DEPARTMENT *of* INFRASTRUCTURE, ENERGY *and* RESOURCES, TASMANIA

BRIDGEWORKS SPECIFICATION

B14 - PRECAST CONCRETE UNITS April 2003

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B14.1 SCOPE

This specification sets out the requirements for the supply of all materials, the manufacture, handling, storage at works and/or on site and delivery to site of precast concrete components and the installation and / or erection of:

- precast deck panels onto the beams.
- precast revetment slabs on a prepared concrete base slab.
- precast concrete crown units, link slab units and wingwall units
- precast concrete barrier units.

B14.2 REFERENCES

The following Australian and British Standards apply:

A.S. 1391 Methods for Tensile Testing of Metals

A.S. 1554 Structural Steel Welding Part 3 Reinforcing Steel

A.S. 1554 Structural Steel Welding Part 6 Stainless Steel for Structural Purposes

A.S. 1597 Precast Reinforced Concrete Box Culverts

A.S. 1720 SAA Timber Structures Code

A.S. 2082 Visually Stress graded Hardwood for Structural Purposes

A.S. 2271 Plywood and Block Board for External Use

A.S. 3600 Concrete Structures

A.S. 3610 Formwork for Concrete

A.S. 4671 Steel Reinforcing Materials

B.S. EN 10088-1 Stainless steels. Part 1 List of stainless steels

B.S. 6744 Austenitic stainless steel bars for the reinforcement and use in concrete

Specifications B4, B10, B11, B12, B50 and B52

B14.3 MANUFACTURE

All precast units shall be manufactured in accordance with the Drawings and the referenced Standards and Specifications:

The manufacture of these units may be carried out on site or at an approved precasting yard.

Details of the proposed mix shall comply with Specification B10 and be submitted in the Contract Management Plan, together with previous test results for this or similar mixes. The submitted mix design shall not be amended without further approval.

If the Contractor wishes to use high early strength cement, use steam curing, or give any special treatment to the units, details shall be included in the Contract Management Plan together with the proposed concrete curing regime.

Steam curing shall comply with the requirements of Specification B11.

The date of casting and necessary unit identification shall be marked on each unit prior to that unit being removed from its mould. Asymmetrically reinforced units shall be marked to avoid lifting damage.

The Contractor shall be wholly responsible for the standard of workmanship performed by the Manufacturer.

Precast concrete piles and prestressed concrete beams shall be manufactured to the requirements of B4 and B12 respectively. Prestress requirements are detailed in those Specifications.

B14.4 TEST PANELS

Before full production of visually important elements, the Superintendent may require the Contractor shall make six (6) full size panels to act as reference samples of the desired finish. If deemed acceptable the sample panels may then be incorporated in the works.

B14.5 CONCRETE

B14.5.1 General

Precast concrete components shall be made from concrete complying with the requirements of Specification B10, grade S25 unless otherwise specified, and no topping shall be permitted.

B14.5.2 Concrete Control Testing

Test samples shall be as required in Specification B10 unless the Superintendent reduces the testing requirements for certain elements.

At least one sample for each pile or beam cast shall be taken in accordance with AS 1012, Part 1. Four test cylinders shall be made from each sample. The cylinders shall be tested as under:

1 cylinder crushed at 7 days

2 cylinders crushed at 28 days

1 cylinder crushed prior to transfer of prestress.

Curing, moulding and capping of test cylinders shall conform to AS 1012 Parts 8 and 9.

B14.6 SURFACE FINISH

B14.6.1 Precast Concrete Units

The surface finish on precast concrete units shall comply with the requirements of Specification B11.

B14.6.2 Precast Deck Panels

The top surface of the panels shall have an exposed aggregate finish.

B14.6.3 Precast Revetment Slabs and Precast Fascia Panels

The exposed surface of the revetment slabs and precast fascia panels shall have a finish matching the appearance of the revetment slabs of any of the following bridges:

(i) Dampier Street Overpass - Tasman Highway, Hobart

(ii) Glen Dhu Interchange Overpass - Launceston

(iii) Castra Main Road Overpass - Ulverstone.

B14.6.4 Precast Reinforced Soil Facing Panels

The surface finish of the front face of the facing panels shall be either plain, striated or exposed aggregate as specified on the Drawings.

(i) Plain or Striated Finish

The surface of the front face shall conform to Specification B11 AS 3610 Class 2 finish.

(ii) Exposed Aggregate Finish

The surface of the front face shall conform to Specification B11 Exposed aggregate finish.

