

Technical Specification

**Transport and Main Roads Specifications
MRTS300 Construction of Boat Ramps**

March 2024



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1 Introduction

This Technical Specification applies to the construction of boat ramps designed in accordance with the department's design manual *Design Criteria for Boat Ramps*.

This Technical Specification shall be read in conjunction with MRTS01 *Introduction to Technical Specifications*, MRTS50 *Specific Quality System Requirements* and other Technical Specifications as appropriate.

This Technical Specification forms part of the Transport and Main Roads Specifications Manual.

2 Definition of terms

The terms defined in MRTS01 *Introduction to Technical Specifications* apply to this Technical Specification. Additional terminology relevant to this Technical Specification is defined in Table 2 below.

Table 2 – Definition of terms

Term	Definition
Business day	A Monday to Friday which is not a public holiday in the Administrator's place of business.
Core rock	Crushed rock used in the core of the boat ramp. This is the rock between the geotextile and geogrid (overlying the substrate), and the concrete boat ramp surface (either cast insitu slabs or precast planks).
EMP	Environmental Management Plan
PPE	Personal Protective Equipment

3 Referenced documents

The requirements of the referenced documents listed in Table 3 apply to this Technical Specification. Where there are inconsistencies between this Technical Specification and the referenced documents, the requirements specified in this Technical Specification shall take precedence.

Table 3 – Referenced documents

Reference	Title
-	<i>Design Criteria for Boat Ramps</i>
Annexure MRTS300	<i>Construction of Boat Ramps - Annexure</i>
Appendix MRTS300	<i>Construction of Boat Ramps – Appendix Forms A to I</i>
AS 1012.9	<i>Method For Testing Concrete Specimens</i>
AS 3610	<i>Formwork for concrete</i>
Environmental Protection Act 1994	<i>Environmental Protection Act 1994, Queensland</i>
MRTS01	<i>Introduction to Technical Specifications</i>
MRTS51	<i>Environmental Management</i>
MRTS71	<i>Reinforcing Steel</i>

Reference	Title
MRTS72	<i>Manufacture of Precast Concrete Elements</i>
SD4000	<i>Precast planks for Boat Ramps Type RG4000 and RG3500</i>
SD4001	<i>Precast planks for Boat Ramps Type OS4000 and OS3500</i>
SD4002	<i>Precast planks for Boat Ramps Type T4000 and T3500</i>
SD4003	<i>Precast planks for Boat Ramps Type RG4000 FRP</i>
SD4024	<i>Boat Ramp Information Signs – Materials, Fabrication, and General Arrangement</i>
SD4030	<i>Boat Ramp Construction – General Arrangement and Earthworks</i>
SD4032	<i>Boat Ramp Construction – Shoulders and Grouted Mattress</i>
SD4032	<i>Boat Ramp Construction – Concrete Slab and Joint Details</i>
Work Health & Safety Regulation 2011	Work Health & Safety Regulation 2011, Queensland

4 Quality system requirements

4.1 Hold Points, Witness Points and Milestones

General requirements for Hold Points, Witness Points and Milestones are specified in Clause 5.2 of MRTS01 *Introduction to Technical Specifications*.

The Hold Points, Witness Points and Milestones applicable to this Technical Specification are summarised in Table 4.1. There are no Milestones defined.

Table 4.1 – Hold Points, Witness Points and Milestones

Clause	Hold Point	Witness Point	Milestone
7.8	1. Start of Works		
8.8.3		1. Acid sulfate soils – treatment with lime	
8.12		2. Placement of geotextile and geogrid	
8.13.3		3. Compaction	
11.5.4	2. Inspection of formwork and reinforcement prior to concrete pour		
13.2		4. Footings (Grouted shoulders)	
13.4	3. Trial section of fully grouted shoulders		
15.1	4. Progress As Constructed Level Survey		
16	5. Partial Completion, Practical Completion, and Disestablishment		

4.2 Hold Points

4.2.1 Definition

A Hold Point is indicated in the text as **Hold Point** as per Clause 5.2 of MRTS01 *Introduction to Technical Specifications*.

In addition, for this Technical Specification Hold Point means an identified process beyond which the Contractor shall not proceed without written release authorisation from the Administrator.

Hold Points apply:

1. Where specified in a Technical Specification, or
2. on issue of a nonconformance report, issue of a corrective action request, or as otherwise nominated by the Administrator.

4.2.2 Contractor requirements for Hold Points

As a requirement for this Technical Specification, the Contractor shall:

- a) Notify the Administrator of an approaching Hold Point five business days before the expected date of the works requiring release.
- b) Fulfil the requirements for release of the Hold Point by midday of the preceding business day.
- c) Not proceed with the Works beyond the identified Hold Point without a written release of the Hold Point, and
- d) Provide evidence that all applicable work has been completed, tested, and inspected in accordance with the Contract.

Extensions of Time shall not be approved for delays caused by the Contractor's failure to supply adequate or timely information.

4.2.3 Hold Points nominated by the Administrator

This clause applies when a Hold Point is applied by the Administrator for a nonconformance or corrective action request. The nonconformance report raised by the Contractor shall address:

- a) The proposed rectification of the nonconforming product, (where applicable).
- b) The Identification of the causes, and the proposed actions to prevent recurrence of the nonconformance.

4.2.4 Release of a Hold Point

As a requirement for this Technical Specification the relevant Hold Point release request form shall be used by the Contractor to initiate the release.

The Hold Point shall be released in writing by the Administrator in response to the Contractor's Hold Point release request. Where the Hold Point is verbally released by the Administrator (during an onsite inspection or by a phone call), the Contractor shall seek written confirmation at the earliest opportunity.

4.3 Witness Points – definition and requirements

4.3.1 Definition

A Witness Point is identified in the text as **Witness Point** as per Clause 5.2 of MRTS01 *Introduction to Technical Specifications*.

In addition, for this Technical Specification a Witness Point is an identified point in the Works process where the Contractor is required to notify the Administrator of an approaching activity requiring observation to confirm specification compliance.

4.3.2 Contractor requirements for Witness Points

As a requirement for this Technical Specification, the Contractor shall:

- a) Shall notify the Administrator of an approaching Witness Point at least one full business day before the expected date of the works requiring witnessing (unless specified otherwise).

Example of an approaching Witness Point notification:

For an event specified as a Witness Point occurring on a Monday morning the Contractor will need to notify the Administrator before the close of business on the preceding Thursday.

- b) May proceed with the activity when either:
 - i. The delegated inspector is present to witness the activity, or
 - ii. The Administrator and the Contractor have agreed on alternative arrangements for demonstrating compliance.

4.4 Notification of an approaching Hold Point or Witness Point

Form D *Notification of approaching Hold Point Release Request / Witness Point* in MRTS300 Appendix shall be used to notify the Administrator of an approaching Hold Point or Witness Point.

4.5 Procurement of defined Items from registered suppliers

The department maintains lists of registered suppliers and approved products which must be used in the construction and maintenance of its infrastructure projects. These lists of registered suppliers and approved products are available at: <https://www.tmr.qld.gov.au/business-industry/Business-with-us/Approved-products-and-suppliers/Bridges-and-other-structures-approved-products-and-suppliers>

These products shall be sourced only from registered suppliers.

Table 4.5 – Defined Items for supply by registered suppliers

Defined Item	Category / Registration Scope
Reinforcing steel	MRTS71 <i>Reinforcing Steel</i>
Precast concrete boat ramp planks	MRTS72 <i>Manufacture of Precast Concrete Elements - precast boat ramp planks</i>

MRTS71 *Reinforcing Steel* and MRTS72 *Manufacture of Precast Concrete Elements* are not included with this Technical Specification as the responsibility for specification compliance remains with the registered supplier. The nominated supplier of these products shall be nominated in the Procurement Plan.

5 Contract Plan

5.1 General

Further to the requirements defined in the General Conditions of Contract (GCC) and the Annexure to the GCC, the Contract Plan includes these broad components:

1. The Safety Management Plan (SMP).
2. The Environmental Management Plan (Construction) [EMP(C)].
3. The Construction Program.
4. The Quality Plan.

5.2 Safety Management Plan (SMP)

The SMP shall have these components:

1. The WHS management plan as required under s309 and other sections of the Work Health & Safety Regulation 2011.
2. Safe Work Method Statements (SWMSs) to manage High Risk Construction work as defined in s291 of the Work Health & Safety Regulation 2011, or otherwise identified as a medium or high-risk activity.

