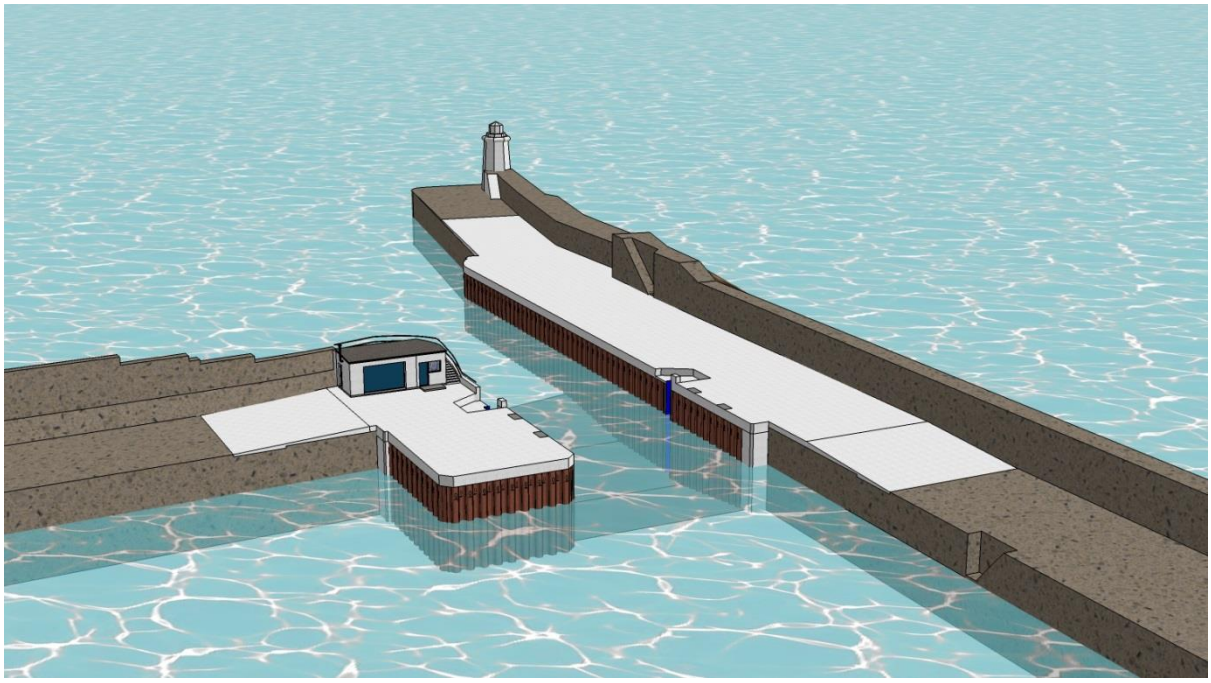
WICK HARBOUR AUTHORITY

HIGH WATER PROTECTION GATE



HORIZONTAL PIVOT GATE

CIVIL WORKS

Design Basis Statement

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Contents

1. Project Definition

1.1 General Extent of Works

Wick Harbour Authority has instructed Arch Henderson LLP to prepare designs suitable for the invitation of Tenders for the provision of a High Water Protection Gate (HWPG), to be located at the entrance to the Outer Basin of the Main Harbour.

An initial Options Study identified that the two most appropriate types of gate were a sliding gate and a horizontal pivot gate. Following initial consideration of a sliding gate, which identified that this was not the most cost-efficient option, Wick Harbour Authority confirmed that design work and preparation of Tender documents should proceed for a horizontal pivot gate.

It was further confirmed that the gate should be located between the South Pier and a new protruding spur section to the inside elevation of the North Pier. The location of the Works and the general operation of the HWPG is illustrated on drawings 3D183010-101(B), 3D183010-102(B), 3D183010-105(B), 3D183010-106(B), 3D183010-108(B), 3D183010-110(B) and 3D183010-130(B). Copies of these drawing have been presented in Appendix 1.

The Works to be undertaken generally comprise the following activities:

a) Driving of sheet piles along the inside face of the South Pier to form a new face to accommodate the lower bed depth and the operating equipment for the new HWPG
b) Construction of a new spur to the end of the North Pier to accommodate the reduced bed depth and to support the operating equipment for the new HWPG.
c) Driving of sheet piles to the entrance face of the North Pier to accommodate the reduced bed depth associated with the new HWPG.
d) Construction of anchor walls and the installation of ties for the upper level restraint of the new sheet pile walls.
e) Driving of guide frames to the new sheet pile faces of the North and South Piers for the operation of the HWPG.
f) Placing of insitu reinforced concrete decks and access ramps to the North Pier and the South Pier.
g) Construction of service chambers and the provision of ducts to house the hydraulic pipework for the HWPG operating equipment.
h) The provision of a Control Room to house the power units and the main control panel for the operation of the HWPG.
i) The installation of a support tower and lighting for the new facility.
j) Provision of ancillary items and harbour furniture.

Arch Henderson LLP has undertaken the design and preparation of drawings for Tender purposes, and to facilitate the preparation of detailed and fabrication drawings by the Contractor for the subsequent construction works. The purpose of this Design Basis Statement is to give an outline of this design and set out the parameters for the

implementation of the Works. The document is set out in packages which reflect the form of construction and the defined professional services as listed in the table of contents.

1.2 Design Principles and Form of Construction

The form of construction and condition of the existing piers necessitated the provision of new internal elevations to the faces of the walls to accommodate the reactions loads associated with the operation of the new HWPG. Consideration was therefore given to a form of construction which would minimise the work to be undertaken to the existing piers to enhance the load carrying capability of the existing structures and the reduced bed depth associated with the operation of the new HWPG. It was also recognised that the primary components of the applied loading would arise through the horizontal wave force applied to the HWPG, particularly during opening and closing operations when the HWPG was not secured in the closed position, and through the reaction forces from the operating of the lifting and lowering equipment.

The adopted form of construction involves the use of tied sheet pile anchor walls combined with vertical bearing piles to cater for the applied vertical and horizontal loading arising from the operation of the HWPG. The vertical bearing piles will be located at the support points for the anchor brackets to the hydraulic cylinders and the cranked lifting arms to the new HWPG. The new sheet pile faces to the inside elevations of the North and South piers will extend along the lengths of the piers to accommodate the reduced bed depth associated with the operation of the gate.

The sheet pile elevations will incorporate pre-fabricated guide frames for the installation of the new HWPG. The placement of the guide frames determines the location of the new HWPG and will form the setting out reference points for the new sheet pile walls.

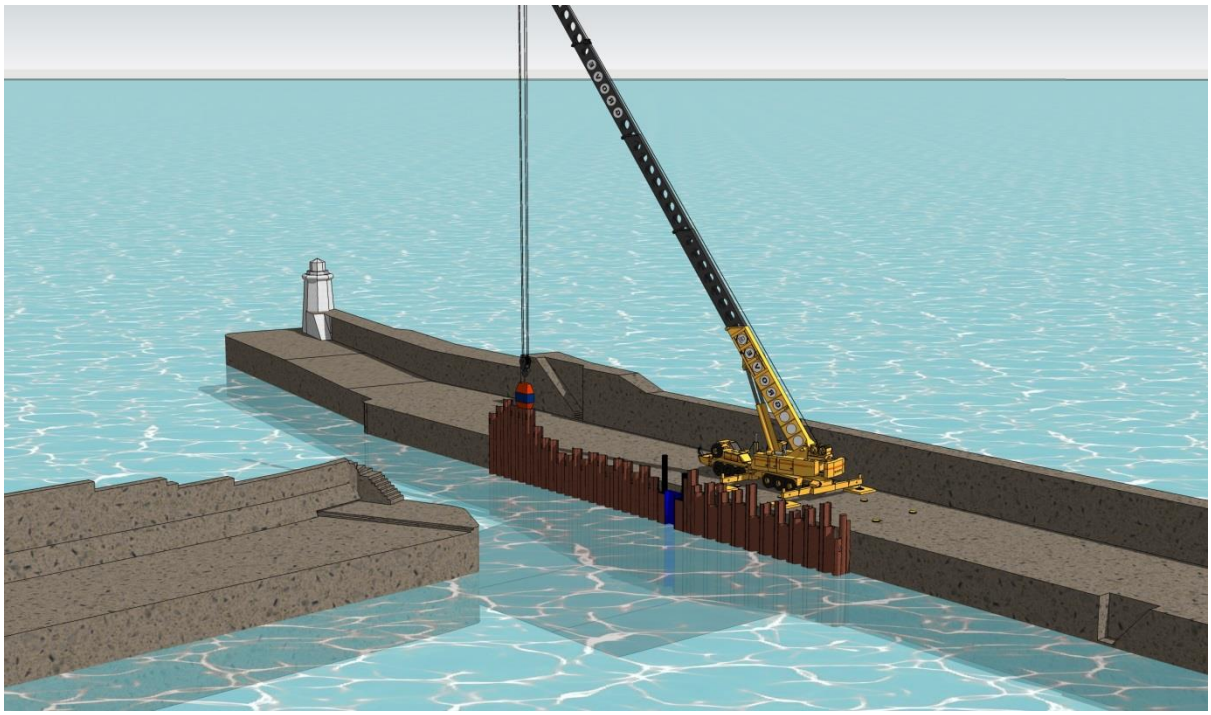
The Control Building for the facility comprises a blockwork construction with pre-cast concrete roof panels for general robustness and ease of construction on site. The building will be sectioned to provide appropriate sound insulation for the operator. The area housing the control panel will be at a raised level for visual appraisal of the movement of the HWPG. The plant area will include service chambers, accessing ducts to the HWPG recess, and a shelved area for small items of plant and equipment. An interceptor separator shall be provided to the front of the building to guard against fuel spillage into the harbour. The windows to the external walls will be double glazed with reinforced UPVC frames.

The site services are essentially restricted to electrical supply and surface water drainage. The electrical supply is confined to lighting, small tools and battery back-up and shall be sourced via an underground duct from the supply point adjacent to the fuel tanks on the North Pier, located approximately 200m to the West of the site. The surface water drainage shall generally be by way of channel discharge to the sea to ensure that run off in to the deck opening for the HWPG is avoided.

