

PART 2
SPECIFICATION
OF CONSTRUCTION MATERIALS
AND
STANDARD CONSTRUCTION DETAILS

PART 2

SPECIFICATION OF CONSTRUCTION MATERIALS AND STANDARD CONSTRUCTION DETAILS

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1. INTRODUCTION

THIS DOCUMENT IS TO BE READ IN CONJUNCTION WITH THE DESIGN GUIDE FOR RESIDENTIAL ROADS, THE HIGHWAYS AGENCY MANUAL OF CONTRACT DOCUMENTS FOR HIGHWAY WORKS AND THE SOUTH YORKSHIRE LABORATORY SPECIFICATION FOR THE SUPPLY OF MATERIALS FOR USE IN HIGHWAY WORKS

INTRODUCTION

This General Specification is issued for the guidance of developers, and forms the general basis for alternative methods of construction for Housing Estate Roads and Industrial Estate Roads which the Highway Authority is ultimately required to adopt as highway to be maintained at public expense.

INSPECTIONS

The Highway Authority shall be notified at least 3 days prior to the commencement of any stage of the works.

Notice

If, as a result of failure to give adequate notice of any stage of the construction works the Engineer is unable to inspect the same, the Developer will be required to carry out tests at his own expense to prove to the Highway Authority's satisfaction that the works comply with the appropriate standard. Otherwise, on completion, the work may not be considered for adoption.

Failure to give adequate notice

The Highway Authority representative shall be given access to the work in progress and may visit from time to time. Such visits do not absolve the Developer from his responsibility for supervising the work that he is paying for, or from ensuring that it is carried out in accordance with the Specification and approved drawings.

Access for The Highway Authority representative

EXISTING SUB-GRADE

All construction details shown in this document are based upon an assumed CBR of 2%. If agreed in writing with the Engineer, thickness of sub-base and or capping layer may vary if a sub-grade survey indicates that there is an increase or decrease in CBR values.

Assumed CBR Values

When the sub-grade is frost susceptible, a minimum construction thickness of 450mm will be required.

Frost susceptible sub-grade

DEFINITIONS

Unless otherwise stated, the definition of terms used in this Specification shall be that in the Glossary of Highway Engineering Terms and BS 6100: 2.4.1

General

The Engineer, for the purposes of this Specification, shall be the representative of The Highway Authority.

The Engineer

Where reference is made in this document to the Contractor, this shall mean the Developer or Party entering into agreement with the Highway Authority in respect of the adoption of the highway.

The Contractor

British Standard - this term will be used where reference is made to a British Standards Institution Specification and the edition current at the time of construction is to be complied with. (See Section 2 - materials)

British Standard

ROAD TYPES

These are detailed in the Design Guides for Residential and Industrial Roads, and are summarised below.

2. Industrial Estate Roads

3. Main Road
Parade

4. Collector Street
Local Street

5. Village Street

5B. Square/Mews Court
Homezone

Footpath + Private Drive (Not adopted)

Footpath Mode specific link

2. MATERIALS

Wherever, in respect of any British Standard (BS), a BSI Kitemark Certification scheme is available, all materials are required to comply with that standard, or the containers of such materials, shall be marked with a BSI Certification Trademark (the Kitemark). The mark of conformity of any other third party certification body accreditation by the National Accreditation Council for Certification Bodies or equivalent shall be an acceptable alternative to this requirement.

BS
Accreditation

At the date of construction, all articles and materials shall conform to: -

GENERAL

A) the above

B) The Highways Agency for Highway Works modified or extended by any substitute or additional clauses referred to in this document

C) The South Yorkshire Laboratory Specifications for the Supply of Materials for use in Highway Works

And the following:-

SAMPLES AND TESTING

Representative samples of all materials proposed to be used in the works shall be submitted for the Engineer's approval not less than three weeks before they are to be used in the works, and shall be in accordance with South Yorkshire Laboratory Specification for the Supply of Materials for use in Highway Works. Such approval shall be obtained before any materials are delivered to site. Any materials not conforming with the Specification and requirements will be condemned in which case they must be removed from the site.

General

The Engineer may require material to be tested on a routine basis at a rate which will normally not exceed;

Routine
Testing

Carriageway

One sample per 50m length of carriageway.

(Sub base and
road base
Material)

One sample per 100m length of carriageway.

(Surfacing
Material)

It may be necessary to take samples for each laying operation. If any material is below the quality required, it will be condemned and must be removed.

Footways

The Developer shall bear the cost of all sampling and testing required by the Engineer. These costs are normally included in the Section 38 agreement and Advance Payments Code Section 220 of The Highways Act 1980.

Costs

However, the Engineer may require extra tests and these shall be paid for by the Developer.

Porous pipes shall comply with the requirements of South Yorkshire Laboratory Specification No. 13.(Concrete porous pipes).

Porous
Pipes

Vitrified clay pipes shall comply with BS EN 295 and BS 65.

Vitrified

The fittings shall have flexible mechanical joints. They shall be bedded on material complying with South Yorkshire Laboratory Specification No. 26 and in accordance with "Simplified tables of External Loads on Buried Pipelines", issued by The Transport Research laboratory.	Clay pipes
Plastic pipes fittings and joints shall be in accordance with the requirements of BS 4660, BS EN 1401/1 and the water industry specification WIS 4/35/01.	Plastic pipes and fittings
Concrete Pipes and fittings shall comply with the requirements of BS 5911 : Part 100 and South Yorkshire Laboratory Specification No. 14.	Concrete Pipes and Fittings
Unless otherwise agreed in writing with The Engineer, all pipes shall be:-	Joints & bedding
Flexibly jointed.	
Bedded on material conforming with South Yorkshire Laboratory Specification No. 26 and designed in accordance with "Simplified Tables of External Loads on Buried Pipelines", issued by the Transport Research Laboratory.	
Bricks are to be a Class B Engineering or Concrete Engineering quality complying to South Yorkshire Laboratory Specification Number 16, and are to be laid in English bond.	Bricks for manholes,gullies and Soak-aways etc
DRAINAGE IRONWORK	
Drainage ironwork shall comply in all respects with BS EN 124 and be Kitemarked or equivalent (any certification body accredited to BS EN 45011).	BS
Products shall be manufactured by companies who operate to BS EN ISO 9000 Series Quality System Standards.	Quality assurance
Ductile iron Class D400 (150mm deep) double triangular to BS EN 124 with 600mm square openings as manufactured by:	Manhole covers and frames
Stanton (Inter-Ax D400-H) (Or similar approved).	
Must be ductile iron with captive hinge to BS EN 124.	Gully grates and frames
Minimum Class D400	Industrial Estate and Type 3 Roads
As manufactured by:	
Stanton Watershed D400 HR 865 1 (Or similar approved)	
Minimum Class C250 (100mm deep)	All other road types
As manufactured by:	
Stanton HY 813 (Or similar approved)	
To be in accordance with BS 1247.	Step irons for Manholes

GULLY POTS

For typical gully details, See STANDARD CONSTRUCTION DETAILS	General
All gullies shall be trapped and provided with a rodding eye and fixed chain stopper.	
Shall comply with the current British Board of Agrément Roads and Bridges Certificate (BBA Publications).	Plastic
Shall comply with the requirements of BS 5911 : Part 230 "Precast Concrete Pipes, Fittings and Ancillary Products" and South Yorkshire Laboratory Specification No. 14.	Precast concrete
Shall comply with the requirements for road gullies, as specified in BS 65 "Specifications for vitrified clay pipes, fittings and ducts" or BS EN 295, and shall be in accordance with South Yorkshire Laboratory Specification No. 12.	Clay
Shall be clay trapped gully pots complying with BS.65 and/or BS EN 295 and South Yorkshire Laboratory Specification No 12 with galvanised bucket. The gullies are to be covered with a hinged grating and frame. (See STANDARD CONSTRUCTION DETAILS).	Footway gullies
CONCRETE	
All concrete shall be in accordance with BS 5328.	BS
All concrete used shall be made of aggregate, cement and water and shall comply with the conditions given below:-	Constituent Parts
Where standard mixes are specified, the related strengths shall be as follows:-	Standard mixes
ST4 20.0 N/mm ²	
ST5 25.0 N/mm ²	
In all phases of the work involving concrete, the concrete must be placed before the initial set has commenced.	Placing
Before concreting works commence, trial mixes, using the aggregates proposed for the work shall be made to ensure that the concrete is sufficiently workable and that no segregation of the mix occurs during either transportation or placing. The composition of these trial mixes shall be adjusted to ensure that the characteristic compressive strength of cubes tested in batches of four shall be 40N per mm ² at 28 days.	Concrete carriageways, Bus draw- ins, lay-bys, In-situ channelling, Manhole slabs
The concrete shall be air-entrained and the total quantity of air as a percentage of the volume of the mix shall be 5% ± 1.5%. Concrete for these purposes shall be of such proportions as to provide a characteristic compressive strength of 25N per mm ² (ST5)at 28 days. When required by the Engineer the Contractor shall satisfy him that the arrangements for mixing the concrete are adequate to produce a material of the right quality, and shall supply batches of four cubes for test purposes.	Concrete Manhole foundations benching and concrete rafts
Pipe bedding and haunching. Bedding and backing of kerbs and edging. Manhole surrounds.	Concrete grade ST4 (20N/mm ²) shall be used

Gully bases and surrounds. Steel pedestrian fencing surround. Pipe saddling. Trench bases. Blinding bases of excavations. MORTAR	for these purposes
Ordinary Portland Cement shall be used unless otherwise specified. To be mixed by volume at a ratio 1 of cement to 3 sand. Natural sand on crushed natural stone or combination of both as specified in BS1200 (Specifications for building sands from natural resources).	Cement Mortar
CONCRETE KERBS CHANNEL AND EDGING	
All precast concrete kerbs, channels and edging shall be hydraulically pressed and shall comply with the requirements of South Yorkshire Laboratory Specification No. 11. Special kerbs (Plasmobility) having dimensions complying with BS 7263, may be approved by The Engineer.	Concrete kerbs channel and edging
ROAD PAVEMENTS	
Sub-base shall be in accordance with South Yorkshire Laboratory Specification No. 19. The source material shall be approved by The Engineer.	Sub-base
Dense Base (Roadbase) to BS 4987 and South Yorkshire Laboratory Specification No. 30.	Base (Roadbase) Surfacing
Dense Binder Course complying with BS 4987 and South Yorkshire Laboratory Specification No. 31. OR Rolled Asphalt complying with BS 594 and South Yorkshire Laboratory Specification No.7.	Binder course
OR Stone Mastic Asphalt complying with BS 4987 and to South Yorkshire Laboratory Specification No. 41	Surface Course
OR Rolled Asphalt to complying with BS 594 and South Yorkshire Laboratory Specification No. 29	
OR 10mm size Close Graded Surface Course complying with BS 4987 and South Yorkshire Laboratory Specification No. 33	
OR 6mm size dense Surface Course to BS 4987 and South Yorkshire Laboratory Specification No. 34	
Interlocking Block Paving complying with BS 6717 "Precast concrete paving blocks"	Notes
Materials containing limestone or blast furnace slag aggregate shall <u>NOT</u> be permitted in the Surface Course.	Blast furnace slag

When the surfacing course is laid in stages the same aggregate must be used for each stage.

Stage laying

BITUMINOUS BINDERS

All binders in bituminous materials must be straight-run. Addition of fluxing agents is not permitted without written permission from The Engineer

Joint sealing compound shall consist of either hot or cold poured material as detailed page 28 - JOINTS IN FLEXIBLE SURFACING

Joint sealing
Compound

FOOTWAY PAVEMENTS

The material used shall consist of a compacted layer of Type 1 granular sub-base material and shall comply with the requirements of the South Yorkshire Laboratory Specification No 19

Sub Base for footways and margins

Surfacing for footways

6mm size Surfacing Course to BS 4987 and complying with South Yorkshire Laboratory Specification No. 34

Asphalt

With

20mm size Binder Course to BS 4987 and complying with South Yorkshire Laboratory Specification No. 31

OR

Precast concrete flags shall comply with the requirements of South Yorkshire Laboratory Specification No. 11, be bedded on sharp sand and cement at a ratio of 6:1 on the prepared sub-base

PCC Flags

OR

Interlocking Block Paving (Pencil Edge)

Block Paving

OR

Natural stone flags

Natural Stone flags

The surfacing for non-vehicular hardened margins shall be 60mm thick concrete block paving bedded on 35mm compacted thickness of sharp sand

Surfacing for non-vehicular hardened margins

See STANDARD CONSTRUCTION DETAILS

Cycle track construction

ROAD HUMPS

See STANDARD CONSTRUCTION DETAILS

Construction

Position of road humps to be agreed with Highway Authority at planning stage.

Locations

Geometrical design shall be in accordance with the latest version of The Highways (Road Humps) Regulations.

Regulations

PAINT FOR METALWORK

Shall be carried out in accordance with the methods recommended in BS 6150, using materials complying with Clause 164 and primed at the works in accordance with BS 5493

Paintwork

Paintwork specification for handrails and safety barrier

1st coat - Galvanising - Hot dip galvanising minimum thickness of galvanising 70 micron B.S.729

2nd coat and preparation "T" wash (or similar)

3rd coat - Primer - Zinc phosphate metal primer

4th coat - Undercoat 1 - Alkyd undercoat (Grey)

5th coat - Undercoat 2 - Alkyd undercoat (White)

6th coat - Top Coat - Permaglax 12D45 - Green (or similar approved)

NB 1st 2nd and 3rd coats to be carried out in factory

3. SITE PREPARATION AND GENERAL WORKS

The investigation should gather all data needed for assessing:	Ground Investigation
A General suitability of the site and neighbourhood for the proposed development works	
B Physical characteristics of the ground e.g. presence of In-ground obstacles, services, buried conduits, sumps soft spots, cellars etc.	
C Physical characteristics of contaminated matrices e.g. mineralogy, moisture content, permeability, chemical composition, particle size distribution	
D Geotechnical characteristics e.g. strength, compressibility, stability of slopes, existing structures, potential for subsidence etc.	
E The need for design requirements of any foundations, earthworks, temporary works and specialist geotechnical processes associated with the development strategy, taking into account the effect of any previous uses of the site.	
F Any factors arising from the soil or groundwater conditions that might constrain the construction or implementation of development works including temporary works, excavation, traffickability and drainage.	
G The quantity, quality and ease of extraction of construction materials (e.g. concrete foundations) suitable for inclusion in the works	
H Changes in the stability, drainage or other geotechnical aspects of the site and the surrounding ground and buildings which might be initiated by the development works.	

In addition, it may be necessary to assess the stability of existing structures, or to evaluate potential failure or instability.

All investigation works shall be carried out in accordance with BS 5930.

Specialist geotechnical processes shall be specified and designed in accordance with appropriate industry standards or relevant Code of Practice.

The lines and levels of the carriageways, footways, verges, drains and all other works shall be properly set out before commencement of the Works.	Setting out
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The Contractor shall remove buildings to a minimum of 1.5m below formation level) and other obstructions, grub up and remove trees, hedges, bushes, shrubs and clear the site of the works to the satisfaction of The Engineer.	Site clearance
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Cellars to be excavated and filled to specification.

Drawings showing site clearance details together with appropriate schedules and appendices shall be submitted to The Engineer prior to commencement of the works	Drawings
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The provision of a comprehensive system of sub-soil drainage may be required where proposed roads are in cutting or where there is evidence that the general level of the water table is within 600mm of the carriageway formation level	Sub-Soil Drainage
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4. EARTHWORKS

All Earthworks are to be carried out in accordance with the latest requirements of Series 600 of The Highways Agency Specification For Highway Works:-

General

The latest requirements of South Yorkshire Laboratory Specification For The Supply of Materials For Use in Highway Works:-

And the following:-

Drawings showing earthworks details together with appropriate schedules and appendices shall be submitted to The Engineer prior to commencement of the works.

Drawings

All topsoil shall be removed from the area required for highway construction.

Topsoil

Excavation shall be to correct lines, levels and contours.

Line & level

Where rock is met in excavation it shall be cut out to the lines and levels shown on the approved drawings, or as directed by The Engineer. Surface irregularities present in the formation after completion of the rock excavation shall be corrected with a layer of mass concrete grade ST4 laid and compacted to the required levels.

Excavation
in Rock

The incorporation of any of the excavated rock in the works shall be left to the discretion of The Engineer, depending upon the nature and suitability/grading of the rock for this purpose.

All sub-grades are to be proof rolled and checked for soft spots. These shall be cut out as directed by The Engineer and backfilled with GRANULAR FILL (see page 15)

Proof rolling/
Soft spots

Unless specifically excepted, all excavated or filled surfaces within the area of the highway shall be thoroughly compacted in accordance with clause 612 of the Specification For Highway Works.

Compaction

The Contractor shall carry out any extra rolling and compaction necessitated by:-

- A The soft or artificial nature of the site
- B The loose nature of replaced material in drain, sewer, statutory undertakers, or other trenches.
- C Any subsidence that may occur

At the discretion of The Engineer, on soft ground, 75mm to 125mm single size stone may be laid over the sub-grade, until an adequate foundation is achieved. Engineering fabrics may also be used in these circumstances as directed by The Engineer.

Soft ground

No material shall be used for filling under carriageways and footways without the prior approval of The Engineer.

Filling

Granular Fill shall comply with class 6F1/6F2

Granular Fill

Capping shall comply with class 6F1/6F2

Capping layer

Shall be in accordance with clause 617 of the Specification for Highway Works and the following;

Trafficking
of sub-grade

Trafficking of the sub-grade should be avoided.

Where the contractor proposes to use the sub-grade for construction plant, he shall:

Stop excavation short of formation level

OR

Provide adequate protection to the formation by the use of a capping layer or type 1 sub-base.

If the Contractor damages the sub-grade, the affected areas shall be cut out to a depth as directed by The Engineer and reinstated with approved capping material properly compacted to his satisfaction before any subsequent pavement layers are placed.

Damage to
sub-grade

5.

DRAINAGE

GENERAL

This document is concerned only with highway drainage. Sewers are the responsibility of the Sewerage Undertaker and any concerns or queries regarding sewers are to be directed to them.

All Drainage works are to be carried out in accordance with the latest requirements of Series 500 of The Specification For Highway Works:-

The latest requirements of South Yorkshire Laboratory Specification For The Supply of Materials For Use in Highway Works:-

And the following:-

Drawings showing proposed drainage details together with appropriate schedules and appendices shall be submitted to The Engineer prior to commencement of the works.

Drawings

Excavation in any material shall be in open trenches to correct lines and levels, as shown on the approved drawings or to such other lines and levels as directed by The Engineer. Excavations taken out to a greater depth than necessary shall be filled with concrete grade ST4 or the appropriate bedding material, to a level directed by The Engineer. Trenching shall be of sufficient width to enable the pipes to be properly laid and jointed but in no case greater than the width specified in "Simplified tables of external loads on buried pipelines" issued by Transport Research Laboratory. Special care shall be taken to provide a solid and even bed for the barrels of the pipes.

Excavation
(General)

Pits, trenches and other excavations shall be adequately supported, shall not be battered and shall be wide enough to enable the pipes and concrete to be laid accurately, and proper refilling and ramming to be carried out.

(Finish)

Where solid rock is set in trenches, it shall be cut out to a depth of 150mm below the intended level of the underside of the pipes or $\frac{1}{4}$ the diameter of the pipe whichever is the greater and replaced with pipe bedding material (as specified on page 8 ; JOINTS AND BEDDING) to provide a firm bed for the pipes. Any over dig shall be back filled with concrete grade ST4, to permit a uniform depth of bedding material.

(Rock)

If any streams or waterways, land drains or sewers are intersected by any part of the Works, they shall be conducted past the same during construction by troughs or other temporary means, and as soon as possible, restored to a condition suitable for the purpose. Land drains shall be provided under the new roads if the nature of the sub-soil appears to warrant their use. (see page 5 ; POROUS PIPES)

Temporary/
Permanent
Diversions of
Ground Water

Trenches and all other excavations shall be kept free from water until any concrete or other works therein are sufficiently set and the Contractor shall construct any sumps or temporary drains that are deemed necessary. The Contractor shall make good any damage caused by prolonged and/or excessive pumping and shall take all precautions necessary for the safety of adjoining structures and buildings during the time that the trenches are open.

Prevention of
Standing Water

Unless otherwise directed by The Engineer, pipes for carrying surface water shall have flexible joints and be laid in accordance with manufacturers instructions. All pipes shall be laid true to line and level, with each pipe being separately aligned. Pipe bedding material shall be as described on page 8 - JOINTS AND BEDDING

Laying and
Jointing of
pipes

Where directed by The Engineer, existing highway drains shall be properly extended to receive additional flows from new gullies or channels. Details of expected surface water run off and drainage calculations will be requested prior to written permission being granted.

