SPECIFICATION

For Adoptable Housing and

Industrial Estate Roads

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1. PRELIMINARIES

This specification applies to works carried out in conjunction with Agreements under Section 38 and Section 278 of the Highways Act 1980, to construct new estate roads and make modifications to existing roads. Construction details are generally based on the requirements of the Department For Transport Manual of Contract Documents for Highway Works: Volume 1 Specification for Highway Works, including any subsequent Amendments and on the requirements of Highway Agency's Design Manual for Roads and Bridges: Volume 7 "Pavement Design and Maintenance" including any subsequent Amendments.

This Specification shall apply to any carriageway, footway, margin, verge, footpath, surface water highway drainage system, service provisions and street lighting being constructed or installed as part of a residential or industrial development and which the Highway Authority will adopt as a highway maintainable at the public expense.

Any points which may arise and which are not fully covered in the Specification shall be determined by the Engineer. Alternative materials may be permitted subject to the written approval of the Engineer. On account of special circumstances the Engineer may, at his discretion, require variations from this Specification.

1.1 DEFINITIONS

- The Council - means the City of York Council
- The Engineer - means the Assistant Director of City Development and Transport for City of York Council. The term Engineer is used throughout this document and is deemed to include duly authorized representatives of the Engineer.
- The Developer - means the person or company by or on whose behalf the works are carried out.
- The Works - means all construction under, forming part of, or servicing the street to be adopted as a highway maintainable at the public expense. This includes agreed necessary construction in existing adopted highway.

1.2 APPROVED DRAWINGS

The whole of the works shall be carried out in conformity with the plans, sections and detailed drawings approved by the Engineer. No amendment shall be made to the approved drawings except with the written agreement of the Engineer. A copy of the approved drawings and this specification shall be available on the site at all times.

1.3 DESIGN OF THE WORKS

The design of the works shall be the responsibility of the Developer who should have due regard to the advice in the Council's 'Highway Design Guide', this document, the current Highway Agency, Department for Transport and Transport Research Laboratory recommendations and reports and to the current practices of the Engineer's Department. If in doubt as to the standard to be applied in any particular case the Developer is advised to consult the Engineer at an early stage of the design

1.4 DESIGN OF ROAD LIGHTING

Developers are recommended to consult with the Council's Road Lighting Engineer at an early design stage. Details of the layout, specification and type of lighting to be used are covered in the supplement to the Council's 'Highway Design Guide'.

1.5 STANDARDS

1.5.1 Works, goods and materials shall comply with the standards specified in this document or the relevant Specification of the British Standards Institution, hereinafter referred to as the BS.

1.5.2 Any reference to a Standard published by the British Standards Institution, or to the specification of another body, shall be construed equally as reference to an equivalent one. A Developer's submission shall be in accordance with the latest published Standard that is current at the date the submission is made.

1.5.3 Where a Developer wishes to use work, goods or materials for which a European, British Standard or equivalent is not available then appropriate details of their standards and their levels of safety, suitability and fitness for purpose shall be submitted to the Engineer for approval. This might be achieved by using products that have been assessed by an independent body. The British Board of Agrément (BBA) is authorized to issue European Technical Approvals under the provisions of the Construction Products Directive (89/106/EEC).

1.5.4 Developers are advised to discuss the use of newly developed products with the Engineer at the earliest opportunity.

1.5.5 Additional quality assurance requirements, including certification under an EN 45011 accredited product conformity certification scheme, may be sought by the Engineer as a cost effective means of ensuring compliance with Standards. BSI kitemarking is an example of a compliant certification scheme.

1.5.6 A list of accepted Product Certification Schemes for products for which the Engineer requires certification to ensure compliance with Standards is provided in Appendix B.

1.6 BRITISH BOARD OF AGRÉMENT CERTIFICATES

1.6.1 Where any work, goods or materials are required to have a British Board of Agrément Certificate, only works goods or materials so certified shall be used and the Developer shall in each case submit to the Engineer a copy of the certificate. Types of work, goods and materials subject to such requirements are listed in Appendix C.

1.6.2 The requirement for types of goods or materials listed in Appendix C to have a British Board of Agrément Certificate shall be satisfied by goods or materials having an equivalent Agrément certificate issued in any member state of the European Communities, provided that the goods or materials covered by such certificate offer in use levels of safety, suitability and fitness for purpose equivalent to those incorporated in the British Board of Agrément Certificate. This sub-clause applies also to works only in so far as the means of carrying out such works are indivisibly associated with the goods or materials for which an alternative Agrément certificate is proposed.

1.7 SAMPLES

1.7.1 Before commencing the works, the Developer shall deposit with the Engineer samples of any materials the Engineer may require. The Developer shall obtain approval to the samples before commencing the work or during the course of the works prior to the materials being used. The materials used must be at least equal in every respect to the approved samples. The Engineer may at his discretion from time to time require the Developer to provide material samples free of charge for testing as the Engineer may direct.

1.7.2 Materials bearing the British Standard Kitemark will not generally require initial or routine sampling and testing.

1.8 TESTING

1.8.1 The Developer shall be responsible for the payment of all charges for tests on materials and in the event of failure he shall replace any faulty materials.

1.8.2 Details of the Engineer's minimum anticipated testing schedule will be agreed before the works commence. Additional testing may be required by the Engineer at any time during the execution of the works.

1.8.3 The Developer, shall, when required, grant every facility to the Engineer for taking such samples, cores, specimens and carrying out any other test on site. He shall provide all attendance and samples, cores and specimens and make good after the tests free from charge.

1.9 CONDEMNED MATERIALS

Any materials condemned by the Engineer as unfit for use in the works shall be removed from the site immediately.

1.10 STATUTORY UNDERTAKERS APPARATUS

1.10.1 The Developer shall take all necessary measures required by the Engineer or Statutory Undertaker for the protection of existing mains, pipes, cables and other apparatus during the progress of the works and shall ensure that all requisite notice is given to the Statutory Undertaker for the protection concerned.

1.10.2 Where new utility plant is to be installed within the works the Developer shall follow the recommendations set out in the National Joint Utilities Group Publication "Guidelines on the Installation and Colour Coding of Utilities' Apparatus". An illustration of the positioning of mains in a two-metre footway is reproduced in the Standard Details.

1.10.3 Where work is to be carried out in proximity to trees the Developer shall follow the recommendations set out in the National Joint Utilities Group Publication No 10 "Guidelines for the Planning, Installation and Maintenance of Utility Services in Proximity to Trees". The "Brief Guide for Operators" is reproduced in Appendix D of this document.

1.10.4 It is the Developers responsibility to liase with all Statutory Undertakers in respect of the installation of their apparatus within the limits of the prospectively adoptable highway and ensure that adequate provision is made prior to the final wearing surfacing of the new carriageways and footways for the installation of such equipment.

1.10.5 Where trenches are excavated in the new streets after surface course has been applied, and prior to adoption, the entire width of surfacing kerb to kerb (or kerb to back edging in the case of footways) shall be relaid. The Engineer reserves the right to postpone the adoption of any new street where there is evidence that a Statutory Undertaker has not yet installed their equipment.

1.10.6 For the purpose of this Specification, the term 'Statutory Undertaker' refers to companies providing gas, water or electricity, as well as telecommunications companies and other cable installers.

1.11 CLEANLINESS OF THE HIGHWAY

1.11.1 All public highways including carriageways, footways, footpaths, bridleways and verges used by the Developer shall be kept clean, free from dust, mud and debris of any description to the satisfaction of the highway authority or the police.

1.11.2 The Developer shall employ such equipment, mechanical or otherwise, as is necessary to clean the highway and/or the wheels of vehicles.

1.12 NOTIFICATION OF COMMENCEMENT OR RECOMMENCEMENT OF WORKS

1.12.1 Work shall not commence on site until Technical Approval is agreed with the Engineer and the Developer has paid the required technical, inspection and agreement fees to the Council. The fee scales are included in Appendix E of this document.

1.12.2 The Developer shall inform the Engineer in writing at least seven days prior to the works commencing on site. If the works on site are to be stopped for a period exceeding 10 working days then the Developer shall inform the Engineer of his intentions to stop work and shall also give at least 3 days notice in writing of his intention to restart.

1.13 WORK REQUIRING INSPECTION

1.13.1 The Developer shall afford opportunity for the Engineer to examine any work which is about to be covered up or put out of view, and to examine foundations before permanent work is to be placed thereon.

1.13.2 The Developer shall give the Engineer at least one clear working day's notice before any formation or other work is to be covered with permanent work and before any testing is carried out during weekday construction.

1.13.3 Failure to give such notice could result in the requirement for the later exposure of the work and its removal if considered necessary by the Engineer. The Developer shall pay the costs of all such exposure, remedial works if required and reinstatement.

1.13.4 The Engineer shall be given access to and may visit the work in progress from time to time. Such visits do not absolve the Developer from his responsibility for supervising the work, nor for ensuring that it is carried out in accordance with the Specification and approved drawings. Developers must not regard the Engineer as their unpaid Clerk of Works.

1.14 QUALITY OF WORKMANSHIP

Where appropriate British Standard Specifications or British Codes of Practice or equivalent lay down standards of workmanship, these are to be recognised as the minimum acceptable standards. Where standards do not exist the workmanship throughout shall be to the minimum good practice of the respective trade or class.

1.15 TEMPORARY TRAFFIC SIGNS

1.15.1 The Developer shall appoint an 'Accredited Supervisor' for works in the public highway.

1.15.2 The Developer shall erect, maintain and, where appropriate, light all traffic signs and traffic control signals necessary for the direction and control of traffic on the site and on the approaches to the site. The signs shall conform to the current Traffic Signs Manual, Chapter 8 "Traffic Safety Measures and Signs for Roadworks and Temporary Situations", 1991 (published by HMSO). The signs shall be reflectorised and be kept clean and legible at all times.

1.15.3 The developer is reminded that Chapter 8 Clause 1.3 – Legal Requirements states:

"Where works are in progress on a highway the person, persons or organization responsible for the works is under an obligation to any persons using the highway lawfully to take such steps as are reasonably necessary to protect them from personal injury and their property from damage. Therefore warnings, barriers and other measures should be placed at or near the site of the works to such an extent as is needed to discharge that obligation. These measures must be removed when no longer required. The highway authority has the ultimate responsibility for the administration of all work that affects any public highway."

1.15.4 In the event of single way traffic becoming necessary on the approaches to the site the Developer shall submit his proposals for the control of the traffic to the Engineer with a minimum of seven days notice. No interruption to the two-way flow of traffic shall commence without the written approval of the Engineer to the traffic control proposals.

1.15.5 The Developer shall notify the Council of any proposed working in the existing public highway in the vicinity of the site to allow all street works to be coordinated for the safety and welfare of the general public. The Engineer may require written details of proposed traffic signing schemes at road works if it is considered necessary.

