8209 Stone Pitched Retaining Walls

REVISION 20/11/2024

8209.1 Introduction

This Supplementary Specification refers to the laying of stone-pitching and rock-walling, and construction for retaining walls and free-standing walls such as noise attenuation, dwarf and feature walls for landscaping or similar structures.

8209.1.1 Definition of terms

This section describes any term which are specific to this specification or requires clarification due to an ambiguous understanding.

Term	Definition
Form 15	Compliance certificate for building design or specification under the Building Act and Regulations Queensland
Form 12	Aspect Inspection Certificate - Compliance certificate for building works or specification under the Building Act and Regulations Queensland. Replaced Form 16
Structural Engineer and/or Superintendent	As applies to this specification, where the retaining wall requires certification, the Structural Engineer shall be the approving person with conjoint inspections with the Superintendent, where no certification is required only the Superintendent shall be required to carry out inspections and approvals.
Stone Pitching	Work activity of placing and laying, and locking in of varying sized stones to create retaining walls
Dry Stacked Stone Pitching	The process of stone pitching without mortar using the stones to interlock individual stones within the retaining wall structure
Mortar Jointed Stone Pitching	Stone pitching which uses cement mortar to interlock the individual stones within the retaining wall structure

8209.1.2 Table of contents

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8209.2 Referenced Documents

This supplementary specification shall be read in conjunction with the following:

- MRS01 and MRTS01 *"Introduction to Technical Specifications"*.
- MRS03 and MRTS03 *"Drainage Structures, Retaining Structures and Embankment Slope Protections"*;
- MRS04 and MRTS04 *"General Earthworks";*
- MRS50 and MRTS50 *"Specific Quality System Requirements";*
- MRS27 and MRTS27 *"Geotextiles (Separation and Filtration)";*
- MRS70 and MRTS70 *"Concrete";*
- MRS71 and MRTS71 *"Reinforcing Steel"*;
- MRC Supplementary Specification 8107 *"Subsoil Drainage";*
- Building Act 1975 Queensland (current revision);
- Building Regulation 2021 Queensland (current revision);
- AS 1141.11 *"Particle size distribution by dry sieving"*;
- AS 1289.5.4.1 *"Compaction control test – Dry density ratio, moisture variation and moisture ratio"*;
- AS 2758.1 *"Concrete aggregates"*;
- AS 3972 *"Portland and blended cements"*;
- AS/NZS 4680 *"Hot-dip galvanized (zinc) coatings on fabricated ferrous articles"*;
- AUS-SPEC C278 *"Stone Pitched Retaining Walls;*
- NATSPEC – "*0241 landscape – Walling and Edging";* and

- the project Drawings.

8209.3 Description of Work Items

Work items incorporated by this supplementary specification are identified in Section 8209.6 and 8209.7 with individual activities/tasks for measurement and payment sourced from the Bill of Quantities and listed in MRC Supplementary Specification Annexure 8209_1 Stone Pitched Retaining Walls Section 1

8209.4 Quality System Requirements

The contractor is to submit a quality plan to the superintendent for review and approval a minimum 4 weeks prior to commencement of works or the prestart. The quality plan shall be compliant to MRTS50 and other reference requirements with as a minimum incorporate the following Testing, Inspections, and Tolerances.

8209.4.1 Standard Test Methods (Testing Regime)

The following minimum testing regime applies to this specification:

Civil works activities associated with the installation of stone pitched retaining walls shall be tested as per the relevant MRTS specification MRTS03, MRTS04, MRTS05, MRTS70, and MRTS71 unless otherwise approved by the Superintendent.

8209.4.1.1 General

The Contractor shall demonstrate weekly throughout the execution of the Works, that adequate and accurate records are being kept such as shall ensure the ultimate completeness and accuracy of the records.

The Contractor shall produce records and documentation (including completed and signed Inspection and Test Plans) which shall demonstrate that hold and witness points were observed and approved and results of the testing as completed. These are to be submitted with the close out of the relevant ITP.

8209.4.2 Hold Points, Witness Points and Milestones

Separate to the Contractors inspections and checklists the following table represents the Superintendents minimum inspection and milestone requirements relating to the works as laid out for this specification. Inspection points are noted on various Sections of this Specification.

