WORKS INFORMATION FOR THE SLIPWAY EXTENSION AT BANFF HARBOUR

1. INTRODUCTION

1.1 Projection Description

1.1.1 Location of the Works

The Works are located at the northern end of the outside basin of Banff harbour, adjacent to the Harbourmaster's office, Quayside, Banff, AB45 1HQ. The existing slipway, which is in disrepair, will be removed and the new slipway will start at the same position as the existing.

1.1.2 Time Scale for the Works

A maximum duration of 10 weeks shall be allowed for the Works.

1.1.3 Nature of the Project

The new slipway will begin at the point where the original slipway starts and extend some 90 m, running almost parallel to the 'Railway Jetty' (refer to drawing AMS296.1/16 and AMS296.8/16). The Railway Jetty is a historic structure constructed of a mixture of granite and metamorphic stone and understood to be formed on the underlying bedrock.

The new slipway will be 4.5 m wide and be constructed using in-situ concrete founded on the existing bedrock, which will require grading and removal. The new slipway in general will be constructed at a nominal distance away from the Railway Jetty to reduce the risk of unsettling any foundation or stability in the Railway Jetty.

The Works comprise the following elements:

- removal of the existing concrete slipway;
- excavation of sand to expose bedrock;
- excavation of bedrock over the area of the new slipway where required;
- construction of new reinforced concrete side walls anchored to the bedrock;
- filling and compaction of rock fill material between the walls;
- preparation of the rock fill surface to receive the slipway slab;
- construction of reinforced concrete slipway slab;
- provision of rock armour between the new slipway and Railway Jetty;
- provision of hardwood timber guides on edge of slipway, and associated furniture;
- clearance of site on completion of works.

1.2 History of the Harbour

Banff harbour, a former fishing and cargo port, came into being in 1625 when rocks were cleared from Guthrie's haven to form what is now the inner basin. Further improvements to the harbour were carried out in 1770 by John Smeaton creating what is now the middle basin and the east pier and then again in 1818 by Thomas Telford resulting in the creation of the north breakwater, forming the outer basin, along with the construction of the lighthouse.

The harbour remained a fishing and cargo port for many years, until siltation began to create a problem (due to a change in the course of the river Deveron) resulting in vessels migrating to the harbour at Macduff. This left Banff principally as a leisure harbour, although a few private fishing vessels do still remain.

In 2003 the local community identified the need for a marina to boost the harbour's attraction to the growing tourist trade and improve the facilities available to its users. So after lengthy consultation and the obtainment of adequate funding (from the European Regional Development fund, Building Buchan New Beginnings, Scottish Enterprise Grampian and Aberdeenshire Council), work began in April 2006.

Work was completed in January 2007 and Banff harbour marina was officially opened in April 2007 by the then Lord Provost, Raymond Bisset OBE. The marina now provides safe haven for 76 fully serviced (water and electricity) pontoon berths that can cater for vessels of up to 10 metres in length with a draft of up to 1.8 metres. A number of these berths are reserved exclusively for the many marina visitors who berth in the harbour whilst they are enjoying sailing along the Moray Firth coastline.

1.3 Tidal information

Tidal information for Banff is as follows:

Banff is a secondary non-harmonic port and the tide type is semi-diurnal. The harbour access is tidal, matching the tidal depths of the river Deveron estuary, providing an access depth of chart datum.

Highest high water	MHWS	3.9 m
Lowest high water	MHWN	3.2 m
Highest low water	MLWN	1.5 m
Lowest low water	MLWS	0.8 m

Predicted heights are in metres above chart datum.

The outer basin is tidal, with the exception of the access channel along the east pier that is also chart datum. The inner basins provide floating berths with matching access at depths varying from 1.8 m below chart datum in the 10 m berthing area to 0.7 m below chart datum.

Harbour radio contact on marine band channel 12, during normal working hours.

2. SPECIFIC WORKS REQUIREMENTS

2.1 Site Security and Access

All site boundaries and security measures shall be sufficient to ensure that unauthorised persons cannot access the site at any time.

Access to site to be restricted by the use of Heras or equivalent fencing. Works information boards, site safety signs and Contractor's banners to be affixed to Heras fencing.