1.16 SITE SAFETY

1.16.1 The Developer shall take full responsibility for the adequate stability and safety of all site operations and methods of construction which shall comply fully with the current requirements of the Health & Safety at Work Etc Act 1974, The Management of Health and Safety at Work Regulations 1999, The Construction (Health, Safety and Welfare) Regulations 1996, The Construction (Design and Management) Regulations 1994 and other relevant legislation and documents.

1.17 UNDERSTANDING OF THE SPECIFICATION

If the Developer is unclear as to the meaning or intent of any item of this specification he should consult the Engineer and obtain a decision prior to work proceeding. A copy of the Specification should be made available on site by the Developer at all times.

1.18 SETTING OUT OF THE WORKS

The lines and levels of formation, drainage and carriageway shall be carefully set out and frequently checked by the Developer to ensure the correct widths, gradients and cross-sections are everywhere obtained.

1.19 STAGED COMPLETION OF THE WORKS

1.19.1 PART 1

The Developer shall inform the Engineer in writing when the works are completed to the extent that a Part 1 Certificate can be issued. On receipt of the Developer's application an inspection will be made and if appropriate a Part 1 certificate will be issued by the Engineer. No building on the development shall be occupied until the Engineer has issued his Part 1 Certificate. The following works are required to be completed to the satisfaction of the Engineer prior to the issue of the Part 1 Certificate to the Developer:

- All highway drainage
- All other drainage contained within the highway
- All kerbs including lowering at vehicle crossings and pram ramps
- Carriageway sub-base base (road base) and any supporting structures thereto
- Carriageway and footway binder course (base course) surfacing where appropriate
- Demarcation of sight lines and clearance of visibility splays
- Street Lighting

1.19.2 PART 2

The Developer shall inform the Engineer in writing when the works are complete. The Engineer shall carry out an inspection and notify the Developer in writing of any outstanding works, including safety related works, which are required to be carried out before the Part 2 Certificate can be issued and also of any minor snagging items which will be undertaken during the Period of Maintenance. When the Engineer has received certification that any sewer constructed under the road or roads under an agreement under Section 104 of the Water Industry Act 1991 (as amended) is or has been on maintenance then the Engineer will issue his Part 2 Certificate to the Developer. The following works are required to be completed to the satisfaction of the Engineer prior to the issue of the Part 2 Certificate to the Developer:

- Pedestrian ways
- Carriageway and footpath surface course (wearing course)
- Visibility splays and verges
- Street Furniture
- Street name plates
- Road signs and markings
- All other works described in the Specification and shown in the Drawings
- Fire hydrants

1.20 PERIOD OF MAINTENANCE

1.20.1 From the date of issue of the Part 2 Certificate the period of maintenance of twelve calendar months shall commence provided that this period shall be extended by a further 24 months in respect of all seeding and planting works. In exceptional circumstances this may be lengthened or shortened at the Engineer's discretion.

1.20.2 The Developer is responsible for making good at his own expense any defects or damage to the works arising during the period of maintenance.

1.20.3 The Developer is responsible at his own expense for maintaining the works including all grassed and planted areas and for carrying out such routine maintenance as may be necessary to facilitate use by vehicles and pedestrians during the period of maintenance.

1.20.4 The Developer shall pay all energy costs for all streetlights and illuminated traffic signs etc during the Period of Maintenance.

1.20.5 The Developer at his own expense shall undertake routine maintenance of all streetlights and illuminated traffic signs and shall change lamps and clean lenses at the end of the maintenance period.

1.20.6 At the end of the Period of Maintenance the Engineer will visit the works to review any previous minor snagging items and inspect the existing works. A final list of defects will be submitted in writing to the Developer, which the Developer is obliged to rectify within a reasonable period of time. When the Engineer is satisfied that the Developer has satisfactorily completed his obligations to complete the works in every respect and provided the 'As constructed' information the road or roads shall become a highway or highways maintainable at the public expense.

1.21 ACCESS TO NEW PROPERTIES

1.21.1 Private driveways must be designed to provide a satisfactory connection with the highway without any alteration to the footway shown on Standard Details.

1.21.2 Developers are required by the terms of their Section 38 Agreement (Highways Act, 1980) to provide a carriageway and footway constructed at least to base course macadam level or its equivalent and road lighting from an adopted public highway up to and including the frontage of any completed property prior to its occupation.

1.22 SITE INVESTIGATION

1.22.1 Where requested by the Engineer, the Developer shall undertake a Site Investigation, carried out by a competent Site Investigation Company to provide adequate information for the design of adoptable areas. This shall include Environmental Searches and a suite of laboratory tests for potential contaminants where necessary.

1.22.2 Where requested by the Engineer, the Developer shall supply to the Engineer an analyst's report on the sulphate content of the site's sub-grade and its classification in accordance with BRE Special Digest No 1.

1.22.3 Any request by a developer to take advantage of superior ground conditions may be considered where significant increases in the CBR are available. Any such request should be supported by an approved site investigation report and, if approved, will require additional supervision by the Engineer and consequent additional charges.

1.23 OPENINGS IN THE HIGHWAY

The Developer should note that when it is necessary to make any connection or break into any highway outside the site boundary shown on the approved Section 38 drawings, then Section 50 of the New Roads and Streetworks Act 1991 will apply. A license will have to be obtained from the Highway Authority and the prescribed fee paid. This license and the inspection fee are additional to payments made in connection with Section 38 Agreements.

2. DRAINAGE AND SERVICE DUCTS

2.1 DRAINAGE GENERAL

All drainage works are to be in accordance with Sewer for Adoption 5th Edition, Civil Engineering Specification for the Water Industry and subsequent revisions.

2.2 PIPEWORK MATERIAL

Pipework material for drainage to be adopted by the Council and private drainage located under the adoptable highway is detailed in the table below:

Material	Usage	Standard	Particular Requirements
Vitrified Clay	Surface Water Drains	BS 65 or BS EN 295	'Surface Water' pipes as defined in BS 65. Installed with flexible mechanical joints.
	Foul Water Drains	BS EN 295	For private drainage located under the highway. Installed with flexible mechanical joints.
	Filter Drains	BS 65	Perforated with flexible mechanical joints.
Concrete	Surface Water Drains	BS 5911: Part 100 & 110 BS 5911-1	Gasket-type flexible jointing unless otherwise agreed.
	Filter Drains	BS 5911: Part 114 BS 5911: Part 110	(Part 114) Porous pipework (Part 110) Perforated pipework

Table 2.2: Pipework Material

2.3 JOINTING OF PIPES

2.3.1 All vitrified clay pipes shall have flexible mechanical joints.

2.3.2 All concrete pipes shall have flexible gasket type joints of spigot and socket or rebated form.

2.3.3 Joints in foul and surface water drains shall be watertight.

2.3.4 Joints in filter drains shall be partly watertight push fit joints.

2.4 PIPE BEDDING MATERIAL FOR FOUL AND SURFACE WATER DRAINS

Unless otherwise approved, materials for pipe bedding or surround shall be a nominal single size granular material, natural crushed gravel or rock. The water soluble sulphate content shall not exceed 1.9g of sulphate (expressed as SO^3) per litre when tested in accordance with BS 1377 Part 3 and the material shall be graded within the following range:

BS SIEVE SIZE	PERCENTAGE BY MASS PASSING
37.5mm	100
20.0mm	95 – 100
10.0mm	0 -10

Table 2.4: Pipe Bedding Material (Foul and Surface Water)

2.5 BACKFILLING MATERIAL FOR FILTER DRAINS

Sub-soil drains shall be surrounded and back filled with free draining filter material in accordance with the specification for Type B filter material in the Department For Transport Specification for Highway Works and graded as to the table given below.

BS SIEVE SIZE	PERCENTAGE BY MASS PASSING
63mm	100
37.5mm	85 – 100
20mm	0 – 25
10mm	0 – 5

Table 2.5: Pipe Bedding Material (Filter Drain)

2.6 FILTER DRAINS

2.6.1 Land drainage in the form of filter drains should be considered, designed by the Developer and agreed by the Engineer in the following situation:

i) the winter height of the water table is within 600mm of the formation level or

ii) the sub-soil is unstable because it is waterlogged or

iii) springs, drains or watercourses are encountered or

iv) there is likelihood of water running off or out of adjacent land, particularly land at a higher level.

2.6.2 Full details of any proposed land drainage that will affect the adoptable highway works should be submitted to the Engineer together with design considerations and calculations. Approval by the Engineer will be required before technical approval can be granted.

2.6.3 Sub-soil drains shall be accurately laid true to line and level. The gradients shall be sufficient to produce a self-cleansing velocity of 0.75 metres per second with the pipe running at full bore.

2.7 DUCTS

2.7.1 Service Ducts shall have a smooth internal bore without any sharp edges to the ends of the pipes. They shall be constructed of any of the materials in Table 2.05 and shall be bedded and surrounded with a minimum of 100mm of class ST4 concrete unless otherwise agree with the Engineer.

MATERIAL	STANDARD	PARTICULAR REQUIREMENTS
PVC-U	BS 4660 / BS EN 13598 BS EN 1401	Solid walled with push fit joints.
HDPE	BS EN 50086	Solid or twin walled systems.

Table 2.7.1: Duct Material

2.7.2 Ducts shall be jointed so that no silt, grit, grout or concrete surround is able to enter the duct. Pipes with push-fit joints shall have a register to ensure that the pipe is fully pushed into the joint.

2.7.3 The colour of ducting shall comply with the requirements of the National Joint Utilities Group and local authorities:

- Green Cable TV
- Orange Street Lighting/traffic signalling

- Black Low voltage power distribution
- Blue Water sleeving
- Yellow Gas sleeving
- Red Electricity
- Grey Telecommunications

2.8 EXCAVATION FOR DRAINS

2.8.1 Trenches shall be excavated to sufficient depth and width to enable the pipe to be laid together with the specified bedding or concrete surround. They shall be of width not exceeding the outside diameter of the pipe plus 600mm nor less than the outside diameter of the pipe plus 300mm unless approved in writing by the Engineer.

2.8.2 Trench sides shall be adequately supported at all times and, unless otherwise approved by the Engineer, they shall not be battered. The supports shall be left in pits or trenches where required by the Engineer.

2.8.3 Soft spots in the bottom of drainage excavation shall be removed and the resulting void immediately backfilled with approved backfilling material.

2.8.4 The Developer shall make good with an approved backfilling material:

i) any additional excavation at or below the bottom of the drainage trenches if the trench bottom has become soft or otherwise unsuitable for the construction of the pipeline.

ii) any excavation greater than the net volume required for the drainage works below the upper level of any pipe surround.

