- Full Demolition
- Partial Demolition
- Relocate buildings to provide feature within the waterfront area
- Sheet pile and infill to save shape of pier and the buildings
- Removal of pier and rebuild
- Identify future viable uses
- Do nothing (council to maintain watching brief)
- Limbo should not be an option but may be a reality in the short / medium term/.

Alternative Strategies

- Continued council ownership / management
- Trust ownership / management
- Community ownership/management
- National body ownership / management (Historic Scotland / National Trust)

Scope and Objectives

- Investigate all options from full restoration to demolition
- Maintain an identity for Dunoon
- Capitalise on the pier being the only remaining Victorian pier capable of restoration
- Identify a trust strategy to restore and maintain the pier
- Move the pier up the ladder in terms of historic importance
- Provide a sustainable outcome for Argyll and Bute Council

7 **Outline Process and Programme**

DT outlined the process and estimated timescales for the consultation, option generation, sifting, appraisal and reporting and highlighted the stages which will require Project Board approval.

It was noted that additional meetings with key consultees will be arranged as part of the consultation process. It was also noted that a public event on the Dunoon Waterfront project would be held in the Queens Hall in the followings weeks (possibly June).

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8	**Closing Remarks** DT thanked the attendees and noted that a follow up e-mail would be sent to capture any further thoughts of the attendees and those not able to attend. BM thanked all present for their input and the workshop was brought to a close.	
9	**KEY ACTIONS** Arrange meeting between Historic Scotland, Project Conservation Architect, Council Conservation Officer and Structural Engineer to discuss forward strategy.	DT
	Source additional information on the pier structure as identified in during the course of the workshop.	DT
	Consider arrangements and invitees for an open day for Trust organisations.	DT
	Contact Glasgow Transport Museum / US Navy Museum to investigate potential links.	DT
	Review available information and develop easily accessible reporting format for the Pier Structure Review	DT/RR
	Source historical costs for maintenance of the Pier and develop an estimate for future scenarios.	DT

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Notes of Discussion

AECOM

Project:	**Dunoon Waterfront - Pier Strategy**	Job No/Ref:	**60190768**
Purpose:	**Pier Conservation Considerations**	Date held:	**13 April 2011**
Held at:	225 Bath Street Glasgow	Made by:	**David Torrance**

Present:	David Torrance	AECOM	Distribution:
	Dara Parsons	Historic Scotland	All Present
	Fiona Sinclair	Fiona Sinclair Architects	Project Board
	Lynda Robertson	Argyll and Bute Council	
	Robert Rocke	AECOM	
Apologies:			

No.	Item	Action By
1	**Introductions and Background** Introductions were made and a brief discussion followed on the background to the study and the information gathered at the pier strategy workshop.	
2	**Dunoon Pier Statement of Significance** The variance between descriptions of the pier in reports and forms was discussed and it was agreed that a correct and concise description should be agreed for use going forward. It was suggested that the description on the Nation Pier Association would be a good basis and that this should be circulated for discussion/agreement.	DT
3	**Dunoon Pier Listing** The current listing of the pier was discussed and it was highlighted that the description contained in the current listing (completed in the 1980s) is out of date and should be revisited to enable the proper consideration of the pier in the present day. The process of revisiting/updating the listing was discussed and it was agreed that that DP and LR would investigate how this should be progressed.	LR/DP
4	**Alternative Management Options** The suggested future management of the Pier by a Trust company was discussed and it was agreed that initial approaches to existing trusts such as the Strathclyde Building Preservation Trust and the Glasgow Building Preservation Trust. It was also agreed that a list of other Trusts operating in the area or even nationally should be drawn up with the view to invites being issue for an open day for interested parties. Input to the list should be provided by DP, LR, FS and DT.	DP/LR/FS /DT
5	**Structural Review** RR explained the basis of the approach being taken in relation to the review of the available data. It was noted that this is likely to take the form of an initial summary of key facts from each of the information sources and including a review of the reason behind the information or report, the assumptions made and conclusions	

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	reached. The format of the information review is likely to be a summary table with electronic links to the full documents, backed up by summary diagrams where possible. LR noted that the archive data which is held by A&BC was currently being moved but that she would be keen to ensure that all relevant information was included in the review and to this end an early draft of the summary review should be provided.	RR/LR
6	**Structural Repair Options** The range of potential repair/protection options was discussed and it was agreed that there should be an initial review of information sources such as previous studies, examples of other projects, research centres/universities, national and international resources. Where possible, any indicative costs should be sourced to inform the consideration of the way forward.	ALL
7	**Future Use Options** The future use of the Pier and it's buildings was discussed and one key area to be explored (as also discussed in the workshop) was the potential links to existing facilities such as the Transport Museum in Glasgow and the US Navy Museum in Washington DC. DT agreed to make initial approaches to each of these and report on the progress of discussions.	DT

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Note of Event

AECOM

Project:	**Dunoon Waterfront – Pier Strategy**	Job No/Ref:	**60190768**
Purpose:	**Pier Open Day**	Date held:	**21/06/2011**
Held at:	Queens Hall, Dunoon	Made by:	**David Torrance**

Attending	David Torrance	AECOM	Distribution:
	Fiona Sinclair	Conservation Architect	Project Board
	Dara Parsons	Historic Scotland	AECOM Design Team
	Sara MacKinnon	Strathclyde Building Preservation Trust	
	Lynda Robertson	Argyll and Bute Council	
	Arlene Cullum	Argyll and Bute Council	
	Ann Campbell	Burgh Hall Team	
	George Allan	Castle House Museum	
	John McManus	MCM Associates	

No.	Item	Action By
1	**Introductions** DT welcomed the attendees and gave a brief summary of the running order for the day and highlighted who the speakers for the initial presentation would be.	
2	**Presentation** DT presented information on the project background and an update on the recent actions. DT Outlined the project programme and noted the various stages at which reports would be issued and approvals by the Project Board would be sought. The status of the structural review was outlined and it was noted that a full update will be provided in due course. FS spoke on the pier history, highlighting the cultural and architectural significance of the structure and why the pier was considered the last of its kind in the country which could be preserved. DP gave an update on Historic Scotland's ongoing review of the Pier Listing and noted that the initial internal discussions were largely complete and that the next stage in the process would be to consult with Argyll and Bute Council and an independent party (as yet unspecified).	
3	**Site Visit** Following the initial presentation the group made their way to the pier where the Harbourmaster, Paul Lambert, was on hand to provide access to the pier buildings, provide his take on the historic and more recent uses and also to answer questions from the group. The group were initially given access to the south end, ground floor of the building currently used as the ferry waiting room and Harbourmaster office. It was explained that the most recent uses of this building were a night club (hence the bar area which is still in place in the centre section of the building) and a	

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	recording/broadcasting studio for the BBC during the MOD event. The group was then given access to the building on the south end of the Pier, which is currently used as storage for barriers. This building is closed to the public as is the south end of the pier. Although the building was not visited by the group, it was noted that the current Calmac ticket office would be vacated when the ferry moves and that some of the Harbourmaster staff may be based there in the short to medium term.	
4	**Discussion** Discussion between the group members identified ideas and potential uses for the pier and it's buildings including; • Cafe / restaurant facility. • Events space (craft/food fairs etc.). • Artist exhibition / workshop space. • Retail uses. • Leisure uses. • Community radio facility. • Heritage museum. • Tourist Information Concern was raised regarding the short term protection of the pier if it was to be closed off following the move of the ferry service. LR and PL agreed to discuss potential arrangements with Martin Gorringe. A number of attendees suggested that ongoing use of the buildings in some form (possibly summer season events) would be beneficial to maintain public interest and to provide some form of passive vigilance. Further consideration of the potential sources of information and future management options was requested by DT and the considered thoughts of the attendees and invitees will be sought within the coming weeks.	
5	**KEY ACTIONS**. DT to chase comment on the initial structural review and provide an update. DP to provide a further update on the Listing review process and indicate timescales for consultation and reporting. DT to seek further feedback from attendees and invitees with regard to additional sources of information and thoughts on the future uses and management options. DT to provide an interim report covering the progress to date and future actions.	DT DP DT / All DT / Design Team

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Our ref: HGG/A/SA/120
Our Case ID: 201103384
Your ref:

September 2011

David Torrance
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Dear David

Dunoon Pier Strategy

Thank you for meeting me recently to talk about the progress of the Dunoon Pier strategy. I said I would write to you to set out in some more detail our previous involvement in discussions about the pier and our views on some of the options we discussed.

You have also sent me a copy of the draft masterplan for the whole waterfront area and I agreed to outline what I saw would be our involvement in the process.

First of all I should say that it is very positive that the Council is looking at the feasibility of retaining and repairing the pier and recognises that this is a very significant heritage asset that can continue to play an important part in the future of Dunoon.

You explained that you would be looking at a range of options for repair and re-use of the different sections of the pier. Our preference would certainly be for the whole existing structure to be retained if that is feasible, but we are of course happy to discuss whatever needs to be done to ensure the viability of the overall project. You specifically mentioned the north section of the pier. While it is the earliest section and contributes to the interest of the whole structure, it has been altered to accommodate the ferry use and is in poor condition. In the context of the options before us in 2006, we accepted the principle of removing this section as part of a scheme which involved encasing the pier structure.

The ticket office was altered very considerably in c1980 and, although it is difficult to see how much earlier fabric remains, it has retained its general form. Work to restore this buildings to its historic character would be very positive.

HISTORIC SCOTLAND ALBA AOSMHOR

It is likely that we would be consulted on the overall planning application for the waterfront, as this is likely to have some impact on the setting of listed buildings and the Scheduled Monument at Dunoon Castle.

As well as Dunoon Castle, there are other heritage assets is the area which are likely to be affected by the proposals. While this effect is likely to be positive for a number of the buildings, we advise that this is carefully considered to ensure that the character and setting of those listed buildings is protected by the works. The document accompanying your application should demonstrate that you have scoped the area's significant heritage assets likely to be affected by the proposals, assessed the imapact on these assets, and mitigated any negative effects as far as possible.

Apart from the pier, the principal designation is Dunoon Castle, which is a Scheduled Monument. I have attached to this a copy of the scheduling document so that you are aware of the boundaries. Any work within this area would need Scheduled Monument Consent (through Historic Scotland), and this would include work to the lodge for Castle House we spoke about, which is also B-listed. Castle House, as well as its boundary walls and the Highland Mary Statue are also category B listed. The only other designation within the area is the Argyll Hotel (B-listed).

Looking at your draft masterplan, it does look like a good deal of your area 3 is with the area of the Scheduled Monument, so we would be keen to talk about this at an early stage.

I hope this is helpful, and I am very happy to be involved further as the strategy develops.

Yours sincerely

Dara Parsons

Cc Brian Close, Argyll and Bute Council
Lynda Robertson, Argyll and Bute Council

Appendix C
Structural Review Summary

Structural Element/ Planking	Report completed by	Report Title	Report Date	Comments
Piles	Shearwater Marine Services	Timber Pile Survey Report	Dec-95	This report provides details of the remaining perimeter lengths of the piles beneath the water level. This information could be used by Aecom to calculate the remaining loading capacity of each pile.
Piles	Trada	Report on the Inspection of the Structural Timbers in Pre-Determined Areas of Dunoon Pier.	Nov-98	This report provides details of the remaining cross-sections of the piles above water level, and also highlights the piles that have suffered from decay, damage, marine borer attack and erosion. The information provided regarding the remaining cross-sections could be used by Aecom to calculate the remaining loading capacity of each pile.
Piles	Halcrow	Dunoon Pier Engineering Assessment	Jul-01	The report states that a large percentage of the piles require repair or replacement, **but does not quote an actual percentage. Therefore, the information is not sufficient for Aecom to calculate the remaining loading capacity of each pile.**
Piles	RGA	Initial Feasibility Study for the Redevelopment of Dunoon Pier	Feb-02	The report states that for the Cost Estimate provided, an assumption has been made that no more than 20% of the piles will require to be replaced. **There does not appear to be any evidence to substantiate this figure. Furthermore, the report also provides contradictory statements regarding the condition of the pier structure.**
Piles	Arch Henderson	Structural Assessment Report for Dunoon Pier Vehicle Accessway	May-06	The report says that above water, zones of timber piles have lost cross-sectional area, some of which are buckling. **However, the report does not state how many piles require to be repaired/ replaced. Therefore, the information is not sufficient for Aecom to calculate the remaining loading capacity of each pile.** The report comments that beneath the water level, piles have suffered loss of cross-sectional area. **However, the report does not state how many piles require to be repaired/ replaced. Therefore, the information is not sufficient for Aecom to calculate the remaining loading capacity of each pile.**
Piles	Martin Hadlington: Conservation Architect	Dunoon Pier Conservation Management Plan	Apr-09	The report states that only 4.2% (25 no.) of the total piles have lost ≥ 33% of their hardwood content through necking. **However, this is second hand information taken from previous assessment reports.**
Deck Beams	Trada	Report on the Inspection of the Structural Timbers in Pre-Determined Areas of Dunoon Pier.	Nov-98	Appendix A of the report contains details of the members (excluding piles) that appear to be decayed in Areas 1, 2 and 3. **The author does not however commit to stating which deck beams have deteriorated to an unacceptable level and require to be repaired. Furthermore, the results cannot be treated as comprehensive, as only the deck beams that were accessible from the scaffold were inspected. The information is not sufficient for Aecom to calculate the remaining loading capacity of each deck beam.**
Deck Beams	Halcrow	Dunoon Pier Engineering Assessment	Jul-01	The report states that widespread rotting is occurring in the deck beams. **The author does not however commit to stating the percentage of deck beams that have deteriorated to an unacceptable level and require to be repaired. The information is not sufficient for Aecom to calculate the remaining loading capacity of each deck beam.**
Deck Beams	Trada	Condition Survey of Selected Timber Components of Dunoon Pier.	Jan-03	The report states that of all the primary deck beams assessed, only four require to be repaired. **It should be noted that this survey only covered the vehicle access area of the pier. Furthermore, the report states that many secondary deck beams were not assessed.**
Deck Beams	RGA	Initial Feasibility Study for the Redevelopment of Dunoon Pier	Feb-02	The report states that most deck beams will require to be replaced. **However, close inspection of many structural elements was not possible, as outlined in page 71 of the report. Therefore, the information is not sufficient for Aecom to calculate the remaining loading capacity of each deck beam.**
Planking	Trada	Report on the Inspection of the Structural Timbers in Pre-Determined Areas of Dunoon Pier.	Nov-98	Appendix A of the report contains details of the members (excluding piles) that appear to be decayed in Areas 1, 2 and 3. **The author does not however commit to stating the quantity of planking that has deteriorated to an unacceptable level and requires to be repaired.**
Planking	Halcrow	Dunoon Pier Engineering Assessment	Jul-01	It is commented that the planks are generally loose underfoot. **There is however no information regarding the structural integrity of the planks themselves.** Moreover, a significant area of planking at the southern end of the pier is missing.
Planking	Martin Hadlington: Conservation Architect	Dunoon Pier Conservation Management Plan	Apr-09	It is stated in the report that substantial areas of planking will require repair/ replacement. **Note the source of this information is not stated in the report, plus there is no mention of the percentage of timber planks requiring replacement.**
Diagonal Bracings	Trada	Report on the Inspection of the Structural Timbers in Pre-Determined Areas of Dunoon Pier.	Nov-98	Appendix A of the report contains details of the members (excluding piles) that appear to be decayed in Areas 1, 2 and 3. **The results cannot be treated as comprehensive, as only the diagonal bracings that were accessible from the scaffold were inspected. Therefore, the information is not sufficient for Aecom to calculate the remaining loading capacity of each diagonal bracing.**
Diagonal Bracings	Halcrow	Dunoon Pier Engineering Assessment	Jul-01	The report states that a high percentage of the diagonal bracings should be replaced, **but does not quote an actual percentage. Therefore, the information is not sufficient for Aecom to calculate the remaining loading capacity of each diagonal bracing.**
Diagonal Bracings	RGA	Initial Feasibility Study for the Redevelopment of Dunoon Pier	Feb-02	The report comments that rot was widely evident in diagonal bracings, but where probing was carried out, the rot depth was not too severe. **However, due to access problems, not all diagonal bracings were accessible for probing. Consequently, the information is not sufficient for Aecom to calculate the remaining loading capacity of each diagonal bracing.**
Diagonal Bracings	Arch Henderson	Structural Assessment Report for Dunoon Pier Vehicle Accessway	May-06	The report states that above water, the cross bracing is suffering longitudinal cracking through the bolt hole and that zones of cross bracing have lost cross-sectional area. **This information is not sufficient for Aecom to calculate the remaining loading capacity of each diagonal bracing.**
Diagonal Bracings	Martin Hadlington: Conservation Architect	Dunoon Pier Conservation Management Plan	Apr-09	It is stated in the report that many diagonal bracings are missing and that other diagonal bracings have cracked. **Note the source of this information is not stated in the report. The information is not sufficient for Aecom to calculate the remaining loading capacity of each diagonal bracing.**
Horizontal Beams	Trada	Report on the Inspection of the Structural Timbers in Pre-Determined Areas of Dunoon Pier.	Nov-98	Appendix A of the report contains details of the members (excluding piles) that appear to be decayed in Areas 1, 2 and 3. **Note that in Areas 2 and 3, due to accessibility issues caused by high water levels and the height of scaffolding, no inspection of the lower horizontal beams was made. Therefore, the information is not sufficient for Aecom to calculate the remaining loading capacity of each horizontal beam.**
Horizontal Beams	Halcrow	Dunoon Pier Engineering Assessment	Jul-01	It is commented that many low-level horizontal beams are missing, and have not been replaced. Furthermore, the remaining members are loose and in poor condition; therefore, it can be assumed that the upper horizontal beams are loose and in poor condition. **However, this information is not sufficient for Aecom to calculate the remaining loading capacity of each horizontal beam.**
Horizontal Beams	RGA	Initial Feasibility Study for the Redevelopment of Dunoon Pier	Feb-02	The report comments that the lower horizontal beams were not visible. However, verbal advice was given that they were in very poor condition and often either loose or missing. **However, this information is not sufficient for Aecom to calculate the remaining loading capacity of each horizontal beam.**
Horizontal Beams	Arch Henderson	Structural Assessment Report for Dunoon Pier Vehicle Accessway	May-06	The report comments that above water some bottom chords (horizontal beams) have become detached and that zones of bottom chords have lost cross-sectional area. Furthermore, lower horizontal beams are broken. **However, this information is not sufficient for Aecom to calculate the remaining loading capacity of each horizontal beam.**
Horizontal Beams	Martin Hadlington: Conservation Architect	Dunoon Pier Conservation Management Plan	Apr-09	The report comments that many horizontal beams are missing and that other horizontal members have cracked. **Note the source of this information is not stated in the report. Moreover, this information is not sufficient for Aecom to calculate the remaining loading capacity of each horizontal beam.**
Bolted connections	Halcrow	Dunoon Pier Engineering Assessment	Jul-01	The report states that all the bolted connections to low-level horizontal beams and diagonal bracings require to be replaced. Moreover, a high percentage of the higher level joints require repair work, **although the author does not commit to stating an actual percentage.**
Bolted connections	RGA	Initial Feasibility Study for the Redevelopment of Dunoon Pier	Feb-02	The report recommends that all connections should be replaced/ enhanced during restoration works. **However, close inspection of many connections was not possible, as outlined in page 71 of the report.**
Bolted connections	Arch Henderson	Structural Assessment Report for Dunoon Pier Vehicle Accessway	May-06	The report states that the connections are not satisfactory for structural safety in the intended use. **However, the author does not go as far as to state that they should all be replaced.**
Bolted connections	Martin Hadlington: Conservation Architect	Dunoon Pier Conservation Management Plan	Apr-09	As the result of an Engineering Assessment by Elliot and Company, it is stated in the report that the main deterioration within the structure is in the ferrous fixings, and these are causing local distress. **However, the percentage of connections requiring replacement is not stated.** Furthermore, it is stated that a considerable number of fixings should be checked and replaced. **However, the author does not state the percentage requiring replacement.**

Key:

Rows highlighted green provide the most useful information regarding the quantity/ percentage of each structural element requiring to be repaired.

