

Superseded

Specification (Measurement)

**Transport and Main Roads Specifications
MRS04 General Earthworks**

July 2017

Superseded

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1 Introduction

This Specification applies to the construction of general earthworks in roadworks and bridgeworks.

The requirements of this Specification apply to excavation and filling operations for all work under the Contract except for excavation for:

- a) cast-in-place piles which is specifically covered by MRS63 *Cast-In-Place Piles*, and
- b) footings for poles which is specifically covered by MRS92 *Traffic Signal and Road Lighting Footings*.

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.

Figure 2.1(a) to Figure 2.1(c), are schematic representations of the application of some of the Standard Work Items for preparation, excavation, embankment, subgrade and backfill.

Table 2.1 – Standard Work Items

Standard Item No.	Description	Unit of Measurement
Earthworks, Preparation		
32001	Clearing and grubbing	m ²
32002	Bridge site preparation	m ²
32003P	Stripping of topsoil (Provisional Quantity, as directed)	m ³
32007	Ground surface treatment under embankment, standard	m ²
32008	Ground surface treatment, special (square metres)	m ²
32009	Ground surface treatment, special (cubic metres)	m ³
32010P	Ground surface treatment, insitu treatment of acid sulphate soils with lime (Provisional Quantity, if ordered)	m ³
32014P	Excavation and disposal of Unsuitable Material with individual excavation ≤ 10 m ³ (Provisional Quantity, as directed)	m ³
32018P	Excavation and disposal of Unsuitable Material with individual excavation > 10 m ³ (Provisional Quantity, as directed)	m ³
32022P	Supply and storage of agricultural lime (Provisional Quantity, as directed)	tonne
32026P	Quantitative laboratory testing of actual or potential acid sulphate soils (Provisional Quantity, if ordered)	set of tests
32030P	Treatment of water contaminated by acid sulphate soil, (Provisional Quantity if ordered)	kL

Standard Item No.	Description	Unit of Measurement
Earthworks, Excavation		
32101	Excavation, all materials	m ³
32102	Excavation to clear waterways at bridge abutments, all materials	m ³
32103	Excavation for culvert, pipe and conduit trenches, all materials [description]	m ³
32104	Excavation for structures, all materials [description]	m ³
32105	Excavation for diversion channels, all materials	m ³
32106	Excavation for diversion drains, all materials	m ³
32107	Excavation for catch drains, all materials	m ³
32108	Special excavation, all materials [description]	m ³
32109P	Excavation of non-rippable material in road excavation, rate additional to rate for Work Item 32101 (Provisional Quantity)	m ³
32113P	Excavation of non-rippable material in confined excavation, rate additional to rates for Work Items 32103 to 32107 inclusive (Provisional Quantity)	m ³
32117	Pre-splitting batters of rock cuttings	m ²
32118P	Excavation and disposal of Unsuitable Material in and below confined excavations (Provisional Quantity, as directed)	m ³
32122P	Excavation and disposal of Unsuitable Material within lines of cuttings, rate additional to rate for Work Item 32101 (Provisional Quantity, as directed)	m ³
32126	Blinding concrete, [thickness] mm nominal thickness	m ²
Earthworks, Embankment		
32201	Embankment	m ³
32202	Levees, catch banks and diversion blocks using earthfill material (Class A1, Class B) from all sources	m ³
32203	Special embankment [description] from all sources	m ³
32204	Supply and installation of geotextile, strength class [strength class], filtration class [filtration class]	m ²
32205	Supply and installation of high strength geosynthetic reinforcement	m ²
32206P	Addition of lime to embankment materials to neutralise acid sulphate soils, rate additional to rates for Work Items 32201 to 32203 (Provisional Quantity, as directed)	m ³
32210	Verge fill	m ³
Earthworks, Subgrade Testing & Treatments		
32301	Subgrade testing	lump sum
32302P	Subgrade testing (Provisional Quantity, if ordered)	set of tests
32306P	Subgrade treatment Type A (Provisional Quantity, if ordered)	m ²
32310P	Subgrade treatment Type B, replace with fill material, (Provisional Quantity, if ordered)	m ³

Standard Item No.	Description	Unit of Measurement
32314P	Subgrade treatment Type C, replace with unbound granular material (Provisional Quantity, if ordered)	m ³
32318P	Subgrade treatment Type D, insitu stabilise existing (Provisional Quantity if ordered)	m ³
32322P	Subgrade treatment Type E, replace with plant-mixed stabilised material (Provisional Quantity, if ordered)	m ³
32326P	Subgrade treatment Type F1, replace with plant-mixed stabilised and unbound drainage layers (Provisional Quantity, if ordered)	m ³
32330P	Subgrade treatment Type F2, replace with plant-mixed stabilised and high permeability drainage layers (Provisional Quantity, if ordered)	m ³
32334P	Subgrade treatment Type G, replace with insitu stabilised drainage layer (Provisional Quantity, if ordered)	m ³
32338P	Subgrade treatment Type H, replace with plant-mixed stabilised drainage layer (Provisional Quantity, if ordered)	m ³
32342P	Subgrade treatment Type I, replace with high permeability drainage layer, (Provisional Quantity, if ordered)	m ³
32346P	Subgrade treatment Type J, bridging layer (Provisional Quantity, if ordered)	m ³
32350P	Subgrade treatment Type K [description], (Provisional Quantity, if ordered)	m ³
32354P	Excavation of non-rippable material in excavation, rate additional to rate for Work Items 32321, 32325, 32329 and 32333 (Provisional Quantity)	m ³
32358P	Supply of stabilising agent, lime (Provisional Quantity, as directed)	tonne
32362P	Supply of stabilising agent, Type GB cement (Provisional Quantity, as directed)	tonne
Earthworks, Backfill		
32401	Backfill with earth backfill material [description]	m ³
32402	Backfill with select backfill material to [description]	m ³
32403	Backfill with free draining granular material to [description]	m ³
32404	Backfill with sand to [description]	m ³
32405	Backfill with cement stabilised granular material to [description]	m ³
32406	Backfill with stabilised sand to [description]	m ³
32407	Backfill with lean mix concrete to [description]	m ³
32408	Backfill with rock fill to [description]	m ³
32409	Backfill with material for steel culverts to [description]	m ³
32410	Bedding of [description]	m ³
32411	Haunch zone for [description]	m ³
32412	Side zone for [description]	m ³
32413	Overlay zone for [description]	m ³