2.9 BEDDING, LAYING AND SURROUNDING OF PIPES

2.9.1 Immediately following the excavation of the trench the pipes shall be laid and jointed on the pipe bed. Pipes shall be laid so that each one is in contact with the bed throughout the length of the barrel. The bed shall be cut away and removed at each socket or sleeve in the case of socketed or sleeved jointed pipes to give a clearance of at least 50mm so that the socket or sleeve does not bear on the bed. Brick or other hard material shall not be used as temporary support.

2.9.2 Except where a concrete bed and surround is specified, pipe-bedding material shall be a granular material complying with Clause 2.4.

2.9.3 After jointing the pipes the bedding shall be brought up equally on both sides of the pipe to the level of the centre of the pipeline. Only after inspection and testing, as required by the Engineer, shall the bedding material be brought to a level 150mm above the top of the pipe collars. The remainder of the trench shall then be backfilled with backfill material as specified in Clause 2.12.

2.9.4 Where a concrete bed and surround is specified it shall be Class ST4 concrete to a minimum thickness of 150mm. The pipes shall be laid on approved pre-cast concrete blocks 150mm square in section and to a length equal to the diameter of the pipe laid across the trench, two blocks per pipe. The pipes shall be laid on these blocks and where necessary wedged in position using hardwood wedges.

2.9.5 After jointing and testing has been completed, the concrete surround shall be placed and well vibrated with an approved poker vibrator for the full width of the trench so that there is a minimum thickness of 150mm of concrete above, below and at either side of the pipe.

2.9.6 Care must be taken to avoid the pipes floating in the vibrated concrete and the finished cross section of surround shall be square.

2.9.7 Where a concrete bed and surround is used the backfill operation shall be completed after the concrete has hardened.

2.9.8 Where a concrete bed and surround is used with a pipeline having flexible joints, a compressible board or a pre-formed joint filler (18mm thick for pipes up to 450mm diameter) shall be placed in contact with the end of the socket at a pipe joint and shall extend through the full thickness of any concrete in contact with the pipe. Such joints in any concrete bed or surround shall be at each pipe joint.

2.9.9 Unless otherwise approved in writing by the Engineer, all surface water pipes shall have a minimum cover of 1.2 metres from the finished surface. A 150mm concrete bed and surround shall be provided for pipes within the adoptable highway with less than 1.2 metes cover from the finished surface. Except for gully connections any concrete surround must not encroach within the sub-base of the road construction.

2.10 CONNECTING TO EXISTING SEWERS, DRAINS AND MANHOLES

2.10.1 Where required, existing sewers and drains shall be properly extended, connected and jointed to new sewers, culverts, drains or channels. All such connections shall be made during the construction of the new main sewer, drain or other work and their positions recorded on the 'As constructed' drawings by the Developer.

2.10.2 Where pipe connections are made to a brick sewer, 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 at an angle not greater than 60° to the direction of flow of the sewer, drain or channel and with the end of the pipe carefully cut to the necessary angle. All special connecting pipes shall be true and properly jointed.

2.10.3 Before entering or breaking into an existing sewer or drain, the Developer shall give notice of his intention to do so to the authority responsible for the pipeline to which the connection is to be made. The Developer is reminded of his responsibility for complying with the requirements of the Health & Safety at Work Act.

2.11 JUNCTIONS

Junctions shall be formed using purpose made 45° oblique junctions of appropriate size. Where connections are to be made to an existing pipe, purpose made saddles may be used, with the prior permission of the Engineer, provided that no internal projections greater than 5mm remain. They shall be properly mortared in, ensuring no mortar enters the main pipeline, and the hole surrounded with 150mm of Class ST4 concrete. Where necessary a pipe shall be removed from the main line and replaced with an approved purpose made junction pipe.

2.12 BACKFILLING OF TRENCHES

2.12.1 Backfilling shall, wherever practicable, be undertaken immediately pipe laying operations have been completed. Backfilling shall not, however, be commenced until the works to be covered have achieved a strength sufficient to withstand all loading imposed thereon and the pipe laying has been approved.

2.12.2 Backfilling around manholes and other structures shall be undertaken in such a manner as to avoid uneven loading.

2.12.3 Filling material shall be deposited in layers not exceeding 250mm loose depth and compacted to form a stable backfill. Where the excavations have been supported and the supports are to be removed, these, where practicable, shall be withdrawn progressively as backfilling proceeds in such a manner as to minimise the danger of collapse and to ensure complete backfilling of the excavation.

2.12.4 Sub-soil drain trenches shall be backfilled with Type B Filter Material as specified under Clause 2.4.

2.12.5 Trenches within the adoptable highway shall be backfilled with Type 1 Sub-base material as Clause 4.4.

2.12.6 Trenches outside the adoptable highway shall be backfilled with selected excavated material approved by the Engineer where it is at a moisture content near to the optimum moisture content or with Type 1 sub-base to Clause 4.4.

2.12.7 Backfilling of trenches shall be carried out in layers not exceeding 250mm and thoroughly compacted with an approved trench vibrating plate compactor or a power rammer to the Engineer's satisfaction.

2.13 MANHOLE CONSTRUCTION

2.13.1 Manholes shall normally be constructed using pre-cast concrete sections manufactured to BS 5911 part 200 and constructed in accordance with the Standard Details. Manhole diameters shall comply with the following table:

NOMINAL BORE OF SEWER (mm)	CHAMBER OF DIAMETER (mm)
Less than 375	1200 reducing to 1050 where the depth to soffit is 1.35m to 1.5m
375 - 450	1350
500 - 700	1500
750 - 900	1800

Table 2.13.1: Minimum PCC chamber diameter

2.13.2 The sizes above are the minimum. If two pipes enter the manhole, the chamber size shall be sufficient to accommodate adequate benching.

2.13.3 Foundations to manholes shall be formed with 225mm thickness of Class ST4 concrete.

2.13.4 Inverts shall be formed of half channel vitrified clayware for pipe sizes up to and including 300mm laid true to falls. For pipe sizes greater than 300mm, channels shall be formed in 38mm of granolithic concrete. The benchings shall be constructed in Class ST4 concrete, properly shaped and finished in 38mm of granolithic concrete.

2.13.5 Brickwork shall be built with bricks to Clause 2.22 in mortar to Clause 9.4, in English bond. The joints of brickwork where exposed shall be finished with a neat flush joint as work proceeds. The ends of all pipes shall be neatly built into the brickwork and finished flush with mortar to Clause 9.4.

2.13.6 Where the depth of invert of manholes exceeds 900mm below the finished surface of the carriageway or adjacent ground, steps shall be built in as specified in BS 1247 Parts 1 and 2 and BS 5911 Part 200, unless shown otherwise on the drawings.

2.13.7 Manholes shall be surrounded with 150mm Class ST4 concrete and the remaining excavation filled with material complying with Clause 2.12 which shall be adequately compacted.

2.13.8 All manholes for foul sewers and drains shall be watertight on completion.

2.13.9 Manhole covers and frames shall be supplied in accordance with Clause 2.14. Frames for manhole covers shall be set in cement mortar to clause 9.4 or modified mortar to Clause 9.6. If requested a set of keys shall be delivered to the Engineer for each type of keyway in covers supplied.

2.13.10 On any pipeline the two pipe joints nearest the manhole must be flexible. The nearest joint shall not be more than 300mm from the manhole wall.

2.13.11 Shallow manholes can be constructed with Class B Engineering bricks in accordance with the Standard Details up to a maximum depth to invert level of 1.5 metres.

2.14 MANHOLE COVERS AND FRAMES

2.14.1 Manhole tops shall be kite marked ductile iron complying with the relevant requirements of BS EN 124.

2.14.2 For use in carriageways, Class D400 manhole tops shall be provided to BS EN 124.

2.14.3 In footways and verges where vehicular overrunning will not occur, Class B125 (single seal 600mm x 450mm clear opening size) manhole tops shall be provided to BS EN 124. In all other cases Class D 400 tops shall be used.

2.15 GRANOLITHIC CONCRETE

2.15.1 Aggregates shall comply with BS EN 12620: 2002. Fine aggregate shall be sand resulting from the natural disintegration of rock. Crusher run fines are not acceptable.

2.15.2 Granolithic concrete shall consist of two parts of 10mm granite or whinstone chippings and one part of sand to one part of Portland cement by weight or 0.035m^3 of dry sand and 0.07m^3 of coarse aggregate to 50 kg of Portland cement.

2.16 GULLIES

2.16.1 Gully pots shall have a minimum diameter of 375mm and a minimum depth of 750mm and be trapped with a 150mm diameter outlet.

2.16.2 Permanent concrete gullies shall comply with BS 5911 Part 230.

2.16.3 In-situ concrete gullies shall be formed with permanent shuttering (plastic gully pot liners) which shall have a current British Board of Agrément Certificate.

2.16.4 All gullies shall be surrounded with 150mm minimum thickness of Grade ST4 concrete to BS EN 206 and the complementary BS 8500.

2.17 GULLY COVERS, GRATINGS AND FRAMES

2.17.1 Gully tops shall be kite marked ductile iron complying with the relevant requirements of BS EN 124.

2.17.2 For use in carriageways and footways or verges Class C250 (captive hinge 325mm x 312mm clear opening size) gully tops shall be provided to BS EN 124.

2.17.3 All gully gratings and frames shall be so fixed as to be 5mm below the surface of the rod channels, carriageway or footway surface.

2.18 GULLY CONSTRUCTION

2.18.1 Gully pots to Clause 2.16 shall be set on a foundation of 150mm thick Class ST4 concrete to BS EN 206 and the complementary BS 8500 and haunched around the bottom. When the base concrete has set, backfilling shall be carried out using 150mm of Class ST4 concrete to the top of the gully pot. The remainder of the backfilling shall be in appropriate road pavement materials except where mechanical compaction of granular sub-base is impracticable, Class ST4 concrete shall be used.

2.18.2 The gully grating and frames shall then be seated on two to four courses of Class B engineering bricks bedded on cement mortar in Clause 9.4 on top of the pot and haunched with mortar as required.

2.18.3 Junction pipes which are laid, but not immediately connected, shall be fitted with temporary stoppers and seals and the positions of all such junctions shall be clearly defined by means of stakes or tracing wires properly marked or labelled. With the Engineer's approval, saddles may be used to form junctions. Junction pipes shall be manufactured of the same type and class of material as the remainder of the pipes in the run or shall be in accordance with the manufacturers' recommendations.

2.19 GULLY SPACING

2.19.1 The spacing of gullies will depend on the width and gradient of the carriageways and footways but as a general guide the spacing shall not exceed 35 metres on a cambered carriageway.

2.19.2 Gullies shall be so placed at low points and at or near to tangent points of junctions in order to prevent ponding and water spilling from one carriageway into another.

2.20 HYDRANTS

Hydrants, hydrant boxes and covers shall comply with the relevant requirements of BS 750 and be so fixed as to be flush with the carriageway or footway surface.

