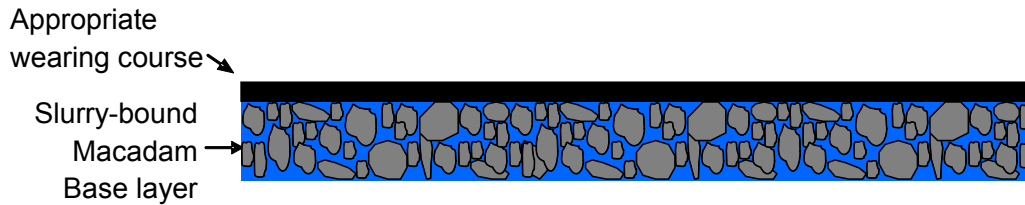


Method statement for labour based construction of:

Slurry-bound macadam layers



Definition

Slurry-bound macadam consists of single-sized aggregate of nominal size ranging from 13 mm to 53 mm with the voids between these stones filled with a slurry, consisting of sand and bitumen emulsion.

Slurry-bound macadam can be laid either as a base layer or as a surfacing. The main difference being that the surfacing will normally use a smaller stone size than in the thicker base layers and the surfacing layer may also be thinner than the base layers.

Application

Slurry-bound macadam can be applied to a wide range of surfacing and traffic applications such as:

- Walkways
- Driveways
- Parking areas
- Roads/streets
- Road rehabilitation using slurry-bound macadam as overlay
- Pothole patching
- Assembly areas
- Tennis courts
- Taxi/bus bays

This method is particularly well suited for inaccessible / mountainous terrain where large construction equipment is difficult and costly to operate whereas the equipment necessary to construct a slurry-bound macadam layer or overlay is light and easy to manoeuvre. It can also be well utilised in a phased construction approach where the problem of mechanical damage to

new asphaltic layers during construction is overcome by using a slurry-bound Macadam as base layer with only a thin slurry seal as initial surfacing. This may be sufficient surfacing for a period of eight years. An asphalt overlay may then follow once construction activities of the total development are complete.

Material requirements

Aggregates: - Aggregates should comply with the project specifications and the size will vary in accordance with the thickness of the layer, generally between 75 – 150 mm depending on the traffic volume and the design. The actual stone aggregate size will be determined by the client or his agent.

Sieve Size	% Passing by mass				
	53 mm	37 mm	26.5 mm	19.0 mm	13.2 mm
75	100				
53	85 – 100	100			
37.5	35 – 70	85 – 100	100		
26.5	0 – 15	0 – 50	85 – 100	100	
19.0	0 - 5	0 – 25	0 – 30	85 – 100	100
13.2		0 - 5	0 – 5	0 – 30	85 – 100
9.5				0 – 5	0 – 30
4.75					0 – 5

Aggregates for slurry filler: Slurry aggregate should comply with the project specifications. Either a fine or medium graded material is selected, depending on the layer thickness. The grade will be determined by the client or his agent.

Sieve Size (mm)	% passing by mass	
	Fine grade	Medium grade

6.7		100
4.75	100	82 – 100
2.36	90 – 100	56 – 95
1.18	65 – 95	37 – 75
0.600	42 – 72	22 – 50
0.300	23 – 48	15 – 37
0.150	10 – 27	7 – 20
0.075	4 - 12	4 - 12

Bitumen emulsion: - Anionic stablemix grade 60% bitumen emulsion is recommended. Generally the emulsion content of the slurry is 250 l/m³.

Cement: - Ordinary cement complying with SANS 50197-1 is used. Generally 1 % by mass of the aggregate is added.

Water: - Potable water

Plant and equipment requirements

The following plant is required to lay approximately 200m² day.

Item	Number of items
• Pedestrian vibratory roller or plate compactor	1
• Shovels	2
• Ballast forks	4
• Wheelbarrows	4
• Concrete mixer	1
• Squeegees	4

• Rakes	2
• 3 m Straight edge (Screed Board)	1
• Bass brooms	2
• 3 m x 2 m Hessian cloth	1
• Measuring containers	4

Labour requirements

Below is the typical composition of a slurry team necessary to place 200 m² per day.

Activity	Number of workers
• Spread & level	4
• Compaction operator	1
• Mixer operator	1
• Wheel barrow operators (slurry)	4
• Squeegeeing	4
• Finishing techniques	2

Construction

Site Preparation

To contain the material at the designed road edge guide rails, gravel edge supports or straightedges need to be set up at the correct positions.. These supports need to be secured so as to withstand the construction forces acting on them. The supports must also be set to the correct levels to provide a guide. Allowance should be made for 30 % extra height to accommodate densification of the material during compaction.

Placing and levelling the aggregate

The aggregate should be placed with the aid of the wheel barrows as close as possible to where it is required. Every effort should be made to ensure that as little of the underlying layer is disturbed when tipping the materials using the pivot point on the front of the wheel barrow. The aggregate is then spread to the levels given using the ballast forks and rakes. The levels should be checked for evenness and correctness with the 3 m straight edge.

The aggregate is compacted starting from the outer edge and moving inwards. Levels should be rechecked for accuracy with the 3 m straight edge. Where necessary material should be added or removed to ensure an even final level. Care should be taken not to disturb the material as it is still quite unstable before the slurry has been applied

Mixing the slurry

The mix proportions will vary depending on the source and grading of the aggregate used. Before laying the slurry, trial mixes should be conducted in a small container. Typical mix proportions are given below. The actual mix proportions will be determined by the client or his agent.

Material	Volume (litres)	% by mass
Bitumen emulsion	25	9
Crusher dust	100	90
Cement	1	1
Water	160	0

The following mixing procedure is recommended to obtain a homogenous slurry mixture:

- Step 1: Pre-wet the concrete mixer drum with approximately 5 litres of water
- Step 2: Add the aggregate into the concrete mixer
- Step 3: Add the cement into the concrete mixer
- Step 4: Mix contents
- Step 5: Pour water into the concrete mixer
- Step 6: Mix contents
- Step 7: Pour in the emulsion
- Step 8: Mix contents

The emulsion must be at ambient temperature. To improve workability of the slurry, more water may have to be added in a controlled manner to achieve a creamy consistency. The quantity of water in the mix will vary depending on the type of aggregate source and prevailing air temperature.

Laying by hand

Slurry can be applied to the layer and worked into the voids with the aid of the squeegees, working in all directions to ensure the voids are filled as completely as possible. Use should also be made of the roller to vibrate the slurry deeper into the layer. This working in of the slurry should continue until no further penetration into the layer can be achieved.

The newly applied slurry should be finished off by dragging a wet hessian sheet over the surface to achieve a uniformly textured surface.

Traffic control

Slurry takes approximately four hours to set properly under favourable weather conditions. As the slurry penetration can be quite deep it may take longer to set. Traffic should not be allowed onto the layer until the slurry has fully set and can withstand the turning force of a shoe heel under a person's weight without scuffing.

Quality control

In general, careful attention should be paid to the correct methods and procedures to ensure that the layer will give adequate service.

Care should be taken to ensure that the aggregate complies with to the project specifications.

On any day work should only commence if no rain is forecast. Care should also be taken if it is likely to rain the following day given the depth to which the slurry penetrates and the time taken to set, especially for thicker layers. The following tests should be conducted on site during the execution of the works:

- Bulking test should be carried out daily on the crusher dust to establish whether the batch volume needs to be adjusted.
- If the water source is changed, dilute it 50:50 with the emulsion in a glass container to check if it is compatible.