Standard Item No.	Description	Unit of Measurement
32414P	Addition of lime to backfill material in Acid Sulphate Soil areas, (Provisional Quantity, as directed)	m ³
Earthworks, Turnouts, Entrances and Stopping Places		
32501	Turnouts	m
32502	Entrances to private property	m
32503	Stopping places	Lump Sum
Widening		
32601	Widening of the existing formation (metres)	m
32602	Widening of the existing formation (square metres)	m ²

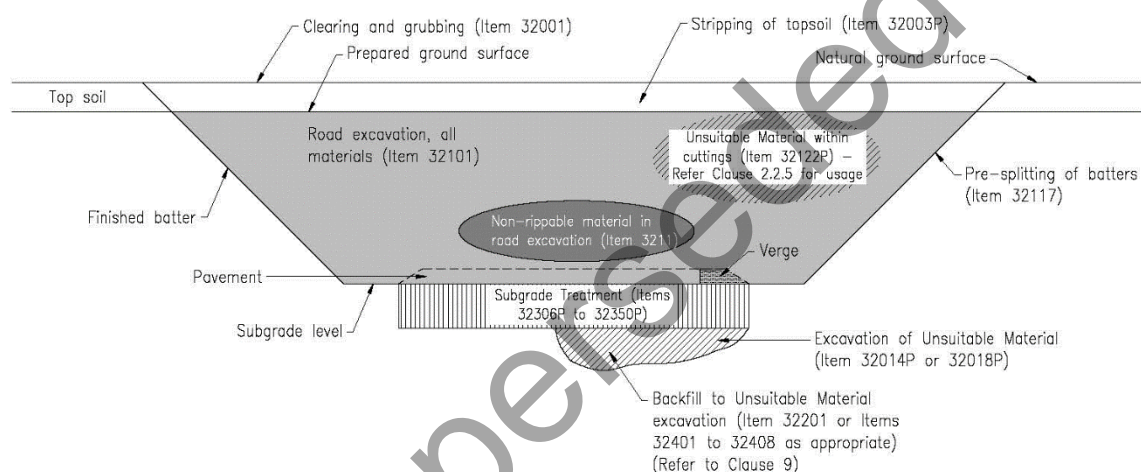
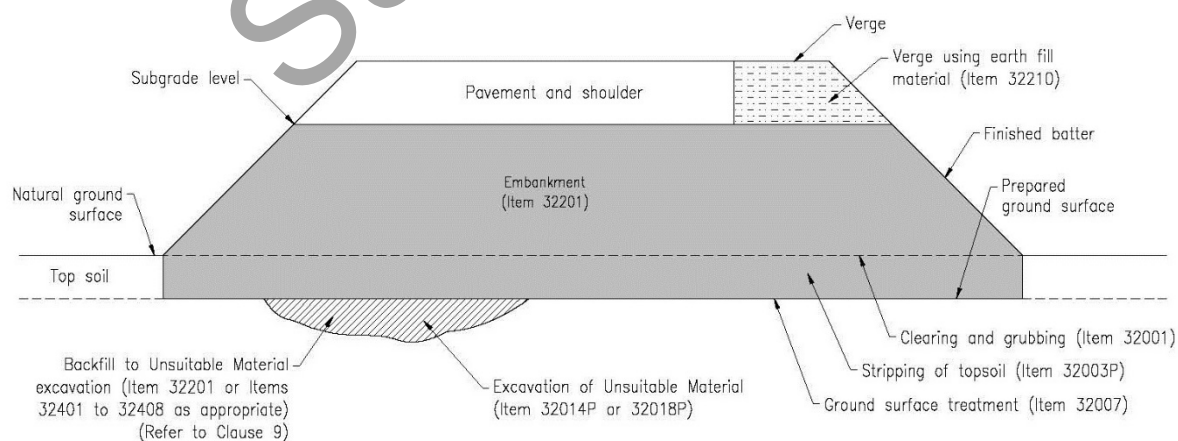
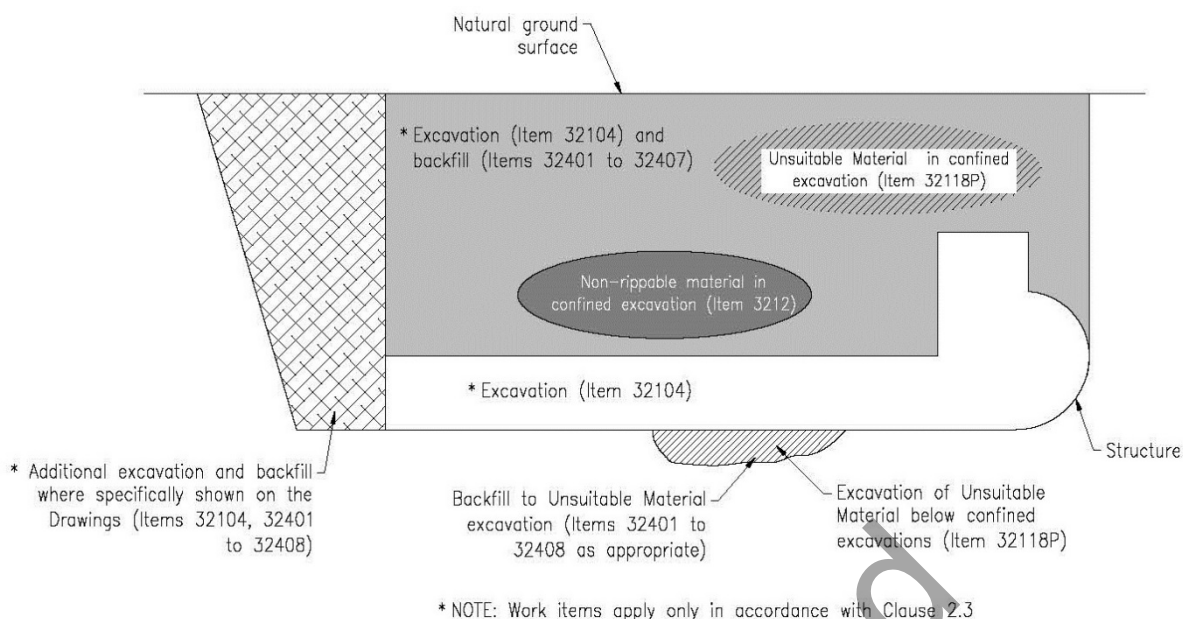
Figure 2.1(a) – Excavation**Figure 2.1(b) – Embankment**

