D20 EXCAVATING AND FILLING

GENERALLY/THE SITE

100 GENERAL

The building will be formed at levels to suit site contours which will involve some degree of upfilling.

The surrounding levels for roads and car parking are to be upfilled as necessary to suit final building levels and the requirements for drainage.

110 SITE INVESTIGATION

Refer to Site Investigation Report.

140 GROUND WATER LEVEL

Refer to site investigation reports for detailed information.

150 EXISTING SERVICES

Approximate positions of known services are shown on the Statutory Authority's drawings. Adequately protect, uphold, maintain and prevent damage to all services.

The Contractor shall adequately verify on site the positions of all existing services.

160 SITE FEATURES TO BE RETAINED

As detailed on Architect's drawings.

180 TREES AND UNDERGROWTH

Refer to Architects drawings for details of any protected areas.

Outside of any protected areas, clear site of trees, bushes, scrub and under-growth. Comply with HSE/Arboricultural and Forestry Advisory Group Safety Guidelines.

Grub up and dispose of large roots.

Where the existing tree roots are in clay material, excavate out the existing clay that contains tree roots and replace with granular material (type 1) compacted in 150mm layers.

EXCAVATING

205 BASIC WORKMANSHIP FOR EXCAVATING

Comply with BS 8000:Part 1, sections 3.1, 3.2 and 3.3.

210 MATERIALS

Materials arising from the excavations and surplus to requirements for filling are to be removed from site by the contractor unless instructed otherwise.

220 STRIPPING TOPSOIL:

Before beginning general excavation of filling, excavate topsoil from areas where there will be regrading, buildings, pavings/roads and other areas where specified.

Remove all top soil and keep separate from excavated subsoil.

Avoid compaction by plant and contamination by subsoil, stone, hardcore or rubbish.

At the time of excavation the topsoil must be reasonably dry and never wetter than the plastic limit.

Do not remove topsoil from below the spread of trees to be retained.

221 TOPSOIL

Not less than two weeks before excavating topsoil treat with a suitable non-residual herbicide.

230 BENCHING

Surfaces of excavations with a gradient greater than 1 in 5, which are to receive filling, must have horizontal benches cut to match the depths of compacted layers of filling.

240 ADJACENT EXCAVATIONS

Where an excavation encroaches below a line drawn at an angle of 45 degrees from the horizontal from the nearest formation level of another higher excavation, the lower excavation, all work within in and backfilling thereto must be completed before the higher excavation is made.

250 ACCURACY

Permissible deviations from formation levels:

Beneath mass concrete foundations: +/-25 mm

Beneath ground bearing slabs and r.c. foundations: +/- 15 mm.

Embankments and cuttings: +/- 50 mm.

Ground abutting external walls: +/- 50 mm, but such as to ensure that finished level is not less than 150 mm below dpc.

260 FORMATIONS GENERALLY

Make advance arrangements with Engineer for inspection of formations.

Remove the last 50 mm of excavations just before inspection.

Trim excavations to required profiles and levels, and remove all loose material.

Unless otherwise instructed seal formations within 4 hours of inspection with concrete or other specified fill.

270 FOUNDATIONS GENERALLY

Obtain instructions if:

A natural bearing formation of undisturbed subsoil is not obtained at the depth shown on the drawings.

The formation contains soft or hard spots or highly variable material.

280 MASS CONCRETE FILL FOUNDATIONS

Excavate the whole depth of the foundation down to formation by machine in one operation. Make advance arrangements with Engineer for inspection of formation as soon as it is exposed.

Unless otherwise instructed place concrete immediately after inspection.

290 FOUNDATIONS IN MADE UP GROUND

Excavate down to a natural formation of undisturbed subsoil.

Obtain instructions if this is at a lesser depth than that shown on the drawings.

310 UNSTABLE GROUND

Inform Engineer without delay if any newly excavated face will not remain unsupported sufficiently long to allow the necessary earthwork support to be inserted.

If the instability is likely to affect adjacent structures or roadways, take appropriate emergency action until instructions are obtained.

320 RECORDED FEATURES

Break out old foundations, beds, drains, manholes, etc, where and to the extent stated on the drawings.

Seal off drain ends.

Backfill excavations to Clause D20.625.

321 CONTAMINATION OF EXCAVATED MATERIALS

Inform Engineer without delay if high visible concentration of contaminated materials arise in the excavation to reduced level.

Remove contaminated material to designated storage skip or area prior to removal from site to specialised tip facility.