Red BOLD text highlights where crucial information has not been reported.

Notes:

1. Arch Henderson's "Dunoon Pier Survey Report" (August 2003) has not been assessed for inclusion in this spreadsheet, as it only covered the southern 20m or so of the pier. Since the time of the report, this area of the pier has been demolished.
2. Argyle & Bute Council's "Survey Report" (June 2006) has not been included above as there is no discussion within the report regarding the repair of structural members or planking; there is simply a series of photographs taken of the sub-structure, with accompanying comments on each photograph.
3. Argyle & Bute Council's "Options Appraisal Report" (August 2006) has not been included above as there are no comments regarding the condition of each type of timber components or, more importantly, the percentage of each requiring replacement, except for extracts from other reports received.
4. Scott Wilson's "Dunoon Pier Sheet Piling - Hydraulic Modelling (Stage 1 Report)" (August 2003) has not been assessed for inclusion in this spreadsheet, as it does not cover any of the structural design/ construction aspects regarding Dunoon Pier.
5. Scott Wilson's "Dunoon Pier Sheet Piling - Hydraulic Modelling (Stage 2 Report)" (August 2003) has not been assessed for inclusion in this spreadsheet, as it does not cover any of the structural design/ construction aspects regarding Dunoon Pier.

Appendix D
Pier Structure Options

Appendix D1

SUMMARY OPTIONS REVIEW

APPENDIX D1

Please Note: All cost estimates relating to the remediation or maintenance of the pier have been derived from reports prepared over the last 15 years. The accuracy of the extent of repairs and the reliability of the individual repair costs has not been tested. Further work is required to provide more reliable estimates.

Dunoon Pier - Structural Option Summary

Option	Sub Option	Advantages	Disadvantages	Capital Investement	50year Maintenance	Total 50yr Costs	Notes
Do Nothing	N/A	- No capital funding required - Waterfront image retained (for a time) - Limited potential for additional funding	- Limited or no uses - Rising maintenance costs - Increased insurance risk - Poor public image - Increased risk of collapse	£nil	£2.5m +	**£2.5m +**	Not preferred
Demolition	N/A	- Limited capital investment - No ongoing mantenance - No ongoing insurance - No potnential for additional funding	- Loss of heritage - No ecconomic or visitor uses - No waterfront feature - Difficult planning process - Poor public image	£0.8m to £1.2m	£nil	**£0.8m to £1.2m**	Not preferred
Timber Pier Conservation	Full Retention	- Full historic structure retained - Iconic buildings retained - Support from Historic Scotland - Funding applications potential - Potential transport use retained - Large Pier area available for use and possibly future options - Potnetial for ecconomic and tourist uses - Potential for Ro-Ro function retained - Potential Wavery use retained - Potential for additional funding	- High capital investment - Redundant areas of pier retained - Poor image of 'industrial' section of pier - Higher maintenance costs - No reclaimed material for repairs or other uses	£5.0m to £7.0m	Circa £1.5m	**£6.5m to £8.5m**	**Potential Option**
	Partial Retention Option 1	- Historic structure retained - Iconic buildings retained - Potential support from Historic Scotland - Third party funding applications potential - Lower maintenance costs than Full Retention - Reclaimed material from demolotion for use in repairs and other areas - Potential Wavery use retained - Potential for additional funding	- High capital investment - Original part of pier removed - Less pier area retained and available for potential future uses - Higher maintenace costs than Option 2 - Potentially lower third party funding contributions - Planning discussions required	£3.5m to £5.25m	Circa £1.25m	**£4.75m to £6.5m**	**Potential Option**
	Partial Retention Option 2	- Historic structure retained - Potential support from Historic Scotland - Third party funding applications potential - Lower maintenance costs than Full Retention and Option 1 - Iconic buildings retained - Reclaimed material from demolotion for use in repairs and other areas - Potential Wavery use retained - More space for ferries to the south of the pier - Potential for adidtional funding	- High capital investment - Original part of pier removed - Less pier area retained and available for potential future uses - Potentially lower third party funding contributions - Planning discussions required - Less pier area retained than Full Retention or Option 1	£3.0m to £4.5m	Circa £1.0m	**£4.0m to £5.5m**	**Potential Option**
Sheet Piling	Steel Sheet Piles	- New structure, less risk and maintenance - Pier Buildings protected - Creates protected marina potential - Protected harbour potential - Potential Wavery use	- High capital investment - Loss of timber pier heirtage - Partial loss of waterfront image - Industrial looking steel piles at low tide - Limited potential for additional funding	£6.0 to £7.0m*	Circa £0.3m*	**£6.3m to £7.3m**	**Potential Option**
	Open Sheet Piles	- New structure, less risk - Pier Buildings protected - Open structure - Potential for Wavery use	- High capital investment - Loss of timber pier heritage - Partial loss of waterfront image - Industrial looking steel piles at low tide - Limited potential for additional funding	£7.5m to £8.5m*	Circa £0.6m*	**£8.1m to £9.1m**	Not preferred
	Steel Sheet Piles with a timber pile face	- New structure, less risk - Pier Buildings protected - Impression of timber pier retained - Potential for Wavery use	- High capital investment - Loss of timber pier heritage - Partial loss of waterfront image - Industrial looking steel piles at low tide - Ongoing maintenance - Risks to timber face related to wave reflection - Limited potential for additional funding	£7.5m to £8.5m*	Circa £1.0m*	**£8.5m to £9.5m**	Not preferred
New Timber Pier	N/A	- New structure, less risk - Pier Buildings protected - Impression of timber pier retained - Potential for Wavery use	- High capital investment - Loss of timber pier heritage - Ongoing maintenance - Retained risk of timber structure - Limited potential for additional funding	£11m to £12m*	Circa £1.5m*	**£12.5m to £13.5m**	Not preferred

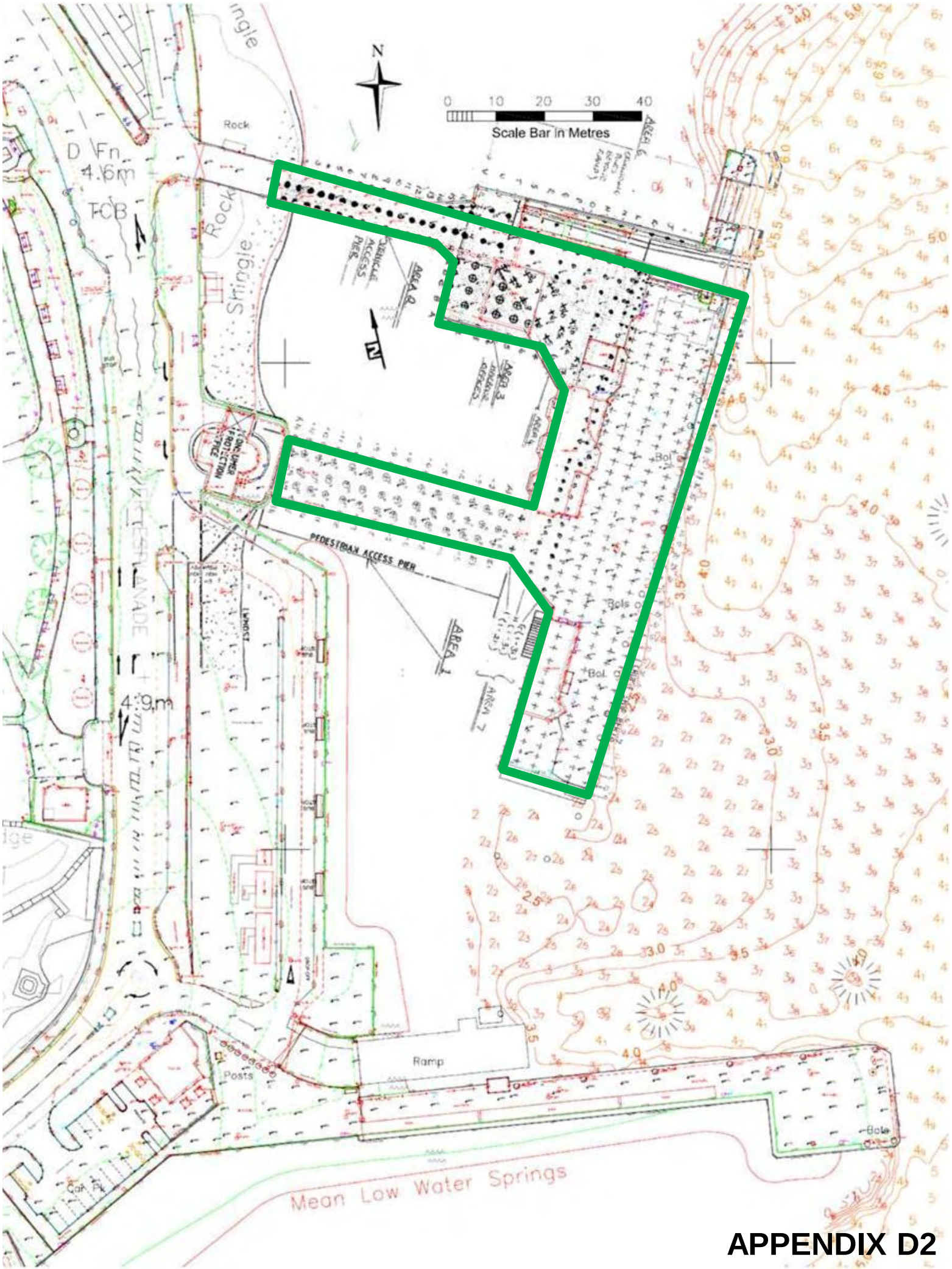
Notes * Based on information in the 2006 A&BC options appraisal issued to Historic Scotland

Appendix D2

PIER OPTIONS FIGURES

Timber Pier Restoration – Full Restoration

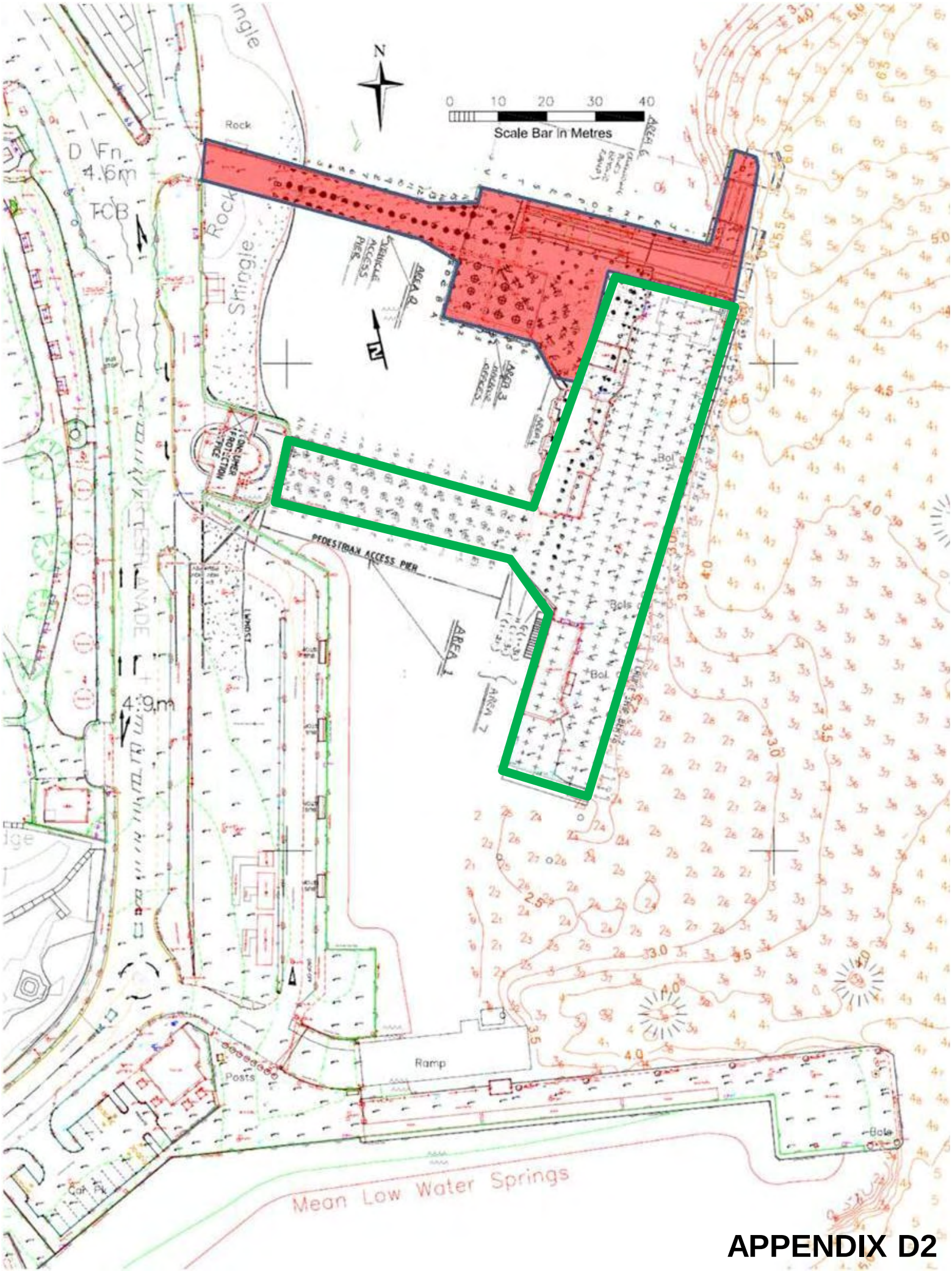
Diagram shows combined topographic survey, bathometric survey & pile locations



APPENDIX D2

Timber Pier Restoration – Partial Retention Option 1

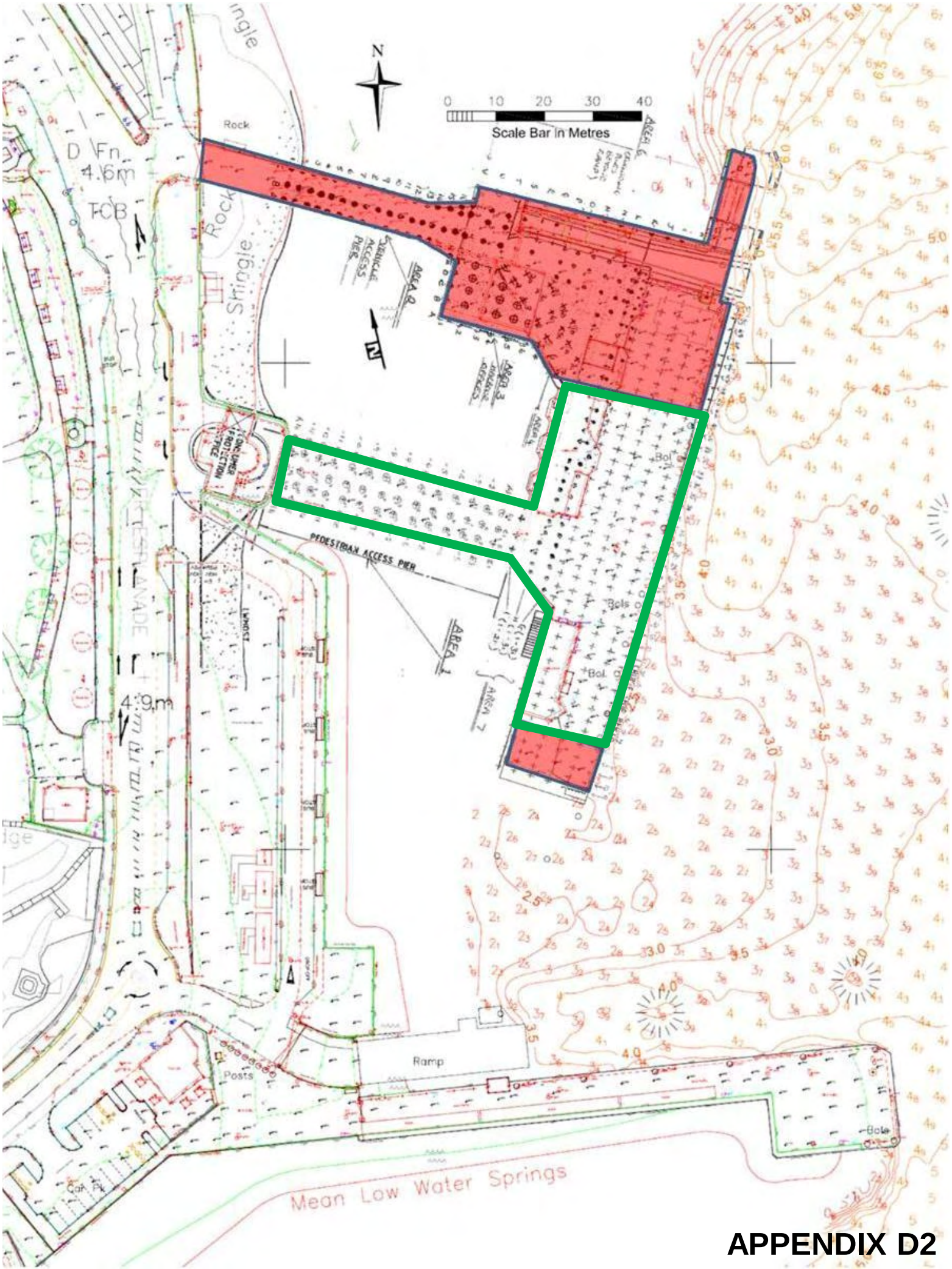
Removal of car access, link span and berthing dolphins



APPENDIX D2

Timber Pier Restoration – Partial Retention Option 2

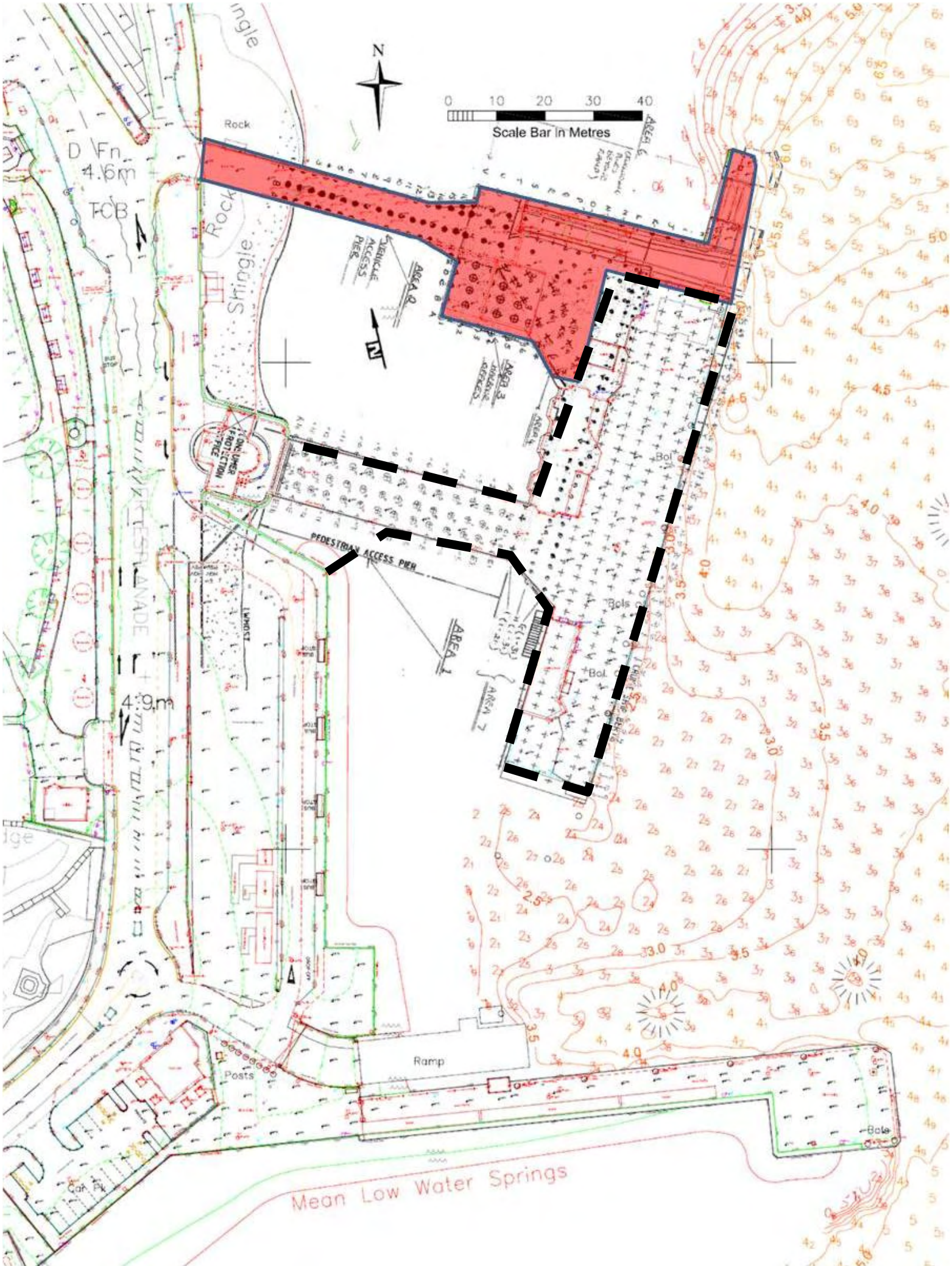
Removal of car access, link span, berthing dolphins, north end and west end



