



8201 Exposed Aggregate Concrete

REVISION 10/01/2024

8201.1 Introduction

This supplementary specification refers to the bed preparation, supply of materials, placement, finishing, and sealing activities associated with the construction of exposed aggregate concrete.

8201.1.1 Definition of Terms

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

Term	Definition
Exposed Aggregate Concrete	Decorative concrete achieved by removing the top layer of cement paste and revealing the underlying aggregate, can include coloured concrete as part of the mix.
Formwork	As applies to this specification timber or steel material type forms only where the surface are smooth and sufficiently rigid to maintain tolerances specified as per MRTS70 Section 15.4

All other definitions refer to MRTS70 Concrete, and AS36000 & AS3610

8201.2 Referenced Documents

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

- MRS01 *“Introduction to Specifications”*.
- MRTS01 *“Introduction to Technical Specifications”*.
- MRS03 and MRTS03 *“Drainage, Retaining Structures and Embankment Slope Protections”*.
- MRS04 and MRTS04 *“General Earthworks”*
- MRS70 and MRTS70 *“Concrete”*.
- MRTS71 Reinforcing Steel
- AS36000 *“Concrete Structures”* & AS3610 *“Formwork for Concrete”*.
- AS 4671 *“Steel for the Reinforcement of Concrete”*; and
- the project Drawings.

8201.3 Description of Work Items

Work items incorporated by this supplementary specification are identified in Section 8201.6 and 8201.7 with individual activities/tasks for measurement and payment sourced from the Bill of Quantities and listed in MRC Supplementary Specification Annexure 8201_1 Exposed Aggregate Concrete Section 1

8201.4 Quality System Requirements

8201.4.1 Std test Methods (Testing Regime)

The following minimum testing regime applies to this specification:



Civil works activities associated with the subgrade/floor of excavation shall be tested as per MRTS04 – General Earthworks unless otherwise approved by the Superintendent.

Concrete works shall be tested as required by MRTS70 - Concrete unless otherwise approved by the Superintendent.

Wet pendulum test slip resistance testing to AS/NZS4586 for all new surfaces.

8201.4.2 Hold Points, Witness Points and Milestones

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

Activity	Inspection Type	When
Mix Design (as required)	Milestone	4 Weeks prior to works commencing
Formwork Design (as required)	Milestone	4 Weeks prior to works commencing
Construction Procedure	Milestone	4 Weeks prior to works commencing
Layout survey	Witness Point	During site survey layout.
Bed/Subgrade Excavation Floor	Hold Point	At completion of excavation and compacting
Formwork and Reinforcing Installation	Hold Point	Prior to concrete pour
Concrete Pour	Hold Point	Approval to pour
Placing of Concrete	Witness Point	During pour activities
Finishing and Curing of Concrete	Witness Point	During Finishing of concrete surface
Stripping of surface for Exposed Aggregate	Witness Point	After Concrete has set and removal of fines will not dislodge larger aggregate
Removal of Formwork Approval	Hold Point	Not prior to 48 hours for side forms, 7 days for soffits, as required by Clause 15.8 of MRTS 70
Sealant Application	Witness Point	Before and during application of sealant
Defect Inspection	Hold Point	Prior to backfilling
Approval to Backfill	Hold Point	After defect inspection and any rectification required.
Wet Pendulum Testing	Hold Point	Superintendent to witness and approve of locations of testing
Works Acceptance	Hold point	After submission of As Cons and QA data has been reviewed and approved

8201.4.3 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 by the relevant specifications as applies to this specification;

- Concrete tolerances in accordance with MRTS70 Concrete.
- Earthworks tolerances in accordance with MRTS04 General Earthworks.

Tolerances specific to the project are detailed on the design drawings and are included in Clause 2 of MRC Supplementary Specification Annexure 8201_1 Exposed Aggregate Concrete

8201.5 Preliminary

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



- Works procedure
- Erosion and Sediment Plan (as required for site/s)
- Traffic Management Plan and TGS's
- Concrete Mix Design (as required)
- Formwork Design (as required)

Other requirements unique to the project will be listed in the MRC Supplementary Specification Annexure 8201_1 Exposed Aggregate Concrete (MILESTONE)

8201.5.1 Materials

Supply of all 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 8201_1 Exposed Aggregate Concrete Section 3 and shall be the point of supply.

8201.5.2 Concrete Mix Design

Concrete mix design shall be in accordance with MRTS70 with the addition of the following requirement.

The exposed aggregate concrete shall be an approved equivalent of colour details specified on project drawings.

