

DEPARTMENT OF INFRASTRUCTURE
HIGHWAY SERVICES DIVISION
HIGHWAY SURFACING AND PATCHING
STANDARD SPECIFICATION

OP-06-058



Isle of Man
Government
Reilrys Ellan Vannin



infrastructure
bun-troggalys

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A. CARRIAGEWAY SURFACING

1. General Specification & Method of Work for Carriageway Surfacing

The *Contractor* will supply all necessary labour, plant, and supervision and materials is responsible for the execution of the work. The Contractor is required to provide permanent managerial and supervisory staff.

Traffic Management and speed limits through work sites shall comply with the recommendation of Chapter 8. All reasonable precautions shall be taken to control speed and movement of traffic through the works.

The agreement of the *Construction Manager*, or his delegated representative, the Supervising Engineer (the person from time to time appointed by the *Client* and notified to the *Contractor* to act as the Employer's representative for the purpose of the contract) must be sought before the *Contractor* departs from the procedure given in those documents.

2. Standards

All plant and materials shall comply with current British (BS) and European (EN) Standards where such exist. The edition shall be those current.

3. Bituminous Pavement Mixtures

Only bituminous materials supplied from Poortown Quarry shall be used in the works. In the event of quarry breakdown or inability to supply the Contractor must seek the approval of the Supervising Engineer to source material from an alternative supply.

Preliminary work at the laying site, transporting and laying bituminous materials shall be in accordance with BS 594987.

The results of testing bituminous materials and their laying as prescribed in BS 594987 shall be provided to the Supervising Engineer.

4. Transporting

Loading of asphalt shall be carried out such that segregation is minimised. Asphalt shall be transported to the laying site in insulated and sheeted vehicles to prevent an excessive drop in temperature and to ensure its protection against adverse weather.

When using release agents to facilitate discharge of the asphalt, substances that are likely to cause softening or damage to the asphalt (e.g. diesel oil, kerosene) shall not be used.

Quarry grit, sand, soap solution, water or a proprietary release agent may be used on the floor and/or other surfaces of the vehicle to facilitate discharge of the asphalt. The amount used should be kept to a minimum and wagons must be cleaned out between loads to avoid cold material contaminating subsequent loads.

Deliveries of asphalt to the laying site shall be coordinated with the rate of laying to avoid interruption to the laying process.

The contractor is to ensure every vehicle is equipped with an approved and working:

- Amber flashing light and audible reversing bleeper.
- Suitable automatic sheeting system to cover loads.
- First aid kit.
- Fire extinguisher.

All vehicles engaged to supply material for unloading onto a Paver must comply with the minimum dimensions listed below;

- The minimum overhang from the rear most part of the rear wheel to the rear end of the vehicle box must be 686mm.
- The minimum height of the tailboard from the ground must be 546mm in the tip position when loaded.
- The Department reserves the right to test any vehicle unloading on to a Paver.

Paver deliveries must be by operators familiar with the paver operation and must comply with the Paver foreman's instruction at all times. The *Client* reserves the right to request only experienced drivers for paver operations. Trainee drivers should be accompanied by an experienced driver until deemed competent by the paver foreman.

5. Laying

While tack coats have traditionally been used they are no longer regarded as best practice. When required a C40B4 or C60B3 tack coat of cationic bitumen emulsion to BS EN 13808 shall be applied to accord with the target rates given in BS 594987 Annex I.

The surface should be thoroughly cleaned prior to application and the emulsion allowed to 'break' (i.e. turn from brown to black) prior to the application of a further layer of binder course or the surface course. Furthermore all vertical faces such as kerbs, channel blocks, iron work, covers and cut joints to which bituminous material will be laid up against shall have either a hot 70/100 paving grade bitumen or cold thixotropic bitumen compound applied before the asphalt is laid.

All longitudinal and transverse joints in asphalt courses (e.g. surface, base and binder course) shall be flush and made by cutting back the edge of the vertical face to expose the full thickness of the layer before the adjacent width is laid. All joints shall be situated outside wheel-track zones and must be offset by at least 150mm from parallel joints in the layer beneath. Surface course joints shall coincide with the lane marking.