B14.7 TOLERANCES

At acceptance, units shall conform to the following dimensional tolerances:-

(a)	Deviation from straight	3mm max
(b)	Cross-sectional dimensions	-3 mm +3 mm
(c)	Cross-sections to be not out of square by more than	6 mm
(d)	Squareness of ends - deviation from a plane perpendicular to the longitudinal axis of members or from the specified end plane shall not exceed	6 mm
(e)	Overall length - shall not vary by more than	-5 mm +5 mm
	Crib Wall Units	-3 mm +0 mm
(f)	Twist - angular rotation of any cross-section relative to an end cross-section shall not exceed	6 mm
(g)	Blockouts and holes	
	(1) Dimensions	-2 mm to +2 mm
	(2) Deviation from position	2mm max.
(h)	Cover	-6mm, +6mm
(i)	Placement on mortar pads	2mm max.

Tolerances for precast concrete piles and prestressed concrete beams are detailed in Specifications B4 and B12 respectively.

B14.8 HANDLING, STORAGE AND TRANSPORT

Concrete strength shall be sufficient to avoid damage to the unit before a precast unit may be lifted from the mould or casting plinth.

Precast units shall only be lifted by the lugs provided for that purpose. Care shall be taken to protect the units from damage due to slings and handling.

Post tensioned beams shall not be lifted until 7 days after grouting.

Units shall be stored with suitable separation and protection to prevent damage to the units and staining of exposed faces.

All damaged or rejected units shall be removed from the site and disposed of by the Contractor at the Contractor's expense.

The proposed methods of lifting, handling, transporting and storing units shall be detailed in the Contractor's Contract Management Plan.

B14.9 INSTALLATION

B14.9.1 Erection of deck panels

Precast deck panel shall be placed on the beams as shown on the Drawings.

All deck unit joints shall be watertight.

Temporary struts and ties shall remain in place until the insitu deck concrete of a particular span has been cured to maturity as specified in Specification B11.

B14.9.2 Installation of Revetment Slabs

The front batter of each abutment shall be trimmed back to the line and level as detailed on the Drawings. Where shown on the Drawings, a layer of non-woven geotextile fabric with a minimum weight of 140 g/m^2 shall be placed on the prepared surface. A 75 mm minimum thick slab of no-fines concrete shall be placed onto the trimmed surface of the batter or the surface of the geotextile fabric when provided. The concrete shall be finished by screed to provide a uniform but rough interlocking surface for the bedding mortar.

The precast slabs shall be bedded on a 10 mm minimum thick intermittent mortar bed. Where shown on the Drawings, 25 mm gaps shall be provided between slabs. The intermittent mortar bed shall consist of pads having a minimum contact area of 100 mm diameter. The gaps between slabs shall be subsequently filled with mortar but left recessed by approximately 5 mm. Slots shall be left unmortared in the bottom row of the slabs for drainage as shown on the Drawings.

Slabs shall be swept clean soon after placement, and excess and spilt mortar removed.

B14.9.3 Placement of Culvert Units

The concrete of the base slab must have attained a strength of at least 20 MPa before placement of culvert crown units.

The crown units shall be placed in position on a stiff mortar before the mortar has set so that a uniform bearing is obtained.

Crown units shall be placed so as to attain uniform gaps of less than 4mm and provide a uniform alignment with minimal misalignment between units.

After placing the crown units, any gap between the inside of the legs and the edge of the recess shall be filled with mortar to the same level as the base slab and smoothly finished off with a steel float.

Once all crown units and link slab units are in their final position all lifting loops shall be neatly cut off flush with the top surface of the units and slabs, the surfaces to be treated thoroughly cleaned and a concrete epoxy repair mortar applied to the tops and the adjacent concrete surface for a distance of at least 25 mm around the outside of the steel bars .

Wing wall units shall be placed directly on the footing as shown on the Drawings. Once positioned correctly dry packed mortar shall be placed in the groove as shown on the Drawings. The wing wall units shall be temporarily supported until such time as fill has been placed. Mortar shall be placed between the wingwall and the crown units which shall be placed so that contact is as uniform as possible to avoid spalling or cracking due to high local stresses.

No backfilling nor embankment material shall be placed at the culvert until after the precast units have been installed and the mortar infill has been cured for seven (7) days.

Where the Contractor requires temporary access over the culvert crown units prior to completion of the road pavement being laid, it shall ensure that the design and manufacture of the culvert allows for the proposed construction loadings.

B14.9.4 Placing Barrier Units

Precast barrier units shall be placed on 50 mm sand bedding as shown on the Drawings.