Carrier Drains

Any gully or branch connections shall be made during the construction of the main drain and a record of their positions kept for future use or reference. Where pipe connections are made to a brick drain, concrete culvert, stone built or lined channel, the pipes shall be well and tightly built into the concrete, brick or masonry work, and be so placed as to discharge in the direction of flow of the main drain or channel, and with the end of the pipe cut to the necessary angle. Where the connections are between piped drains, special connecting pipes shall be supplied, truly laid and properly jointed.

Where pipes are beneath the carriageway or footway, at a depth less than 1.2 metres cover from the finished surface level (or elsewhere if The Engineer considers that the nature of the ground demands it), they are to be bedded on and surrounded with 150mm of concrete grade ST4. In carrying out this work, the Contractor shall take care to pack the concrete under and around the pipes to ensure even bedding and solidity in the concrete. The concrete shall not be thrown directly onto the pipes. The upper surface of the concrete shall be struck off with a wooden screed or template and neatly finished off. The surrounding of pipes with concrete or the refilling of trenches, shall not proceed until the drains have been inspected and approved by The Engineer. The flexible joint shall be maintained by forming a break in the concrete bed and surround by the use of flexcell, fibre board or other approved materials. All pipelines shall be designed in accordance with BS 5911 and "Simplified tables of external loads on buried pipelines" issued by Transport Research Laboratory.

Shallow
Pipework

Junction pipes which are laid but are not immediately connected to gullies, shall be fitted with temporary stoppers or seals, and the position of all such junctions shall be clearly defined by means of stakes or trailing wires properly marked or labelled.

Gully
connections

All bricks shall be as described on page 5. Brickwork is to be built in English Bond, on mortar (in accordance with the details shown on page (7), finished plumb and true, and flat pointed on the exposed face as the work proceeds. Each brick is to be well bedded and jointed. No half bricks shall be used except as closures. No brickwork shall be built when the outside temperature precludes the proper placing of concrete.

Brickwork
for manholes
gullies and
soak-aways etc.

Manholes and Inspection Chambers shall be constructed in the positions shown on the approved drainage drawings, or

Manholes and
inspection

as directed by The Engineer. The designs and details shall be in accordance with the Standard Details shown in The Highways Agency Construction Details, Series F - Drainage.

chambers

See below regarding setting street furniture to finished levels.

Unless otherwise directed by The Engineer, each gully shall drain a maximum of 200 sq.m.

Gullies
(Drained area)

.Individual gullies shall be sited to avoid standing water on the carriageway and to prevent flows that might create danger, damage or give rise to complaints.

(Siting)

All gully connections are to be proved.

(Proving
Connections)

Gully pots shall be set on a foundation of and surrounded by 150mm of concrete grade ST4. After the concrete has set and hardened, backfilling shall be carried out and thoroughly compacted.

(Setting gully
pots)

Covers and frames, shall be set to correct levels on a minimum of one and a maximum of four courses of brickwork (See BRICKS FOR MANHOLES, GULLIES & SOAKAWAYS ETC ON PAGE 5) on top of drainage units.

Setting covers
and frames

For gullies, the top course shall be laid as headers, as brick on edge. (REFER TO STANDARD CONSTRUCTION DRAWINGS FOR DETAILS)

To allow for adequate compaction of pavement asphalt layers, street furniture should not be placed until the base course layer is complete. Any chambers or gullies should be covered to prevent ingress of extraneous matter.

Setting street
furniture to
finished levels

Street furniture should then be set to finished levels before the wearing course is laid.

Where The Engineer is in any doubt as to the efficiency of the drainage works, he may require the Contractor to provide the apparatus, labour and tools for making tests before the trenches are backfilled, or concrete surround/haunching is placed in position. Any defects discovered in testing or otherwise shall be made good as directed by The Engineer and no pipes or fittings of any description shall be covered up until he has given his approval to the same.

Testing
Drains

Only after the drains have been approved by The Engineer shall trenches be backfilled. The first 300mm of backfill above the crown of the pipe shall be fill material as specified in "Simplified tables of external loads on buried pipelines" issued by Transport Research Establishment. The approved material shall be compacted in layers, to a density at least equal to that of the undisturbed ground adjacent to the trench. During the filling process, care must be taken to avoid pipes being broken, displaced or moved. When concrete is not used for surrounding the drains, the first layer of filling shall be carefully placed into position by hand and rammed so that no cavities are left under the pipes. The remainder of the trench is to be backfilled to formation

Backfilling

level or sub formation level where capping is required, with Type 2 sub-base material to South Yorkshire Laboratory Specification No 20 (or other material approved in writing by The Engineer, which shall contain a minimum 10% of material retained on a 37.5mmBS sieve).

Timber which has been employed for shoring and supporting, shall not be removed until the compacted fill has reached such a level as to render support unnecessary. It shall then be removed as filling proceeds, but they may be left in trenches or other excavations, as directed by The Engineer. Any damage arising from the collapse of trenches must be made good. No material shall be used for filling under the carriageways and footways without prior approval of The Engineer.

Shoring and
support timber

6. KERBS, FOOTWAYS AND PAVED AREAS

All works for kerbs, footways and paved areas are to be carried out in accordance with the latest requirements of Series 1100 of The Specification For Highway Works:-

GENERAL

The latest requirements of South Yorkshire Laboratory Specification For The Supply of Materials For Use in Highway Works:-

And the following:-

Drawings showing details of proposed kerbs, footways and paved areas shall be submitted to The Engineer prior to commencement of the works.

Drawings

Concrete kerbs are to be laid to correct line and level on a preformed bed of concrete kerb race, 150mm minimum thickness unless otherwise directed by The Engineer. The concrete is to be carried up the back of the kerbs to within 100mm of the top face for a width of 150mm to form a haunch.

Laying Kerbs

Joints between kerbs should not exceed 2mm in width.

Joints

Where joints are wider than 2mm, or where kerbs have been cut, joints are to be filled with cement mortar (as described on page 7) and the face of the joint pointed.

For all curves up to 12 metre radius, circular kerbs are to be used and laid true to radius. Curves between 12 metres and 20 metres radius, are to be formed using 450mm straights. Curves in excess of 20m radius are to be formed using full length straight kerbs.

Radii

Kerb face shall be as specified in STANDARD CONSTRUCTION DETAILS, GENERAL REQUIREMENTS FOR KERBING & CHANNELLING. Where special kerbs are used, the kerb face shall be as directed by the Engineer.

Kerb Face

CHANNEL BLOCKS

Channel Blocks 150mm x 150mm (125mm) are to be used when channel gradients are;

- A. between 1.25% (1 in 80) and 0.67% (1 in 150)
- B. or greater than 10% (1:10) (to prevent scour)

Combined drainage and channel units are to be used when channel gradients are;

less than 0.67% (1 in 150)

Channel blocks shall abut the front face of kerbs, shall be laid to correct line and level on a 150mm thick bed of concrete, and shall be properly bonded to the concrete used in the kerb foundations.

Laying

(SEE STANDARD CONSTRUCTION DETAILS, GENERAL REQUIREMENTS FOR KERBING & CHANNELLING)

Where the kerb radius exceeds 12 metres, channel blocks shall be 450mm in length, but where the radius is less than 12 metres they shall be 300mm in length.

Radii

Joints between blocks are not to exceed 2mm in width and are to be properly grouted with cement mortar (for specification see page 7).

Joints

COMBINED KERBING AND DRAINAGE UNITS

Combined kerbing and drainage units are to be laid in accordance with manufacturers instructions.

DAMAGE TO KERBS etc

Should any damage be done to the finished kerbs, edging, channel blocks or combined drainage units, or should any movement of the blocks take place during the execution of the works or during the maintenance period, the Contractor shall take out and make good the lengths so affected, including all associated works. New concrete bed and haunch is to be provided for kerbing, edging, channel blocks and combined kerbing and drainage units

Damage

7. FLEXIBLE CARRIAGEWAYS

All road pavements are to be built in accordance with the latest requirements of the following Series of The Specification For Highway Works:-

GENERAL

700 : Road Pavements General

800 : Road pavements-Unbound, Hydraulically Bound and other materials

900 : Road pavements-Asphalt Bound Materials

1100 : Kerbs Footways and Paved Areas, Clause 1107

The latest requirements of South Yorkshire Laboratory Specification For The Supply of Materials For Use In Highway Works.

and the following:-

Drawings showing details of proposed road pavement works shall be submitted to The Engineer prior to commencement of the works
BITUMINOUS

Drawings

Hot bituminous materials shall be laid and compacted in accordance with the requirements and recommendations for laying in BS 4987: Part 2 or BS 594: Part 2, as appropriate. Where there is no British Standard for the particular material, it shall be laid in accordance with the requirements and recommendations of BS 594: Part 2, subject also to the requirements of Clause 901 Sub Clauses 8 to 31 of The Specification For Highway Works, and South Yorkshire Laboratory Specification For The Supply of Materials For Use In Highway Works.

British
Standard for
Asphalt
Materials

All materials shall be placed and spread evenly.

Spreading

All material shall be spread using a paving machine or a spreader box operated with a mechanism that levels off the material to an even depth. In cases where The Engineer considers that the extent of the work does not warrant the use of mechanical equipment, he may allow hand spreading. In such cases, every precaution should be taken to minimise segregation and to avoid contamination of the material.

The Contractor shall, in his choice of permitted materials for sub-bases, have regard to the nature of those materials and of the sub-grade or any other capping and need to protect them from deterioration due to the ingress of water, the adverse effects of weather and the use of construction plant. The contractor shall programme the laying and compaction of the sub-base and the subsequent pavement courses and take such steps as may be considered necessary, to afford protection to the sub-base and subgrade.

Choice of
permitted
materials
for sub-base

Compaction shall comply with B.S. 4987-2: Clause 7.
(Please refer to tables for delivery & rolling temperatures extracted from B S 4987 on pages 28 & 29)

Compaction
of asphalt
materials

Asphalt materials shall be laid and compacted in layers which enable the specified thickness, surface level, regularity requirements and compaction to be achieved. Compaction shall be substantially completed before the temperature falls below the minimum rolling temperatures stated BS 4987: Part 2 or BS 594: Part 2.

Rolling shall continue until all roller marks have been

removed from the surface.

Asphalt materials should normally be rolled in a longitudinal direction, with the driven rolls nearest the paver. The roller shall first compact material adjacent to joints and then work from the lower to the upper side of the layer, overlapping on successive passes by at least half the width of the rear roll or, in the case of a pneumatic tyred roller, at least the nominal width of one tyre.

The rolling pattern should be such as to ensure that compaction is as uniform as possible across the road width. In order to achieve this, at least half of the roller passes should be along the edge of the layer.

Rollers shall not be permitted to stand on warm compacted materials

Stationary
Rollers

The recommended roller for all carriageway works shall be BM130 or TV130 or similar approved.

Recommended
rollers

Regulating

Regulating courses, that may consist of one or more layers of asphalt material, shall have their finished surfaces laid to achieve the appropriate tolerances for horizontal alignments, surface levels and surface regularity, for pavement layers.

(Tolerances)

Unless otherwise advised in writing by the Engineer, base (roadbase) or binder course macadam can be used for regulating immediately below the surface course. Asphalt materials used shall meet the requirements of the appropriate material as specified.

(Materials)

Where the total depth of regulating course exceeds 150mm then the course shall be laid so that each regulating layer has a compacted thickness of between 75mm and 150mm.

(Compacted
thicknesses)

Where any pavement layer does not comply with the specification for regularity, surface tolerance, thickness, texture depth, material properties or compaction, the full extent of the area that does not comply with the specification shall be made good and the surface of the pavement course shall be rectified in the manner described in later paragraphs for each section separately.

Rectification

Reclaimed asphalt materials may be used in production of asphalt base (roadbase), binder course and surface course. Advice on the types of reclaimed asphalt materials permitted can be obtained from The Engineer .

Reclaimed
asphalt
materials

Should any asphalt material become contaminated, The Contractor shall make it good by cleaning it by jet washing. If this proves impractical, the full depth of the top layer as laid shall be removed and be replaced with fresh material laid and compacted in accordance with the Specification.

Cleanliness
of laid
bituminous
layers

Reinstatement of openings shall comply with the "Specification For the Reinstatement of Openings in Highways" issued by the South Yorkshire Highway Authorities and Utilities Committee. Immediately before asphalt layers are reinstated, the edges of the existing material shall be cleaned of all loose material and be coated with an appropriate hot binder, or equivalent treatment.

Reinstatement
of paved areas

SUB-BASE

All road pavements (unbound materials) are to be built in accordance with the latest requirements of Series 800 of The Specification For Highway Works .

GENERAL

The latest requirements of South Yorkshire Laboratory Specification For The Supply of Materials For Use In Highway Works.

and the following:-

The delivery of the material shall be co-ordinated with the the rate of laying to avoid interruption to the laying process.

Delivery

Material up to 225mm compacted thickness shall be spread in one layer so that after compaction the total thickness is as specified. Material of compacted thickness greater than 225mm shall be laid in two or more layers and the minimum compacted thickness of any such layer shall be 110mm. Where layers of unbound material are of unequal thickness the lowest layer shall be the thickest layer.

Compaction

The sub-base material, at appropriate moisture content, shall be compacted to the requirements set out in The Specification For Highway Works, table 8/1. Tolerances are +10mm -30mm.

INDUSTRIAL ESTATES

Materials shall be compacted with vibrating rollers without drying out or segregation so that when tested they achieve 95% of the density when compacted in accordance with BS 1377 Part 14. This shall be measured in-situ using a calibrated nuclear density meter at a rate of 1 tests per 50 linear metres of carriageway.

Prior to laying the bituminous material the surface of the sub-base shall not have a rut exceeding 10mm measured using a 3m straight edge.

The surface of any layer of material shall on completion of compaction and immediately before overlaying be well closed, free from movement under compaction plant and from ridges, cracks, loose material, pot holes, ruts or other defects. All loose, segregated or otherwise defective areas shall be removed to the full thickness of the layer, and new material laid and compacted.

The top 110mm shall be scarified, reshaped with material added or removed as necessary, and re-compacted. The area treated shall be not less than 20m long and 2m wide.

Rectification
(Refer to
General section
on page 22)

BASE (ROADBASE)

All road pavements(asphalt bound materials) are to be built in accordance with the latest requirements of Series 900 of The Specification For Highway Works.

General

The latest requirements of South Yorkshire Laboratory Specification For The Supply of Materials For Use In Highway Works.

and the following:-

Base (Roadbase) material shall be spread over the sub-base and

Compaction

rolled so as to give the compacted thickness required by clause 901 of The Specification For Highway Works, and BS 4987-2 Table 1.

Where more than one layer of material is required each layer shall be thoroughly compacted to the correct levels and profile before the material for a subsequent layer is spread.

With coated macadam or asphalt bases (roadbase), the full depth of the top layer as laid 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 asphalt base (roadbase) to be overlaid with binder course, the Contractor may make up the level with additional binder course material.

SURFACING

The consolidated thickness of the respective layers of coated materials for the surfacing of carriageways, as previously specified, shall be as indicated in the Standard Construction Details.

The spreading and initial compaction of surfacing material shall be carried out by an Asphalt Finisher unless otherwise agreed in writing with The Engineer. Laying shall comply with Clause 6.3 of BS 4987: Part 2. Final compaction shall be completed as described below, shall satisfy the requirements as set out in Section 7 of BS 4987: Part 2 and shall conform to the levels and cross-sections specified.

Any results falling below 93 PRD will be deemed to have failed.

The coated material, shall be spread by means of heated tools to the correct thickness, should satisfy the requirements as set out in Clause 6.4 of BS 4987: Part 2. Final compaction shall satisfy the requirements set out in Section 7 of BS 4987: Part 2 and shall conform to the levels and cross-sections specified. Narrow strips remaining alongside machine work, if laid by hand, shall be rolled at the same time as the machine laid work, with allowance being made for extra surcharge to and compaction of the hand laid material.

The method of laying shall ensure that air voids of:-

Compacted Close Graded Surface Course materials

And

Dense Binder course and Base (Roadbase) materials

Shall be in the range of 2% to 8%.

Not more than 1 in 10 results will be permitted above 8% and no result is allowed over 10%.

Compacted Hot Rolled Asphalt material

Shall be in the range of 2% to 6%.

Not more than 1 in 10 results will be permitted above 6% and no result is allowed over 8%.

Rectification
(Refer to
General section
on page 22)

Thickness
of Layers

Spreading and
compaction of
Coated
Materials
Machine
Laying

Minimum PRD

Hand Laying

Air Voids

Material tipped from delivery lorries shall be properly turned and spread to ensure that the material at the bottom of the heap as it falls from the lorry, is not left undisturbed.

Tipping from lorries

During the whole of the operation, every precaution shall be taken to avoid segregation and to prevent the material becoming contaminated with dust or other foreign matter by the provision of sheeting.

Segregation and Contamination

After compaction, the thickness of the surfacing shall measure not less than that specified. The Contractor shall ensure that the specified thickness is laid over the whole area, and, where required by the Engineer, he shall open out sufficient areas of surfacing, each area to measure not less than 300mm square or drill cores to enable actual thicknesses to be ascertained by direct measurement.

Compacted thicknesses

In two course work, the thickness of each course shall measure not less than the specified minimum.

Surface courses and binder courses 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 long if surface course.

The surface of the binder course shall be thoroughly cleaned of dirt, mud and all other foreign matter by power washing prior to the laying of the surfacing course.

Unless the Engineer rules otherwise, a tack coat of Class K1-40 bitumen emulsion shall be applied to the binder course at the rate of 0.35 to 0.5 l/m² and allowed to "break" (turn from brown to black) unless applied by integral spray bar on the paver, before laying the surface course. The emulsion shall not be allowed to accumulate in hollows but shall be dispersed by brushing. The emulsion shall comply with BS 434 : Part 1.

No traffic shall be allowed on the carriageway during the period between the application of the tack coat and the laying of the wearing course.

Delivery and rolling temperatures are shown on pages 26 and 27.

Rectification
(Refer to
General section
on page 20

Preparation
of
Binder course

Tack coat

DELIVERY AND ROLLING TEMPERATURE

Attention is drawn to the delivery and rolling temperatures given in BS 4987 Part 2 and BS 594 which should be observed.

BS 4987 Part 2

Recommended delivery and rolling temperatures for coated macadams other than dense, heavy duty and high modulus binder course and base(roadbase) macadams.

Type of mixture including binder type and grade	Minimum temp. of mixture in lorry within 30min. after arrival on site °C	Minimum temp. immediately prior to rolling °C	
<u>Bitumen</u>			
Dense, close graded, medium graded surface courses and fine graded	290 pen 190 pen*	100 110	80 85
Dense and close graded surface course	125 pen	120	95
Open graded and single course 190 pen 95 75	290 pen	85	65

For steel slag macadam, temperatures 10°C lower than those recommended may be used

Minimum rolling temperatures for dense, heavy duty and high modulus binder Course and base(roadbase) macadams.

Binder type and grade	minimum rolling temperature °C
190 pen	60
125 pen	75
50 pen	105
35 pen	110

BS 594

Minimum rolling temperature

Binder Type	Grade	Minimum rolling temperature °C
Bitumen	50 pen	85
Lake Asphalt Bitumen	50 pen	85
Pitch Bitumen	50 pen	85
Bitumen	70 pen	80
Lake Asphalt Bitumen	70 pen	80
Bitumen	125 pen	75

NOTE TO To ensure that adequate time is available for compaction

BS 594 to be substantially completed before the temperature falls below the recommended minimum for rolling, a minimum delivery temperature, taken within 30 min. after arrival on site, of 130°C is recommended

Inclement
and cold
weather
working

Laying shall be carried out with due regard to ambient weather conditions so that materials can be properly compacted. If weather conditions are such that the performance of the pavement may be jeopardised, discontinue all operations.

General

Laying of asphalt materials shall not be carried out if free standing water is present on the surface to be covered. Laying should also be avoided as far as is practicable during heavy rain. If the wet weather threatens to be prolonged, laying of the coated macadam should be suspended.

Rain and
standing
water

For cold weather working a minimum of 24 hours notice is required by the Engineer and generally the following shall apply:-

Cold weather
working

Material for use in road pavements shall not be laid on any surface which is frozen or covered with ice.

No road pavement material in a frozen condition shall be incorporated in the Works but it may be used if acceptable when thawed out.

Materials containing bitumen binders, shall not be laid if the temperature of the surface to be covered is at or below 2°C. Where however the surface is dry, unfrozen and free from ice, laying may proceed at air temperatures in the shade at or above -1°C on a rising thermometer.

Additionally, unless the temperature of the surface to be covered is 5°C or more, rolled asphalt wearing course shall not be laid when the air temperature in the shade falls below 6°C. Laying operations below this air temperature may be allowed at the discretion of the Engineer.

Joints in Flexible Surfacing

When laying new material abutting freshly laid or old material care shall be taken to secure good adhesion between joints by cutting back the exposed joint, for a distance equal to the specified layer thickness, to a vertical face, discarding all loosened material and coating the vertical face completely with a suitable hot bitumen, or cold applied polymer modified intermediate or premium grade bitumen emulsion.