The WHS management plan shall include (as a minimum):

- a) The requirements under S309 (2) of the Work Health & Safety Regulation 2011.
- b) The induction arrangements for communicating the content to workers prior to the start of site works (including the workers right to inspect the plan) under S310 of the Work Health & Safety Regulation 2011.
- c) The arrangements for reviewing and revising the plan to ensure it remains current, and the arrangements for communicating any changes to anyone working at the site (under s311 of the Work Health & Safety Regulation 2011).
- d) The Contractor's safety policy.
- e) Staff roles and responsibilities.
- f) Site safety rules, and
- g) Safety hazard risk assessments to identify the medium to high-risk construction activities, and the mitigation strategies to treat these risks through an appropriate SWMS.

SWMSs for hazardous activities:

These activities have been identified in the design process as being potentially hazardous during the construction phase, and shall have a SWMS (when required):

- a) undertaking construction activities near publicly accessible areas
- b) working near, in, on or under water

- c) operating plant and machinery
- d) lifting, transporting, and handling precast units and piling
- e) slips, trips, and falls within the construction area
- f) dangerous marine animals (stingers, sharks, stone fish, crocodiles and so on), and
- g) management of exposure to respirable crystalline silica (RCS) dust.

5.3 Environmental Management Plan (Construction)

5.3.1 Scope and purpose

Under the *Environmental Protection Act 1994* the Contractor has a:

- a) General Environmental Duty (GED) to not carry out any activity that causes, or is likely to cause, environmental harm unless it:
 - i. is authorised, or
 - ii. has taken all reasonable and practicable measures to prevent or minimise the harm, and
- b) duty to notify of environmental harm – to inform the administering authority, and landowner(s) or occupier(s) when an incident has occurred that may have caused or threatens serious or material environmental harm.

The EMP shall document the Contractor's procedures and methods for fulfilling the GED and the duty to notify.

5.3.2 General requirements

The Contractor shall prepare a site-specific Environmental Management Plan to document:

1. the administrative procedures, and
2. the reasonable and practicable measures for fulfilling the general environmental duty to not carry out any activity that causes, or is likely to cause, environmental harm.

The EMP shall include (as a minimum):

- a) The Contractor's environmental policy.
- b) Staff roles and responsibilities.
- c) The induction arrangements for communicating the content to workers prior to the start of site works.
- d) The arrangements for reviewing and revising the EMP to ensure it remains current.
- e) The reasonable and practicable measures to prevent or minimise environmental harm.
- f) If environmental harm occurs - the procedures for notifying the:
 - i. Principal
 - ii. Administering authority, and
 - iii. Landowner(s) and/or occupier(s).
- g) The procedures for management of cultural heritage finds.

- h) The procedures for management of complaints related to environmental factors. The procedures shall include:
 - i. notification and reporting to the principal, and to the relevant statutory and/or administering authorities
 - ii. investigation and assessment for legislative triggers, and
 - iii. management and corrective actions.
- i) Operational requirements identified for these environmental elements:
 - i. water quality
 - ii. public amenity / health (air, noise, vibration, and visual amenity)
 - iii. soil and land management
 - iv. flora and fauna
 - v. cultural heritage, and
 - vi. waste management.

5.4 Construction Program

The Construction Program shall be submitted in Gantt chart format and show:

- a) Milestone: The Date of the Letter of Acceptance (LoA).
- b) The Contract Duration defined in the Annexure to the GCC converted from weeks to calendar days (at seven calendar days for each week).
- c) Milestone: The Date for Practical Completion (which is the Date of the LoA + the Contract Duration in calendar days).
- d) Project specific boat ramp closure constraints or program requirements defined in Clause 3 of Annexure MRTS300
- e) Offsite procurement of precast planks.
- f) Establishment.
- g) Hold Points and Witness Points.
- h) These major construction activities (as required):
 - i. removal of existing facilities
 - ii. excavation
 - iii. placement of geogrid and geotextile
 - iv. placement and compaction of rock core
 - v. excavation for shoulder footings
 - vi. cast insitu concrete slabs
 - vii. placement of precast concrete planks

- viii. construction of shoulders
- ix. reinstallation of facilities, and
- x. other works.
- i) The anticipated Date of Practical Completion.
- j) Disestablishment.

5.5 Quality Plan

The Quality Plan shall include the mandatory and project specific requirements defined in Table 5.5.

Table 5.5 – Quality Plan Elements

Quality Plan Element	Requirement	Reference
1. Supply of Materials - Procurement Plan	Mandatory	Form A of Appendix MRTS300
2. Crushed (Core) Rock Compaction Plan	Refer to Clause 3 of Annexure MRTS300	Form B of Appendix MRTS300 (if required)
3. Concreting Quality Plan	Mandatory	Clause 10 of MRTS300

6 Implementation of the SMP and the EMP (C)

6.1 Protection of exposed star pickets and reinforcement starter bars

Exposed star pickets and reinforcement starter bars shall be marked to identify trip hazards and be fitted with impalement protection complying with California Occupational Health & Safety [Cal/OHSA] Regulations – Section 344.90.

The Danley™ LifeGuard™ Impalement Prevention Caps are a product which meets this requirement:

- High visibility Yellow to suit 12-20 mm nominal diameter bars.
- High visibility Orange to suit 24-36 mm nominal diameter bars and star pickets.

6.2 PPE for works in water

SWMSs for activities working near, in, on or under water may need to consider using special PPE suitable for use in a marine environment. Special PPE to be used while working near, in, on or under water shall consider:

- Buoyancy.
- Visibility.
- Abrasion.
- Head protection.
- UV protection.
- Thermal requirements.
- Foot protection and slip hazards.
- Protection from marine animals (if applicable).

6.3 Payment for implementation of the Safety Plan

Payment for implementation of the Safety Plan is included in Item 77101 'Preparation and implementation of the Contract Plan', refer to MRS300.

6.4 Notifications to environmental statutory authorities at the commencement and completion of works

Unless otherwise advised, the principal shall notify the relevant statutory authorities of the commencement and completion of works.

6.5 Payment for implementation of the Environmental Management Plan

This clause applies only if MRTS51 *Environmental Management* is not a listed contract document.

Payment for implementation of the Environmental Management Plan is included in Item 77101 'Preparation and implementation of the Contract Plan', refer to MRS300.

6.6 Environmental incident notifications, inspections, and audits

The Contractor shall inspect and audit the project's environmental impact and incident preparedness at the specified intervals using the Environmental Checklist Template.

Form A *Contractor's Monthly Environmental Reporting Form* in the MRTS51 *Environmental Management* Appendix shall be used for monthly and project completion reporting.

Environmental reports shall be submitted to the Administrator within five business days of the end of each month.

Environmental and cultural heritage incidents and notifications shall be in accordance with Clause 7.7 of MRTS51 *Environmental Management*.

The Administrator may audit and inspect the implementation of the EMP(C) in accordance with Clause 7.4 of MRTS51 *Environmental Management*.

7 Site establishment

7.1 General

Site establishment broadly includes these tasks and requirements:

- Delivery to site of the major items of construction plant required to commence work operations.
- Delivery to site and establishment of fencing, site accommodation buildings and facilities as required.
- Delineation of the Site of Works.

7.2 Site of Works

The Site of Works includes:

- a) the footprint of the Works shown on the General Arrangement drawing
- b) sufficient area to the sides, top and end of the works to safely access, operate plant and machinery, and allow a delineation for safety between the Works and publicly accessible areas (subject to time and area constraints defined in Clause 3 of the Annexure)
- c) sufficient area for a fenced site compound

- d) temporary storage areas for construction materials outside the site compound, and
- e) temporary use of unfenced publicly accessible areas during transfer or delivery of materials and plant.

7.3 Site compound

The Contractor is responsible for arranging a suitable site compound area adjacent to the Works either with a landowner or the facility's managing authority.

The site compound includes the Contractor's site facilities and fencing to delineate the work area from publicly accessible areas. The site compound shall be:

- Securely fenced to prevent public access.
- Located to minimise disruption to boat ramp users and car / trailer parking (if applicable).
- Used for unloading and storage of materials for the works. When materials are unloaded outside the compound, public vehicular and pedestrian traffic is to be controlled to avoid conflict with manoeuvring vehicles and loads.