The following table represents the minimum inspection requirements for this specification:

Activity	Inspection Type	When	Clause/s
Preliminary submissions for approval	Milestone	4 weeks prior to site works commencing	8209.5
Inspection materials delivered to site	Hold Point	At time of delivery of materials prior to use on site	8209.6.2
Site Set Out and Excavation			
Site layout confirming compliance with design and location of retaining wall	Hold Point	Prior to excavation commencing	8209.6.3.1
Base of excavation compliance with level, alignment and compaction	Hold Point	At completion of excavation works prior to footing works commencing	8209.6.3.2

Activity	Inspection Type	When	Clause/s
Foundation Compliance			
Confirmation of foundation compliance	Hold Point	Prior to construction approval to proceed for the stone pitching	8209.6.4.1
Foundation inspection including testing and survey results	Hold Point	At completion of levelling and compacting of foundation prior to approval to proceed	8209.6.4.1
Foundation inspection and approval to proceed with footing	Hold Point	After removal of unsuitable material prior to approval to proceed	8209.6.4.1
Footing Installation			
Notification of pouring blinding layer	Witness Point	Prior to pouring blinding layer	8209.6.4.2.1
Prepour inspection of bed, formwork, reinforcing	Hold Point	Prior to pouring reinforced concrete footing	8209.6.4.2.2
Receiving of test results on Concrete footing	Hold Point	Prior to granting approval to proceed with laying stone pitching	8209.6.4.2.2
Prepour inspection of bed, formwork	Hold Point	Prior to pouring mass concrete footing	8209.6.4.2.3
Compacted base material footing inspection	Hold Point	Prior to granting approval to proceed with laying stone pitching	8209.6.4.2.4
Stone Pitching in Walls			
Laying of mortar set stone pitching	Witness Point	During laying of mortar jointed stone pitching	8209.6.5.1
Laying of dry stacked stone pitching	Witness Point	During laying of dry stacked stone pitching wall	8209.6.5.2
Survey level of coping stones	Hold Point	At completion of laying of coping stone course	8209.6.5.4
Scour protection cut off walls installation	Witness Point	At excavation for cutoff wall and during installation	8209.6.5.5
Drainage Mortar Jointed Stone Pitched Retaining Walls			
Weephole Installation at correct locations and heights	Hold Point	During the installation and laying of the grouted stone pitching courses	8209.6.6.1
Inspection of laying of longitudinal drainage	Hold Point	Prior to backfilling commencing	8209.6.6.1
Longitudinal drainage outlets as required by drawings	Witness Point	At completion of laying longitudinal drainage line	8209.6.6.1
Backfilling of mortar jointed wall with approved drainage material	Witness Point	During the backfilling activities in association with stone pitching	8209.6.6.1
Weephole grated outlets	Witness Point	At completion of installation of weephole outlets in wall	8209.6.6.1
Drainage Dry Pack Stone Pitched Retaining Walls			

Activity	Inspection Type	When	Clause/s
Lining of wall with type 3 geotextile	Hold Point	Prior to installation drainage and backfilling commencing	8209.6.6.2
Backfilling of wall with approved drainage material	Witness Point	During the backfilling activities in association with stone pitching	8209.6.6.2
Inspection of laying of sub soil drainage	Hold Point	Prior to backfilling commencing	8209.6.6.3
Backfilling of wall with approved material	Witness Point	During the backfilling activities in association with stone pitching and drainage layer installation	8209.6.6.4
Turf laying and site clean up	Witness Point	During turf laying activities	8209.6.6.5
Post Construction			
As Constructed documentation for all works submitted and accepted	Hold Point	4 weeks prior to "On Maintenance" inspection request	8209.7

8209.4.3 Construction Tolerances

Unless otherwise approved by the Superintendent the following construction tolerances shall apply as to this Specification.

The construction activity outcome shall not depart from the widths, lengths, heights, and shapes specified within this Supplementary Specification for each of the respective activities, where there are no stated tolerances the relevant specifications as applies to this specification;

- Concrete tolerances in accordance with MRTS70 Concrete.
- Earthworks tolerances in accordance with MRTS04 General Earthworks.
- Pavement tolerances in accordance with MRTS05 Unbound Pavement

Tolerances specific to the project are detailed on the design drawings and are included in Clause 2 of MRC Supplementary Specification Annexure 8209_1 Stone Pitched Retaining Walls.

All Council retaining walls to be constructed wholly in the road reserves/public land unless otherwise stated in Clause 5 of MRC Supplementary Specification Annexure 8209_1 Stone Pitched Retaining Walls. Private retaining walls including footings are to be wholly contained within private property.

8209.5 Preliminary

The Contractor is to submit the following documentation 4 weeks prior to commencing work or a prestart is conducted:

- Works procedure
- Erosion and sediment control plan (as required for site/s)
- Traffic management plan and TGS's (as required)
- Design certification Form 15
- Test results on materials proposed to be used.