Abutting freshly
laid or
old material

Further details:- for type 4 & 5 roads are given in a) below
type 3 roads are given in b) below
Patches (all patches) are given in c) below
Bituminous emulsion specification shown in d) below

Manhole covers, kerbs, channels, gullies and similar projections against which asphalt materials are to abut shall be cleaned and painted with a thin uniform coating of 50(40/60) or 85(70/100) pen hot bitumen or, if approved in writing by the Engineer, cold applied thixotropic bitumen compound of similar grade,

Other vertical
faces

before the coated macadam is laid as indicated below.
The new material shall be tamped around and against such projections so that, after final compaction, the finished surface shall be left flush or not exceeding 6mm above such projections. Manhole covers and similar fittings shall be adjusted to the correct levels before the wearing course is laid.

- a) ON TYPE 4 & 5 ROADS - The longitudinal centre line joint will require sealing with hot run bitumen or an approved thixotropic cold compound.
- b) ON TYPE 3 ROADS AND INDUSTRIAL ESTATE ROADS - All vertical joints to be sealed, kerb faces up to the finished water line and all iron work to be painted with hot run bitumen.
- c) PATCHES (ALL PATCHES) - Vertical joints to be painted with hot run or approved cold compound for all patches in all categories of roads and footpaths - minimum size of patch 2m x 2m.
- d) SPECIFICATION FOR JOINTS - To comply with BS594 : Part 2 : Clause 6.6 .
- OR
- BS 4987: Part 2 :Clauses 6.7 & 6.8 50(40/60) or 85(70/100) penetration hot run bitumen.
- OR
- if approved in writing by the Engineer, cold applied thixotropic bitumen compound of similar grade
- e.g. COLAS (BITUKOLD LANSTAR)
- Bitumen cold joint primer or other similar approved.

Trafficking of asphalt base(roadbase) or binder courses may be permitted for a period of time before the surface course is laid. They should be blinded with coated grit that shall be carried out either by hand or mechanically with bituminous grit as specified in BS 4987, Part 2: 7.9 and the guidance given in BS 4987, Part 2-B.5.4 before being open to traffic, with due regard being paid to the following :-

Trafficking
of asphalt
Base(Roadbase)
and Binder
Courses

- (a) On Type 3, 4 and industrial estate roads limestone and blast furnace slag aggregates are not allowed, and permitted aggregates shall have a minimum P.S.V. of 55 if they are not to be covered within 6 weeks.
- (b) On type 5 roads, limestone and blast furnace slag aggregates are not permitted in if the gradient exceeds 10% (1:10).
- (c) If temporary trafficking causes polishing to the extent that a satisfactory skid resistance is not maintained then the skidding resistance should be restored to a satisfactory level by surface dressing using chippings of minimum P.S.V. 55, or the application of other surface treatment as approved in writing by the Engineer.

Tolerance in
surface levels
of pavement
courses

Road surface \pm 6mm except immediately adjacent to gullies surface water channels and manholes where it shall be +6mm/ - 0mm.

Binder course \pm 6mm

Base(roadbase) \pm 8mm

Sub-base + 10mm/-30mm when under base(roadbase), otherwise \pm 10mm

Formation + 20mm/-30mm

Surface levels shall be checked for compliance with the tolerance requirements using the method described in paragraph 702.4 of the Highways Agency Specification for Highway Works. To meet the requirements, no measurement shall exceed the permitted tolerance.

The finished surface shall be tested with a 3 metre long straight edge, laid longitudinally.

For machine laid

Surface courses, the maximum depression under a 3 metre long straight edge shall not exceed 3mm.

Binder courses, the maximum depression under a 3 metre long straight edge shall not exceed 6mm.

For hand laid

Surface courses, the maximum depression under a 3 metre long straight edge shall not exceed 6mm.

Binder courses, the maximum depression under a 3 metre long straight edge shall not exceed 9mm

Where these figures are exceeded the material shall be treated in accordance with the requirements for Rectification shown for :-

SUB BASE & BASE (ROADBASE) on page 4

SURFACING on page 24

NOTE: See separate requirements for Block Paving

BLOCK PAVING

Shall be in accordance with the requirements of and recommendations in BS 7533 except where it is varied by the project specification.

British
standard for
block paving

All block paving is to be built in accordance with the latest requirements of The Highways Agency Specification For Highway Works:- clause 1107

GENERAL

The latest requirements of South Yorkshire Laboratory Specification For The Supply of Materials For Use In Highway Works.

and the following:-

Unless agreed in writing with the Engineer, all block paving shall be concrete block paving.

Pencil edge blocks shall be used

For carriageway construction, sub-base shall be granular type 1 material in accordance with South Yorkshire Laboratory Specification No 19.

- Where the sub-base is to be subjected to residential traffic,
- a 50mm thick course of 20mm dense asphalt binder
- course shall be laid on top of the sub-base to provide
- a running surface and protection to the sub-base.

Where block paving is to be used for carriageway construction, The Contractor shall also refer to the following sections of this document:-

Page 2 - Section 1 INTRODUCTION (Assumed CBRs)
and
(Frost susceptible sub-grade)

Subgrade and
Sub-base

Page 4 - Section 2 MATERIALS- ROAD PAVEMENTS
Page 21 - Section 7 FLEXIBLE CARRIAGEWAYS - SURFACING

Sub-base and
Binder course

The subgrade, sub-base and binder course shall be prepared so that:-

- (a) the surface levels are within the tolerances given in table 1 on page 35
- (b) the longitudinal falls and crossfalls are such that no depressions hold water.

Minimum recommended gradients:-

Longitudinal fall ; 1.25% (1:80)

Crossfall ;..... 2.50% (1:40)

- (c) the surface is tight and dense enough to prevent laying course (sand layer) material being lost into the lower layers during construction and use;

(d) provision is made to:

- (1) drain water from any abutting laying course, e.g. by

installation of drainage when the laying course is on impermeable foundations;

- (2) prevent migration and loss of laying course material into the drainage system, e.g. by using a geotextile;

The extent of the site prepared for block laying shall include enough room to provide adequate foundations and backing for any edge restraint.

Edge restraints

Edge restraints should be adequate to support traffic loads and to prevent loss of laying course material from beneath the surface course. Examples are kerbs, combined kerbs and channels, established structures or rigid abutments such as paving blocks fixed vertically, bedded on and haunched with concrete.

Do not vibrate the surface course until the edge restraint, together with any concrete haunching, has gained sufficient strength.

Are to be found in section 13

Standard Construction details

LAYING COURSE (SAND BEDDING LAYER)

Laying course (and jointing material) shall be naturally occurring sand in accordance with the recommendations given in B.S.7533-3 and Table 2 on page 30 of this specification.

Material

The moisture content of the laying course should be as uniform as possible and the material should be moist without being saturated.

Moisture content

All material to be used must be stockpiled under a cover.

Stockpiling

Construct the laying course so that after compaction it forms a layer approximately 35mm thick below the paving blocks.

Screeding

Where closer tolerances than those given in table 1 on page 30 for the level of the sub-base have been achieved, or where a binder course has been used, a thinner laying course can be used. However, in no case should the material be less than 25mm thick at any point.

The object of screeding the laying course is to produce a uniform surface, to the specified design profiles and falls, at a uniform degree of compaction. When setting up screeding rails, allowance should be made for the subsequent compaction of the laying course

If any disturbance of the prepared laying course by pedestrian or wheeled traffic occurs, prior to placing paving blocks, re-screed areas of laying course material.

Construct the laying course using one of the methods described below:-

LAYING METHODS

Spread the material loose in a uniform layer to approximately the required final depth below the surface profile. Compact this layer using a vibrating plate compactor. Spread a further layer of material about 15mm thick and screed it to create a loose surface on which the paving blocks can be placed.

Precompaction

Spread the material loose in a uniform layer, and screed it to the thickness required to give the specified design thickness after the paving blocks have been laid and vibrated into place.

Compaction after laying

The precompaction method is preferable because it helps to ensure uniform density and compaction of the laying course and hence improves surface tolerances.

Where a nominal compacted thickness of 35mm is to be used, if previous experience of a particular material is lacking, a small trial area will be needed to determine the allowance.

Trial areas

The area of laying course prepared should generally be such that its boundary is not less than 1m ahead of the laying face, except at the end of the working period when the boundary should be no more than 1m ahead of the laying face.

Block laying boundaries

The working edge should be protected overnight and it may be necessary to remove an area of blocks prior to screeding for the days operation.

Table.1. Tolerances on surface levels

Layer of pavement		Maximum permissible deviation from design level
Sub-layer:	sub-base	+/- 20mm
	Binder course (roadbase)	+/- 15mm
Surface course:	overall	+/- 6mm
	flatness	10mm under a 3m straightedge 2mm between adjacent blocks
	adjacent to gullies, surface drainage channels and outlets (see note)	+ 6/- 0

LAYING PAVING BLOCKS

Lay paving blocks so that the surface levels are within the tolerances given in table 1. Make minor adjustments to maintain the bond pattern and ensure that the joints remain wide enough for sand filling.

Surface Course

Details of the bond pattern should be agreed before commencement. Where rectangular blocks are being used in areas subject to vehicular traffic, herringbone bond should be used to minimise creep and to ensure better radial distribution of wheel loads.

Bond pattern

Follow an order of laying which maintains an open working face and does not trap paving blocks. The first row of blocks should be aligned against the edge restraint or by using a straightedge or string line. Check the alignment of blocks periodically, e.g. by using string lines, and make adjustments where necessary.

Order of Laying

NOTE

Block paving is designed to function with sand-filled joints, which will normally lie in the range of 2mm to 5mm when placed hand tight. The joint width will be influenced by block shape and bond pattern.

Lay whole paving blocks first, followed by closures. Complete the area to be laid, as far as possible using whole blocks. Where appropriate, incorporate block shapes designed to assist with the formation of boundaries and with changes in direction. Complete infilling before compaction commences.

Wherever possible, infilling to boundaries and obstructions should be completed as the laying of the surface course proceeds.

Infilling

Trim paving blocks to shape and size to form boundaries. Do not insert pieces of a size less than one-third of a full block. This can often be achieved by altering the bond pattern slightly at the edges of the paving and trimming some of the paving blocks inboard of the edge blocks.

Trimming

To work round any obstructions, cut the paving block as necessary to fill in any irregular shape.

Obstructions

Fully compact the surface course using a plate compactor with a plate area of not less than 0.25m², transmitting an effective force of not less than 75kN/m² of plate at a frequency of vibration in the range 75Hz to 100Hz. Alternatively, use any compacting equipment which will achieve the same degree of compaction or better. It is important to fill the lower portion of the block-to-block joint with the laying course material. Carry out compaction as soon as possible after laying but not within 1m of any laying face. Apart from this edge strip, do not leave any area of paving uncompacted at the completion of the day's work.

Compaction
of Block
Paving

Ensure that the finished surface levels are within the tolerances given in table 1 on Page 30.

The contact area of a plate compactor may be measured by standing the plate on a flat smooth level surface and sliding a piece of card in from both front and rear until it meets the position where the plate touches the ground.

Measuring
contact area
of plate
compactor

After compaction of the surface course, spread sand or crushed rock fines over the surface and brush it into the joints. Materials complying with the grading in table 2 shall be used. Do not use a sand which might stain the pavement surface, if this is an important consideration.

Joint
Filling

NOTE.1. Filling between the joints is very important. It interlocks the paving and helps impart static load bearing characteristics. The use of dry material will assist in rapid joint penetration.

Vibrate the block paving to ensure complete filling of the block-to-block joint by the surface-applied sand. Where necessary add further sand and re-vibrate the paving. Complete joint filling and final compaction as soon as practicable after laying.

NOTE.2. Where block paving is to be used by industrial vehicles imposing exceptionally high point loads, it is advisable to further compact the entire pavement after joint filling.

NOTE.3. Concrete blocks should not be vacuumed for at least three weeks after laying in order to reduce the risk of jointing sand being lost.

It may be necessary to provide joint stabilisation compound and block surface sealants at the discretion of the Engineer.
Table 2 - Laying course sand etc.

The surface course shall be inspected after an early period of traffic use and additional sand filling brushed in where necessary

Early
Trafficking

Table 2 Laying course sand and joining sand to comply with BS7533: Part 3: Annex D

Nominal aperture of sieve size	Percentage by mass passing through sieve	
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sand

	%	%
--	---	---

10.00mm	100 -----	
5.00mm	90-100 -----	
2.36mm	75-100	100
1.18mm	55-90 -----	95-100
600um	35-65 -----	50-100
300um	10-45 -----	15-60
150um	0-10 -----	0-15
76um	0-3-----	0-3

NOTE: Sands should be graded by washing, decanting
and dry sieving in accordance with BS812 : Part 103

8. FOOTWAYS AND VEHICLE CROSSINGS

GENERAL

All footways and vehicle crossings are to be built in accordance with the latest requirements of Series 1100 Kerbs Footways and Paved Areas of The Specification For Highway Works:-

The latest requirements of South Yorkshire Laboratory Specification For The Supply of Materials For Use In Highway Works.

and the following:-

Drawings showing details of proposed footways and vehicle crossings areas shall be submitted to The Engineer prior to commencement of the works.

Drawings

FOOTWAY EDGING

Precast concrete edging as previously specified shall be laid closely jointed between footpath surfaces and verges or elsewhere if directed by the Engineer. The edging shall be solidly bedded on concrete 100mm thick and haunched (both sides) with 75mm thick concrete so as to ensure that it does not move during the footpath construction and shall be laid to correct alignment and level. After completion, any unit found to be more than 6mm out of line or level at either end of the unit shall be lifted and re-laid.

Fixing

The Contractor shall be responsible for rectifying any movement that occurs prior to and during the maintenance period.

Rectification

FOOTWAYS AND HARDENED MARGINS

The sub-base for both footways and hardened margins are to be formed with Type 1 sub-base material complying with South Laboratory specification No 19, properly compacted. The completed surface shall be free from irregularities and loose material and is to be true to cross section, line and level.

Sub-Base

Note; Sub-Base is to extend under concrete bedding for kerbs and edging.

ASPHALT MATERIALS

Binder courses for asphalt footways shall be dense binder course that shall be laid in accordance with BS 4987-2.

Binder course

6mm size Dense Surface Course that shall be laid in accordance with BS 4987-2 and laid evenly on the binder course to give a minimum compacted thickness of 25mm. Where the surfacing abuts kerbs, the final surface shall be between 2mm and 3mm proud of the top of the kerb and shall be true to level and the required crossfall.(3% min - 4% max).

Surface Course for Footways

Compaction shall comply with B.S. 4987-2 Clause 7. (Please refer to tables for delivery & rolling temperatures extracted from B S 4987 on page 22)

Compaction of asphalt materials

The recommended roller for all footway and footpath works shall be a double drum vibratory roller TV.75 or BW75ADL (articulated) or similar approved.

Recommended rollers

FLAGS

It may be necessary to lay a bonding course to avoid "creep" in large areas on steep gradients.

Bonded courses of flags properly bedded on the prepared base with a 10mm sand and cement mortar bed, closely jointed, and driven into position with a heavy maul. The outer edge of flags where the footway abuts kerbs, is to be kept level with the latter and the footway shall be laid true to level and required crossfall. The flags shall be laid in courses at right angles to the kerbs.

BLOCK PAVING

Block paving may be used as an alternative i.e. 60mm thick blocks (Pencil Edge) on 35mm compacted sand on 150mm of Type 1 sub-base to South Yorkshire Laboratory Specification Number 19.

VEHICLE CROSSINGS

Footway Vehicle Crossings subjected to more than private car traffic shall be constructed to the same specification as the adjacent carriageway. Footway vehicle crossings subjected to private car traffic only shall be constructed in accordance with the Standard Details.

PEDESTRIAN CROSSINGS

Dropped kerbs to facilitate the passage of wheelchairs and prams, shall be installed at all road junctions and other pedestrian crossing points, as directed by the Engineer, and shall be constructed in accordance with the Standard Details. (Maximum upstand 6mm).

LAYING AND COMPACTION OF ASPHALT MATERIALS

Materials shall be compacted as soon as rolling can be effected without causing undue displacement of the material and at no less than the minimum rolling temperature. The material shall be uniformly compacted by an appropriate roller capable of meeting the air void requirements across the full width.

Compaction

The method of laying shall ensure that air voids of compacted asphalt materials shall be in the range of 2% - 8%.

Air voids

Not more than 1 in 10 results will be permitted above 8% and no result is allowed over 10%.

Delivery and rolling temperatures to be in accordance with the tables shown on page 27.

Delivery and
rolling
temperatures

9. HIGHWAY VERGES AND PLANTING

GRASS AND GROUND COVER PLANTS

All grassed and planted areas are to be built in accordance with the latest requirements of Series 3000 of The Highways Agency Specification For Highway Works where it does not conflict with BS 4428:1989

General

And the following:-

Drawings/planting plans indicating species, size, spacing/m² with appropriate schedules and appendices shall be submitted for specific approval for the scheme prior to the commencement of works.

Drawings

Topsoil to comply with BS 3882 figure K1 for texture and And BS1377 part 3 pH

Topsoil

Depth to be 450mm for shrubs, to be top quality vegetable soil maximum stone content 5% dry weight, not more than 50mm any dimension.

Soil containing Japanese Knot weed and Mares Tail will be rejected.

The surface is to be cultivated down to a minimum depth of 150mm, bring to fine tilth and regulate to evenly running levels. Clear out all weeds, large stones, broken brick, perennial weeds and roots.

Cultivation

British conifer bark mulch containing less than 5% wood, minimum thickness of 75mm over entire planted area, supply ENMAG (or similar approved) and mix into bark at a rate of 50 g/m²

Bark mulch
and Fertilizer

Approved fertiliser evenly distributed at not less than 68 grammes per m² (20.10.10).

Approved species of plants should be well established and free from disease, with a minimum 3 good growing points.

Plants

Size & spacing:- Ground cover 200 - 300mm - 15/m²
Shrubs (medium) 450 - 600mm - 6/m²
Hedging Plants 600 - 900mm - 4/Lin-m

The area is to be well maintained free from grass, weeds and litter and watered in dry weather.

Maintenance

GRASS

Nothing less than 900mm width.

Minimum width

Soil depth of 150mm reduced to a fine tilth, free from stones and other debris.

Topsoil

After settlement, finished level to be 10mm above adjacent concrete edging/kerb.

Finished
level

Approved fertiliser evenly distributed at not less than 68 grammes per m²(20.10.10).

Fertiliser

Low maintenance grass seed or turf shall be used.

Seed

During the maintenance period all verges are to be maintained in healthy condition, free from weeds and grass verges are to be cut regularly.

Maintenance period

At the end of the maintenance period there should be 100% cover of planted and grassed areas which are 97% weed free, with no dead or diseased plants.

A tree planting Specification is available on request.

Tree planting Specification

10.

STREET LIGHTING

All street lighting works are to be in accordance with the latest requirements of Series 1300 & 1400 of The Highways Agency Specification For Highway works.

General

And the following:-

The design and installation of street lighting schemes is normally undertaken by The Highway Authority. An early approved design which may include illuminated traffic signs is required to avoid any abortive works.

Design

A list of acceptable equipment is available, on request. Developers wishing to deviate from this list should discuss the matter with the Lighting Engineer at the earliest opportunity.

Acceptable
Equipment

The installation of street lighting should be related closely to the occupation of dwellings and must not be left until the development as a whole is nearing completion.

Installation

Where the work is to be carried out by the Developer, the Engineer should be asked to approve the positions of the columns on site prior to erection. The Developer must make all the necessary arrangements with the Electricity Company for the connection of the supply. Alternatively, subject to receipt of an official order, the Highway Authority will provide and install equipment on behalf of the Developer, and make the necessary arrangements for the connection of the electricity supply.

Lighting columns should be located within the limits of the highway, normally at the back edge of footway or verge. In certain instances, however, it may be acceptable to attach lighting units to buildings, for example in mews courts. This will normally require a way-leave agreement between the owner, Electricity Company and the Highway Authority.

11.

COMPLETION OF WORKS

Grass verges are to be rolled during the progress of the work and during the period of maintenance, and well watered in dry weather. The Contractor shall remove and replace any areas that are not in a healthy condition, up to the end of the period of maintenance. The grass is to be cut on a regular basis and not less than 4 times in 12 months.

Maintenance
of Verges

CLEANLINESS OF THE SITE

The whole of the works shall be left on completion in a clean and tidy condition.

General

It is an offence under Section 151 of the Highways Act 1980 to deposit deleterious material on the Public Highway. The Developer must ensure that appropriate measures for cleaning are provided within the CDM Regulations. It is normal for this to be a condition of the planning permission.

Deleterious
matter

The Contractor is to cleanse the carriageway, footway and verges regularly during the progress of the works, as required during their term of maintenance and once thoroughly immediately before the termination of the maintenance period.

Cleansing

PROVING DRAINS

On completion of the works all drains, manholes and gullies shall be rodded, flushed with water and left clean and free from obstruction.

Rodding

12.