Construction materials may be stored outside the site compound if:

- it is impractical to store the materials inside
- it is approved by the managing authority, and
- a risk assessment has identified and managed related safety hazards.

7.4 Hydrocarbon spill response kit

A hydrocarbon spill response kit meeting the minimum requirements defined in Table 7.4 shall be established and remain onsite for the duration of the Works to respond, contain, and remove hydrocarbon contamination events on land and water. Examples of hydrocarbon contamination events are:

- Fuel spills and hydraulic fluid leaks.
- Submersion of construction plant.

Table 7.4 – Hydrocarbon spill response kit requirements

The minimum requirements for the hydrocarbon spill response kit includes these items:

Item	Minimum Requirements
Silt curtain	Draft: 1 metre (skirt length) Length: 15 metres Skirt material: nonwoven 90 micron
Floating hydrocarbon containment boom	Length (total): 25 mm x 12 metres (total)
Oil spill response kit	240 litre kit: (includes booms, absorbent pads, absorbent material, and disposal bags)

The silt curtain does not necessarily have to be installed as a turbidity control, but is required onsite to be used:

- for turbidity control (if required), and
- as an extra hydrocarbon containment boom.

7.5 Site surveillance camera

A site surveillance camera fulfilling the requirements defined in Table 7.5 shall be provided with access to the Administrator to monitor the progress of the works.

Table 7.5 – Site surveillance camera requirements

Parameter	Requirements
Camera type:	V8000 solar outdoor available for hire from ATF Vision or approved equivalent.
Duration:	From site establishment to Practical Completion.
Access:	Provision will be made for up to eight Transport and Main Roads / MSQ login accesses.
Extras:	A time lapse video will be provided at completion.
Time of operation:	Daylight.
Location and coverage:	Location and coverage shall be agreed at site establishment. At a minimum it will cover current works and shall be moved if required for progressive stages.

7.6 Traffic control (landside)

This clause shall apply whenever or wherever there is potential for conflict between construction vehicles and pedestrians or boat ramp users (particularly when works are occurring at partially in service boat ramps). Landside traffic control for the first stage of works shall be implemented before the commencement of works.

The Contractor shall:

- Always maintain safe access to existing facilities outside the Site of Works.
- Clearly delineate work areas from the active boat ramp lanes.
- Maintain adequate manoeuvring area for car / trailer units to access the active boat ramp lanes.
- Use traffic controllers to separate boat ramp users and construction activities if required.
- Implement landside traffic control site establishment.

Short term full closures will be considered by the principal for approval by the Administrator. The Contractor shall supply this information when applying for a temporary full boat ramp closure:

- The reason for the closure.
- The expected timing and duration of the closure.
- The method and lead time of advising potentially affected boat ramp users.

- Other methods to be used to mitigate the impact of the closure.

7.7 Traffic control (waterside)

This clause shall apply whenever or wherever there is potential for conflict between construction activities and publicly operated vessels accessing a partially closed boat ramp from the water side.

The intent of this clause is to ensure that users accessing the partially in service facility from the waterside:

- Are easily able to identify the active side of a partially closed in service boat ramp.
- Do not hit submerged hazardous construction materials (planks and geogrid).

Waterside traffic control for the first stage of works shall be implemented before start of works.

The minimum requirements for waterside delineation are:

- installing a minimum of six 400 mm diameter yellow buoys at a maximum spacing of 1.5 metres when connected by a low visibility rope, or
- installing a minimum of four 200 mm diameter yellow buoys at a maximum spacing of 4 metres when connected by a high visibility (yellow or orange) floating boom system of diameter greater than 100 mm.

The buoys and delineators can be secured:

- with individual anchors, or
- by attaching to existing structures outside the Works without affecting safe navigation to the active boat ramp lanes.

All anchors used for the waterside delineation shall be removed when the marker buoys are removed.

7.8 Start of Works

Hold Point 1

Form E *Start of Works – Hold Point Release Request* in Appendix MRTS300 shall be used for the release of this Hold Point.

Works shall not commence before the following requirements have been verified:

- a) The major item(s) of construction plant required to commence work operations has been delivered to the site.
- b) The Site compound including accommodation, facilities and fencing has been delivered and installed, and the work area has been delineated from the publicly accessible areas.
- c) The traffic management controls for landside including devices and signage have been implemented and established.
- d) The traffic management controls for waterside traffic (if required) including devices and signage have been implemented and established.
- e) Existing services that are part of the Works, may conflict with the Works, or will be hazardous to public or worker safety have been located and marked.

- f) The following environmental management controls and requirements have been delivered to Site and implemented (as required):
- i. Copies of the EMP(C) and environmental approvals.
 - ii. Silt curtain.
 - iii. Floating hydrocarbon containment boom.
 - iv. Oil spill response kit.
 - v. Limits of work areas and/or limits of clearing (where defined on approvals and permits) have been identified, delineated, and marked.
 - vi. Required notifications to environmental statutory authorities.
- g) The following safety controls and requirements have been delivered and implemented as required:
- i. Copy of the WHS Plan and induction records.
 - ii. Impalement protection star picket caps.
 - iii. Special PPE (protective headwear, protective footwear and hi vis clothing) for all working near, in, on or under water activities.
- h) The site surveillance camera has been delivered and installed, and the live feed is available to the Administrator.

8 Earthworks

8.1 General

Earthworks broadly covers these activities to prepare the site for the installation of precast planks, cast insitu slabs, and other structures (including floating walkway modules and piles if required):

- Removal and disposal of existing structures.
- Clearing and grubbing of vegetation.
- Excavation to the design surface.
- Treatment of excavated spoil.
- Supply and installation of geogrid.
- Supply and installation of geotextile.
- Supply placement and compaction (where required) of 75 mm nominal core rock.
- Supply and placement of larger rock sizes (where required).

8.2 Removal and disposal of existing structures

The extent(s) of existing structures to be removed and cleared from the site are shown on the project specific drawings and/or defined in Clause 4.1 of Annexure MRTS300.

8.3 Clearing and grubbing of vegetation

The extents of vegetation clearing and grubbing are shown on the project specific drawings and/or defined in Clause 4.2 of Annexure MRTS300.

The Conditions attached to approvals for vegetation clearing are defined in one or all of the following:

1. Clause 4.2 of Annexure MRTS300
2. The project specific approvals, and
3. The Annexure MRTS51.1 *Environmental Management*.

8.4 Existing services relocation

The existing services that are required to be relocated are shown on the project specific drawings and/or defined in Clause 4.3 of Annexure MRTS300.

8.5 Unsuitable material

Unless otherwise directed by the Administrator, or indicated in the Drawings or Annexure, unsuitable material below the design excavated surface shall be left in place, covered with geotextile, and allowed to consolidate under the weight of the core rock.

Where the Contractor over-excavates beyond or below the design surface for safety, vehicle access, surveying errors, or for any other reason for the Contractor's convenience, extra payment shall not be approved for:

- excavation, treatment, and disposal, or
- backfill with approved material.

8.6 Disposal of waste materials

Wastes shall preferably be reused as a resource where possible in accordance with Clause 8.13 of MRTS51 *Environmental Management*.

The Contractor is responsible for the appropriate storage, management, and disposal of waste materials in accordance with the waste management hierarchy:

1. Avoidance
2. Reuse
3. Recycle
4. Energy recovery
5. Disposal

Construction waste materials include (but are not limited to):

- existing structures requiring to be removed as part of the Contract
- vegetation removed as part of the Contract
- packaging from materials used in the Works
- surplus construction materials generated or not used in the Works
- excavated spoil, and
- liquid or solid wastes generated from servicing or maintenance of plant and equipment used in the Works.

Waste materials stored onsite prior to offsite disposal shall not create safety or environmental hazards. The Contractor shall only use offsite disposal locations complying with all legislative and statutory requirements.

Payment for management and disposal of waste materials is included in the tendered rates.

8.7 Transport and disposal of excavated spoil

All excess cut material shall be transported from the site and disposed (except when defined in the Annexure that the material is to be reused in the Works). Where needed and indicated, excess material will be treated for contaminants prior to disposal.