331 WATER ON EARTHWORKS

The Contractor shall arrange for the rapid dispersal of water shed onto or entering the earthworks from any source or at any time during construction.

The contractor shall provide within the site, where necessary, temporary watercourse, ditches, drains, pumping or other means of maintaining the earthworks free from standing water.

360 EXCESS WIDTH TO FOUNDATIONS

Backfill any excavations taken wider than required with approved material to Clause D20:711 thoroughly compacted in layers not greater than 200mm.

371 EXCESS DEPTH TO FOUNDATIONS

Backfill any foundations taken deeper than required with mass fill concrete, GEN 1.

372 EXCESS DEPTH TO GROUND FLOOR SLAB

Backfill any excavations taken deeper than required with approved material to D20:711.

DISPOSAL OF MATERIALS

410 TOPSOIL

Stockpile all excavated preserved topsoil in temporary spoil heaps at locations to be agreed with client. Any ecess topsoil to be removed from site.

420 TOPSOIL SPOIL HEAPS

To be not more than 2m high.

Treat with a suitable herbicide at appropriate times to prevent seeding of weeds.

Prevent compaction and contamination.

443 SURPLUS SUBSOIL

Remove from site surplus excavated material not specified to be spread and levelled or stockpiled.

FILLING

510 HAZARDOUS, AGGRESSIVE OR UNSTABLE MATERIALS

Do not import or use fill materials which would, either in themselves or in combination with other materials or ground water, give rise to a health hazard, damage to building structures or instability in the filling.

Soluble sulphate content (SO3) of imported materials for filling under concrete slabs or within 1 m of substructures must not exceed 0.5 g/litre when tested to BS 1377:Part 3, clause 5 using a 2:1 water-soil extract.

Submit test reports from an approved laboratory demonstrating compliance of the proposed material(s).

530 PLACING FILL GENERALLY

Ensure that excavations and areas to be filled are free from loose soil, rubbish and standing water.

Do not use frozen materials or materials containing ice.

Do not place fill on frozen surfaces.

Take all necessary precautions to ensure stability of adjacent structures.

Place and compact fill against structures, membranes or buried services in a sequence and manner which will ensure stability and avoid damage.

Plant employed for transporting, laying and compacting must be suited to the type of material.

Lay differing materials separately so that only one type of material occurs in each layer.

540 BENCHING IN FILL

Where, during the progress of the work, the difference in level between adjacent areas of filling exceeds 600 mm, cut into edge of higher filling to form benches having a minimum width of 600mm and a height equivalent to the depth of a layer of compacted filling.

Spread and compact new filling to ensure maximum continuity with the previous filling.

GENERAL FILL MATERIALS – UPFILL BENEATH BUILDINGS/CAR PARKS/ROADS

600 EARTHWORKS MATERIALS SHALL FALL INTO THE FOLLOWING GENERAL CLASSIFICATIONS IN ACCORDANCE WITH VOLUME 1 SPECIFICATION FOR HIGHWAY WORKS, SERIES 600, EARTHWORKS

If there is a requirement to achieve a BREEAM rating **recycled aggregate** should be used. See appendix A below.

(i) Acceptable Material:

Material imported onto the site which meets the requirements of Table 6/1 and Appendix 6/1 for acceptability for use in the Permanent Works.

(ii) Unacceptable Material:

Material which does not comply with the permitted constituents and material properties of Table 6/1 for acceptable material;

Material, or constituents of materials, composed of the following, unless otherwise described in Appendix 6/1:

(a) Peat materials from swamps, marshes and bogs;

(b) logs, stumps and perishable material;

(c) materials in a frozen condition;

(d) clay having a liquid limit determined in accordance with BS:1377 Test 2, exceeding 80 or plasticity index determined in accordance with BS:1377 Test 4, exceeding 55.

(e) material susceptible to spontaneous combustion.

610 GENERAL LANDSCAPE SUBSOIL FILLING

Materials arising from the excavations, but excluding the following:

Material from marshes or bogs.

Peat, logs, stumps, slurry, mud and perishable material.

Material susceptible to spontaneous combustion.

Clay of liquid limit exceeding 80 and/or plasticity index exceeding 55

Material with excessive moisture content.

Unacceptable material class U2 as defined in clause 601 of the Highways Agency ‘Specification for highway works’.

Lay in layers not more than 200 mm thick and consolidate each layer.

625 COMPACTED SOIL FILLING

Lay and compact in layers using suitable plant in accordance with Volume 1 Specification for Highway Works, Series 600, Earthworks.