Other requirements unique to the project will be listed in the MRC Supplementary Specification Annexure 8209_1 Stone Pitched Retaining Walls

MILESTONE

8209.5.1 Materials

Supply of materials to site is the responsibility of the Contractor at their cost, where items are Principal supplied the nominated storage site shall be obtained from MRC Supplementary Specification Annexure 8209_1 Stone Pitched Retaining Walls Section 3 and shall be the point of supply.

All earthworks and pavement materials shall be supplied, laid, and compacted in accordance with MRTS03, MRTS04, and MRTS05.

Geotextile filter fabric shall be Class A non-woven geotextile filter fabric.

Insitu concrete for the coping and foundation shall conform with MRTS03 and MRTS70.

Rock shall be sound igneous rock with a minimum specific gravity of 2.7. The rock shall be dense, durable and resistant to weathering.

Bedding material shall comprise crushed rock or gravel whose particle size lies between 19 and 37.5, with at least 40 percent of the material greater than 26.5mm in size.

Impervious material shall conform the requirements of this Specification.

The cement used shall be Type GP Portland cement, complying with AS 3972.

The sand shall conform to AS 2758.1. It shall be clean, sharp, and free from salts, vegetable matter and impurities.

Backfill – Clause 19.2.5 MRTS04 (excluding recycled crushed glass)

The mortar shall consist of 1 part of Portland cement, 3 parts of sand and 0.005 parts of a water thickener approved by the Superintendent. Suitable pigments shall be used to match the colour of the adjacent units.

Concrete supplied and placed for the reinforced concrete footing and 50mm mass concrete blinding layer shall comply with MRTS03 and MRTS70.

Steel reinforcement provided for concrete shall comply with MRTS03 and MRTS71.

In addition, where galvanizing of reinforcing steel is indicated on the Drawings or otherwise specified, such galvanizing shall be an average minimum coating thickness of 85µm of not less than 98 per cent by mass zinc when tested in accordance with AS/NZS 4680.

8209.5.2 Design Drawing Changes

Prior to works commencing and the Prestart Meeting, should the Contractor propose any changes to the design to assist in constructability of works the Contractor shall present in writing the proposed changes to the structural Engineer for certification where required and/or Superintendents approval. Changes to suit the Contractor's construction procedures shall be at the Contractor's cost.

Where approval for changes to the design have been granted the Contractor shall present the wall structure at set out, including any approved changes which are proposed by the Contractor, for the structural Engineer and/or the Superintendent's approval prior to commencing excavation.

Location of wall footing and toe excavations – private walls shall be wholly inside property boundary, MRC wall as required by drawings wholly within public land.

8209.6 Construction

This section lays out the works operations with more detail based on specific requirements of this supplementary specification. Some activities may appear to include items which are stated within other specifications, the purpose is to reinforce that requirement specific to this supplementary specification.

8209.6.1 Work Operations

Work operations incorporated in this item are those included in Clause 2.1.5 of MRS01 "Introduction to Standard Specifications' and the following work scope activities and associated sub activities.

8209.6.1.1 Work Scope

The scope of works (including all associated sub activities) covered under this specification is as follows:

a) Supplying all materials;

b) Set out excavation and wall;

c) Carrying out excavations;

d) Utilising or disposing of excavated material;

e) Foundation conformance inclusive of testing and compacting material at bottom of excavations to project specifications;

f) Fabricating and placing steel reinforcing;

g) Placing and compacting concrete;

h) Finishing and curing of concrete;

i) Carrying out all works to construct stone pitched wall in accordance with project Drawings;

j) Installing drainage behind retaining wall, as required; and

k) Backfilling behind retaining wall, as required.

8209.6.2 Supplying all Materials.

All materials, plant, and labour required to carry out the works under this Specification is to be supplied by the Contractor, where materials are Principal supplied the designated storage site will be the point of supply for the purposes of this Specification.

Stones delivered are to be inspected for size and shape and sorted upon delivery for use within the various layers of the wall and may be sourced from different suppliers/locations with approval of the Superintendent.

The following types of stones should be evident in appropriate quantities;

I. Foundation Stones of similar height (largest stones)

II. Through Stones (must have appropriate length and shape)

III. Cap Stones (must have appropriate dimensions)

IV. Wall Stone and Backing Stones (may be further sorted by size)

V. Pinning and Hearting (small stones and stone chips)

Materials requiring testing or certification prior to delivery shall comply with Clause 8209.5.1, proof of compliance shall be provided prior to delivery to site.

All items shall be inspected at delivery to site prior to use. Any items which are damaged or not complying to specification are not to be used and are to be returned to the supplier.

