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Technical Specification

**Transport and Main Roads Specifications
MRTS62 Bridge Substructure**

July 2017

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1 Introduction

This Technical Specification applies to the construction of the substructure of bridge and marine structures including abutments and piers from foundations to bearing pedestals.

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 used in this Technical Specification shall be as defined in Clause 2 of MRTS01 *Introduction to Technical Specifications*.

In addition, terms listed in Table 2 are applicable to this Technical Specification.

Table 2 – Definitions of terms applicable to MRTS62

Term	Definition
Substructure	That section of a structure from the top of the bearing pedestal (or underside of bearing) to the base of the foundations.

3 References

Table 3 lists documents referenced in this Technical Specification.

Table 3 – Referenced documents

Reference	Title
MRTS01	<i>Introduction to Technical Specifications</i>
MRTS03	<i>Drainage, Retaining Structures and Protective Treatments</i>
MRTS04	<i>General Earthworks</i>
MRTS50	<i>Specific Quality System Requirements</i>
MRTS51	<i>Environmental Management</i>
MRTS63	<i>Cast-In-Place Piles</i>
MRTS63A	<i>Piles for Ancillary Structures</i>
MRTS65	<i>Precast Prestressed Concrete Piles</i>
MRTS66	<i>Driven Steel Piles</i>
MRTS68	<i>Dynamic Testing of Piles</i>
MRTS70	<i>Concrete</i>
MRTS71	<i>Reinforcing Steel</i>
MRTS71A	<i>Stainless Steel Reinforcing</i>
MRTS72	<i>Manufacture of Precast Concrete Elements</i>
MRTS78	<i>Fabrication of Structural Steelwork</i>
MRTS78A	<i>Fabrication of Structural Stainless Steelwork</i>
MRTS79	<i>Fabrication of Aluminium Components</i>

Reference	Title
MRTS81	<i>Bridge Bearings</i>
MRTS81A	<i>Stainless Steel Bridge Bearings</i>
MRTS83	<i>Anti-graffiti Protection</i>
-	<i>Design Criteria for Bridges and Other Structures</i>

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. Where reference to other Technical Specifications are made, these may require additional Hold Points, Witness Points or Milestones.

Table 4.1 – Hold Points, Witness Points and Milestones

Clause	Hold Point	Witness Point	Milestone
5		1. Setting out	
9.1	1. Headstock support frames		
9.2			Submissions of void infilling for headstocks (3 weeks)
13	2. Embankment construction		Submission of procedure for construction of embankment (14 days)

4.2 Construction procedures

The Contractor shall prepare documented procedures for all construction processes in accordance with the quality system requirements of the Contract.

Construction procedures for those activities listed in Clause 1 of Annexure MRTS62. 1 shall be submitted to the Administrator in accordance with the quality system requirements of the Contract.

4.3 Testing frequency

The minimum testing frequency for work covered by this Technical Specification shall be as stated in the relevant Technical Specifications.

5 Construction

Bridge abutments and piers shall be located as shown in the Standard Drawings.

Abutments and piers shall be set out on the site by a surveyor experienced in bridge construction.

Witness Point 1 During the setting out process, the Contractor shall be deemed to have checked the location and details of abutments and piers in relation to the dimensions of any precast superstructure members. If an error in the details shown in the Standard Drawings is detected, the Administrator shall be notified immediately.

No extension of time for practical completion will be granted by the Administrator for delays caused in relation to the setting out process undertaken by the Contractor.

The Construction of piles, footings, pile caps, headstocks, abutment and pier structures and bearing pedestals shall be carried out to the details shown in the Standard Drawings and this Technical Specification.

Care shall be taken when constructing piers in waterways to ensure that the specified environmental constraints described in MRTS51 *Environmental Management* or elsewhere in the Contract, are not compromised. Construction of permanent or temporary earth bunds to assist in the construction of piers shall be permitted only where specifically stated in the Contract.

6 Piling

Piling shall be carried out in accordance with the following Technical Specifications, as appropriate:

- a) MRTS63 *Cast-In-Place Piles*
- b) MRTS63A *Piles for Ancillary Structures*
- c) MRTS65 *Precast Prestressed Concrete Piles*
- d) MRTS66 *Driven Steel Piles*, and
- e) MRTS68 *Dynamic Testing of Piles*.

7 Excavation

Excavation for footings and pile caps shall be in accordance with the requirements of Clause 13.3.4 of MRTS04 *General Earthworks*.

8 Concrete

The requirements of MRTS70 *Concrete* shall apply to the supply and construction of both concrete components and cast insitu concrete, but some exceptions apply for some low strength concrete.