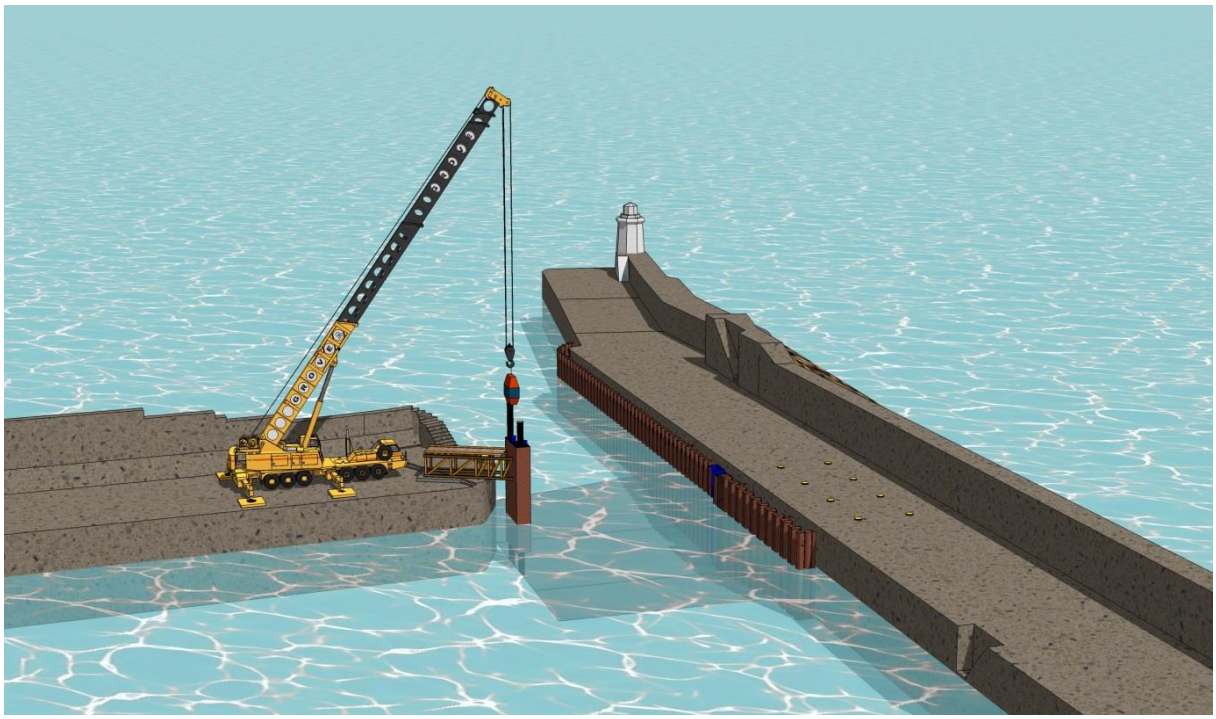
The deck to the reconstructed North Pier shall be of insitu reinforced concrete. The deck slab shall be designed to accommodate a general imposed loading of 100 kN/m^2. The deck slab shall also be required to withstand vessel berthing loads applied through the harbour furniture. Additional reinforcement shall be provided at the locations of the items of harbour furniture for the distribution of the applied loads into the support piles to the reconstructed pier.

The deck slab to the South Pier shall also incorporate a heavy lift area, to be used for the initial installation and future maintenance of the HWPG. The heavy lift area has been designed on the basis of a flat slab supported on tubular piles which extend to rock level. It is envisaged that the tubular piles will be Codex type cored piles or similar approved form of construction.

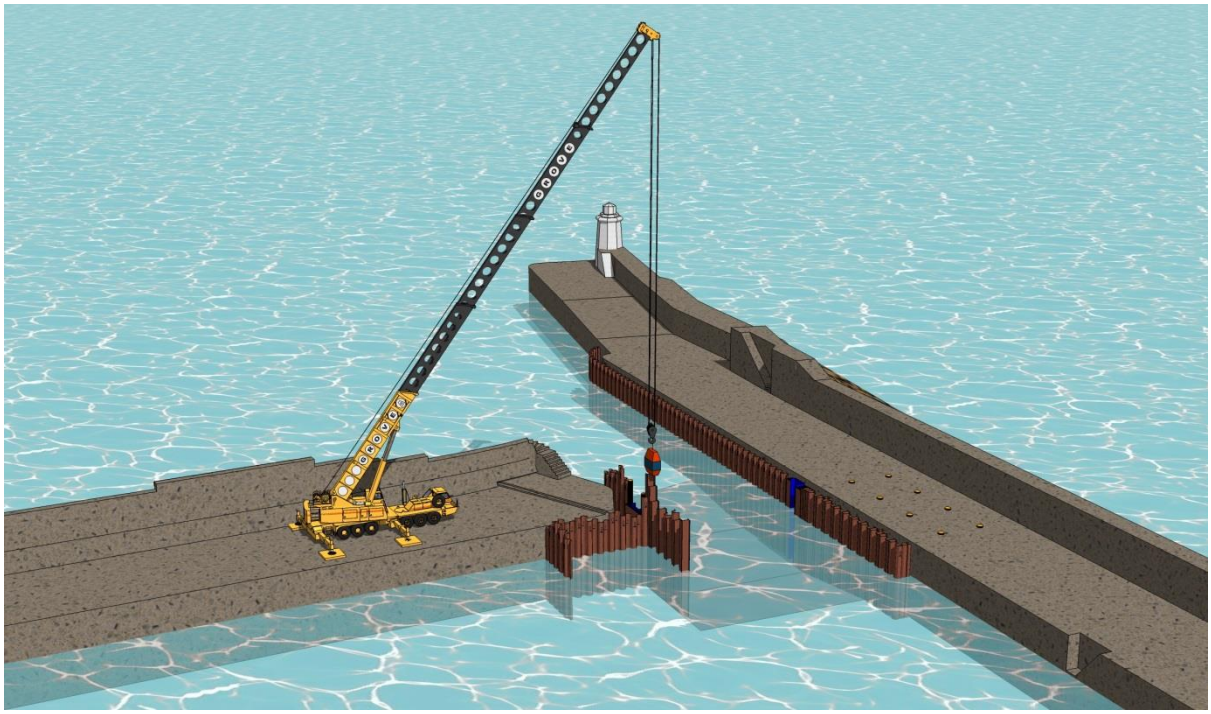
1.3 Schematic Representations



Stage 1 Works - Initial driving of Guide Frame and piles to South Pier



Stage 2 Works – Driving of Guide Frame to North Pier



Stage 3 Works – Progression of piles and commencement of spur to North Pier

Stage 4 Works – Completion of pile driving and placement of backfill

Stage 5 Works – Placement of Surface Slabs and Construction of Control Building

2. Primary Works Elements

2.1 General Parameters

It is intended that the Civil Works will be undertaken on a 'traditional' contract basis using Option B of the NEC Engineering and Construction Contract with a tendered Bill of Quantities reflecting fully designed and specified items of work. The primary elements of the Works are to have a Design Life of 50 years with a Design Life of 20 years being adopted for secondary elements. Refer to Appendix 2 for current design standards.

General imposed loadings are to be in accordance with BS EN 1991 – Eurocode 1. Site specific imposed loads have been considered as listed below:-

Location	Loading	Notes
Surface Slabs	100 kN/m^2	Specified
Service Chamber Covers	10 kN/m^2	Specified
Control Room – all areas	10 kN/m^2	Specified

The applicable external wave heights at the entrance to Wick Harbour considered for the project are as recommended in the HR Wallingford Report DEM8283-RT001-R-01-00. This report stipulates significant wave heights for storm and swell conditions as applicable to return periods of one year and one hundred years. The predicted wave conditions have been reproduced in Table 1 below.

Table 1 – Predicted extreme wave conditions incident on the harbour HWPG

Return period (years)	Storm Waves		Swell Waves	
	Hs (m)	Tp (s)	Hs (m)	Tp (s)
1	1.9	12.7	1.3	16.5
100	2.2	14.9	2.2	21.3

An assessment of the required crown height of the HWPG was also confirmed in the HR Wallingford Report, based on the recommendations of the Japanese Port Standards publication (OCDI). The maximum recommended crown heights have been utilised for the determination of the surface levels of the adjacent ground slab levels. The recommended crown heights are listed in Table 2.

Table 2 – Recommended Crown heights of HWPG

Wave Condition	HWPG Crown Height
1 year storm	5.8m CD
1 year swell	5.1m CD
100 year storm	6.2m CD
100 year swell	6.2m CD

2.2 Ground Conditions

The soil parameters were established from the Whiteford Site Investigation Report 1694/16. This indicates a marked variation between the boreholes adjacent to the entrance, to both piers, and the borehole located a distance along the North Pier to the west of the entrance. All boreholes generally indicate silty gravely sand overlying compact to stiff clay overlying boulders and dense sand. However, the boreholes adjacent to the entrance generally reach rock level at between six and 8 meters below Chart Datum, whereas the sub soil conditions to the West of the Entrance seem to comprise a deeper layer of boulder clay below the dense sands and gravels at approximately seven to eight metres below Chart Datum with rock level being reached at approximately twenty-seven metres below Chart Datum.

The site investigation report also indicates a layer of weathered rock overlying sound rock for all boreholes. Seabed level has been assumed to be at -2.7m ACD for tender design purposes.

The design life of the principle structural components is 50 years. Cathodic protection in the form of aluminium zinc anodes are to be installed below water level on the HWPG structure to provide 20 years protection to first anode replacement. Anodes are replaced after 20 years, resulting in 40 years total design life of cathodic protection. The tubular piles to the pre-cast units and the insitu deck are to be infilled with insitu reinforced concrete which will eliminate steel corrosion concerns in respect of the support members for the design life of the facility.

2.3 Piles and Foundations

The guide frame for the HWPG comprises a bespoke fabricated steel structure which is connected to and forms the setting out reference for the facing piles to the North and South Piers. The sheet piles adjacent to the entrance, along the South Pier and to the inside face of the spur to the North Pier, incorporate steel bearing piles to accommodate the reaction loads for the hydraulically powered cranked arms to be utilised for the opening and closing of the HWPG.

A heavy lift area, comprising an isitu reinforced concrete slab supported on axial piles, is provided to the North Pier for the initial lifting in, and potential future maintenance lifting operations, of the HWPG. The extensive presence of cobbles and boulders, and the requirement to penetrate the existing pier construction for the piled supports, dictated the adoption of codex type driving and tubular piles being utilised throughout

The SI information provided indicates that the ground is relatively competent with high SPT N values (all greater than 50). At the support locations adjacent to the entrance the ground makeup generally comprises a thin layer of silty sand, overlying firm to stiff clay, overlying very dense sands and gravels, overlying extremely and very weak siltstone, overlying medium strong to strong sandstone. The layer of weathered siltstone generally starts at approximately -7.5m to -8.5m CD. A relatively conservative assessment based on the Brinch Hansen method using derived coefficients for single laterally loaded piles indicates that the required compressive restraint would be provided with the piles being driven to -9.0m CD. It

has been assumed for the purposes of the tender design that the piles will be driven to a depth of -10.0m CD.

2.4 Pier Structure and Deck Slab

In addition to accommodating the reaction forces for the cranked arms and the local deepening adjacent to the entrance, comprising the basic requirements for the operation of the HWPG, the piling work to the North and South Piers is required to provide lateral stabilisation to the existing structures. This is particularly applicable to the front face of the existing North Pier where cracking is evident to the existing stonework. The facing piles in this location will be utilised as temporary formwork for the containment of insitu concrete infill for the stabilisation of the existing structure. Granular backfill material will be provided to the spur at the North Pier and along the face of the South Pier.

The setting out for the facing piles will be determined by the placement of the HWPG guide frames which are to be positioned to a tolerance of +/- 10mm in both directions over the length of the frame. Particular attention is therefore required to be taken during the placement driving to ensure that the driven frames are within the required tolerances.

Some wave dissipation rock armour units shall be provided to the North of the entrance adjacent to the North Pier. A row of tubular steel piles shall also be provided to the North side of the entrance to contain the rock armour units. The tubular piles shall be infilled with reinforced insitu concrete to ensure the design life requirement of the units.