Figure 2.1(c) – Excavation and embankment to structures

2.2 Work Operations

Work Operations included in the Standard Work Items are specified in the relevant clause adjacent to each Standard Work Item listed in Table 2.1.

2.2.1 Clearing and grubbing

Item 32001 Clearing and grubbing

Item 32002 Bridge site preparation

Work Operations incorporated in the above items include:

- Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*
- removing trees, shrubs and overhanging branches
- setting aside marketable timber
- setting aside vegetative material suitable for processing to produce organic mulch
- placing fallen logs and branches suitable for fauna habitat clear of construction activities
- removing stumps and roots (including any subsequent regrowth) to a depth not less than 300 mm below ground surface
- removing noxious weeds, crops and other vegetable matter from the ground surface (including any subsequent regrowth)
- removing rocks, buildings and artificial obstructions from the ground surface
- removing and / or demolishing existing drainage infrastructure and roadside furniture including barriers where not scheduled separately
- removing abandoned Public Utility Plant to a depth not less than 300 mm below natural ground surface
- disposing of all cleared and grubbed materials which are not to be reused, and

- l) trimming and lightly compacting area within the limits of the clearing and grubbing outside the limits of earthworks operations.

2.2.2 Stripping of topsoil

Item 32003P Stripping of topsoil (Provisional Quantity, as directed)

Work Operations incorporated in the above item include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*
- b) stripping existing topsoil from the Site
- c) identification of material suitable for use as planting media
- d) stockpiling of material considered suitable for use as planting media, and
- e) use of or disposal of surplus material and material unsuitable for use as planting medium.

2.2.3 Acid sulphate soils

Item 32022P Supply and storage of agricultural lime (Provisional Quantity, as directed)

Work Operations incorporated in the above item include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*, and
- b) supply and storage of lime.

Item 32026P Quantitative laboratory testing of actual or potential acid sulphate soils (Provisional Quantity, if ordered)

Work Operations incorporated in the above item include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*, and
- b) collection of sample, appropriate packaging, transport to laboratory, testing and reporting of result.

Item 32030P Treatment of water contaminated by acid sulphate soil, (Provisional Quantity, if ordered)

Work Operations incorporated in the above item include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*
- b) temporary retention of contaminated water
- c) testing and analysis of contaminated water
- d) mixing of lime slurry and incorporation into contaminated water, and
- e) discharge of, or disposal of, treated water and contaminated products.

2.2.4 Ground surface treatment

Item 32007 Ground surface treatment under embankment, standard

Work Operations incorporated in the above item include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*
- b) supplying, placing and compacting fill material in holes and localised depressions

- c) adjusting the moisture content of insitu material below the existing ground surface, and
- d) compacting material below the prepared ground surface.

Item 32008 Ground surface treatment, special (square metres)

Work Operations incorporated in the above item include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*, and
- b) all work specified in Clause 12.2.2 of MRTS04.

Item 32009 Ground surface treatment, special (cubic metres)

Work Operations incorporated in the above item include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*, and
- b) all work specified in Clause 12.2.2 of MRTS04.

Item 32010P Ground surface treatment, insitu treatment of acid sulphate soils with lime (Provisional Quantity, if ordered)

Work Operations incorporated in the above item include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*
- b) visual and field testing of materials for acid sulphate potential
- c) identification of areas requiring treatment and level of treatment required
- d) loosening and excavation of materials as directed by the Administrator
- e) spreading and mixing of lime into excavated material at a rate required to neutralise acid production, and
- f) moisture conditioning and re-compaction of material into excavation.

Item 32014P Excavation and disposal of Unsuitable Material with individual excavation $\leq 10 \text{ m}^3$ (Provisional Quantity, as directed)

Item 32018P Excavation and disposal of Unsuitable Material with individual excavation $> 10 \text{ m}^3$ (Provisional Quantity, as directed)

Work Operations incorporated in the above item include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*
- b) identification of Unsuitable Material including testing and survey where required
- c) loosening insitu material
- d) excavating loading and hauling loosened material to stable slopes as directed by the Administrator
- e) disposal of Unsuitable Material, and
- f) compaction of base of excavation.