The location and method for disposal shall be either:

- at the location defined in the Annexure, or
- if a location is not defined in the Annexure, at a place selected by the Contractor that complies with all relevant legislation and local authority requirements.

8.8 Treatment of Acid Sulfate Soils (ASS)

8.8.1 Scope

This clause applies only when the treatment of ASS is defined in Clause 4.4 of the annexure.

8.8.2 Construction of temporary bunding

Temporary bunding shall be constructed from compacted uncontaminated soil to prevent acidic drainage entering watercourses if spoil is not treated on the same day as excavation. The Contractor is responsible for locating a suitable area for bunding for approval by the Administrator.

All temporary bunds shall be removed, and the disturbed areas shall be reinstated to the pre-commencement state after completion of the Works.

8.8.3 Treatment with lime

Witness Point 1

Excavated material shall be treated by the addition of fine agricultural lime at the defined rate within 24 hours of excavation. The lime shall be added after excavation and shall be thoroughly mixed with the soil by rotation or tilling with a rotary hoe, grader, or excavator. If lime is added within 24 hours and the material is still wet, further tilling shall be done when the material has dried to ensure full mixing.

8.9 Core rock – type and nominal grading

The core rock shall be a crushed rock with a grading between rail ballast (ideal) grading and the nominal (75 mm) grading defined in Table 8.9.

Table 8.9 – Core rock nominal grading

Sieve size (mm)	Rail ballast (mm)	Nominal (75 mm) grading
75		100
63	100	
53	95	
37.5	51	>50
26.5	5	<5

The suitable grading sizes are constrained at:

- the smaller end of the scale by the geogrid’s aperture size ability to contain rock, and
- the larger end of the scale by compatibility and a flat surface to support concrete elements.

8.10 Supply of geotextile

The geotextile shall be either:

- Texcel 600R
- ProFab Ultra AS600X, or
- another product approved by the Administrator complying with the property requirements defined in Table 8.10.

Table 8.10 – Geotextile properties

Parameter	Property
Material	Non-woven needle punched staple fibre polyester or polypropylene.
CBR burst strength (minimum)	4kN
Grab tensile strength (minimum)	1400N
Nominal weight	600g/m ²

8.11 Supply of geogrid

The geogrid shall be either:

- Tensar SS30.
- ProGrid 30/30, or
- Another product approved by the Administrator complying with the property requirements defined in Table 8.11

Table 8.11 – Geogrid properties

Parameter	Property
Material	Monolithic geogrids with integral junctions made from polypropylene sheet to form ribs minimum thickness 1.3 mm.
Minimum quality control strength	Minimum 30kN/m in both directions (transverse and longitudinal)
Aperture size	Maximum 40 mm in both directions (to contain 75 mm nominal crushed rock)
Junction efficiency (between the longitudinal and transverse ribs)	100% of the minimum quality control strength

8.12 Storage and placement of geotextile and geogrid

Geotextiles and geogrid shall be stored within an opaque, protective, waterproof and UV resistant cover, and shall not be stored directly on the ground or where they could be affected by heat.

Geogrid and geotextiles shall be placed in accordance with the layout and lapping plan if included in the project drawings.

Witness Point 2

The area for geotextile placement shall be prepared by clearing and removing all sharp objects. Cut trees and shrubs shall not protrude above the surface, but existing soil and vegetation mat may remain.

Geotextiles shall be placed just ahead of advancing construction work and shall be covered with construction materials on the same working day to prevent movement due to wave and tidal action.

8.13 Placement and compaction of core rock beneath cast insitu slabs

8.13.1 Scope

This clause applies to the compaction of the core rock beneath cast insitu slabs and for core rock beneath planks two metres beyond the connection with the cast insitu slab.

Compaction of the core rock is not required when a Type 1 anchor beam is used.

8.13.2 Placement

Rock shall be placed to the length and depth of the lift before progressively compacting with the roller and placing the next lift. The allowable depth of each lift prior to compaction is a function of the mass of the compaction equipment as defined in Table 8.13.2.

Table 8.13.2 – Allowable compaction layer thicknesses

Mass of double drum roller	Maximum Uncompacted Layer Thickness (Lift)
1.0 to 2.0 tonnes	200 mm
2.0 to 5 tonnes	300 mm
Greater than 5.0 tonnes	400 mm

8.13.3 Compaction

Witness Point 3

Unless a minimum capacity size machine is specified in the Annexure, rock shall be compacted with a vibrating double drum roller of minimum mass 1.0 tonne.

Compaction shall be undertaken in accordance with the approved Compaction Plan (when required).

The mechanical interlock method of compaction shall be used. Each lift / layer of core rock shall be rolled until the compacted surface does not exhibit permanent distortion, rutting, yielding, visible reduction in volume or vertical displacement using the nominated compaction equipment.

The design surface levels at the final lift shall be restored if distortion occurs during compaction.

8.14 Placement and compaction of core rock beneath precast planks

The core rock does not need compaction more than two metres beyond cast insitu slabs. Surface distortion and design levels shall be corrected prior to installation of planks so that they are evenly supported across their full length and width.

9 Storage and handling – reinforcement and precast concrete planks

9.1 Storage of reinforcement

These clauses apply to reinforcement and stainless steel components that are to be embedded in concrete (dowels and link bars) to ensure that bond surfaces remain clean and undamaged.

Reinforcement shall be stored to prevent damage and surface contamination that could affect the bond with concrete. The storage area shall be a flat level surface clear of walkways. Reinforcement shall be stored off the ground surface on full width timber gluts or dunnage of minimum thickness 50 mm at maximum spacing 2000 mm.

Refer to Figures 9.1(a) and (b) for examples of acceptable and unacceptable storage methods.

Figure 9.1(a) – Acceptable storage method



Reinforcement is stored flat on the ground, and evenly supported on timber gluts.

Figure 9.1(b) – Unacceptable storage method



Reinforcement is unevenly supported and on a contaminated surface.



Nonconformance

9.2 Handling of reinforcement

Reinforcement with a protective coating shall be handled using a method that will not damage the coating. Acceptable and unacceptable handling methods are defined in Table 9.2.

Table 9.2 – Handling of reinforcement

Acceptable methods of handling:	Unacceptable methods of handling: Nonconformance
✓ Manual handling.	✘ Using a forklift or loader (steel against steel).
✓ Lifting with slings and a spreader bar.	✘ Lifting with chains.

9.3 Rejection of reinforcement

Damaged, kinked, bent, or contaminated reinforcement shall be rejected. **Nonconformance**

9.4 Reinstatement of galvanised protective coating

Cut ends of galvanised carbon steel bar and mesh shall be protected with a zinc rich paint.

9.5 Transport of precast concrete planks

These clauses apply from the commencement of transport of precast concrete planks from the place of manufacture.

Precast concrete planks shall not be transported from the place of manufacture until:

- a minimum of seven days has elapsed since casting, and
- the concrete strength is greater than 70% of the specified 28 day characteristic strength.

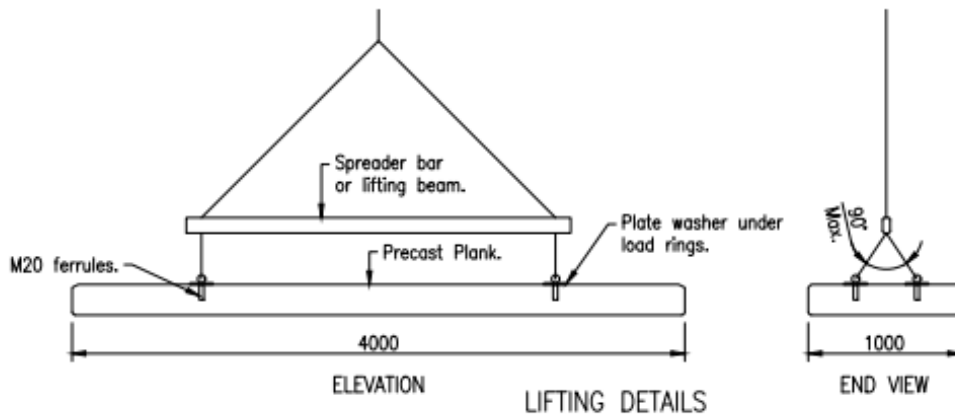
Planks shall be separated from the load bed of the truck and from each other by supports, packers or dunnage made from a soft but firm material that shall not damage the concrete plank. Supports for upper layers shall be placed directly above the supports of the layer below.