The docking recesses to the North and South Piers, the closure units where the piles terminate against the existing piers, the service chambers and the roof panels to the Control Room will utilise pre-cast concrete units. Exposed reinforced concrete to the pre-cast concrete units shall have an exposure class of XS3 as defined in BS 8500-1 with a nominal cover of 60mm to all reinforcement to an exposed face. The new surface slabs to the North and South Piers shall generally be of insitu reinforced concrete. Insitu concrete shall have a minimum strength grade of C40/50 and pre-cast concrete shall have an exposure class of XS4.

Flexural cracking of reinforced concrete roof panel members, and the precast concrete interface units to the existing piers, is to be limited to a design crack width of 0.3mm based on a nominal cover of 60mm.

The new insitu concrete deck slab has been assessed for imposed loads from general vehicular access, the imposed loads arising from the use of the loads to the feeder line of housing and for the imposed loads arising from the miscellaneous harbour furniture to be provided on the pier. Provision has also been made for a heavy lift area, to the South of the gate location on the South Pier, to accommodate the imposed loads arising through the use of temporary plant and equipment for the initial lifting in of the gate structure and subsequent maintenance operations. Load combinations were factored as per Eurocode design criteria and the revised Maritime Codes with consideration made to leading variable actions.

The concrete deck at the location of services interface from the control building incorporates a formed duct in the slab covered with precast concrete slab. The finished surface to the insitu reinforced concrete deck slab will be as per the Employer's requirements. The covers provided over the services ducts and docking chamber for the HWPG shall be of precast concrete and shall be designed to accommodate the general imposed loading set out in section 2.1 of this report and for the self-weight of the HWPG components during initial assembly prior to the installation of the HWPG.

3. Architectural Services

3.1 CDM Regulations

It is envisaged that the execution of the Works will incorporate the role of Principal Designer as defined by the Construction (Design and Management) Regulations 2015. The implementation of the detailed design phase will include consideration of the CDM requirements. The design work for the tender submission has been carried out on the basis that the process will continue through the detailed design and construction phases. This will assist the ongoing compilation and completion of the Health and Safety File for hand-over at the end of the project.

3.2 Architectural Principles

3.2.1 Aesthetic Considerations

The proposed development generally piling to the faces of the existing North and South Piers, a spur construction to the inside of the North Pier at the Harbour Entrance, wave dissipation rock armour to the outside of the North Pier at the Harbour Entrance, new raised concrete decks to the North and South Piers, and a control building and associated facilities.

Client expectation for principles of the construction aesthetic have been identified in the project brief and have been fully embraced and adopted in the project proposals. The proposed ramped construction to the piers to accommodate the locally raised deck level will assist in "softening" the scale of the development, and the design has considered the detail and colours of the development to ensure that, as a "clean" and functional design, it will sit comfortably and sympathetically in its setting. The construction form has given consideration to the potentially problematic HWPG maintenance removal and, with the arrangement of lifting frames and temporary displacement of the covers to the opening intended for the following phase of works, has enabled a cohesive overall design form to be achieved.

The associated engineered structures including the harbour furniture are of necessity industrial in nature, but have been functionally designed to provide an elegant visual solution. With the selected form and use of colour the finished construction of the reconstructed piers will compliment and be compatible with the existing harbour structures.

3.2.2 Ongoing Detailed Design Considerations

Within the functional aesthetic as described, the Works will be carefully and robustly detailed to meet the environmental demands of this location throughout its 50 year design life. It is understood and appreciated that the Works are located in an exposed marine environment and the components have been designed and specified accordingly.

Although not subject to Building Standards approval, the design work undertaken for the Tender Submission has considered the function and layout of the construction with regard to the Building Standards (Scotland) Regulations and some minor adjustments have been required to be made for the assessed compliance requirements, particularly in respect of access arrangements to the reconstructed pier and the new Control Building. The amendments made have tried to ensure that the original design intent is respected, whilst also providing a layout more suited to our overall design and construction strategy.

3.2.3 The Built Environment

It is considered that the development provides the opportunity to positively affect a significant number of people, which will be achieved in our detailed design solution. It is recognised that this would be required to address ongoing client requirements and would be best achieved through active client participation.

3.3 Materials

3.3.1 Steelwork

All steel will be hot rolled structural steel complying with BS EN 10210, grade S275 or S355, or to BS EN 10025 grade S355J2H.

3.3.2 Steelwork Protection

Protective coatings will be applied to achieve a life to first maintenance of 10 years. Sacrificial anodes shall be provided to the HWPG structure which shall be designed to accommodate a 20 year period for the replacement of the anodes.

4. Ancillary Works

4.1 Temporary Support Frames

4.1.1 Functionality

It is envisaged that the project will involve the provision of temporary support frames for the installation of the gate guide frames to the North and South Piers. The placement of the gate guide frames forms a key element of the Works and the Contractor will be required to detailed information in respect of the proposed method of installation. It is envisaged that the pile guide to the South Pier will be driven initially and that a space frame structure will be utilised to ensure that the guide frame to the North Pier is in the correct location relative to the South Pier and for the general setting out of the piling Works to the North Pier. The Contractor shall be responsible for the design and specification of all temporary works which shall also include the requirements in respect of the new piled faces to the North and South Piers and the spur to the North Pier. The Contractor shall be free to utilise the envisaged frame configuration issued with the Tender documents or to prepare an alternative design.

4.1.2 Applied Loading

The primary design loads for the temporary support frames arise from the wave action on the temporary frames and the permanent components during the installation process. The frames also have to accommodate the self-weight of the units and the required lifting equipment and the general imposed loading for personnel access during the installation process.

4.1.3 Basis of Design

The illustrated support frames have essentially been designed as space frames, primarily with standard hot rolled sections but also utilising dedicated lifting plates and brackets. Restraint measures considered appropriate by the Contractor for installation purposes are required to be incorporated in the design.

4.2 Berthing Pockets to the North and South Piers

4.2.1 Functionality

Berthing pockets are to be provided within the new deck slabs to the North and South Piers to house the locking equipment for the securing of the gate in the closed position. The berthing pockets are to be formed from pre-cast concrete units which will initially be located in the required locations and subsequently utilised as permanent shutters to be combined with the insitu concrete slabs and local backing concrete.

4.2.2 Loading

The design loading for the berthing pockets arises primarily through wave action on the HWPG in the closed position. The specified form of construction is considered to be able to satisfactorily accommodate the applied lateral arising through the locking equipment securing the HWPG in the closed position..

4.2.3 Basis of Design

The berthing pockets has essentially been designed as open box structures, combined with adjacent insitu concrete, to resist the applied lateral loading through reverse wave action on the secured gate. The lateral loading is transferred to the ground slab and underlying materials through local insitu concrete placed adjacent to the berthing pocket and tied to the structure through cast in fixings provided to the unit.

4.3 General Access and Harbour Furniture

4.3.1 Functionality

The requirements of BS 6349 and the HSE – Safety in Docks: Approved Code of Practice and Guidance, in respect of ladders, is satisfied with the provision of the access ladders being provided to the external panels adjacent to the support point at the furthest east and furthest west locations on the housing to the North Pier.

It was considered during the course of the design process for the Tender submission that it would be convenient for the client to have two means of access to the housing on the North Pier, thereby increasing the operational flexibility and minimising any time when loading operations might be restricted by personnel access. The space available to the East end of the housing is however restricted and a suitable alternative access should be provided.

Hand railing is to be provided to non-operational edges and edge protection is to be provided to operational edges as per the Employer's Requirements. Lifesaving rings are to be provided at a minimum spacing of 100m along quay faces as per the Employer's Requirements.

The construction of the facility will involve various fittings and items of harbour furniture. These items include propriety items and bespoke items. The bespoke items, such as the edge beam to the cope, are of steel grade S27. Protective coatings shall be equivalent to the main structural members. Proprietary items tend to be of alloy construction which are delivered with a protective coating.

4.3.2 Loading

A general design imposed loading of 5kN/m2 should be considered for the stairs, applied through the full tidal range, for sections of the stairs subject to tidal action.

Fittings and miscellaneous items of harbour furniture shall be considered as subjected to equivalent loading as primary structural members, as defined by the relevant codes and standards for the Works.

4.3.3 Basis of Design

The design of fittings and harbour furniture generally comprises installation in accordance with manufacturer's instructions. Bespoke members will be designed in accordance with equivalent codes and standards as used for primary structural members.

4.4 Site Services

4.4.1 Power Lines

Power line ducting will be provided from the isolation board adjacent to the existing lighting tower to the switch room in the control building and the interface point on the quay for the services to the housing for powering of electrical equipment as outlined here and as detailed in the Employer's Requirements. The electrical supply cable to the Control Room shall be a 3 core × 25mm^2 Steel Wire Armoured cable sized in accordance with BS7671:2018 (IET Wiring Regulations).

Low level lighting is to be provided along the length of the new housing construction suitable to illuminate the walkway for operational staff.

Work level lighting is to be provided above the housing, reconstructed piers and the circulation area to illuminate the full extents of the High Water Protection HWPG sufficient for the tasks to be performed.

Cable draw pits will be placed at branches, 90° bends and ductwork tie-ins. Draw pits to be constructed of insitu or precast concrete or engineering brick walls and concrete base slab, and covered with either a removable concrete cover or machined metal covers to class E600. Draw pit walls and cover to be designed for all relevant soil and surcharge loading.

While permanent navigation marks and lights are not required to be provided by the Works Contractor, temporary navigation markers will be provided. Furthermore, obstruction lighting provided by others will be incorporated into the Works.

Cabling for the telecommunications systems; general and emergency lighting provided to the pontoon, jetty structure, and to the Control Building will be provided as required to address the Employer's Requirements.

4.4.2 Surface Water Drainage

The entire site area shall be provided with a positive storm surface water drainage system. The drainage system shall be durable, easy to clean and shall require limited routine maintenance.
All gullies, channels, pipes and outfalls, etc shall be designed for a minimum rainfall intensity of 75mm/hr in accordance with Sewers for Scotland and the Specification for Highway Works. All pipes shall be designed to run at self-cleansing velocity.
Concrete paving shall be suitably graded to ensure that surface water is conveyed to the drainage system without ponding occurring on the surfaced areas. Paving shall be graded generally to a unidirectional gradient of 1:80 (1.25%), and locally, no steeper than 1:66 (1.5%) and no shallower than 1:90 (1.11%) No surface water shall be permitted to flow over the quay edge. All drainage falling within the site boundary shall be lead through interceptors.

The pipework shall be installed to such falls as to ensure that the design limits on falls are not exceeded through a design life of 50 years taking into account the effects of settlement.

Open channel surface water collection systems shall not be permitted.

All manhole, chambers must allow easy and safe access for maintenance. Manhole covers, gully gratings and other covers shall be Load Class F900 to BS EN124 Manholes shall be circular, precast and surrounded in sufficient concrete to withstand the quay loadings. Base slabs and cover slabs shall be similarly designed.

A non-return valve shall be fitted downstream of all interceptors with which shall be located, as far as is reasonably practical, at a level above MHWS. If the outfalls are through sheet piles, a bespoke fitting shall be installed into the sheet pile to connect to the pipework and to reinforce the pile section local to the outfall.

The non-return valves shall be designed for the saline environment with minimum maintenance requirements and a 20 year life span.