In addition to the requirements of MRS03 and MRS70, the exposed aggregate concrete shall be supplied and constructed per the following requirements:

- a) The exposed aggregate concrete mix specified contain full depth aggregate and colour and are not produced by "seeding" a normal concrete mix.
- b) As defined in AS2758.1 coarse aggregates shall have a nominal size not less than 5mm and fine aggregates are of a nominal size of less than 5mm. In addition, maximum size for aggregates for trafficable areas shall be limited to 10mm and for other road applications 20mm.
- c) Topping mixes, bonded toppings and seeding surfaces with aggregate are not considered acceptable
- d) Pigments used in the cement matrix are to integrally mix into the concrete with pigment as defined on the project drawings

Submission for approval by the Superintendent is required 4 weeks prior to the concrete works commencing, this forms a Hold Point with approval to proceed required.

8201.5.3 Formwork Design (as required)

Unless required for submission Formwork shall be in accordance with MRTS70 and be of Timber or Steel forms. Any variation to this must be approved by the Superintendent 4 weeks prior to works commencing.

All formworks must be sufficiently rigid to maintain tolerances specified for line and level so the finished concrete shall conform within the specified dimensional tolerances as per the project plans. If not specified on the project plans, then relevant MRC Standard Drawings apply.

8201.5.4 Construction Process

Council requires the submission of the contractors construction process and procedures a minimum 7 days prior to works commencing, including proposed testing and inspection regimes.

As a minimum the construction process will include but not be limited to the following identified operations and cover the full exposed aggregate concrete activity of preparation, pouring, finishing, curing, and backfilling.

8201.5.5 Acceptance and Rejection of Concrete

8201.5.5.1 Rejection of Concrete (Plastic – Non Hardened)



Prior to concrete being placed it shall be visually checked and be rejected if the following apply

- a) The slump is outside the limits specified on the project plans and/or MRTS70
- b) The concrete contains significant lumps of unmixed material.
- c) Appearance, colour, cohesiveness is significantly different to other batches delivered and placed.

8201.5.5.2 Rejection of Concrete (Hardened)

Concrete may be rejected based on strength as per MRTS70

8201.5.5.3 Acceptance of Concrete

During the placing stage the consistency and workability of concrete shall be such that it can be handled and transported without segregation and can be placed, worked and compacted into all corners, angles and narrow sections of forms, and around all reinforcement during the placing stage

The strength of the concrete passes all compression tests, and all test results are within the parameters of rejecting as laid out in MRTS70.

8201.5.5.4 Defects and Rectification

Where concrete does not comply with this specification the concrete shall be removed and replaced.

Where cracking has occurred rectification will be dependent on the size, type, and extent of cracking, and the cause. Any rectification method will be as per approval of the Superintendent.

8201.6 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.

8201.6.1 Work Operations

Work operations incorporated in this item will include:

- a) **Work operations included in Clause 2.1.5 of MRS01 “Introduction to Standard Specifications”.**

- b) **Supplying all materials.**

All materials, plant, and labour required to carry out the works under this Specification is to be supplied by the Contractor.

- c) **Site layout with Superintendent**

The final location of the base slab and site works is to be marked out on site and shall be inspected and approved by an MRC representative prior to excavation commencing. (HOLD POINT)

- d) **Carrying out excavations, as required.**

Site surveyed and marked out prior to excavation commencing (WITNESS POINT)

Excavation of material to level and grade as per design plans, vertical tolerances shall not exceed +5mm/-10mm.

Width to be +300mm of design width structure.

Bed/Subgrade is to be inspected for areas of unsuitable material (HOLD POINT)

If unsuitable material is identified this is to be removed and replaced with approved material as per the instructions of the Superintendent



e) Utilising or disposing of surplus excavated material;

Excess excavated materials shall be disposed of or utilised as per Superintendents instructions.

Material stockpiled shall ensure that all Environmental ESC measures are in place and maintained.

f) Compacting material at the bottom of excavations;

Bed/Subgrade is to be compacted to 97% SDD and tested at a frequency of 1/200m² (minimum 4/Lot)

All loose material is to be removed from the excavation.

Bed/subgrade is to be presented for inspection by the Superintendent prior to polythene sheeting being laid (HOLD POINT)

Where concrete is constructed on ground surfaces or foundation bedding a Polythene Sheeting is to be laid, a minimum 300mm beyond the concrete work.

g) Installation of formwork

Formwork to be used has been approved by Superintendent.

Installed formwork has been installed to project drawings line, levels and shape, positional tolerance Horizontal +25/-5 mm's, Vertical +/-5 mm's

Depth from bed/subgrade complies with project drawings design depth of concrete +10/-3mm's (HOLD POINT)

h) Fabricating and placing steel reinforcement;

Reinforcing complies with project drawings and AS4671

Cover around reinforcing is to comply with project drawings and/or AS3600, this includes cover to formwork, tolerance of cover to reinforcing +10/-5mm's

Inspection of reinforcing and formwork prior to pouring (HOLDPOINT)

i) Placing compressible packing;

Compressible packing is to be installed as per project plans or as required by Council's Standard drawings

j) Placing and compacting concrete;

Concrete delivered to site is as per the approved mix design, delivery dockets verify mix and target strength.