All materials and plant left on site when site is not operational to be secured and closed off.

Site visitors must be signed in and a record kept in the welfare facilities.

Contractor to liaise with the Harbourmaster for access when moving large equipment in and out of the site working area.

2.2 Site Rules and Other Restrictions

No alcohol or illegal drugs shall be permitted on site.

Construction traffic shall use warning lights and audible reversing devices at all times. Vehicles shall reverse only under the control of a competent marshall.

Access for emergency vehicles (fire/police/ambulance) must be maintained at all times during construction.

Lone working on the site shall not be permitted.

The Contractor shall monitor the weather and stop all works if any adverse weather occurs.

2.3 Pre and Post Inspection

Prior to setting up compounds and starting work on site, a joint survey by the Contractor and Project Manager of the existing condition of the areas where the Contractor shall be working will be made with record photographs taken.

Following completion of the work on site, a joint survey by the Contractor and the Project Manager shall be carried out to verify whether any damage to the quays or areas where the Contractor has been working has occurred, caused by the Contractor's activities. Any damage identified shall be rectified by the Contractor to the satisfaction of the Project Manager at the Contractor's expense.

2.4 Tide Gauge

The Contractor shall establish a master tide board at an easily accessible sheltered location. The master tide board shall be levelled directly from the main survey control datum.

3. MATERIALS AND WORKMANSHIP – GENERAL

3.1 General

3.1.1 Quality of Materials

All materials used in the Works shall be as described herein or on the drawings or Activity Schedule. Where not so described, materials shall comply with appropriate current International Standards.

3.1.2 Specification for Highway Works Volume 1

Where items of the Works are not covered herein, the Works shall be carried out to the relevant clauses of the Specification for Highway Works Volume 1.

3.2 Tolerances

General construction tolerances on lines, levels, positions and dimensions shall be as follows unless stated otherwise on drawings or relevant parts of this Works Information:

Plan dimensions	± 5 mm
Level	± 3 mm
Layer thickness	+ 5mm, - 0
Slab and pavement surfaces	± 3 mm

3.3 Proprietary Materials

All proprietary materials such as mortar, grouts, bonding agents, primers and sealants shall be prepared, mixed and applied in accordance with the manufacturer's instructions and health and safety recommendations.

4. SITE CLEARANCE & DEMOLITION

4.1 Site Clearance for Permanent Works

Areas above and below water to receive permanent works shall be cleared of all organic matter, loose deposits and materials and aquatic growth. All existing concrete and other materials from the original slipway shall be removed from the Works.

4.2 Demolition

All demolition work shall be carried out strictly in accordance with the requirements of BS6187: 2000 – 'Code of Practice for Demolition' and also in accordance with the advice contained in the SEPA Guidance Note PPG6 – 'Working at Construction and Demolition Sites (available at SEPA's website www.sepa.org.uk).

5. EARTHWORKS

5.1 Site Clearance

Areas to receive concrete or foundation works shall be cleared of all loose material, marine growth and debris.

5.2 General Excavation and Filling

5.2.1 General Excavation

Excavations shall be taken out to the least minimum dimensions required to accommodate the permanent works and shall provide for any working space necessary for their execution.

5.2.2 Siltation

After excavation, removal of unsuitable or unsound material, and before placing fill, foundation stones or concrete, a build-up of unsuitable deposits is possible during the Works as a result of both natural causes and construction operations.

Such deposits shall be removed immediately prior to proceeding with subsequent work.

5.2.3 Preparation of Final Surface

In excavations in of material other than rock, when approaching the final surface, the final trimming for foundations or concrete works shall not take place until placing of concrete is about to commence.

After final trimming, the surface shall be well compacted.

5.2.4 Excess Excavation

Excavation in excess of that required by the Contract shall be filled with such material and in such manner as directed by the Project Manager, at the Contractor's expense.

5.2.5 Preparation of Surfaces to Receive Works

Prior to placing of any works, all unsuitable and unsound material shall be removed.

Unsuitable material comprises silt, organic matter, netting, ropes and other debris overlying founding level.