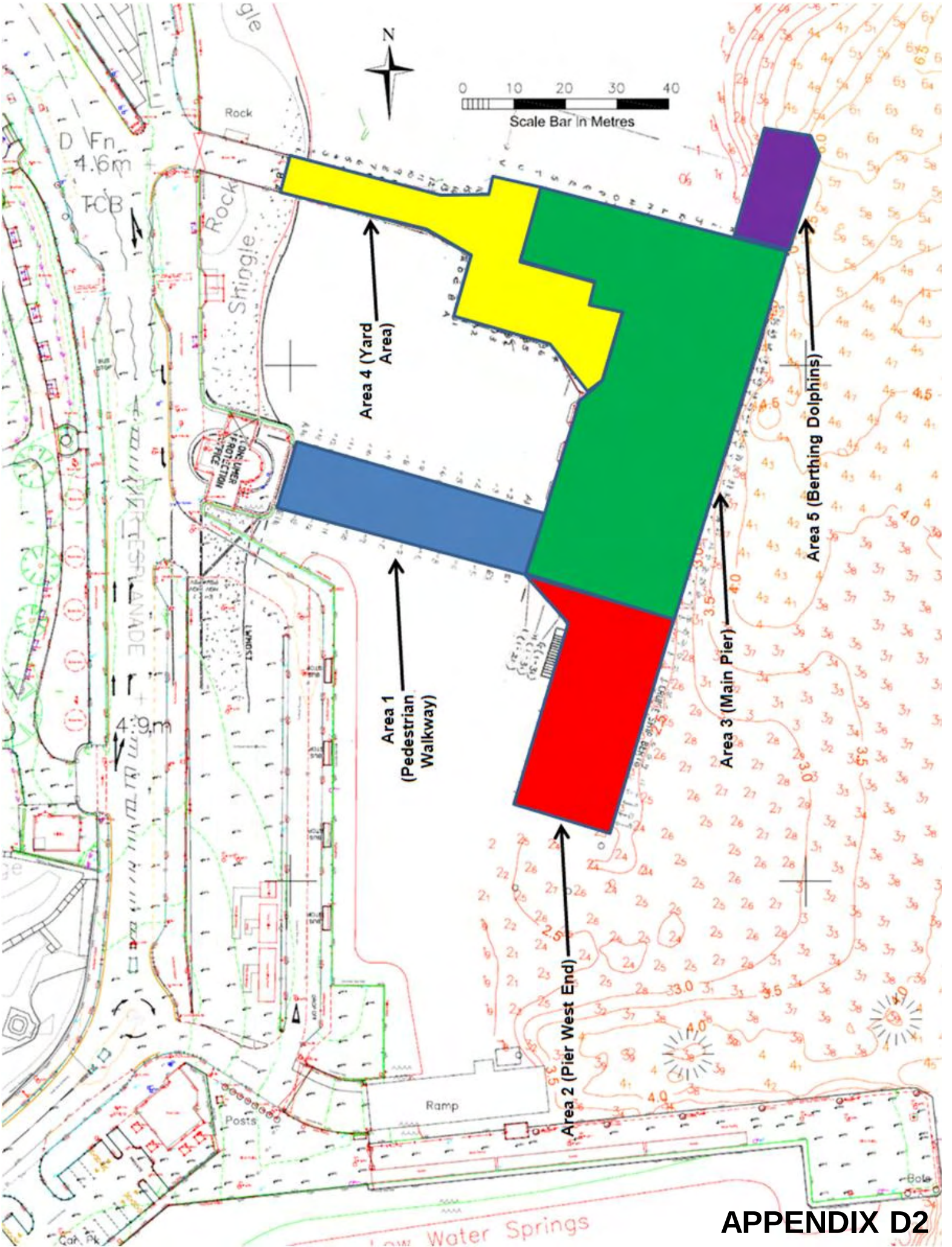
APPENDIX D2

Steel Sheet Pile Option

Removal of car access, link span, berthing dolphins, north end and west end



Pier Area References Within the Timber Repair Costings



APPENDIX D2

Appendix D3

TIMBER PIER COSTS REVIEW

Timber Pier Options Overview

APPENDIX D3

Dunoon Pier Retention - Cost Review Summary

		Martin Hadlington	AECOM Update	AECOM Update	AECOM Update
1	Access	£500,000.00	£500,000.00	£500,000.00	£500,000.00
2	Pedestrian Walkway (Area 1)	£427,373.50	£344,155.50	£342,614.70	£342,614.70
3	Peir West End (Area 2)	£480,323.50	£284,643.75	£375,327.19	£255,676.56
4	Main Pier (Area 3)	£1,372,752.00	£979,746.00	£844,591.88	£486,703.86
5	Yard Area (Area 4)	£486,472.50	£325,352.75	£0.00	£0.00
6	Pier Buildings	£204,000.00	£204,000.00	£204,000.00	£204,000.00
7	Demolition	£0.00	£0.00	£213,200.00	£293,300.00
8	Pile Renewals	£1,000,000.00	£0.00	£0.00	£0.00
	WORKS TOTAL	**£4,470,921.50**	**£2,637,898.00**	**£2,479,733.77**	**£2,082,295.11**
9	Preliminaries	18% of £4,470,921.50 = £804,765.87	18% of £2,637,898.00 = £474,821.64	18% of £2,479,733.77 = £446,352.08	18% of £2,082,295.11 = £374,813.12
10	Location Factor	6% of £5,275,687.37 = £316,541.24	6% of £3,112,719.64 = £186,763.18	6% of £2,926,085.84 = £175,565.15	6% of £2,457,108.23 = £147,426.49
11	Contingency & Deisgn Development	20% of £5,592,228.61 = £1,118,445.72	20% of £3,299,482.82 = £659,896.56	20% of £3,101,650.99 = £620,330.20	20% of £2,604,534.73 = £520,906.95
	ADDITIONS TOTAL	**£2,239,752.83**	**£1,321,481.38**	**£1,242,247.43**	**£1,043,146.56**

	Martin Hadlington	AECOM	AECOM	AECOM
GRAND TOTAL	**£6,710,674**	**£3,959,379**	**£3,721,981**	**£3,125,442**
SAY	**£7,000,000**	**£4,000,000**	**£3,750,000**	**£3,250,000**

NOTES:

1 No change on assumptions on access costs

2 timbers is largely non-structural sapwood, a larger proportion of existing timbers can be simply refixed, rather than renewed. MH's assumption was 50% of existing to be renewed, we suspect that a lower percentage is more likely - especially as the structure is now protected from storm damage by the breakwater. The occasional berthing of "Waverley" may require a more comprehensive strengthening locally. A more detailed inspection /

3 Difference is due to % of timbers that are to be renewed. As the eroded section of the timbers is largely non-structural sapwood, a larger proportion of existing timbers can be simply refixed, rather than renewed. MH's assumption was 50% of existing to be renewed, we suspect that a lower percentage is more likely - especially as the structure is now protected from storm damage by the breakwater. The occasional berthing of "Waverley"

4 timbers is largely non-structural sapwood, a larger proportion of existing timbers can be simply refixed, rather than renewed. MH's assumption was 50% of existing to be renewed, we suspect that a lower percentage is more likely - especially as the structure is now protected from storm damage by the breakwater. The occasional berthing of "Waverley" may require a more comprehensive strengthening locally. A more detailed inspection /

5 timbers is largely non-structural sapwood, a larger proportion of existing timbers can be simply refixed, rather than renewed. MH's assumption was 50% of existing to be renewed, we suspect that a lower percentage is more likely - especially as the structure is now protected from storm damage by the breakwater. The occasional berthing of "Waverley" may require a more comprehensive strengthening locally. A more detailed inspection /

6 Elliott report indicates that the heartwood of the piles, is generally intact. The missing

7 No change ot the assumptions made on the pier buildings

8 No change to assumptions on percentage applied for preliminaries

9 No change to assumptions on percentage applied location factor

10 No change to assumptions on percentage applied for contingencies and design

Appendix D4

MARTIN HADLINGTON FULL REPAIR COST REVIEW

Dunoon Pier Cost Estimate - Martin Hadlington Full Retention April 2009

Appendix D4

	Description of work	Quantity	Unit	Rate	Amount	Total
1 - Access						
Barge/ pontoon access allowance		1	Sum	500,000.00		
						£500,000.00
2 - Area 1: Pedestrian walkway						
Deck boards (approx. 280mm x 90mm boards)						
	Lift deck boards	610	m^2	15.00	£9,150.00	
	Relay deck boards	488	m^2	15.00	£7,320.00	
	New deck boards 280mm X 90mm (20% assumed)	122	m^2	220.00	£26,840.00	
	New rod fixings	1,200	nr	40.00	£48,000.00	
Deck beams (280mm x 85mm)	***Total nr of deck beams in area***	***168***	***m***			
	Lift deck beams	168	m	7.00	£1,176.00	
	New deck beams (20% assumed)	34	m	95.00	£3,192.00	
	Splice repairs	0	nr	250.00	£0.00	
	New fixings	1	sum	1,500.00	£1,500.00	
Deck joists (280mm x 85mm)						
	Lift deck joists	501	m	7.00	£3,507.00	
	Relay deck joists	251	m	10.00	£2,505.00	
	New deck joists (50% assumed)	251	m	95.00	£23,797.50	
	Splice repairs	50	nr	350.00	£17,500.00	
	New fixings	1	sum	20,000.00	£20,000.00	
Diagonal bracings 7m long (280mm x 85mm)						
	Remove diagonal bracings	56	nr	70.00	£3,920.00	
	Refix diagonal bracings	28	nr	250.00	£7,000.00	
	New diagonal bracings (15% assumed)	28	nr	1,750.00	£49,000.00	
	Splice repairs (25% assumed)	14	nr	650.00	£9,100.00	
	New fixings	168	nr	55.00	£9,240.00	
	Temporary propping to refix	1	sum	3,500.00	£3,500.00	
Longitudinal water level ties (280mm x 85mm)						
	Lift longitudinal water level ties	255	m	12.00	£3,060.00	
	Refix longitudinal water level ties	0	m	15.00	£0.00	
	New longitudinal water level ties (15% assumed)	255	m	175.00	£44,625.00	
	Splice repairs	0	nr	250.00	£0.00	
	New fixings	70	nr	45.00	£3,150.00	
Lateral water level ties (280mm x 85mm)						
	Lift lateral water level ties	168	m	12.00	£2,016.00	
	Refix lateral water level ties	0	m	15.00	£0.00	
	New lateral water level ties (15% assumed)	168	m	175.00	£29,400.00	
	Splice repairs	0	nr	250.00	£0.00	
	New fixings	70	nr	45.00	£3,150.00	
Piles (300mm x 300mm)	***Total nr of piles in area***	***70***	***nr***			
It has been assumed that the repairs to piles will be in the form of splicing or another form of strengthening to the section under water, but not to the section below sea bed level. Assumed pile section requiring repairs are 4m long and 20% of 70nr of pi	Propping (20%)	14	nr	250.00	£3,500.00	
	Cut out and remove (20%)	14	nr	250.00	£3,500.00	
	Piece in (20%)	14	nr	4,000.00	£56,000.00	
	Metal work splice fixings	28	nr	400.00	£11,200.00	
Other timber repairs						
	Heavier pile repairs - provisional sum	1	sum	15,000.00	£15,000.00	
	Sundry timbers - allowance	1	sum	2,500.00	£2,500.00	
	Take down and re-erect balustrade fence	115	m	35.00	£4,025.00	
						£427,373.50

3 - Area 2: Pier west end						**Appendix D4**
Deck boards (approx. 280mm x 90mm boards)						
	Lift deck boards	678	m^2	15.00	£10,170.00	
	Relay deck boards	542	m^2	15.00	£8,136.00	
	New deck boards 280mm X 90mm (20% assumed)	136	m^2	220.00	£29,920.00	
	New rod fixings	1,200	nr	40.00	£48,000.00	
Deck beams (280mm x 85mm)	***Total nr of deck beams in area***	***216***	***m***			
	Lift deck beams	216	m	7.00	£1,512.00	
	New deck beams (20% assumed)	43	m	95.00	£4,104.00	
	Splice repairs	0	nr	250.00	£0.00	
	New fixings	1	sum	1,500.00	£1,500.00	
Deck joists (280mm x 85mm)						
	Lift deck joists	561	m	7.00	£3,927.00	
	Relay deck joists	281	m	10.00	£2,805.00	
	New deck joists (15% assumed)	281	m	95.00	£26,647.50	
	Splice repairs	50	nr	250.00	£12,500.00	
	New fixings	1	sum	20,000.00	£20,000.00	
Diagonal bracings 10m long (280mm x 85mm)						
	Remove diagonal bracings	60	nr	70.00	£4,200.00	
	Refix diagonal bracings	30	nr	250.00	£7,500.00	
	New diagonal bracings (15% assumed)	30	nr	1,750.00	£52,500.00	
	Splice repairs (25% assumed)	15	nr	650.00	£9,750.00	
Diagonal bracings 5m long (280mm x 85mm)						
	Remove diagonal bracings	30	nr	70.00	£2,100.00	
	Refix diagonal bracings	15	nr	250.00	£3,750.00	
	New diagonal bracings (15% assumed)	15	nr	1,400.00	£21,000.00	
	Splice repairs (25% assumed)	8	nr	650.00	£4,875.00	
	New fixings	180	nr	55.00	£9,900.00	
	Temporary propping to refix	1	sum	3,500.00	£3,500.00	
Longitudinal water level ties (280mm x 85mm)						
	Lift longitudinal water level ties	216	m	12.00	£2,592.00	
	Refix longitudinal water level ties	0	m	15.00	£0.00	
	New longitudinal water level ties (15% assumed)	216	m	175.00	£37,800.00	
	Splice repairs	0	nr	250.00	£0.00	
	New fixings	90	nr	45.00	£4,050.00	
Lateral water level ties (280mm x 85mm)						
	Lift lateral water level ties	280	m	12.00	£3,360.00	
	Refix lateral water level ties	0	m	15.00	£0.00	
	New lateral water level ties (15% assumed)	280	m	175.00	£49,000.00	
	Splice repairs	0	nr	250.00	£0.00	
	New fixings	90	nr	45.00	£4,050.00	
Piles (300mm x 300mm)	***Total nr of piles in area***	***105***	***nr***			
It has been assumed that the repairs to piles will be in the form of splicing or another form of strengthening to the section under water, but not to the section below sea bed level. Assumed pile section requiring repairs are 4m long and 20% of 70nr of pi	Propping	16	nr	250.00	£3,937.50	
	Cut out and remove	16	nr	250.00	£3,937.50	
	Piece in	16	nr	4,000.00	£63,000.00	
	Metal work splice fixings	32	nr	400.00	£12,800.00	
Other timber repairs						
	Heavier pile repairs - provisional sum	1	sum	5,000.00	£5,000.00	
	Sundry timbers - allowance	1	sum	2,500.00	£2,500.00	
						£480,323.50

4 - Area 3: Main pier						Appendix D4
Deck boards (approx. 280mm x 90mm boards)						
	Lift deck boards	1,984	m^2	15.00	£29,760.00	
	Relay deck boards	1,587	m^2	15.00	£23,808.00	
	New deck boards 280mm X 90mm (20% assumed)	397	m^2	220.00	£87,296.00	
	New rod fixings	2,500	nr	40.00	£100,000.00	
Deck beams (280mm x 85mm)	***Total nr of deck beams in area***	***621***	***m***			
	Lift deck beams	621	m	7.00	£4,347.00	
	New deck beams (20% assumed)	124	m	95.00	£11,799.00	
	Splice repairs	0	nr	250.00	£0.00	
	New fixings	1	sum	3,000.00	£3,000.00	
Deck joists (280mm x 85mm)						
	Lift deck joists	1,624	m	7.00	£11,368.00	
	Relay deck joists	812	m	10.00	£8,120.00	
	New deck joists (50% assumed)	812	m	95.00	£77,140.00	
	Splice repairs	50	nr	250.00	£12,500.00	
	New fixings	1	sum	40,000.00	£40,000.00	
Diagonal bracings 10m long (280mm x 85mm)						
	Remove diagonal bracings	112	nr	70.00	£7,840.00	
	Refix diagonal bracings	56	nr	250.00	£14,000.00	
	New diagonal bracings (15% assumed)	56	nr	2,000.00	£112,000.00	
	Splice repairs (25% assumed)	28	nr	650.00	£18,200.00	
Diagonal bracings 7m long (280mm x 85mm)						
	Remove diagonal bracings	112	nr	70.00	£7,840.00	
	Refix diagonal bracings	56	nr	250.00	£14,000.00	
	New diagonal bracings (15% assumed)	56	nr	1,750.00	£98,000.00	
	Splice repairs (25% assumed)	28	nr	650.00	£18,200.00	
Diagonal bracings 5m long (280mm x 85mm)						
	Remove diagonal bracings	56	nr	70.00	£3,920.00	
	Refix diagonal bracings	28	nr	250.00	£7,000.00	
	New diagonal bracings (15% assumed)	28	nr	1,400.00	£39,200.00	
	Splice repairs (25% assumed)	14	nr	650.00	£9,100.00	
	New fixings	450	nr	75.00	£33,750.00	
	Temporary propping to refix	1	sum	7,500.00	£7,500.00	
Longitudinal water level ties (280mm x 85mm)						
	Lift longitudinal water level ties	620	m	12.00	£7,440.00	
	Refix longitudinal water level ties		m	15.00	£0.00	
	New longitudinal water level ties (15% assumed)	620	m	175.00	£108,500.00	
	Splice repairs	0	nr	250.00	£0.00	
	New fixings	252	nr	45.00	£11,340.00	
Lateral water level ties (280mm x 85mm)						
	Lift lateral water level ties	812	m	12.00	£9,744.00	
	Refix lateral water level ties		m	15.00	£0.00	
	New lateral water level ties (15% assumed)	812	m	175.00	£142,100.00	
	Splice repairs	0	nr	250.00	£0.00	
	New fixings	252	nr	45.00	£11,340.00	
Piles (300mm x 300mm)	***Total nr of piles in area***	***280***	***nr***			
It has been assumed that the repairs to piles will be in the form of splicing or another form of strengthening to the section under water, but not to the section below sea bed level. Assumed pile section requiring repairs are 4m long and 20% of 70nr of pi	Propping (15%)	42	nr	250.00	£10,500.00	
	Cut out and remove (15%)	42	nr	250.00	£10,500.00	
	Piece in (15%)	42	nr	4,000.00	£168,000.00	
	Metal work splice fixings	84	nr	400.00	£33,600.00	
Other timber repairs						
	Heavier pile repairs - provisional sum	1	sum	50,000.00	£50,000.00	
	Sundry timbers - allowance	1	sum	10,000.00	£10,000.00	
						£1,372,752.00