2.21 LADDERS

Mild steel ladders for vertical fixing shall comply with the relevant requirements of BS 4211. After fabrication, mild steel ladders shall be hot dip galvanized in accordance with BS EN ISO 1461:1999.

2.22 BRICKS

Bricks shall be solid type Class B Engineering, complying with BS 3921. The shape and dimensions of special bricks shall comply with the relevant requirements of BS 4729.

2.23 EXISTING LAND DRAINS

Existing land drains and springs severed by construction shall be investigated and reconnected into the existing land drainage system where possible. If the Developer cannot design an alternative discharge for the land drainage then the consent of the Engineer must be obtained before land drainage is connected into the surface water drainage system via a trapped catchpit.

2.24 TESTING AND CLEANING OF PIPES

2.24.1 All foul sewers, drains and surface water drains with watertight joints shall be tested as directed by the Engineer, in sections (e.g. between manholes), before the pipes are covered by means of the air test or the water test as described in the Department of Transport Specification for Highway Works Clause 509. Before testing, the ends of the pipeline to be tested, including those of short branches, shall be plugged and sealed to the satisfaction of the Engineer. Any section not passing any of the tests shall have the defects made good and shall be re-tested.

2.24.2 All drains and service ducts less than 350mm diameter shall be checked by drawing a mandrel through each completed length of pipe unless the Engineer agrees an alternative method of checking.

2.24.3 On completion of the works, or earlier if the Engineer agrees, all manholes and drains other than French drains shall be flushed from end to end with water and left clean and free from obstruction. A CCTV camera inspection of the drains shall be carried out and a good quality image recorded. A copy of the recording and log of each of the pipelines shall be passed to the Engineer as part of the 'As constructed' information.

3. EARTHWORKS

3.1 SITE CLEARANCE

3.1.1 Trees and vegetation, which are to remain on the site, are to be protected with barriers to minimize damage prior to Developer's plant entering the site. Works shall be carried out generally in accordance with the recommendations of the National Joint Utilities Group - Guidelines for the Planning, Installation and Maintenance of Utility services in Proximity to Trees and to the satisfaction of the Engineer. Trees that are to remain shall on no account be pruned, felled or interfered with without the Engineer's written consent.

3.1.2 Where it is necessary and after the Developer has obtain the relevant permissions, trees and hedges shall be removed from the site of the works, the roots shall be completely grubbed out and the resultant hole filled and compacted to the satisfaction of the Engineer.

3.2 REMOVAL OF VEGETABLE SOIL

Before depositing any filling, all turf and vegetable soil under the works shall be excavated and removed. Any material which may be required for soiling verges, cuttings and embankments shall be stacked for re-use.

3.3 GENERAL EXCAVATION

3.3.1 Where sub-soil has to be removed to reach the approved levels it shall be excavated in a manner that the formation undergoes the minimum possible disturbance. The formation for the road works shall be prepared for the full width of the carriageway and footways and the sub-grade shall wherever possible be compacted at its natural moisture content by eight passes of a smooth-wheeled roller having a mass per metre width of roll of 2.7 tonnes to 5.4 tonnes.

3.3.2 Where in the opinion of the Engineer the sub-grade is of poor quality he may require the removal of further material and its replacement by an approved general fill which shall be compacted in layers not thicker than 225mm in accordance with Table 4.6.1 of the compaction requirement for granular materials.

3.3.3 The Developer must ensure that the excavation is kept free from water during the progress of the Works and provide permanent land drainage if required to do so by the Engineer.

3.4 GENERAL FILL MATERIAL

3.4.1 Material for general filling may consist of approved broken bricks, stone, slag, gravel or sound broken concrete free from soft brick, dust, dirt, ashes, wood, metal, plaster or other extraneous matter, organic or inorganic impurities (e.g. sulphur, lime).

3.4.2 Unless otherwise stated general fill material shall be well graded from 100mm down and shall produce a well consolidated mass on compaction. It shall be compacted in layers not thicker than 225mm in accordance with Table 4.6.1 of the compaction requirements for granular materials.

3.4.3 When requested by the Engineer, the Developer shall provide a Certificate for imported general fill with details of the source and composition of the material and confirmation that it is free from contamination.

3.4.4 Where any approved fill is used adjacent to concrete structures it shall be certified to have a water soluble sulphate content not exceeding 1.9g per litre when tested in accordance with BS 1377 Part 3.

3.5 MEMBRANE/GEOTEXTILE/GEOGRID BELOW PAVEMENT CONSTRUCTION

3.5.1 In suitable circumstances the Engineer will permit the use of membrane/geotextile/geogrid to reduce environmental impact and reduce the amount of excavation and refilling in poor ground conditions.

3.5.2 Separation membranes shall be provided when required by the Engineer before filling on soils of low bearing strength.

3.5.3 The Developer shall supply to the Engineer on request details of the proposed product together with calculations to demonstrate the adequacy of the product for the proposed application.

3.5.4 The Membrane/geotextile/geogrid shall be positioned below the level of ducts etc for public utilities services to avoid subsequent damage.

3.5.5 The membrane/geotextile/geogrid shall be installed in accordance with the recommendations of the manufacturer.

3.5.6 The layer of material on which the membrane/geotextile/geogrid is to be placed shall not have protrusions or sharp projections which are likely to damage the geotextile/membrane during installation or in service.

3.5.7 The method of installation shall ensure that the membrane/geotextile/geogrid is in continuous contact with the surface on which it is to be placed and the geotextile/membrane shall not be stretched or bridged over hollows or humps.

3.5.8 Operation of construction plant directly on the installed membrane/geotextile/geogrid will not be permitted and its covering with fill material shall take place immediately after its laying.

4. ROAD PAVEMENT

4.1 CARRIAGEWAY SHAPE AN D TOLERANCES

4.1.1 If requested by the Engineer the Developer shall supply on site:

i) A substantial straight edge 3m long.

ii) A substantial template cut to the finished profile of the road and long enough to rest on the carriageway kerbs. Templates shall be made of sound timber and have a depth of at least 150mm and thickness of at least 40mm.

The finished levels of the various layers of road construction shall be measured from the template placed in position on the kerbs.

4.1.2 The acceptable tolerances for the various layers are as follows:

Subgrade	+ 20mm	- 30mm
Capping Layer	+ 20mm	- 30mm
Sub-base	+ 20mm	- 30mm
Base	+ 10mm	- 30mm
Binder Course	+ 6mm	- 6mm
Surface Course	+ 6mm	- 6mm

Table 4.1.2: Carriageway Tolerance

Where any tolerances are exceeded the area shall be made good as required by the Engineer.

4.1.3 At the request of the Engineer the surfaces of the surface course and binder course shall be tested for irregularities, with a 3m straight edge placed parallel with or at right angles to the centre line of the road. The maximum allowable deviation of the surface below the straight edge shall be:

for wearing course	3mm
for basecourse	6mm

Table 4.1.3: Maximum Surface Deviation

Where any toleranc es are exceeded the area shall be made good as required by the Engineer.

4.2 FORMATION

4.2.1 For the avoidance of doubt in this specification "subgrade" refers to the top of existing ground prior to the laying of any pavement construction material.

4.2.2 Preparation and surface treatment of the formation shall be carried out only after completion of all sub-grade drainage.

4.2.3 Trenches formed in the construction of ducts, gully connections and public utilities shall be filled with Type 1 sub-base material. The material is to be compacted using a vibro-tamper (wacker plate) to following regime:

Vibro-Tamper Category	No of passes for layers not exceeding the following thicknesses:		
	110mm	150mm	225mm
Over 50kg – 65kg	4	8	Unsuitable
65kg – 75kg	3	6	10
Over 75kg	2	4	8

Table 4.2.3: Compaction of Trench Fill

Alternative methods should be agreed by the Engineer prior to implementation.

4.2.4 The prepared subgrade shall be sound, free from soft areas, water, mud and slurry. The surface should be within the approved tolerance and shall (unless otherwise agreed by the Engineer) be compacted by a minimum of eight passes of a smooth-wheeled roller having a mass per metre roll of 2700kg – 5500kg.

4.2.5 Construction traffic shall not run on the formation so that damage is caused. Any damage that may be caused shall be made good as directed by the Engineer. The Developer must arrange his work such that the formation is covered by a capping layer immediately following approval by the Engineer.

4.3 CAPPING LAYER

4.3.1 The capping layer shall be well graded granular natural sands, gravels, crushed rock, crushed concrete, well burnt shales or other material approved by the Engineer.

4.3.2 All material used shall pass a 125mm BS sieve but not more than 12% of the material shall pass a 63 micron BS sieve. The wet 10% fines value of the material shall not be less than 30kN when tested in accordance with BS 812: Part111.

4.3.3 The material shall be compacted to the requirement of Clause 4.06 at a moisture content, with the range of optimum moisture content to optimum moisture content - 2%, determined in accordance with BS 1377 Part 2 to give a 200mm compacted thickness.

4.3.4 Material used within 450mm of the surface of the road shall not be frost susceptible. Materials that have a mean heave of 15mm or less when tested in accordance with BS 812: Part 124 amended in accordance with the Department For Transport Specification for Highway Works.

4.4 SUB-BASE

4.4.1 Sub-base is to consist of Type 1 granular material in accordance with The Department of Transport Specification for Highway Works, see appendix.

4.5 CARRIAGEWAY CONSTRUCTION THICKNESSES

4.5.1 Unless otherwise specified the thicknesses given in the table below shall be the minimum compacted construction for varying widths of carriageway:

Carriageway Width	Capping Layer (mm)	Sub Base (mm)	Roadbase (mm)	Basecourse (mm)	Wearing Course (mm)
>5.5m	200	350	90	55	45
<5.5m	200	300	90	55	45

Table: 4.5.1: Carriageway Construction Thickness

4.5.2 The above figures are based upon a CBR above 2%. Where this CBR is not achieved the developer will be expected to carry out measures to accommodate the poor ground conditions, these measures shall be approved by the Engineer. The developer may be requested by the Engineer to carry out CBR tests to verify the CBR on site.

4.5.3 When requested by the Engineer the pavement shall be designed in accordance with the Highways Agency document, Design Manual for Roads and Bridges, Vol 7 and the material thicknesses adjusted accordingly.