The compaction is to be undertaken in accordance with the requirements of Table 6/1.

Fill under buildings to be class 6N, in accordance with Clause 610 of the Specification for Highways Works and compacted in accordance with Clause 612 of that Specification and Table 6/1.

700 BACKFILLING TO FOUNDATIONS

Graded granular filling as Clause 711.

711 GRADED GRANULAR FILLING

To Department of Transport Specification for Highway Works, Clause 803 (Type 1) or other approved.

Lay and compact to Clause 802.

Well in advance of starting work, submit details of proposed type of plant, maximum depth of each compacted layer, minimum number of passes per layer.

720 GRADED GRANULAR FILLING DIRECTLY UNDER CONCRETE SLABS

To be as Clause 711 and not less than 150mm thick, as shown on the contract drawings. Any requirement for fill material below this is to be as Item 625 above.

730 BLINDING

Surfaces to receive sheet overlays or concrete to have sufficient sand, fine gravel or other approved fine material applied to fill interstices and provide a close smooth surface.

Permissible deviations on surface level: +0 –25 mm.

TOPSOIL AREAS

810 GRADE SUBSOIL

Grade subsoil to smooth flowing contours and to achieve the specified finished levels of the topsoil.

Excavate locally as necessary for areas of thicker topsoil.

Small planting beds located in general landscape areas may be excavated separately at a later date.

820 LOOSEN SUBSOIL

Loosen subsoil consisting of light, noncohesive material with a 3 tine ripper, drawn 300 mm deep at 600 mm centres in two directions obliquely across the slope, when ground conditions are reasonably dry.

827 REMOVE STONES

Remove stones with largest dimension exceeding 50 mm from surface of subgrade immediately before spreading topsoil.

850 CONTAMINATION

Do not use topsoil contaminated with subsoil, rubbish, oil based products, or other materials toxic to plant life.

Dispose of contaminated topsoil as instructed.

855 HANDLING TOPSOIL

When moving topsoil within the site, or when stripping topsoil and importing to site:

If aggressive weeds are present, obtain instructions from the CA before moving topsoil.

Select and use plant to minimize disturbance, trafficking and compaction.

Avoid contamination by subsoil, stone, hardcore, rubbish or material from demolition work.

Keep different grades of topsoil separate from each other when handling and stockpiling.

Inform CA where the depth of topsoil is difficult to determine.

880 FINISHED LEVELS OF TOPSOIL

Finished levels of topsoil after settlement, unless otherwise stated, to be:

30mm above adjoining paving or kerbs.

Unchanged where abutting existing trees.

Not less than 150 mm below dpc of adjoining buildings.

30mm higher for shrub areas than for adjoining grass areas.

Married-in with adjoining soil areas.

Appendix A RECYCLED AGGREGATES

100 RECYCLED AGGREGATES SHOULD BE USED TO QUALIFY FOR BREEAM RATING POINTS.

110 ALL RECYCLED MATERIAL MUST BE FREE FROM:

i) Contaminates at a level which pose a risk to health,

ii) Combustible material,

iii) Domestic refuse,

iv) Other material which, in the opinion of the Engineer, may affect the durability of the permanent works.

115 CLASS OF RECYCLED AGGREGATE ALLOWED AS DEFINED BELOW

CLASS	ORIGIN	BRICK CONTENT BY WEIGHT
RCA(1) NOT ALLOWED	Brickwork	0 – 100%
RCA(II) ALLOWED	Concrete	0 – 10%
RCA(III) NOT ALLOWED	Concrete and brick	0 – 50%

The recycled aggregates are to be stored separately on site.

120 IMPURITIES SEE TABLE 2 BELOW

Table 2 Maximum levels of impurities by weight	
Asphalt and tar	10% in RCA(I) 5% in RCA(II) 10% in RCA(III)
Wood	1% in RCA(1), (II), (III)
Glass	5% in RCA(I), (II), (III)
Other foreign materials eg. metals, plastics, clay lumps	1% in RCA(1), (II), (III)

125 TESTING OF MATERIALS

Before the commencement of works, the Engineer will require samples of the various materials to be used in the construction to be sampled and tested. If approved, these samples shall then be taken as representative of the standard required by the Engineer.

The Engineer reserves the right to sample and test at any time any materials and goods that will form part of the permanent works to ensure compliance with the specification requirements.

The contractor shall ensure that all assistance is provided to obtain any sample at any time before or during the works.