5. Precis of Design Basis Statement

5.1 Project Definition

A Study report undertaken in 2015 identified two preferred options for the provision of a High Water Protection gate to the entrance of Wick Harbour, comprising a sliding gate and a horizontal pivot gate. Following initial consideration of a sliding gate, Wick Harbour Authority instructed Arch Henderson LLP to proceed with the design and preparation of Tender documents and drawings for the provision of a horizontal pivot gate to the main entrance of Wick Harbour. It was confirmed by Wick Harbour Authority that the gate should be provided to the inside face of the North Pier to open by extending out towards the approach channel.

The Civil Works construction to accommodate the horizontal pivot gate generally consists of new steel sheet pile facing to the North and South Piers, a new spur at the harbour entrance to the to the inside of the North Pier, new insitu concrete decks providing raised surface levels to the Piers, a heavy lift area to the North Pier adjacent to the gate location, local dredging Works to accommodate the opening of the gate, the placement of tubular piles and rock armour wave dissipation units to the outside of the North Pier, the construction of a Control Room, the erection of a lighting tower and the installation of miscellaneous harbour furniture.

The facing piles to the North Pier, combined with the rear wall to the new spur, will also be utilised as shuttering for the retention of insitu stabilisation concrete to the entrance section of the North Pier. The stabilisation concrete shall be placed in controlled height lifts as dictated by the section modulus of the sheet piles and the anchor system provided for the facing of the North Pier.

The Control Building for the operation of the HWPG is to be constructed adjacent to the parapet wall on the South Pier. The Control Building is to be of blockwork walls and pre-cast concrete roof units. The internal layout of the building will essentially comprise two rooms to accommodate the housing of the operating machinery and the control panel.

The Works shall also incorporate site services, including electrical supply, surface water drainage and service ducts, access ladders and stairs and harbour furniture.

5.2 Constraints and Terms of Reference

The Works are to be undertaken on a 'traditional' contract basis using Option B of the NEC3 Engineering and Construction Contract with a tendered Bill of Quantities reflecting fully designed and specified items of work. The primary elements of the Works are to have a Design Life of 50 years with a Design Life of 20 years being adopted for secondary elements.

The surface levels of the decks of the modified piers have been raised to accommodate the upper gate level of +6.2m Chart Datum recommended by HR Wallingford, to eliminate overtopping of the gate. A minimum clear entrance width of 17.5 metres is to be provided between the new facings to the piers.

The primary elements of the Works are to have a Design Life of 50 years with a Design Life of 20 years being adopted for secondary elements.

Site Investigation Work carried out to the area indicated that the sub soil materials generally comprise silty sand overlying compact to stiff clay overlying cobbles and boulders overlying stiff to very stiff clay overlying rock. The depth of clay overlying rock appears to be much greater adjacent to the South Pier than adjacent to the North Pier.

The heavy lift area to the North Pier consists of a flat slab supported on tubular piles. The area has been designed to accommodate imposed point loads of 2000kN set at a distance of not less than 8.0 metres apart at any location over the area. The nature of the sub soli materials requires that a Codex type piling system is utilised for the provision of the piles.

The general structure and the surrounding deck slab have been designed to accommodate a general imposed loading of 100 kN/m^2 in addition to the specific loads arising through the use of the HWPG.

5.3 Architectural Services

The Works will incorporate the role of Principal Designer as defined by the Construction (Design and Management) Regulations 2015. Part of this role comprises the ongoing compilation and completion of the Health and Safety File for hand-over at the end of the project.

Client expectation for principles of the construction aesthetic have been identified in the project brief and have been fully embraced and adopted in the project proposals. The proposed form of construction to the piers will assist in "softening" the scale of the development, and the design has considered the detail and colours of the development to ensure that, as a "clean" and functional design, it will sit comfortably and sympathetically in its setting.

Although not subject to Building Standards approval, the design work undertaken for the Tender Submission has considered the function and layout of the construction with regard to the Building Standards (Scotland) Regulations, particularly in respect of access arrangements to the reconstructed pier and the new Control Building.

5.4 Ancillary Works

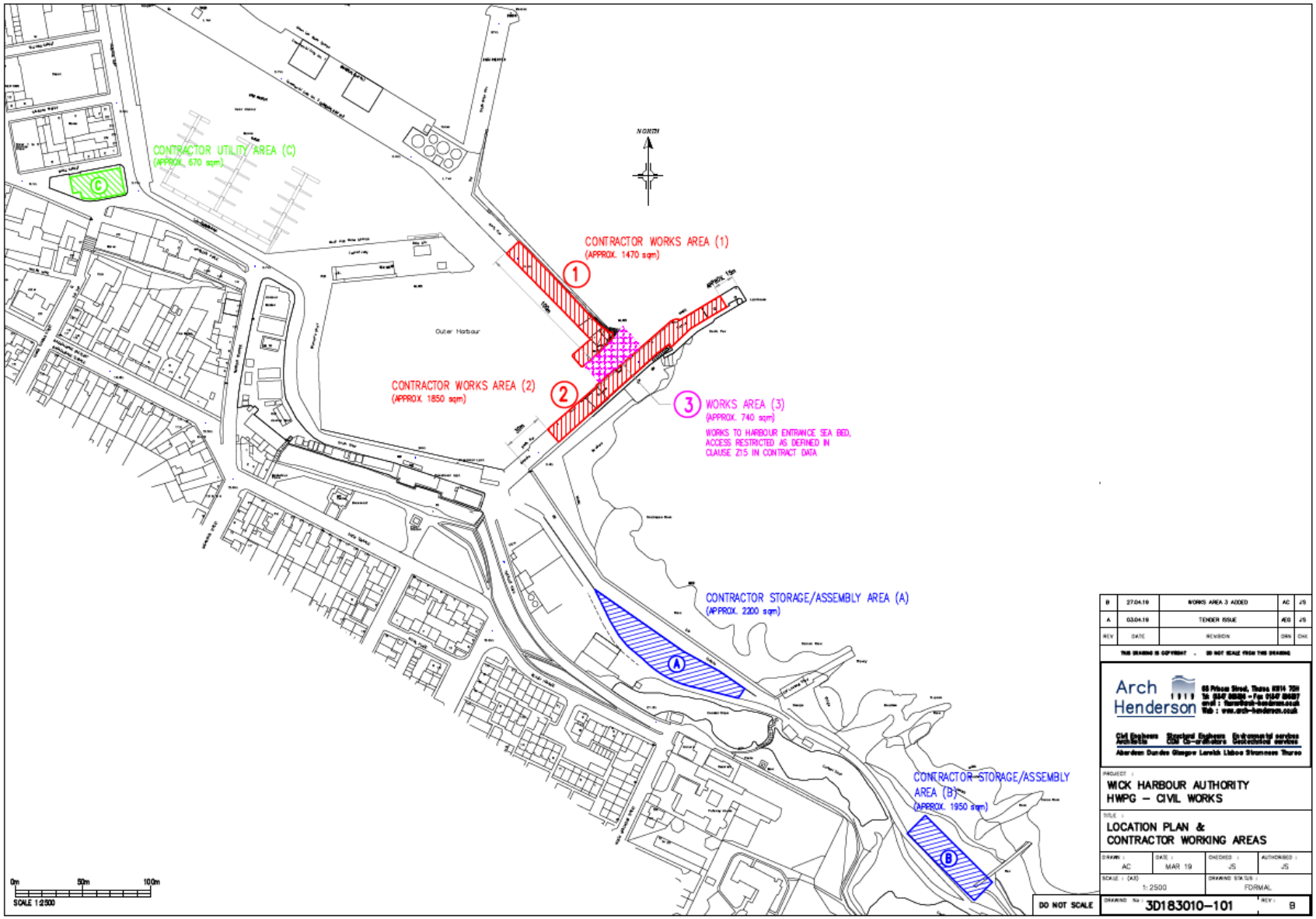
The envisaged form of construction involves the utilisation of temporary support frames for the locating and driving of the pile guides. The pile guide installation has to be to close tolerances for the operation of the gate. It is also envisaged that the position of the guides will form the setting out reference for the facing piles to the piers.

Berthing packets are to be provided within the deck slabs to house the equipment to lock the gate in the closed position. The berthing pocket is to be formed from pre-cast concrete units which will be initially located on the infill material and subsequently utilised as permanent formwork for the insitu concrete deck slab and local backing concrete.

The Works to be undertaken will also include the provision of site services along with access stairs and ladders and general harbour furniture to the area. The site services will include the provision of electrical supply to the Control Building, local lighting, service ducts and draw pits and surface water drainage.

Appendix 1 – General Layout Drawings

Ref No.	Title
3D183010-101(B)	LOCATION PLAN & CONTRACTOR WORKING AREAS
3D183010-102(B)	SERVICES TO CONTROL BUILDING
3D183010-105(B)	GENERAL ARRANGEMENT PLAN, SHEET 1 OF 3
3D183010-106(B)	GENERAL ARRANGEMENT PLAN, SHEET 2 OF 3
3D183010-108(B)	GENERAL ARRANGEMENT, SECTION A-A & B-B
3D183010-110(B)	GENERAL ARRANGEMENT, ELEVATION E-E
3D183010-130(B)	CONTROL ROOM, GA, SHEET 1 OF 2