2.2.5 Excavation

Item 32101 Excavation, all materials

Work Operations incorporated in the above item include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*
- b) identification of material classes and Unsuitable Material including testing and survey where required
- c) loosening insitu material
- d) excavating, loading, hauling and unloading loosened material
- e) any additional stockpiling, reloading, hauling and unloading of excavated material as required to deliver the material to its final point of placement
- f) disposing or otherwise using excavated material
- g) lightly tyning areas specified, and
- h) finishing batters.

Item 32102 Excavation to clear waterways at bridge abutments, all materials

Item 32103 Excavation for culvert, pipe and conduit trenches, all materials [*description*]

Item 32104 Excavation for structures, all materials [*description*]

Item 32105 Excavation for diversion channels, all materials

Item 32106 Excavation for diversion drains, all materials

Item 32107 Excavation for catch drains, all materials

Item 32108 Special excavation, all materials [*description*]

Work Operations incorporated in the above items include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*
- b) identification of material classes and Unsuitable Material including testing and survey where required
- c) loosening insitu material
- d) excavating, loading, hauling and unloading loosened material
- e) any additional stockpiling, reloading, hauling and unloading of excavated material as required to deliver the material to its final point of placement
- f) disposing or otherwise using excavated material
- g) compacting material at the bottom of excavations, and
- h) finishing batters.

Item 32109P Excavation of non-rippable material in road excavation, rate additional to rate for Work Item 32101 (Provisional Quantity)

Item 32113P Excavation of non-rippable material in confined excavation, rate additional to rates for Work Items 32103 to 32107 inclusive (Provisional Quantity)

Work Operations incorporated in the above items include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*, and
- b) work associated with the excavation of non-rippable material in addition to that required for road excavation or confined excavation, as appropriate, in all materials.

Item 32117 Pre-splitting batters of rock cuttings

Work Operations incorporated in the above item include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*, and
- b) pre-splitting of face of batter with explosives.

Item 32118P Excavation and disposal of Unsuitable Material in and below confined excavations (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) identification of Unsuitable Material including testing and survey where required
- c) loosening insitu material
- d) excavating to stable slopes and to extent of Unsuitable Material as directed by the Administrator, loading and hauling loosened material
- e) use of or disposal of Unsuitable Material, and
- f) compaction of base of excavation.

Item 32122P Excavation and disposal of Unsuitable Material within lines of cuttings, rate additional to rate for Work Item 32101 (Provisional Quantity, as directed)

Work Operations incorporated in the above item include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*
- b) identification of Unsuitable Material including testing and survey where required
- c) use of or disposal of Unsuitable Material, and
- d) supply of additional fill material, to supplement construction of embankments and other fills.

If there is an excess of excavation over proposed embankment, the tender schedule allows for the disposal of the excess material under Work Item 32101 and the unsuitable material also has to be selected and disposed of under Work Item 32101 and no additional payment is made.

If there is a deficiency of excavation over proposed embankment, and the excavated unsuitable material has to be disposed of and fill material up to the amount of unsuitable material to be imported, payment is made under Work Item 32122P.

Item 32126 Blinding concrete, [*thickness*] mm nominal thickness

Work Operations incorporated in the above item 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, and
- e) finishing concrete.

2.2.6 Embankments

Item 32201 Embankment

Work Operations incorporated in the above items include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*
- b) loosening insitu material
- c) stepping the ground surface
- d) supplying and placing embankment fill material from stockpiles and borrow areas on or off the Site as required
- e) separation of embankment fill material into embankment zones where specified
- f) installing embankment geotextile at changes in fill type
- g) spreading fill material
- h) compacting fill material
- i) sampling and testing, and
- j) finishing batters.

Item 32202 Levees, catch banks and diversion blocks using earthfill material (Class A1, Class B) from all sources

Item 32203 Special embankment [*description*] from all sources

Work Operations incorporated in the above items include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*
- b) loosening insitu material

- c) stepping the ground surface
- d) supplying and placing fill material from stockpiles and borrow areas on or off the Site as required
- e) separation of fill material into embankment zones where specified
- f) spreading fill material
- g) compacting fill material
- h) sampling and testing and
- i) finishing batters.

Item 32204 Supply and installation of geotextile, strength class [*strength class*], filtration class [*filtration class*]

Item 32205 Supply and installation of high strength geosynthetic reinforcement

Work Operations incorporated in the above item include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*
- b) supply, delivery and handling of geotextile and / or high strength geosynthetic reinforcement including allowance for lapping, and
- c) installation of geotextile and / or high strength geosynthetic reinforcement, including lapping / joining.

Item 32206P Addition of lime to embankment materials to neutralise acid sulphate soils, rate additional to rates for Work Items 32201 to 32203 (Provisional Quantity, as directed)

Work Operations incorporated in the above item include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*
- b) visual assessment and field testing of materials for acid sulphate potential
- c) identification of materials requiring treatment and level of treatment required, and
- d) mixing of lime into excavated material at rate required to neutralise acid production (excluding supply of lime).

Item 32210 Verge fill

Work Item Operations incorporated in the above item include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*
- b) loosening insitu material
- c) stepping the ground surface
- d) supplying and placing verge material from stockpiles and borrow areas on or off the Site as required
- e) spreading verge material
- f) compacting verge material

- g) sampling and testing, and
- h) trimming and finishing batters.