MISCELLANEOUS

Street lighting, traffic signs, road markings and street name plates shall be provided at the expense of the Developer. All these items shall comply with the edition of the relevant British Standard and Specification for Highway Works current at the time of construction for illuminated signs (see page 1).

Street Lighting signs etc.

Street name plates are to be erected prior to occupancy of any properties.

Street name plates

When requested by the Engineer, grit bins shall also be provided. at the expense of the Developer.

Grit bins

Grit Bins will generally be required on roads and/or footpaths with a gradient steeper than 1 in 12 (8%) and must be maintained and kept full of salt by The Developer until adoption.

Further details in this connection can be obtained from the Engineer upon request.

Any retaining wall to which Section 167 of the Highways Act 1980 applies or any other retaining wall or Structure which the Developer intends to offer for adoption by the Highway Authority must be approved by the Engineer. Notes for guidance on such matters are available on request.

Retaining Walls

The extent of the adoptable areas are to be clearly defined to the satisfaction of the Engineer.

Definition of Highway Boundary

Adoptable parking areas adjacent to roads must be surfaced with a material which is not susceptible to damage by oil droppings and such surfacings should preferably be brindle coloured block paving with approved edge restraint.

Parking Areas

13.

STANDARD CONSTRUCTION DETAILSFOOTPATHS, FOOTWAYS AND FOOTWAY VEHICLE CROSSING FOR CAR USE ONLYSurface Course

25mm thick

0/6mm DBM 190 Pen Surface Course L/Stone to BS 4987-1: Clause 7.5

0/4mm FG 190 Pen Surface Course L/Stone to BS 4987-1: Clause 7.7

may be used if approved by the Engineer.

Binder Course

55mm thick

0/20mm DBM 190 Pen Binder Course L/Stone to BS 4987-1: Clause 6.5

Sub-Base

150mm thick

Type 1 Sub-Base to comply with Specification for Highway Works Clause 803.

Must be free from extraneous matter. Weeds must be removed and the subgrade sprayed with total weedkiller.

Note :

Concrete block paving may be used as an alternative i.e. 60mm thick blocks on 35mm compacted sand to BS 7533-3 (and as described in SECTION 6 BLOCK PAVING TABLE 2 of this specification) on 150mm thickness of Type 1 sub-base.

Steep Gradients

Footpaths with a gradient steeper than 10% (1 in10) will require: -

1. Handrail (Please see step detail for handrail specification)
2. Possibly special surface treatment.

Note :

The use of a single drum roller is not permitted.

CARRIAGEWAY CONSTRUCTION FOR TYPE 2 ROADS

125mm kerb face - 155mm kerb face at bus stops

Industrial Roads

Surface Course

40mm thick

0/14mm SMA 50 pen surface course H/Stone PSV 60 to South Yorkshire Laboratory Specification No 41.
OR

45% 0/10mm High Stone Content 50 pen surface course steel slag to South Yorkshire Laboratory Specification No 29 with 10mm aggregate (or 14mm aggregate at the request of the Engineer)

Note :

Limestone and blast furnace slag aggregates are not allowed in the carriageway surfacing course.

Binder Course

70mm thick

0/20mm DBM 125pen binder course H/Stone to BS 4987-1;Clause 6.5

Notes

1. Blast furnace slag and limestone aggregate are only allowed in the carriageway binder course if it is to be covered within 6 weeks.
2. Coated grit will be required on all binder courses unless laid concurrently with the surface layer to BS 4987-1:Clause 7.9

Base (Roadbase)

120mm thick

0/32mm DBM 125 pen base L/Stone to BS 4987-1:Clause 5.2.

Sub-Base

Thickness in accordance with CBR value of the Sub-Grade.

470mm thick

To be laid unless site investigation indicates that a lesser thickness will suffice. Any variation is to be agreed in writing with the Engineer.

Type 1 Sub-Base to comply with Specification for highway Works Clause 803.

Footways are to be as previously described but footway vehicle crossings shall be constructed as the adjacent carriageway.

The above is to read in conjunction with Section 7 FLEXIBLE CARRIAGEWAYS.

CARRIAGEWAY CONSTRUCTION FOR TYPE 3 ROADS
(MAIN ROADS AND PARADES)

125mm kerb face - 155mmkerb face at bus stops

Surface Course

40mm thick

0/14mm SMA 50 Pen Surface Course H/ Stone PSV 60 to South Yorkshire Laboratory Specification No 41.(A lesser thickness of SMA may be permitted if agreed in writing with the Engineer see note 1 below)

OR

45% 0/10mm High Stone Content 50 Pen Surface Course Steel Slag to South Yorkshire Laboratory Specification No 29 with 10mm aggregate (or 14mm aggregate at the request of the Engineer)

Note

Limestone and blast furnace slag aggregates are not allowed in the carriageway surface course

Binder Course

50mm thick

0/20mm DBM 125 Pen Binder Course H/Stone to BS 4987-1:Clause 6.5.

Notes

1. If a reduction in thickness of Surface Course is approved then the Binder Course thickness shall be increased by appropriate amount.
2. Blast furnace slag and limestone aggregates are not allowed in the carriageway binder course unless the binder course is to be covered in 6 weeks.
3. Coated grit will be required on all binder courses unless laid concurrently with the surface layer to BS 4987-1:Clause7.9.

Base (Roadbase)

100mm thick

0/32mm DBM 125 Pen Base L/Stone to BS 4987-1: Clause 5.2

Sub Base

Thickness in accordance with CBR value of Sub Grade

470mm thick

To be laid unless site investigation indicates that a lesser thickness will suffice. Any variation is to be agreed in writing with the Engineer.

Type 1 Sub-base to comply with Specification for Highway Works Clause 803.

The above is to be read in conjunction with Section 7 FLEXIBLE CARRIAGEWAYS.

CARRIAGEWAY CONSTRUCTION FOR TYPE 4 ROADS
(COLLECTOR AND LOCAL STREETS)

100mm kerb face - 155mm kerb face at bus stops

Surface Course

30mm thick

0/10mm CG Surface Course 125 Pen H/Stone to BS 4987-1:Clause 7.4

Note :

Limestone and blast furnace slag aggregates are not allowed in carriageway surfaces courses.

Binder Course

50mm thick

0/20mm DBM 125 Pen Binder Course H/Stone to BS 4987-1: Clause 6.5

Notes

1. Limestone and blast furnace slag aggregates are not allowed in the carriageway binder course.
2. Coated grit will be required on all binder courses unless laid concurrently with the surface layer to BS 4987-1:Clause 7.9

Base (Roadbase)

90mm thick

0/32mm DBM 125 Pen Base L/Stone to BS 4987-1: Clause 5.2

Sub Base

Thickness in accordance with CBR value of sub-grade.

440mm thick

To be laid unless site investigation indicates that a lesser thickness will suffice. Any variation is to be agreed in writing with the Engineer.

Type 1 Sub-Base to comply with Specification for Highway Works Clause 803.

The above is to be read in conjunction with Section 7 FLEXIBLE CARRIAGEWAYS.

CARRIAGEWAY CONSTRUCTION FOR TYPE 5A ROADS
(VILLAGE STREET)

100mm kerb face

Surface Course

25mm thick

0/6mm DBM 125 Pen Surface Course H/Stone to BS 4987-1: Clause 7.5

Note :

Limestone and blast furnace slag aggregates are not allowed in the carriageway surface courses.

Binder Course

50mm thick

0/20mm DBM 125 Pen Binder Course H/Stone to BS 4987-1: Clause 6.5

Note :

Coated grit will be required on all binder courses unless laid concurrently with the surface layer to BS 4987-1: Clause 7.9

Base (Road Base)

70mm thick

0/32mm - DBM 125 Pen Base L/Stone to BS 4987-1: Clause 5.2

Sub-Base

Thickness in accordance with CBR value of the Sub-Grade

390mm thick

To be laid unless site investigation indicates that a lesser thickness will suffice. Any variation is to be agreed in writing with the Engineer.

Type 1 Sub-Base to comply with Specification for Highway Works Clause 803.

The above is to be read in conjunction with Section 7 FLEXIBLE CARRIAGEWAYS

SHARED SURFACE CONSTRUCTION FOR ACCESS WAYS/ACCESS COURT/MEWS COURT
(TYPE 5B)

RECTANGULAR INTERLOCKING CONCRETE BLOCK PAVING

(Pencil Edge), (Fineline), (Chamferless) or (Mini chamfer).

60mm Thick - Concrete block paving laid on a screeded layer 35mm compacted thickness of naturally occurring sand, complying with BS 7533 : Part 3 (and as described in SECTION 6- BLOCK PAVING TABLE 2 of this specification) Method of laying to be in accordance with BS 6717 Part 3. Other types of block paving may be approved on request.

Unless otherwise approved the blocks shall be 200mm x 100mm.

Colours of blocks to be restricted to Buff, Red, Charcoal, and Brindle (brown, grey, red) in a combination to be agreed by the Engineer.

BINDER COURSE

50mm Thick - 0/20mm DBM 125 Pen Binder Course H/Stone to BS4987-1: Clause 6.5

SUB-BASE

Thickness in Accordance with C.B.R. Value of Sub-grade

340mm Thick - To be laid unless site investigation indicates that a lesser thickness will suffice. Any variation is to be agreed in writing with The Engineer

Type 1 granular sub-base to South Yorkshire Laboratory Specification No. 19.

GENERAL REQUIREMENTS FOR KERBING, CHANNELLING & EDGING
KERBING

All kerbs, channels and edgings must be hydraulically pressed precast concrete to BS. 7263 and South Yorkshire Laboratory Specification No. 11. Non-standard or special kerb on Type 5 roads to be agreed with the Engineer.

KERB SIZE

125mm x 250mm half battered kerbs.

125mm x 150mm bullnose dropped kerbs (centres) on type 3,4 & 5A roads.

50mm x 150mm flat topped edgings for footpaths.

Special kerbs as approved by the Engineer
(Red, Charcoal, Buff or Brindle).

KERB FACE

100mm on Type 4 and 5A roads

125mm on Type 3 roads and industrial estate roads

30mm on Type 5B (or other approved).

25mm at vehicle crossings. (See typical vehicle crossing detail)

0-6mm at pedestrian crossings. (See typical pedestrian crossing detail)

RADIUS KERBS

For kerb radii up to 12m use properly formed radius kerbs.

For radii between 12m and 20m use 450mm long, straight kerbs, above 20m radius use 900mm long, straight kerbs.

KERB RACE

Concrete to be ST4 to the following dimensions:-

275mm wide x 150mm deep for kerbing

425mm wide x 150mm deep for kerbing and channelling together

Note :

Concrete shall be vibrated with a vibrating poker to ensure adequate compaction

200mm wide x 100mm deep wet bed concrete for edging.

Wet bed concrete for kerbing, channelling and string courses, to the dimensions shown above may be allowed on short sections as an alternative if agreed in writing with the Engineer.

Kerbs must be bedded on 1:4 sand/cement mortar laid a maximum of 25mm thick and a minimum of 13mm thick.

Kerbs must be properly backed with 150mm concrete as shown on the typical cross section. Edgings are to be haunched (both sides) with 75mm thick concrete. String courses shall be haunched both sides with 150mm thick concrete.

CHANNEL BLOCKS

Hydraulically pressed concrete blocks size 150mm x 125mm (150mm) shall be used adjacent to kerbs when conditions described in SECTION 6. KERBS, FOOTWAYS AND PAVED AREAS (CHANNEL BLOCKS) prevail.

Dished channels are not permitted.

Square/Mews/Courts that are block paved and edge drained must be steeper than 1.25% (1 in 80). String courses shall comprise 125mm x 255mm precast concrete channel blocks or 125mm (150mm) x 150mm in 450mm lengths.

97. MANHOLES AND HIGHWAY DRAINS

Generally all manholes and highway drains shall be constructed and laid in accordance with current edition of Sewers for Adoption.

Clay pipes and fittings shall be in accordance with the requirements of BS.65. Concrete pipes and fittings shall be in accordance with the requirements of BS. 5911 and shall be fitted with approved flexible joints.

Plastic pipes and fittings shall be in accordance with the requirements of EN1401-1 BS 4660 and the water industry specification W1S 4/35/01.

Gully connections shall be surrounded with 150mm thickness ST4 concrete and include a flexible joint on each pipe.

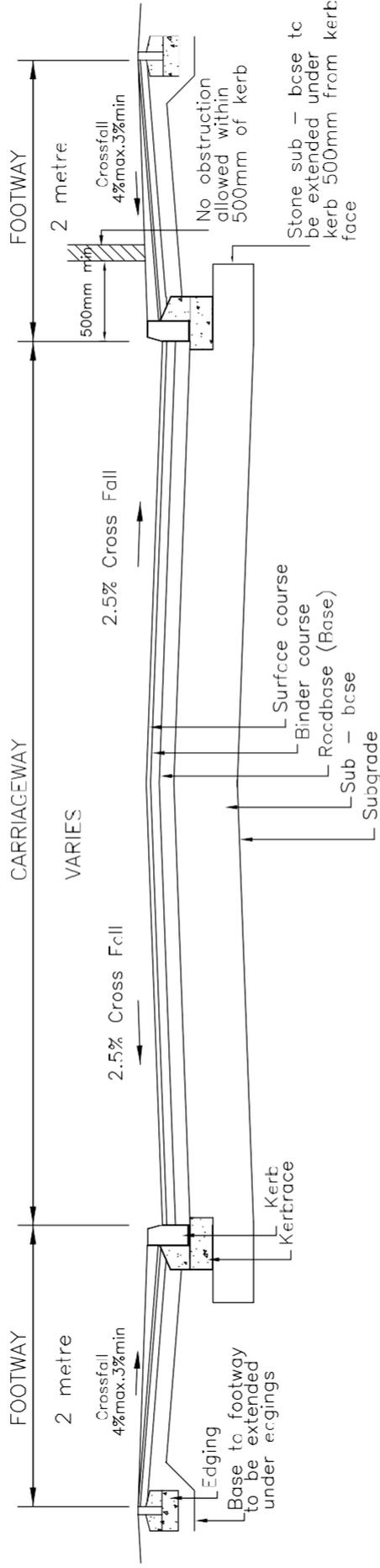
Where the cover to a pipeline laid under a carriageway is 1.2m or less, it shall be surrounded with 150mm thickness ST4 concrete.

Where a concrete surround is not required, pipelines shall be laid on a concrete or granular bed designed in accordance with "Simplified Tables of External Loads or Buried Pipelines" issued by the Transport Research Laboratory. Gully connections should not exceed 20m in length.

Drain trenches are not to be backfilled until the pipework has been approved by the Engineer which may include air and/or water tests.

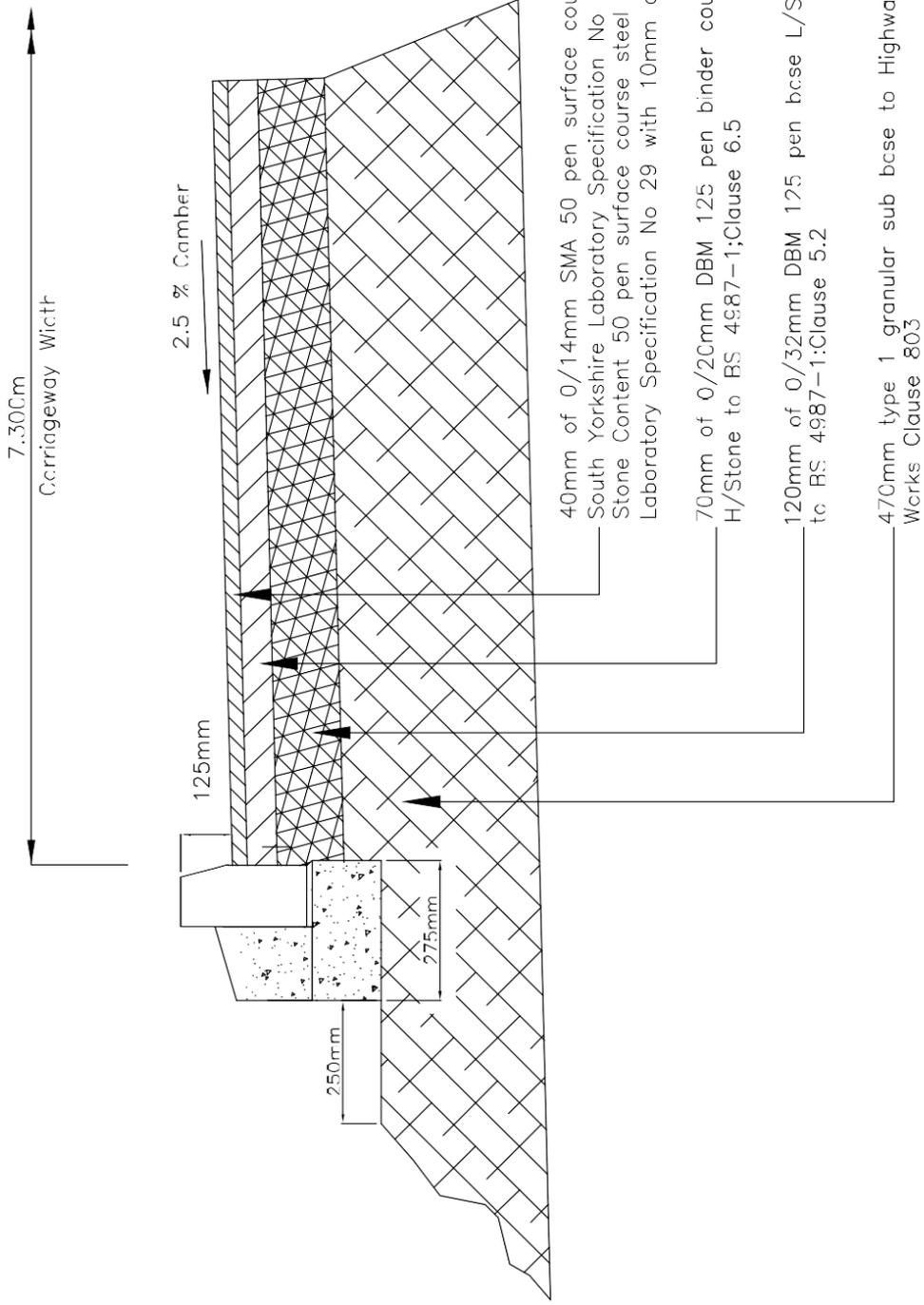
Trenches in the carriageways are to be backfilled with Type 2 granular material to South Yorkshire Laboratory Specification No. 20 (or other material approved in writing by the Engineer) which shall contain a minimum of 10% of material retained on a 37.5mm BS Sieve.