CONTRACTOR UTILITY AREA (C)
(APPROX. 670 sqm)
C
NORTH
CONTRACTOR WORKS AREA (1)
(APPROX. 1470 sqm)
1
Outer Harbour
CONTRACTOR WORKS AREA (2)
(APPROX. 1850 sqm)
2
3
WORKS AREA (3)
(APPROX. 740 sqm)
WORKS TO HARBOUR ENTRANCE SEA BED, ACCESS RESTRICTED AS DEFINED IN CLAUSE Z15 IN CONTRACT DATA
CONTRACTOR STORAGE/ASSEMBLY AREA (A)
(APPROX. 2200 sqm)
A
CONTRACTOR STORAGE/ASSEMBLY AREA (B)
(APPROX. 1950 sqm)
B
0m 50m 100m
SCALE 1:2500
B 27.04.19 WORKS AREA 3 ADDED AC JS
A 03.04.19 TENDER ISSUE AEG JS
REV DATE REVISION DRN CHK
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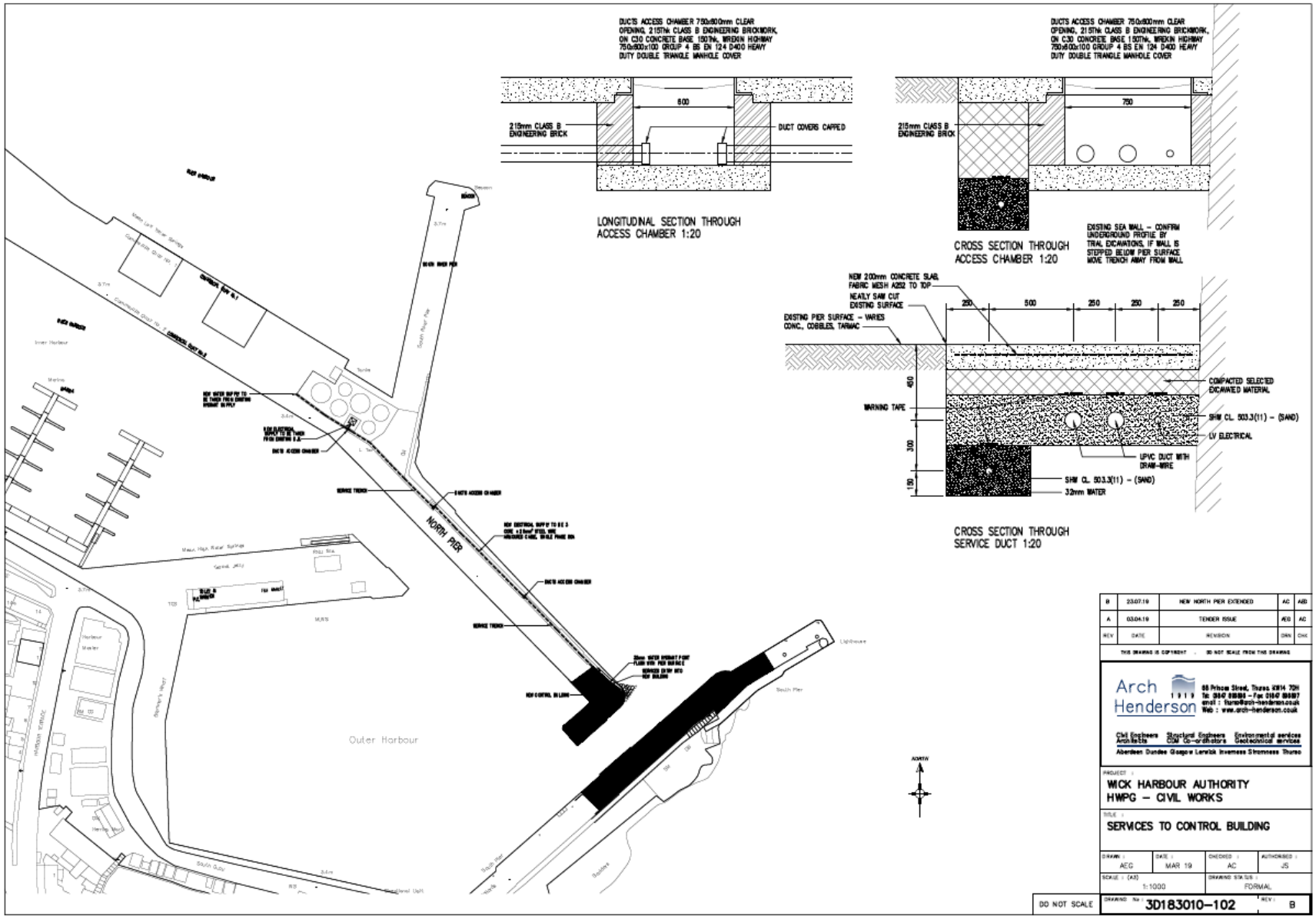
Arch Henderson
Civil Engineers Structural Engineers Environmental services Architects Quantity Surveyors Construction services
Aberdeen Dundee Glasgow Lerwick Lisbon Stornoway Thurso
PROJECT :
WICK HARBOUR AUTHORITY
HWPG – CIVIL WORKS
TITLE :
LOCATION PLAN &
CONTRACTOR WORKING AREAS
DRAWN : AC
DATE : MAR 19
CHECKED : JS
AUTHORISED : JS
SCALE : (A3) 1:2500
DRAWING STATUS : FORMAL
DRAWING No : 3D183010–101
REV : B
DO NOT SCALE


DUCTS ACCESS CHAMBER 750x800mm CLEAR OPENING, 215THk CLASS B ENGINEERING BRICKWORK, ON C30 CONCRETE BASE 150THk, WREKIN HIGHWAY 750x800x100 GROUP 4 BS EN 124 D400 HEAVY DUTY DOUBLE TRIANGLE MANHOLE COVER
600
215mm CLASS B ENGINEERING BRICK
DUCT COVERS CAPPED
LONGITUDINAL SECTION THROUGH ACCESS CHAMBER 1:20
DUCTS ACCESS CHAMBER 750x800mm CLEAR OPENING, 215THk CLASS B ENGINEERING BRICKWORK, ON C30 CONCRETE BASE 150THk, WREKIN HIGHWAY 750x800x100 GROUP 4 BS EN 124 D400 HEAVY DUTY DOUBLE TRIANGLE MANHOLE COVER
750
215mm CLASS B ENGINEERING BRICK
CROSS SECTION THROUGH ACCESS CHAMBER 1:20
EXISTING SEA WALL – CONFIRM UNDERGROUND PROFILE BY TRIAL EXCAVATIONS, IF WALL IS STEPPED BELOW PIER SURFACE MOVE TRENCH AWAY FROM WALL
NEW 200mm CONCRETE SLAB, FABRIC MESH A252 TO TOP
NEATLY SAW CUT EXISTING SURFACE
EXISTING PIER SURFACE – VARIES CONC., COBBLES, TARMAC
250
500
250
250
250
450
300
150
WARNING TAPE
COMPACTED SELECTED EXCAVATED MATERIAL
SHW CL. 503.3(11) – (SAND)
LV ELECTRICAL
UPVC DUCT WITH DRAW-WIRE
SHW CL. 503.3(11) – (SAND)
32mm WATER
CROSS SECTION THROUGH SERVICE DUCT 1:20
NORTH PIER
Outer Harbour
B 23.07.19 NEW NORTH PIER EXTENDED AC AB
A 03.04.19 TENDER ISSUE AEG AC
REV DATE REVISION DRN CHK
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Arch Henderson 1919
68 Princes Street, Thurso, KW14 7EH
Tel: 01847 893893 – Fax: 01847 894897
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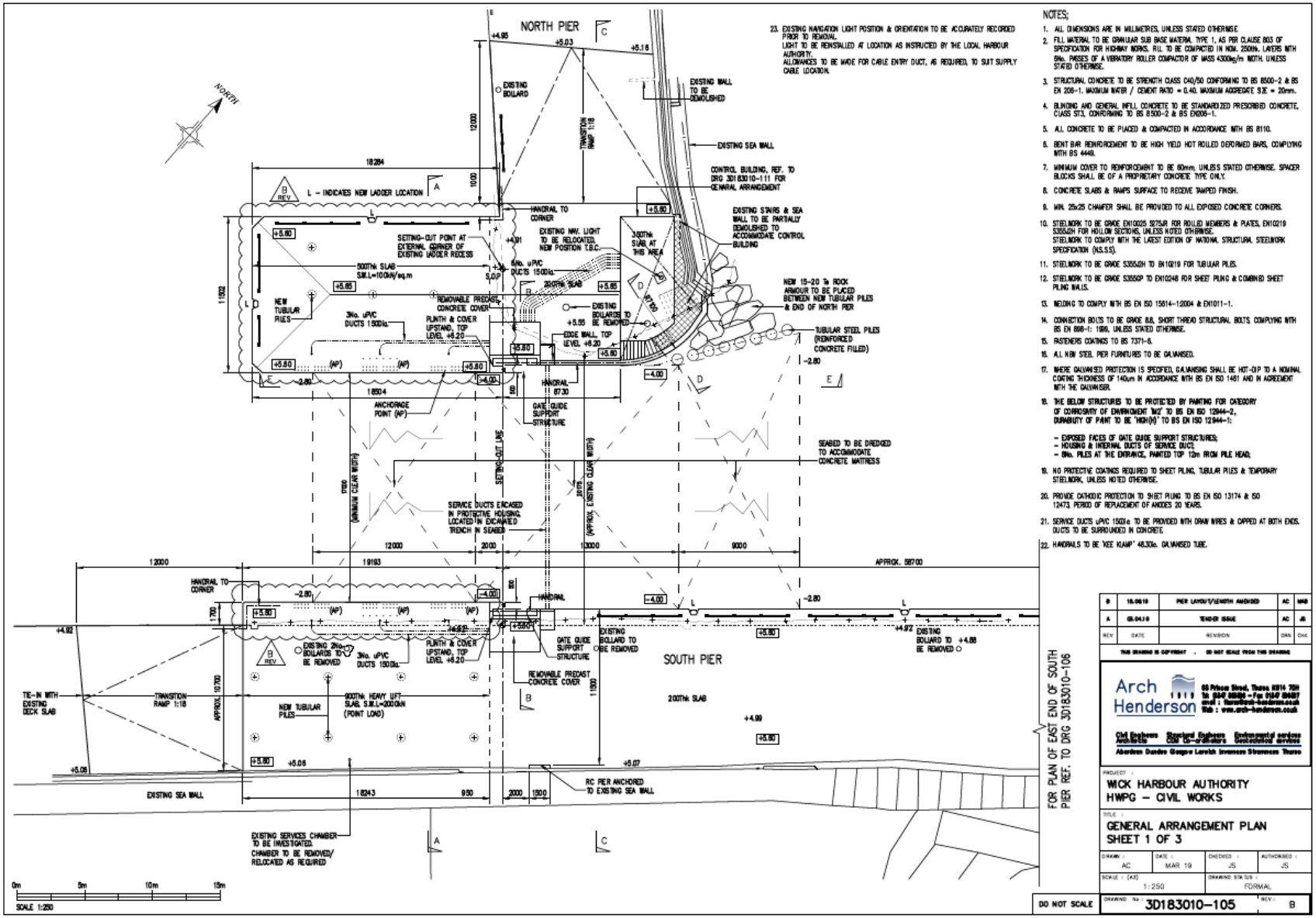
Web : www.arch-henderson.co.uk
Civil Engineers Architects
Structural Engineers CDM Co-ordinators
Environmental services Geotechnical services
Aberdeen Dundee Glasgow Lerwick Inverness Stromness Thurso
PROJECT :
WICK HARBOUR AUTHORITY
HWPG – CIVIL WORKS
TITLE :
SERVICES TO CONTROL BUILDING
DRAWN : AEG
DATE : MAR 19
CHECKED : AC
AUTHORISED : JS
SCALE : (A3) 1:1000
DRAWING STATUS : FORMAL
DO NOT SCALE
DRAWING No : 3D183010–102
REV : B