Unsound material comprises materials lying below founding level which are of inadequate strength or stability to form a foundation for the Works.

The final trimming and compaction of material shall not take place until the subsequent construction is about to commence. The Contractor shall organise their working methods to ensure that sound material is not rendered unsound by softening, immersion and the like.

Materials so affected shall be replaced with sound material.

5.2.6 Disposal of Excavated Material

All surplus excavated material shall be removed from site and disposed of by the Contractor at a suitable, approved disposal site.

5.2.7 Filling Against Structures

In forming embankments or other areas of fill against structures, precautions shall be taken to ensure that no damage is caused during the filling operations or by earthmoving or compaction equipment.

5.2.8 Recycled Waste as Fill

The Contractor shall not deposit recycled waste as fill in the Works below the level of mean high water of spring tides.

5.3 General Fill Materials

5.3.1 General Rock Fill

General rock fill for the permanent works shall consist of hard, angular, dense, sound, durable, inert material, free from mechanical weakness or chemical decomposition and shall consist of natural rock with the following gradings:

Gradings: selected well graded material derived from natural rock conforming to Class 6A of Table 6/1 and Table 6/2 of Volume 1, Series 600, of the Specification for Highway Works.

The summary gradings for general rock fill are: well graded through the size range 1.5 kg to 10 kg with no more than 5% smaller than 1.5 kg.

5.3.2 Rock Fill Placed Below Water

All rock fill for the Works shall be washed at the source of supply to remove any fine particles or dust. This requirement is to avoid particles going into suspension in the sea.

5.3.3 Capping Layer

Capping layer: - well graded granular fill conforming to class 6F2 of Table 6/1 of Volume 1 of the Specification for Highway Works.

The summary grading requirements for capping layer are:

Sieve size (mm)	**Percentage by mass passing the size shown**
125	100
90	80 – 100
75	65 – 100
37.5	45 – 100
10	15 – 60
5	10 – 45
600 microns	0 – 25
63 microns	0 – 12

5.3.4 Sub Base

Sub base shall be made and constructed to conform to BS 13285: Unbound Mixtures: Specifications, and shall also comply with the Manual of Contract Documents for Highway Works, Volume 1 – Specification for Highway Works, Series 800 : Road Pavements –

Unbound, Cement and other Hydraulically Bound Mixtures – Clause 803 ‘Type 1 Unbound Mixtures’.

Sub base Type 1 shall be made from crushed rock, crushed slag, crushed concrete, recycled aggregates or well burnt non-plastic shale and may contain up to 10% by mass of natural sand that passes the 4 mm test sieve. Crushed gravel made from natural cobbles retained on the 63 mm test sieve may also be used.

The summary grading requirements for sub base Type 1 are: -

Sieve size (mm)	**Percentage by mass passing the size shown**
63	100
31.5	75 – 90
16	50 – 90
8	30 – 75
4	15 – 60
1	0 – 35
63 microns	0 – 9

5.4 Compaction of Fill

Compaction of fill shall be in accordance with the Specification for Highway Works – Series 600, Earthworks using ‘Method Compaction’ to comply with Clause 612 and Table 6/4 of SHW.

All fill material above mid-tide level shall be compacted as specified.

6. GROUT AND DOWEL BARS

6.1 Cementitious Grouts for General Use

Cementitious grout where specified shall be ‘Conbextra GP’ for dry situations and ‘Conbextra UW’ for underwater installations as manufactured by Fosroc Ltd, or similar material approved by the Project Manager.

Cementitious grout shall be mixed and applied strictly in accordance with the manufacturer’s instructions. Gap width 10 - 75 mm.

6.2 Polyester Resin Grout for Dowels or Resin Anchors

Polyester resin grout for grouting of dowels or resin anchors or where otherwise specified in the dry or underwater shall be ‘Lokfix S25’ for use in vertical holes and ‘Lokfix P25’ for use in overhead or horizontal holes, all as manufactured by Fosroc Ltd or similar materials approved by the Project Manager.

Resin grouts shall be mixed and applied in accordance with the manufacturer’s instructions.