Where it is necessary to run vehicles on or adjacent to an asphalt layer that is at a different level to the adjoining surface a temporary ramp must be formed of compacted 6mm close graded macadam to ensure the safe passage of vehicles. The ramps should not exceed a gradient of 1 in 30 parallel to the flow of traffic and 1 in 15 perpendicular to the flow of

traffic. The temporary ramps should be removed immediately prior to surfacing. Traffic cones may also be used in lieu of ramps when approved by the Supervising Engineer.

Adequate precautions shall be taken to prevent foreign matter from entering the drainage system. In manholes and gullies metal plates shall be placed across the openings.

As soon as possible after arrival on site the asphalt shall be supplied continuously to the paver and laid without delay. Double handling of materials is not permitted. The rate of asphalt delivery to the paver shall be regulated to enable the paver to operate continuously. The travel rate of the paver, and its method of operation, shall be adjusted to ensure an even and uniform flow of bituminous material across the screed so that material is free from dragging, tearing and segregation. In the event of a delay or discontinuation of a free flowing operation the paving machine should be moved and a transverse joint introduced.

Asphalt shall not be laid if standing water is present or the surface is frozen or covered with ice or snow.

The laying of materials containing bitumen binder shall cease if the temperature of the surface to be covered is at, or falls below, 2°C. If the surface is dry, unfrozen and free from ice, laying may proceed at air temperatures at or above 1°C provided the temperature is rising. Attention is drawn to the additional 'wind chill' factor in cold weather working conditions. Further guidance is published in the Transport Research Laboratory's (TRL) Report No. 4 (1985) "Cooling of Bituminous Layers and Time Available for Their Compaction".

The table below is a guide to indicate what difference the cooling effect of the wind has on still air temperatures:-

| Wind Speed (Mph) | Actual Temperature (°C) | | | |
|------------------|---|----|-----|-----|
| | | 13 | 7 | 2 |
| | 'Wind Chill' (i.e. the still air temperature that will give a similar heat loss to the laid asphalt mixture) | | | |
| 5 | 12 | 7 | 0 | -7 |
| 15 | 8 | 0 | -9 | -17 |
| 25 | 3 | -5 | -13 | -22 |
| 35 | 1 | -7 | -16 | -25 |

Newly laid sections of asphalt shall not be opened to traffic until the surface temperature has fallen below 25°C unless otherwise agreed with the Supervising Engineer.

6. Texture Depth

The minimum average texture depth of the surfacing material when measured by the volumetric patch test method specified in BS EN 13036-1 shall be 1.2mm.

7. Compaction

Asphalt shall be laid and compacted in layers which enable the specified thickness, surface level, regularity requirements and compaction to be achieved.

The *Contractor* shall submit details of proposed rolling patterns to the Supervising Engineer for approval not less than 24 hours before the asphalt is laid.

Compaction of the asphalt shall commence as soon as the un-compacted material will bear the effects of the rollers without undue displacement or surface cracking. Compaction shall generally be in accordance with BS 594987. Rolling shall continue until all roller marks have been removed from the surface.

Compaction shall be carried out using rollers of the following types;

- 8-10 tonnes deadweight smooth wheeled rollers having a width of roll not less than 450mm
- Vibratory rollers provided they are capable of achieving at least the standard of compaction of an 8 tonne deadweight roller. Evidence of achievement of equivalent compaction by the make and model proposed for use shall be provided.

Surface course and binder course material shall be surface finished with a smooth wheeled roller, which may be a deadweight roller or a vibratory roller in non-vibrating mode. Vibratory rollers shall not be used in vibrating mode on bridge decks.

The number of deadweight rollers used on a normal site shall be;

- a) At least two operational rollers at all times;
- b) A third roller when the daily tonnage exceeds either;
 - i. 100t of surface course;
 - ii. 150t of base or binder course;

The compaction process shall be controlled on site by the use of an Indirect Density Gauge (IDG). The Indirect Density Gauge will not measure the absolute density of the material being laid (this can only be determined by the taking of cores) but should be able to demonstrate potential compliance with the specification requirements.