Typical Cross Section Showing Constructional Elements



(All dimensions in millimetres - Do not scale)

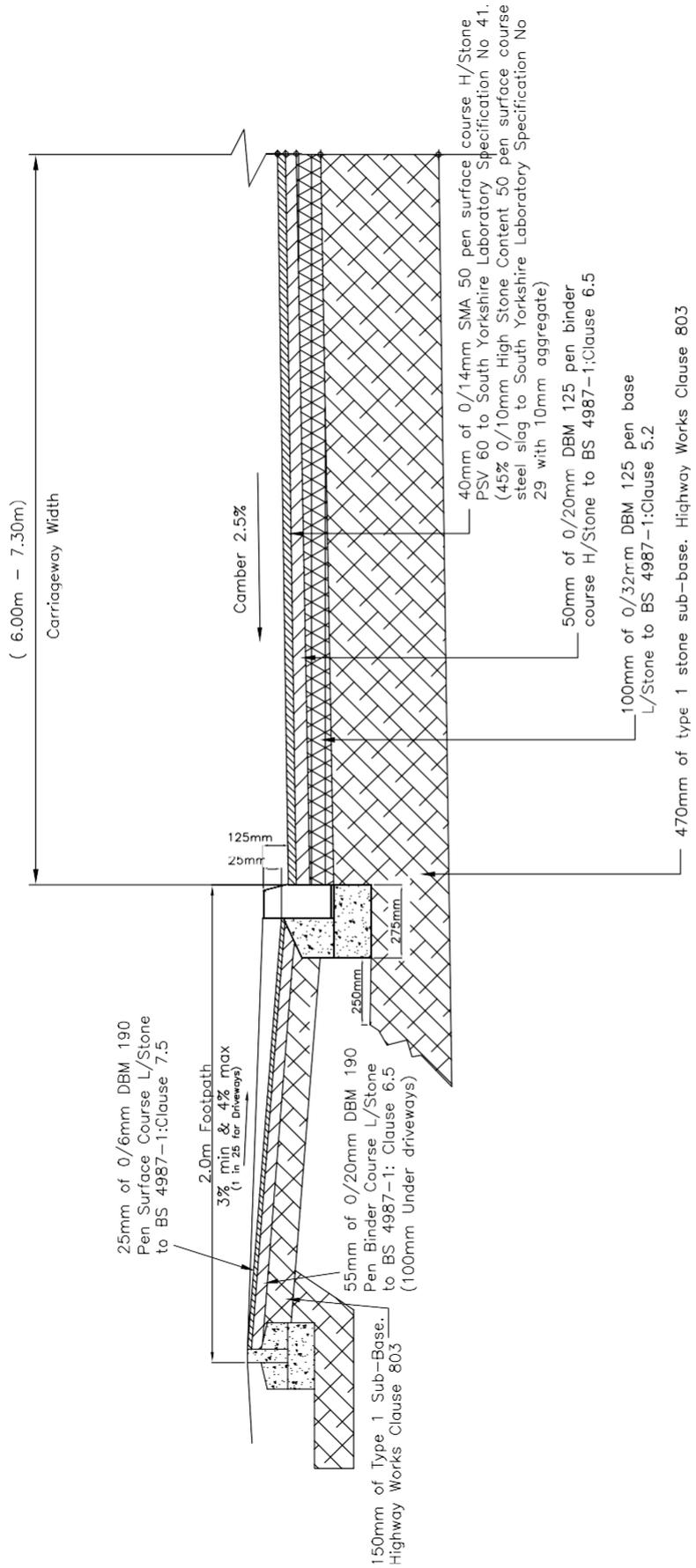
Title	Typical Cross Section Of Carriageway	Date	03/03	Drawing No	Rev
				13/1	



(Industrial Estate Road)

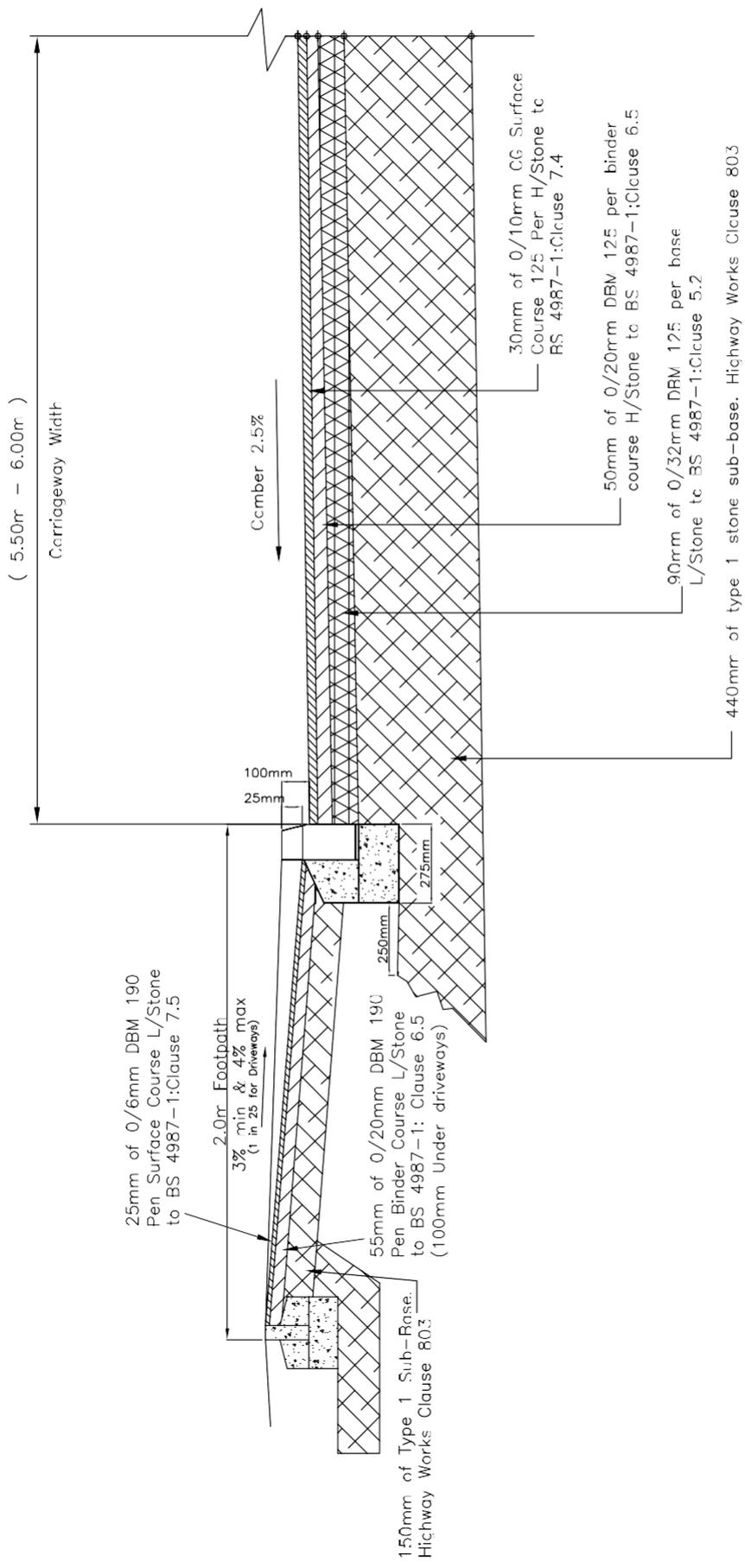
(All dimensions in millimetres - Dc not scale)

Title	Standard Carriageway Cross Section	Date	Drawing No	Rev
		03/03	13/2	



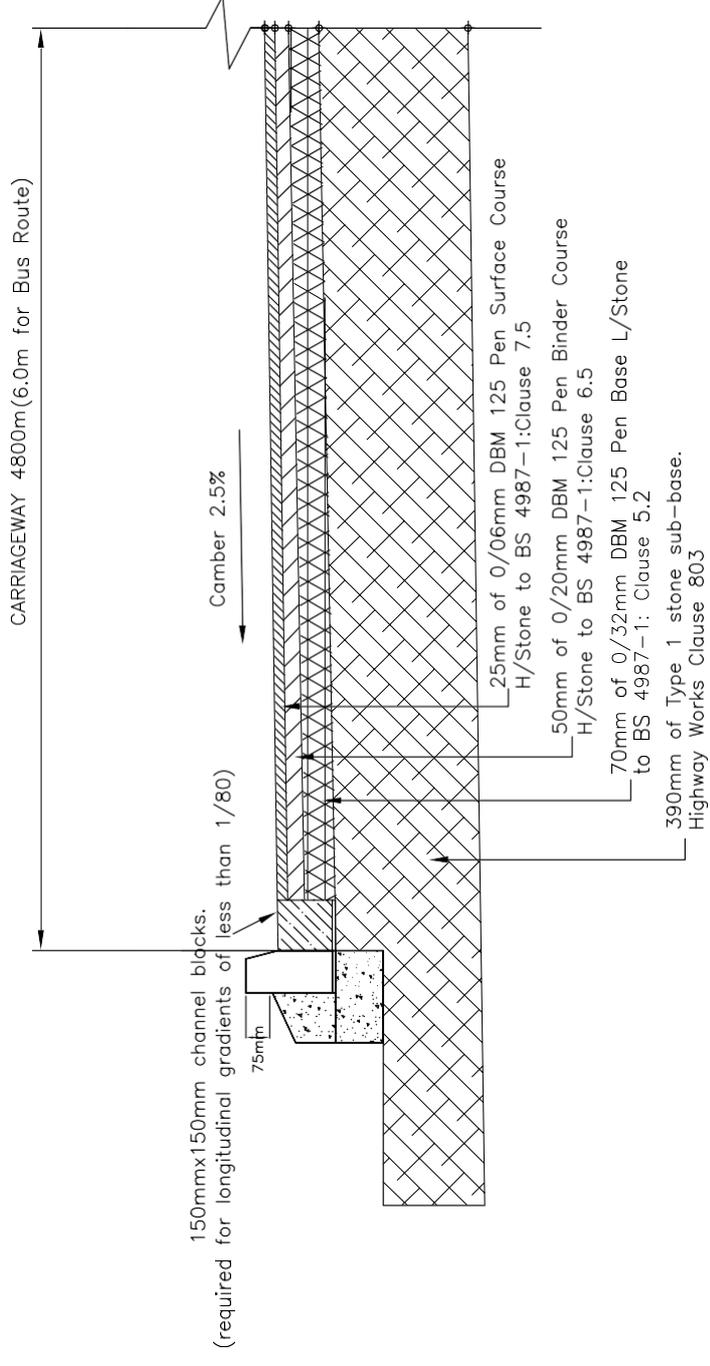
(All dimensions in millimetres – Do not scale)

Title	Standard Carriageway Cross Section (Type 3 Road)	Date	Drawing No	Rev
		03/03	13/3	



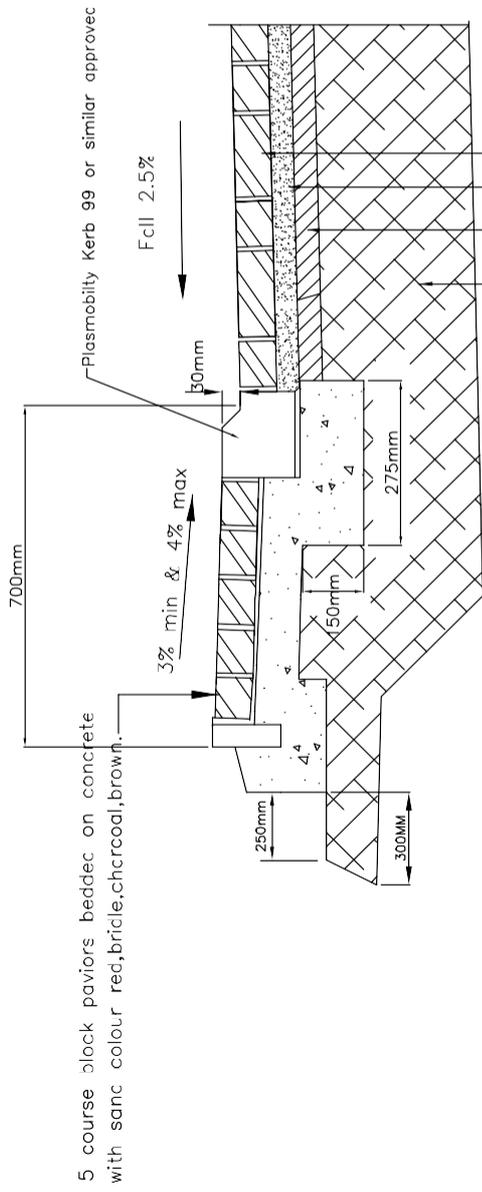
(All dimensions in millimetres - Do not scale)

Title	Standard Carriageway Cross Section (Type 4 Road)	Date	Drawing No	Rev
		03/03	13/4	



(All dimensions in millimetres – Do not scale)

Title	Standard Carriageway Cross Section (Type 5A Road)	Date	03/03	Drawing No	13/5	Rev
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- 60mm concrete block paviors laid in a 45° herringbone pattern (colour red,brindle,charcoal,brown),with pencil edge
- 35mm naturally occurring silicc sand as approved by Engineer.
- 50mm of 0/20mm DBM 12.5: Pen Binder
- Course H/Stone to BS 4987-1:Clause 6.5
- 340mm type 1 sub - base to Highway Works Clause 803

Hard Margin Details.

(All dimensions in millimetres - Dc not scale)

Title	Date	Drawing No	Rev
Standard Carriageway Cross Section (Type 5B Road)	03/03	13/6	



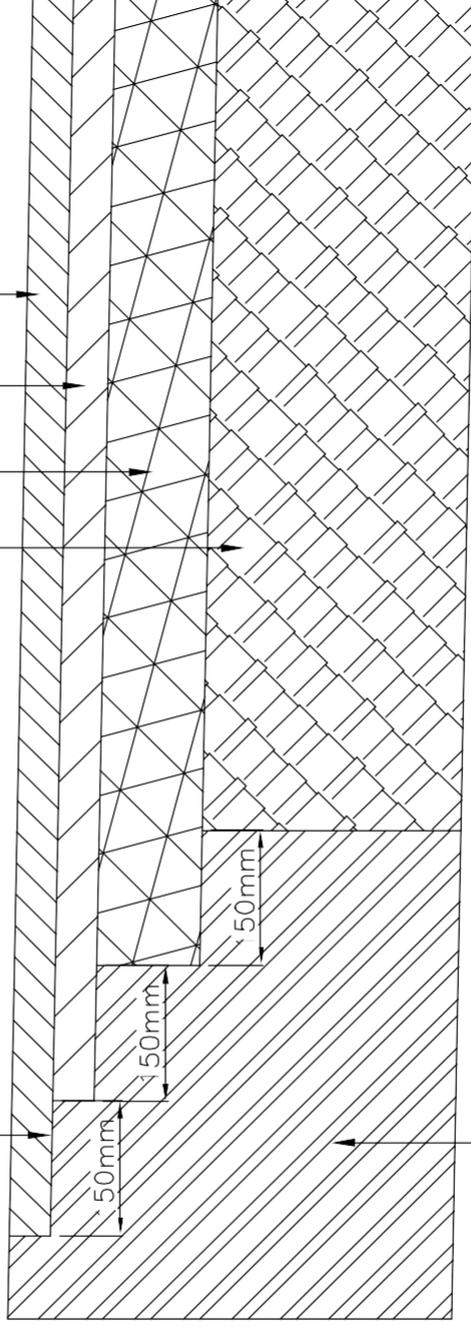
30mm of 0/10mm Close Graded Bitumen Macadam Surface Course

50mm of 0/20mm Dense Bitmac Binder course

90mm of 0/32mm Dense Bitumen Roadbase

440mm Type 1 Subbase

All vertical and horizontal faces to be painted with tack coat prior to laying the respective layers.

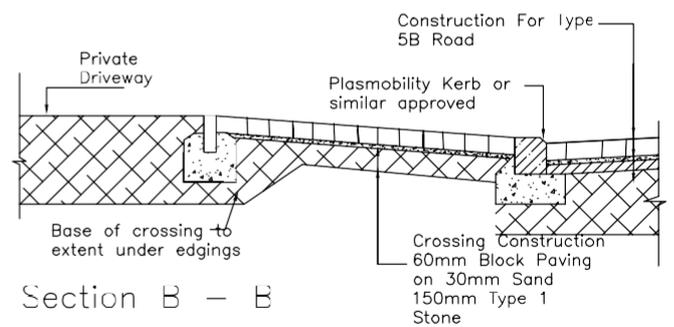
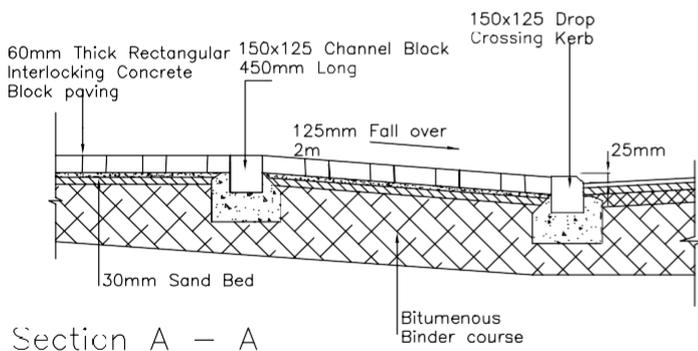
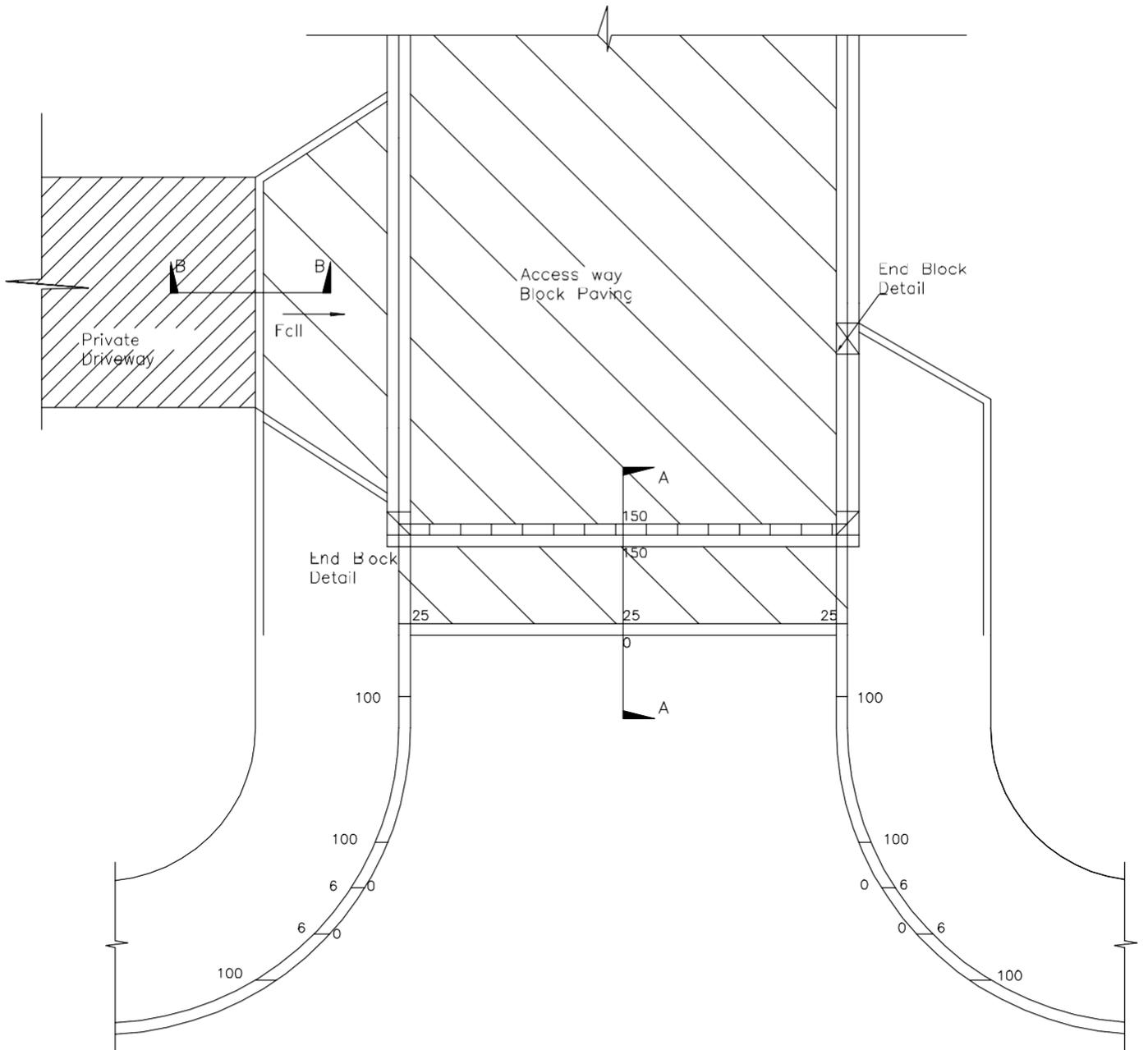


Tie In Detail

Existing Carriageway Construction

(All dimensions in millimetres – Dc not scale)

Title	Date	Drawing No	Rev
Tie in Details Example (Type 4 Road)	03/03	13/7	



< All dimensions in millimetres - Do not scale >

	Title Access way Detail	Date 03/03	Drawing No 13/8	Rev
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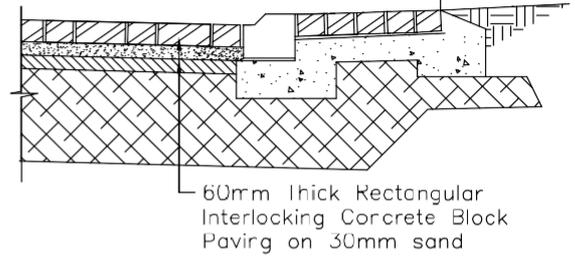
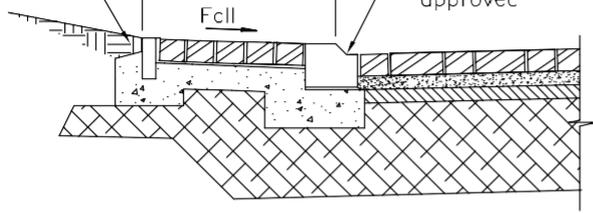
150mm x 50mm
Concrete Lo
Edging

700mm min
Block Paving On
Sand

Plcsmobility
Kerb or similar
approvec

Block Paving Loic On
150mm
Concrete Bedding
(or as oppoosite)

Extert Of
Adoptior



5500

700mm min Block
Paved Berm With Fall
To Carriageway

End Block

Edging
Plasline mini
Chamfer

Tarmac
Footway

1.8m

Channel Block

Visibility Splay
(Shown Dashed)