Limitations on hole size:

Lokfix S25	bar diameter + 8 to 0 mm
Lokfix P25	bar diameter + 25 mm

6.3 Steel Dowel Bars and Bolts

Steel dowel bars shall be high yield ribbed bars, Grade 500, in accordance with BS 4449 or equivalent bars approved by the Project Manager. Hooks or bends in the dowel bars, where detailed, shall be formed in accordance with BS 8666: 2005.

Grouted in bolts shall be Grade 8.8 to BS 4190 or equivalent threaded bar as approved by the Project Manager.

7. CONCRETE TO WORKS ABOVE AND BELOW WATER

7.1 Concrete Mix Class

Concrete which is placed in the dry and maintained in the dry for at least 3 hours after finishing shall be of the following mix class:

Standard mix (XC2, XS3, XA2)

• compressive strength class (to BS EN 206-1)	C32/40
• permitted cement types (to BS EN 197-1)	CEM I CEM II A-V CEM II B-V
• minimum cement content	360 kg/m^3
• maximum free water / cement ratio	0.50
• maximum aggregate size	20 mm

Otherwise, concrete shall be a designed underwater concrete mix (with anti-washout additive) to the proportions as specified below:

Underwater mix (XC2, XS3, XA2)

• compressive strength class (to BS EN 206-1)	C32/40
• permitted cement types (to BS EN 197-1)	CEM I CEM II A-V CEM II B-V
• minimum cement content	450 kg/m^3
• fine / coarse aggregate ratio	75 - 100%
• fine aggregate grading	M/F
• maximum free water / cement ratio	0.50
• maximum aggregate size	20 mm
• additives (waterproofing / plasticising / ant-washout): “Conplast uw” by Fosroc or similar approved by the Project Manager	

Blinding mix (XC2, XS3, XA2)

• compressive strength class (to BS EN 206-1)	C15/20
• permitted cement types (to BS EN 197-1)	CEM I CEM II A-V CEM II B-V
• minimum cement content	360 kg/m^3
• maximum free water / cement ratio	0.50
• maximum aggregate size	20 mm

Concrete mixes shall be designed by the Contractor and full details shall be submitted to the Project Manager for approval. In addition, the Contractor shall develop the underwater mix in consultation with the “anti-washout” additive manufacturer.

7.2 Cement

Cement shall comply with BS EN 197–1:Cement.
Composition, specifications and conformity criteria for common cements.

7.3 Aggregates

7.3.1 Type

Aggregates for concrete shall comply with BS EN 12620: aggregates for concrete.

7.3.2 Source

The source of aggregates shall be notified to the Project Manager for prior approval.

7.3.3 Resistance to Freeze-Thaw Deterioration

Aggregates shall be obtained from a source which has a proven record of use of at least ten years of producing freeze-thaw resistant concrete of the quality specified in the exposed environments shown in the table below:

Location	Environmental Class Designation*	Exposure Description
Walls, foundations & slabs	XS3	Tidal splash and spray zones of marine structures

* See BS 8500-1, Table A1

If the Contractor proposes to use aggregates from an un-proven source, they shall demonstrate their suitability to resist freeze-thaw deterioration by carrying out the procedures and testing specified in BS EN 12620, Section 5.7, prior to incorporating such aggregates in the Works.

7.3.4 Avoidance of Alkali Silica Reaction

Aggregates shall be obtained from a source which has a proven record of at least ten years of no disruptive reaction in combination with the proposed cement type.

If the Contractor proposes to use aggregates from an un-proven source, they shall advise the Project Manager, for prior approval, of the precautions they propose to adopt to minimise the risk of disruptive reaction between aggregate and cement. Such precautions shall be in accordance with Clause 5.2 of BS 8500-2. Further guidance is given in BS12620 Annex G.

7.4 Concrete Admixtures

Additives or admixtures shall not be used in any concrete without the written permission of the Project Manager.

Mixing shall be by forced action mixer for a minimum of two minutes after introduction of any permitted additive or in accordance with manufacturer's procedures.