Steel reinforcing shall be supplied and installed in accordance with the requirements of MRTS71 *Reinforcing Steel* or MRTS71A *Stainless Steel Reinforcing*.

The tops of footings, pile caps, headstocks and piers shall be steel trowel finished.

Bearing pedestals shall be constructed separately and care shall be taken to achieve the tolerances described in this clause. The top surface of bearing pedestals shall be finished with a wood float to a coarse sandpaper-like finish and shall be accurate to the tolerances set out in Table 8.

Table 8 - Tolerances for bearing pedestal surfaces

Dimension	Tolerance
Position (including height) of pedestal (from position shown in the Standard Drawings)	± 3 mm
Slope of bearing surface	± 1 in 300
Surface planarity (straight-edge)	1 mm

Embedded items shall be supplied and installed, and holes cored or formed, in the locations and to the details shown in the Standard Drawings. Such items include, but are not limited to:

- a) holes for deck unit holding down bolts and dowels

- b) holes for holding down bolts for girder restraints
- c) holes for bearing holding down bolts or locating dowels, and
- d) support brackets and or anchorages for future services.

9 Precast concrete headstocks

Materials, manufacture, handling, storing and transporting of precast concrete headstocks shall conform to the requirements of MRTS72 *Manufacture of Precast Concrete Elements*. Lifting of headstocks shall be carried out as shown in Standard Drawings, using the lifting anchors cast in to the headstocks.

9.1 Support frames

Headstock support frames shall be designed and certified by the Contractor, and approved by the Administrator. **Hold Point 1**

Material for headstock support frames and fabrication methods shall conform to the requirements of MRS78 *Fabrication of Structural Steelwork*.

All support frames are to be certified by a Registered Professional Engineer Queensland (RPEQ).

9.2 Erection of headstocks

Headstocks shall be erected according to the procedures shown on the Standard Drawings.

For abutment headstocks, the ground shall be compacted to ensure that no ground settlement occurs due to the weight of the headstock. The top surface of the blinding concrete shall be checked to ensure that the correct grade and the level are achieved after the headstock is placed.

After the headstocks are placed in final position, the voids around piles or columns shall be filled with concrete. Before concreting, the sides of the voids shall be well scabbled.

Materials and construction methods for concreting block-out voids shall conform to the requirements of MRTS70 *Concrete*.

To reduce the effects of shrinkage, a shrinkage compensating agent shall be added to the concrete mix used for infilling the voids. Details of this material shall be forwarded to the Administrator for approval, at least three weeks prior to the commencement of concreting. **Milestone**

Headstock support frames shall be removed no less than three days after concrete has been placed.

10 Bearings

Bearings shall be supplied and installed in accordance with MRTS81 *Bridge Bearings* or MRTS81A *Stainless Steel Bridge Bearings* as applicable.

11 Metalwork

All fabricated metalwork shall be manufactured in accordance with MRTS78 *Fabrication of Structural Steelwork*, MRTS78A *Fabrication of Structural Stainless Steelwork* or MRTS79 *Fabrication of Aluminium Components* as applicable.

12 Backfilling

Following construction, remaining excavations for abutment and pier footings and / or pile caps shall be backfilled in accordance with the requirements of MRTS04 *General Earthworks* and the details shown in the Standard Drawings.

13 Embankment construction

The construction or completion of road embankments at abutments shall be undertaken in a manner which:

- a) does not place external loads on any piles or the abutment structure, and
- b) complies with any notes shown in the Standard Drawings.

Where an embankment is placed after the abutment has been constructed, the Contractor shall submit to the Administrator, at least 14 days before commencement of construction of the embankment, a procedure to be used to place and compact the embankment material. **Milestone** The procedure will be subject to the approval of the Administrator. **Hold Point 2** Where appropriate, embankments shall be constructed against abutments in accordance with the requirements of MRTS04 *General Earthworks*. Embankments shall not place loads on abutment structures for a period of 28 days from the date on which the most recent concrete was placed, unless approved by the Designer and the Administrator. Approval will not be granted if the concrete is less than 14 days old or has not achieved the design concrete strength.

14 Abutment protection

Abutment protection shall be constructed as shown in the Standard Drawings and in accordance with the requirements specified in MRTS03 *Drainage, Retaining Structures and Protective Treatments*.

15 Anti-graffiti protection

Anti-graffiti protection coatings shall be applied in accordance with the requirements of and in the locations specified in MRTS83 *Anti-graffiti Protection*.

16 As constructed records

As constructed records shall be provided in accordance with the requirements of MRTS50 *Specific Quality System Requirements*.

17 Supplementary requirements

The requirements of MRTS62 *Bridge Substructure* are varied by the supplementary requirements given in Clause 2 of Annexure MRTS62.1.

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