.1/75

Edging To Back Of
Footway Or On The
Adopted Visibility Splay

FOOTWAY

100

0

0

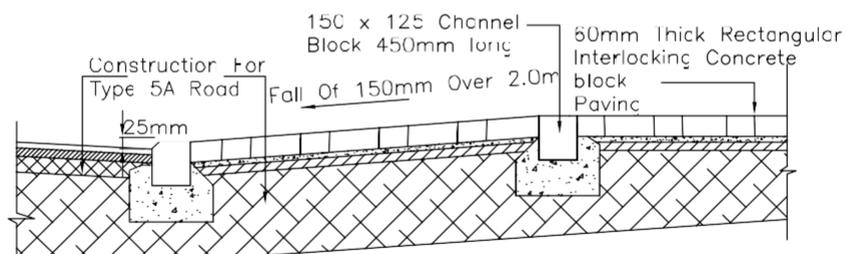
0.9m
Tcper Kerb

Block Paving

11Nc Dropped Kerbs

A

0.9m
Tcper Kerb



Section A - A

< All dimensions in millimetres - Do not scale >

Title

Mew Court Detail

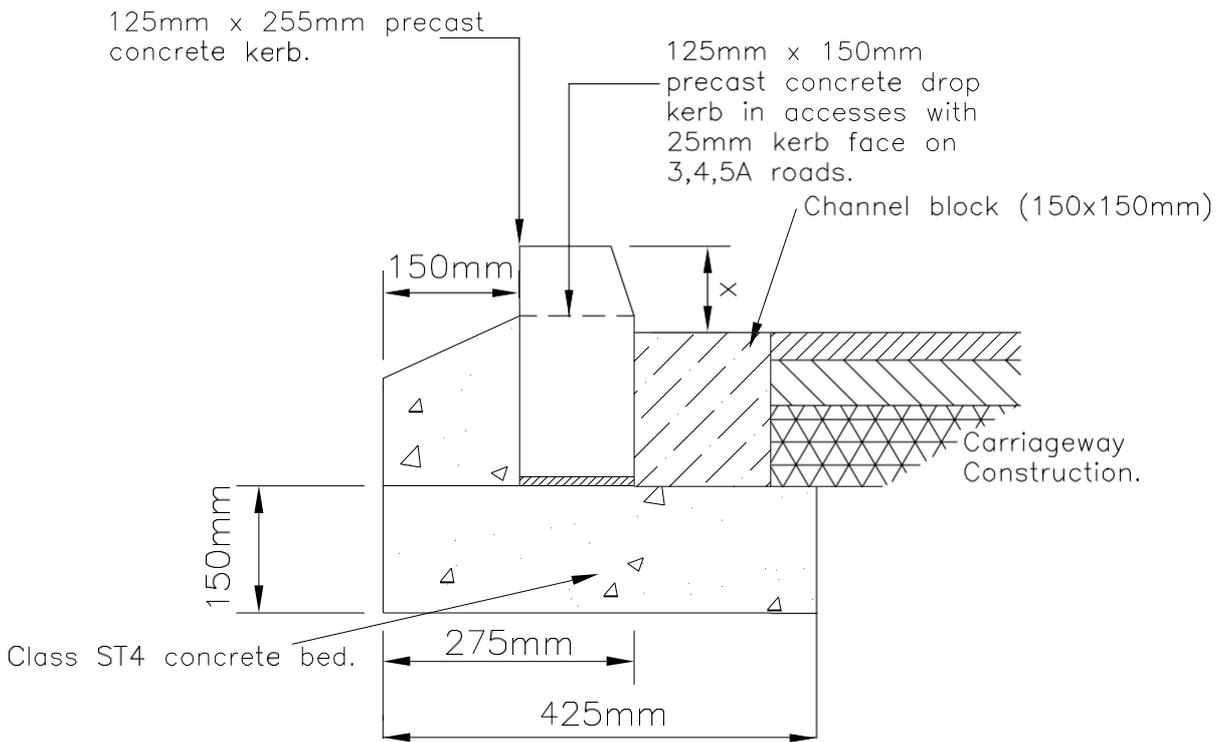
Date

03/03

Drawing No

13/9

Rev

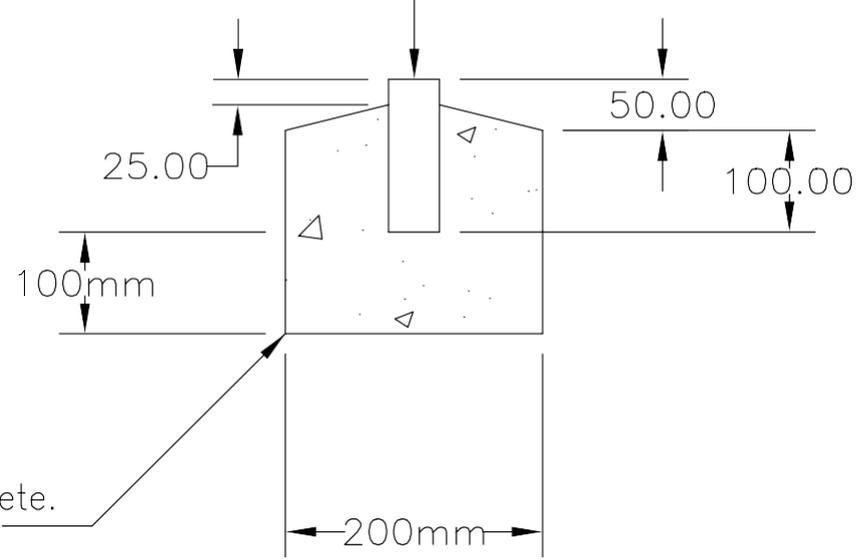


- Kerb Face 'x'
- 125mm On Type 3 and Industrial Roads.
 - 100mm On Type 4 and 5A Roads.
 - 30mm on Type 5B Roads.

< All dimensions in millimetres - Do not scale >

	Title Standard Kerb Detail	Date 03/03	Drawing No 13/10	Rev
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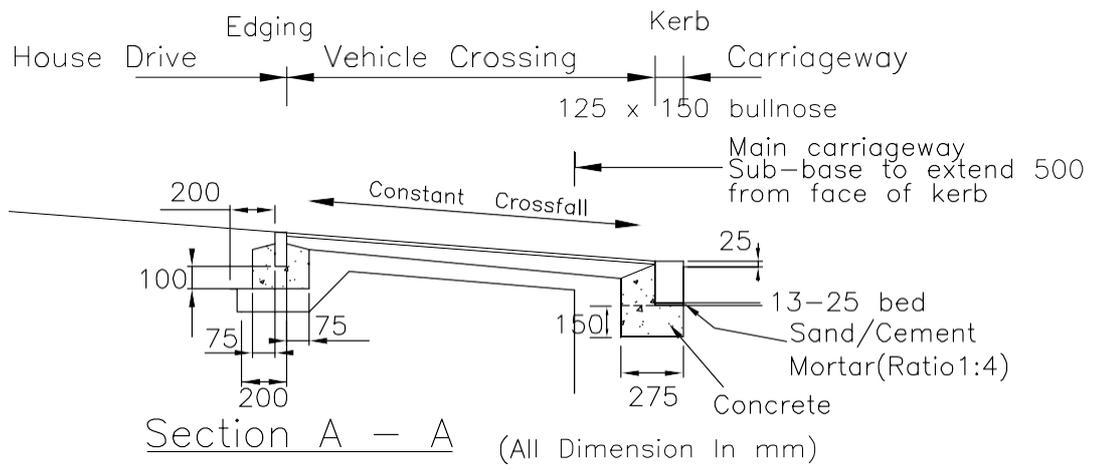
150mm x 50mm precast
concrete edging type K11B.



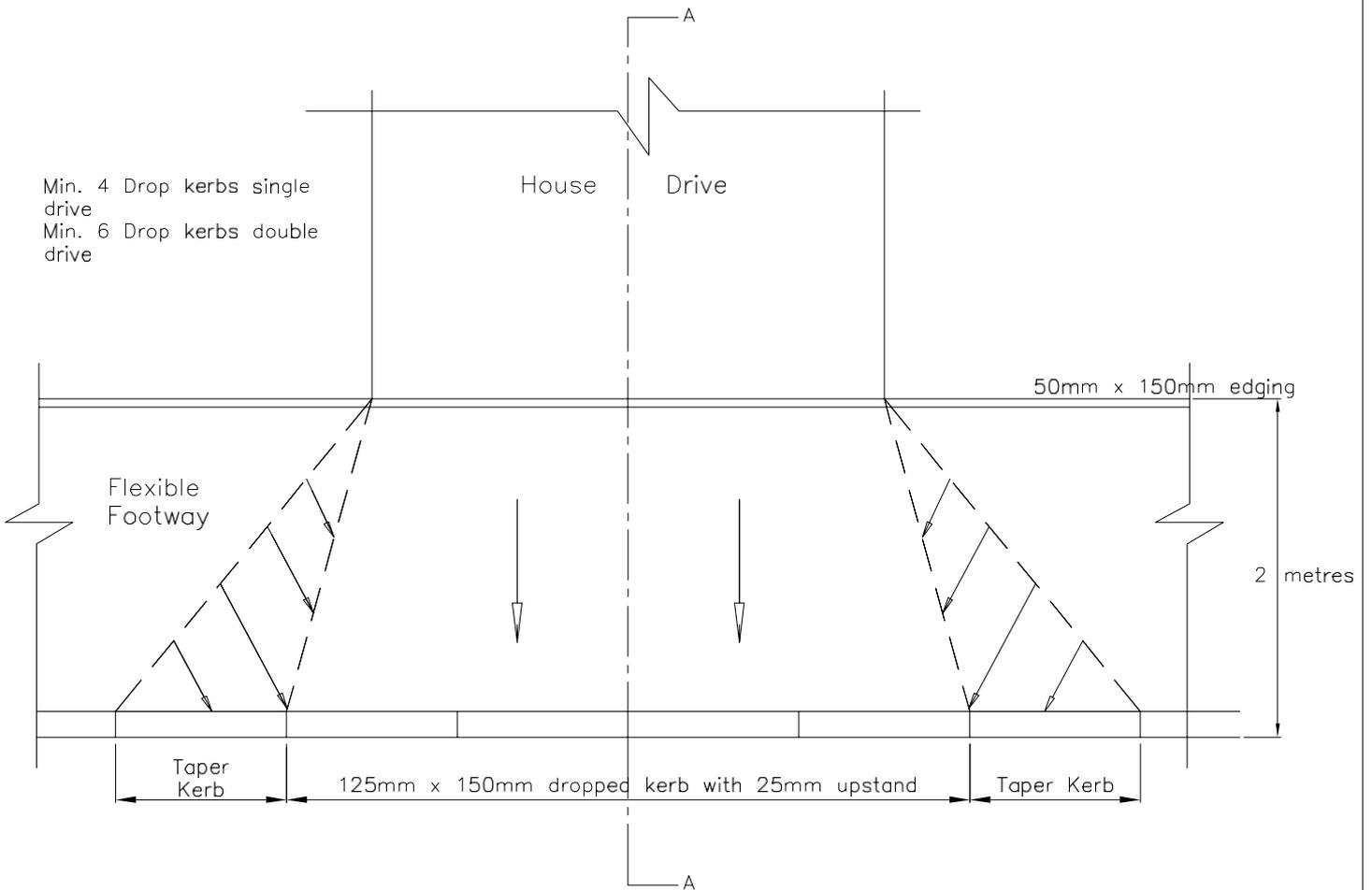
Class ST4 concrete.

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	Title Footway Edging Detail	Date 03/03	Drawing No 13/11	Rev
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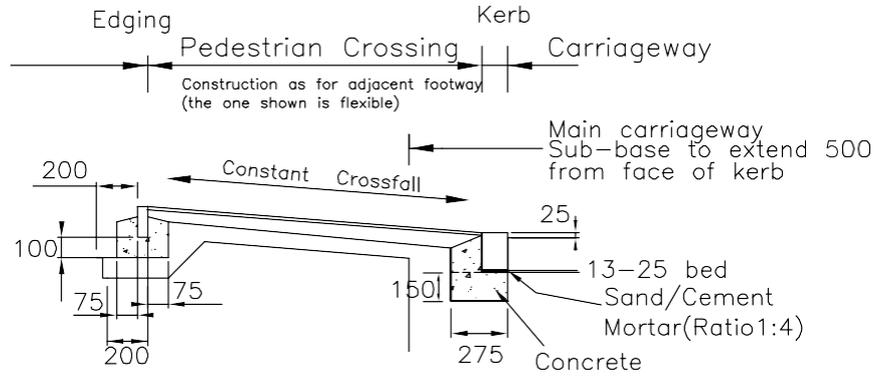


Plan Of Typical Vehicle Crossing To Individual House

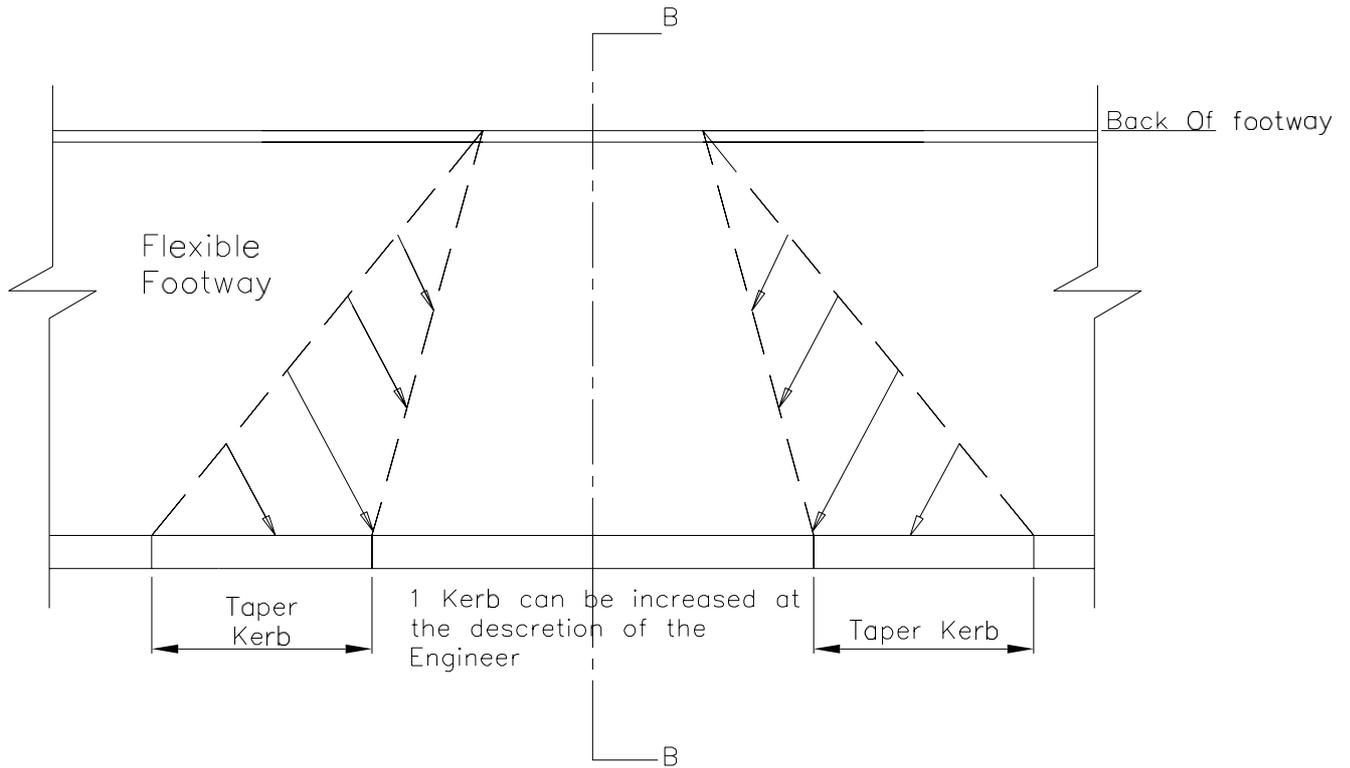


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	Title Typical Vehicle Crossing To Individual House	Date 03/03	Drawing No 13/12	Rev
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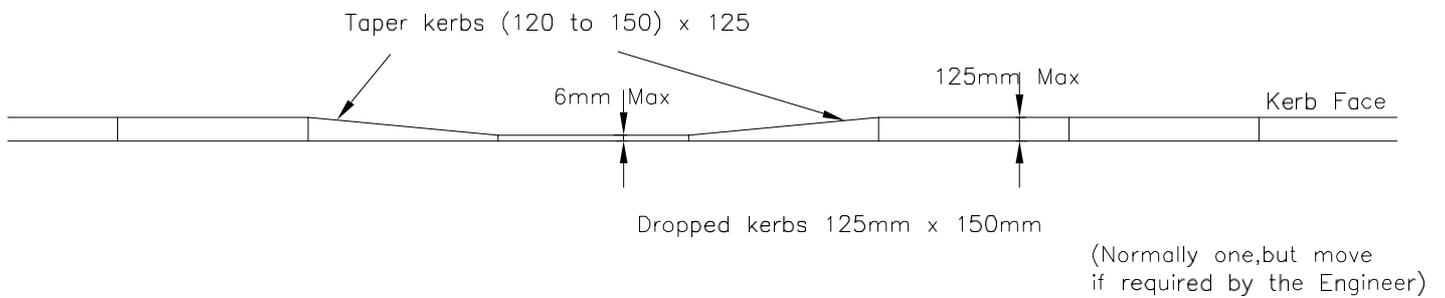


Section A - A (All Dimension In mm)



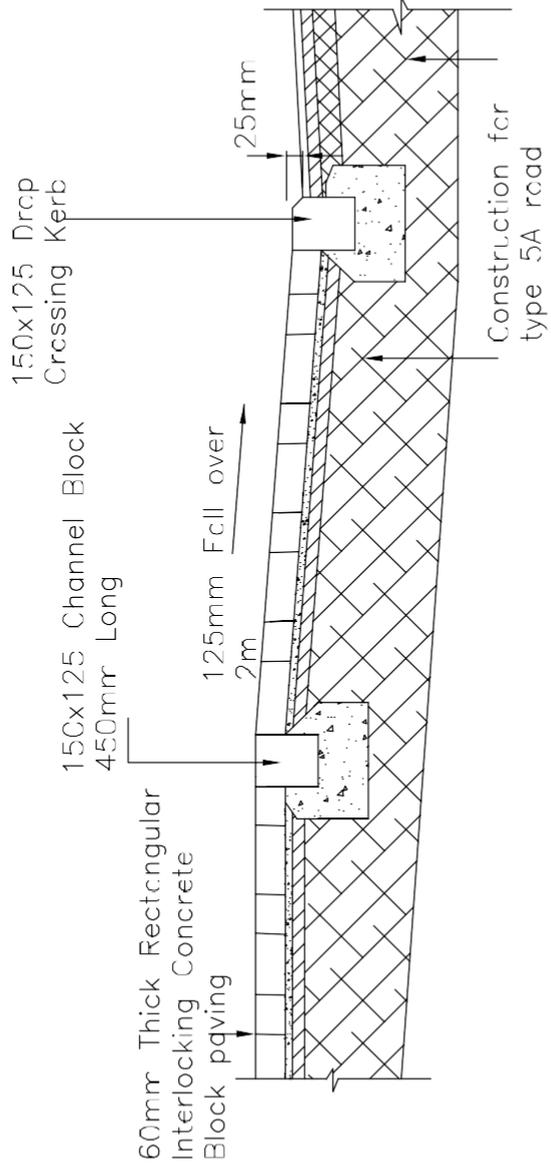
Plan

Elevation Of Typical Pedestrian Crossing



< All dimensions in millimetres - Do not scale >

	Title Typical Pedestrian Crossing	Date 03/03	Drawing No 13/13	Rev
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Typical Section Through Ramped Crossing From Traditional Type 5A Road to Type 5B Accessway/Access Court/Mew Courts

(All dimensions in millimetres – Dc not scale)

Title

Typical Section Through Ramped Crossing

Date

03/03

Drawing No

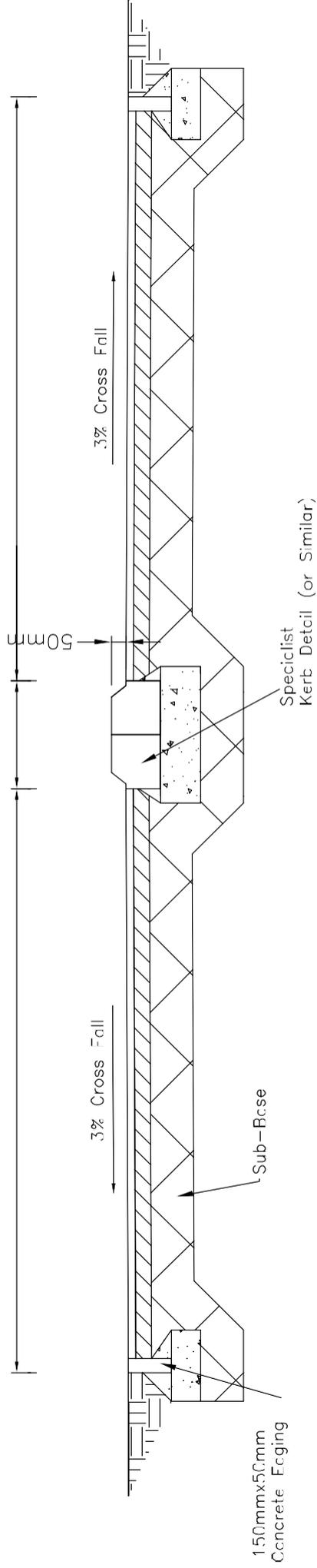
13/15

Rev

EDGE BOUNDED/MIN 1.75m – 2.5m
EDGE CLEAR/MIN 1.5m – 2.0m

APPROX 0.4M

EDGE BOUNDED/MIN 1.75m – 2.0m
EDGE CLEAR/MIN 1.5m – 2.0m



CYCLE TRACK

FOOTPATH

CONSTRUCTION

- Surface Course – 25mm Thick 0/6mm DBM 19C Pen Surface Course L/Stone to BS 4987-1:Clause 7.5 (Red For Cycle Track) Arcen Rec On Rec
- Binder Course – 55mm Thick 0/20mm DBM 190 Pen Binder Course L/Stone to BS 4987-1:Clause 6.5
- Sub – Bcse – 150mm Thick Type 1 Highway Works Clause 803

