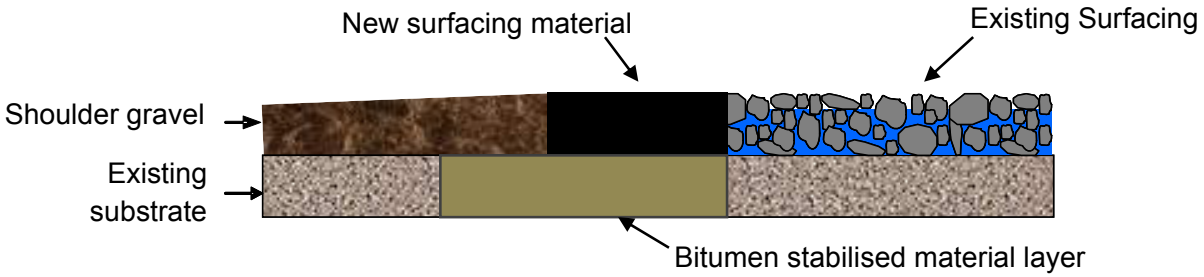
Method statement for labour based construction of:

Edge break repairs with bitumen stabilised material



Definition

An edge break is damage caused to the edge of the road surface due to the lack of lateral support afforded to the base and surfacing by the gravel shoulder. This lack of support may arise from a number of factors, such as tyre action on the gravel adjacent to the surfaced edge, water scouring and wind eddies from passing vehicles removing fines from the gravel shoulder. Edge breaks have the effect of reducing the road width and forming deep furrows at the edge, both a hazard to traffic.

Application

Edge breaks can be repaired using a range of materials. The method described will deal only with the repair of deep edge breaks with bitumen stabilised material and asphalt surfacing.

Material requirements

Bitumen stabilised material: The bitumen stabilised material consists of a combination of aggregates (approximately 1 part 13,2 mm size, 2 parts 6,7 mm size and 1 part crusher dust) to meet the recommended grading requirements given in the table below. The bituminous binder is 60% cationic premix grade emulsion mixed 1 part to 8 parts by volume of the aggregate combination.

Sieve size (mm)	Percentage passing (by mass)
19	100
13,2	90 - 100
9,5	55 – 75
6,7	20 – 45
3,35	5 – 15
0,075	0 - 2

Wearing course asphalt: Either hot mix, or (bagged) cold mix asphalt can be used depending on the location, traffic and availability of materials. The recommended nominal maximum aggregate size for both materials is 9.5 mm.

Bitumen emulsion: - Anionic stablemix grade bitumen 60% emulsion, diluted in equal parts with water is recommended as a tack for the edge break operation as is breaks more rapidly and allows the work to be completed sooner.

Solvent/water: Used to clean the equipment after use if an emulsion is used.

Sealant: A bitumen emulsion to seal over the edge break edges once repaired to prevent moisture ingress and seal off the top surface of the repaired pothole.

Shoulder gravel: Used to ensure a smooth transition from wearing course to the shoulder as well as to provide support to the area that has been repaired.

Plant and equipment requirements

Item	Number of items
Tape measure	1
Crayons	1 box
Straight edge	1
Fish line	1 roll

Steel pegs	10
2 kg mallet	1
Picks	4
Shovels	8
Broom	2
Block brush	1
Shutter boards	2 or more
Small Concrete mixer 175 litres	1
Wheel barrows	4
Watering can	1
Rake	2
Pedestrian roller or plate compactor	1
Hand stamper	1

Labour requirements

Below is the typical composition of a small maintenance team to repair edge breaks.

Activity	Number of workers
Supervisor	1
General labour	12
Mixing team	3

Additional labour is required for traffic control. A minimum of two flag men will be required with signage to assist in this operation. Stop/go signage and large cones or delineators will be required to demarcate the working area and make it safe for the operation to be undertaken.

Construction

Traffic control

The road will need to be barricaded off in the correct manner to allow for the work to be undertaken in a safe manner, especially where the work is undertaken under traffic. The signage may need to remain in place until the material has set and is hard enough to carry traffic loading. This operation needs to be coordinated by the supervisor to ensure the correct decision is made regarding the choice of asphalt wearing course to allow safe passage of traffic.

Site Preparation

The damaged area to be removed should be marked out clearly along the edge of the road, measuring from the centre line to achieve a neat joint parallel to the road edge. A straight edge and/or fish line and crayons should be used for this purpose, ensuring that the area marked out covers the full extent of the damaged road edge.

Excavation and preparation

The damaged surfacing as well as the surfacing up to the edge of the crayon markings is chipped out using a pick. The loose material is removed to a depth of a maximum of 150 mm. All loose material and dust is removed by brooming to ensure a good bond between new and existing materials.

Making use of the block brush, the entire exposed surface is painted with the diluted emulsion to assist in creating a good bond between the bitumen stabilised material and the existing material on the sides and the bottom of the repair area. The diluted emulsion must not be applied in such a thick layer as will leave pools lying at the bottom of the prepared area. A thin, evenly applied layer will suffice.

Backfilling the prepared area

Firstly, the bitumen stabilised material layer should to be placed and compacted. The shutter boards must then be positioned and secured in place followed by the placing of the wearing course. Each aspect is covered separately below.

Backfilling and compaction of bitumen stabilised material for deep edge breaks

The bitumen stabilised material should to be mixed in batches in the concrete mixer as required, as close to the repair work as possible. Wheel barrows are used to transport the bitumen stabilised material to the repair area.