4.6 COMPACTION REQUIREMENTS FOR GRANULAR MATERIALS

4.6.1 Granular Materials (including capping and sub-base layers) are to be compacted by one of the methods detailed below:

Type of Compaction Plant	Category: (mass per metre width of roll)	Number of passes for:		
		Not greater than 110mm thickness	Not greater than 150mm	Not greater than 225mm thickness
Smooth Wheeled roller	2700 – 5400kg	16	Unsuitable	Unsuitable
	over 5400kg	8	16	Unsuitable
Vibrating roller	700 – 1300kg	16	Unsuitable	Unsuitable
	1300 – 1800kg	6	16	Unsuitable
	1800 – 2300kg	4	6	10
	2300 – 2900kg	3-	5	9
	2900 – 3600kg	3	5	8
	3600 – 4300kg	2	4	7
	4300 – 5000kg	2	4	6
	over 5000kg	2	3	5
Vibrating plate compactor	mass per unit area of base plate (kg/m^2)			
	1400 - 1800	8	Unsuitable	Unsuitable
	1800 - 2100	5	8	Unsuitable
	over 2100	3	6	10

Table 4.6.1: Compaction Requirements of Granular Material

4.6.2 The mass per 1.0m width of roll is the total weight on the roll divided by the total roll width. In the case of a smooth wheeled roller having more than one axle, the assessment is based on the highest value axle.

4.6.3 The requirements for vibratory rollers are based on the use of the lowest gear on a self propelled machine and a towing speed of 1.5 to 2.5 kph for a towed machine. If higher gears or speeds are used an increased number of passes shall be made in proportion to the increase in the speed of travel.

4.6.4 Vibratory rollers shall be operated with their vibration mechanism operating only at the manufacturer's recommended frequency. All such rollers shall be equipped with a means of indicating automatically the frequency at which the vibration is given. Vibratory rollers not vibrating shall be treated as smooth wheeled rollers.

4.6.5 Vibrating-plate compactors are machines having a base plate to which is attached a source of vibration consisting of one or two eccentrically weighted shafts.

4.6.6 The static pressure under the plate is calculated by dividing the total working mass of machine by the area of contact with the compacted soil in m^2. Vibrating-plate compactors shall normally be operated at travelling speeds of less than 1.0 kph, if higher speeds are necessary the number of passes shall be increased in proportion to the increase in the speed of travel.

4.7 COLD WEATHER WORKING FOR GRANULAR MATERIALS

4.7.1 No material in a frozen condition shall be incorporated in the works but shall instead be retained on the site for use if suitable when thawed.

4.7.2 Materials for use in road pavements shall not be laid on any surface that is frozen or covered with ice.

4.8 SPECIFICATION FOR DENSE BITUMINOUS MACADAM FOR ROAD CONSTRUCTION

4.8.1 Materials used for base, binder course and surface course are to conform to BS 4987 Part 1 with the exception that limestone aggregate shall only be used for base.

4.8.2 Base material to the BS 4987 Part 1 - Clause 5.2 shall be a 28mm nominal size dense base using 125-pen bitumen binder giving a compacted thickness of 90mm.

4.8.3 Binder course material to the BS 4987 Part 1 - Clause 6.5 shall be a 20mm nominal size dense binder course using a 125-pen bitumen binder giving a compacted thickness of 55mm. Limestone aggregate shall not be used.

4.8.4 Surface course material to the BS 4987 Part 1 - Clause 7.3 shall be 14mm nominal size close graded surface course using 125-pen bitumen binder giving a compacted thickness of 45mm. The material must not be fluxed and limestone aggregate shall not be used.

4.9 HOT ROLLED ASPHALT SURFACE COURSE

4.9.1 Hot Rolled Asphalt surface course shall be used where a harder wearing road surface is required and where requested by the Engineer.

4.9.2 Hot Rolled Asphalt surface course shall comply with BS 594 Part 1 (Group 2: surface course design mix), Table 3 type F. The binder shall be 50-pen bitumen complying with BSEN 12591. The course aggregate content shall be 35% by mass of total mix and shall have a PSV of not less than 45.

4.9.3 20mm nominal size coated chippings shall have a PSV of not less than 60 unless the Engineer requests a higher value.

4.9.4 Coated chippings shall be uniformly spread at a rate of 10-12kg/m^2 and rolled into the wearing course so that they are effectively held.

4.10 STONE MASTIC ASPHALT SURFACE COURSE

4.10.1 Stone Mastic Asphalt shall be used as an alternative to Hot Rolled Asphalt where agreed/instructed by the Engineer.

4.10.2 Stone Mastic Asphalt shall comply with the general requirements of BS4987 for coated macadam and the Highways Agency draft specification for Stone Mastic Asphalt.

4.10.3 The surface course shall comprise of 14mm aggregate stone mastic asphalt using a 50-pen binder giving a compacted thickness of 45mm. The PSV of the aggregate should be not less than 60 unless the Engineer requests a higher value.

4.11 COLOURED FLEXIBLE WE ARING COURSES

4.11.1 Coloured flexible wearing courses shall be provided at the approval/requirement of the Engineer and in accordance with the following sub-clauses. Other coloured flexible wearing courses shall be subject to the approval of the Engineer.

4.11.2 The Developer shall agree with the Engineer the materials and method of application of coloured surfacing as part of the technical approval process.

4.12 REGULATING COURSE

The material shall conform to BS 4987 - Part 1 and shall be as determined by the Engineer.

4.13 TACK COAT

Prior to laying subsequent layers of bituminous material the surface shall be thoroughly cleaned and a tack coat of bitumen emulsion Class K1-40 to BS 434 shall be applied at a rate of 0.4 to 0.6 litres per square metre to any bituminous surface that has been left uncovered for more than three days.

4.14 LAYING OF BITUMINOUS MATERIALS FOR CARRIAGEWAYS

4.14.1 Laying of road base material shall not proceed until the channel and/or kerb has been laid to the approved line and level and suitably haunched to the satisfaction of the Engineer. The level of the sub-base must be approved by the Engineer to the tolerance of clause 4.1.

4.14.2 Unless otherwise approved by the Engineer, all bituminous material shall be laid with an approved mechanical spreader capable of applying initial compaction.

4.14.3 Hand laying will only be permitted in confined spaces where it is impractical for a mechanical paver to operate.

4.14.4 Hand raking of wearing course material which has been laid by mechanical means or the addition of such material by hand spreading to the paved area for adjustment of level will only be permitted at the edge of material layers and at gullies and manholes.

4.14.5 All work, whether hand laid or machine laid, shall comply in all respects with the recommendations for laying contained in BS 594 Part 2 or BS 4987 Part 2. Tolerances on the finished surface shall be in accordance with Clause 4.1.

4.14.6 Final compaction to the wearing course shall be carried out using roller with the equivalent linear load of 2700 - 5400kg/m.

4.15 JOINING INTO EXISTING CONSTRUCTION

Where any new carriageway joins an existing carriageway, the existing carriageway shall be cut back to the satisfaction of the Engineer, tack coated and the levels adjusted to the Engineer's satisfaction.

4.16 WORKING IN ADVERSE WEATHER CONDITIONS WITH BITUMINOUS MATERIAL

4.16.1 Laying of materials containing bitumen binders, shall cease if the temperature of the surface to be covered is at or falls below 2°C. Where however, the surface is dry, unfrozen and free from ice, laying may proceed at temperatures at or above -1°C on a rising thermometer.

4.16.2 Laying of bituminous materials shall be avoided as far as practicable during wet weather and shall be suspended when free standing water is present on the surface.

4.16.3 Hot Rolled Asphalt wearing course shall not be laid when the air temperature is less than 5°C.

4.17 CONCRETE BLOCK PAVING

4.17.1 Concrete block paving may be used as a carriageway surface in cul-de-sacs and for footways or decorative areas. It may also be used for surface course of traffic management structures.

4.17.2 Concrete block paving shall be designed and constructed in accordance with BS7533 Parts 2 & 3 together with any additional requirements in these Clauses. In general the concrete block paving will replace the macadam binder and surface course and the overall pavement thickness shall be as determined in Table 4.5.1 for the appropriate road width.

4.17.3 The blocks shall be rectangular 100mm x 200mm and 80mm thick, to a colour or colours previously agreed with the Engineer and shall meet the requirements of BS 6717:2001. They shall be laid in a herringbone pattern on laying course of 30mm compacted thickness of sand. Sand shall be well graded to BS 7533 Part 3 of uniform moisture content without being saturated.

4.17.4 The sand shall be laid on a layer of base of 28mm nominal size dense base to specification clause 4.8.2 giving a compacted thickness of 90mm. All other construction layers shall be as Table 4.5.1.

4.17.5 Block paved carriageways shall be laid with a 1 in 40 cross fall unless agreed otherwise by the Engineer.

4.17.6 Alternative block sizes and laying pattern may be considered by the Engineer in some very lightly trafficked situations. The Developer should submit details of his proposals together with the location and loading of the proposed units to the developer for approval.

4.18 LAYING OF CONCRETE BLOCK PAVING

4.18.1 The acceptable tolerance for the laid surface of blocks shall be ±6mm with a maximum relative difference between adjacent blocks of 2mm. The acceptable tolerances for capping layer, sub-base and base shall be as Clause 4.1.

4.18.2 All block cutting shall be done using a purpose made block splitter or saw and the minimum size of laid block shall be 33% of a full block. The bond shall be broken as necessary to accommodate the minimum cut block size.

4.18.3 Full edge restraint must be provided prior to the laying of the blocks. The edge restraint should present a vertical face down t the level of the underside of the laying course.

4.18.4 Where block paving abuts a macadam surface an approved form of channel edge support shall be provided set flush into the surface of the block paving. Where the block paving adjoins manhole frames, gully frames etc the blocks shall be neatly cut and may require to be set in coloured cement mortar. The use of in-situ concrete infill is not acceptable.

4.18.5 On completion of paving the surface course should be fully compacted using a plate compactor to achieve the required compaction of the laying course. Joints between blocks shall be fully filled with dried free-flowing silica sand conforming to BS7533: 3. Joints should be refilled as necessary and the paving revibrated with two or more passes.

4.19 JOINT SEALANTS

4.19.1 Joint seals shall consist of hot or cold applied sealants.

4.19.2 Hot applied sealants shall be Type N1 or Type F1 complying with BS 2499 Part 1.

4.19.3 Cold applied sealants shall be Type N complying with BS 5212 Part 1 or gunning grade cold applied plasticised bituminous rubber sealant or gunning grades of two part polysulphide sealants complying with BS 4254 may be used. Alternatively polyurethane based sealing compounds may be used provided their performance is not inferior to BS 4254 material.

5. KERBS, FOOTWAYS AND PAVED AREAS

5.1 KERBS AND CHANNELS

5.1.1 All kerbs and channels irrespective of type shall be laid, bedded and backed in accordance with Clauses 5.6 and 5.7 and be laid to a flowing alignment to the satisfaction of the Engineer.

5.2 PRECAST CONCRETE KERBS AND CHANNELS

5.2.1 Longitudinal falls less than 1 in 100 will not normally be acceptable. The Engineer should be consulted at an early stage in the design if the Developer intends to use gradients less than 1 in 100.

5.2.2 Precast concrete kerbs shall be 125mm x 255mm half battered and shall comply with BS7263 Part 1, and shall be hydraulically pressed. Precast concrete radius kerbs shall be used on radii not exceeding 12.0m. .