5 - Area 4: Yard Area						**Appendix D4**
Deck boards (approx. 280mm x 90mm boards)						
	Lift deck boards	700	m^2	15.00	£10,500.00	
	Relay deck boards	560	m^2	15.00	£8,400.00	
	New deck boards 280mm X 90mm (20% assumed)	140	m^2	220.00	£30,800.00	
	New rod fixings	1,200	nr	40.00	£48,000.00	
Deck beams (280mm x 85mm)	***Total nr of deck beams in area***	***216***	***m***			
	Lift deck beams	43	m	7.00	£1,512.00	
	New deck beams (20% assumed)	43	m	95.00	£4,104.00	
	Splice repairs	0	nr	250.00	£0.00	
	New fixings	1	sum	1,500.00	£1,500.00	
Deck joists (280mm x 85mm)						
	Lift deck joists	561	m	7.00	£3,927.00	
	Relay deck joists	281	m	10.00	£2,805.00	
	New deck joists (50% assumed)	281	m	95.00	£26,647.50	
	Splice repairs	50	nr	250.00	£12,500.00	
	New fixings	1	sum	20,000.00	£20,000.00	
Diagonal bracings 10m long (280mm x 85mm)						
	Remove diagonal bracings	60	nr	70.00	£4,200.00	
	Refix diagonal bracings	30	nr	250.00	£7,500.00	
	New diagonal bracings (15% assumed)	30	nr	1,750.00	£52,500.00	
	Splice repairs (25% assumed)	15	nr	650.00	£9,750.00	
Diagonal bracings 5m long (280mm x 85mm)						
	Remove diagonal bracings	30	nr	70.00	£2,100.00	
	Refix diagonal bracings	15	nr	250.00	£3,750.00	
	New diagonal bracings (15% assumed)	15	nr	1,400.00	£21,000.00	
	Splice repairs (25% assumed)	15	nr	650.00	£9,750.00	
	New fixings	180	nr	55.00	£9,900.00	
	Temporary propping to refix	1	sum	3,500.00	£3,500.00	
Longitudinal water level ties (280mm x 85mm)						
	Lift longitudinal water level ties	216	m	12.00	£2,592.00	
	Refix longitudinal water level ties	0	m	175.00	£0.00	
	New longitudinal water level ties (15% assumed)	216	m	175.00	£37,800.00	
	Splice repairs	0	nr	250.00	£0.00	
	New fixings	90	nr	45.00	£4,050.00	
Lateral water level ties (280mm x 85mm)						
	Lift lateral water level ties	280	m	12.00	£3,360.00	
	Refix lateral water level ties	0	m	15.00	£0.00	
	New lateral water level ties (15% assumed)	280	m	175.00	£49,000.00	
	Splice repairs	0	nr	250.00	£0.00	
	New fixings	90	nr	45.00	£4,050.00	
Piles (300mm x 300mm)	***Total nr of piles in area***	***105***	***nr***			
It has been assumed that the repairs to piles will be in the form of splicing or another form of strengthening to the section under water, but not to the section below sea bed level. Assumed pile section requiring repairs are 4m long and 20% of 70nr of pi	Propping (15%)	16	nr	250.00	£3,937.50	
	Cut out and remove (15%)	16	nr	250.00	£3,937.50	
	Piece in (15%)	16	nr	4,000.00	£63,000.00	
	Metal work splice fixings	32	nr	400.00	£12,600.00	
Other timber repairs						
	Heavier pile repairs - provisional sum	1	sum	5,000.00	£5,000.00	
	Sundry timbers - allowance	1	sum	2,500.00	£2,500.00	
						£486,472.50

Appendix D4

5. Pier buildings						
Main pier building						
	Allowance for repairs (cost/ m^2 pending further info)	241	m^2	450.00	£108,450.00	
West pier building						
	Allowance for repairs (cost/ m^2 pending further info)	147	m^2	650.00	£95,550.00	
						£204,000.00
0. Demolition costs						
Site mobilisation & demobilisation						
	Mobilisation/ demobilisation	0	sum	20,000.00	£0.00	
	Allowance for divers' work	0	day	1,200.00	£0.00	
Demolition						
	Remove and dispose of timber planking and structural members	0	m^2	75.00	£0.00	
	Remove and dispose of timber piles	0	nr	40.00	£0.00	
	Remove and dispose of concrete caps on northern berthing dolphin (6m x 6m)	0	m^2	200.00	£0.00	
	Remove and dispose of concrete piles on northern berthing dolphin	0	nr	1,000.00	£0.00	
	Remove and dispose of concrete caps on southern berthing dolphin (6m x 6m)	0	m^2	200.00	£0.00	
	Remove and dispose of concrete piles on southern berthing dolphin	0	nr	1,000.00	£0.00	
	Remove and dispose of steel linkspan	0	nr	10,000.00	£0.00	
	Remove and dispose of store shed	0	m^2	100.00	£0.00	
						£0.00
Pile Renewals	Pile Renewal Allowance	1	nr	£ 1,000,000.00		**£1,000,000.00**
					Sub Total	**£4,470,921.50**
Preliminaries				18%		**£804,765.87**
					Sub Total	**£5,275,687.37**
Location factor				6%		**£316,541.24**
					Sub Total	**£5,592,228.61**
Contingency and Design Development				20%		**£1,118,445.72**
						£6,710,674.33
					SAY	**£7,000,000.00**

Notes:

1. Based on Martin Hadlington Report.

Appendix D5

AECOM FULL REPAIR COST REVIEW

AECOM have reviewed the document extracts referred in the “Review of Historic Reports” spreadsheet.

Whilst parts of the extracts are confusing, referring to parts of the pier by different names, with a dearth of overall plans, the general conclusion of the reports was that the pier had only about 5 years life remaining, back in 1999. This appears to have been subjective and not based on an assessment of the condition of the timber and the applied loadings.

Since then parts of the pier have been demolished (south end of cruise ship berth), and a new breakwater has been constructed to the south of the pier, thus reducing the potential for storm damage. The public have been excluded from the areas of the pier and only parts of the pier structure are currently in use.

The extracts from the report by Elliott and Company suggest that this pier is not in such a bad state of repair.

In the Elliott report the piles are rightly considered as a combination of both Heartwood and Sapwood. The Heartwood remains in good condition, the Sapwood has deteriorated. Therefore very few piles are in need of replacement. This observation alone removes large elements from the repair cost estimates. A similar analogy can be made of all the hardwood timber elements, the erosion that has taken place appears to have only removed the sapwood, leaving the structural hardwood intact.

On the other hand, the deck is constructed from softwood planks and is in a poor condition, with few mitigating circumstances. A poor deck is likely to lead to numerous claims for compensation and should be repaired as a matter of urgency if the pier is to be retained as open to the public.

The capacity of the timber joints are questioned. It is understood that a combination of mild steel bolts and hardwood timber will lead to splitting of the timber as the bolts corrode. This in turn will loosen the connection, open the joint and cause further deterioration.

The cost estimate provided in the Martin Hadlington report has been reviewed in the light of the above, i.e. reducing the cost of pile repairs (including eliminating the £1,000,000 provisional sum), reducing the number of sub-deck elements that require replacement and increasing the fixings allowance for the sub deck elements. The recommended repair regime for the deck, deck beams and deck joists has not been changed, although the element for repair of deck joists is probably now conservative. Item 7, Pier Buildings has not been altered. The % for the Preliminaries, the Location Factor or the Contingency / Design Development have also remained unchanged.

The original budget cost was £7,000,000. The revised budget cost is £4,000,000. 75% of this saving comes from the factored value of the Provisional Sum for Pile Renewals. Therefore the savings relating to the findings that the condition of the sub deck is in a better condition than that originally assumed only amounts to approximately £500,000. So whilst the proportion of the sub-deck timbers can be re-used, has been increased, the additional cost of the required enhancement to the connections (making use of stainless steel plates and bolts rather than mild steel) considerably reduces the overall cost saving.

In the review a 15% rate of replacement of the sub deck elements has been assumed, but only an on-site investigation can determine whether this proportion is reasonable. It does appear from reading the reports as though only the outer easily accessible elements have been examined in detail therefore the chosen proportion may be light. However, this may not make a great deal of difference to the overall cost.

The rates used in the cost estimate for materials etc have been reviewed by the project cost consultant and found to be in the correct order of magnitude. Further checks on the costs will be undertaken when more detail on the potential repair strategy is progressed.

	Description of work	Quantity	Unit	Rate	Amount	Total
1 - Access						
Barge/ pontoon access allowance		1	Sum	500,000.00		
						£500,000.00
2 - Area 1: Pedestrian walkway						
Deck boards (approx. 280mm x 90mm boards)						
	Lift deck boards	610	m^2	15.00	£9,150.00	
	Relay deck boards	488	m^2	15.00	£7,320.00	
	New deck boards 280mm X 90mm (20% assumed)	122	m^2	220.00	£26,840.00	
	New rod fixings	1,200	nr	40.00	£48,000.00	
Deck beams (280mm x 85mm)	***Total nr of deck beams in area***	***168***	***m***			
	Lift deck beams	168	m	7.00	£1,176.00	
	New deck beams (20% assumed)	34	m	95.00	£3,192.00	
	Splice repairs	0	nr	250.00	£0.00	
	New fixings	1	sum	1,500.00	£1,500.00	
Deck joists (280mm x 85mm)						
	Lift deck joists	501	m	7.00	£3,507.00	
	Relay deck joists	251	m	10.00	£2,505.00	
	New deck joists (50% assumed)	251	m	95.00	£23,797.50	
	Splice repairs	50	nr	350.00	£17,500.00	
	New fixings	1	sum	20,000.00	£20,000.00	
Diagonal bracings 7m long (280mm x 85mm)						
	Remove diagonal bracings	56	nr	70.00	£3,920.00	
	Refix diagonal bracings	48	nr	250.00	£11,900.00	
	New diagonal bracings (15% assumed)	8	nr	1,750.00	£14,700.00	
	Splice repairs (25% assumed)	14	nr	650.00	£9,100.00	
	New fixings	168	nr	55.00	£9,240.00	
	Temporary propping to refix	1	sum	3,500.00	£3,500.00	
Longitudinal water level ties (280mm x 85mm)						
	Lift longitudinal water level ties	255	m	12.00	£3,060.00	
	Refix longitudinal water level ties	217	m	15.00	£3,251.25	
	New longitudinal water level ties (15% assumed)	38	m	175.00	£6,693.75	
	Splice repairs	50	nr	250.00	£12,500.00	
	New fixings	255	nr	45.00	£11,475.00	
Lateral water level ties (280mm x 85mm)						
	Lift lateral water level ties	168	m	12.00	£2,016.00	
	Refix lateral water level ties	143	m	15.00	£2,142.00	
	New lateral water level ties (15% assumed)	25	m	175.00	£4,410.00	
	Splice repairs	0	nr	250.00	£0.00	
	New fixings	168	nr	45.00	£7,560.00	
Piles (300mm x 300mm)	***Total nr of piles in area***	***70***	***nr***			
It has been assumed that the repairs to piles will be in the form of splicing or another form of strengthening to the section under water, but not to the section below sea bed level. Assumed pile section requiring repairs are 4m long and 20% of 70nr of pi	Propping (20%)	14	nr	250.00	£3,500.00	
	Cut out and remove (20%)	14	nr	250.00	£3,500.00	
	Piece in (20%)	14	nr	4,000.00	£56,000.00	
	Metal work splice fixings	28	nr	400.00	£11,200.00	
Other timber repairs						
	Heavier pile repairs - provisional sum	0	sum	15,000.00	£0.00	
	Sundry timbers - allowance	0	sum	2,500.00	£0.00	
	Take down and re-erect balustrade fence	0	m	35.00	£0.00	
						£344,155.50

3 - Area 2: Pier west end						Appendix D5
Deck boards (approx. 280mm x 90mm boards)						
	Lift deck boards	678	m^2	15.00	£10,170.00	
	Relay deck boards	542	m^2	15.00	£8,136.00	
	New deck boards 280mm X 90mm (20% assumed)	136	m^2	220.00	£29,920.00	
	New rod fixings	1,200	nr	40.00	£48,000.00	
Deck beams (280mm x 85mm)	***Total nr of deck beams in area***	***216***	***m***			
	Lift deck beams	216	m	7.00	£1,512.00	
	New deck beams (20% assumed)	43	m	95.00	£4,104.00	
	Splice repairs	0	nr	250.00	£0.00	
	New fixings	1	sum	1,500.00	£1,500.00	
Deck joists (280mm x 85mm)						
	Lift deck joists	561	m	7.00	£3,927.00	
	Relay deck joists	477	m	10.00	£4,768.50	
	New deck joists (15% assumed)	84	m	95.00	£7,994.25	
	Splice repairs	50	nr	250.00	£12,500.00	
	New fixings	1	sum	20,000.00	£20,000.00	
Diagonal bracings 10m long (280mm x 85mm)						
	Remove diagonal bracings	60	nr	70.00	£4,200.00	
	Refix diagonal bracings	51	nr	250.00	£12,750.00	
	New diagonal bracings (15% assumed)	9	nr	1,750.00	£15,750.00	
	Splice repairs (25% assumed)	15	nr	650.00	£9,750.00	
Diagonal bracings 5m long (280mm x 85mm)						
	Remove diagonal bracings	30	nr	70.00	£2,100.00	
	Refix diagonal bracings	26	nr	250.00	£6,375.00	
	New diagonal bracings (15% assumed)	5	nr	1,400.00	£6,300.00	
	Splice repairs (25% assumed)	8	nr	650.00	£4,875.00	
	New fixings	180	nr	55.00	£9,900.00	
	Temporary propping to refix	1	sum	3,500.00	£3,500.00	
Longitudinal water level ties (280mm x 85mm)						
	Lift longitudinal water level ties	216	m	12.00	£2,592.00	
	Refix longitudinal water level ties	0	m	15.00	£0.00	
	New longitudinal water level ties (15% assumed)	32	m	175.00	£5,670.00	
	Splice repairs	0	nr	250.00	£0.00	
	New fixings	216	nr	45.00	£9,720.00	
Lateral water level ties (280mm x 85mm)						
	Lift lateral water level ties	280	m	12.00	£3,360.00	
	Refix lateral water level ties	238	m	15.00	£3,570.00	
	New lateral water level ties (15% assumed)	42	m	175.00	£7,350.00	
	Splice repairs	0	nr	250.00	£0.00	
	New fixings	90	nr	45.00	£4,050.00	
Piles (300mm x 300mm)	***Total nr of piles in area***	***105***	***nr***			
It has been assumed that the repairs to piles will be in the form of splicing or another form of strengthening to the section under water, but not to the section below sea bed level. Assumed pile section requiring repairs are 4m long and 20% of 70nr of pi	Propping	0	nr	250.00	£0.00	
	Cut out and remove	0	nr	250.00	£0.00	
	Piece in	0	nr	4,000.00	£0.00	
	Metal work splice fixings	32	nr	400.00	£12,800.00	
Other timber repairs						
	Heavier pile repairs - provisional sum	1	sum	5,000.00	£5,000.00	
	Sundry timbers - allowance	1	sum	2,500.00	£2,500.00	
						£284,643.75

4 - Area 3: Main pier						**Appendix D5**
Deck boards (approx. 280mm x 90mm boards)						
	Lift deck boards	1,984	m^2	15.00	£29,760.00	
	Relay deck boards	1,587	m^2	15.00	£23,808.00	
	New deck boards 280mm X 90mm (20% assumed)	397	m^2	220.00	£87,296.00	
	New rod fixings	2,500	nr	40.00	£100,000.00	
Deck beams (280mm x 85mm)	***Total nr of deck beams in area***	***621***	***m***			
	Lift deck beams	621	m	7.00	£4,347.00	
	New deck beams (20% assumed)	124	m	95.00	£11,799.00	
	Splice repairs	0	nr	250.00	£0.00	
	New fixings	1	sum	3,000.00	£3,000.00	
Deck joists (280mm x 85mm)						
	Lift deck joists	1,624	m	7.00	£11,368.00	
	Relay deck joists	1,380	m	10.00	£13,804.00	
	New deck joists (50% assumed)	244	m	95.00	£23,142.00	
	Splice repairs	50	nr	250.00	£12,500.00	
	New fixings	1	sum	40,000.00	£40,000.00	
Diagonal bracings 10m long (280mm x 85mm)						
	Remove diagonal bracings	112	nr	70.00	£7,840.00	
	Refix diagonal bracings	95	nr	250.00	£23,800.00	
	New diagonal bracings (15% assumed)	17	nr	2,000.00	£33,600.00	
	Splice repairs (25% assumed)	28	nr	650.00	£18,200.00	
Diagonal bracings 7m long (280mm x 85mm)						
	Remove diagonal bracings	112	nr	70.00	£7,840.00	
	Refix diagonal bracings	95	nr	250.00	£23,800.00	
	New diagonal bracings (15% assumed)	17	nr	1,750.00	£29,400.00	
	Splice repairs (25% assumed)	28	nr	650.00	£18,200.00	
Diagonal bracings 5m long (280mm x 85mm)						
	Remove diagonal bracings	56	nr	70.00	£3,920.00	
	Refix diagonal bracings	48	nr	250.00	£11,900.00	
	New diagonal bracings (15% assumed)	8	nr	1,400.00	£11,760.00	
	Splice repairs (25% assumed)	14	nr	650.00	£9,100.00	
	New fixings	450	nr	75.00	£33,750.00	
	Temporary propping to refix	1	sum	7,500.00	£7,500.00	
Longitudinal water level ties (280mm x 85mm)						
	Lift longitudinal water level ties	620	m	12.00	£7,440.00	
	Refix longitudinal water level ties	527	m	15.00	£7,905.00	
	New longitudinal water level ties (15% assumed)	93	m	175.00	£16,275.00	
	Splice repairs	0	nr	250.00	£0.00	
	New fixings	252	nr	45.00	£11,340.00	
Lateral water level ties (280mm x 85mm)						
	Lift lateral water level ties	812	m	12.00	£9,744.00	
	Refix lateral water level ties	690	m	15.00	£10,353.00	
	New lateral water level ties (15% assumed)	122	m	175.00	£21,315.00	
	Splice repairs	0	nr	250.00	£0.00	
	New fixings	252	nr	45.00	£11,340.00	
Piles (300mm x 300mm)	***Total nr of piles in area***	***280***	***nr***			
It has been assumed that the repairs to piles will be in the form of splicing or another form of strengthening to the section under water, but not to the section below sea bed level. Assumed pile section requiring repairs are 4m long and 20% of 70nr of pi	Propping (15%)	42	nr	250.00	£10,500.00	
	Cut out and remove (15%)	42	nr	250.00	£10,500.00	
	Piece in (15%)	42	nr	4,000.00	£168,000.00	
	Metal work splice fixings	84	nr	400.00	£33,600.00	
Other timber repairs						
	Heavier pile repairs - provisional sum	1	sum	50,000.00	£50,000.00	
	Sundry timbers - allowance	1	sum	10,000.00	£10,000.00	
						£979,746.00

