

Specification (Measurement)

**Transport and Main Roads Specifications
MRS64 Driven Tubular Steel Piles (with reinforced
concrete pile shaft)**

November 2020

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1 Introduction

This Specification applies to the construction of driven tubular steel piles with reinforced concrete pile shafts. These are essentially large diameter thick walled (> 20 mm thick) steel tubes, driven to a predetermined level then partially excavated, a short mass concrete plug is then cast towards the base of the pile, and a heavily reinforced concrete pile shaft is then cast from the top of the plug to the top of the pile. Load transfer devices are placed at least towards the base of the pile shaft to transfer loads from the concrete pile shaft to the steel tube.

This Specification shall be read in conjunction with MRS01 *Introduction to Specifications*, and other Specifications as appropriate.

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

2 Measurement of work

2.1 Standard Work Items

In accordance with the provisions of Clause 2.1.3 of MRS01 *Introduction to Specifications*, the Standard Work Items incorporated in this Specification are listed in Table 2.1.

Table 2.1 – Standard Work Items

Standard Item No.	Description	Unit of Measurement
Driven Tubular Steel Piles (with reinforced concrete pile shafts)		
70601	Steel tubes, supply on Site [<i>diameter</i>]	m
70602	Supply and fixing of stiffening bands (if ordered)	each
70603	Handling and pitching of steel tubes	each
70604	Driving steel tubes	m
70605P	Extension of steel tubes (Provisional Quantity, as directed)	each
70609	Excavation of steel tubes	m ³
70610	Certification of pile capacity including provision of As Constructed survey information	each
70611	Concrete Class [<i>Class & compressive strength</i>] MPa/20 in abutment pile	m ³
70612	Concrete Class [<i>Class & compressive strength</i>] MPa/20 in pier pile	m ³
70613	Steel reinforcing bar in piles	tonne

2.2 Work Operations

Item 70601 Steel tubes, supply on Site, [*diameter*]

Work Operations incorporated in the above items include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*
- b) supply of tubes, including shear connection in the transfer zone and any additional length to suit construction methods
- c) transport of steel tubes to Site

- d) preparation of Site storage area
- e) storage of tubes at Site, and
- f) additional length, if any, required to suit the Contractor's proposed construction method.

Item 70602 Supply and fixing of stiffening bands (if ordered)

Work Operations incorporated in the above items include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*
- b) supply of stiffening bands, and
- c) fixing stiffening bands to steel tubes, as per the Drawings.

Item 70603 Handling and pitching of steel tubes

Work Operations incorporated in the above items include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*
- b) transferring steel tube from on-site storage to its aligned position in the driving rig
- c) provision and use of driving rig
- d) any preboring shown on the Drawings or approved by the Administrator, including filling the gap between steel tube and excavated hole with flowable fill or approved alternative, and
- e) retention of steel tube on line for driving.

Item 70604 Driving steel tubes

Work Operations incorporated in the above items include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*
- b) driving the steel tube
- c) field splices made during driving
- d) trimming the steel tube to level on completion
- e) setting up to re-drive steel tubes, where steel tubes are driven in increments with progressive excavation
- f) repair of any damage to steel tube necessary to complete construction, and
- g) driving of extended steel tube.

Item 70605P Extension of steel tubes (Provisional Quantity, as directed)

Work Operations incorporated in the above items include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*
- b) preparation for welding, and
- c) full penetration butt welding of steel tubes.

Item 70609 Excavation of tubes

Work Operations incorporated in the above items include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*

- b) excavation of material
- c) disposal of excavated material
- d) de-watering, and
- e) interruptions where steel tubes are driven in increments with progressive excavation.

Item 70610 Certification of pile capacity including provision of As Constructed survey information

Work Operations incorporated in the above items include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*
- b) assessment of information including information available to tenderers
- c) undertaking additional investigations and reporting of investigations
- d) inspection and logging of the foundation by the Contractor's Geotechnical Assessor
- e) geotechnical certification of foundation capacity
- f) provision of As Constructed records, and
- g) provision of As Constructed survey information.