HOLD POINT

8209.6.3 Site Set Out and Excavation

Prior to commencing works the Contractor shall ensure the site layout for excavation works correspond and comply with the design drawings and any approval granted in compliance with Clause 8209.5.2.

8209.6.3.1 Site layout with Superintendent

The location, length, and height of the retaining wall including the footing is to be surveyed and marked out on site and shall be inspected and approved by the Superintendent prior to excavation commencing, this shall also verify the location of the retaining wall and associated infrastructure with respect to the property boundaries and design drawings.

HOLD POINT

8209.6.3.2 Carrying out Excavations.

Excavation shall be undertaken to the required width, depths and dimension of footings shown on the Drawings, including the 50mm concrete blinding layer. All loose material shall be removed. Minor fissures in rock shall be thoroughly cleaned out and filled with concrete, mortar or grout.

The base of the excavation shall be compacted to the requirements of Clause 8209.6.4.1 of this Supplementary Specification and trimmed to ensure that at no point the vertical tolerances exceed +5mm/-10mm of the design foundation level. The levels of the base of the excavation shall be confirmed by survey.

HOLD POINT

Any over-excavation in rock below foundation level shall be filled with concrete of the same quality as that of the footing, while over-excavation in earth below foundation shall be backfilled and re-compacted to the requirements of Clause 8209.6.4.1 of this Supplementary Specification.

Excess excavated materials shall be disposed of by the contractor as required by their Environmental Plan or utilised as per the design drawings and/or Superintendents instructions. The Contractor shall ensure all Environmental ESC measures are in place and maintained to Stockpiled materials.

The Contractor shall supply and erect any necessary sheeting and bracing to support the excavation in a safe manner and in accordance with statutory requirements. The excavation shall be kept free of water.

8209.6.3.3 Batter Trimming

After the earthworks of the approach embankments have been placed and compaction has been completed, the batters shall be trimmed back to the slopes shown on the Drawings. Immediately prior to the start of rock placement, the necessary additional excavation adjacent to the toe of the fill shall be carried out.

8209.6.4 Foundation and Footing

The foundation level shall be defined as the level of the underside of the 50mm concrete blinding layer below the reinforced concrete footing.

8209.6.4.1 Foundation Compliance

The levels and dimensions of foundations where the wall is greater than 1 metre in height shall be recognised as subject to confirmation or alteration before construction and have the structural Engineers endorsement via Form 15, and the structural Engineer may direct such changes to the levels and dimension of footings as necessary to ensure a satisfactory foundation. Where the wall is less than 1 metre in height the Superintendent shall direct such changes to the footings.

HOLD POINT

Foundations shall be compacted to the following requirements:

i. Foundations or base of excavation to a depth of 150 mm below foundation levels 95% std dry density, where the foundation is deemed subgrade, this shall be compacted to 97% std dry density within 300mm of finished subgrade level.

ii. Unsuitable material replacement 95% std dry density, the above shall apply where replacement material is identified as subgrade.

Unless otherwise directed by the Superintendent, all material shall be compacted in layers not exceeding 150 mm compacted thickness.

All loose material is to be removed from foundation. Preparation of the foundation is to be carried out as per MRTS04 and is to be presented for inspection by the structural Engineer and/or the Superintendent depending of the height of the wall, with inspections, geotechnical testing and geometric requirements applying unless stated otherwise in MRC Supplementary Specification Annexure 8209_1 Stone Pitched Retaining Walls.

HOLD POINT

Where and as required by the design drawings the foundation material shall be assessed for its load bearing capacity (> then 100kPa). A geotechnical assessment by a suitable qualified Engineer shall be carried out to confirm the suitability of the material.

If the foundation is composed of material which the Structural Engineer and/or the Superintendent deems to be unsuitable to support the proposed structure, such material shall be excavated to the extent directed, backfilled with sound material, and re-compacted to the requirements as detailed above within this clause.

The foundation shall then be presented again for the approval of the structural Engineer and/or Superintendent. The unsuitable material from the excavation below Foundation Level shall be spoiled as directed by the Superintendent.

HOLD POINT

Only upon approval to proceed by the Superintendent shall the Contractor continue with works.

8209.6.4.2 Footing Installation

8209.6.4.2.1 Blinding Layer

Where the design drawings show a blinding layer, it shall be mass concrete (unreinforced) for full length of wall with a minimum thickness 50mm and maximum thickness of 100mm. The finished level shall be as required by the design drawings, the concrete shall comply with the requirements of MRTS70 and be minimum Class N20/20 if not noted on the design drawings.