7.5 Preparation of Surfaces for Concrete

All surfaces to receive concrete or grout shall be cleaned by high velocity air or water jets, or other method approved by the Project Manager, such that earlier construction work is not damaged. Preparation works shall ensure that surfaces are clean, sound, and free from any concrete laitance, debris, siltation, organic matter, marine growth, or other contaminants, to the approval of the Project Manager.

Concrete surfaces to receive fresh concrete or grout shall be prepared to ensure the outer mortar skin is removed to expose the larger aggregate without disturbing it. Where the concrete is relatively fresh this preparation may be possible using water spray and/or brushing with a stiff brush. Where the concrete is hardened concrete the surface skin and laitance shall be removed by a method to be approved by the Project Manager.

7.6 Placing Concrete Above Water

All concrete placed in the dry (free from tidal effects and/or being submerged for at least 3 hours after placement) shall be placed within formwork within 2 hours of mixing. No concrete that has commenced to set shall be permitted to be used in the Works.

Concrete shall be placed within formwork and compacted using immersion type vibrators of mechanical drive or compressed air drive pattern. Concrete shall be placed in layers and worked to fill all voids at formwork, around reinforcement and fittings.

Where concrete placement is interrupted the Contractor shall make provision for forming satisfactory joints with earlier pours. If concreting is delayed by over an hour, work shall be suspended until the concrete has hardened and the hardened surfaces prepared to receive fresh concrete.

All work to concrete shall be complete before initial set occurs and the Contractor shall ensure the concrete is not disturbed before it has set hard.

Concrete placement shall not be allowed during heavy rain or sea spray without the permission of the Project Manager. If concreting has commenced prior to these environmental conditions the Contractor shall make all necessary precautions to protect the Works.

7.7 Placing Concrete Below Water

Concrete to be placed below water may be placed via tremie pipe in such a manner that the concrete does not drop any distance through water before arriving at its final position. Concrete shall not be permitted to fall from air into water during concreting.

Concrete operations shall be planned to place each pour in one continuous operation without breaks in the flow of concrete where possible (other than breaks to allow refilling of hoppers etc., as appropriate).

Tremie pipes shall be charged with concrete prior to commencing concreting by use of a travelling plug.

Concrete containing the underwater additive shall be in its final position within 2 hours of the introduction of the additive.

7.8 Protection of Concrete from Wave Action and Attrition

The Contractor shall take particular care to protect newly laid or finished surfaces from damage by rain, sea spray, wave motion or movement of foreshore materials until the concrete has fully hardened.

All surfaces within the reach of waves, vessel wash and transported foreshore material (attrition) shall be securely covered by jute hessian, tarpaulins, steel plates, shutters or other method to the approval of the Project Manager. Particular care shall be taken to protect exposed slab surfaces which become submerged by the rising tide after pouring.

7.9 Concreting in Low Temperatures

Concrete shall not be made with frozen materials and any concrete or mortar that has been frozen shall not be used in the Works.

Concreting shall not be carried out when the temperature is below 3 °C on a falling thermometer unless special precautions are taken to thaw aggregate, heat mixing water and protect the concrete from freezing, to the satisfaction of the Project Manager.

A reliable thermometer registering maximum and minimum temperatures shall be kept on site at all times during concreting operations and the Contractor shall keep written records of the maximum and minimum temperatures recorded on each day.

7.10 Certification of Batching Plant

The Contractor shall produce a certificate of load testing of the weighing mechanism of the batching plant by an independent tester, to prove its accuracy. A certificate not more than two weeks old shall be produced at commencement of concreting and thereafter updated certificates at two weekly intervals.

7.11 Sampling and Testing of Concrete

7.11.1 Testing for Compressive Strength

Sampling and testing for compressive strength shall be carried out in accordance with BS EN 206 -1: Annex B.

For the purpose of clause B.2 of Annex B, the rates of sampling shall be as shown in the table below: -

Class of concrete	**sample from one batch selected randomly to represent an average volume not exceeding:**
Class C32/40	15 m^3
Class UW	15 m^3

Samples shall be taken in a random fashion throughout any particular pour in a manner approved by the Project Manager or a representative approved by the Project Manager.

Three 150 mm cubes shall be made from each sample. One cube shall be tested at an age of 7 days.