Suitable materials for dunnage include High Density Polyethylene or softwood of minimum thickness 35 mm.

9.6 Handling of precast concrete planks

Precast concrete planks shall be lifted only using the M20 ferrules in accordance with the Lifting Details diagram.

Figure 9.6 – Lifting Details diagram for handling precast planks



9.7 Site storage of precast concrete planks

Precast concrete planks shall be stored clear of the ground on a flat, level surface with adequate bearing capacity so that they will not be subject to twisting or warping. Storage shall be within a securely fenced area.

Precast concrete planks may be stacked up to six units high, with supports, packers, or dunnage between the layers of planks and the ground. Supports for upper layers shall be placed directly above the supports of the layer below.

9.8 Installation of precast concrete planks

The Contractor shall develop and implement an installation methodology that prevents damage to planks as they are progressively installed. Steel tracked installation machinery shall not have direct contact with precast concrete planks. Examples of acceptable installation methods include using:

- a) Conveyor belt rubber to separate the tracks from the planks.
- b) Tracked machinery with rubber track pads.

10 Concreting Quality Plan

10.1 Scope

These clauses apply only to reinforced cast in situ concrete elements including:

1. Floating walkway abutments.
2. Slabs.
3. Type 1 anchor beams.

For clarification, this clause does not apply to:

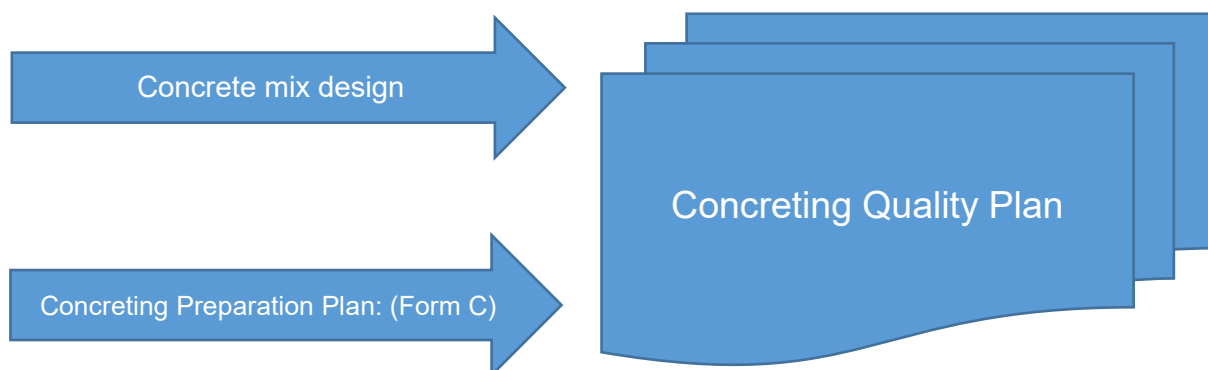
- Precast elements.
- Mass concrete for Type 2 anchor beam footings.
- Footpaths, kerbs, kerb crossings and stone pitched shoulder top caps.

10.2 Concreting Quality Plan requirements

The Concreting Quality Plan has these two components:

1. The Concrete mix design.
2. The Concrete Preparation Plan.

Figure 10.2 – The Concreting Quality Plan



10.3 Concrete mix design

10.3.1 Design parameters and requirements

The concrete for the cast insitu elements shall comply with the requirements in Table 10.3.1.

Table 10.3.1 – Concrete mix design parameters and requirements

Parameter		Requirement		
Designation		S50/20		
Strength Grade (MPa)		50		
Minimum Cementitious Content (kg/m ³)		450		
Maximum Water / Cementitious Ratio		0.4		
Nominal maximum aggregate size (mm)		20		
Slump Range (mm)		80-150		
Cementitious Content				
The cementitious material shall be a blend compliant with one of these three options:				
Option	GP cement %	Ground granulated blast furnace slag %	Amorphous silica %	Fly ash %
a.	50-55	20-25	-	25-30
b.	65-71	-	4-8	25-31
c.	30-40	60-70	-	-

10.3.2 Supply of cement, admixtures, and aggregates

The materials listed in Table 10.3.2 for the cast insitu concrete shall use only the registered products sourced from these registered suppliers.

Table 10.3.2 – Cement, admixtures, and aggregates from registered suppliers

Material	Source / Registered Supplier List
Cementitious Materials	Cementitious materials: https://www.tmr.qld.gov.au/business-industry/business-with-us/approved-products-and-suppliers/bridges-and-other-structures-approved-products-and-suppliers
Chemical Admixtures	Chemical admixtures: https://www.tmr.qld.gov.au/business-industry/business-with-us/approved-products-and-suppliers/bridges-and-other-structures-approved-products-and-suppliers
Aggregates	Aggregates shall be supplied from Quarries - Registered suppliers: https://www.tmr.qld.gov.au/business-industry/business-with-us/approved-products-and-suppliers/pavements-materials-and-geotechnical

10.3.3 Concrete design mix submission

The concrete design mix submission shall include the following information:

- a) Client, Project, Specification and Version / Date.
- b) Mix code and version.
- c) Intended application (insitu boat ramp slabs).
- d) Strength grade of concrete.
- e) Target strength.
- f) Nominated slump.
- g) Name of the concrete supplier and location of the batch plant.
- h) Cementitious materials – types, supplier / source, ATIC numbers, and batch mass (kg).
- i) Aggregates – sizes, supplier / sources, QRS numbers, and SSD batch mass (kg).
- j) Admixtures – dosages, supplier / sources and ATIC numbers.
- k) Proportioning – total cementitious content and W/C ratio.
- l) Performance – characteristic strength (f'_c), Average 7 and 28 day strengths, and Target 28 day strength.

10.4 Concreting Preparation Plan submission

10.4.1 Form for submission

Form C *Concreting Preparation Plan* in Appendix MRTS300 shall be used to submit this plan.

10.4.2 Transport time (from mixer charging to placement)

The Form C *Concreting Preparation Plan* shall include the estimated transport time (commencing from the time of charging of the mixer at the batching plant and ending at placement). The transport time shall comply with the time limits defined in Table 10.4.2.

Table 10.4.2 – Concrete transport time limits

Temperature of Concrete	Time Limit
≤32°C	75 minutes
32°-35°C	60 minutes
>35°C	Reject load

These times may be extended at the Administrator's discretion when approved in advance.

The following information shall be provided to the Administrator when seeking an extension to the delivery time:

- Location of the nearest batching plant reasonably able to supply a suitable concrete mix (higher cost is not an acceptable reason for an extension to the approved delivery time).
- Expected ambient temperature.
- Mitigation measures (for example an early morning pour in a cooler part of the day).

10.4.3 Placement plan

The Placement Plan shall be a Top View matrix numbering of each slab in the Works by Lane Number (from top down) and Slab Number (left to right) as in the Figure 10.4.3 example.

Figure 10.4.3 – Slab numbering guide for the placement plan

Slab 1	Slab 2	Slab 3										Lane 1
												Lane 2
	F/W Abutment											Lane 3
												Lane 4
												Lane 5

The Placement Plan shall consider:

- Curing and stripping times.
- Early strength loading time before construction plant uses the slab or element.
- The proposed delivery method (from truck to formwork).

10.4.4 Proposed placing methods

The elements of the Concrete Preparation Plan in Table 10.4.4 shall conform with the referenced requirements from Clause 11.

Table 10.4.4 – Placing methods requirements from Clause 11

Concrete Preparation Plan elements	Requirement and/or reference
Vibrators	Clause 11.8.1
Proposed curing compound	Clause 11.10
Source of water for cleaning reinforcement	Clause 11.6
Placement method (from the agitator truck to the insitu formwork)	Clause 11.7

11 Concrete placement

11.1 Scope

This clause applies to each cast insitu concrete placement cycle (for a slab, Type 1 anchor beam, section, or element). Each cycle commences five business days before the proposed pour and extends through to five calendar days after the pour.



As the cycle from beginning to end is a minimum of 11 days, a project with multiple cast insitu elements will most likely have overlapping cycles.

The cycle follows the flowchart in Figure 11.1 and the placement, curing, and form stripping timeframes in Table 11.1.