The risk of failing to comply with the end performance requirements of the specification will be significantly increased if laying during adverse weather conditions or the compaction process is not completed by the minimum rolling temperatures summarised in the table below:-

| Material | Binder Grade | Min Temp °C On Arrival | Min Temp °C Prior to Rolling |
|-----------------|---------------------|-----------------------------------|---|
| AC Dense base | 40/60 | 130 | 100 |
| AC Dense binder | 40/60 | 130 | 100 |
| AC Close Surf | 70/100 | 130 | 100 |

| | | | |
|---------------|---------|-----|-----|
| AC Close Surf | 100/150 | 120 | 95 |
| AC Dense Surf | 70/100 | 125 | 95 |
| HRA Surf | 40/60 | 140 | 110 |
| SMA Surf | 40/60 | 130 | 100 |

If required, the in-situ density of the material shall be found by taking cores and testing in accordance with BS EN 12697-6:2003 Procedure C; bulk density – sealed sample. The air void content shall be determined in accordance with BS EN 12697-8: 2003 Clause 4.

The air void content of compacted materials containing bitumen binder shall comply with the following table:-

| Material | Air Voids % | |
|---|-----------------|-------------------|
| | Mean of 6 Cores | Means of Any Pair |
| Footway Dense Binder Course | 2 - 9 | 1 - 11 |
| Footway Dense Surface Course | 2 - 9 | 1 - 10 |
| Carriageway Dense Base Course | 2 - 8 | 1 - 10 |
| Carriageway Dense Binder Course | 2 - 7 | 1 - 9 |
| Carriageway Close Surface Course | 2 - 8 | 1 - 9 |
| Carriageway HRA Surface Course | 2 - 5 | 1 - 7 |
| Carriageway SMA Surface Course | 2 - 7 | 1 - 8 |
| <u>Notes</u> ¹ No results permitted with air voids below 1% | | |

8. Temperature Testing

Temperature testing of material on site shall be undertaken within 30 minutes of the material arriving on site. Every load delivered to site is to be tested. The material is to be tested in accordance with BS EN 12697-13:2000.

Temperature measuring devices shall measure the temperature in maximum intervals of 5°C with an accuracy of $\pm 2^\circ\text{C}$ and be fitted with an appropriate probe. Temperature measuring devices must be tested annually.

The probe for temperature measurement of material in a lorry or in a heap shall have a minimum length of 300mm with the sensing element positioned close to the end.

The probe for temperature measurement after it has been laid and before or during rolling shall have a temperature sensitive element small enough to be completely buried in the material that has been laid.

The probe to be used for testing must be conditioned by pre-heating in the material before obtaining the first measurement.

When measuring in a lorry, insert the probe in the lorry load of material to a minimum depth of 100mm. Take a minimum of four readings at evenly spaced intervals along each side of the lorry and at least 500mm from the edge.

Measurement of laid materials requires a minimum of four readings as close as possible to the mid-depth of the layer.

The probe must not be allowed to cool between readings.

The contractor must enter the temperature measurement results into the record sheet and calculate the average temperature. A copy of the record sheet is to be given to the Supervising Engineer.

Bituminous material should conform to the minimum and maximum temperatures given on the attached table extracted from BS 594987:2010 and BS EN 13108-1:2006.

Materials that do not reach the minimum temperatures specified within the time constraints defined above should be rejected. The temperature of material on site is of critical importance and the key measure should be the temperature immediately prior to rolling.

Materials that are measured on site in excess of the maximum mixing temperature or are otherwise visually defective when delivered to site should also be rejected.

| Material Type | | Binder Grade | Minimum Temperature °C | | Mixing Temperature °C |
|---------------------|---------------------------------|-------------------|------------------------|------------------------------|--------------------------|
| | | | On Arrival | Immediately prior to rolling | |
| Asphalt Concrete | Close, fine, medium, dense surf | 70/100 100/150 | 130 120 | 100 95 | 140 to 180 130 to 170 |
| | Dense bin, base | 40/60 | 130 | 100 | 150 to 190 |
| HRA | Surf | 40/60 | 140 | 110 | 150 to 190 |
| SMA | Surf, reg, bin | 40/60 | 130 | 100 | 150 to 190 |

9. Surface Levels and Regularity

The level of any point on the surface course after completion of compaction shall be correct within a tolerance of plus/minus 6mm to that specified on the setting-out drawing except for those contained in the table below:-

| Feature | Upstand | Tolerance |
|---------------------------------------|---------------|-----------|
| Kerb (new) | as specified | ±5mm |
| Vehicular crossing kerb | 25mm | ±3mm |
| Pedestrian and cycleway crossing kerb | 3mm to flush | ±3mm |
| Surface adjacent to gullies | 6mm | ±3mm |
| Surface adjacent to ironwork | +3mm to flush | |