Item 70611 Concrete Class [Class & compressive strength] MPa/20 in abutment pile

Work Operations incorporated in the above items include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*
- b) supply of concrete
- c) transport of concrete
- d) placing and compacting concrete including the provision of a tremie and all necessary equipment for placing concrete underwater, if the hole is not dry
- e) finishing and curing concrete, and
- f) removal of any nonconforming concrete at the top of the pile and replacement if necessary.

Item 70612 Concrete Class [Class & compressive strength] MPa/20 in pier lined pile

Work Operations incorporated in the above items include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*
- b) supply of concrete
- c) transport of concrete
- d) placing and compacting concrete including the provision of a tremie and all necessary equipment for placing concrete underwater, if the hole is not dry
- e) finishing and curing concrete, and
- f) removal of any nonconforming concrete at the top of the pile and replacement if necessary.

Item 70613 Steel reinforcing bar in piles

Work Operations incorporated in the above items include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*
- b) supply of all materials, including any additional steel required to form a pile cage that can be safely lifted and placed into the pile shaft
- c) fixing reinforcing steel in place, and
- d) the provision of stainless steel nibs or approved spacers to maintain minimum specified concrete cover.

2.3 Calculation of quantities

2.3.1 Natural ground surface level

The natural ground surface level shall be taken as the level determined from the contours shown on the Drawings unless agreed otherwise, in writing, by the Contractor and Administrator, prior to commencing excavation.

2.3.2 Supply of steel tubes

Supply of steel tubes of the nominated thickness shall be the length of steel tube shown on the Drawings which includes an allowance for possible variations in foundation levels. Prior to ordering the steel tubes, the Contractor shall check that the supply length is adequate for the proposed construction methods such as extending the steel tubes above high tide level in tidal waters.

2.3.3 Driving of steel tubes

Sinking or driving of steel tubes shall be the length of steel tubes, in place, measured along the pile axis from the toe of the steel tube to the approved top cut-off level, or to the natural ground surface level, whichever is the lower.

2.3.4 Excavation

2.3.4.1 General

The volume stated in the Schedule of Rates against any Work Item for excavation is the aggregate excavation from all areas and for all materials.

2.3.4.2 Excavation of steel tubes

Excavation of steel tubes shall be measured as the volume calculated from the bottom of the plug level to the natural ground surface level, or to the underside of the pile cap or headstock if that is lower, using the nominal internal diameter of steel tube shown on the Drawings.

2.3.5 Concrete

The quantity of concrete shall be calculated as the sum of:

- a) the volume calculated from the approved bottom of plug level to the underside of the pile cap, headstock or other specified level shown on the Drawings using the nominal internal diameter of steel tube shown on the Drawings.

Deductions will not be made for the volume occupied by reinforcing steel.

No measurement will be made for concrete required to fill over-break in excavation.

2.3.6 Steel reinforcing bars

The quantity of steel reinforcing bars shall be calculated in accordance with Clause 2.3 of MRS71 *Reinforcing Steel*. The quantity shall be increased where appropriate to include additional steel reinforcing bars required by extensions to the length of piles.

2.4 Assessment of foundation information

In the schedule, where any item for foundation work is inclusive of work from a number of discrete areas (piles), the aggregate quantity shown for that item encompasses a range of constituent materials having similar physical properties and similar overall relative proportions of the different components as could be expected from information provided in the tender documents. The actual disposition and volumes of the various constituent materials within any individual pile may vary somewhat from those indicated by adjacent boreholes, but no additional compensation shall be paid where the aggregate quantities of the various components for all locations scheduled under the item are compatible with those indicated in the tender documents.

That is, where a work item encompasses a number of piles, the quantity and composition of the total excavation is what counts with regard to costs, not each individual pile.