Figure 11.1 – Concreting placement cycle flow chart

Business days (before)				Day	Calendar days (after)			
-5			-1	0		3		5
Notification of pour			Hold Point release	Concrete pour	Curing with formwork			
					Curing without construction loading			

Table 11.1 – Concrete placement, curing, and form stripping timeframes

Activity	Requirement	Timing
Notification to Administrator of approaching concrete pour		5 business days before the proposed concrete pour
Reinforcement in place – layout and cover checked by Administrator		1 business day before the proposed concrete pour

Activity	Requirement	Timing
<ul style="list-style-type: none"> • Clean reinforcement with fresh water • Establish concrete pump (if required) • Establish concrete testing • Place and compact concrete • Finish and apply curing compound 		Day of the concrete pour
Strip formwork	<div style="border: 1px solid black; border-radius: 15px; background-color: #4F81BD; color: white; padding: 5px; display: inline-block;"> minimum 3 days / 72 hours </div>	
Curing before earliest construction equipment loading (except concrete trucks)	<div style="border: 1px solid black; border-radius: 15px; background-color: #4F81BD; color: white; padding: 5px; display: inline-block;"> minimum 5 days </div>	

11.2 Blinding layer beneath cast insitu slabs

The nominal thickness of 30 mm shown on the standard drawings is intended only as a quantity calculator and is not the minimum depth.

The 10 mm gravel blinding is used only to debond the slab from the core rock.

Nonconformances

For clarifications, the blinding layer shall not be used:

- as a level corrector or used to reduce volume of other materials, or
- beneath precast planks.

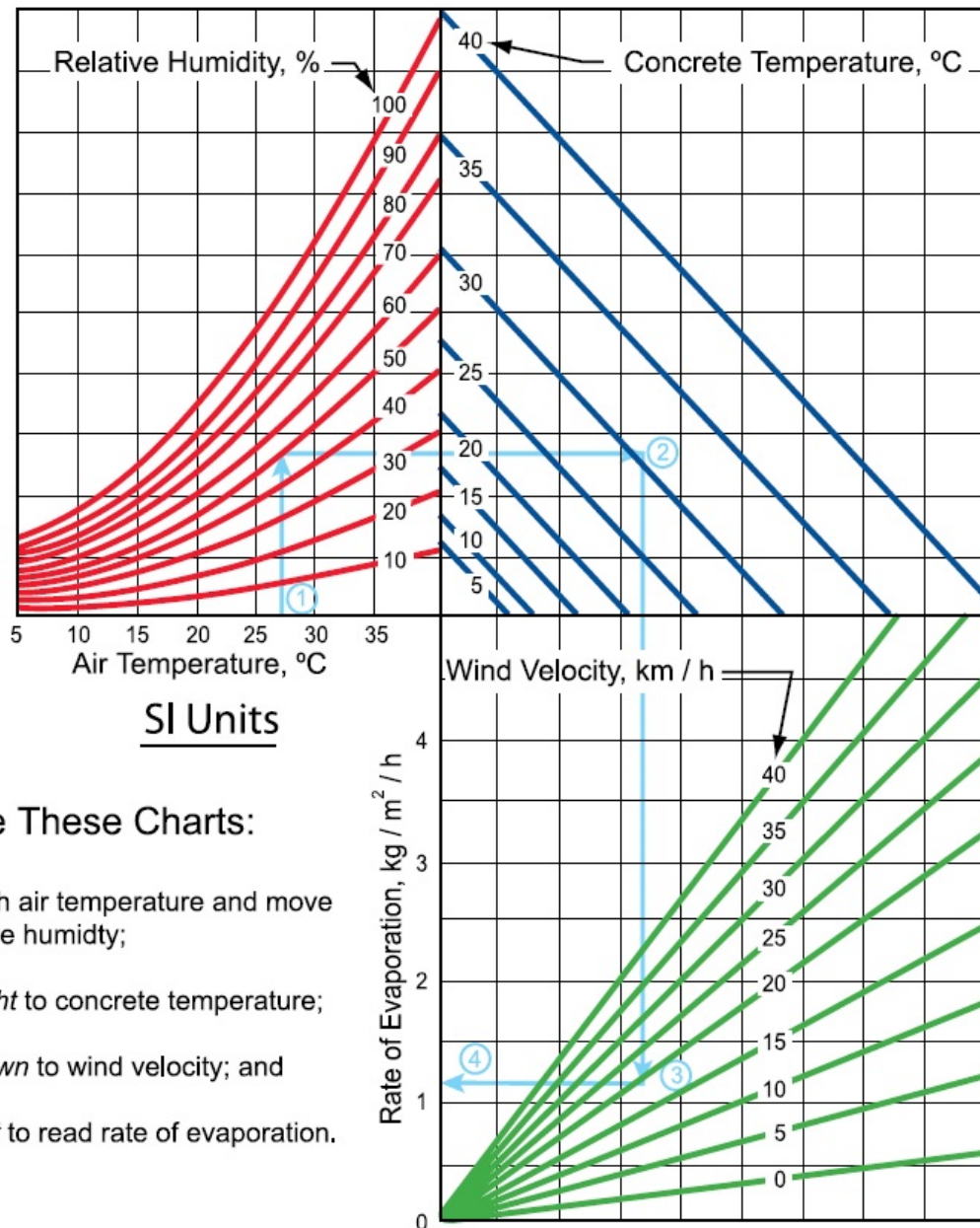
Excessive amount of blinding layer gravel will not be contained within the geogrid aperture which could cause subsidence.

11.3 Environmental limits for concreting

Concrete shall not be placed if:

- The concrete temperature is less than 10°C or higher than 35°C, or
- The ambient temperature is likely to be higher than 45°C during placement, or
- The predicted evaporation rate is likely to be greater than 0.75/kg/m²/h, where the evaporation rate is estimated from Figure 13.2.3 Estimation of water evaporation rate chart.

Figure 11.3 – Estimation of water evaporation rate chart



To Use These Charts:

1. Enter with air temperature and move *up* to relative humidity;
2. Move *right* to concrete temperature;
3. Move *down* to wind velocity; and
4. Move *left* to read rate of evaporation.

Source: 'Q&A' Concrete International, March 2007 (ACI)

11.4 Notification to Administrator of approaching concrete pour

Form F *Concrete pre-pour - Hold Point Release Request* in Appendix MRTS300 shall be used for the notification of an approaching concrete pour. The Contractor shall give the Administrator a minimum five business days notification of an approaching concrete pour. This notice period is required for:

- The Administrator to approve the Form F *Concrete pre-pour - Hold Point Release Request*, and to arrange an Inspector.
- The Contractor to amend the plan as required and resubmit for approval.

11.5 Placement and inspection of reinforcement prior to concrete pour

11.5.1 Formwork

Formwork shall generally conform to AS3610. Exposed vertical surfaces shall have a Class 2 finish as defined in AS3610. Formwork for unpatterned exposed vertical surfaces shall be either:

- plastic-coated plywood
- waterproof plywood
- timber lined with tempered hardboard, or
- close-fitting unwarped metal forms.

Joints in the form sheeting for exposed concrete surfaces (floating walkway abutments) shall be vertical and spaced with a regular pattern.

Formwork for concrete without exposed surfaces may consist of modular timber or metal panels. Timber forms shall be constructed and maintained to prevent warping and opening of joints due to shrinkage of the timber.

11.5.2 Placing and lapping of reinforcement

Bar chairs: Plastic bar chairs are acceptable.

Reinforcement shall have only a single lap running in the longitudinal direction. Laps in the transverse direction shall be permitted only when the mesh sheet can fully span the width.

The maximum slab length of 613 0mm allows for a full reinforcement sheet length of 6000 mm and the nominated end cover. The lane width of 4000 mm can be reinforced with a single longitudinal lap.

Nonconformance

Laps of 3 or 4 layers of mesh shall be rejected.

The top and bottom concrete cover requirements shown on the Drawings cannot be achieved with more than two pieces of mesh.

11.5.3 Concrete cover requirements

The concrete cover requirements apply to:

- the top and bottom cover (at the closest points above and below the laps), and
- the end cover to formwork in both directions.

Mesh shall be placed relative to the formwork to achieve the cover requirements in Table 11.5.3 and illustrated in Figure 11.5.3.