5 - Area 4: Yard Area						**Appendix D5**
Deck boards (approx. 280mm x 90mm boards)						
	Lift deck boards	700	m^2	15.00	£10,500.00	
	Relay deck boards	560	m^2	15.00	£8,400.00	
	New deck boards 280mm X 90mm (20% assumed)	140	m^2	220.00	£30,800.00	
	New rod fixings	1,200	nr	40.00	£48,000.00	
Deck beams (280mm x 85mm)	***Total nr of deck beams in area***	***216***	***m***			
	Lift deck beams	43	m	7.00	£1,512.00	
	New deck beams (20% assumed)	43	m	95.00	£4,104.00	
	Splice repairs	0	nr	250.00	£0.00	
	New fixings	1	sum	1,500.00	£1,500.00	
Deck joists (280mm x 85mm)						
	Lift deck joists	561	m	7.00	£3,927.00	
	Relay deck joists	477	m	10.00	£4,768.50	
	New deck joists (50% assumed)	84	m	95.00	£7,994.25	
	Splice repairs	50	nr	250.00	£12,500.00	
	New fixings	1	sum	20,000.00	£20,000.00	
Diagonal bracings 10m long (280mm x 85mm)						
	Remove diagonal bracings	60	nr	70.00	£4,200.00	
	Refix diagonal bracings	51	nr	250.00	£12,750.00	
	New diagonal bracings (15% assumed)	9	nr	1,750.00	£15,750.00	
	Splice repairs (25% assumed)	15	nr	650.00	£9,750.00	
Diagonal bracings 5m long (280mm x 85mm)						
	Remove diagonal bracings	30	nr	70.00	£2,100.00	
	Refix diagonal bracings	26	nr	250.00	£6,375.00	
	New diagonal bracings (15% assumed)	5	nr	1,400.00	£6,300.00	
	Splice repairs (25% assumed)	15	nr	650.00	£9,750.00	
	New fixings	180	nr	55.00	£9,900.00	
	Temporary propping to refix	1	sum	3,500.00	£3,500.00	
Longitudinal water level ties (280mm x 85mm)						
	Lift longitudinal water level ties	216	m	12.00	£2,592.00	
	Refix longitudinal water level ties	184	m	175.00	£32,130.00	
	New longitudinal water level ties (15% assumed)	32	m	175.00	£5,670.00	
	Splice repairs	0	nr	250.00	£0.00	
	New fixings	180	nr	45.00	£8,100.00	
Lateral water level ties (280mm x 85mm)						
	Lift lateral water level ties	280	m	12.00	£3,360.00	
	Refix lateral water level ties	238	m	15.00	£3,570.00	
	New lateral water level ties (15% assumed)	42	m	175.00	£7,350.00	
	Splice repairs	0	nr	250.00	£0.00	
	New fixings	180	nr	45.00	£8,100.00	
Piles (300mm x 300mm)	***Total nr of piles in area***	***105***	***nr***			
It has been assumed that the repairs to piles will be in the form of splicing or another form of strengthening to the section under water, but not to the section below sea bed level. Assumed pile section requiring repairs are 4m long and 20% of 70nr of pi	Propping (15%)	0	nr	250.00	£0.00	
	Cut out and remove (15%)	0	nr	250.00	£0.00	
	Piece in (15%)	0	nr	4,000.00	£0.00	
	Metal work splice fixings	32	nr	400.00	£12,600.00	
Other timber repairs						
	Heavier pile repairs - provisional sum	1	sum	5,000.00	£5,000.00	
	Sundry timbers - allowance	1	sum	2,500.00	£2,500.00	
						£325,352.75

5. Pier buildings						**Appendix D5**
Main pier building						
	Allowance for repairs (cost/ m^2 pending further info)	241	m^2	450.00	£108,450.00	
West pier building						
	Allowance for repairs (cost/ m^2 pending further info)	147	m^2	650.00	£95,550.00	
						£204,000.00
0. Demolition costs						
Site mobilisation & demobilisation						
	Mobilisation/ demobilisation	0	sum	20,000.00	£0.00	
	Allowance for divers' work	0	day	1,200.00	£0.00	
Demolition						
	Remove and dispose of timber planking and structural members	0	m^2	75.00	£0.00	
	Remove and dispose of timber piles	0	nr	40.00	£0.00	
	Remove and dispose of concrete caps on northern berthing dolphin (6m x 6m)	0	m^2	200.00	£0.00	
	Remove and dispose of concrete piles on northern berthing dolphin	0	nr	1,000.00	£0.00	
	Remove and dispose of concrete caps on southern berthing dolphin (6m x 6m)	0	m^2	200.00	£0.00	
	Remove and dispose of concrete piles on southern berthing dolphin	0	nr	1,000.00	£0.00	
	Remove and dispose of steel linkspan	0	nr	10,000.00	£0.00	
	Remove and dispose of store shed	0	m^2	100.00	£0.00	
						£0.00
Pile Renewals	Pile Renewal Allowance	0	nr	£ 1,000,000.00		**£0.00**
					Sub Total	**£2,637,898.00**
Preliminaries				18%		**£474,821.64**
						£3,112,719.64
Location factor				6%		**£186,763.18**
						£3,299,482.82
Contingency and Design Development				20%		**£659,896.56**
						£3,959,379.38
					SAY	**£4,000,000.00**

Notes:

1. See Separate Revised Costing Explanation.

Appendix D6

AECOM PARTIAL RETENTION OPTION 1 COST REVIEW

	Description of work	Quantity	Unit	Rate	Amount	Total
1 - Access						
Barge/ pontoon access allowance		1	Sum	500,000.00		
						£500,000.00
2 - Area 1: Pedestrian walkway						
Deck boards (approx. 280mm x 90mm boards)						
	Lift deck boards	610	m^2	15.00	£9,150.00	
	Relay deck boards	488	m^2	15.00	£7,320.00	
	New deck boards 280mm X 90mm (20% assumed)	122	m^2	220.00	£26,840.00	
	New rod fixings	1,200	nr	40.00	£48,000.00	
Deck beams (280mm x 85mm)	***Total nr of deck beams in area***	***168***	***m***			
	Lift deck beams	34	m	7.00	£235.20	
	New deck beams (20% assumed)	34	m	95.00	£3,192.00	
	Splice repairs	0	nr	250.00	£0.00	
	New fixings	1	sum	1,500.00	£1,500.00	
Deck joists (280mm x 85mm)						
	Lift deck joists	501	m	7.00	£3,507.00	
	Relay deck joists	251	m	10.00	£2,505.00	
	New deck joists (50% assumed)	251	m	95.00	£23,797.50	
	Splice repairs	50	nr	350.00	£17,500.00	
	New fixings	1	sum	20,000.00	£20,000.00	
Diagonal bracings 7m long (280mm x 85mm)						
	Remove diagonal bracings	56	nr	70.00	£3,920.00	
	Refix diagonal bracings	48	nr	250.00	£12,000.00	
	New diagonal bracings (15% assumed)	8	nr	1,750.00	£14,000.00	
	Splice repairs (25% assumed)	14	nr	650.00	£9,100.00	
	New fixings	168	nr	55.00	£9,240.00	
	Temporary propping to refix	1	sum	3,500.00	£3,500.00	
Longitudinal water level ties (280mm x 85mm)						
	Lift longitudinal water level ties	255	m	12.00	£3,060.00	
	Refix longitudinal water level ties	217	m	15.00	£3,251.25	
	New longitudinal water level ties (15% assumed)	38	m	175.00	£6,693.75	
	Splice repairs	50	nr	250.00	£12,500.00	
	New fixings	255	nr	45.00	£11,475.00	
Lateral water level ties (280mm x 85mm)						
	Lift lateral water level ties	168	m	12.00	£2,016.00	
	Refix lateral water level ties	143	m	15.00	£2,142.00	
	New lateral water level ties (15% assumed)	25	m	175.00	£4,410.00	
	Splice repairs	0	nr	250.00	£0.00	
	New fixings	168	nr	45.00	£7,560.00	
Piles (300mm x 300mm)	***Total nr of piles in area***	***70***	***nr***			
It has been assumed that the repairs to piles will be in the form of splicing or another form of strengthening to the section under water, but not to the section below sea bed level. Assumed pile section requiring repairs are 4m long and 20% of 70nr of pi	Propping (20%)	14	nr	250.00	£3,500.00	
	Cut out and remove (20%)	14	nr	250.00	£3,500.00	
	Piece in (20%)	14	nr	4,000.00	£56,000.00	
	Metal work splice fixings	28	nr	400.00	£11,200.00	
Other timber repairs						
	Heavier pile repairs - provisional sum	0	sum	15,000.00	£0.00	
	Sundry timbers - allowance	0	sum	2,500.00	£0.00	
	Take down and re-erect balustrade fence	0	m	35.00	£0.00	
						£342,614.70

3 - Area 2: Pier west end						**Appendix D6**
Deck boards (approx. 280mm x 90mm boards)						
	Lift deck boards	678	m^2	15.00	£10,170.00	
	Relay deck boards	542	m^2	15.00	£8,136.00	
	New deck boards 280mm X 90mm (20% assumed)	136	m^2	220.00	£29,920.00	
	New rod fixings	1,200	nr	40.00	£48,000.00	
Deck beams (280mm x 85mm)	***Total nr of deck beams in area***	***216***	***m***			
	Lift deck beams	43	m	7.00	£301.00	
	New deck beams (20% assumed)	43	m	95.00	£4,085.00	
	Splice repairs	0	nr	250.00	£0.00	
	New fixings	1	sum	1,500.00	£1,500.00	
Deck joists (280mm x 85mm)						
	Lift deck joists	561	m	7.00	£3,927.00	
	Relay deck joists	239	m	10.00	£2,389.86	
	New deck joists (15% assumed)	322	m	95.00	£30,591.33	
	Splice repairs	0	nr	250.00	£0.00	
	New fixings	1	sum	20,000.00	£20,000.00	
Diagonal bracings 10m long (280mm x 85mm)						
	Remove diagonal bracings	60	nr	70.00	£4,200.00	
	Refix diagonal bracings	51	nr	250.00	£12,750.00	
	New diagonal bracings (15% assumed)	9	nr	1,750.00	£15,750.00	
	Splice repairs (25% assumed)	15	nr	650.00	£9,750.00	
Diagonal bracings 5m long (280mm x 85mm)						
	Remove diagonal bracings	30	nr	70.00	£2,100.00	
	Refix diagonal bracings	25	nr	250.00	£6,250.00	
	New diagonal bracings (15% assumed)	5	nr	1,400.00	£7,000.00	
	Splice repairs (25% assumed)	8	nr	650.00	£5,200.00	
	New fixings	180	nr	55.00	£9,900.00	
	Temporary propping to refix	1	sum	3,500.00	£3,500.00	
Longitudinal water level ties (280mm x 85mm)						
	Lift longitudinal water level ties	216	m	12.00	£2,592.00	
	Refix longitudinal water level ties	183	m	15.00	£2,745.00	
	New longitudinal water level ties (15% assumed)	32	m	175.00	£5,670.00	
	Splice repairs	0	nr	250.00	£0.00	
	New fixings	216	nr	45.00	£9,720.00	
Lateral water level ties (280mm x 85mm)						
	Lift lateral water level ties	280	m	12.00	£3,360.00	
	Refix lateral water level ties	238	m	15.00	£3,570.00	
	New lateral water level ties (15% assumed)	42	m	175.00	£7,350.00	
	Splice repairs	0	nr	250.00	£0.00	
	New fixings	280	nr	45.00	£12,600.00	
Piles (300mm x 300mm)	***Total nr of piles in area***	***105***	***nr***			
It has been assumed that the repairs to piles will be in the form of splicing or another form of strengthening to the section under water, but not to the section below sea bed level. Assumed pile section requiring repairs are 4m long and 20% of 70nr of pi	Propping (20%)	16	nr	250.00	£4,000.00	
	Cut out and remove (20%)	16	nr	250.00	£4,000.00	
	Piece in (20%)	16	nr	4,000.00	£64,000.00	
	Metal work splice fixings	32	nr	400.00	£12,800.00	
Other timber repairs						
	Heavier pile repairs - provisional sum	1	sum	5,000.00	£5,000.00	
	Sundry timbers - allowance	1	sum	2,500.00	£2,500.00	
						£375,327.19

4 - Area 3: Main pier						**Appendix D6**
Deck boards (approx. 280mm x 90mm boards)						
	Lift deck boards	1,647	m^2	15.00	£24,700.80	
	Relay deck boards	1,317	m^2	15.00	£19,760.64	
	New deck boards 280mm X 90mm (20% assumed)	329	m^2	220.00	£72,455.68	
	New rod fixings	2,075	nr	40.00	£83,000.00	
Deck beams (280mm x 85mm)	***Total nr of deck beams in area***	***515***	***m***			
	Lift deck beams	103	m	7.00	£721.60	
	New deck beams (20% assumed)	103	m	95.00	£9,793.17	
	Splice repairs	0	nr	250.00	£0.00	
	New fixings	1	sum	2,490.00	£2,490.00	
Deck joists (280mm x 85mm)						
	Lift deck joists	1,348	m	7.00	£9,435.44	
	Relay deck joists	1,186	m	10.00	£11,861.70	
	New deck joists (50% assumed)	162	m	95.00	£15,366.29	
	Splice repairs	42	nr	250.00	£10,500.00	
	New fixings	1	sum	33,200.00	£33,200.00	
Diagonal bracings 10m long (280mm x 85mm)						
	Remove diagonal bracings	93	nr	70.00	£6,510.00	
	Refix diagonal bracings	80	nr	250.00	£20,000.00	
	New diagonal bracings (15% assumed)	14	nr	2,000.00	£28,000.00	
	Splice repairs (25% assumed)	24	nr	650.00	£15,600.00	
Diagonal bracings 7m long (280mm x 85mm)						
	Remove diagonal bracings	93	nr	70.00	£6,510.00	
	Refix diagonal bracings	80	nr	250.00	£20,000.00	
	New diagonal bracings (15% assumed)	14	nr	1,750.00	£24,500.00	
	Splice repairs (25% assumed)	24	nr	650.00	£15,600.00	
Diagonal bracings 5m long (280mm x 85mm)						
	Remove diagonal bracings	47	nr	70.00	£3,290.00	
	Refix diagonal bracings	40	nr	250.00	£10,000.00	
	New diagonal bracings (15% assumed)	7	nr	1,400.00	£9,800.00	
	Splice repairs (25% assumed)	12	nr	650.00	£7,800.00	
	New fixings	374	nr	75.00	£28,050.00	
	Temporary propping to refix	1	sum	6,225.00	£6,225.00	
Longitudinal water level ties (280mm x 85mm)						
	Lift longitudinal water level ties	515	m	12.00	£6,175.20	
	Refix longitudinal water level ties	437	m	15.00	£6,561.15	
	New longitudinal water level ties (15% assumed)	77	m	175.00	£13,508.25	
	Splice repairs	0	nr	250.00	£0.00	
	New fixings	515	nr	45.00	£23,175.00	
Lateral water level ties (280mm x 85mm)						
	Lift lateral water level ties	674	m	12.00	£8,087.52	
	Refix lateral water level ties	573	m	15.00	£8,592.99	
	New lateral water level ties (15% assumed)	101	m	175.00	£17,691.45	
	Splice repairs	0	nr	250.00	£0.00	
	New fixings	674	nr	45.00	£30,330.00	
Piles (300mm x 300mm)	***Total nr of piles in area***	***232***	***nr***			
It has been assumed that the repairs to piles will be in the form of splicing or another form of strengthening to the section under water, but not to the section below sea bed level. Assumed pile section requiring repairs are 4m long and 20% of 70nr of pi	Propping (15%)	35	nr	250.00	£8,750.00	
	Cut out and remove (15%)	35	nr	250.00	£8,750.00	
	Piece in (15%)	35	nr	4,000.00	£140,000.00	
	Metal work splice fixings	70	nr	400.00	£28,000.00	
Other timber repairs						
	Heavier pile repairs - provisional sum	1	sum	41,500.00	£41,500.00	
	Sundry timbers - allowance	1	sum	8,300.00	£8,300.00	
						£844,591.88

5 - Area 4: Yard Area						Appendix D6
Deck boards (approx. 280mm x 90mm boards)						
	Lift deck boards	0	m^2	15.00	£0.00	
	Relay deck boards	0	m^2	15.00	£0.00	
	New deck boards 280mm X 90mm (20% assumed)	0	m^2	220.00	£0.00	
	New rod fixings	0	nr	40.00	£0.00	
Deck beams (280mm x 85mm)	***Total nr of deck beams in area***	***0***	***m***			
	Lift deck beams	0	m	7.00	£0.00	
	New deck beams (20% assumed)	0	m	95.00	£0.00	
	Splice repairs	0	nr	250.00	£0.00	
	New fixings	0	sum	1,500.00	£0.00	
Deck joists (280mm x 85mm)						
	Lift deck joists	0	m	7.00	£0.00	
	Relay deck joists	0	m	10.00	£0.00	
	New deck joists (50% assumed)	0	m	95.00	£0.00	
	Splice repairs	0	nr	250.00	£0.00	
	New fixings	0	sum	20,000.00	£0.00	
Diagonal bracings 10m long (280mm x 85mm)						
	Remove diagonal bracings	0	nr	70.00	£0.00	
	Refix diagonal bracings	0	nr	250.00	£0.00	
	New diagonal bracings (15% assumed)	0	nr	1,750.00	£0.00	
	Splice repairs (25% assumed)	0	nr	650.00	£0.00	
Diagonal bracings 5m long (280mm x 85mm)						
	Remove diagonal bracings	0	nr	70.00	£0.00	
	Refix diagonal bracings	0	nr	250.00	£0.00	
	New diagonal bracings (15% assumed)	0	nr	1,400.00	£0.00	
	Splice repairs (25% assumed)	0	nr	650.00	£0.00	
	New fixings	0	nr	55.00	£0.00	
	Temporary propping to refix	0	sum	3,500.00	£0.00	
Longitudinal water level ties (280mm x 85mm)						
	Lift longitudinal water level ties	0	m	12.00	£0.00	
	Refix longitudinal water level ties	0	m	175.00	£0.00	
	New longitudinal water level ties (15% assumed)	0	m	175.00	£0.00	
	Splice repairs	0	nr	250.00	£0.00	
	New fixings	0	nr	45.00	£0.00	
Lateral water level ties (280mm x 85mm)						
	Lift lateral water level ties	0	m	12.00	£0.00	
	Refix lateral water level ties	0	m	15.00	£0.00	
	New lateral water level ties (15% assumed)	0	m	175.00	£0.00	
	Splice repairs	0	nr	250.00	£0.00	
	New fixings	0	nr	45.00	£0.00	
Piles (300mm x 300mm)	***Total nr of piles in area***	***0***	***nr***			
It has been assumed that the repairs to piles will be in the form of splicing or another form of strengthening to the section under water, but not to the section below sea bed level. Assumed pile section requiring repairs are 4m long and 20% of 70nr of pi	Propping (15%)	0	nr	250.00	£0.00	
	Cut out and remove (15%)	0	nr	250.00	£0.00	
	Piece in (15%)	0	nr	4,000.00	£0.00	
	Metal work splice fixings	0	nr	400.00	£0.00	
Other timber repairs						
	Heavier pile repairs - provisional sum	0	sum	5,000.00	£0.00	
	Sundry timbers - allowance	0	sum	2,500.00	£0.00	
					DEMOLISHED	**£0.00**

						Appendix D6
5. Pier buildings						
Main pier building						
	Allowance for repairs (cost/ m^2 pending further info)	241	m^2	450.00	£108,450.00	
West pier building						
	Allowance for repairs (cost/ m^2 pending further info)	147	m^2	650.00	£95,550.00	
						£204,000.00
6. Demolition costs						
Site mobilisation & demobilisation						
	Mobilisation/ demobilisation	1	sum	20,000.00	£20,000.00	
	Allowance for divers' work	2	day	1,200.00	£2,400.00	
Demolition						
	Remove and dispose of timber planking and structural members	1,600	m^2	75.00	£120,000.00	
	Remove and dispose of timber piles	150	nr	40.00	£6,000.00	
	Remove and dispose of concrete caps on northern berthing dolphin (6m x 6m)	36	m^2	200.00	£7,200.00	
	Remove and dispose of concrete piles on northern berthing dolphin	12	nr	1,000.00	£12,000.00	
	Remove and dispose of concrete caps on southern berthing dolphin (6m x 6m)	36	m^2	200.00	£7,200.00	
	Remove and dispose of concrete piles on southern berthing dolphin	14	nr	1,000.00	£14,000.00	
	Remove and dispose of steel linkspan	1	nr	10,000.00	£10,000.00	
	Remove and dispose of store shed	144	m^2	100.00	£14,400.00	
						£213,200.00
Pile Renewals	Pile Renewal Allowance	0	nr	£ 1,000,000.00		**£0.00**
					Sub Total	**£2,479,733.77**
Preliminaries				18%		**£446,352.08**
						£2,926,085.84
Location factor				6%		**£175,565.15**
						£3,101,650.99
Contingency and Design Development				20%		**£620,330.20**
						£3,721,981.19
					SAY	**£3,750,000.00**

Notes:

1. Under this option, the Demolition costs are for the demolition of 17% of Area 3 (Main Pier), 100% of Area 4 (Yard Area), and 100% of Area 5 (Berthing dolphins).
2. It has been assumed that the demolition will be completed using floating plant.
3. It has been assumed that divers will be required to ensure no debris is left on the seabed.
4. It has been assumed that there will be no requirement for the disposal of hazardous materials during this work.
5. Landfill tax has not been included in the Cost Estimate, as the quantities of materials to be disposed of to landfill has not been confirmed at this stage.