2.2.7 Subgrade

Item 32301 Subgrade testing

Item 32302P Subgrade testing (Provisional Quantity, if ordered)

Work Operations incorporated in the above item include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction Specifications*
- b) testing as required by Appendix B of MRS04, and
- c) reporting of test results to the Administrator.

Item 32306P Subgrade treatment Type A (Provisional Quantity, if ordered)

Work Operations incorporated in the above item include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*
- b) ripping and / or tining to specified treatment depth
- c) adjustment of moisture content, where necessary
- d) compaction of material
- e) sampling and testing, and
- f) trimming of subgrade to tolerance.

Item 32310P Subgrade treatment Type B, replace with subgrade fill material, (Provisional Quantity, if ordered)

Item 32314P Subgrade treatment Type C, replace with unbound granular material (Provisional Quantity, if ordered)

Item 32342P Subgrade treatment Type I, replace with high permeability drainage layer, (Provisional Quantity, if ordered)

Item 32346P Subgrade treatment Type J, bridging layer (Provisional Quantity, 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 and delivery of all materials (excluding geotextile and / or high strength geosynthetic reinforcement, where required)
- c) excavation of existing subgrade in accordance with the Work Operations of Item 3201 in Clause 2.2.5, where required
- d) placement of appropriate fill material
- e) compaction
- f) sampling and testing, and
- g) trimming of subgrade to tolerance.

Item 32318P Subgrade treatment Type D, insitu stabilise existing (Provisional Quantity, if ordered)

Work Operations incorporated in the above item include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*
- b) supply and delivery of all materials excluding stabilising agent
- c) testing insitu material and undertaking mix design to determine lime or cement application rate, as required
- d) scarifying and / or pulverising the material to be stabilised
- e) spreading the stabilising agent
- f) incorporation of water and stabilising agent into the material
- g) compaction
- h) trimming of subgrade to tolerance
- i) sampling and testing, and
- j) moist curing until subgrade is covered.

Item 32322P Subgrade treatment Type E, replace with plant-mixed stabilised material (Provisional Quantity, if ordered)

Item 32338P Subgrade treatment Type H, replace with plant-mixed stabilised drainage layer (Provisional Quantity, 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 and delivery of all materials excluding stabilising agent
- c) excavation of existing subgrade in accordance with the Work Operations of Item 32101 in Clause 2.2.5, where required
- d) undertaking mix design to determine lime or cement application rate, as required
- e) storing, metering and mixing of all components of plant-mixed material
- f) placing of plant-mixed material
- g) compaction
- h) trimming of subgrade to tolerance
- i) moist curing until subgrade is covered
- j) sampling and testing, and
- k) provide free draining surface as per Clause 18.3.3.1 of MRS04.

Item 32326P Subgrade treatment Type F1, replace with plant-mixed stabilised and unbound drainage layer (Provisional Quantity, if ordered)

Item 32330P Subgrade treatment Type F2, replace with plant-mixed stabilised and high permeability drainage layers (Provisional Quantity, if ordered)

Work Operations incorporated in the above item include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*
- b) supply and delivery of all materials excluding stabilising agent
- c) excavation of existing subgrade in accordance with the Work Operations of Item 32101 in Clause 2.2.5, where required
- d) undertaking mix design to determine lime or cement application rate, as required
- e) storing, metering and mixing of all components of plant-mixed material
- f) placing of unbound or rockfill material
- g) placing of plant mixed material
- h) compaction
- i) trimming of subgrade to tolerance
- j) sampling and testing
- k) moist curing until subgrade is covered, and
- l) provide free draining surface as per Clause 18.3.3.1 of MRTS04.

Item 32334P Subgrade treatment Type G, replace with insitu stabilised drainage layer (Provisional Quantity, if ordered)

Work Operations incorporated in the above item include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*
- b) supply and delivery of all materials excluding stabilising agent
- c) excavation of existing subgrade in accordance with the Work Operations of Item 32101 in Clause 2.2.5, where required
- d) undertaking mix design to determine lime or cement application rate, as required
- e) placing the unbound material
- f) spreading the stabilising agent
- g) incorporation of water and stabilising agent into the material
- h) compaction
- i) trimming of subgrade to tolerance
- j) sampling and testing
- k) moist curing until subgrade is covered, and
- l) provide free draining surface as per Clause 18.3.3.1 of MRTS04.

Item 32350P Subgrade treatment Type K [description], (Provisional Quantity, if ordered)

Work Operations incorporated in the above item include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*
- b) all work operations required to supply and construct the particular subgrade treatment described, and
- c) sampling and testing

Item 32354P Excavation of non-rippable material in road excavation, rate additional to rate for Work Items 32321, 32325, 32329 and 32333 (Provisional Quantity)

Work Operations incorporated in the above item include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*, and
- b) work associated with excavation of non-rippable material in addition to that required for excavation of ripplable material.

Item 32358P Supply of stabilising agent, lime (Provisional Quantity, as directed)**Item 32362P Supply of stabilising agent, Type GB cement (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*, and
- b) supply, delivery and storage of stabilising agent.

2.2.8 Backfill**Item 32401 Backfill with earth backfill material to [description]****Item 32402 Backfill with select backfill material to [description]****Item 32403 Backfill with free draining granular material to [description]****Item 32404 Backfill with sand to [description]****Item 32405 Backfill with cement stabilised granular material to [description]****Item 32406 Backfill with stabilised sand to [description]****Item 32407 Backfill with lean mix concrete to [description]****Item 32408 Backfill with rock fill to [description]****Item 32409 Backfill with material for steel culverts to [description]****Item 32410 Bedding of [description]****Item 32411 Haunch zone for [description]****Item 32412 Side zone for [description]****Item 32413 Overlay zone for [description]**

Work Operations incorporated in the above items include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*
- b) supplying all materials

- c) mixing all materials where applicable
- d) placing and compacting material in trenches or against structures,
- e) sampling and testing, and
- f) finishing surfaces of backfill.