5.2.3 Precast concrete dropped vehicular crossing kerbs shall be 125mm x 178mm and shall comply with BS 7263 Part 1 except dimensionally and shall be hydraulically pressed. Transition kerbs shall comply with the British Standard.

5.2.4 Precast concrete channels shall be 150mm x 150mm and shall be hydraulically pressed and manufactured in accordance with BS 7263 Part 1 except dimensionally. Precast concrete channels shall be used where the carriageway falls towards the kerb and may be used where the carriageway falls away from the kerb.

5.2.5 Precast concrete channels laid to a radius not exceeding 12m shall not exceed 450mm long.

5.2.6 Precast units conforming to BS 5328 Part 1 should not be cut to a length of less than 300mm

5.3 NATURAL STONE KERBS

5.3.1 Natural stone kerbs shall comply with BS435. Kerbs shall be natural stone granite, whinstone or York stone. They shall be laid and bedded in accordance with Clause 5.7

5.3.2 The location, size and stone type and surface finish of the proposed kerbs shall be submitted to the Engineer at an early stage in the design. Samples shall be submitted to and approved by the Engineer prior to their use and the kerbs used shall be equivalent or superior to the approved sample.

5.3.3 Small kerb stones for use in areas without footways shall be of igneous rock of minimum nominal size 200mm x 150mm x 75mm.

5.4 PRECAST CONCRETE BLOCK KERBS AND CHANNELS

5.4.1 Precast concrete blocks used for kerbs and channels shall comply with BS 6717 Part 1. They shall be laid and bedded in accordance with BS 7533 Part 6 and Clause 5.7.

5.4.2 Units shall be of proprietary manufacture with a range of suitable profiles for dropped crossings and transitions where appropriate. Small units of stone and concrete should not be cut to less than one-third of their original length and in no case less than 50mm.

5.4.3 A list of ranges of concrete paving systems currently approved for use in the City of York area is included in Appendix F to this Specification. A developer wishing to use an alternative system is required to provide details of the product and range to the Engineer for approval.

5.5 STONE SETS

5.5.1 Stone setts for use as decorative areas, rumble strips or highway boundary definition shall be natural stone granite, whinstone or York stone. Samples shall be submitted to and approved by the Engineer prior to their use and the setts used shall be equivalent or superior to the approved sample.

5.5.2 Setts shall be laid and bedded in accordance with BS 7533 Part 7.

5.6 BLOCK PAVING CHANNELS

Where approved by the Engineer, approved concrete paving blocks may be used as channels only where a block paving surface is being used. They shall be laid in stretcher bond on bedding sand as specified in Clauses 4.17 and 4.18. The channel shall be laid to a level 5mm below the finished edge of carriageway level. Block channels will not be approved for longitudinal gradients less than 1 in 80.

5.7 KERB AND CHANNEL LAYING

5.7.1 Typical sections giving full details of the foundation and backing are shown in Standard Details.

5.7.2 Where units are to be set on a race of fresh concrete, a foundation of ST2 concrete should be deposited along the line of units, onto which the units are laid directly on fresh mixed concrete and set to line and level. The backing concrete should be laid monolithically with a race of fresh concrete, dowel bars should be fixed into the base and extended into the backing haunching.

5.7.3 Where units are to be bedded onto a concrete edge beam, the concrete foundation shall be formed on the compacted sub-base to a minimum thickness of 150mm and wide enough to accommodate the units and backing concrete. Soundly fixed formwork or shuttering shall be used and the Class ST2 concrete to BS 5328 shall be compacted to produce a dense foundation free from honeycombing. The minimum period between concreting and the removal of the formwork or shuttering shall be 24 hours.

5.7.4 Kerb and channel units on the concrete foundation shall be laid butt jointed on a maximum 25mm thick bed of semi-dry 3:1 cement mortar to Clause 9.04. Any surplus bedding material shall be thoroughly cleaned off and the foundation wetted if necessary prior to the placing of the backing concrete. The backing of ST2 concrete to BS 5328 shall be placed in a soundly fixed road form or shutter and thoroughly compacted to produce a concrete dense and free from honeycombing to the section as shown on Standard Details.

5.7.5 Kerb and channel units shall be laid true to line and level in a flowing alignment and shall not be backed until they have been inspected and approved by the Engineer.

5.7.6 Channels shall be laid in a broken joint bond with the kerbs.

5.8 PREPARATION OF SUBGRADE TO FOOTPATHS AND OTHER PEDESTRIAN AREAS.

5.8.1 During the course of the works the Developer must keep the subgrades free of water.

5.8.2 These subgrades shall be treated in accordance with Clause 4.2. Any depressions in these subgrades shall be filled with approved sub-base material and compacted to the Engineer's satisfaction before further materials are deposited thereon. These subgrades should then be treated with an approved granular total weedkiller in accordance with Clause 10.6 to the satisfaction of the Engineer to ensure that no weed growth disturbs subsequent construction.

5.9 SUB BASE TO FOOTWAYS AND FOOTPATHS

5.9.1 After the formation has been inspected and approved by the Engineer the required compacted thickness of Type 1 sub-base material in accordance with Clause 4.4 shall be spread evenly and thoroughly compacted in accordance with Clause 4.6.

5.9.2 The compacted thickness of sub-base material to footways and footpaths on residential estate roads shall be 150mm.

5.9.3 The acceptable tolerances for the sub base surface under footways shall be +0mm, -30mm. Where any tolerances are exceeded the area shall be made good as required by the Engineer

5.9.4 Footways adjacent to industrial estate roads shall have an increased thickness of sub-base to the same depth as the road construction.

5.10 COATED MACADAM TO FOOTWAYS AND FOOTPATHS

5.10.1 Laying of binder course material shall not proceed until the kerbs and edgings have been laid to the approved line and level and suitably haunched to the satisfaction of the Engineer. The level of the sub-base must be approved by the Engineer to the tolerance of clause 4.1.

5.10.2 Binder course material to the BS 4987 Part 1 - Clause 6.5 shall be a 20mm nominal size dense binder course using a 125-pen bitumen binder giving a compacted thickness of 50mm. Limestone aggregate shall not be used.

5.10.3 Surface course material to the BS 4987 Part 1 Clause 7.3 shall be 6mm nominal size close graded wearing course using 125-pen bitumen binder giving a compacted thickness of 25mm. The material must not be fluxed and limestone aggregate shall not be used.

5.10.4 Prior to the laying of the surface course the surface of the binder course shall be thoroughly cleaned and an approved bitumen emulsion tack coat to Clause 4.11 applied where the binder course has been left uncovered for more than three days.

5.10.5 Compaction shall be carried out with an approved smooth-wheeled roller of 2.0 tonnes to 3.0 tonnes mass or an approved vibratory roller of equivalent rating to give the specified compacted thicknesses.

5.10.6 The binder and wearing courses shall be laid to the tolerances states in Clause 4.1.

5.11 CONCRETE BLOCK PAVING TO FOOTWAYS AND FOOTPATHS.

5.11.1 In footways and footpaths concrete blocks shall be 80mm thick 100mm by 200mm rectangular blocks. The blocks shall be to a colour or colours previously agreed with the Engineer and shall be laid in a herringbone pattern on 30mm compacted thickness of sand as specified in BS 7533 Part 3.

5.11.2 Concrete block paving to footways and footpaths shall be laid in accordance with Clause 4.16.

5.12 FLAGGING TO FOOTPATHS AND FOOTWAYS

5.12.1 The use of pre-cast concrete flags will generally only be acceptable in conservation areas or other areas of landscape importance or adjacent to existing flagged areas.

5.12.2 Pre-cast concrete flags shall be hydraulically pressed and shall comply with the requirements of BS 7263 Part 1. All aggregates shall comply with BS 882. The flags shall generally be 450mm x 450mm x 70mm thick. The use of 63mm thick flags of a uniform width of 600mm, a minimum length of 450mm and a maximum length of 900mm will be permitted to tie in with existing flagged areas.

5.12.3 All flags shall have a foundation of 150mm compacted thickness of Type 1 Sub-base material to Clause 4.4.

5.12.4 All 450mm x 450mm square flags shall be on a laying course of 50mm compacted thickness of sand as specified in BS 7533 Part 4.

5.12.5 All 600mm wide flags shall be bedded and pointed in cement mortar to Clause 9.4.

5.12.6 The flagging shall be laid at right angles to the kerb and joints must be broken in each course and properly radiated to the kerbing laid to radius. Where the radius is less than 12 metres the flags shall be radially cut on both edges to the required line. Care must be taken to ensure a neat fit around all surface boxes and obstructions. Flags are to be laid close jointed i.e. with a 2mm to 4mm joint. The joint shall have concreting sand or crushed rock fines compatible with grade f of BS 882 brushed into the joints. Further sand shall be brushed into the joints after the flags have compacted down into the bedding material.

5.12.7 Where a flagged footway is used concrete block paved vehicular crossings shall be constructed at all foreseeable crossing points and as required by the Engineer.

5.13 TACTILE PAVING

5.13.1 Tactile paving in accordance with Department of Environment Transport and the Regions document 'Guidance on the use of Tactile Paving Surfaces' shall be used at pedestrian crossing points to identify the existence of a flush dropped kerb and an appropriate place to cross.

5.13.2 In accordance with the recommendations red tactile paving shall only be used at controlled crossing places, i.e. pelican and zebra crossings and light signalled crossings with a pedestrian phase. Elsewhere the tactile surface shall be buff or in such a colour which provides a contrast with the footway surface material.

5.13.3 The tactile surface itself can help some visually impaired pedestrians to align themselves in the correct direction of travel in order to locate the threshold of the crossing place. The surface should therefore be laid to ensure that the domes are in line with the direction of travel.

5.13.4 The width of the crossing point will need to be determined according to local circumstances, but it should never be less than 1.2m wide.

5.13.5 The target gradient of ramps in footways down to carriageway level is 1in 20 with a maximum gradient of 1 in 12. Where the kerb is dropped at pedestrian crossing points there should be no vertical upstand between the road channel and the kerb; a 6mm tolerance can be made but only on a bullnose kerb. The drainage of the channel at pedestrian crossing points must be considered to ensure that no water is routed across or allowed to pond at the pedestrian crossing point.

5.13.6 The paving units shall have a foundation of 150mm compacted thickness of Type 1 Sub-base material to Clause 4.4 and shall be bedded on 100mm compacted thickness of ST2 concrete. Where the paving units are to be laid onto a mortar laying course it shall comply with Clause 9.4 and be 25mm thick when laid.

5.13.7 The paving units shall be hydraulically pressed and shall comply with the requirements of BS 7263 Part 1. All aggregates shall comply with BS EN 12620:2002.