After placing the barrier units, the keys between the units and recesses for lifting anchors shall be filled with class S25 concrete and smoothly finished off with a steel float.

B14.9.5 Other Precast Units

Specifications B4, B12, B50 and B52 detail the installation requirements for piles, beams, crib block wall units and reinforced soil facing units respectively.

B14.10 PAYMENT

Payment of 90% of the scheduled item value shall be made once units are manufactured and in storage in the manufacturer's yard.

B14.10.1 Precast Deck Panels

The rate in the Bill of Quantities for the manufacture of precast panels and their delivery to site storage area shall include full payment for providing all labour, materials, tools, equipment and any other work incidental to the manufacture and delivery of the panels. Payment for this item shall include formwork, and supply, handling and placing of reinforcement and lifting eyes.

The rate in the Bill of Quantities for handling and placing precast panels shall include full payment for providing all labour, materials, tools, equipment and any other work incidental to placing the panels in their final position. Payment for this item shall include equipment and work involved in the handling and transport of the units from the storage area, placing and fixing the panels on the formed mortar bed, and caulking all joints with compressed foam. The supply of the mortar and its placing in position is included in this item.

B14.10.2 Precast Revetment Slabs

The rate in the Bill of Quantities for the manufacture of precast slabs and their delivery to storage on site shall include full payment for providing all labour, materials, tools, equipment, formwork, handling and any other work incidental to the manufacture and storage of the slabs.

The rate in the Bill of Quantities for the erection of precast revetment slabs shall include full payment for providing all labour, materials, tools, equipment and any other work incidental to placing the slabs in their final position. (Also included is the supply and placement of geotextile, bedding mortar and clean up.)

The number of slabs called up in the Bill of Quantities has been calculated on the basis that there is a whole slab for which a part slab has been specified on the Drawings.

B14.10.3 Precast Crown Units, Linkslabs and Wingwalls

The rate in the Bill of Quantities for the manufacture of precast units and their delivery to site storage areas shall include full payment for providing all labour, materials, tools, equipment and any other work incidental to the manufacture and delivery of the units. Payment for this item shall include formwork and supply, handling and placing of reinforcement, ferrules and lifting eyes.

The rate in the Bill of Quantities for handling and placing precast units shall include full payment for providing all labour, materials, tools, equipment and any other work incidental to placing the units in their final position. Payment for this Item shall include equipment and work involved in the handling and transport of the units from the storage areas, placing the units on the formed mortar bed and caulking all joints with mortar. The supply of the mortar and its placing in position shall be included in this Item.

B14.10.4 Precast Fascia Panels

The rate in the Bill of Quantities for the manufacture of the precast fascia panels and their delivery and storage on site shall include full payment for providing all labour, materials, tools, equipment, formwork, handling and any other work incidental to the manufacture and storage of the fascia panels..

The rate in the Bill of Quantities for the placing of precast fascia panels shall include full payment for providing all labour, materials, tools, equipment and any other work incidental to placing the fascia panels in their final position. Also included is the supply and placement of jointing material and clean up.

B14.10.5 Precast Barrier Units

The rate in the Bill of Quantities for the manufacture of precast barrier units and their delivery to site storage areas shall include full payment for providing all labour, materials, tools, equipment and any other work incidental to the manufacture and delivery of the units. Payment for this item shall include formwork, supply, handling and placing reinforcement and lifting anchors and no separate allowance shall be made for any of these.

The rate in the Bill of Quantities for handling and placing precast barrier units shall include full payment for providing all labour, materials, tools, equipment and any other work incidental to placing the units in their final position. Payment for this Item shall include equipment and work involved in the handling and transport of the units from the storage areas, placing the units on the formed sand bed and caulking all keys and lifting holes with concrete. The supply of sand and concrete and their placing in position shall be included in this Item.

B14.11 HOLDPOINTS

The following holdpoints have been identified in this Specification:

- Prior to any change in concrete mix. (B14.3)
- Approval of test panels (B14.4)

B14.12 INFORMATION TO BE INCLUDED IN CONTRACT MANAGEMENT PLAN

The following information to be included in the Contract Management Plan has been identified in this Specification:

- Manufacturer and location of precasting site (B14.3)
- Curing regime for units (B14.3)
- Use of high early strength concrete mix (B14.3)
- Use of steam curing (B14.3)
- Proposed concrete mix design (B14 4)
- Procedure for the lifting, handling, storage and transport of units (B14.8)
- Compressed foam plastic sealing material (B14.9.1)
- Epoxy concrete repair mortar (B14.9.3)