The other two cubes shall be tested at an age of 28 days.

The results of the tests made at 28 days shall form the basis for determining compliance with specified characteristic strength requirements.

Cubes required by the Contractor for his own use in determining the rate of increase of strength of concrete shall be considered as additional to the three cubes specified above.

Cubes shall be prepared and tested in accordance with BS EN 12390: testing hardened concrete. Cubes shall be tested by an approved independent testing laboratory.

7.11.2 Records of Cube Tests

The Contractor shall submit to the Project Manager in duplicate, standard certificates showing the cube test results, completed in ink and signed by both the Contractor and the manager of the testing laboratory. The certificates shall be submitted as soon as possible after the tests and shall include the following information:-

1) date, time and batch and part of the Works from which the cube was taken;

2) date and age of cube when tested;

3) aggregate, type of cement and admixtures used and specified grade of concrete;

4) concrete slump and air temperature at the time the batch was sampled;

5) weight of the cube and volume determined by displacement;

6) compressive strength;

7) appearance of the concrete and nature of the fracture.

7.12 Maximum Chloride Content

The total chloride content of each concrete mix shall not exceed the values specified in Specification Clause 5.1.

The method of determining chloride content of the individual constituent materials shall be in accordance with Table 4 of BS 8500 – 2.

8. REINFORCEMENT

8.1 Materials

Bars for the reinforcement of concrete shall be hot rolled ribbed high yield bars or cold worked deformed bars in accordance with BS 4449. Bars shall have minimum characteristic yield strength of 500 N/mm².

Steel fabric for the reinforcement of concrete shall be in accordance with BS 4483.

8.2 Bar Schedules, Cutting and Bending

The scheduling, dimensioning, bending and cutting of steel reinforcement shall be in accordance with BS 8666.

Steel shall not be bent at temperatures less than 5 ºC.

Steel shall not be re-bent at the location of an original bend.

8.3 Fixing

Reinforcement shall be secured against displacement. The concrete cover shall be not less than the required nominal cover, minus 5 mm.

The cover to a bar in an outer layer of reinforcement shall not exceed the nominal cover described on the drawings by more than 2% of the overall dimension of the member, measured in the same direction, or by more than 10 mm, whichever is the lesser.

Cover blocks shall be of comparable strength, durability and appearance to the surrounding concrete. They shall match the mix proportions of the adjacent material so far as is practicable. They shall ensure that the reinforcement is correctly positioned and shall be as small as possible consistent with their purpose, of a shape acceptable to the Project Manager and designed so that they will not overturn or be displaced when the concrete is placed.

Other types of cover blocks may be used only with the approval of the Project Manager. Pieces of wood, metal, tile, or porous material shall not be used as cover blocks.

Tying wires shall be 1.6 mm diameter soft annealed iron wire. Projecting ends of tying wires shall not encroach into the concrete cover.

8.4 Surface Condition

Immediately before concrete is placed around it, reinforcement shall be clean, free from mud, oil, paint, retarder, release agent, loose rust, loose mill scale, snow, ice, grease or any other substance that can be shown to adversely affect the steel or concrete chemically, or to reduce the bond.

9. CONCRETE FINISHES

9.1 Use of Formwork

All structural concrete, excluding blinding concrete unless otherwise specified, shall be placed within formwork.

9.2 Formwork

Formwork shall be of sufficiently rigid construction to support the pressures from the placed concrete at all stages of placing, compacting and curing and to produce finished concrete dimensions within specified tolerances.

Formwork shall be such as to prevent the loss of grout or mortar from the concrete at all stages of placing and compacting.

The same type of plywood or timber shall be used in formwork throughout similar exposed areas.

9.3 Release Agents

Release agents for the formwork shall be to the approval of the Project Manager and shall enable the formwork to be removed without damage to the concrete surface. There shall be no adverse residual effect from the release agent on the concrete surface.

Where a concrete surface is to be permanently exposed only one agent shall be used throughout the entire area. Release agents shall be applied evenly and shall not be permitted to come into contact with reinforcement and built-in metal items.

9.4 Arrises

All exposed arrises shall be formed with a 25 x 25 mm chamfer.