Where a concrete footing is constructed on the ground without a blinding layer and the design drawings lack detail the Contractor shall install a polythene sheet as required by MRTS03.

Prior to pouring the blinding layer the contractor shall notify the structural Engineer and/or the Superintendent of their intent to pour.

WITNESS POINT

Pouring, testing for slump and strength, finishing, and curing shall be carried out as required by MRTS70 and the design drawings unless otherwise approved by the Superintendent.

8209.6.4.2.2 Reinforced Concrete Footing

The reinforced concrete footing shall be constructed to the details as shown on the design drawings.

Unless otherwise indicated on the Drawings, forms shall be used for all vertical concrete surfaces. All formwork shall comply with the MRTS70.

For the reinforced concrete footing and 50mm mass concrete blinding layer, the placement and compaction of concrete, including joints, finishing, curing and protection of concrete, and the placement of the reinforcing steel, including starter bars, shall comply with MRTS70. A prepour inspection shall be carried out by the structural Engineer and/or Superintendent.

HOLD POINT

The finished concrete footing shall not vary by more than 10mm from the specified levels and by more than 25mm from the specified horizontal alignment. The finished level shall be compliant with the grade and crossfall shown on the design drawings.

The laying of the footing layer of stone shall not commence until after the concrete compression test results have been confirmed to comply with the requirements of the design drawings and as directed by the structural Engineer and/or the Superintendent.

HOLD POINT

8209.4.2.3 Mass Concrete Footing

The mass concrete footing shall be constructed to the details as shown on the design drawings.

Unless otherwise indicated on the Drawings, forms shall be used for all vertical concrete surfaces. All formwork shall comply with the MRTS70.

For the mass concrete footing and 50mm mass concrete blinding layer, the placement and compaction of concrete, including joints, finishing, curing and protection of concrete shall comply with MRTS70. A prepour inspection of the forms shall be carried out by the structural Engineer and/or Superintendent.

HOLD POINT

The finished concrete footing shall not vary by more than 10mm from the specified levels and by more than 25mm from the specified horizontal alignment. The finished level shall be sloped (into the embankment) at the grade shown on the design drawings.

Prior to the concrete setting however wet enough to carry the weight of the stone/s, spalls shall be set into the wet concrete with 100mm protrusion to provide a key for stone pitching to be laid on. The footing shall then be cured with the structural Engineer and/or the Superintendent approving to proceed with the stone pitching.

8209.4.2.4 Compacted Base Materials Footing

The footing material shall be as required by the design drawings, where there is a lack of detail the footing material shall comply with the bedding material listed in Clause 8209.5.1 or other similar material as approved by the structural Engineer and/or the Superintendent.

Prior to laying the material on the excavated and compacted floor a layer of type 2 geotextile shall be placed to encompass the footing and drainage backfill as required by the design drawings.

The width and depth of the footing shall be as per the design drawings and as required by the structural Engineer and/or the Superintendent. The Contractor shall ensure that the material is placed in layers and compacted to 100% SDD, the surface shall be finished within a tolerance of ± 15mm's of the design drawings level.

The completed footing shall be inspected by the structural Engineer and/or the Superintendent prior to commencing stone pitching, approval to proceed shall be granted only if the compaction and geometric test results comply with the design drawings or documents.

HOLD POINT

8209.6.5 Stone Pitching in Walls

The type of stone pitching shall be as required by the design drawings, **NO** alternative material and/or procedure/s will be approved after the design drawing endorsement or as required by Clause 8209.5.2.

Vertical tolerances for laying of the wall/s shall be in accordance with 8209.6.5.5, the following horizontal tolerances apply to all stone pitched walls.

Relative (in 1 metre) tolerance:	± 20 mm
Relative (in 3 metre) tolerance:	± 30 mm
Absolute tolerance:	± 20 mm

The Contractor is to ensure that personnel employed to construct the stone pitched wall/s are competent in this type of work activity.

Stone pitching shall not commence until the structural Engineer and/or the Superintendent have granted approval to proceed.

8209.6.5.1 Mortar Set Stone Pitching

Pitching shall consist of irregular stones selected to roughly fit together and placed on bedding material having a mean thickness of 100 mm. The stone facing shall have a mean thickness of 300 mm with at least 90 percent of the individual stones having a mass not less than 40 kg. No stones shall have a mass less than 10kg.

All stones shall be cleaned and thoroughly wet before placing, this will ensure moisture is not drawn away from the mortar.

The stones shall be firmly bedded without any tendency to rock and, where necessary, shall be securely wedged in position by stone spalls. Any stones which break or crumble during placement shall be rejected.