To Be Located In Footpath

LIGHTING

GRADIENTS

- Unrestricted – 3%
- Up To 100mm Length – 5%
- Up To 50m Length – 7%
- Up To 30m Length – 10%

Note

To be in accordance with the general specification for roads to be adopted as public highway

(All dimensions in millimetres – Do not scale)

Title

Segregated Footpath/Cycle Track

Date

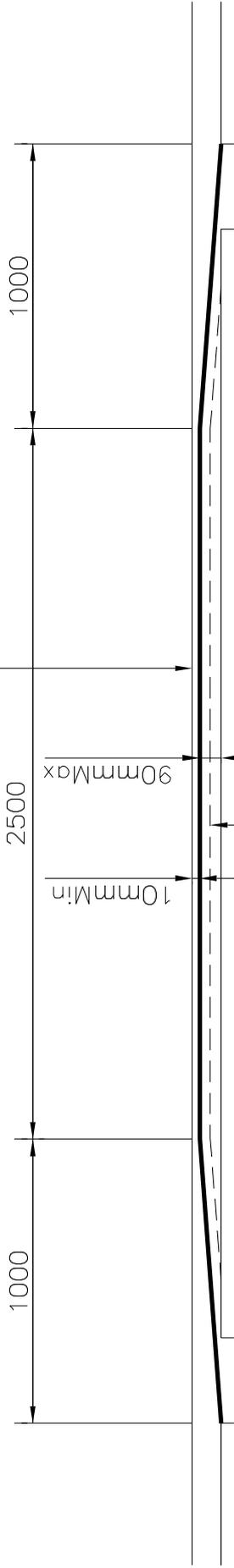
03/03

Drawing No

13/16

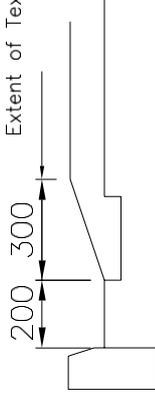
Rev

Textureflex surface applied finished in Signal Red (BS 381C No.537) by "Zebraflex"



Hot Rolled Asphalt 10mm Agg
High stone content S.Y. Lab spec No.29 laid in two equal layers.
or
Similar materials may be substituted with the agreement of the Engineer

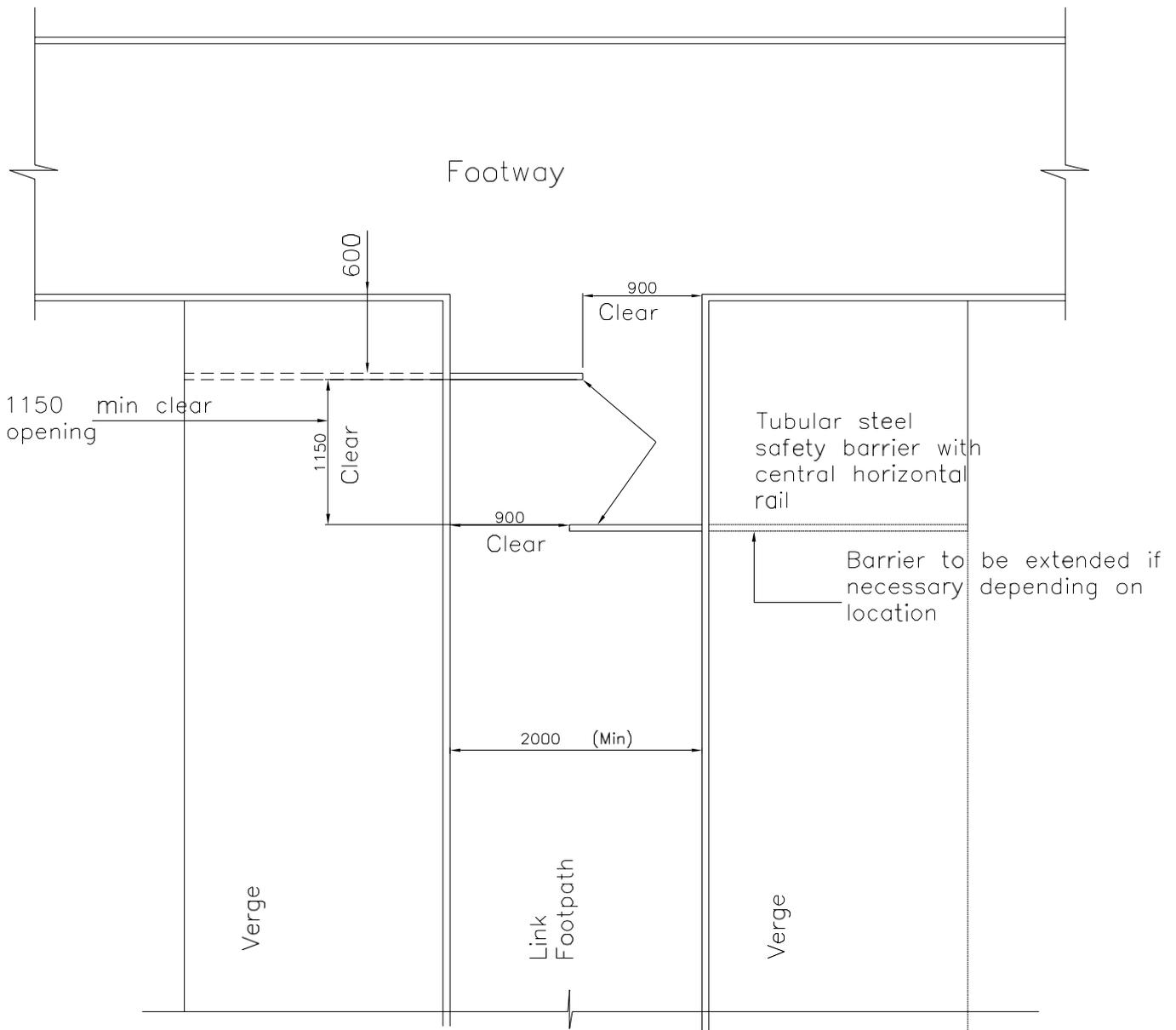
Extent of Textureflex



Channel details (where necessary)

(All dimensions in millimetres – Do not scale)

Title	Date	Drawing No	Rev
Road Hump Detail	03/03	13/17	



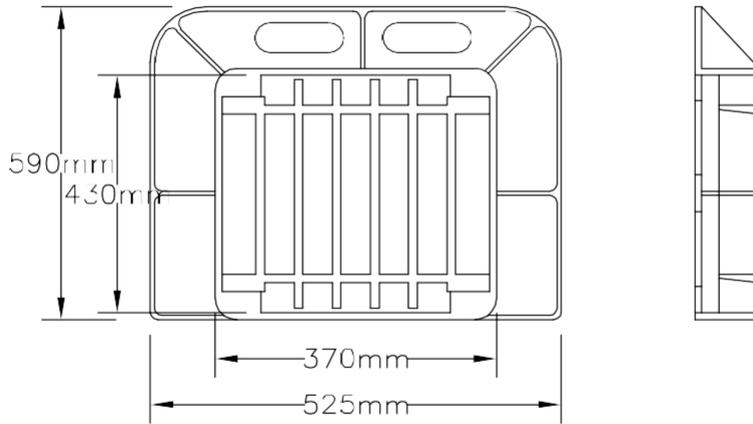
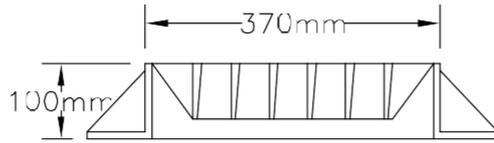
Note:

_____ An anti-motor cycle barrier will be required at each footpath.

Alternative designs may be required depending on the individual location. Detail and specification to be agreed, in writing by the Engineer.

< All dimensions in millimetres - Do not scale >

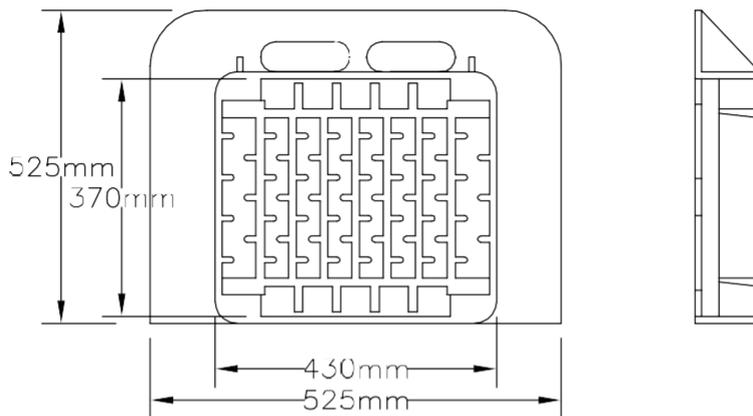
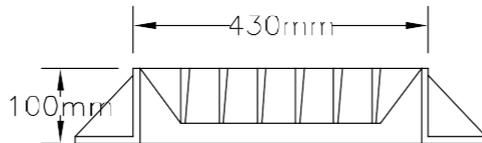
Title	Date	Drawing No	Rev
Typical Pedestrian Safety Barrier	03/03	13/18	



(Stanton watershed HR 865 gully grate medium duty ductile Iron).

To BS EN124 D40C and Kitemarked.

Type 3 & Industrial Type Roads.



(Stanton HY 813 pedestrian gully grate)
To BS EN124 C250 and Kitemarked.

Type 4 & 5 Roads

< All dimensions in millimetres - Do not scale >

	Title Road Gully Details	Date 03/03	Drawing No 13/18	Rev
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Type 3 & Industrial Estate Roads

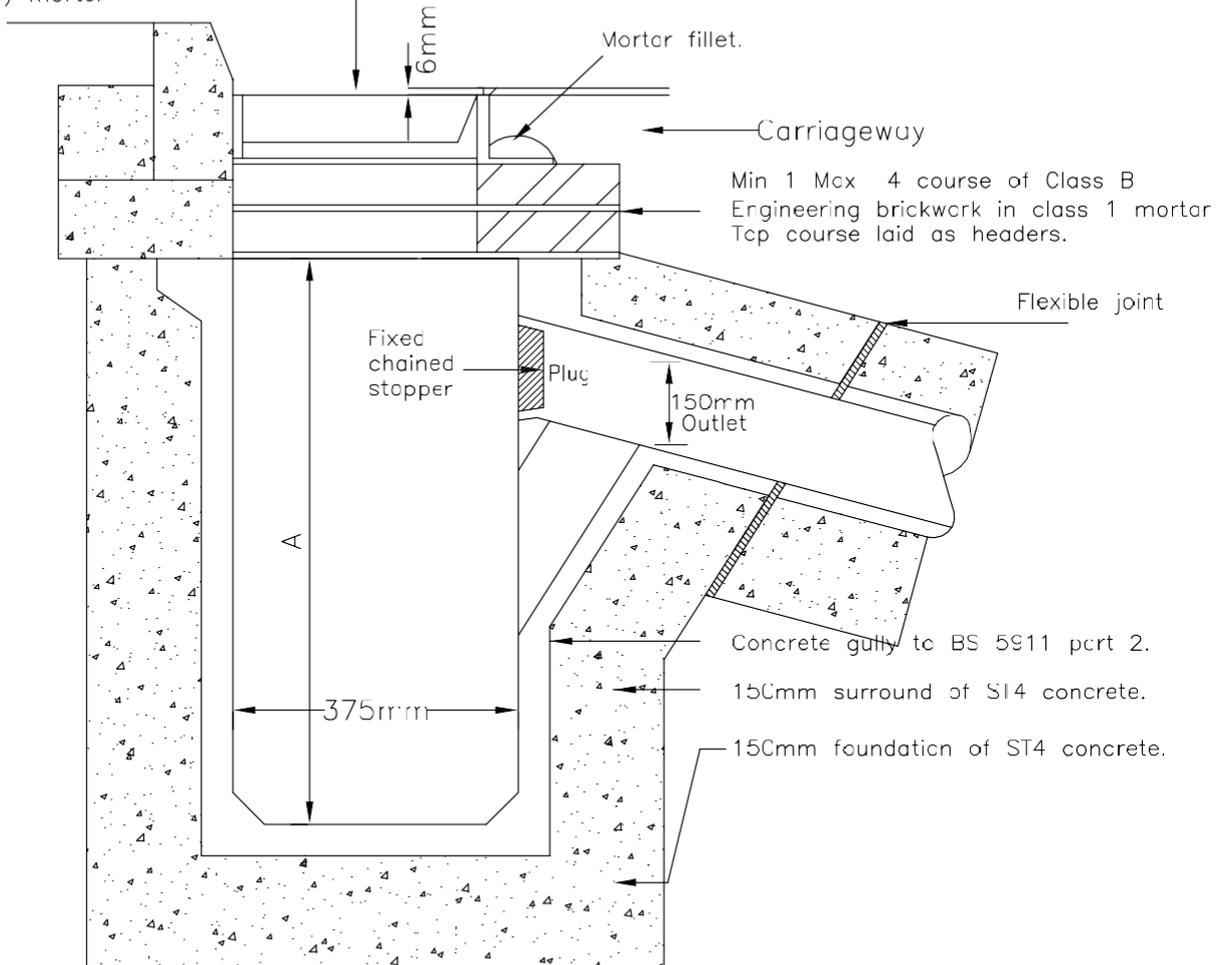
A = 915mm B = 375mm

Type 4 & 5 Roads

A = 750mm B = 375mm

Minimum clear opening between gully pot and gully frame to be (C=300min) in any concrete or clayware

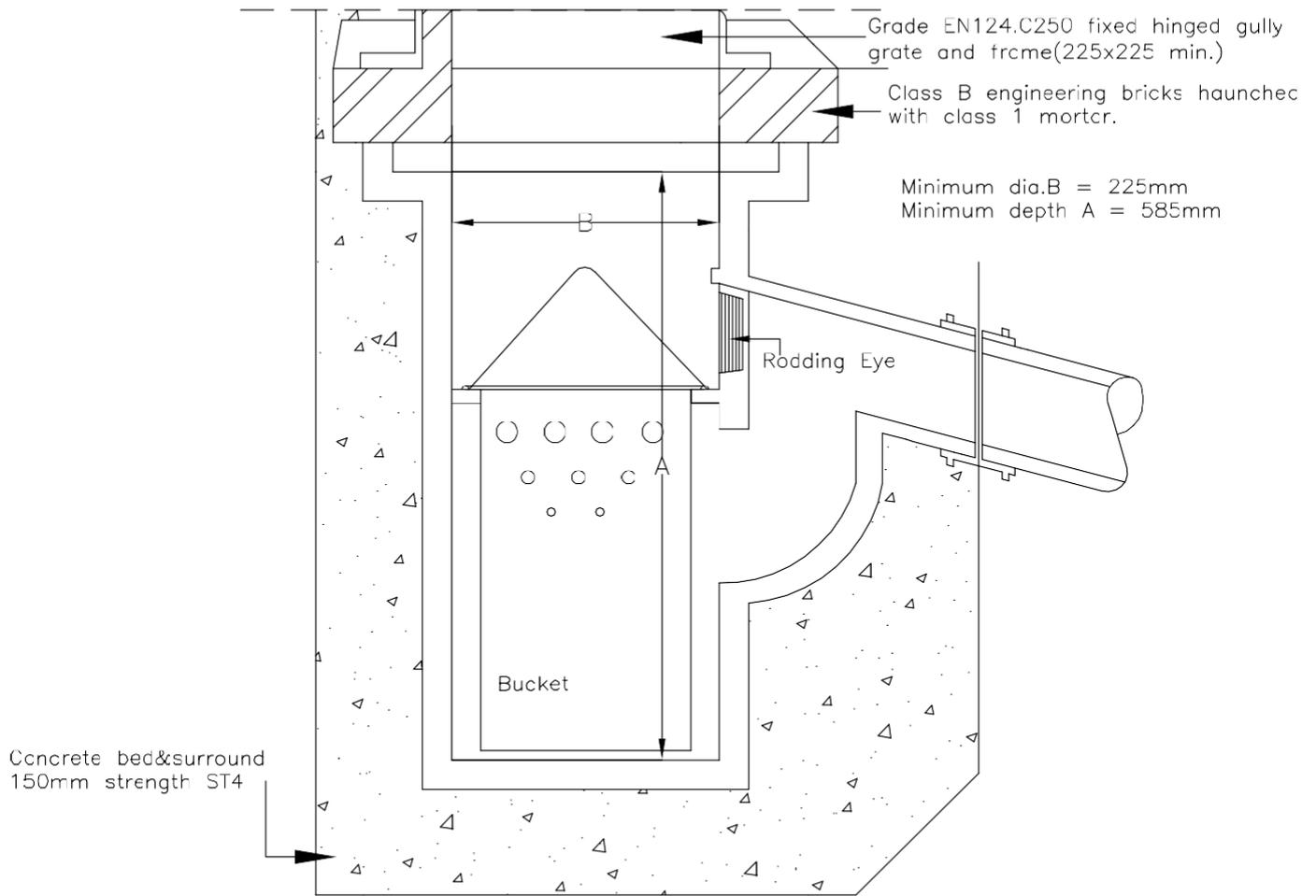
Gully frame bedded on cement/sand (1:3) mortar



Gully grating frame to BS 497
ref. GB 325 and to be kitemarked.