The permitted deviation of the level of the finished surface at any point on the pavement layer from the true surface level (specified on the setting-out drawing) shall be within the tolerances shown below:-

| Course | Tolerance from specified levels (mm) |
|---|--------------------------------------|
| Sub-base to receive base | +10 -30 |
| Base to receive surface course | ±8 |
| Base to receive binder course | ±15 |
| Binder course to receive surface course on roads | ±6 |
| Binder course to receive surface course on other areas e.g. car parks | ±10 |

Each layer is to be signed off/approved by the Supervising Engineer prior to laying subsequent layers. The Contractor must give sufficient notice to the Supervising Engineer to inspect the works and where practical should be a minimum of 24 hours.

Compliance shall be deemed to be met for all pavement courses, other than the final surface course, when not more than one of ten consecutive measurements taken longitudinally or one in any transverse line, exceeds the tolerances permitted in the table above, provided that this one measurement does not exceed the tolerance for the course concerned by more than 5mm.

Furthermore the combined thickness of bituminous bound mixtures shall not be reduced in thickness by more than 6mm from that specified.

In addition, when tested with the TRL Rolling Straight Edge on any line parallel to the channel, irregularities must not exceed those given below

| Irregularity | Surface course | | | | Binder Course | | | |
|--------------------------|----------------|----|-----|----|---------------|----|-----|----|
| | 4mm | | 7mm | | 4mm | | 7mm | |
| Traverse length (metres) | 300 | 75 | 300 | 75 | 300 | 75 | 300 | 75 |
| Number of irregularities | 20 | 9 | 2 | 1 | 40 | 18 | 4 | 2 |

For works of lengths of between 75m and 300m the maximum permitted irregularities shall be calculated by a pro-rata scaling down (to a zero base length) of the 300m permitted number of irregularities.

For works of lengths less than 75m the maximum permitted irregularities shall be calculated by a pro-rata scaling down of the 75m length permitted number of irregularities.

The longitudinal regularity and transverse regularity on straight crossfalls of finished surfaces shall be such that the maximum depression measured under a 3m straightedge, in accordance with BS 13036-7, placed parallel to or at right angles to the centre-line of the carriageway shall not exceed the dimensions shown below:-

| Surface | Maximum permissible depth of the gap beneath a 3m straightedge or a template. | |
|--|---|----------------|
| | Machine-laid (mm) | Hand-laid (mm) |
| Base | 25 | 25 |
| Binder course | 13 | 13 |
| Regulating course below surface course | 13 | 13 |
| Surface course | 7 | 10 |

10. Ironwork

Regardless of the type of new surfacing, all ironwork within the carriageway shall be set to finished level before the surface course is laid. Ironwork should not be set until the carriageway is ready to receive the final surface course.

Where adjustments are made to ironwork the frame and cover shall be removed and all the old bedding material removed from the supporting structure. All inadequate or unsound portions of the structure shall be removed and cleaned of all loose paint, rust and other debris. Any defects or damage should be reported to the Supervising Engineer before re-bedding.

Bedding material shall be Ultracrete M60 or equivalent BBA/HAPAS approved reinstatement system capable of reaching a strength of 10N/mm² within 1 hour when used in accordance with the manufacturer's recommendations.

Haunching material shall be Ultracrete QC10 F or equivalent BBA/HAPAS approved rapid set concrete of reaching a strength of 20N/mm² within 90 minutes when used in accordance with the manufacturers recommendations

The depth of the bedding mortar under the ironwork shall be between 10mm and 75mm for Ultracrete M60. Where alternate proprietary cementitious or epoxy resins are used the mortar bedding depth should be in accordance with the manufacturer's recommendations.

All bedding and haunching materials shall be allowed to cure in accordance with the manufacturers recommendations prior to the application of the surface course.

Where it is necessary to run traffic on existing surfaces or on binder course material where ironwork has been set to finished levels the edges should be protected with temporary ramps formed of compacted 6mm close graded macadam. The ramps should not exceed a gradient of 1 in 30 parallel to the flow of traffic and 1 in 15 perpendicular to the flow of traffic. The temporary ramps should be removed immediately prior to surfacing.