5.14 EDGINGS

Edgings shall be pre-cast hydraulically pressed concrete 50mm x 150mm flat topped, manufactured and complying in all respects to BS 7263 Part 1. Edgings shall be laid true to line and level in a smooth alignment on a foundation of Class ST2 concrete to BS 5328 as shown in Standard Detail B5. Edgings shall not be backed until inspected and approved by the Engineer.

6. ROAD MARKINGS AND TRAFFIC SIGNS

6.1 GENERAL

6.1.1 All traffic signs used (including reflectors and road markings), whether permanent or temporary shall be of the size, shape, colour and type prescribed for that use in the Traffic Signs Regulations and General Directions 2002 (SI 2002/3113) and subsequent amending regulations.

6.1.2 The location of all traffic signs and road markings (with the exception of street name signage) should be agreed with the Engineer in order to meet technical approval.

6.2 PERMANENT TRAFFIC SIGNS

6.2.1 Sign plates shall be constructed from sheet aluminium, extruded aluminium, extruded plank sections and shall conform to BS 873.

6.2.2 Unless otherwise stated all sign faces shall be Class 1 retroflective and shall carry a ten year guarantee from the Manufacturer. The rear faces of signs shall have a 5-year guarantee. All signs shall comply with BS 873 and should be supplied by a recognised Road Traffic Sign Supplier being part of the:

Association for Road Traffic Safety & Management. (ARTSM)
Office 8
Epic House
128 Fulwell Road
Teddington
TW11 0RQ

6.2.3 All signs shall be erected on tubular steel posts which shall be hot dipped galvanized in accordance with BS EN ISO 1461. Where the sign is to be erected on a single post the post shall have a square baseplate fabricated from 4.75 mm thick steel plate welded to the base of the post. The area of the baseplate shall not be less than specified in BS 873: Part 7. Post caps shall be manufactured from plastics.

6.2.4 Compartments for electrical equipment shall for posts less than 140mm diameter be wide base posts with 168mm diameter base section and 76mm to 114mm diameter shafts. For posts 140mm diameter or greater root boxes attached to sign posts shall be used.

6.2.5 Where luminaries are shown as not being mounted on the posts supporting the traffic sign an additional stub post will be required for each luminaire, attached to the rear of the sign frame to take the luminaire, together with the necessary plastic conduit between stubs and outer posts.

6.2.6 Two sets of keys shall be provided for each type of lock on traffic sign housings.

6.2.7 Foundations to signs shall be constructed in accordance with the standard details.

6.3 ELECTRICITY SUPPLY PROVISION TO ILLUMINATED SIGNS

6.3.1 Each column shall have a 240 volt 50 cycle continuous supply of electricity provided. That supply shall be transmitted via a direct connection to the Regional Electricity Company's underground or overhead distribution system. All service connections will remain the responsibility of the Regional Electricity Company for their on-going repair and maintenance. It is strongly recommended that the Regional Electricity Companies be consulted at the earliest opportunity.

6.3.2 In the event that the Regional Electricity Company is unable to provide a direct underground service connection from its existing network, an alternative method of supply will be necessary. It may be possible for the Regional Electricity Company to provide a single service connection to either a street lamp or a control cubicle/pillar; from which a fused looped electrical distribution system could then be derived. Such a fused loop electrical distribution system must be designed and constructed in accordance with all current legislation and regulations. The responsibility for its provision, its testing, and the recording or those results, rests with the Developer.

6.3.3 The Developer is required to submit to the Council, a copy of the proposed private distribution network, its electrical characteristics, for approval, prior to installation.

6.3.4 The Developer shall retain all relevant information of the as laid cable routes, their depth, and their test readings for onward transmission to the Council, at or before the date of the adoption of the streetworks.

6.4 TEMPORARY TRAFFIC SIGNS

Any design required for temporary traffic signs shall be carried out by the Contractor and submitted to the Engineer for approval.

6.5 PERMANENT WHITE ROAD MARKINGS

6.5.1 White road marking shall be in accordance with the Traffic Signs Regulations and General Directions 2002 (SI 2002/3113) and subsequent amending regulations.

6.5.2 The material type shall be thermoplastic material complying with BS 3262 Part 1 Class A and BS EN 1436 and shall be either sprayed, extruded or screed applied.

6.5.3 All markings shall be reflectorised.

6.5.4 Road marking shall be laid in accordance with BS 3262 Part 3.

6.6 PERMANENT YELLOW ROAD MARKING

6.6.1 White road marking shall be in accordance with the Traffic Signs Regulations and General Directions 2002 (SI 2002/3113) and subsequent amending regulations.

6.6.2 The material type shall be thermoplastic material complying the BS 3262: Part 1: Class A and BS EN 1436 and shall be either sprayed, extruded or screed applied.

6.6.3 The colour of the marking shall be as follows:

Generally	Lemon
Conservation & environmentally sensitive areas	Primrose

The supplier and the colour type is to be agreed by the Engineer.

6.6.4 Road markings shall be laid in accordance with BS 3262 Part 3.

6.7 DIMENSIONAL TOLERANCES FOR PERMANENT ROAD MARKINGS

The length and width of road markings shall be as specified with a permitted tolerance as follows:

- Length : +10% -5%
- Width : +10% -5%

6.8 TEMPORARY ROAD MARKINGS

6.8.1 All temporary road markings shall be reflectorised.

6.8.2 Proprietary prefabricated temporary road marking material shall only be used on the types of surfaces recommended by the Manufacturer and approved by the Engineer. Materials, which are only available in 100mm and 150mm wide strips, shall not be used to form warning arrows etc.

6.9 PERMANENT REFLECTING ROAD STUDS

6.9.1 Reflecting road studs to BS 873 Part 4 and BS EN 1463 shall be selected from those that have received Statutory Type Approval and shall be agreed by the Engineer.

6.9.2 Road studs shall be fixed in strict accordance with the manufacturers instruction.

6.9.3 Only one type of stud shall be used in a particular location in any one carriageway.

6.10 STREET NAME SIGNAGE

6.10.1 Approved street names are to be provided by Building Control. The Developer is to formally approach building control once technical approval is granted.

6.10.2 Once the street names have been provided the positioning of street name boards is to be agreed with the Engineer.

6.10.3 Name plates are to be pressed aluminium and enamelled with raised text in min 11 gauge thickness. Stove enamelled cast aluminium with raised text may also be used. All plates to be black text on a white background with a raised black border, see standard details.

6.10.4 Standard plate depths are 150mm or 225mm; lengths shall be determined by individual conditions. Larger plate sizes may be required at the entrance to larger estates; the plate size is to be determined by the lettering arrangement. For examples of street nameplate see standard details.

6.10.5 Lettering is to be 90mm or 50mm "Kindersley" style black, all capital letters.

6.10.6 Where required a 'No Through Road Symbol' (diag 816.1, Traffic Signs Regulations and General Directions 2002) should be added to the plate.

6.10.7 Unless agreed by the Engineer, the plate should be erected free standing on two posts 750mm above the ground level by one of the following methods:

Manufactured plates fitted to 2 horizontal channel stiffeners and attached to 75mm tubular posts with sole plates. All steelwork to be galvanised and painted with 2 coats of grey gloss paint. See standard details for post installation.

Steel angle frame to receive name plate riveted, welded or bracketed to 75mm tubular posts with sole plates. All steelwork to be galvanised and painted with 2 coats of grey gloss paint. See standard details for post installation.

7. ROAD LIGHTING AND ELECTRICAL EQUIPMENT

7.1.1 Street lighting shall comply with the requirements set out in the City of York Council Highway Development Information Sheet 7 – Street Lighting Information.

7.1.2 The preferred location for columns is at the back edge of the footway. Columns should be located to avoid obstruction to accesses and driveways. Consideration should be given to the effect of spilled light into residential properties.

8. CONCRETE

8.1 CONCRETE MIXES

8.1.1 Concrete shall be standard mixes unless otherwise agreed by the Engineer and shall comply with BS EN 206 and the complementary BS 8500. Typically used mixes are detailed below:

CLASS	NOM COARSE AGGREGATE SIZE (mm)	MAX SLUMP (mm)	TYPICAL USES
ST2	20	75	Kerb bedding and backing
ST4	20	75	Drainage bedding and backing

Table 8.1.1: Typically Used Concrete Mixes

8.1.2 All concrete shall be supplied to site Ready Mixed from certified supplier, certified by the following bodies:

The Quality Scheme for Ready Mixed Concrete Ltd
3 High Street
Hampton
Middlesex
TW12 2SQ
BSI Quality Assurance
389 Chiswick High Road
London
W4 4AL

8.1.3 Concrete shall be designed in accordance with the Sulphate classification determined in table A.2 of BS 8500.

8.2 CONCRETE PLACING AND COMPACTION

8.2.1 Concrete shall be so transported and placed to avoid contamination segregation or loss of constituent materials.

8.2.2 All formwork and reinforcement shall be free from dirt, standing water, snow, or ice.

8.2.3 Concrete shall not be placed until approval of formwork or the foundation has been given by the Engineer. Concreting must then be started within 24 hours or further approval must be sought. Fresh concrete shall not be placed against in-situ concrete which has been in position for more than 30 minutes. Concrete shall be laid and compacted as specified within 30 minutes of its discharge from the mixer and unless otherwise agreed by the Engineers shall not be dropped into place from a height exceeding 2m.

8.3 CONCRETING IN COLD WEATHER

8.3.1 Concreting at ambient temperatures below 3°C may be carried out only if the following conditions are met:

a) The aggregates and water used in the mix shall be free from snow, ice and frost.

b) Before placing the concrete, the formwork shall be free from snow, ice and frost and shall be at a temperature above 0°C.

c) The initial temperature of concrete at the time of placing shall be at least 5°C.

8.3.2 Precautions to prevent the temperature of any concrete falling to 0°C during the first five days of placing shall be provided to the satisfaction of the Engineer.

8.4 CONCRETE CURING

Concrete shall be protected for seven days against harmful effects of weather including rain, wind, sun and frost and from drying out. The method of protection used shall be subject to the approval of the Engineer.

8.5 CONSTRUCTION JOINTS

Construction joints are to be designed and detailed for the specific requirements and approved by the Engineer.

8.6 SURFACE FINISH

The finish to exposed concrete is to be approved by the Engineer.

8.7 SAMPLING AND TESTING

Sampling and testing of concrete shall be in accordance with BS 1881.

8.8 ROUND BAR REINFORCMENT

Carbon steel for the reinforcement of concrete shall comply with BS 4449 and shall be cut and bent in compliance with BS 8666.

8.9 MESH REINFORCEMENT

Steel wire mesh reinforcement shall comply with BS 4483. Where required as a bottom reinforcement in surface water drain trenches it shall be 5.55kg/m^2 ref. C.636.

8.10 TYING WIRE

Tying wire shall be 1.2mm diameter (No. 18 gauge) stainless steel wire.