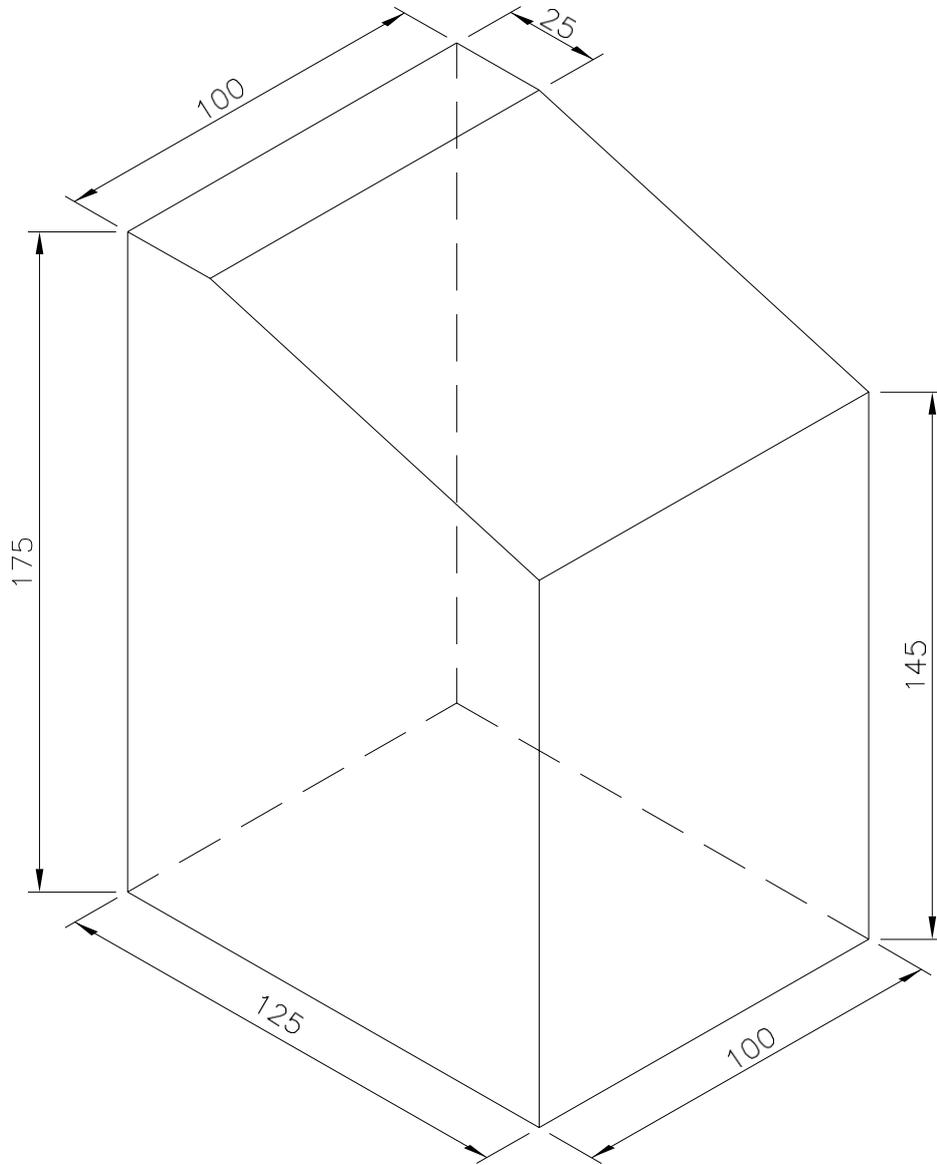
< All dimensions in millimetres - Do not scale >

Title	Date	Drawing No	Rev
Road Gully Details	03/03	13/20	



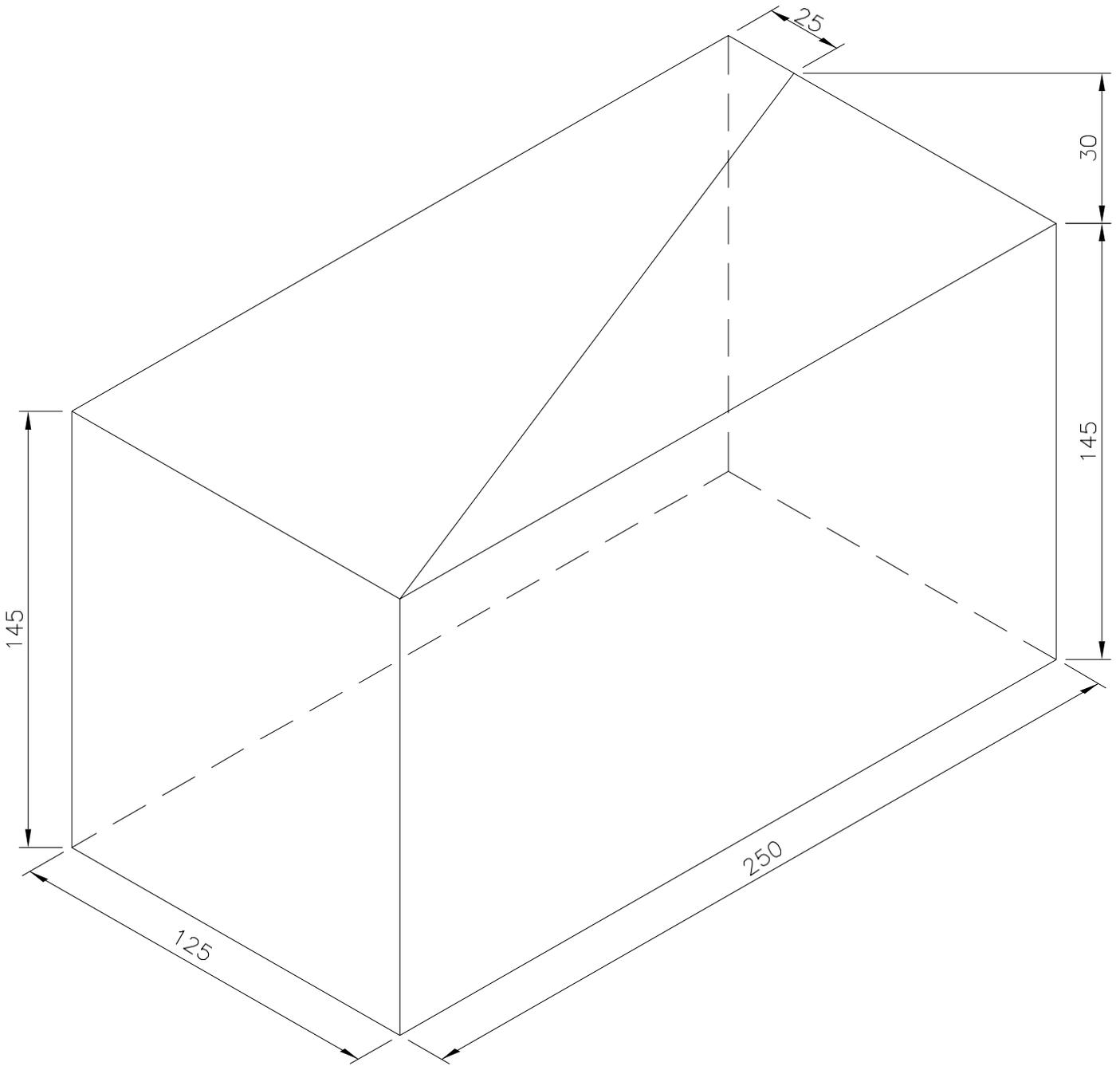
< All dimensions in millimetres - Do not scale >

Title	Date	Drawing No	Rev
Typical Footpath Gully Detail	03/03	13/21	



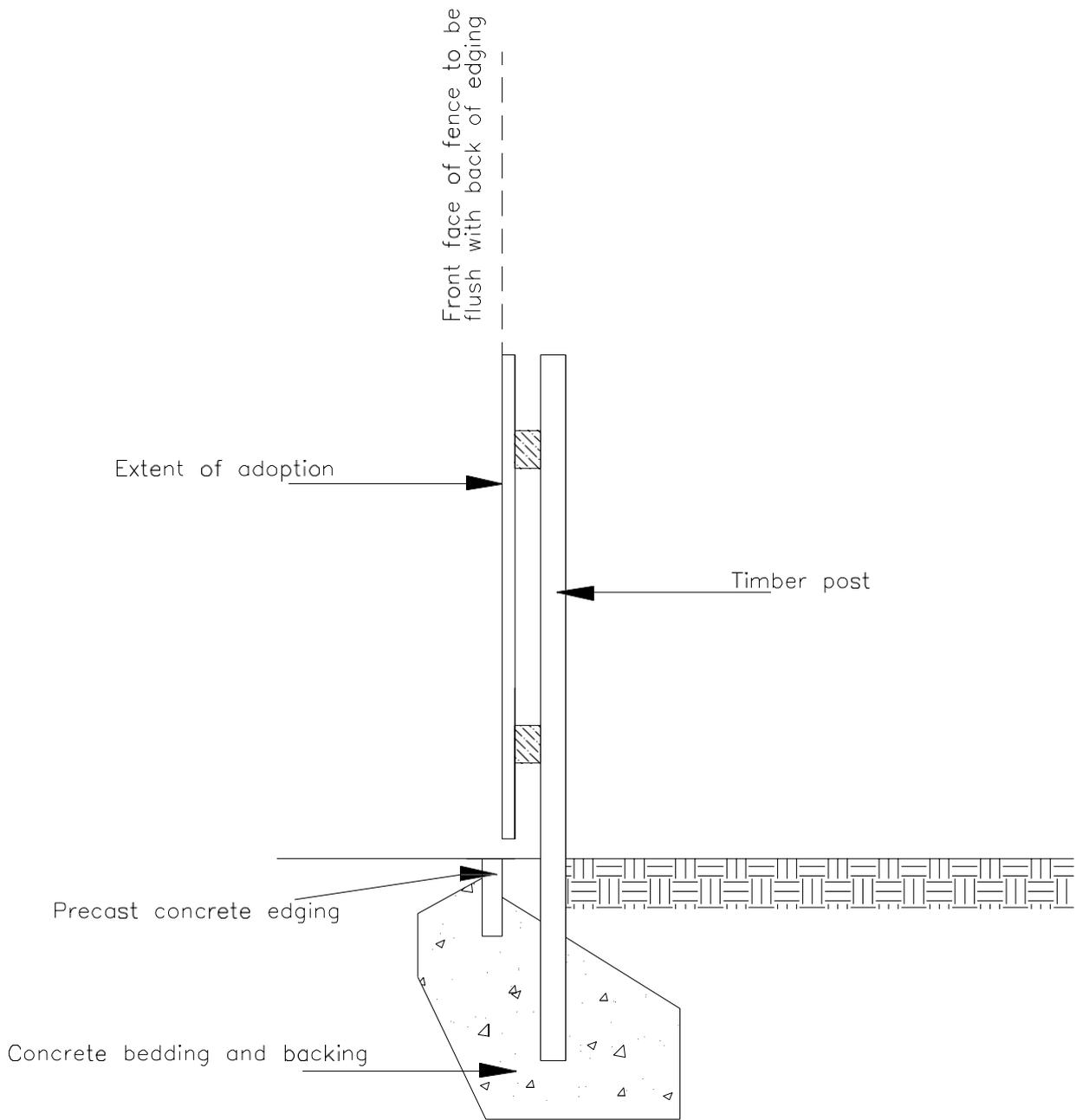
< All dimensions in millimetres - Do not scale >

	Title Details Of Plasmobility Kerb 99	Date 03/03	Drawing No 13/22	Rev
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(All dimensions in millimetres - Do not scale)

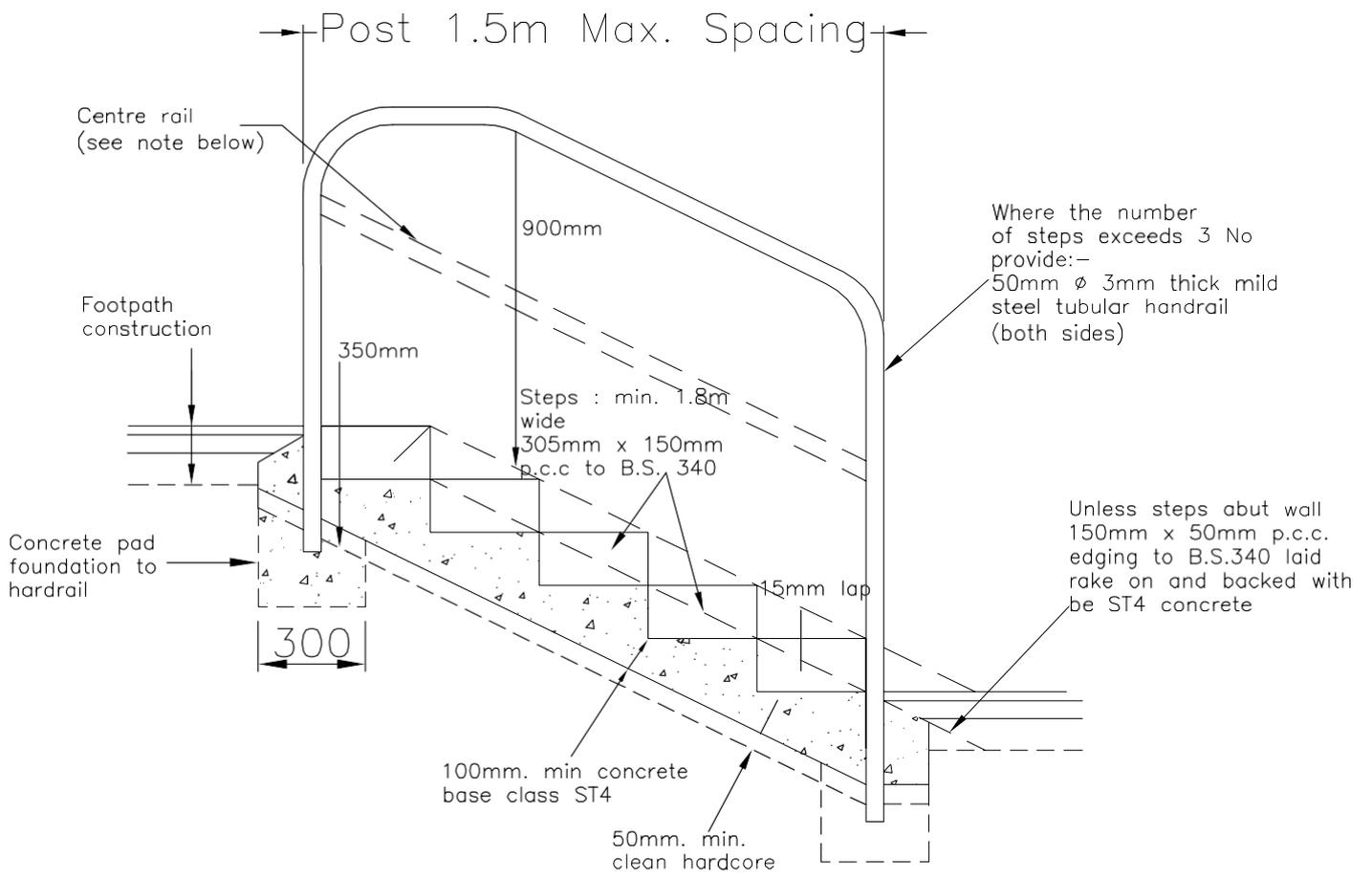
	Title Details Of Dropper Kerb	Date 03/03	Drawing No 13/23	Rev
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(Fencing adjacent to adoptable footpath)

< All dimensions in millimetres - Do not scale >

	Title Typical Fencing Position	Date 03/03	Drawing No 13/24	Rev
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NOTES:

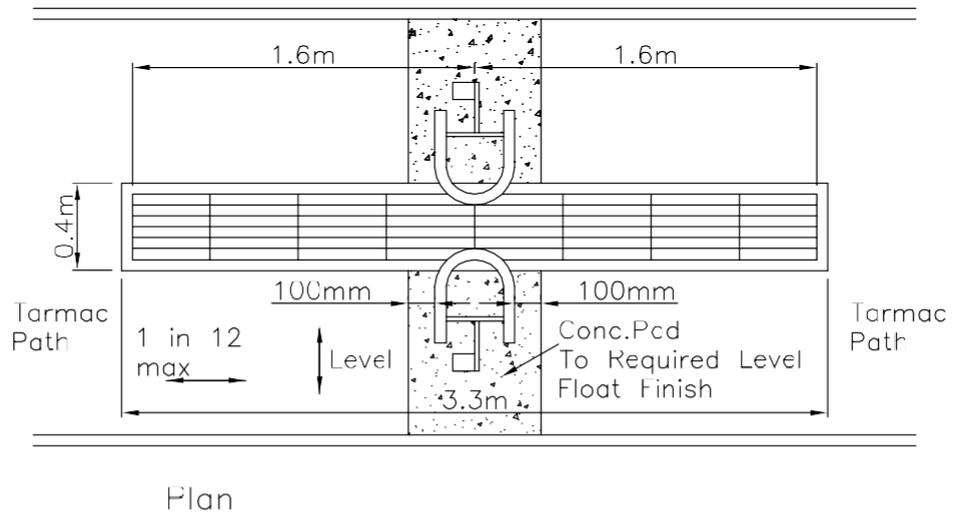
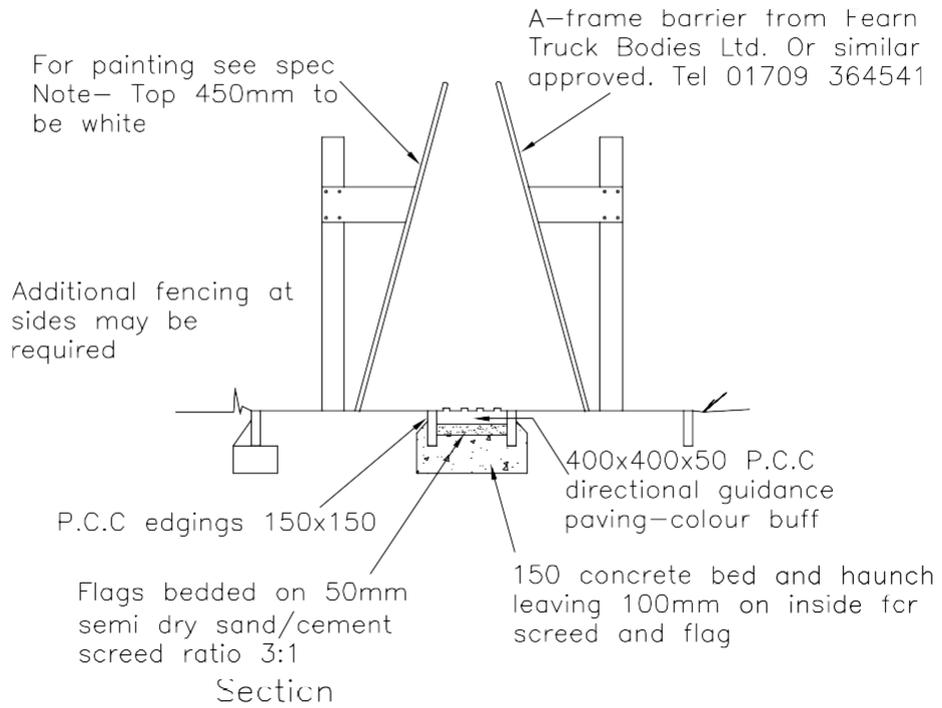
Maximum of 8 No. steps in a flight landings to be minimum of 1.5m long with maximum gradient of 8%

NOTES:

A horizontal centre rail may be requested at the discretion of the Engineer

< All dimensions in millimetres - Do not scale >

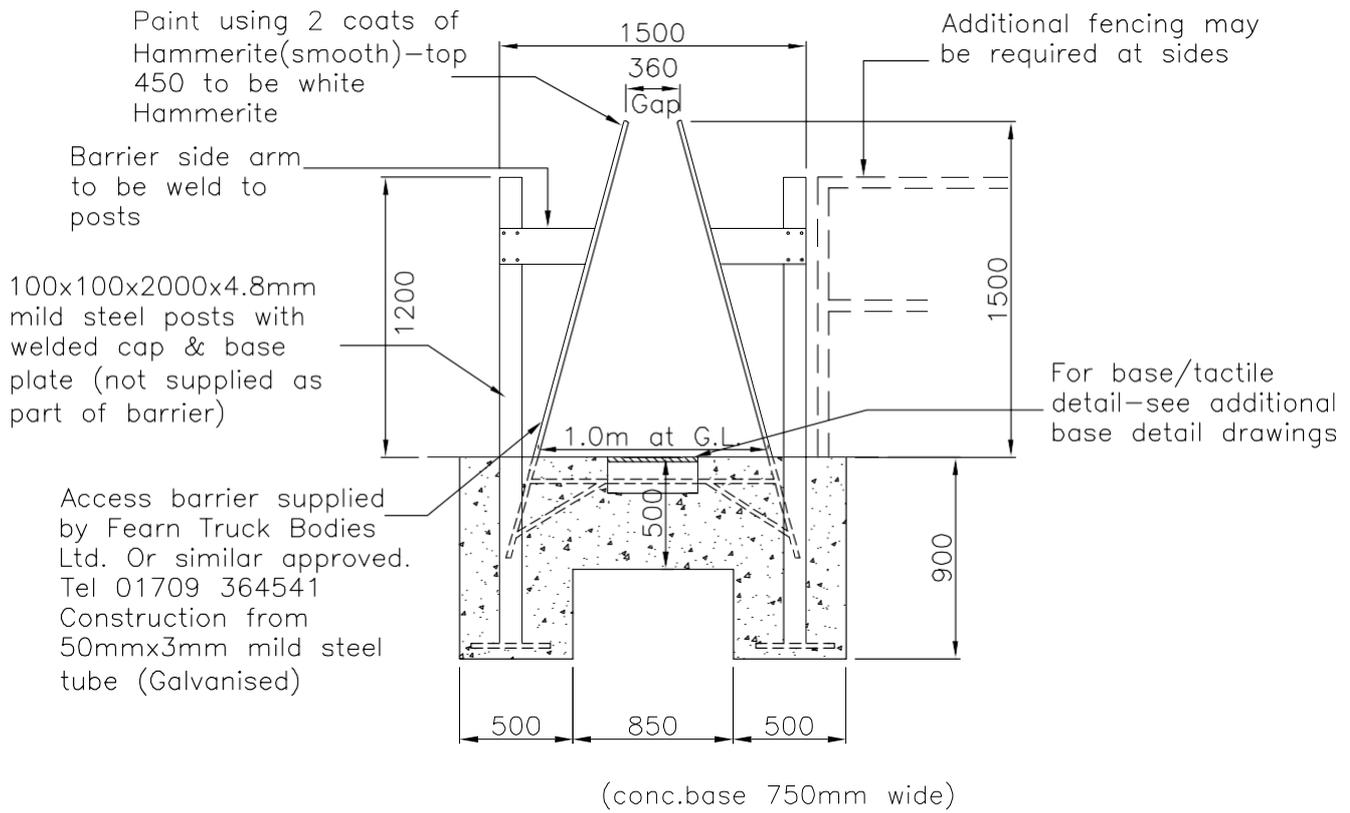
	Title Pre-cast Concrete Step Detail with Handrail	Date 03/03	Drawing No 13/25	Rev
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Note:- A- Frame Base Detail In New Tarmac Path

< All dimensions in millimetres - Do not scale >

Title	Standard Detail A-Frame Barrier	Date	Drawing No	Rev
		03/03	13/26	



Section

< All dimensions in millimetres - Do not scale >

	Title Standard Detail A-Frame Barrier	Date 03/03	Drawing No 13/27	Rev
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XYZ