9.5 Joints in Concrete Construction

9.5.1 Expansion Joints

Expansion joints, where required, shall be as shown on drawings.

9.5.2 Construction Joints

Before commencing any section of the Works, the Contractor shall submit for the Project Manager's approval, details of the number and location of construction joints where these are not shown on the drawings.

Concreting shall be carried out continuously up to construction joints. When the concrete is self-supporting but still sufficiently green, the formwork shall be removed, as necessary, to expose the construction joint. The concrete surface shall be sprayed with a fine spray of water or brushed with a stiff brush, just sufficiently to remove the outer mortar skin and expose the larger aggregate without disturbing it. Alternatively, where this preparation proves impracticable, the hardened surface skin and laitance shall be removed by grit blasting, needle gun or similar approved method. Hardened surfaces shall not be hacked.

Formwork retarding agents shall not be used unless authorised by the Project Manager.

The joint surface shall be clean and damp but free of standing water immediately before any fresh concrete is placed against it.

9.6 Surface Finishes for Concrete

9.6.1 Walls

The formwork shall be fixed in a regular pattern with horizontal and vertical lines continuous throughout the structure. All construction joints shall coincide with these horizontal and vertical lines. The finish to vertical walls shall be class F1 as defined in the Manual of Contract Documents for Highway Works, Volume 1, Specification 1700 Series.

9.6.2 New Slipway Top Surface Finish

The new slipway top surface finish shall be a transverse lightly ribbed, non-slip finish, obtained by tamping with a full width screed board.

The accuracy of the finished surface shall be such that it does not have any abrupt irregularities more than 3 mm.

9.6.3 Slabs

When the concrete has sufficiently hardened to prevent laitance being worked to the surface, it shall be floated with a wooden float to produce a uniform surface and a brushed texture applied with a bristle broom drawn transversely across the slab.

9.7 Curing of Concrete

All concrete surfaces shall be cured by one of the following methods:

(1) maintain formwork in place;

(2) cover the exposed surface with constantly soaked hessian for seven days after placing the concrete;

(3) spray the surface with an efficient curing membrane;

(4) cover the exposed surfaces with an impermeable material such as polythene, sealing and fastening around the new concrete.

The Contractor shall confirm his chosen method in writing to the Project Manager.

9.8 Embedded Metal Parts

Internal metal ties to be withdrawn through hardened concrete, shall not be used where either face is permanently exposed. Where internal ties are left in, they shall be provided with a cover of at least 60 mm or the nominal cover to the reinforcement, whichever is the greater.

9.9 Mooring Rings

Mooring rings shall be fabricated and installed on the new slipway in accordance with the Contract drawings.

Steel grades for all steelwork shall be grade S275 J2H to BS EN 10210, or similar approved by the Project Manager.

All steelwork and bolts shall be hot dipped galvanised for protection against corrosion. Hot dipped galvanised coatings shall comply with BS EN ISO 1461 except that the average coatings weight achieved shall be no less than 1000 g/m^2.

Fixings shall be drilled and grouted a minimum of 200 mm into the slipway top surface.

Mooring rings shall not be located such that they span joints in concrete slipway.

9.10 Edge Protection

The edge protection shall be 200 mm wide by 150 mm deep Greenheart timber, secured with marine grade stainless steel bolts at 1 m spacing in countersunk holes.

Edge protection shall be drilled and grouted a minimum of 200 mm into the slipway top surface.

Spacing of the fixings on lengths of edge protection fendering shall be developed by the Contractor, in accordance with manufacturers recommendations.

Except at joints in concrete, individual lengths of edge protection shall be butt jointed with a nominal 5 mm gap.

Edge protection elements shall not be located such that they span joints in the concrete slipway.

The Contractor shall be responsible for determining the exact lengths and spacing of fixings for the edge protection units, taking into account joints, mooring ring spacings and variations in gradient. Details shall be forwarded to the Project Manager for approval.

9.11 Weep Holes

Weep holes shall be 100 mm diameter uPVC pipe, secured and cast into the new reinforced concrete slipway walls at 2000 mm centres and 100 mm above seabed level, or similar.