8.11 WATERPROOF UNDERLAY

Waterproof underlay shall be approved 125µm impermeable plastic sheeting. Over lapping of plastic sheeting shall be at a minimum of 300mm.

8.12 FORMWORK

8.12.1 Formwork shall include all temporary or permanent forms required for forming concrete, together with all temporary supports. It shall be so constructed that there shall be no loss of material from the concrete. After hardening the concrete shall be in the position, shape and surface finish required by the Engineer.

8.12.2 All formwork shall be designed by the Developer and approved by the Engineer.

9. MISCELLANEOUS ITEMS

9.1 CEMENT FOR MORTAR

9.1.1 All cement shall be from an approved BSI Kitemark source.

9.1.2 Portland Cement shall comply with the requirements of BSEN 197 Part 1

9.1.3 Sulphate Resisting Portland Cement shall comply with BS 4027.

9.2 CEMENT STORAGE

9.2.1 All the cement shall be delivered to the site in the original sealed bags of the manufacturer and stored off the floor in a dry, weatherproof container, or other building approved by the Engineer.

9.2.2 Any cement that shall become adversely affected by damp, or other causes, shall at once be removed from the site.

9.2.3 Each consignment of cement shall be kept separate, identified and used in order of delivery.

9.3 BUILDING SAND

Building sand shall comply with BS 1200.

9.4 CEMENT MORTAR

9.4.1 Cement mortar for brickwork or bedding ironwork shall consist of one part by volume of Portland Cement to three parts by volume of clean building sand.

9.4.2 Cement mortar for kerb, channel and flag bedding shall be semi-dry one part by volume of Portland Cement to three parts by volume of concreting sand.

9.4.3 Site batched mortar shall be mixed thoroughly using a concrete mixer on site until of uniform colour and shall not be re-mixed or used after a period of 1 hour has elapsed since mixing.

9.4.4 Admixtures shall not be used in site batched mortar without the written approval of the Engineer.

9.4.5 Details of proposed mix and characteristics of off-site batched mortar shall be submitted to the Engineer for written approval prior to use on site.

9.5 CEMENT GROUT

Cement grout shall consist of one part by volume of cement to $1^1/_2$ parts by volume of water and shall be used within 1 hour of mixing.

9.6 SPECIAL MORTARS FOR BEDDING IRONWORK

The use of cement mortar to Clause 9.4 for bedding ironwork is only acceptable where the mortar will remain undisturbed until it has achieved adequate strength (7 days) before further works around it proceeds. In all situations where follow up works, such as surfacing or trafficking, will take place within 7 days of the installation of the ironwork then the cement mortar shall be substituted for a fast setting mortar or polyester resin mortar. Details of the proposed mortar shall be supplied to the Engineer for approval. Special mortars shall be used in accordance with the manufacturer's recommendations.

9.7 BITMAC REPAIR COMPOUNDS

The use of hot applied bitumen macadam for small patch repairs will not be permitted where, in the opinion of the Engineer, there is a significant risk of a poor finished surface with poor anticipated durability. Small patch repairs shall be carried out using a cold lay surfacing macadam designed for permanent first time reinstatements and will provide a hard dense surface. Details of the proposed surfacing macadam shall be submitted to the Engineer for approval. Special macadams shall be used in accordance with the manufacturer's recommendations.

9.8 STREET FURNITURE

9.8.1 Details of the Developers proposed Street furniture shall be submitted to the Engineer for approval prior to works commencing on site. For practical maintenance reasons CYC wish to restrict some items of furniture to ensure suitable parts/replacement items are readily available from stock held locally. A list of City of York Council currently approved items of street furniture is included in Appendix G.

9.8.2 All Street Furniture is to be designed and fitted in accordance with the manufacturer's recommendations.

10. LANDSCAPING

10.1 TOPSOIL

10.1.1 Topsoil shall comply in all respects with British Standard 3882 (1994) and shall be to the approval of the Engineer. As a general guide the approved topsoil will be good quality, medium loam of good heart, free from large stones (over 50mm) and not more than slightly stony and slightly acid to neutral reaction (BS Classification). This quality of topsoil must be maintained throughout the works.

10.1.2 For topsoil areas to be seeded or turfed the depth of topsoil must not be less than 150mm. Areas intended for shrub plating must have a topsoil depth not less than 300mm. If locations for trees over 1000mm tall are identified on site a pit must be prepared 1000mm x 1000mm x 600mm deep into which is placed topsoil.

10.2 MULCH

10.2.1 Where bark mulch is appropriate this must be from an approved source and should consist of matured conifer bark at lease 75% of which should be within 50-70mm particle size and should contain a minimum of wood particles. The bark is to be pest, disease and weed free. Mulch of this nature should be applied at depth not less than 70mm.

10.2.2 Where other mulch products are appropriate these should be obtained from approved Suppliers and applied in accordance with the Manufacturer's instructions and with the approval of the Engineer.

10.3 TREES AND SHRUBS

10.3.1 All nursery stock must comply with BS 3936 Part 1(1992) and all plant supply and handling must comply with appropriate codes of practice currently in force and recognized by the landscape and nursery stock industries.

10.3.2 All stock must be healthy and grown according to their intended use. Planting shall be carried out to ensure successful establishment of the plant and any damaged roots or shoots must be cut back to sound material.

10.3.3 Bareroot trees and shrubs shall only be planted during the season 31 October to 31 March and when the soil is in a friable condition. Containerised stock can be planted at any time except in extremely dry conditions. Planting must not be carried out when the ground is frozen or snow covered.

10.3.4 All trees over 1.0m tall shall be planted into a tree pit of nominal 1.2m diameter and 0.6m deep which shall be lined with a suitable root barrier to direct roots down below the pavement construction. The tree pit shall be filled with topsoil. The tree must be supported by a suitable stake, spacer block and tree tie.

10.3.5 Shrub and trees species must be approved by the Engineer and a representative sample is to be provided to the Engineer for approval prior to planting commencing. A schedule of approved trees and shrubs is included in the City of York Council Highway Design guide Appendix B.

10.4 GRASS SEED

10.4.1 Seed should be good quality of appropriate composition and obtained from approved suppliers. Sowing must only be carried out at the appropriate time of year and when weather and soil conditions are suitable.

10.4.2 High Frequency Maintenance Areas (Urban Situations)

A suitable mix of grass seed species for these areas will typically contain Chewings Fescue, Creping Red Fescue and Highland Browntop Bent but no Ryegrass. The spread rate shall be 25-30 g/m^2.

10.4.3 Low Frequency Maintenance Areas (Rural Situations)

A suitable mix of grass seed species for these areas will typically contain Perennial Ryegrass, Creeping Red Fescue and Highland Browntop Bent. The spread rate shall be 25-35 g/m^2.

10.5 TURFING

10.5.1 Turf must comply with BS 3969 (1998). Turf laying must not be carried out on extremely dry or water logged ground nor during frost or snow.

10.5.2 Turves must be laid stretcher bond with a maximum stagger and closely butted, or in accordance with the suppliers' instructions if turves of a non-tradition nature are used.

10.5.3 Grass species mixes for the turves must be appropriate to the location in which they are to be used (see Grass Seed).

10.6 HERBICIDES

10.6.1 The herbicides for use in footway construction must give total weed control and shall be of a granular nature. The active ingredient must be approved by the Engineer (see Herbicide Schedule) (Casoron G or similar). The herbicide must be used and applied by appropriately trained operatives in accordance with the Manufacturer's instructions and relevant Health and Safety Legislation.

10.6.2 The herbicides for use after pavement construction and in areas of other weed control must be a total weed control product and approved for use in those situations. The active ingredient must be approved by the Engineer (see Herbicide Schedule)(Glyphosate/Diuron or similar). The herbicide must be used and applied by appropriately trained operatives in accordance with the Manufacturer's instructions and relevant Health and Safety Legislation.

10.6.3 Use of any other pesticide products must be at the approval of the Engineer.

ACTIVE INGREDIENTS	**EXAMPLE OF PRODUCT NAME (This does not preclude other equivalent products)**	**PESTICIDES REG. NO.**
Dalapon & Dichlobenil	Fydulan G	00958
Dichlobenil	Casoron G Prefix D	00448 01631
Gylphosate	Round Up Stirrup	01828 04174
Diuron	Diuron	05701

Table 10.6.3: Herbicide Schedule

10.7 FERTILISER

Fertiliser shall consist of an approved compound containing not less than NPK 1:1$^{1}/_{2}$:1 (10%, 15%, 10%) and be applied in accordance with the Manufacturer's instructions.

10.8 MAINTENANCE

10.8.1 Maintenance of plant material must be carried out to ensure successful establishment of the stock. Appropriate maintenance should include weed control, pruning and other routine maintenance.

10.8.2 All other maintenance should be carried out to the satisfaction of the Engineer.

10.8.3 The Developer shall replace any planting that is damaged, destroyed or has failed to establish successfully with plants of equal size and condition to the adjacent successful planting. Planting will generally be acceptable to the Engineer if 90% of the Agreed Planting Schedule is established at the end of the Maintenance Period and there are no bare areas of failed groups of planting.

APPENDICES

APPENDIX A

MAP OF CITY OF YORK COUNCIL BOUNDARIES

UNDER REVIEW

APPENDIX B

LIST OF ACCEPTED PRODUCT CERTIFICATION SCHEMES

UNDER REVIEW

APPENDIX C

LIST OF MATERIALS REQUIRING BBA CERTIFICATES

UNDER REVIEW

APPENDIX D

GUIDELINES FOR THE PLANNING, INSTALLATION AND MAINTENANCE OF UTILITY SERVICES IN PROXIMITY TO TREES

A COPY OF "THE BRIEF GUIDE FOR OPERATORS"

UNDER REVIEW

SCHEDULE OF FEES

Fee for Technical Approval checking:
Lump sum of £ 500 + 1% of the agreed estimated cost of the works.
This fee is VAT exempt

Fee for inspection of works on site
7% of agreed estimated cost of the works
This fee is VAT exempt

Fee for preparation of legal agreement (Section 38/62/278)
£ 500 / agreement
This fee is VAT exempt

Calculation of Fees due

Agreed estimated cost of the Works £_____ **(A)**

Number of Agreements required to complete the Works _____Nr **(B)**

Technical Approval Checking Fee

Lump Sum £ 500.00

0.001 x **(A)** ..... = £

Sub total £

Inspection of Works on Site Fee

0.07 x **(A)** ..... = £

Preparation of Legal Agreements Fee

500 x **(B)** ..... = £

Total fee payable £
(Note – Fee is VAT exempt)

APPENDIX F

CITY OF YORK COUNCIL APPROVED CONCRETE PAVING SYSTEMS

UNDER REVIEW

APPENDIX G

CITY OF YORK COUNCIL APPROVED STREET FURNITURE

UNDER REVIEW

Appendix G