NORTH PIER
SOUTH PIER
EXISTING SEA WALL
EXISTING BOLLARD
EXISTING WALL TO BE DEMOLISHED
CONTROL BUILDING, REF. TO DRG 3D183010-111 FOR GENERAL ARRANGEMENT
EXISTING STAIRS & SEA WALL TO BE PARTIALLY DEMOLISHED TO ACCOMMODATE CONTROL BUILDING
NEW 15-20 Te ROCK ARMOUR TO BE PLACED BETWEEN NEW TUBULAR PILES & END OF NORTH PIER
TUBULAR STEEL PILES (REINFORCED CONCRETE FILLED)
SEABED TO BE DREDGED TO ACCOMMODATE CONCRETE MATTRESS
SERVICE DUCTS ENCASED IN PROTECTIVE HOUSING, LOCATED IN EXCAVATED TRENCH IN SEABED
RC PIER ANCHORED TO EXISTING SEA WALL
EXISTING SERVICES CHAMBER TO BE INVESTIGATED. CHAMBER TO BE REMOVED/ RELOCATED AS REQUIRED
TIE-IN WITH EXISTING DECK SLAB
TRANSITION RAMP 1:18
NEW TUBULAR PILES
HANDRAIL TO CORNER
HANDRAIL
GATE GUIDE SUPPORT STRUCTURE
REMOVABLE PRECAST CONCRETE COVER
EDGE WALL, TOP LEVEL +6.20
ANCHORAGE POINT (AP)
L – INDICATES NEW LADDER LOCATION
SETTING-OUT POINT AT EXTERNAL CORNER OF EXISTING LADDER RECESS
EXISTING NAV. LIGHT TO BE RELOCATED. NEW POSITION T.B.C.
EXISTING BOLLARD TO BE REMOVED
EXISTING 2No. BOLLARDS TO BE REMOVED
EXISTING BOLLARD TO BE REMOVED
EXISTING BOLLARD TO +4.88 BE REMOVED
FOR PLAN OF EAST END OF SOUTH PIER REF. TO DRG 3D183010-106
NOTES;
1. ALL DIMENSIONS ARE IN MILLIMETRES, UNLESS STATED OTHERWISE.
2. FILL MATERIAL TO BE GRANULAR SUB BASE MATERIAL TYPE 1, AS PER CLAUSE 803 OF SPECIFICATION FOR HIGHWAY WORKS. FILL TO BE COMPACTED IN NOM. 250mm. LAYERS WITH 6No. PASSES OF A VIBRATORY ROLLER COMPACTOR OF MASS 4300kg/m WIDTH, UNLESS STATED OTHERWISE.
3. STRUCTURAL CONCRETE TO BE STRENGTH CLASS C40/50 CONFORMING TO BS 8500-2 & BS EN 206-1. MAXIMUM WATER / CEMENT RATIO = 0.40. MAXIMUM AGGREGATE SIZE = 20mm.
4. BLINDING AND GENERAL INFILL CONCRETE TO BE STANDARDIZED PRESCRIBED CONCRETE, CLASS ST3, CONFORMING TO BS 8500-2 & BS EN206-1.
5. ALL CONCRETE TO BE PLACED & COMPACTED IN ACCORDANCE WITH BS 8110.
6. BENT BAR REINFORCEMENT TO BE HIGH YIELD HOT ROLLED DEFORMED BARS, COMPLYING WITH BS 4449.
7. MINIMUM COVER TO REINFORCEMENT TO BE 60mm, UNLESS STATED OTHERWISE. SPACER BLOCKS SHALL BE OF A PROPRIETARY CONCRETE TYPE ONLY.
8. CONCRETE SLABS & RAMPS SURFACE TO RECEIVE TAMPED FINISH.
9. MIN. 25x25 CHAMFER SHALL BE PROVIDED TO ALL EXPOSED CONCRETE CORNERS.
10. STEELWORK TO BE GRADE EN10025 S275JR FOR ROLLED MEMBERS & PLATES, EN10219 S355J2H FOR HOLLOW SECTIONS, UNLESS NOTED OTHERWISE. STEELWORK TO COMPLY WITH THE LATEST EDITION OF NATIONAL STRUCTURAL STEELWORK SPECIFICATION (NASS).
11. STEELWORK TO BE GRADE S355J2H TO EN10219 FOR TUBULAR PILES.
12. STEELWORK TO BE GRADE S355GP TO EN10248 FOR SHEET PILING & COMBINED SHEET PILING WALLS.
13. WELDING TO COMPLY WITH BS EN ISO 15614-1:2004 & EN1011-1.
14. CONNECTION BOLTS TO BE GRADE 8.8, SHORT THREAD STRUCTURAL BOLTS, COMPLYING WITH BS EN 898-1: 1999, UNLESS STATED OTHERWISE.
15. FASTENERS COATINGS TO BS 7371-6.
16. ALL NEW STEEL PIER FURNITURES TO BE GALVANISED.
17. WHERE GALVANISED PROTECTION IS SPECIFIED, GALVANISING SHALL BE HOT-DIP TO A NOMINAL COATING THICKNESS OF 140µm IN ACCORDANCE WITH BS EN ISO 1461 AND IN AGREEMENT WITH THE GALVANISER.
18. THE BELOW STRUCTURES TO BE PROTECTED BY PAINTING FOR CATEGORY OF CORROSIVITY OF ENVIRONMENT 'M3' TO BS EN ISO 12944-2, DURABILITY OF PAINT TO BE 'HIGH(H)' TO BS EN ISO 12944-1:
– EXPOSED FACES OF GATE GUIDE SUPPORT STRUCTURES;
– HOUSING & INTERNAL DUCTS OF SERVICE DUCT;
– 6No. PILES AT THE ENTRANCE, PAINTED TOP 12m FROM PILE HEAD;
19. NO PROTECTIVE COATINGS REQUIRED TO SHEET PILING, TUBULAR PILES & TEMPORARY STEELWORK, UNLESS NOTED OTHERWISE.
20. PROVIDE CATHODIC PROTECTION TO SHEET PILING TO BS EN ISO 13174 & ISO 12473. PERIOD OF REPLACEMENT OF ANODES 20 YEARS.
21. SERVICE DUCTS uPVC 150Dia TO BE PROVIDED WITH DRAW WIRES & CAPPED AT BOTH ENDS. DUCTS TO BE SURROUNDED IN CONCRETE.
22. HANDRAILS TO BE 'KEE KLAMP' 48.3Dia. GALVANISED TUBE.
23. EXISTING NAVIGATION LIGHT POSITION & ORIENTATION TO BE ACCURATELY RECORDED PRIOR TO REMOVAL. LIGHT TO BE REINSTALLED AT LOCATION AS INSTRUCTED BY THE LOCAL HARBOUR AUTHORITY. ALLOWANCES TO BE MADE FOR CABLE ENTRY DUCT, AS REQUIRED, TO SUIT SUPPLY CABLE LOCATION.
B 15.06.19 PIER LAYOUT/LENGTH AMENDED AC MAB
A 05.04.19 TENDER ISSUE AC JS
REV DATE REVISION DRN CHK
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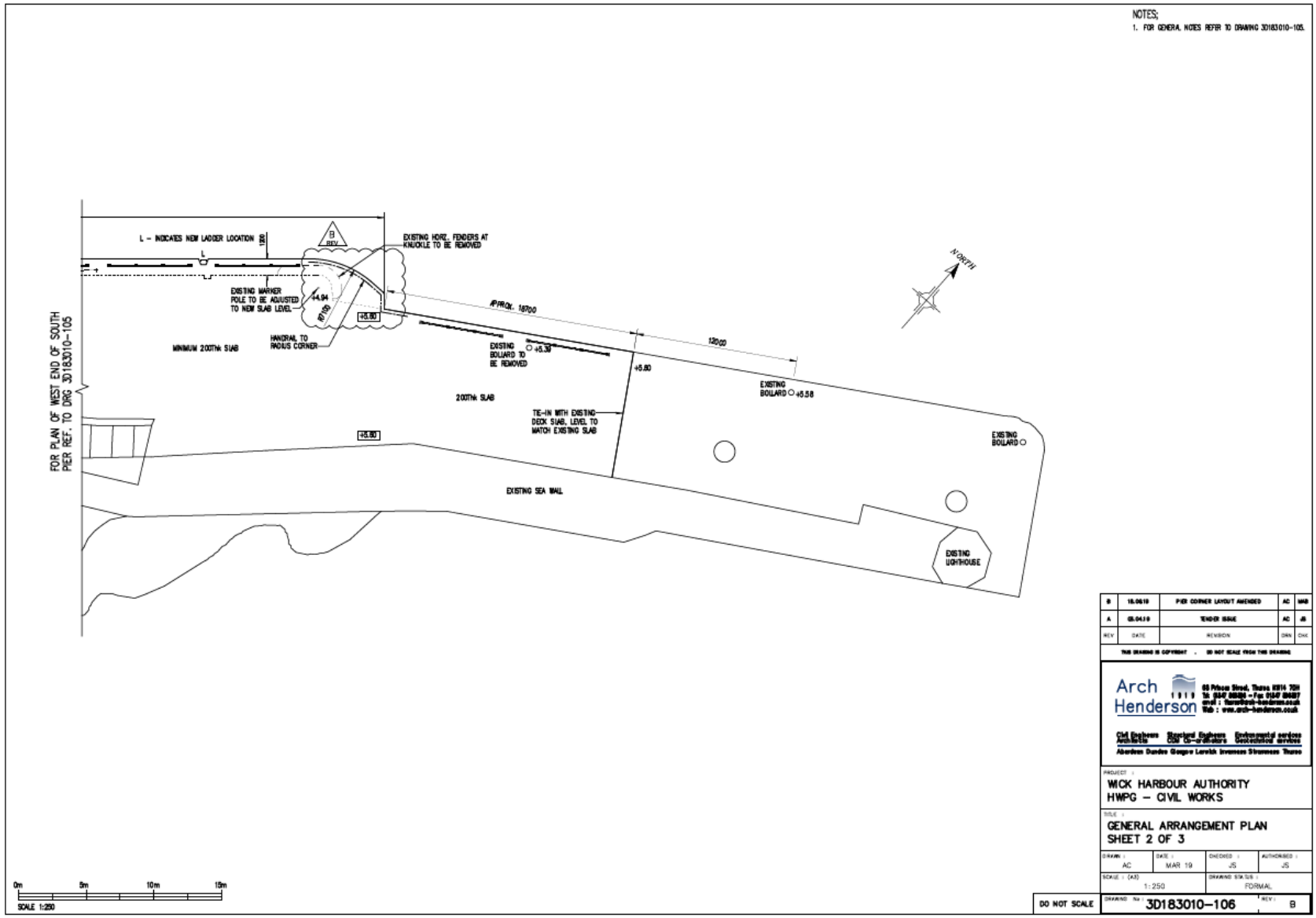
Arch Henderson
PROJECT : WICK HARBOUR AUTHORITY HWPG – CIVIL WORKS
TITLE : GENERAL ARRANGEMENT PLAN SHEET 1 OF 3
DRAWN : AC DATE : MAR 19 CHECKED : JS AUTHORISED : JS
SCALE : (A3) 1:250 DRAWING STATUS : FORMAL
DO NOT SCALE DRAWING No : 3D183010–105 REV : B
SCALE 1:250