Once the prime coat of diluted emulsion has broken, the premixed bitumen stabilised material is placed in the repair area and raked level. The finished level of the bitumen stabilised material

should allow for a thickness of 40 mm of wearing course layer placed on top of it. If the space allows, the pedestrian roller is used to compact the bitumen stabilised material layer. This will normally require that the bitumen stabilised material layer is spread wider then the actual opening by stepping the excavation out to accommodate the width of the roller. If this is not feasible, a plate compactor should be used. A hand stamper is used to tuck the material neatly into the corners and around the edges adjacent to the existing surfacing.

The finished level of the bitumen stabilised material should be checked both transversely and longitudinally to ensure that the correct cross-fall or camber is maintained and that the wearing course will have a uniform thickness and will allow water to drain freely off the road surface without ponding.

The bitumen stabilised layer will need to be exposed to sunlight for a few days to ensure it has dried out and cured sufficiently before placing the asphalt wearing course.

Securing the shutters in position after compaction of bitumen stabilised material layer

Shutter boards should be placed along the outer edge of the road surfacing using of the fish line to ensure they are properly aligned. The shutter board should be secured into position using the steel pegs on both sides. The tops of the shutter boards should coincide with the extension of the camber or cross-fall of the road. The straight edge should be used to ensure the correct level is obtained. If these levels are too low the resulting dip in the surfacing could lead to damage and material loss over this section of road. Should the section be too high on the outer-edge, it could lead to water ponding which is unsafe and detrimental to the durability pf the road surface..

Placing and compaction of wearing course

Either hot mix or cold mix asphalt wearing course can be used, the choice depending on the availability of material and the need to open the road speedily. Each method is covered separately below.

Placing and compaction of hot mix asphalt wearing course

The temperature of the hot mix asphalt must be maintained for the edge break to be effectively repaired. It should be kept covered with a tarpaulin in heaps large enough to retain the heat for as long as is necessary. To avoid wastage only required quantities should be ordered. Once the temperature of the asphalt has fallen below 120 ^{o}C it becomes unworkable.

The hot mix asphalt should be dumped as close to the area where it is required to reduce double handling and also to ensure the there is minimal temperature loss.

The diluted emulsion is applied to the edges of the existing surfacing and the top of the bitumen stabilised material layer to provide a good bond. The emulsion should be allowed to break before applying the asphalt surfacing.

The asphalt is placed in the repair area and raked level. To allow for compaction the loose asphalt should be about 10 mm proud of the existing road surface and the shutter board on the road edge. Compaction should take place from the side of the existing road surface and gradually moving towards the outer edge using the pedestrian roller. The existing road camber or cross fall will assist in achieving the correct fall towards the road edge.

Note that vibratory compaction on the existing road layer may damage it.

The surface of the compacted layer should be tightly knit with no visible holes or large voids. The decision to use a plate compactor or a pedestrian roller will be depend on the size of the repair work to be undertaken. Bigger repairs will require the pedestrian roller. A hand stamper can be also be used to ensure the joints are all well sealed and that the outer edge is bevelled.

The finished surface level should be checked with the straight edge (and spirit level) in both the longitudinal and transverse directions to ensure that surface drainage is not blocked.

Placing and compaction of cold mix asphalt wearing course (in bags)

Having measured the quantity of wearing course required, the corresponding number of bags are opened and the material exposed to sunlight for some time to warm up and become sufficiently workable for it to be laid and compacted.

The compaction of the repair is the same as that for hot mix asphalt.

It should be noted that where cold mix is used, it should not be opened to traffic immediately after completion because the volatiles in the cold mix still need to evaporate for the mix to stiffen. If at all possible traffic should be kept off the repaired edge break until the following day.

Construction of gravel shoulder support

Before commencing this stage of the repairs the wearing course should be examined to ensure that it is sufficiently firm to resist the compaction forces it will be exposed to during the gravelling operation.

The existing shoulder gravel should be loosened along the length of the repaired area and, if required, additional material should be added. This shoulder gravel is placed and compacted over the bitumen stabilised material that protrudes under the wearing course edge so as to support the actual wearing course and prevent the edge break from recurring. The gravel is then moistened and compacted level with the outer surfacing. Care should be taken to ensure that this operation does not disturb or damage the new repairs.

Sealing of surface joints

After all loose material has been swept from the surface the sealant should be painted over the surface to seal off all openings as well as the joint between the existing surfacing and the

repaired area. This will ensure that the repaired area is waterproof and will not allow water to seep into the repaired edge break.

A sprinkling of fine dust or sand can be placed over the sealant to assist in the drying process if it has been over-applied.

Cleaning up

All the tools should be cleaned after each edge break repair to prevent any build up of emulsion and asphalt of the spades and rakes. The block brush should be kept in water during the repair operations and thoroughly rinsed at the end of each day.

.Quality control

Some important aspects that require attention are:

- Compaction in the repair area should be applied in such a manner so as not to damage the existing surrounding pavement layers;
- Bitumen stabilised material requires some time to set and harden. The wearing course should only be applied once the bitumen stabilised material layer has set sufficiently;
- Regarding the selection of wearing course asphalt for a particular maintenance operation, the following factors need to be considered:
    - Hot mix asphalt allows the road to be opened to traffic once it has cooled which is soon after the repair is complete, resulting in less traffic disruptions and earlier removal. As it is important to ensure that the HMA remains hot enough to be compacted, there is a risk of wastage.
    - Cold mix asphalt wearing course can only be opened to traffic once the volatiles in the mixture have evaporated to prevent the layer yielding under traffic. Consequently the repair area may cause an obstruction with signage having to be in place, typically overnight.
- As with all repairs to roads under traffic, it is vitally important that road users are aware of the roadworks through proper signage and traffic accommodation procedures.