Where a high friction surface is required on the ironwork the material shall be Colasgrip or similar approved thermosetting epoxy resin binder used in accordance with the manufacturer's recommendations.

The surface should be thoroughly cleaned prior to application and the binder applied uniformly to obtain an even coating at a rate of 1.5kg/m². The 1-3mm aggregate should be applied with a flatbed squeegee to ensure even distribution as soon as possible. The application rate is 10-12kg/m².

Curing time will vary according to the surface temperature, but is typically 3 hours at 20°C. After completion the area should be swept to remove excess aggregate to leave around 7-8kg/m² of aggregate on the surface. Application of the bond coat shall cease if the temperature falls below 5°C.

11. Cold-Milling (Planing)

Where cold-milling of bituminous bound materials is required, the area of carriageway to be milled shall be removed by a suitable milling machine. The cut edges shall be left neat, vertical and in straight lines.

The milled surface shall provide a level running surface with a uniform texture to a tolerance of plus/minus 6mm.

Existing ironwork shall not be disturbed by the milling action. Where necessary, surfacing in the vicinity of ironwork and in small or irregular areas shall be cut out by pneumatic tools.

12. Road Materials Containing Tar

Where coal tar has been identified in the existing road construction layers that are to be planed, the layers containing tar must be separated to minimise the amount of tar containing material produced if the Polycyclic Aromatic Hydrocarbons (PAHs) components exceed the threshold levels given below:-

- The concentration of Benzo(a)pyrene is above 100 ppm
- The concentration of all other components of PAH17 is above 1,000 ppm
- The concentration of phenol in the leachate of a liquid to solid ration of 10 litres per kg is above 1mg/kg

Where materials containing tar exceed the threshold levels refer to the DoI Coal Tar in Highways Policy and seek guidance from the Supervising Engineer on treatment options.

13. Geosynthetics (Geogrid)

Where required the surface onto which the geosynthetic is to be laid should be even, dry and free of dust and other loose materials. Finely milled surfaces are suitable for installation, however, coarse, unevenly milled or broken surfaces should be regulated with AC 6 Dense Reg 100/150 prior to installation.

A tack coat shall be applied mechanically at a uniform rate to provide 1 - 2 kg/m² residual binder in accordance with the manufacturer's recommendation to hold the geosynthetic in place.

The geosynthetic should be applied under light tension without wrinkles or creases across the entire width of the pavement and brushed with a stiff broom to ensure it is fully bonded. On curves the grid should be laid as chords. Chord lengths will be dependent on the curve radius

Where overlaps are recommended by the manufacturer they should not be coincident with a wheel path or a longitudinal construction joint. Trafficking of the geosynthetic shall be restricted to the paving machine and delivery vehicles only.

14. Temporary Traffic Management

The *Contractor* shall be responsible for the provision and maintenance of Temporary Traffic Management measures in accordance with Chapter 8 of the Traffic Signs Manual and the 'Safety at Street Works and Road Works' code of practice.

Where Traffic Orders are not required the proposed scheme of Temporary Traffic Management shall be submitted to the Supervising Engineer for approval not less than 7 working days before it is implemented.

The *Contractor* shall arrange his work in such a manner that there is minimum restriction to the traffic flows.

All temporary road signs placed on the highway must be weighted to prevent blow over and shall be accompanied by a 750mm road cone on the traffic side.

The *Contractor* must ensure that footways are not obstructed by the placement of temporary signs.


Where temporary traffic signals are to be used they should be manually operated during peak hour travel periods (08.00 – 09.30 & 16.30 – 18.00 Monday to Friday).

15. Courtesy/Information Signs

Where required by the contract the *Contractor* shall supply, erect, maintain and remove courtesy/information boards similar to that shown below. The signs shall have a yellow background and black writing and incorporate an appropriately agreed logo and wording, which shall include a 24 hour contact telephone number.



Dimensions (mm):
Width: 1050, Height: 750
x-Height: 40
Area: 0.79 sq m

Colours:
 black on yellow

The signs are to be erected on all entry routes to the site and must be displayed two weeks in advance of the works.