NOTES;
1. FOR GENERAL NOTES REFER TO DRAWING 3D183010-105.
L – INDICATES NEW LADDER LOCATION
EXISTING HORZ. FENDERS AT KNUCKLE TO BE REMOVED
EXISTING MARKER POLE TO BE ADJUSTED TO NEW SLAB LEVEL
HANDRAIL TO RADIUS CORNER
MINIMUM 200Thk SLAB
EXISTING BOLLARD TO BE REMOVED
+5.39
+5.80
APPROX. 16700
12000
EXISTING BOLLARD +5.58
200Thk SLAB
TIE-IN WITH EXISTING DECK SLAB, LEVEL TO MATCH EXISTING SLAB
EXISTING BOLLARD
EXISTING SEA WALL
EXISTING LIGHTHOUSE
FOR PLAN OF WEST END OF SOUTH PIER REF. TO DRG 3D183010-105
NORTH
0m
5m
10m
15m
SCALE 1:250
B 18.06.19 PIER CORNER LAYOUT AMENDED AC MAB
A 03.04.19 TENDER ISSUE AC JS
REV DATE REVISION DRN CHK
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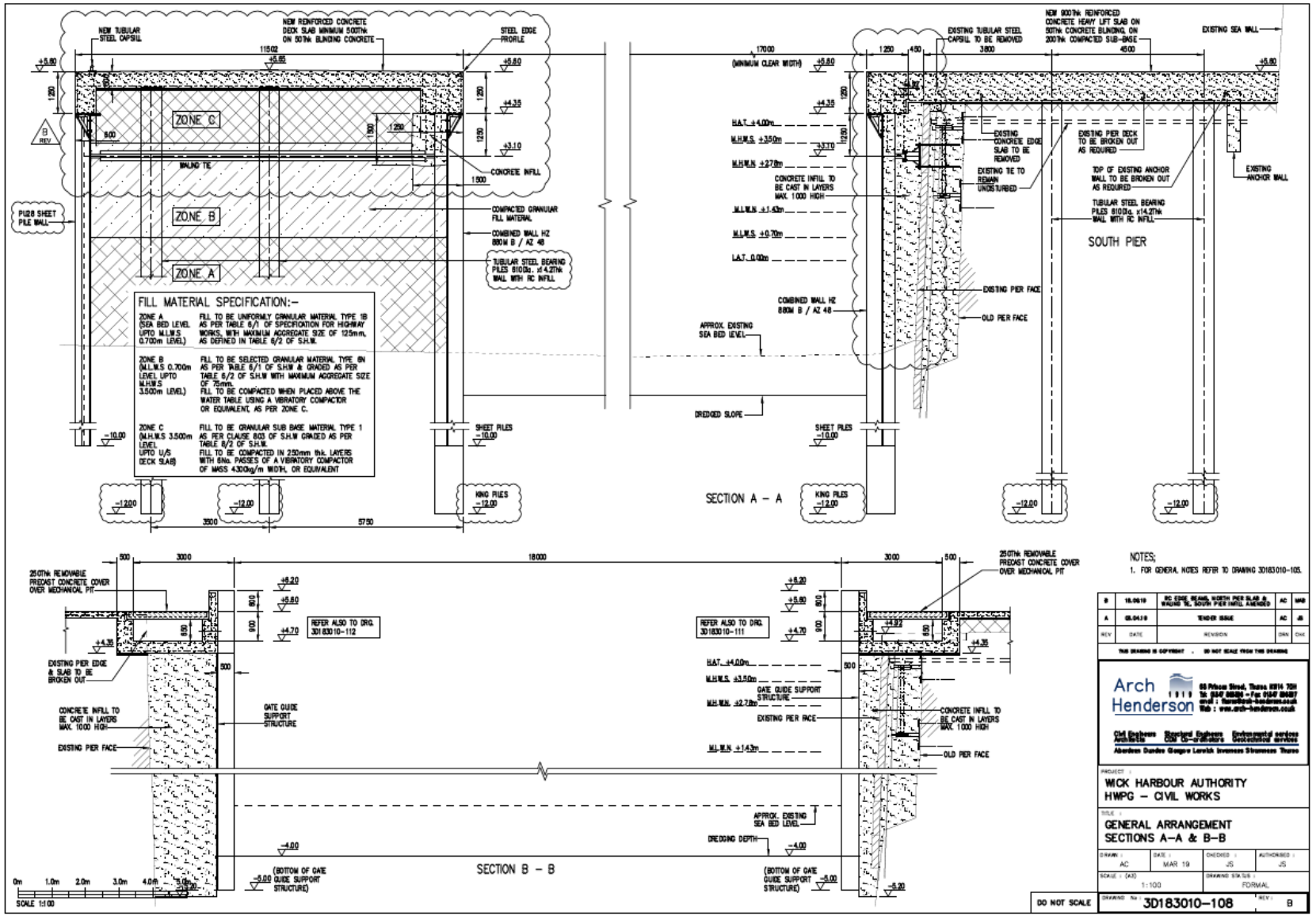
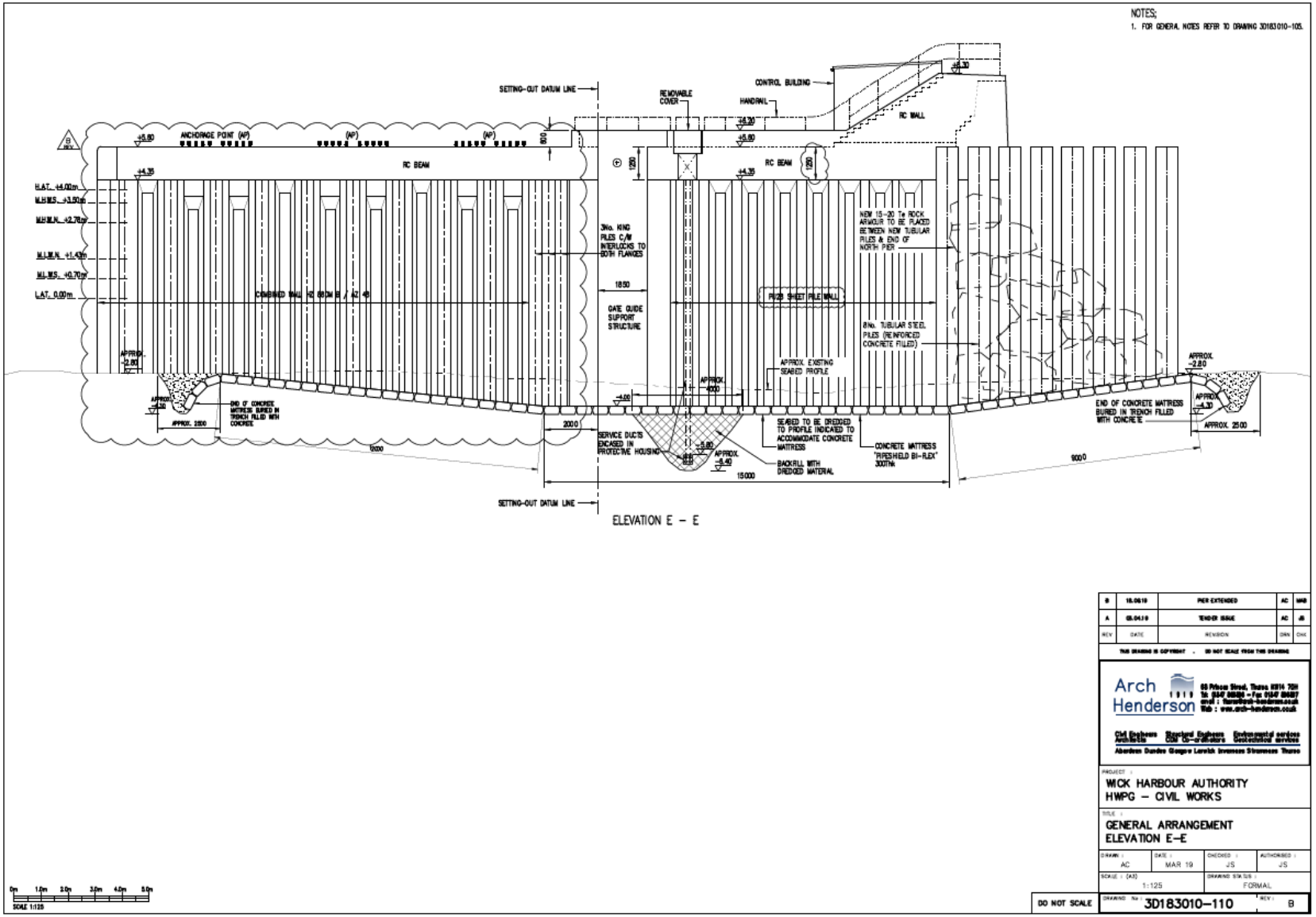
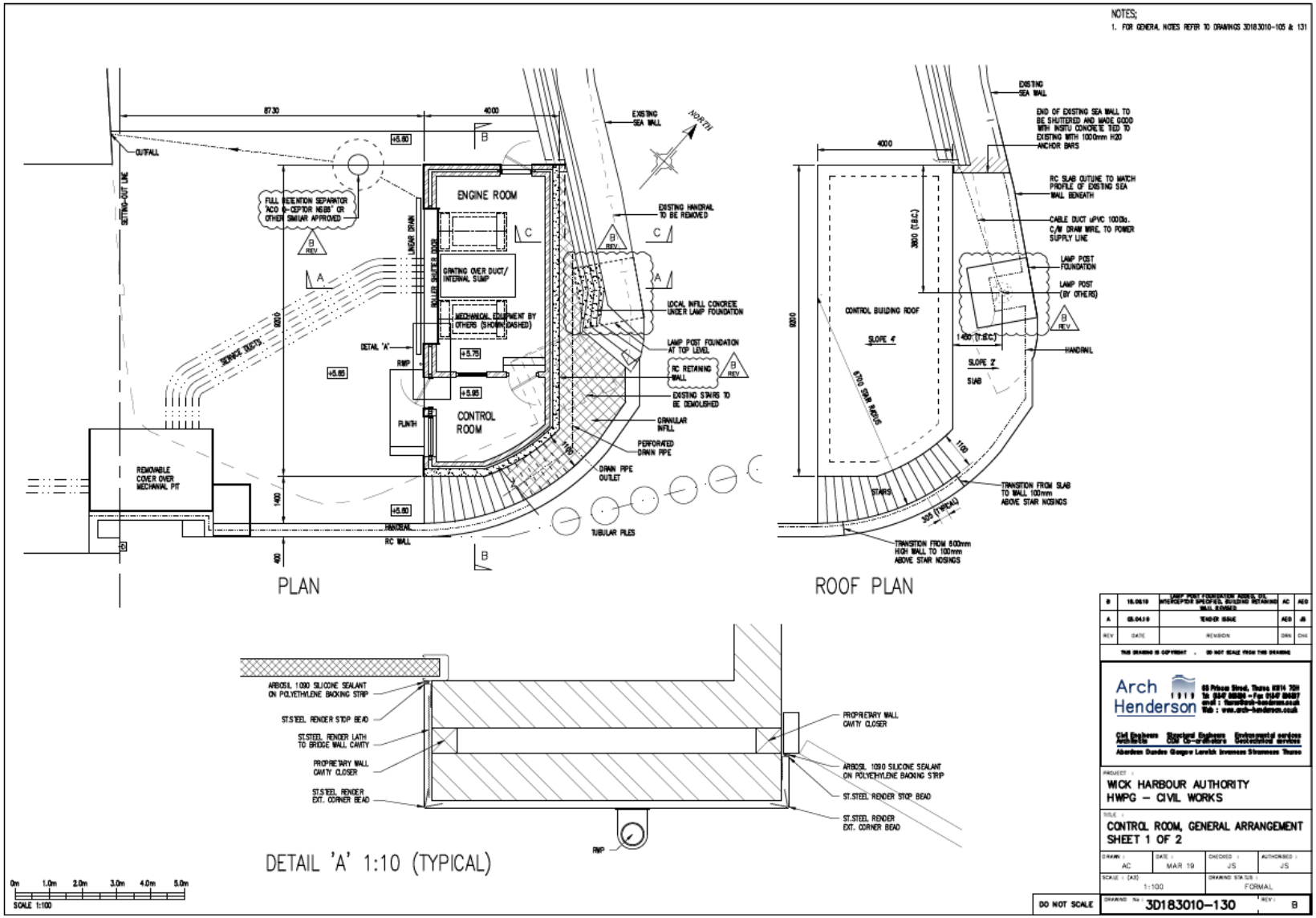
Arch Henderson
Civil Engineers Architects Marine Engineers Oil & Gas Consultants Environmental services Geotechnical services
Aberdeen Dundee Glasgow Leeds Inverness Stornoway Thurso
PROJECT :
WICK HARBOUR AUTHORITY
HWPG – CIVIL WORKS
TITLE :
GENERAL ARRANGEMENT PLAN
SHEET 2 OF 3
DRAWN : AC
DATE : MAR 19
CHECKED : JS
AUTHORISED : JS
SCALE : (A3) 1:250
DRAWING STATUS : FORMAL
DO NOT SCALE
DRAWING No : 3D183010-106
REV : B