Item 32414P Addition of lime to backfill material in Acid Sulphate Soil areas, (Provisional Quantity, as directed)

Work Operations incorporated in the above item include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*, and
- b) mixing of lime into backfill material at the rate required to neutralise potential acid production (excluding supply of lime).

2.2.9 Turnouts, entrances and stopping places

Item 32501 Turnouts

Item 32502 Entrances to private property

Item 32503 Stopping places

Work Operations incorporated in the above items include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*
- b) clearing and grubbing, topsoil stripping and ground surface treatment standard
- c) constructing road cutting excavations
- d) constructing road embankments
- e) constructing subgrade in general fill material, and
- f) sampling and testing.

2.2.10 Widening of existing formation to subgrade level

Item 32601 Widening of the existing formation (metres)

Item 32602 Widening of the existing formation (square metres)

Work Operations incorporated in the above item include all requirements for Standard Item Numbers:

- a) 32001 Clearing and grubbing
- b) 32003P Stripping of topsoil
- c) 32007 Ground surface treatment under embankment, standard
- d) 32101 Road excavation, all materials
- e) 32106 Excavation for diversion drains, all materials
- f) 32107 Excavation for catch drains, all materials
- g) 32201 Embankment, and
- h) 32306P Subgrade treatment Type A

2.3 Measurement of excavation and backfilling of trenches and structures

Excavation and backfilling for construction or installation of the following elements shall not be measured separately:

- a) pipes less than 1200 mm nominal diameter
- b) box culverts less than 1200 mm nominal height
- c) conduits and cables
- d) pits, access chambers, gullies and sumps
- e) culvert end structures and aprons
- f) kerbs and channels
- g) subsoil drains of any description
- h) batter, embankment and channel protection of any description
- i) sundry paving for footpaths, bikeways, rail and machinery crossings, relieving slabs and median and verge infill paving
- j) retaining walls
- k) road furniture
- l) landscape works, and
- m) traffic signal and road lighting footings.

Excavation and backfilling for construction or installation of the following elements shall not be measured separately unless specifically stated otherwise in Clause 1 of Annexure MRS04.1 or in the relevant Specification or Supplementary Specification:

- a) pipe culverts greater than or equal to 1200 mm nominal diameter
- b) culverts greater than or equal to 1200 mm nominal height
- c) inlets and outlets to culverts
- d) structures, and
- e) cast-in-place piles.

Where not measured separately, payment for excavation and backfilling for any of the above mentioned elements shall be deemed to be included in the rate for an appropriate Work Item (provided in another Specification or Supplementary Specification) for construction or installation of that particular element.

2.4 Borrow, spoil, hauling, stockpiling and multiple handling

No separate Work Item shall apply to and no separate payment shall be made for borrowing, spoiling, hauling, stockpiling and / or multiple handling of materials forming the earthworks described by this Specification and / or the Drawings. Full payment for such activities shall be deemed to be included in the rates for the Work Items included in the Schedule of Rates.

2.5 Calculation of quantities

In Clause 2.5, the term “top of excavation” shall mean:

- a) in a cutting – subgrade level, or
- b) elsewhere – prepared ground surface. For the purpose of calculating quantities, the prepared ground surface shall be taken as the natural ground surface less the depth of topsoil to be excavated.

The following methods of measurement shall apply to the quantities of earthworks measured under the Contract:

- a) excavation (except as stated otherwise in Clause 2.5) – the volume determined from the three-dimensional shape bounded by the prepared ground surface and the finished shapes and dimensions to subgrade level as shown on the Drawings or otherwise nominated in the Contract
- b) topsoil – the volume calculated using the areas and average depths specified
- c) excavation of Unsuitable Material – the volume determined by a method approved by the Administrator, which may require surveys to be carried out before and after excavation of the material
- d) excavation for culverts (where excavation for culverts is to be measured separately in accordance with Clause 2.3) – the volume determined from the three-dimensional shape bounded by the top of excavation, the minimum depth determined from the dimensions shown on Standard Drawing 1359 *Culverts – Installation, bedding and filling / backfilling against / over culverts*, the vertical planes representing the minimum width of excavation at the centre of the culvert as shown on Standard Drawing 1359 and the actual length of the culvert at top of excavation
- e) excavation for structures (where excavation for structures is to be measured separately in accordance with Clause 2.3) – the volume determined from the three-dimensional shape bounded by the top of excavation, the underside of structure (excluding any blinding concrete) and the vertical planes containing the plan shape of the structure plus any defined backfill zones as shown on the drawings
- f) excavation in non-rippable material (where excavation in non-rippable material is to be measured separately in accordance with Clause 13.3.1 of MRS04) – the actual volume of non-rippable material excavated provided that the provisions of Clause 3.5 are followed
- g) pre-splitting of batters in cuttings – the area defined by the plane of the inclined rock face shown on the drawings
- h) embankments – the volume determined from the three-dimensional shape bounded by subgrade level, the prepared ground surface and, the finished shapes and dimensions as shown on the drawings or otherwise nominated in the Contract
- i) backfill of Unsuitable Material excavations – the volume equal to that described in subparagraph (c) above
- j) backfill for culverts – total backfill for each zone as appropriate (where backfill to culverts is to be measured separately in accordance with Clause 2.3) – the volume equal to that described in subparagraph (d) above less the actual volume of the culvert except that:

- i. for a trench installation as shown on Standard Drawing 1359, the backfill above the overlay zone will be measured as overlay zone material, and
- ii. for an embankment installation, the volume of backfill above the prepared ground surface shall be calculated to the lines shown on Standard Drawing 1359
- k) backfill for structures (where backfill to structures is to be measured separately in accordance with Clause 2.3) – the volume equal to that described in subparagraph (e) above less the actual volume of the structure
- l) blinding concrete – the area covered by the footprint of concrete footing or slab as shown on the Drawings, and
- m) subgrade treatment Type A – the area at subgrade level.