As the stones are carefully placed to the slopes specified on the Drawings, the spaces between them shall be completely filled with hand-placed mortar from bottom to top, and the surface shall be cleaned to expose the individual stone faces. All mortared joints shall be raked 5 mm below the adjacent surface of the rock pitching.

WITNESS POINT

The pitching shall be laid in horizontal courses with headers at intervals or in random fashion depending on available stones. Pitching shall be finished with a horizontal course at the reduced level shown on the Drawing.

8209.6.5.2 Dry Pack Rock Pitching

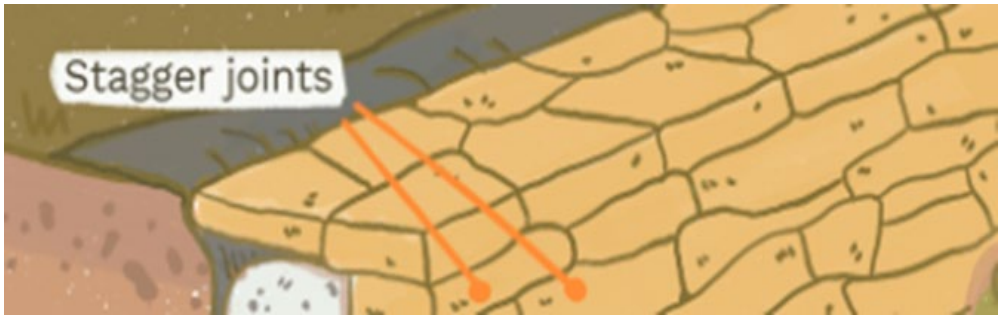
Dry pack rock pitching shall comprise rock fragments of size range 200 mm to 400 mm ALD with at least 80 percent of the material greater than 300 mm ALD. The rocks shall be placed on a geotextile filter fabric to a mean width thickness of 500 mm at the base. They shall be placed dry jointed and well interlocked.

When carrying out pitching select the stones for their locations and lay them in the wall with a minimum of stone cutting so that:

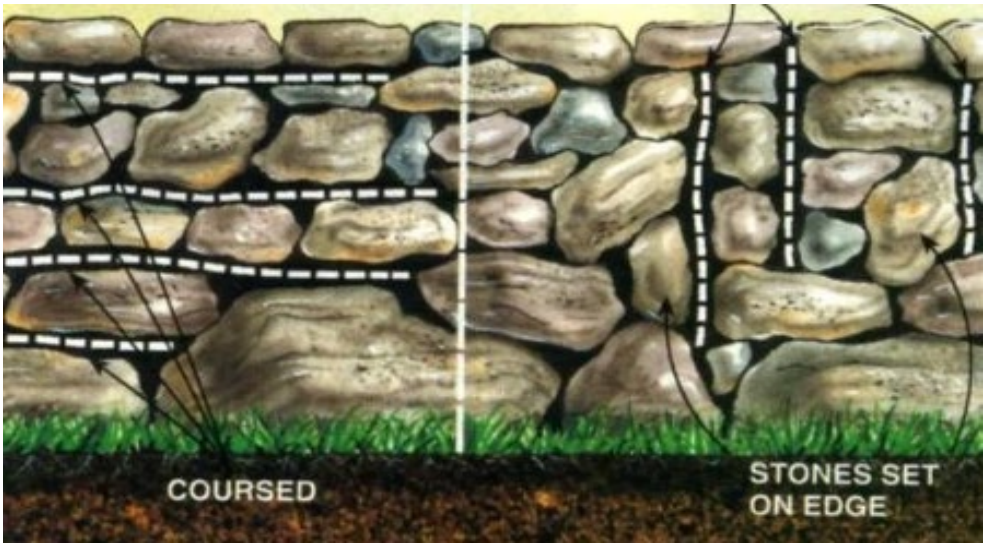
- Each stone is stable, non-rocking and firmly locked to its neighbours without the use of mortar.
- The wall face shows reasonably regular, flat and vertical stone faces.
- Stones of same height placed next to each other to form even horizontal courses.
- Vertical joints (perpends) between stones are spanned by the next stone above by a minimum third of the stone length.
- Stones are laid generally as through stones wherever possible.

- At least 50% of footings, 30% of wall stones and all coping stones are laid as through stones.

WITNESS POINT



Below is an example of coursed/layered stone pitching and non-compliant stone pitching. Stones on edge in depiction have no interlocking properties and will collapse within the short term.



Batter the face of the wall back 50 – 70 mm for every 300 mm in height, finally cap the top of the wall.