NEW TUBULAR STEEL CAPSILL
NEW REINFORCED CONCRETE DECK SLAB MINIMUM 500THK ON 50THK BLINDING CONCRETE
STEEL EDGE PROFILE
ZONE C
ZONE B
ZONE A
WALING TIE
CONCRETE INFILL
PU28 SHEET PILE WALL
COMPACTED GRANULAR FILL MATERIAL
COMBINED WALL HZ 880M B / AZ 48
TUBULAR STEEL BEARING PILES 8100Ø x t 4.27THK WALL WITH RC INFILL
FILL MATERIAL SPECIFICATION:-
ZONE A (SEA BED LEVEL UPTO M.L.W.S 0.700m LEVEL) FILL TO BE UNIFORMLY GRANULAR MATERIAL TYPE 1B AS PER TABLE 6/1 OF SPECIFICATION FOR HIGHWAY WORKS, WITH MAXIMUM AGGREGATE SIZE OF 125mm, AS DEFINED IN TABLE 6/2 OF S.H.W.
ZONE B (M.L.W.S 0.700m LEVEL UPTO M.H.W.S 3.500m LEVEL) FILL TO BE SELECTED GRANULAR MATERIAL TYPE 6N AS PER TABLE 6/1 OF S.H.W & GRADED AS PER TABLE 6/2 OF S.H.W WITH MAXIMUM AGGREGATE SIZE OF 75mm. FILL TO BE COMPACTED WHEN PLACED ABOVE THE WATER TABLE USING A VIBRATORY COMPACTOR OR EQUIVALENT, AS PER ZONE C.
ZONE C (M.H.W.S 3.500m LEVEL UPTO U/S DECK SLAB) FILL TO BE GRANULAR SUB BASE MATERIAL TYPE 1 AS PER CLAUSE 803 OF S.H.W GRADED AS PER TABLE 6/2 OF S.H.W. FILL TO BE COMPACTED IN 250mm thk. LAYERS WITH 6No. PASSES OF A VIBRATORY COMPACTOR OF MASS 4.300kg/m WIDTH, OR EQUIVALENT
SHEET PILES
KING PILES
SECTION A – A
EXISTING TUBULAR STEEL CAPSILL TO BE REMOVED
NEW 900THK REINFORCED CONCRETE HEAVY LIFT SLAB ON 50THK CONCRETE BLINDING ON 200THK COMPACTED SUB-BASE
EXISTING SEA WALL
EXISTING CONCRETE EDGE SLAB TO BE REMOVED
EXISTING PIER DECK TO BE BROKEN OUT AS REQUIRED
EXISTING TIE TO REMAIN UNDISTURBED
TOP OF EXISTING ANCHOR WALL TO BE BROKEN OUT AS REQUIRED
EXISTING ANCHOR WALL
TUBULAR STEEL BEARING PILES 8100Ø x t 4.27THK WALL WITH RC INFILL
SOUTH PIER
CONCRETE INFILL TO BE CAST IN LAYERS MAX. 1000 HIGH
EXISTING PIER FACE
OLD PIER FACE
APPROX. EXISTING SEA BED LEVEL
DREDGED SLOPE
250THK REMOVABLE PRECAST CONCRETE COVER OVER MECHANICAL PIT
EXISTING PIER EDGE & SLAB TO BE BROKEN OUT
REFER ALSO TO DRG. 3D183010-112
REFER ALSO TO DRG. 3D183010-111
GATE GUIDE SUPPORT STRUCTURE
(BOTTOM OF GATE GUIDE SUPPORT STRUCTURE)
APPROX. EXISTING SEA BED LEVEL
DREDGING DEPTH
SECTION B – B
SCALE 1:100
NOTES;
1. FOR GENERAL NOTES REFER TO DRAWING 3D183010-105.
WICK HARBOUR AUTHORITY
HWPG – CIVIL WORKS
GENERAL ARRANGEMENT
SECTIONS A–A & B–B
DRAWN : AC
DATE : MAR 19
CHECKED : JS
AUTHORISED : JS
SCALE : (A3) 1:100
DRAWING STATUS : FORMAL
DRAWING No : 3D183010–108
REV : B
DO NOT SCALE


NOTES;
1. FOR GENERAL NOTES REFER TO DRAWING 3D183010-105.
SETTING-OUT DATUM LINE
REMOVABLE COVER
CONTROL BUILDING
HANDRAIL
RC WALL
ANCHORAGE POINT (AP)
RC BEAM
H.A.T. +4.00m
M.H.W.S. +3.50m
M.H.W.N. +2.70m
M.L.W.N. +1.40m
M.L.W.S. +0.70m
L.A.T. 0.00m
3No. KING PILES C/W INTERLOCKS TO BOTH FLANKES
GATE GUIDE SUPPORT STRUCTURE
NEW 15-20 T∞ ROCK ARMOUR TO BE PLACED BETWEEN NEW TUBULAR PILES & END OF NORTH PIER
PU23 SHEET PILE WALL
8No. TUBULAR STEEL PILES (REINFORCED CONCRETE FILLED)
APPROX. EXISTING SEABED PROFILE
END OF CONCRETE MATTRESS BURIED IN TRENCH FILLED WITH CONCRETE
SERVICE DUCTS ENCASED IN PROTECTIVE HOUSING
SEABED TO BE DREDGED TO PROFILE INDICATED TO ACCOMMODATE CONCRETE MATTRESS
BACKFILL WITH DREDGED MATERIAL
CONCRETE MATTRESS "SHIELD BI-FLEX" 300TM
SETTING-OUT DATUM LINE
ELEVATION E – E
SCALE 1:125
DO NOT SCALE
WICK HARBOUR AUTHORITY
HWPG – CIVIL WORKS
GENERAL ARRANGEMENT
ELEVATION E–E
AC
MAR 19
JS
JS
1:125
FORMAL
3D183010–110
B


NOTES;
1. FOR GENERAL NOTES REFER TO DRAWINGS 3D183010-105 & 131
PLAN
ROOF PLAN
DETAIL 'A' 1:10 (TYPICAL)
ENGINE ROOM
CONTROL ROOM
CONTROL BUILDING ROOF
EXISTING SEA WALL
NORTH
OUTFALL
SETTING-OUT LINE
FULL RETENTION SEPARATOR 'ACO O-CEPTOR NSBS' OR OTHER SIMILAR APPROVED
LINEAR DRAIN
ROLLER SHUTTER DOOR
GRATING OVER DUCT/ INTERNAL SUMP
MECHANICAL EQUIPMENT BY OTHERS (SHOWN DASHED)
SERVICE DUCTS
PLINTH
REMOVABLE COVER OVER MECHANICAL PIT
EXISTING HANDRAIL TO BE REMOVED
LOCAL INFILL CONCRETE UNDER LAMP FOUNDATION
LAMP POST FOUNDATION AT TOP LEVEL
RC RETAINING WALL
EXISTING STAIRS TO BE DEMOLISHED
GRANULAR INFILL
PERFORATED DRAIN PIPE
DRAIN PIPE OUTLET
TUBULAR PILES
HANDRAIL
RC WALL
END OF EXISTING SEA WALL TO BE SHUTTERED AND MADE GOOD WITH INSITU CONCRETE TIED TO EXISTING WITH 1000mm H20 ANCHOR BARS
RC SLAB CUTLINE TO MATCH PROFILE OF EXISTING SEA WALL BENEATH
CABLE DUCT uPVC 100dia. C/W DRAW WIRE, TO POWER SUPPLY LINE
LAMP POST FOUNDATION
LAMP POST (BY OTHERS)
SLOPE 4°
SLOPE 2°
SLAB
STAIRS
TRANSITION FROM SLAB TO WALL 100mm ABOVE STAIR NOSINGS
TRANSITION FROM 600mm HIGH WALL TO 100mm ABOVE STAIR NOSINGS
ARBOSIL 1090 SILICONE SEALANT ON POLYETHYLENE BACKING STRIP
ST.STEEL RENDER STOP BEAD
ST.STEEL RENDER LATH TO BRIDGE WALL CAVITY
PROPRIETARY WALL CAVITY CLOSER
ST.STEEL RENDER EXT. CORNER BEAD
RWP
SCALE 1:100
Arch Henderson
WICK HARBOUR AUTHORITY
HWPG – CIVIL WORKS
CONTROL ROOM, GENERAL ARRANGEMENT
SHEET 1 OF 2
DRAWN AC
DATE MAR 19
CHECKED JS
AUTHORISED JS
SCALE (A3) 1:100
DRAWING STATUS FORMAL
DRAWING No 3D183010–130
REV B
DO NOT SCALE

Appendix 2 – Design Standards

The following design standards will be used in the detailed design of the new works associated with HWPG.

BS EN 1990	Eurocode 0 – Basis of Structural Design
BS EN 1991	Eurocode 1 – Actions on Structures
BS EN 1992	Eurocode 2 – Design of Concrete Structures
BS EN 1993	Eurocode 3 – Design of Steel Structures
BS EN 1997	Eurocode 7 – Geotechnical Design
BS 6349 Part 1-1: 2013	Maritime Works Code of Practice for Planning and Design for Operations
BS 6349 Part 1-2: 2012	Maritime Works Code of Practice for Geotechnical Design
BS 6349 Part 1-4: 2013	Maritime Works Code of Practice for Materials
BS 6349 Part 2: 2010	Maritime Works Code of Practice for Design of Quay Walls, Jetties & Dolphins
BS 6349 Part 4 : 2014	Maritime Structures Code of Practice for the Design of Fendering and Mooring Systems
EAU 2004	Recommendations of the Committee for Waterfront Structures Harbours and Waterways
L148	HSE – Safety in Docks: Approved Code of Practice and Guidance
BS 8110 Part 1: 1997	The Structural Use of Concrete *(Reference only. Superseded by BS EN 1992 Eurocode 2: Design of concrete structures.)*
BS 8500 Part 1: 2015	Concrete – Method of Specifying and Guidance for the Specifier
BS 5950 Part 1: 2000	Structural Use of Steelwork in Building *(Reference only. Superseded by BS EN 1993 Eurocode 3: Design of steel structures)*
BS 449 Part 2: 1969 (AMD 1975)	The Use of Structural Steel in Building *(Reference only. Superseded by BS EN 1993 Eurocode 3: Design of steel structures)*
BS EN ISO 12944-5: 2007	Paints and varnishes – Corrosion Protection of Steel Structures by Protective Paint Systems
BS 8002: 2015	Code of Practice for Earth Retaining Structures
BS 8081: 1989 (AMD No. 1)	Code of Practice for Ground Anchorages
BS EN 1537: 2000	Execution of Special Geotechnical Work. Ground Anchors
BS EN 12063: 1999	Execution of Special Geotechnical Work – Sheet Pile Walls
API Spec 5L	American Petroleum Institute Specification for Line Pipe
ICE Specification for Piling and Embedded Retaining Walls – Second Edition	
Arcelor Piling Handbook, 8th Edition	