All sampling and testing used for construction design purposes and to judge compliance to specification shall be carried out by a laboratory which holds United Kingdom Accreditation Service (UKAS) accreditation for the appropriate test.

Where the Contractor submits to the Engineer sampling and/or test certificates for any goods or materials for which there is a requirement for UKAS accreditation then the certificates shall be accompanied by the UKAS testing schedule for the test laboratory and shall indicate the following:-

(i) address of the permanent laboratory

(ii) Laboratory contact

(iii) Issue date of schedule and issue number

130 METHOD STATEMENT FOR PRODUCTION

The contractor shall provide a method statement detailing the process, process control and the range of products produced and the procedures for storing materials on site.

135 INSPECTION AND TESTING REGIME

The material should come from a recognised and approved recycled aggregate supplier that provide regular source testing of material. Source testing certificates should be provided for approval.

Where the product is intended for use of SUB-BASE TYPE 1 then RCA(II) shall be used and the following test and acceptance criteria is required:-

TEST	METHOD	FREQUENCY (min)	LIMITS
Water absorption	BSEN1097 and BS812	3 no	8.5% max
Grading	BSEN933 AND BS812	3 no	Table 8/2 vol.1.
Composition	as table 2	3 no	as table 2
Los Angeles Fragmentation Test	BSEN 1097	3 no	50KN min
Soundness	BS812 Part 121	3 no	min of 65
Frost Heave	BS812	1 no	15mm max.

140 ALL TESTING SHALL BE PERFORMED BY A UKAS LABORATORY WHICH HOLDS ACCREDITATION FOR THAT TEST.

145 INFORMATION TO BE PROVIDED BY THE CONTRACTOR:-

test results

test procedure

quality plan

150 REQUIREMENTS FOR GRANULAR SUB-BASE MATERIAL TYPE 1

All to be in accordance with the Highways Agency Manual of Contract Documents for Highway Works, Volume 1, clause 803 and grading from Table 8/2.

155 REQUIREMENTS FOR GRANULAR SUB GRADE IMPROVEMENT LAYER (CAPPING)

To be in accordance with the Highways Agency manual of Contract Document for Highway Works, Volume 1, Table 6/1, Class 6F2.

TEST	METHOD	FREQUENCY (min)	LIMITS
Grading	BS1377 Part 2	3 no	Table 6/2 vol.1
10% Fines	Clause 635 vol.1	3 no	30 kN

Appendix 6/1 – Requirements for Acceptability and Testing ETC. of Earthworks Materials

6.1.1 ACCEPTABILITY LIMITS FOR THE FILLS

The fill is to be placed by method compaction or end product compaction based on the Specification for Highways Works. Acceptable limits for the classes of general fill materials, excavated from site or imported, likely to be adopted for use on the scheme are shown in Table 6/1 'Acceptable Earthworks Materials: Classification and Compaction Requirements', of the Specification for Highways Works. The Contractor will be responsible for assessing the suitability of the site-won material for placement and determining the placement criteria to ensure that the material is placed to achieve the criteria of:

95% maximum dry density as determined by BS1377, 2.5kg rammer compaction method, placed within OMC -1% and OMC +2% of optimum moisture content underneath the building footprint.

A CBR value of greater that 5%, when measured in situ in areas of roads/car parks.

The above criteria will also be applicable to any imported materials.

The following imported materials are permitted: Class 1A, 1B, 6F1, 6F2, 6F5, Type 1 (Clause 803).

During and on completion of the earthworks, a programme of screening and validation testing will be carried out to confirm that the required end product/method compaction has been achieved. The testing frequency is defined in Appendix 1/5 of this specification.

The acceptability of materials arising from the site earthworks or materials imported for use as earthworks fill shall be the responsibility of the Contractor, including classification and testing required. The requirements for earthworks materials testing are indicated in Specification Appendix 1/5. The Contractor shall be responsible for identifying the need for and location of trial pits and excavations required for materials classification and shall agree with CA prior to commencement of excavation.

The Contractor shall submit two copies of all classification test results to CA within one working day of the completion of the test. The copies shall be signed by the Contractor's responsible representative.

Source testing will be required on any proposed imported material to demonstrate that the material is acceptable. The CA must be satisfied that the material is acceptable before any

proposed imported material is deposited on site. In the case of imported materials the testing for acceptability, except frost susceptibility and sulphate content, shall be carried out at the point of deposition. The Contractor is to maintain full records on each sub unit of imported materials including but not limited to, the location of the sources, the suppliers details the acceptability testing and the location it has been incorporated within the works.