The exposed aggregate concrete mix specified and approved by the Superintendent shall contain full depth aggregate and colour and are not produced by "seeding" a normal concrete mix. (WITNESS POINT)

Exposed aggregates incorporates a high aggregate content in the design for decorative purposes and shall not be pumped.

Offsite ready-mix batched concrete shall be discharged in place within the times of the batching process commencing indicated by Clause 10.5 of MRTS70. Site mixed concrete shall be discharged in place within 30 minutes of batching commencing. Concrete is to be placed with minimum drop height to minimise segregation, at no time should this be greater than 2m.

Testing for slump is to occur on every truck load with compressive strength testing as required by Clause 12 and 15 of MTRS70.

Compaction of concrete shall occur using a vibrating needle, with insertion directly perpendicular (up and down) to the finished surface and not more than 450mm apart, no dragging of needle along surface is permitted



Vibrating against steel reinforcing should be avoided, no vibrating of formwork or tapping/hammering of formwork is to occur

Depressions in the fresh concrete caused by foot traffic, or aluminium screeding tools, must be refilled with the concrete mix, not just surface slurry.

Care shall be taken to avoid uneven screeding that will cause 'screed-lines' of mortar and /or aggregate to become apparent when the surface has been washed. Over-screeding by an overlapping technique has been found to be an effective method to avoid this finishing problem.

Use placing methods that minimise plastic cracking. Closing plastic cracking by merely trowelling is not sufficient, as they will again be revealed after washing. If plastic cracking occurs during placement, they shall be closed by careful and efficient surface compaction before re-trowelling.

Construction and Contraction/Expansion Joints are to be incorporated as per the project plans or as per the Superintendents instructions.

k) Finishing and curing concrete;

Following initial set of the concrete methods such as water washing, abrasive blasting, honing or acid etching are to be used to expose the aggregate to meet the surface texture requirements on the project drawings

The treatment shall ensure an embedment depth for the aggregate of 60-80% of the aggregate size. All aggregate shall be well bonded in the cement matrix. The resultant residue from the treated surface shall be removed immediately from the pavement and any previously treated areas and is to be prevented from entering garden beds or the stormwater system.

Immediately after concrete placing and compacting, one coat of an approved curing compound shall be applied to the surface in accordance with the manufacturer's recommendations. Plastic sheeting shall not be used as part of the curing process.

The process for stripping the veneer of concrete to produce exposed aggregate shall take place after the concrete surface has set sufficiently for the fines to be removed. The process is to follow the approved method with Environmental measures in place to capture the waste from the stripping process.

l) Stripping of formwork

Formwork is not to be stripped earlier than 48 hours for side forms, 7 days for soffits, as required by Clause 15.8 of MRTS 70 or as per project plans as approved by the Superintendent (HOLD POINT).

m) Sealing of concrete surface;

Concrete to be inspected for defects which are to be rectified prior to sealing (HOLD POINT)

Concrete to be cleaned of all dirt, grime and stains,

Sealer to be applied no later than 1 day after stripping of formwork and curing of concrete

Three (3) coats of a UV stable clear concrete sealer, approved by the Superintendent, shall be applied in accordance with the manufacturer's recommendations.

n) Backfilling against structure;

Backfilling to structure is not to occur until after the sealing process has taken place and the sealant has hardened/set (HOLD POINT)

Backfilling and turfing to be carried out and left 10mm below level of concrete finished level



a) **Collection and submission of all As Constructed data including QA data requirements.**

Contractor is to supply and submit Works as Executed documentation as required by *MRC D20 - Drawings and Documentation* for approval by the Superintendent 4 weeks prior to requesting a practical completion inspection.

For all trafficable surfaces the Contractor shall carry out wet pendulum test slip resistance testing to AS/NZS4586 for all new surfaces to meet the following requirements”

- Less than 5% grade – Classified Class ‘P5’ (>44 mean BPN using a slider 55 (TRL) Rubber Pad) to AS/NZS 4586
- Greater than 5 % grade – Mean BPN increased as per Appendix A HB197

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

8201.8 Measurement and Payment

Provision for these works shall be included in the scheduled unit rate for the items show in Clause 8201.3 of this Supplementary Specification and Annexure. No separate payment will be made for the works specified within this Supplementary specification or it’s annexure.

Version Control:

Version	Description	Reviewed / Endorsed	Date
1.0	Original issue	MRC	07.12.2021
2.0	Review of specification	C. Sultana	10.01.2024