Table 11.5.3 – Concrete cover requirements

	Minimum cover	Maximum Distance
Mesh bars at right angles to the formwork	Refer to Standard Drawings	70 mm
Mesh bars parallel to the formwork	Refer to Standard Drawings	100 mm

Figure 11.5.3 – Concrete cover requirements



11.5.4 Inspection of formwork and reinforcement prior to concrete pour

Hold Point 2

Form F *Concrete pre-pour - Hold Point Release Request* in Appendix MRTS300 shall be used for release of this Hold Point.

The insitu reinforcement shall be available for inspection by midday of the business day prior to the proposed concrete pour. The concrete pour shall not proceed until the Hold Point has been released.

11.6 Cleaning of reinforcement prior to concrete placement

All insitu reinforcement shall be hosed with low pressure high volume fresh water on the day of the concrete pour to remove accumulated salt.

11.7 Placement method (from truck to insitu formwork)

11.7.1 Placement – general

Concrete shall be continuously placed with a drop height of less than 2 metres. All concrete shall be either:

- pumped, or
- chute discharged from the truck (when approved).

Nonconformance

Intermediate handling with an excavator bucket shall not be permitted.

11.7.2 Placement on sloped surfaces

On a sloped surface (for example - a boat ramp slab) the placement and compaction of concrete shall commence at the lower end of the slab and work upwards.

11.7.3 Chute discharge from truck

Placement by chute discharge direct from the truck shall be suitable only when:

- a) it has been approved in the Concrete Preparation Plan
- b) it is approved for the individual concrete pour, and
- c) the chute can reach to the far end of the section without using an adjacent, previously poured slab section of less than 28 days age.

11.8 Compaction of concrete

11.8.1 Vibration equipment

Vibration equipment type and quantity shall conform with the requirements of Table 11.8.1.

Table 11.8.1 – Vibration equipment requirements

Parameter	Requirement
Type	Vibrators shall operate at a frequency greater than 150 Hz, and with an intensity which visibly affects the concrete at a minimum radius of 300 mm.
Quantity on site	Minimum 2

11.8.2 Operation of vibration compaction equipment

Vibration of concrete shall:

- a) commence immediately after placement
- b) be undertaken with vibrators inserted vertically at positions not more than 450 mm apart
- c) ensure that compaction is achieved around reinforcement and embedded items
- d) continue at each position for a minimum of 5 seconds, and
- e) be used to ensure freshly deposited concrete is vibrated into adjacent concrete to provide a homogenous mass.

11.9 Concrete testing

Compressive strength testing to AS1012.9 shall be performed by a NATA accredited laboratory. The test results shall be traceable to the concrete delivery dockets. Testing shall be undertaken at the frequency defined in Table .9.

Table 11.9 – Concrete testing – sampling frequency and parameters

Sampling Frequency	Parameter
One sample per truckload, or a maximum of four samples from truckloads delivered in a single day	Slump, 7 day and 28 day compressive strength
A reduced sampling frequency will be considered for large projects if sufficient 7 day compressive strength data is provided and shows acceptable results	

11.10 Application of curing compound

The approved curing compound shall be applied to:

- Exposed surfaces as soon as the concrete surface has hardened.
- Surfaces that are exposed when formwork is removed at less than 3 days.

The application rate of curing compound shall be 0.2 Litre/m² per coat x 2 coats at full rate.

11.11 Removal of formwork

Formwork shall not be removed at less than 3 days unless:

- a) approved by the Administrator, and
- b) the approved curing compound is applied to the newly exposed surfaces.

11.12 Earliest loading of slabs

The minimum curing time required before construction plant can load cast insitu slabs shall conform with Table 11.12.

Table 11.12 – Early construction plant loading times

Construction Plant	Minimum curing time before construction load
Wheeled construction plant to 3 tonnes or tracked plant to 12 tonnes	5 days
Wheeled plant to 8 tonnes or tracked plant greater than 12 tonnes	7 days
All other plant (concrete trucks)	28 days

12 Concrete – End of Project Quality Records

12.1 Requirements

The End of Project Quality Records shall be supplied within 5 business days of the Contractor receiving the last 28 day compressive strength test results. The records shall include:

- a) The completed pre-pour notification forms with:
 - i. Evidence of the Approval to Pour by the Administrator.
 - ii. Slump test results.

- b) Photos of the concrete delivery docket showing:
 - i. Concrete mix design code.
 - ii. Batching and delivery times.
- c) 28 day compressive strength test results for each truckload of concrete.

Figure 12.1 – End of Project Quality Records



12.2 Payment for Quality Records

Payment for the Concrete – End of Project Quality Records is included in Payment Item 77112 (20% of the total amount payable).

13 Grouted shoulder construction

13.1 General

The fully grouted shoulders shall be constructed to the profiles and with the materials shown on the drawings.

13.2 Footings

Witness Point 4

The footings shall be excavated to the width and depth shown on the drawings and fully lined with geotextile. The geotextile shall extend outside of the footing by a minimum 500 mm to allow for consolidation as the footing material is placed into the excavation. Figure 13.2 illustrates an example of a nonconforming geotextile lining.

The depth of the footing and extent of the geotextile placement shall be witnessed or confirmed prior to construction of the footing.

Figure 13.2 – Nonconforming geotextile lining of footing



The footings shall be constructed from either full thickness grouted rock or minimum N25/20 mass concrete.

13.3 Shoulder and shoulder batter construction

13.3.1 Construction

The shoulder and the shoulder batter shall be constructed by:

- a) Placing alternating layers of grout and rock so that the grout extends through the full design thickness of the shoulder and the shoulder batter. Rocks shall be placed to form irregular joints and interlock without voids, or
- b) A top layer of rock bonded to a stiff mix mass grout or mass concrete layer.

Nonconformance

Shoulders constructed by placing ungrouted rock with only the outer layer grouted shall be rejected.

13.3.2 Alignment of the shoulder batter toe and the footing (for fully grouted stone pitched shoulders in fill)

The outer face of the stone pitched batter shall be fully supported on the footing and not extend beyond the footing.

13.3.3 Grouted stone surface finish

The finished surface shall be generally flat and even with a neat appearance without sharp or angular points hazardous to boat ramp users.

Underwater sharp edges or angular points from protruding stones in the shoulder batter when underwater are:

- A trip hazard to pedestrians accessing the boat ramp.
- An impact hazard to boat hulls.

The exposed surfaces shall be a minimum 80% interlocking stone face with a flush or close faced maximum mortar setback of 10 mm. Excess mortar coating on the stone faces shall be removed.

13.4 Trial section of fully grouted shoulders

Hold Point 3

A trial section of fully grouted stone pitching of about two lineal metres shall be completed for approval by the Administrator. Work shall not proceed beyond the trial section until approved.

13.5 Guidelines to acceptable practices of fully grouted shoulder construction.

Figure 13.5 provides guidance on conformance with the requirements of the standard drawings and this specification.

Figure 13.5 – Examples of acceptable grouted rock shoulder construction



Fully grouted stone pitched shoulders in fill:

- Evidence of geotextile full perimeter of the footing.
- Minimum 80% of exposed stone and maximum mortar setback of 10 mm.
- The top surface is free of trip hazards.
- Correct profile with the shoulder and batter sharply delineated.
- The width of the shoulder and the slope of the batter is correct.
- The delineation between the slab surface and the shoulder is approximately 30 mm.
- The drainage groove inverts are about 10 mm above the adjacent shoulder.



Fully grouted stone pitched shoulders in cut:

- 750 mm wide drain, transversely broom finished with tooled construction joints at 2000 mm spacing. 10 mm clearance from invert of the drainage groove.
- Correct profile with the shoulder, batter and drain sharply delineated.
- Optional 400 x 80 mm 32 Mpa shoulder cap.
- The drain and the top surface are free of trip hazards.



13.6 Guidelines to non-conforming practices of grouted rock shoulder construction

Figure 13.6 provides guidance on non-conformance with the requirements of the standard drawings and this specification.

Figure 13.6 – Examples of non-conforming grouted rock shoulder construction



Nonconformances

- The drain profile is correct, but the transition to the shoulder and the shoulder batter doesn't define the width of the boat ramp.
- The stone placement is angular and has created trip hazards.
- The stone placement is random, and the stone / mortar ratio is significantly less than 80%.