Excavation quantities shall make no allowance for any additional excavation required to place planting media and other landscape treatments to the specified thicknesses and finished levels shown on the Standard Drawings. No additional payment shall be made for such excavation under the Contract. Embankment quantities shall make no allowance for any reduction of embankment dimensions required to place planting media and other landscape treatments to the specified thicknesses and finished levels shown on the drawings

3 Measurement and payment

3.1 Unsuitable material

Payment for backfilling of excavations of unsuitable material shall be made under Standard Work Items 32401 to 32408 as appropriate. However, where, in the opinion of the Administrator, backfilling is required to be carried out in an area which does not allow the use of earthmoving plant of the size and capacity employed by the Contractor in constructing embankments on the Site, payment shall be made under Standard Work Item 32401. The Administrator may order backfill in alternative materials in accordance with Work Items 32402 to 32408 inclusive.

The Contractor shall carry out surveys, before and after treatment of any Unsuitable Material, to determine the quantity of Unsuitable Material for payment purposes and the cost of such surveys shall be deemed to be included in the Contractor's rates for treatment of Unsuitable Materials.

In the interests of expediency, the Contractor may elect to remove Unsuitable Material and replace it with other material without reference to the Administrator. In such a case, the Principal will not be bound to make any additional payment.

In general, no additional payment will be made to the Contractor for Unsuitable Material within cuttings / excavations where there is excavated material which is surplus to the project requirements.

If there is an excess of excavation over proposed embankment, the tender schedule allows for the disposal of the excess material under Work Item 32101 and the unsuitable material also has to be selected and disposed of under Work Item 32101 and no additional payment is made.

If there is a deficiency of excavation over proposed embankment, and the excavated unsuitable material has to be disposed of and fill material up to the amount of unsuitable material to be imported, payment is made under Work Item 32122P.

3.2 Acid sulphate soil

The costs of visual and field testing for acid sulphate soils shall be borne by the Contractor. The Administrator will authorise payment for ordered quantitative laboratory testing under Standard Work Item 32026P.

The cost of water treatment where required will be borne by the Principal under Standard Work Item 32030P where the contaminated water is:

- a) groundwater from excavations which are essential to the construction of the Works, or
- b) runoff from stockpiles which have been created as essential steps in the management of acid sulphate soils on the Site

but only where, in the opinion of the Administrator, the Contractor:

- a) has taken all reasonable steps to avoid contamination, and
- b) is constructing the works in accordance with its construction program.

In all other circumstances the cost of water treatment shall be borne by the Contractor.

3.2.1 Disposal in areas on the site

No additional payment shall be made for shaping, draining, topsoiling and revegetation of spoil sites.

3.3 Non-rippable material

3.3.1 General

For the purpose of Clause 3.3, "production rate" means the rate at which material can be ripped only, without regard to stockpiling, loading or carting.

3.3.2 Road excavation

Non-rippable material in road excavation shall be material which cannot be ripped at a production rate exceeding the rate specified in Table 3.3.2 for the classes of crawler tractor nominated in Clause 2.1 of Annexure MRS04.1. Where no class of crawler tractor is nominated in the annexure, this requirement shall be assessed against any class of crawler tractor in Table 3.3.2. The crawler tractor shall be equipped with a heavy duty, single tine, parallelogram ripper approved by the manufacturer of the crawler tractor for use with the particular model of crawler tractor.

Table 3.3.2 – Road excavation – production rate limit for non-rippable material

Class of Crawler Tractor^{1,2}	Operating Mass (kg)³	Classifying Power (kW)	Production Rate (m³/h)
150C	≥ 20 000 < 29 000	≥ 150 < 200	50
200C	≥ 29 000 < 44 000	≥ 200 < 300	75
300C	≥ 44 000 < 58 000	≥ 300 < 400	90
400C	≥ 58 000 < 73 000	≥ 400 < 500	105
500C	≥ 73 000 < 90 000	≥ 500 < 600	120
600C	≥ 90 000	≥ 600	135

Notes

1. C in class number designates a crawler tractor.
2. Class number shall be the number, or the lower of the two numbers for which the machine would be classified separately by classifying power and by operating mass.
3. Operating mass also includes hydraulic controls and fluids, straight bulldozer blade, operator's protective structure.

3.3.3 Confined excavations

Non-rippable material in confined excavation shall be material which cannot be ripped at a production rate exceeding the rate specified in Table 3.3.3 for the classes of crawler excavator nominated in Clause 2.2 of Annexure MRS04.1. Where no class of crawler tractor is nominated in the annexure, this requirement shall be assessed against any class of crawler tractor in Table 3.3.3. The crawler excavator shall be equipped with a heavy duty bucket or rock bucket (approved by the manufacturer of the crawler excavator for use with the particular model of crawler excavator for excavation in rock) of width not greater than that stated in Table 3.3.3. The bucket teeth shall be fitted with high penetration boots.