The area adjacent to the toe of the rock pack shall be backfilled to existing natural surface level in accordance with this Supplementary Specification and the design drawings. This shall be carried out as soon as practical after the first stone pitched layer above the ground has been laid and drainage weepholes (as required) have been installed and encased in the wall stone pitching.

8209.6.5.3 Foundation Stones

The stone pitched (foundation) first layer shall consist of the largest, flattest and most regular shaped stones, and shall be placed so that one-third of their depth is set into the ground (below finished design ground level).

Dry stacked stone pitching footings shall be laid at the depth indicated on the design drawings directly onto the blinding layer or compacted base material.

8209.6.5.4 Coping Stones

Stones selected shall be of reasonable uniform size able to finish the top of the wall flat and to level. Joins shall be staggered and not coincide with the underlying stone pitching layer joins.

The following tolerances apply to the capping stone finished level and alignment unless otherwise indicated in the design drawings;

Vertical alignment:	± 20 mm absolute
Horizontal alignment:	± 30 mm absolute, ± 10 mm relative to a 3 m straight edge

HOLD POINT

8209.6.5.5 Scour Protection

Where scour protection is required a stone pitched cut-off wall shall be constructed at the toe and sides of all stone pitching in waterways (except at the toe where it is protected by a slab or footing). This shall also apply to areas where stormwater runoff is directed to and over the end of the rock pitched wall. The cut-off walls must be a minimum 0.45 m deep from finished surface and at least 0.3 m wide.

WITNESS POINT

8209.6.6 Drainage to Stone Pitched Drainage Walls

Drainage to stone pitched retaining walls shall be provided in the form of sub soil drains installed longitudinally behind the wall and weep holes through the wall. Dry pack stone pitched walls shall allow for free draining through the wall in lieu of weepholes and be installed with sub soil drainage longitudinally along the wall at the base of the footing.

The Contractor shall supply all materials for the installation, laying, joining, and backfilling of drainage components and materials to the stone pitched retaining walls as required by the design drawings.

8209.6.6.1 Drainage Mortar Jointed Stone Pitched Retaining Walls

Weepholes and longitudinal drainage shall be installed for maintenance and overflow purposes as required by the approved plans, where there is a lack of detail this supplementary specification shall apply.

Weepholes shall be 100 dia UPVC at 1000mm maximum centres, positioned at approximately 100mm constant height above the finished ground level. Where the design drawings indicate other required weepholes within the wall these shall be spaced a maximum $2m^2$.

HOLD POINT

A longitudinal drain shall be installed along the length of the wall, it shall be of 300 X 50 megaflow or subsoil drain of 100dia corrugated perforated polyethylene pipe. The drain shall be encased in geofabric (BIDIM A20 or approved equivalent). The invert of the longitudinal drain shall be 100mm below the invert of the weephole inlet.

HOLD POINT

Where shown on the design drawings the longitudinal drain shall outlet to the suitable location such as a drainage pit or kerb and channel at a minimum slope shown, otherwise as required by Clause 8209.6.6.3. Where such an outlet is not achievable, the inverts of the longitudinal drain and the weephole inlet shall be aligned to allow direct discharge via the weepholes.

WITNESS POINT

Any connections between the longitudinal drain and the weep holes shall be made using standard manufacturers fittings.

The Contractor shall ensure the drainage backfill layer behind the stone pitched retaining wall is a minimum 300mm thick, of free draining filter sand/gravel material, separated from insitu material by a type II geofabric layer.

Alternative drainage systems shall be considered prior to site works commencing, this shall be approved by the structural Engineer and/or the Superintendent prior to site works commencing.

Backfilling of the drainage layer shall be continuous in layers not exceeding 150mm with a layer at least 300 mm thick of porous material such as coarse aggregate or crushed rock. In stone pitching, the weepholes inlets be covered with type 2 geotextile securely taped in place with the weephole inlets surrounded with at least 0.03 m^2 of 10 mm granular drainage material. Drainage backfill shall be free draining, non-plastic predominantly granular material.

WITNESS POINT

At all weephole outlets shall have securely fixed grated outlets supplied and installed, subsoil drains which discharge to open swale or verge area shall also have securely fixed grated outlets with concrete or rock pitched surround and suitably marked.

WITNESS POINT

8209.6.6.2 Drainage Dry Pack Stone Pitched Retaining Walls

The Contractor shall construct the dry stacked stonework to be free draining through the wall.

Where walls are constructed as retaining walls, all timbering, bracing and rubbish of all descriptions shall be removed before backfill is placed behind the wall.

The stone pitched wall shall be lined with a layer of type III geotextile on its back face to separate the drainage backfill.