Appendix D7

AECOM PARTIAL RETENTION OPTION 2 COST REVIEW

	Description of work	Quantity	Unit	Rate	Amount	Total
1 - Access						
Barge/ pontoon access allowance		1	Sum	500,000.00		
						£500,000.00
2 - Area 1: Pedestrian walkway						
Deck boards (approx. 280mm x 90mm boards)						
	Lift deck boards	610	m^2	15.00	£9,150.00	
	Relay deck boards	488	m^2	15.00	£7,320.00	
	New deck boards 280mm X 90mm (20% assumed)	122	m^2	220.00	£26,840.00	
	New rod fixings	1,200	nr	40.00	£48,000.00	
Deck beams (280mm x 85mm)	***Total nr of deck beams in area***	***168***	***m***			
	Lift deck beams	34	m	7.00	£235.20	
	New deck beams (20% assumed)	34	m	95.00	£3,192.00	
	Splice repairs	0	nr	250.00	£0.00	
	New fixings	1	sum	1,500.00	£1,500.00	
Deck joists (280mm x 85mm)						
	Lift deck joists	501	m	7.00	£3,507.00	
	Relay deck joists	251	m	10.00	£2,505.00	
	New deck joists (50% assumed)	251	m	95.00	£23,797.50	
	Splice repairs	50	nr	350.00	£17,500.00	
	New fixings	1	sum	20,000.00	£20,000.00	
Diagonal bracings 7m long (280mm x 85mm)						
	Remove diagonal bracings	56	nr	70.00	£3,920.00	
	Refix diagonal bracings	48	nr	250.00	£12,000.00	
	New diagonal bracings (15% assumed)	8	nr	1,750.00	£14,000.00	
	Splice repairs (25% assumed)	14	nr	650.00	£9,100.00	
	New fixings	168	nr	55.00	£9,240.00	
	Temporary propping to refix	1	sum	3,500.00	£3,500.00	
Longitudinal water level ties (280mm x 85mm)						
	Lift longitudinal water level ties	255	m	12.00	£3,060.00	
	Refix longitudinal water level ties	217	m	15.00	£3,251.25	
	New longitudinal water level ties (15% assumed)	38	m	175.00	£6,693.75	
	Splice repairs	50	nr	250.00	£12,500.00	
	New fixings	255	nr	45.00	£11,475.00	
Lateral water level ties (280mm x 85mm)						
	Lift lateral water level ties	168	m	12.00	£2,016.00	
	Refix lateral water level ties	143	m	15.00	£2,142.00	
	New lateral water level ties (15% assumed)	25	m	175.00	£4,410.00	
	Splice repairs	0	nr	250.00	£0.00	
	New fixings	168	nr	45.00	£7,560.00	
Piles (300mm x 300mm)	***Total nr of piles in area***	***70***	***nr***			
It has been assumed that the repairs to piles will be in the form of splicing or another form of strengthening to the section under water, but not to the section below sea bed level. Assumed pile	Propping (20%)	14	nr	250.00	£3,500.00	
	Cut out and remove (20%)	14	nr	250.00	£3,500.00	
	Piece in (20%)	14	nr	4,000.00	£56,000.00	
	Metal work splice fixings	28	nr	400.00	£11,200.00	
Other timber repairs						
	Heavier pile repairs - provisional sum	0	sum	15,000.00	£0.00	
	Sundry timbers - allowance	0	sum	2,500.00	£0.00	
	Take down and re-erect balustrade fence	0	m	35.00	£0.00	
						£342,614.70

3 - Area 2: Pier west end						**Appendix D7**
Deck boards (approx. 280mm x 90mm boards)						
	Lift deck boards	454	m^2	15.00	£6,813.90	
	Relay deck boards	363	m^2	15.00	£5,451.12	
	New deck boards 280mm X 90mm (20% assumed)	91	m^2	220.00	£19,987.44	
	New rod fixings	804	nr	40.00	£32,160.00	
Deck beams (280mm x 85mm)	***Total nr of deck beams in area***	***145***	***m***			
	Lift deck beams	29	m	7.00	£202.61	
	New deck beams (20% assumed)	29	m	95.00	£2,749.68	
	Splice repairs	0	nr	250.00	£0.00	
	New fixings	1	sum	1,005.00	£1,005.00	
Deck joists (280mm x 85mm)						
	Lift deck joists	376	m	7.00	£2,631.09	
	Relay deck joists	160	m	10.00	£1,601.21	
	New deck joists (50% assumed)	216	m	95.00	£20,496.19	
	Splice repairs	0	nr	250.00	£0.00	
	New fixings	1	sum	13,400.00	£13,400.00	
Diagonal bracings 10m long (280mm x 85mm)						
	Remove diagonal bracings	40	nr	70.00	£2,800.00	
	Refix diagonal bracings	34	nr	250.00	£8,500.00	
	New diagonal bracings (15% assumed)	6	nr	2,000.00	£12,000.00	
	Splice repairs (25% assumed)	10	nr	650.00	£6,500.00	
Diagonal bracings 5m long (280mm x 85mm)						
	Remove diagonal bracings	20	nr	70.00	£1,400.00	
	Refix diagonal bracings	17	nr	250.00	£4,250.00	
	New diagonal bracings (15% assumed)	3	nr	1,400.00	£4,200.00	
	Splice repairs (25% assumed)	5	nr	650.00	£3,250.00	
	New fixings	121	nr	75.00	£9,075.00	
	Temporary propping to refix	1	sum	2,345.00	£2,345.00	
Longitudinal water level ties (280mm x 85mm)						
	Lift longitudinal water level ties	145	m	12.00	£1,736.64	
	Refix longitudinal water level ties	123	m	15.00	£1,845.18	
	New longitudinal water level ties (15% assumed)	22	m	175.00	£3,798.90	
	Splice repairs	0	nr	250.00	£0.00	
	New fixings	145	nr	45.00	£6,525.00	
Lateral water level ties (280mm x 85mm)						
	Lift lateral water level ties	188	m	12.00	£2,251.20	
	Refix lateral water level ties	159	m	15.00	£2,391.90	
	New lateral water level ties (15% assumed)	28	m	175.00	£4,924.50	
	Splice repairs	0	nr	250.00	£0.00	
	New fixings	188	nr	45.00	£8,460.00	
Piles (300mm x 300mm)	***Total nr of piles in area***	***70***	***nr***			
It has been assumed that the repairs to piles will be in the form of splicing or another form of strengthening to the section under water, but not to the section below sea bed level. Assumed pile	Propping (15%)	11	nr	250.00	£2,750.00	
	Cut out and remove (15%)	11	nr	250.00	£2,750.00	
	Piece in (15%)	11	nr	4,000.00	£44,000.00	
	Metal work splice fixings	21	nr	400.00	£8,400.00	
Other timber repairs						
	Heavier pile repairs - provisional sum	1	sum	3,350.00	£3,350.00	
	Sundry timbers - allowance	1	sum	1,675.00	£1,675.00	
						£255,676.56

4 - Area 3: Main pier						**Appendix D7**
Deck boards (approx. 280mm x 90mm boards)						
	Lift deck boards	952	m^2	15.00	£14,284.80	
	Relay deck boards	762	m^2	15.00	£11,427.84	
	New deck boards 280mm X 90mm (20% assumed)	190	m^2	220.00	£41,902.08	
	New rod fixings	1,200	nr	40.00	£48,000.00	
Deck beams (280mm x 85mm)	***Total nr of deck beams in area***	***298***	***m***			
	Lift deck beams	60	m	7.00	£417.31	
	New deck beams (20% assumed)	60	m	95.00	£5,663.52	
	Splice repairs	0	nr	250.00	£0.00	
	New fixings	1	sum	1,440.00	£1,440.00	
Deck joists (280mm x 85mm)						
	Lift deck joists	780	m	7.00	£5,456.64	
	Relay deck joists	686	m	10.00	£6,859.78	
	New deck joists (50% assumed)	94	m	95.00	£8,886.53	
	Splice repairs	24	nr	250.00	£6,000.00	
	New fixings	1	sum	19,200.00	£19,200.00	
Diagonal bracings 10m long (280mm x 85mm)						
	Remove diagonal bracings	54	nr	70.00	£3,780.00	
	Refix diagonal bracings	46	nr	250.00	£11,500.00	
	New diagonal bracings (15% assumed)	8	nr	2,000.00	£16,000.00	
	Splice repairs (25% assumed)	14	nr	650.00	£9,100.00	
Diagonal bracings 7m long (280mm x 85mm)						
	Remove diagonal bracings	54	nr	70.00	£3,780.00	
	Refix diagonal bracings	46	nr	250.00	£11,500.00	
	New diagonal bracings (15% assumed)	8	nr	1,750.00	£14,000.00	
	Splice repairs (25% assumed)	14	nr	650.00	£9,100.00	
Diagonal bracings 5m long (280mm x 85mm)						
	Remove diagonal bracings	27	nr	70.00	£1,890.00	
	Refix diagonal bracings	23	nr	250.00	£5,750.00	
	New diagonal bracings (15% assumed)	4	nr	1,400.00	£5,600.00	
	Splice repairs (25% assumed)	7	nr	650.00	£4,550.00	
	New fixings	216	nr	75.00	£16,200.00	
	Temporary propping to refix	1	sum	3,600.00	£3,600.00	
Longitudinal water level ties (280mm x 85mm)						
	Lift longitudinal water level ties	298	m	12.00	£3,571.20	
	Refix longitudinal water level ties	253	m	15.00	£3,794.40	
	New longitudinal water level ties (15% assumed)	45	m	175.00	£7,812.00	
	Splice repairs	0	nr	250.00	£0.00	
	New fixings	298	nr	45.00	£13,410.00	
Lateral water level ties (280mm x 85mm)						
	Lift lateral water level ties	390	m	12.00	£4,677.12	
	Refix lateral water level ties	331	m	15.00	£4,969.44	
	New lateral water level ties (15% assumed)	58	m	175.00	£10,231.20	
	Splice repairs	0	nr	250.00	£0.00	
	New fixings	390	nr	45.00	£17,550.00	
Piles (300mm x 300mm)	***Total nr of piles in area***	***134***	***nr***			
It has been assumed that the repairs to piles will be in the form of splicing or another form of strengthening to the section under water, but not to the section below sea bed level. Assumed pile	Propping (15%)	20	nr	250.00	£5,000.00	
	Cut out and remove (15%)	20	nr	250.00	£5,000.00	
	Piece in (15%)	20	nr	4,000.00	£80,000.00	
	Metal work splice fixings	40	nr	400.00	£16,000.00	
Other timber repairs						
	Heavier pile repairs - provisional sum	1	sum	24,000.00	£24,000.00	
	Sundry timbers - allowance	1	sum	4,800.00	£4,800.00	
						£486,703.86

5 - Area 4: Yard Area						**Appendix D7**
Deck boards (approx. 280mm x 90mm boards)						
	Lift deck boards	0	m^2	15.00	£0.00	
	Relay deck boards	0	m^2	15.00	£0.00	
	New deck boards 280mm X 90mm (20% assumed)	0	m^2	220.00	£0.00	
	New rod fixings	0	nr	40.00	£0.00	
Deck beams (280mm x 85mm)	***Total nr of deck beams in area***	***0***	***m***			
	Lift deck beams	0	m	7.00	£0.00	
	New deck beams (20% assumed)	0	m	95.00	£0.00	
	Splice repairs	0	nr	250.00	£0.00	
	New fixings	0	sum	1,500.00	£0.00	
Deck joists (280mm x 85mm)						
	Lift deck joists	0	m	7.00	£0.00	
	Relay deck joists	0	m	10.00	£0.00	
	New deck joists (50% assumed)	0	m	95.00	£0.00	
	Splice repairs	0	nr	250.00	£0.00	
	New fixings	0	sum	20,000.00	£0.00	
Diagonal bracings 10m long (280mm x 85mm)						
	Remove diagonal bracings	0	nr	70.00	£0.00	
	Refix diagonal bracings	0	nr	250.00	£0.00	
	New diagonal bracings (15% assumed)	0	nr	1,750.00	£0.00	
	Splice repairs (25% assumed)	0	nr	650.00	£0.00	
Diagonal bracings 5m long (280mm x 85mm)						
	Remove diagonal bracings	0	nr	70.00	£0.00	
	Refix diagonal bracings	0	nr	250.00	£0.00	
	New diagonal bracings (15% assumed)	0	nr	1,400.00	£0.00	
	Splice repairs (25% assumed)	0	nr	650.00	£0.00	
	New fixings	0	nr	55.00	£0.00	
	Temporary propping to refix	0	sum	3,500.00	£0.00	
Longitudinal water level ties (280mm x 85mm)						
	Lift longitudinal water level ties	0	m	12.00	£0.00	
	Refix longitudinal water level ties	0	m	175.00	£0.00	
	New longitudinal water level ties (15% assumed)	0	m	175.00	£0.00	
	Splice repairs	0	nr	250.00	£0.00	
	New fixings	0	nr	45.00	£0.00	
Lateral water level ties (280mm x 85mm)						
	Lift lateral water level ties	0	m	12.00	£0.00	
	Refix lateral water level ties	0	m	15.00	£0.00	
	New lateral water level ties (15% assumed)	0	m	175.00	£0.00	
	Splice repairs	0	nr	250.00	£0.00	
	New fixings	0	nr	45.00	£0.00	
Piles (300mm x 300mm)	***Total nr of piles in area***	***0***	***nr***			
It has been assumed that the repairs to piles will be in the form of splicing or another form of strengthening to the section under water, but not to the section below sea bed level. Assumed pile	Propping (15%)	0	nr	250.00	£0.00	
	Cut out and remove (15%)	0	nr	250.00	£0.00	
	Piece in (15%)	0	nr	4,000.00	£0.00	
	Metal work splice fixings	0	nr	400.00	£0.00	
Other timber repairs						
	Heavier pile repairs - provisional sum	0	sum	5,000.00	£0.00	
	Sundry timbers - allowance	0	sum	2,500.00	£0.00	
					DEMOLISHED	**£0.00**

Appendix D7

5. Pier buildings						
Main pier building						
	Allowance for repairs (cost/ m^2 pending further info)	241	m^2	450.00	£108,450.00	
West pier building						
	Allowance for repairs (cost/ m^2 pending further info)	147	m^2	650.00	£95,550.00	
						£204,000.00
6. Demolition costs						
Site mobilisation & demobilisation						
	Mobilisation/ demobilisation	1	sum	20,000.00	£20,000.00	
	Allowance for divers' work	3	day	1,200.00	£3,600.00	
Demolition						
	Remove and dispose of timber planking and structural members	2,580	m^2	75.00	£193,500.00	
	Remove and dispose of timber piles	285	nr	40.00	£11,400.00	
	Remove and dispose of concrete caps on northern berthing dolphin (6m x 6m)	36	m^2	200.00	£7,200.00	
	Remove and dispose of concrete piles on northern berthing dolphin	12	nr	1,000.00	£12,000.00	
	Remove and dispose of concrete caps on southern berthing dolphin (6m x 6m)	36	m^2	200.00	£7,200.00	
	Remove and dispose of concrete piles on southern berthing dolphin	14	nr	1,000.00	£14,000.00	
	Remove and dispose of steel linkspan	1	nr	10,000.00	£10,000.00	
	Remove and dispose of store shed	144	m^2	100.00	£14,400.00	
						£293,300.00
Pile Renewals	Pile Renewal Allowance	0	nr	£ 1,000,000.00		**£0.00**
					Sub Total	**£2,082,295.11**
Preliminaries				18%		**£374,813.12**
						£2,457,108.23
Location factor				6%		**£147,426.49**
						£2,604,534.73
Contingency and Design Development				20%		**£520,906.95**
						£3,125,441.67
					SAY	**£3,250,000.00**

Notes:

1. Under this option, 33% of Area 2 (Pier West End), 52% of Area 3 (Main Pier), 100% of Area 4 (Yard Area), and 100% of Area 5 (Berthing dolphins) are to be demolished.
2. It has been assumed that the demolition will be completed using floating plant.
3. It has been assumed that divers will be required to ensure no debris is left on the seabed.
4. It has been assumed that there will be no requirement for the disposal of hazardous materials during this work.
5. Landfill tax has not been included in the Cost Estimate, as the quantities of materials to be disposed of to landfill has not been confirmed at this stage.

Appendix E
Recent Survey Information

STUDENT GROUP CDC 66

DUNOON PIER TIMBER PILE SURVEY
September 2011

PROFESSIONAL DIVING ACADEMY
UNIT 19, SANDBANK BUSINESS PARK
SANDBANK, DUNOON
Tel: 01369 701 701
Email: info@professionaldivingacademy
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STUDENT GROUP CDC 66

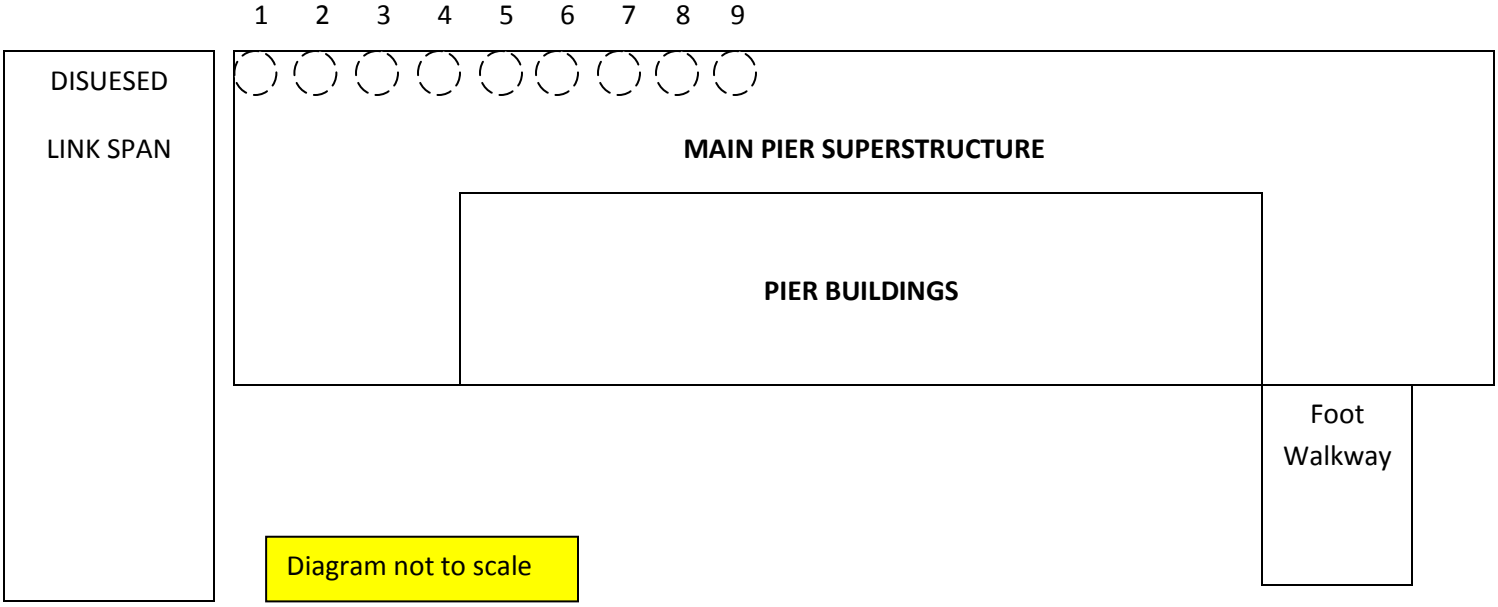
Overview:

Student group CDC 66 were contracted by PDA Management Group International, to carry out a detailed visual inspection including circumference measurements of the timber piles of the Victorian Pier based in Dunoon, Scotland. The inspection would be carried out along the outer East facing section of the timber pier and would be supplemented using underwater stills photography when visibility permitted. This was to be an initial survey prior to a more detailed inspection by a later student group who would take time to clean marine growth for a better inspection of timber beneath. Therefore all circumference measurements are reflective of existing marine growth and therefore only provide a basic overview of any underlying corrosion problems.