Nonconformances

- Excessive amounts of mortar. The exposed stone is significantly less than 80% of the surface area.
- Incorrect top profile.
- Poorly defined changes in profile in the transition from drain to shoulder batter.



Nonconformances

- Incorrect profile – the transverse change in profile from the shoulder to the shoulder batter is not defined.

14 Pavement Markings

14.1 Raised retroreflective pavement markers (RRPMs)

14.1.1 Fixing to concrete

RRPMs shall be chemically (using a two part epoxy adhesive) and mechanically fixed (screwed) to concrete surfaces using this procedure for full adhesion:

1. Grind the concrete surface to around 1 mm depth for the full contact area to remove the concrete laitance.
2. Drill holes for star plugs in the concrete aligned with the holes in the pavement marker.
3. Clean concrete dust from the full contact area.
4. Apply epoxy with a 3 mm notched tile trowel to the full area of both contact surfaces.
5. Adhere and screw fix (SS316 8G x 40 screws) the RRPM to the concrete surface.
6. Remove excess epoxy without contaminating the reflective face.

14.1.2 Fixing to bitumen

1. Prepare and clean surface.
2. Position the adhesive pad and heat with a blow torch for 10 seconds.
3. Place and press the RRPM onto the heated pad.

14.2 Painted markings

14.2.1 Locations, colours, materials, and type

The locations, colours, materials, and types of painted markings (when required) shall be shown on the project specific drawings.

14.2.2 Preparation of surfaces

Concrete surfaces shall be pressure water blasted on the day prior to painting to remove concrete laitance and dust.

Bitumen surfaces shall be water cleaned on the day prior to painting to remove dust.

15 Progress As Constructed Level Survey

15.1 New boat ramp lanes (not adjacent to existing lanes)

Hold Point 4

Form G *Progress As Constructed level survey - Hold Point Release Request* in Appendix MRTS300 shall be used for release of this Hold Point.

Progress As Constructed levels surveys shall be undertaken by a Registered Surveyor along the centrelines of each new lane to demonstrate that As Constructed levels of the boat ramp comply with the design levels shown.

This Hold Point shall be released prior to installation of the grouted mattress.

The performance of a boat ramp at low water is dependent on constructing it to the design levels. As Constructed levels lower than the design levels are better than higher levels.

15.2 Tolerances

Finished surface levels shall be measured at a consistent point on the lower edge of the plank above the chamfer and shall be within the tolerances defined in Table 15.2.

Table 15.2 – Finished surface level tolerances

Chainage – Where L = length of the boat ramp at the design slope	Tolerance (from design levels)	
	+ (Above design level)	- (Below design level)
Connection of slab / Type 1 anchor beam to planks	10	10
Chainage = L/4	10	10
Chainage = L/2	10	20
Chainage = L3/4	20	50
Chainage = L*	20	100

* L = Length

Boat ramp length L at the design slope:

Starts at the lower end of a Type 1 anchor beam or connecting / transitional slab, or the top of a slab at the design slope.

Ends at the lower end of a Type RG plank. Type T planks are not considered part of the design length or depth of the boat ramp.

16 Partial Completion, Practical Completion, and Disestablishment

16.1 Scope

This clause applies:

- At the completion of each stage of the Works when lanes are progressively closed and reopened for public use, and/or
- At Practical Completion (including Practical Completion of a Separable Portion).

16.2 Opening / Reopening a boat ramp lane for public use

Hold Point 5

Form H Lane reopening – Hold Point Release Request in Appendix MRTS300 shall be used for the release of this Hold Point.

A boat ramp lane which is part of the Works shall not be made available for public use until:

- a) Adjacent shoulders (if applicable) are fully and correctly constructed, and safely trafficable for pedestrians and vehicles (if wheels depart the boat ramp lane).

- b) The water side approaches to the lane are clear of construction material obstructions hazardous to vessels.

Examples of construction material obstructions include:

- Excavated spoil.
- Existing surface levels displaced by surcharging
- Waste materials from existing structures removed as part of the Works.
- Imported rock for the core or armour protection.
- Loose geotextile and geogrid.

- c) The Type T4000 end plank (if applicable) is installed.
- d) The bolt recesses at all plank connections in the lane(s) are grouted, and
- e) This Hold Point has been released.

17 Floating walkway support lanes

17.1 General

This clause applies only when the Scope of Works includes:

- construction of a new floating walkway support lane, or
- modifying an existing boat ramp lane to be used as a floating walkway support lane.

A floating walkway support lane is generally constructed to the same standards, details, and sections as a regular boat ramp lane. It may not be fully detailed on the project specific drawings as these details are unknown at the time of tendering:

- length and height of the floating walkway abutment, and
- locations of piles within cast insitu slabs and precast planks.

The design for a new construction or modified floating walkway support lane shall be approved by the Administrator prior to Start of Works.

17.2 Construction of a floating walkway support lane.

The design requirements for a floating walkway support lane are defined in the Manual "Design Criteria for Floating Walkways". The construction shall comply with:

- the relevant standard drawings, and
- this specification.

17.3 Modifying an existing boat ramp lane to be used as a floating walkway support lane

Cast insitu slabs

Areas of slabs requiring removal for abutments and piles shall be neatly sawcut (or cored for piles) and exposed reinforcement shall be protected with an epoxy based sealer. After construction of the abutment or after the pile sleeve has been driven the remaining void shall be concreted or filled with an epoxy based filler.

Percussion methods of removal (jackhammers or rockbreakers) shall only be used to the extent required to remove concrete inside the area of sawcutting.

'Type RG' precast planks

Type RG planks shall be removed and replaced with custom plank(s) of suitable width.

'Type OS' precast planks

This procedure for cutting an existing 'Type OS' precast plank shall be used when replacement with a custom width plank is not practical:

1. Remove the plank.
2. Sawcut the plank to the full thickness.

For clarification – planks shall not be partially cut, and the remaining thickness broken.

3. Apply an approved epoxy treatment to the newly exposed face.
4. Reinstall the plank after curing of the epoxy treatment is complete.

18 As Constructed survey and other handover documents

18.1 Purpose

The purpose of the 'As Constructed' survey is to:

- confirm the As Constructed horizontal and vertical alignments within the specified tolerances, and
- record the differences between the design and the As Constructed details.

18.2 Survey feature requirements

The survey shall pick up:

- a) finished surface levels of:
 - i. centreline of each lane, corners of cast insitu slabs and precast planks.
 - ii. construction joints and changes in grade, and
 - iii. edges and joints of boat ramp / floating walkway components (abutment, anchor beam and shoulders)
- b) footprint of the boat ramp over the natural surface (where the embankment meets the existing surface)
- c) contours and features within five metres beyond the footprint of the boat ramp, or to a greater extent if required to capture these features (such as top of or bottom of cut and fill).
- d) signs that were installed as part of the works, and
- e) as driven positions of piles (for floating walkways).

18.3 As Constructed survey outputs

The As Constructed survey outputs shall include:

- the AutoCAD file (.dwg) and associated files (.lin, .shp, .shx, .ctb and .stb) and fonts
- .pdf files of all the survey plot sheets, and
- the raw xyz (comma delimited) ASCII file with point code listing.

18.4 Drawings requirements

The As Constructed survey drawing(s) shall use a standard undistorted engineering scale on standard A3 sized media when printed at full size and include:

1. a site plan showing all the survey features, generated contours and a labelled grid displaying Eastings and Northings to horizontal datum MGA, and
2. longitudinal section(s) showing chainage and levels along the centreline of each constructed boat ramp lane.

18.5 Submission of the As Constructed survey

Form I *As Constructed survey checklist* from Appendix MRTS300 shall be completed to demonstrate conformance to this Specification requirement. The survey shall be submitted to the Administrator within 20 days of the Date of Practical Completion.

18.6 Handover documents

Handover documents specified elsewhere in this Specification shall be submitted to the Administrator within the specified timeframe.

Environmental and cultural heritage end of project records shall be submitted to the Administrator within 2 weeks of site disestablishment. These project records include (as required):

1. Inspection checklists
2. Close out notifications of permits and approvals
3. Return of operations forms
4. Environmental end of project report
5. Registers
6. Site inspection photos.

19 Supplementary requirements

The requirements of MRTS300 *Construction of Boat Ramps* are varied by the Supplementary requirements given in Clause 6 of Annexure MRTS300.