Unless otherwise agreed with the Supervising Engineer, the signs shall be Class Ref 2 (prismatic) reflective with black machine printed lettering minimum 'X' height of 40mm and the signs shall be mounted in a trestle frame.


16. Road Closure / Speed Restrictions

If a traffic order is required the *Contractor* will liaise directly with the Highways Section of the Department of Infrastructure to arrange a Temporary Traffic Order not less than 6 weeks before it is due to be implemented.

The *Contractor* shall supply, erect, maintain and remove Advance Road Closure Roadside Notices similar to that shown below. The signs shall have a yellow background and black writing and incorporate an appropriately agreed logo and wording.



Dimensions (mm):
Width: 1050, Height: 750
x-Heights: 40, 50
Area: 0.79 sq m

Colours:
 black on yellow

The signs shall be free standing or fixed to existing street furniture where appropriate. Road danger lamps shall be erected where signs may form an obstruction to highway users.

The *Contractor* shall consult with/notify the residents of all properties affected by the closure not less than 7 working days prior to installation.

Pedestrian access to premises and Public Rights of Way abutting the works or served from the Works shall be maintained at all times as the site dictates.

17. Defects

Where defects occur, remedial action shall be agreed with the Supervising Engineer. Defects which result from the laying process shall be rectified promptly by the *Contractor* at his cost. The defects correction period shall be 4 weeks after the end of the *Completion date*.

A defect shall be defined as any deviation from the permitted tolerances shown in sections 8 and 9 of this document. Where any pavement area does not comply with the specification for regularity, surface tolerance, thickness, texture depth or compaction, the full extent of the area which does not comply shall normally be rectified in the manner described below:

- Base Course – The full depth of the layer shall be removed and replaced with fresh material laid and compacted in accordance with the specification. Any area so treated shall be at least 5m long and the full width of the paving laid in one operation. Alternatively for low areas in bituminous bases, the *Contractor* may make up the level with additional binder course material.
- Surface and Binder Courses – These shall have the full depth of the course removed and replaced with fresh material laid and compacted in accordance with the specification.

The area rectified shall be the full width of the paving laid in one operation, and at least 5m long if binder course, or 15m if surface course.

Where the number of surface irregularities exceeds the limits in section 9 of this document, the area to be rectified shall be 300m or 75m long as appropriate and the full width of the lanes affected, or such lesser length as necessary to make the number of surface irregularities conform with the limits and shall be the full width of the lanes affected.

Where the texture depth requirement is not met a minimum length of 50m and the full lane width shall be removed and replaced to the full depth of the surface course or treated with an approved proprietary Slurry or Micro Surfacing material in order to improve the texture depth.

Areas to be removed shall be delineated both longitudinally and transversely by saw cutting prior to the material being removed. Joints shall be formed by coating the exposed sawn face with hot bitumen.

◆ **Guidance Notes**

Chapter 8 of the Traffic Signs Manual.
Traffic Safety Measures and Signs for Road Works and Temporary Situations and amendments.

Design Manual for Roads and Bridges, Vol. 7
'Pavement Design and Maintenance' – HD 36/06,
Surfacing Materials for New and Maintenance
Construction, Chapter 3 – Texture and Aggregate
Properties.

Design Manual for Roads and Bridges, Vol. 7
Bituminous Surfacing Materials and Techniques HD
37/99.

B. CARRIAGEWAY PATCHING

1. General

Patching is defined as the replacement of surface course, binder course and base where the materials are laid in small areas. All repairs are to be carried out in accordance with the Specification for Highway Works.

The *Contractor* must allow for all temporary works, labour and plant required to complete the works, including messing facilities, washing and shower facilities, storage areas, parking and access arrangements.

The *Contractor* must include for protecting the works, making good damage occasioned thereto during the construction of the works and cleaning and making good damage to existing structures at completion.

The *Contractor* must include for all necessary lighting, barricades, protection and warning notices, all temporary traffic direction and, where necessary, any temporary crossings to permit access to buildings and other areas to comply with the *Contractor's* requirements.

All loose material shall be removed off site. Rates included for the disposal of material are to include all haulage, loading and tipping charges.

Material wastage shall be kept to a minimum. The wastage of material will be monitored through record sheets and material supply data provided by the quarry. The permitted wastage shall be no more than 10% of material ordered in any one day.