HOLD POINT

A continuous granular drainage layer of width as shown on the drawings (minimum 300mm if not noted on drawings) shall be progressively placed and compacted in layers not exceeding 150 mm and in accordance with the various clauses of 8209.6.6 of this supplementary specification.

WITNESS POINT

The backfill material shall contain broken stone or river gravel, consisting of clean, hard, durable particles graded from 50 mm to 10 mm to AS 1141.11 such that:

a) The maximum particle dimension shall not exceed 50 mm; and

b) No more than 5 per cent by mass shall pass the 9.5 mm AS sieve.

8209.6.6.3 Sub Soil Drainage

The Contractor shall install a subsoil drainage line at the base of the drainage layer as shown on the design drawings, in the case of retaining walls with weepholes this shall be 100mm below the inlet of the weephole behind the wall. It shall outlet either into adjacent stormwater gully pits, headwall, or alternatively through adjacent fill batter, and be suitably marked.

Where it is not possible to discharge through an outlet external to the wall the subsoil drain pipe shall be laid at the same level of the weepholes through the bottom of the retaining wall.

The subsoil drain shall comply with the requirements of MRC Supplementary Specification 8107 – Subsoil Drainage and shall consist of 100 mm diameter slotted corrugated plastic pipe and seamless tubular filter fabric, surrounding by a maximum of 100 mm of Type A filter material wrapped within a layer of type 2 geotextile.

Unless shown otherwise on the Drawings, the subsoil pipe shall be laid to an even line and uniform grade of not less than two per cent (2%) fall towards the outlet. The Contractor shall arrange for the structural Engineer and/or the Superintendent to inspect the laid sub soil prior to backfilling commencing.

HOLD POINT

8209.6.6.4 Backfilling Behind Retaining Wall with Insitu Material, Where Required

Except as specified within the drainage backfill above, excavations for foundations and for the construction of walls shall be backfilled to the level of the surrounding ground with approved material for the purpose of backfill in accordance with MRTS04.

Unless otherwise directed by the Superintendent, all material shall be compacted in layers not exceeding 150 mm compacted thickness, and be compacted to 95% std dry density, and tested in accordance with MRTS04.

Backfilling shall be carried out in parallel with the construction of the wall and drainage layer. The difference in height from the wall to the backfill layers shall not be greater than a layer of stone pitching or 300mm maximum.

Sealing utilising compacted earth or other treatment as shown on the design drawings shall be provided at the top of walls over the full length and required depth, as well as at the vertical edge at both ends of all walls to the satisfaction of the Superintendent.

The finished graded surface behind the retaining wall shall be as detailed on the design drawings, where there is a lack of detail the grade shall be no steeper than 1 in 4 from the top back point of the stone pitched wall (not capping stone).

WITNESS POINT

8209.6.6.5 Clean Up Site, and Turf Bare Areas

Any disturbed areas are to be top dressed, turfed, and made good in accordance with the design drawings and MRC Supplementary Specification 8300. The site is to be cleaned of all debris, excavated material, and construction materials.

WITNESS POINT

8209.7 Post Construction

8209.7.1 Collection and submission of all As Constructed data including QA data requirements.

Format of submitted "As Constructed" documentation shall be compliant with MRC Supplementary Specification 8919.

Contractor shall supply and submit RPEQ Structural Engineer endorsed Works As-Constructed documentation as required by *MRC D20 - Drawings and Documentation* for approval by the Superintendent 4 weeks prior to requesting a practical completion inspection, this includes Engineering Certification (Form 15 and 12) for all walls or sections or walls which are over 1 metre in height or require certification as required by the design drawings and documents

HOLD POINT

8209.8 Measurement and Payment

Provision for these works shall be deemed to be included in the scheduled unit rates for the items shown in Clause 8209.3 of this Supplementary Specification. No separate payment will be made for the works specified within this Supplementary specification or it's annexure.

A lump sum price for any of these items shall not be accepted. Any excavation and backfilling required to be carried out in order to construct the work described by this Supplementary Specification, shall not be measured separately. Payment for excavation and backfilling shall be deemed to be included in the rate for the items shown in Clause 8209.3.

The volume of concrete footing shall be taken from the Drawings, excluding the volume of the 50mm mass concrete blinding layer. The blinding layer shall be paid under MRC Item No. 4525 "Blinding concrete, (thickness) mm nominal thickness".

The area of stone pitched wall shall be measured as face area of stone pitched wall from the top of the footing to the top of the wall.

Version Control:

Version	Description	Reviewed / Endorsed	Date
1.0	Revision	R. Mogg	03.02.2022
2.0	Revision	C. Sultana	25.11.2024