Method:

A student dive team from CDC 66 arrived on site, and set up the dive station close to the waters edge. The dive supervisor after liaising with pier engineers on a previous occasion held a safety briefing with the dive team and explained the job method required for the successful completion of the task. Risk assessments were drawn up and all personnel were instructed to adhere to the contents of these assessments at all times. It was apparent from the length of the survey area that the diver's lifelines could possibly become entangled around pier piles and as the survey was conducted using SCUBA equipment the decision was taken not to penetrate beneath the pier for the time being.

The diver entered the water at the ladder (see diagram) and progressed towards the link-span on the North outer face of the pier where he would commence the inspection from diagram pile number 1. The diver would check for scour at the base and would comment on marine growth and physical damage as he began taking circumference measurements working from the pile base upwards in 0.5m increments



Imagery:

The following photographic stills (fig: 1 – fig: 6) images represents a general overview of timber pile condition within the scope areas of the inspection. Marine growth is evident in most images.

Fig: 1

Fig: 2

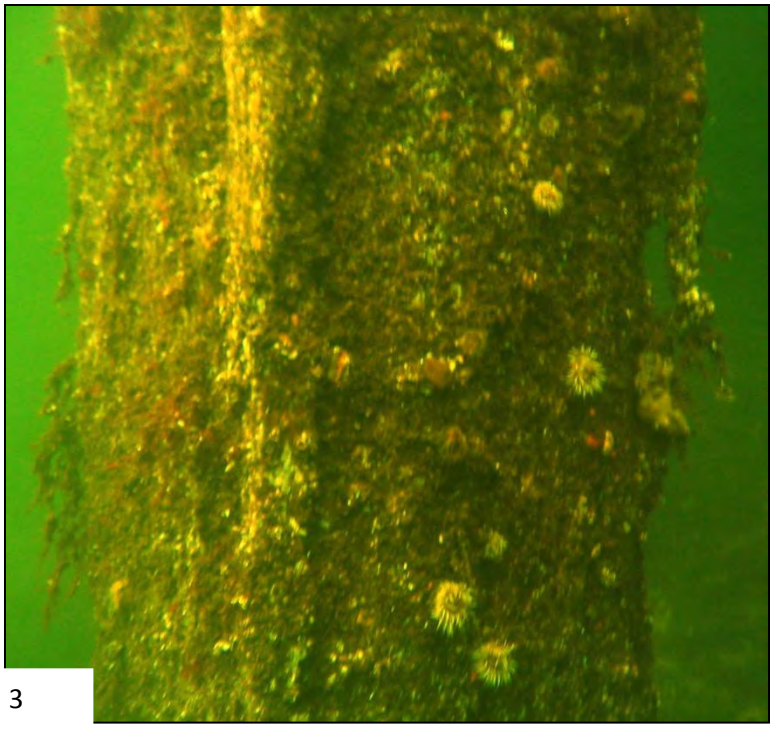


Fig: 3

STUDENT GROUP CDC 66

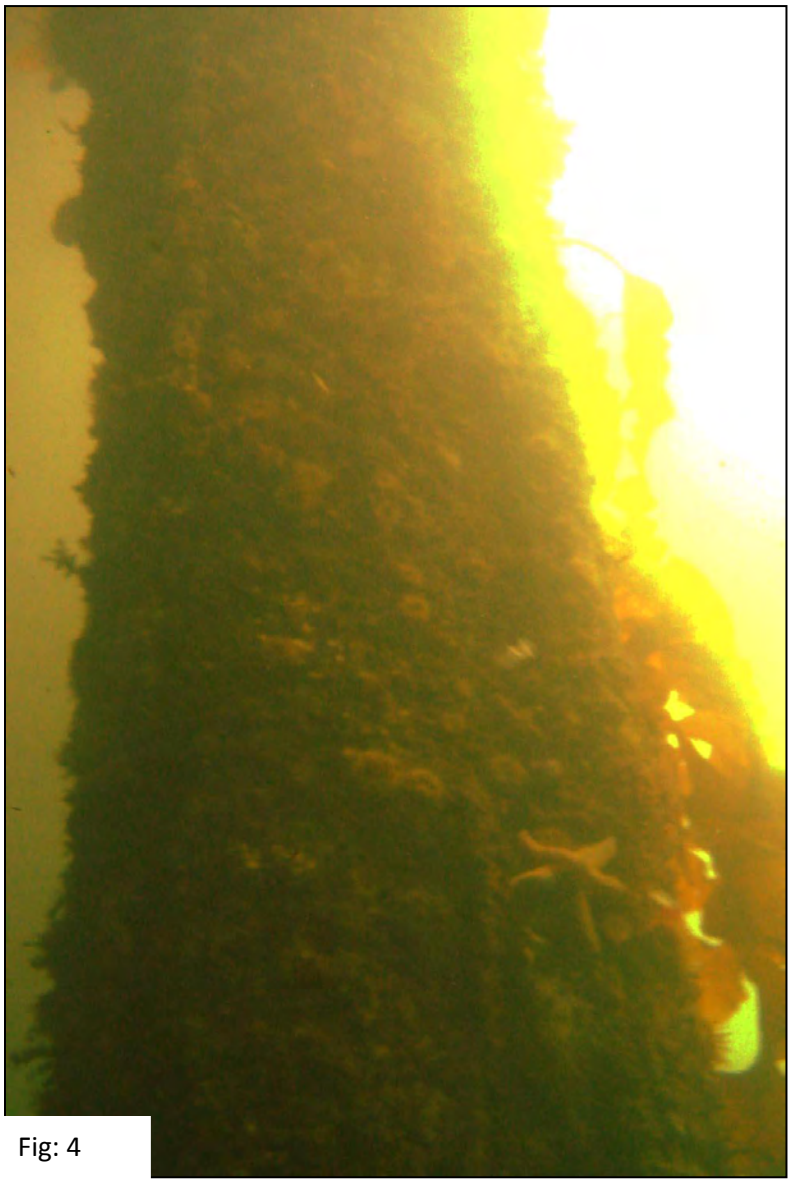


Fig: 4

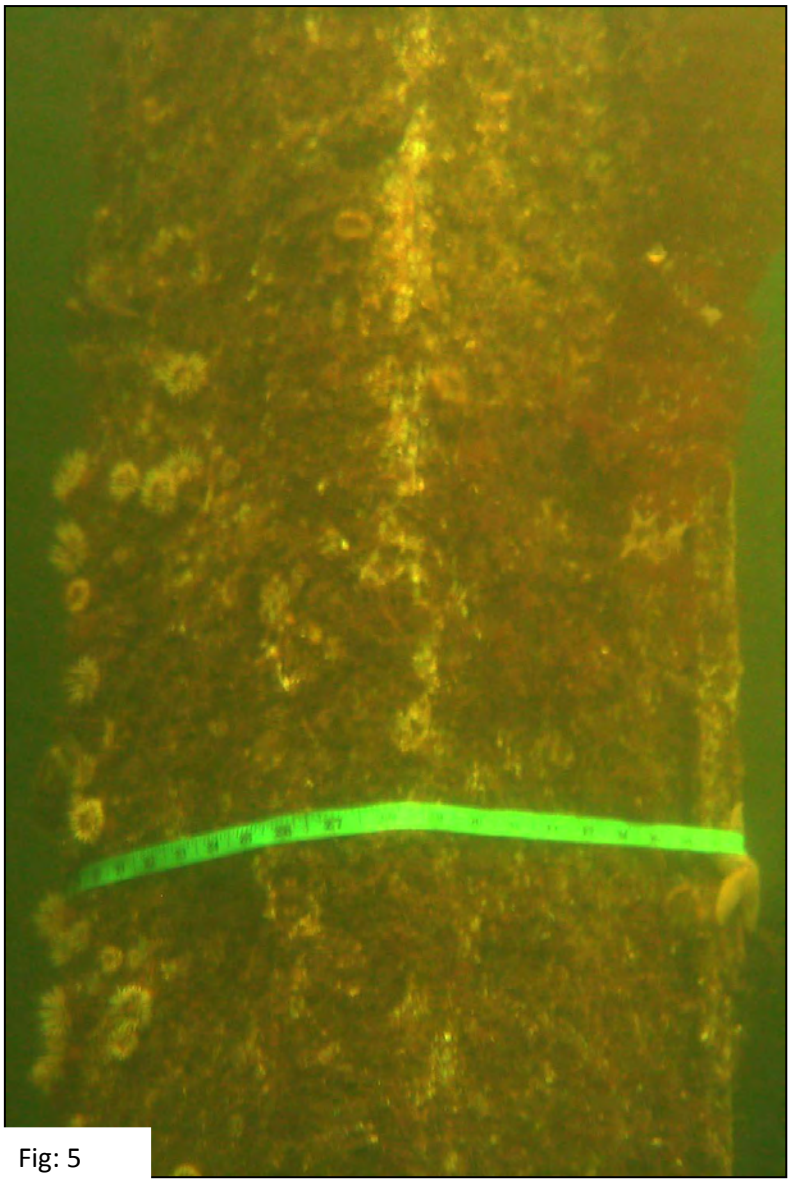


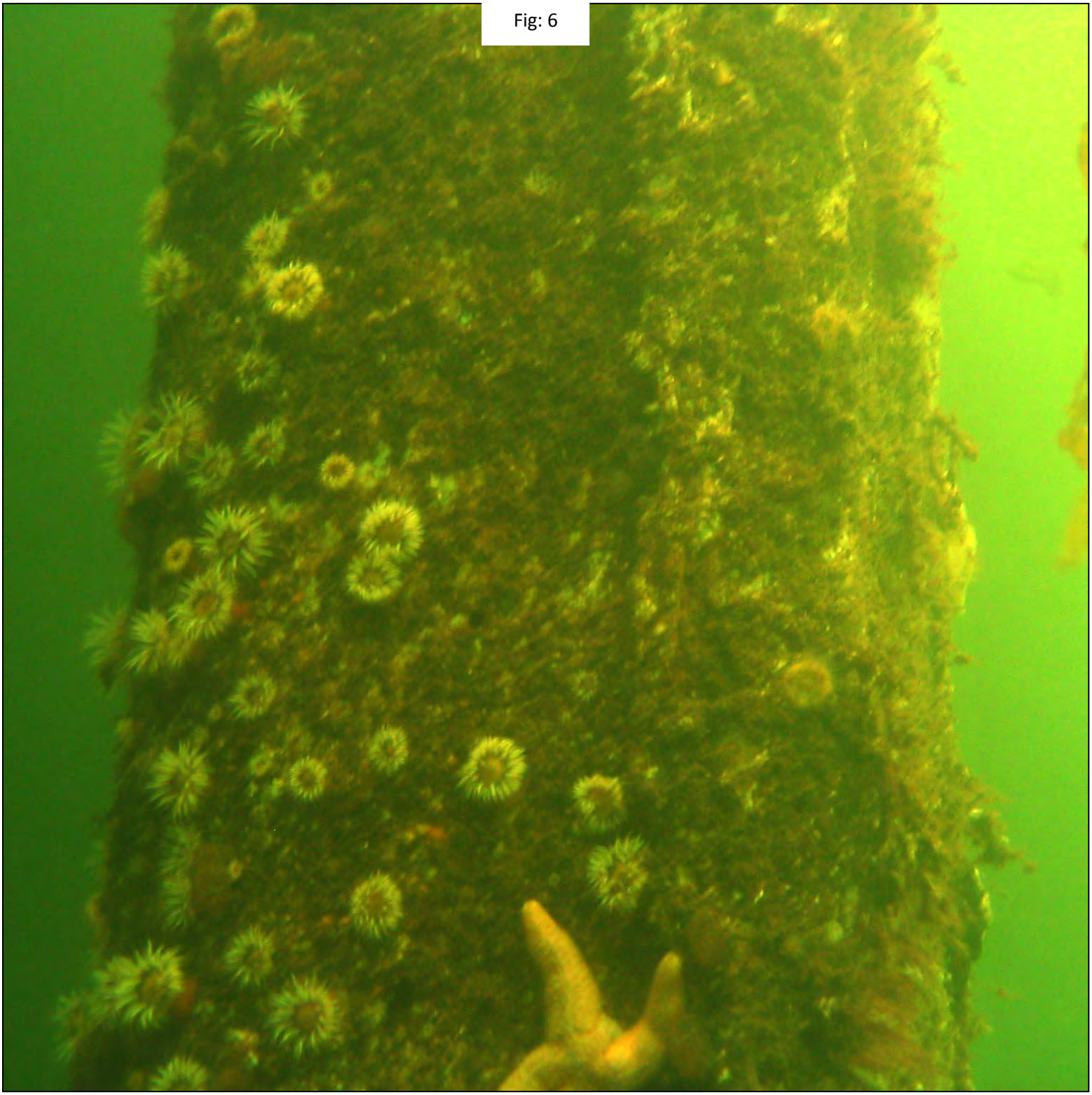
Fig: 5

Conditions:

Underwater visibility: 5m
Sea state Beauford: 1 – 2

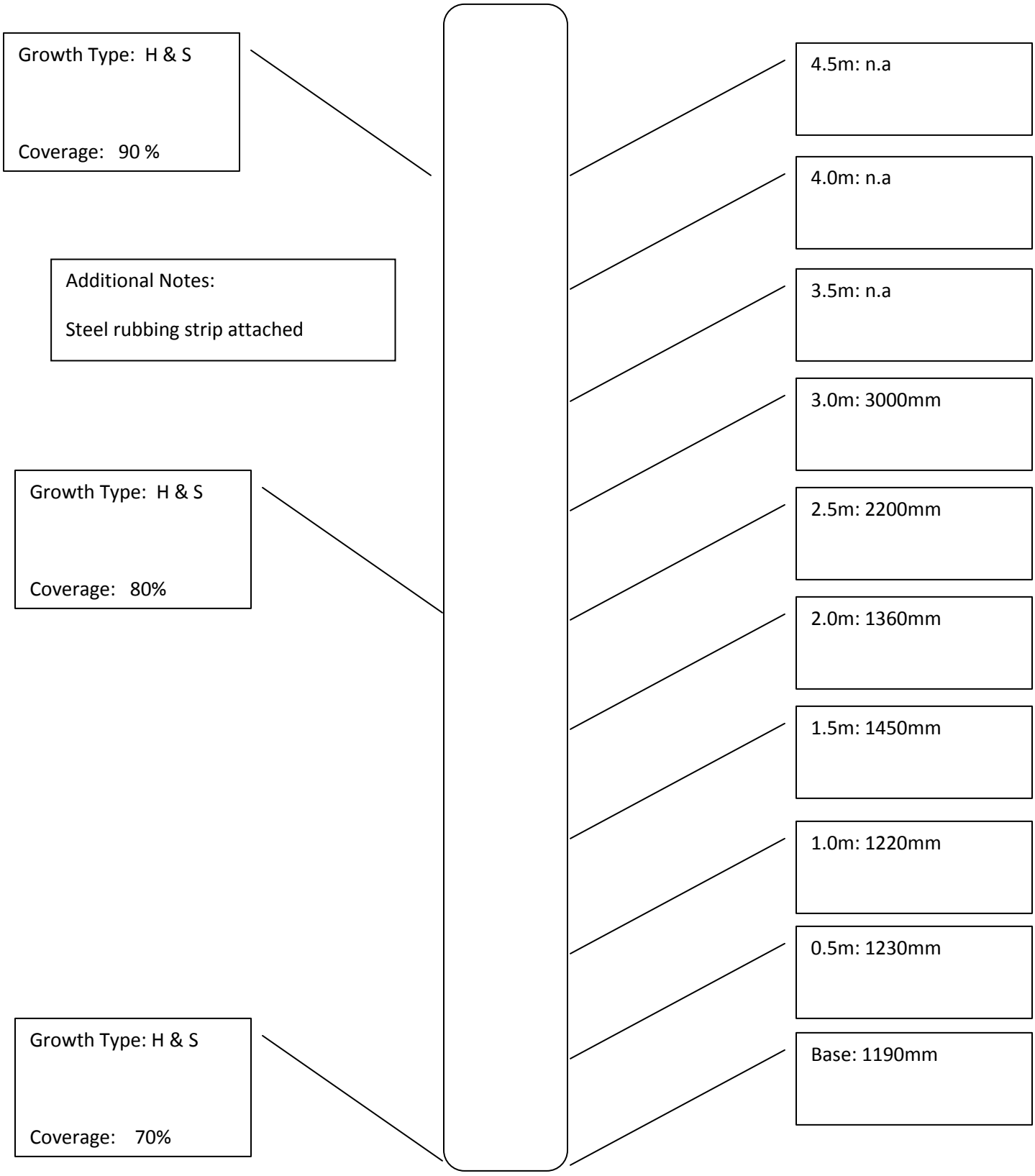
Dive Team: Paul Carter, Ben Fitts, Christian Dumitrescue, Andrew Petty