Table 3.3.3 – Confined excavation – production rate limit for non-rippable material and classification of excavators and shovel loaders

Class Number of Crawler Excavator¹	Operating Mass (kg)²	Net Engine Power (kW)	Maximum Bucket Width (mm)	Production Rate (m³/h)
55	≥ 12 500 < 15 000	≥ 55 < 65	450	1.5
85	≥ 19 000 < 23 000	≥ 85 < 100	600	3
115	≥ 27 000 < 31 000	≥ 115 < 135	750	4.5
155	≥ 38 000 < 44 000	≥ 155 < 175	900	7
200	≥ 50 000 < 60 000	≥ 200 < 235	1050	10

Notes

1. Class number shall be the number or the lower of the two numbers, for which the machine would be classified separately by net engine power and by operating mass.
2. Operating mass shall also include standard attachments, e.g one piece boom standard stick, small bucket, standard undercarriage.

3.3.4 Blasting

In general, no additional payment shall be made to the Contractor for blasting operations in any excavation. The Contractor shall be deemed to have made due allowance in its tendered rates for the cost of all blasting operations.

3.4 All excavations

Except where other specific Work Items are included in the Schedule of Rates, all excavations shall be measured under Standard Work Item 32101.

In general, no additional payment shall be made to the Contractor for excavation in non-rippable material in any excavation. The Contractor shall be deemed to have made its own assessment of the extent and nature of the material to be excavated and to have made due allowance in its tendered rates for the cost of excavation in all materials.

However, where so stated in Clause 2.3 of Annexure MRS04.1, the Contract shall provide for additional payment to be made to the Contractor for excavation of non-rippable material in road excavation and where so stated in Clause 2.4 of Annexure MRS04.1, the Contract shall provide for additional payment to be made to the Contractor for excavation of non-rippable material in confined excavation. Where the Contract provides for additional payment for excavation in non-rippable material, the provisions of Clause 3.5 shall apply.

Irrespective of whether material is rippable or non-rippable, the Contractor may carry out excavations using any equipment and any safe techniques.

3.5 Conditions applicable to additional payment for excavation in non-rippable material

Where the Contract provides for additional payment for excavation in non-rippable material in accordance with Clause 3.4, the following provisions shall apply:

- a) the Schedule of Rates will contain an appropriate Standard Work Item for the work associated with excavation in non-rippable material
- b) proving material to be non-rippable shall be the Contractor's responsibility
- c) proving material to be non-rippable shall be a hold point as specified in MRTS50 *Quality System Requirements* to be released by the Administrator
- d) equipment shall be in good working condition and the Administrator may require the Contractor to demonstrate that the equipment has been regularly and properly serviced
- e) the Administrator shall have the right to nominate the operator (whether a Contractor's employee or not) and the type, manufacturer and / or size of excavating machine and to direct the operations of the machine during the proving operation
- f) unless the Contractor has proved material to be non-rippable and the Administrator has agreed that the material is non-rippable prior to excavation of that material, the Principal shall not be bound to make any additional payment for that material on account of its non-rippability

- g) at the discretion of the Administrator, measurement of quantities of non-rippable material may require surveys, before and after excavation, and such surveys shall be carried out by the Contractor and the cost thereof shall be deemed to be included in the Contractor's rates for excavation in non-rippable material, and
- h) in particular, any additional payment to be made to the Contractor for excavation of non-rippable material for subgrade treatments shall be made strictly in accordance with these provisions.

3.6 Special requirements for cuttings

3.6.1 Bottom of excavation

All excavation down to subgrade level shall be measured under Standard Work Item 3201.

3.6.2 Unsuitable material below the bottom of excavation

The quantity of excavation of unsuitable material below the finished lines and levels of bottom of excavation shall be measured separately under Standard Work Item 32014P or 32018P as appropriate – refer to Figure 2.1-A.

3.7 Unsuitable material in confined excavations

Where excavation for the relevant trench or structure is to be measured separately in accordance with Clause 2.3, the quantity of excavation of Unsuitable Material shall be measured separately under Standard Work Item 32118P.

3.8 Special embankment materials

Where special embankment materials are required to be used, they are included in the Schedule of Rates under Standard Work Item 32203.

3.9 Geotextile at changes in material type

No additional payment shall be made for supply or installation of the geotextile at the interface at changes in material type in embankments.

3.10 Borrow operations

No separate payment shall be made for establishing borrow areas or for sourcing material from borrow areas.

3.11 Backfill zones to concrete pipe culverts

Overlay zone material not actually in a trench shall be measured as embankment material under Standard Item Number 32201.

4 Existing ground level survey

The Principal has provided survey data as stated in Clause 3 of Annexure MRS04.1. If the Contractor accepts this data, it shall become the basis for calculation of all quantities.

If the Contractor does not agree with the survey data provided, it shall provide notice to the Administrator prior to the natural ground surface being disturbed. This notice shall contain a survey of a sample set of points agreed with by the Administrator showing the differences from the Principal's survey. No additional payment shall be made by the Principal for this sample survey. If the Administrator accepts that the survey indicates inaccuracies in the Principal's survey sufficient to

require an additional independent ground level survey of the disputed areas, it shall be carried out as directed by the Administrator.

This independent survey shall be arranged, programmed and organised by the Contractor and the survey shall be conducted by a mutually agreed, qualified surveyor working to an agreed program and quoted price. Payment for the survey will be made as a variation.

No additional payment shall be made by the Principal other than for the above independent survey and no extension to time shall be granted as a result.

5 Supplementary requirements

The requirements of MRS04 *General Earthworks* are varied by the supplementary requirements given in Clause 4 of Annexure MRS04.1.

Superseded

Superseded