2. Surface Preparation

The existing defective surfacing shall be broken out so as to provide a cavity with straight vertical edges. Removal of the surfacing should be such that the cut provides a rectangular patch around the carriageway defect and should be cut with a diamond saw within 100mm of the widest point of the defect. Existing joints should be considered so that no two joints are within 500mm of each other.

The surface of the road shall be brushed mechanically or by hand with a stiff broom to remove loose material. The sides of the hole shall be squared up and all debris / water removed.

A tack coat of cationic bitumen emulsion such as 'Leotak' or similar approved shall be applied at a uniform rate of approximately 1 litre/m² by brush or sprayed to both the base and sides of the excavation prior to patching the hole.

Installation shall not be undertaken unless weather conditions are such that the repair material will have at least 30 minutes in which to cure and harden.

3. Material

All replacement material as specified below shall be ordered and collected from Poortown Quarry. The material will be charged to the client and not through the contract. Notice of requirements should be given at least 24 hours in advance. Materials from other coating plants will not be permitted.

Surface Course: 40mm thick AC10 close surf 100/150 in accordance with S.H.W. (Aug 2008) clause 912 and BS EN 13108-1.

Binder Course: 60mm thick AC20 dense bin 70/100 in accordance with S.H.W. (Aug 2008) clause 906 and BS EN 13108-1.

Material shall be transported to site in an insulated and sheeted vehicle to prevent an excessive drop in temperature and to protect it against adverse weather conditions. Material shall not be laid below 85°C. The use of a 'hot-box' to maintain the asphalt at an appropriate temperature is recommended.

The *Contractor* shall take account of the weather conditions and his working methods shall comply with all weather related requirements of BS 594987. When laying is to be undertaken in the winter (October to April) and or night time (9pm to 6am) the Contractor shall allow for specific issues raised by winter/night time working.

Compaction of material for patching work shall be by either static rollers of 2.5t deadweight or vibrating rollers of a minimum deadweight of 750kg.

4. Surface Level and Regularity

Construction layers shall be levelled and shaped to maintain existing carriageway camber / crossfall and shall be the same level as the adjacent course following compaction.

The surface course must be flush with all joints, channels and projections and shall be level or not more than 3mm above the adjoining pavement surfaces.

The longitudinal regularity and transverse regularity on straight crossfalls of finished surfaces shall be such that the maximum depression measured under a 3m straightedge, in accordance with BS 13036-7, placed parallel to or at right angles to the centre-line of the carriageway shall not exceed the dimensions shown below:-

| Surface | Maximum permissible depth of the gap beneath a 3m straightedge or a template. | |
|--|---|----------------|
| | Machine-laid (mm) | Hand-laid (mm) |
| Binder course | 13 | 13 |
| Regulating course below surface course | 13 | 13 |
| Surface course | 7 | 10 |

5. Health & Safety

The *Contractor* shall be deemed to have included for any entry, signing in, safety briefing, operational, hygiene or security measures, details of which are included in the General Specification.

The *Contractor* will be expected to comply with the Department of Infrastructure's Safe System of Working for Roadside Working.

6. Temporary Traffic Management

The *Contractor* shall be responsible for the provision and maintenance of Temporary Traffic Management measures in accordance with Chapter 8 of the Traffic Signs Manual and the 'Safety at Street Works and Road Works' code of practice.

Where Traffic Orders are not required the proposed scheme of Temporary Traffic Management shall be submitted to the Supervising Engineer for approval not less than 7 working days before it is implemented.

The *Contractor* shall arrange his work in such a manner that there is minimum restriction to the traffic flows.

All temporary road signs placed on the highway must be weighted to prevent blow over and shall be accompanied by a 750mm road cone on the traffic side.

The *Contractor* must ensure that footways are not obstructed by the placement of temporary signs.

Where temporary traffic signals are to be used they should be manually operated during peak hour travel periods (08.00 – 09.30 & 16.30 – 18.00 Monday to Friday).

◆ **Guidance Notes**

Chapter 8 of the Traffic Signs Manual.
Traffic Safety Measures and Signs for Road Works and Temporary
Situations and amendments.

Manual of Contract Documents for Highway Works (MCHW)
Volume 1, Specification for Highway Works

Transport Research Laboratory (TRL)
Road Note 42 "Best Practice Guide for Durability of Asphalt Pavements"