Fig: 6



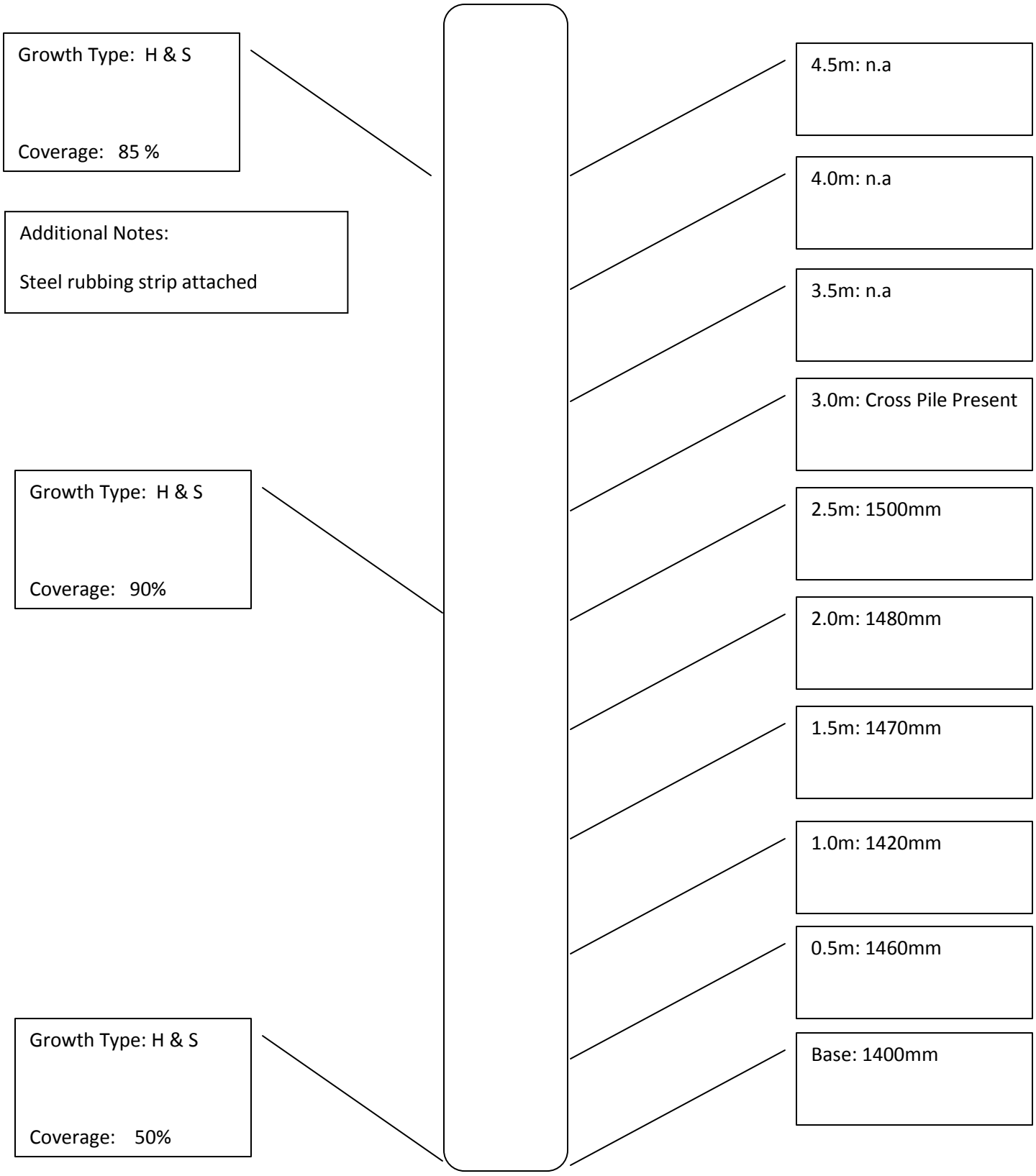
STUDENT GROUP CDC 66

PILE NUMBER: 001



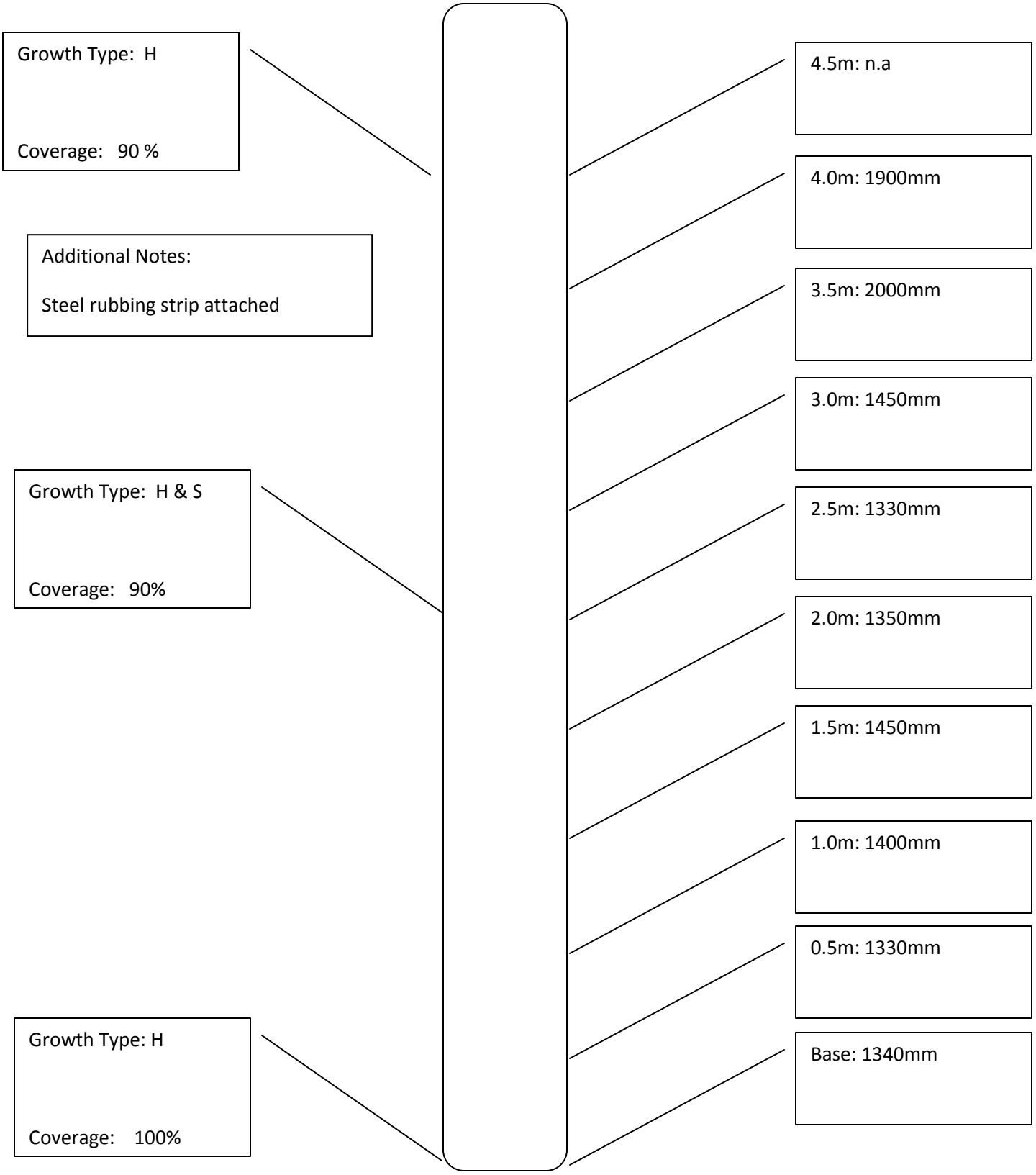
STUDENT GROUP CDC 66

PILE NUMBER: 002



STUDENT GROUP CDC 66

PILE NUMBER: 003



STUDENT GROUP CDC 66

PILE NUMBER: 004

Growth Type: H & S

Coverage: 90 %

Additional Notes:

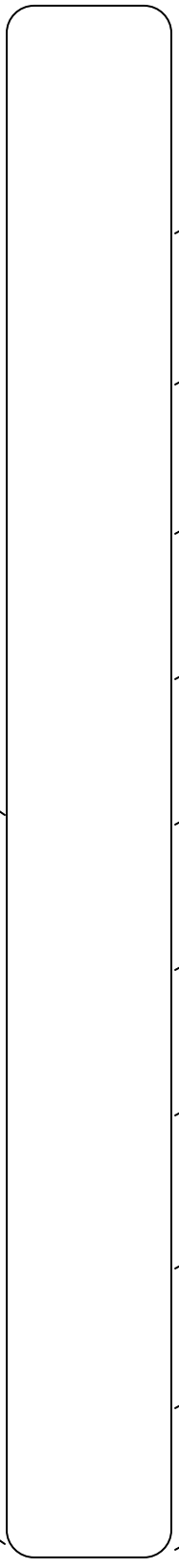
Steel rubbing strip attached
No scour @ base

Growth Type: H & S

Coverage: 100%

Growth Type: H

Coverage: 90%



4.5m: n.a

4.0m: 2300mm

3.5m: 189mm

3.0m: 1780mm

2.5m: 1600mm

2.0m: 1550mm

1.5m: 1460mm

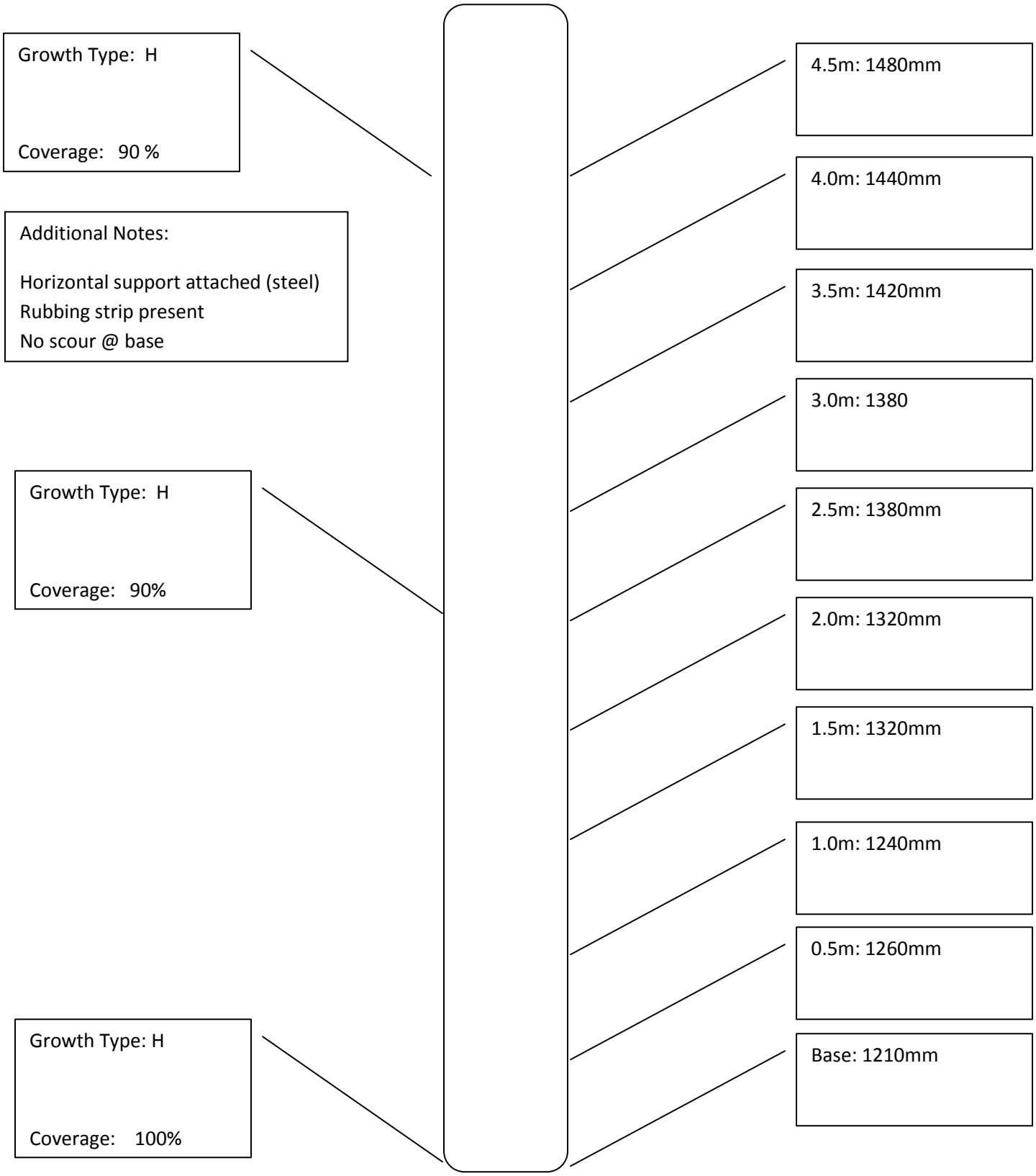
1.0m: 1430mm

0.5m: 1420mm

Base: 1480mm

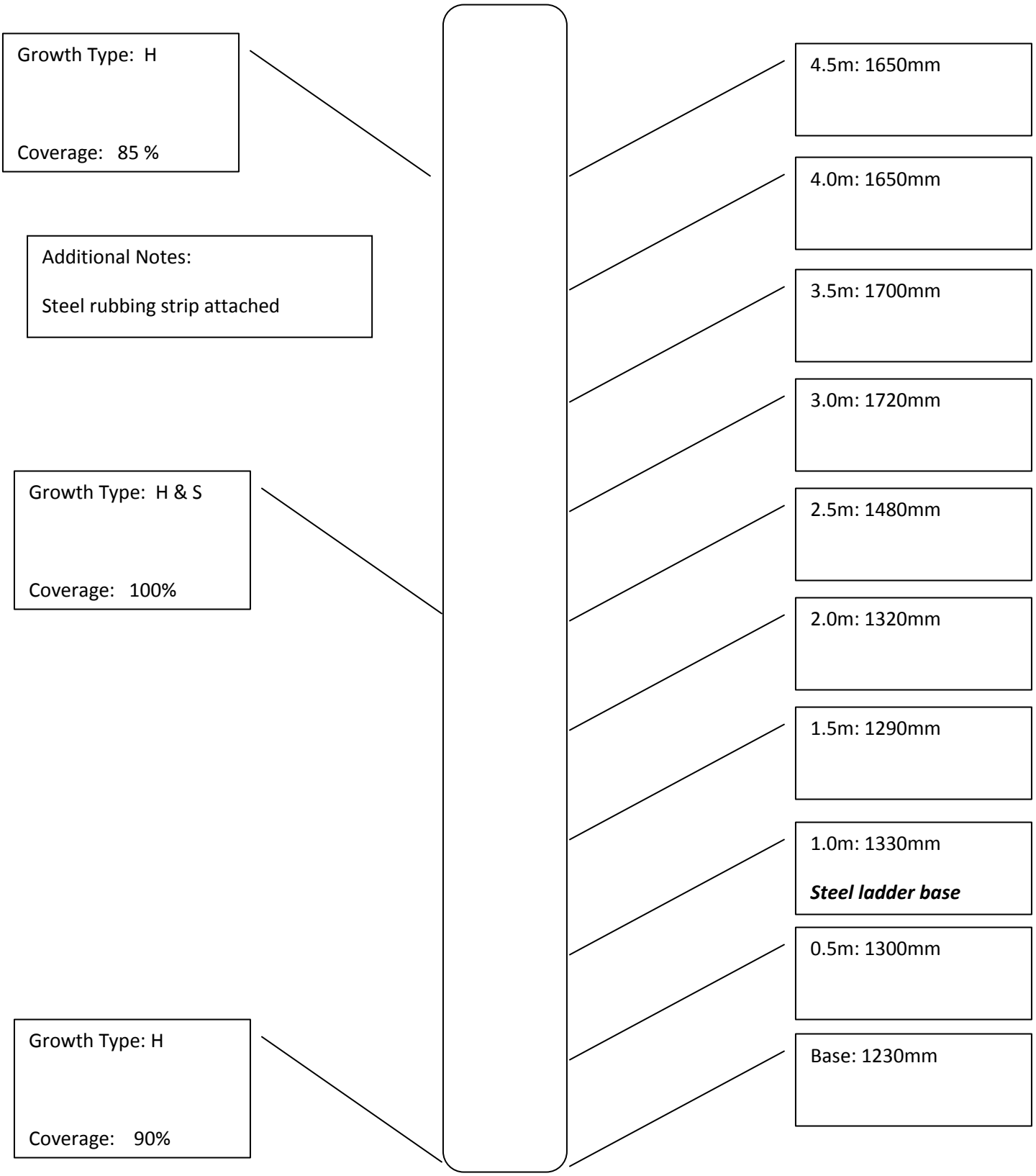
STUDENT GROUP CDC 66

PILE NUMBER: 005



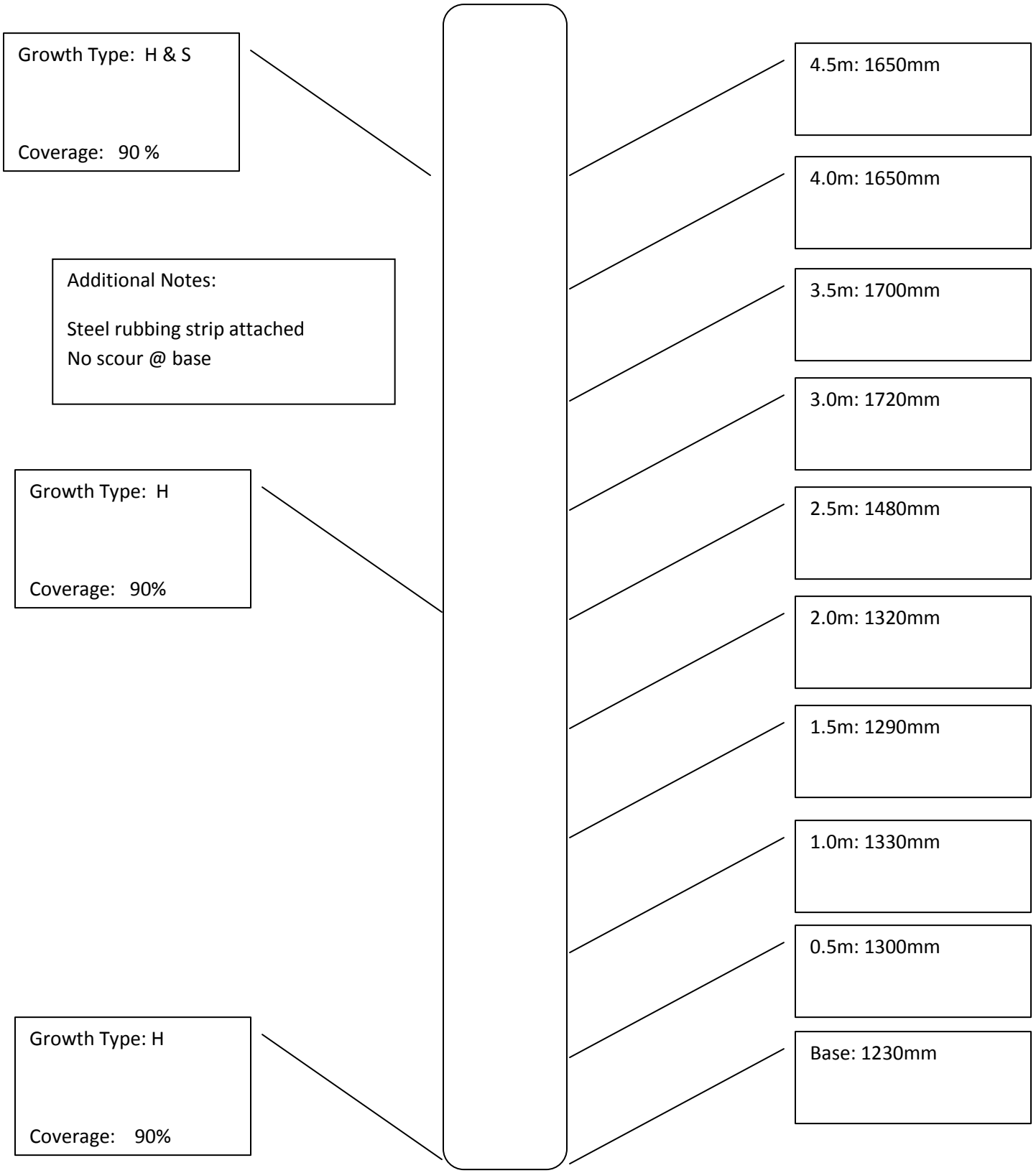
STUDENT GROUP CDC 66

PILE NUMBER: 006



STUDENT GROUP CDC 66

PILE NUMBER: 007



STUDENT GROUP CDC 66

PILE NUMBER: 008

Growth Type: H

Coverage: 95 %

Additional Notes:

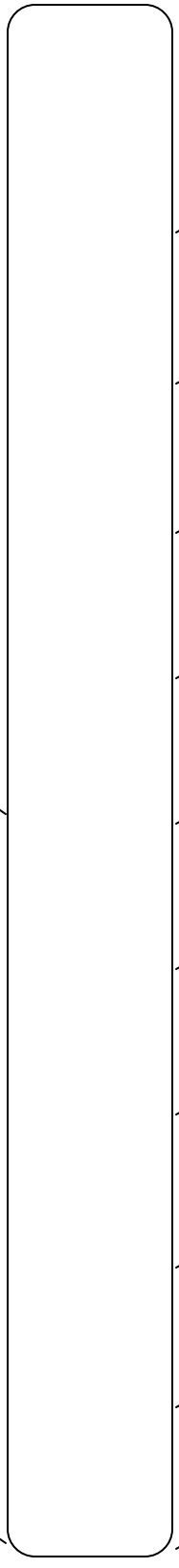
No scour @ base

Growth Type: H & S

Coverage: 100%

Growth Type: H & S

Coverage: 70%



4.5m: 1480mm

4.0m: 1440mm

3.5m: 1950mm

3.0m: 2050mm

2.5m: 2100mm

2.0m: 1650mm

1.5m: 1290mm

1.0m: 1200mm

0.5m: 1170mm

Base: 1150mm

STUDENT GROUP CDC 66

PILE NUMBER: 009