Any imported or site won material for use as general fill or capping shall not contain asbestos.

6.1.3 DESIGNATION OF MATERIAL AS CLASS 3

Class 3 material shall not be used in the works.

6.1.4 GROUNDWATER LOWERING AND TREATMENT

Where reasonably practicable, groundwater, if encountered, shall be lowered to allow exposure of formation level and the compaction of fill. Any ground water lowering proposed should be agreed with the CA as it may influence settlement of adjacent areas.

6.1.5 MINIMUM MCV FOR CLASS 9D MATERIAL

Not used.

6.1.6 REQUIREMENTS FOR UN-BURNT COLLIERY SPOIL

No un-burnt colliery spoil will be used on the scheme. The Contractor shall agree with CA scheme specific requirements covering engineering and environmental aspects of its use prior to any proposal to import un-burnt colliery spoil.

6.1.7 PERMITTED USE OF RAPID ASSESSMENT PROCEDURE

Nuclear moisture/density gauge for measuring field densities are permitted. If nuclear density gauge is used this will be calibrated for each soil type to be used in the laboratory in accordance with BS1377: Part 9 prior to use in the field. Relevant permit should be obtained for the use of the Nuclear Density Gauge at the site.

APPENDIX 6/2 - REQUIREMENTS FOR DEALING WITH CLASS U2 UNACCEPTABLE MATERIAL

6.2.1 GENERAL REQUIREMENTS

The Contractor shall comply with all current legislation concerning the handling, transportation and disposal of materials, including those which could be regarded as hazardous, including but not restricted to, the Collection and Disposal of Waste Regulations, the Controlled Waste Regulations 1992, the Control of Pollution Act 1974, the Environmental Protection Act 1990 and amendments, the Environmental Protection (Duty of Care) Regulations 1991, the Landfill Regulations 2002 and other relevant statues and regulations.

The Contractor will be responsible for the detailed classification of the waste (Class U2 material) for disposal purposes in accordance with the Landfill Regulations 2002 and for selection of appropriate waste disposal facilities. Class U2 material is described as 'the hazardous waste (as defined in the Hazardous Waste (England and Wales) Regulations 2005) and radioactive waste (as defined in the Radioactive Substances Act 1993).

The Contractor shall inform the CA immediately upon discovering any Class U2 Unacceptable Material. The Contractor shall submit to the CA a method statement for dealing with such Class U2 Unacceptable Material prior to commencing any works in that vicinity. Any contaminated Class U2 Unacceptable Material excavated shall be handled and disposed of in accordance with the requirements of the relevant local authority and statutory authority.

6.2.2 CONTAMINANTS PRESENT ON SITE

The contractor should refer to the Site Investigation Report which gives a summary of the ground conditions at the site including contamination, ground gas and ground aggressivity revealed during the past ground investigations. However, previously unidentified contamination arising during the redevelopment of the site is always a possibility, in common with any previously developed site. In recognition of this, the Contractor has a responsibility to notify the CA should any unusual ground conditions or previously unidentified contamination (e.g. evidence of visual or olfactory contamination) be revealed during the redevelopment of the site. If such conditions are encountered then expert advice should be sought and it will be further investigated and relevant and appropriate action taken.

Contaminated materials which may be suitable for re-use on site after treatment shall be classified for the purpose of earthworks operations in accordance with Appendix 6/1. Additional requirements of this Appendix shall also apply where relevant to this material. However, made ground may not be suitable to use as subsoil for landscaping purposes due to the presence of

large particles of stone, concrete, brick, ash, etc. An appropriate thickness of subsoil and topsoil may be required in accordance with the requirements of the landscape architect.

6.2.3 DISPOSAL OF U2 MATERIAL

Where it is anticipated that some soil materials will be disposed off-site, the materials may be re-processed to lower their classification to inert waste. This should be discussed with the selected landfill operator. Further tests may be required by the landfill operator and it is recommended that any soils arising on site that are intended to be disposed to landfill are carefully segregated, stockpiled and retested.

The Contractor shall be responsible for the detailed classification of the waste (U2) material for disposal purposes in accordance with the Landfill Regulations 2002 and for selection of appropriate (suitably licensed) waste disposal facilities. The Contractor shall be deemed to be the producer of the waste (in accordance with the Waste Management Duty of Care Provisions of the Environmental Protection Act, 1990) and in order to satisfy the regulations the Contractor shall as a minimum:

The Contractor shall be responsible for the safe handling, storage, transportation and disposal off site of Class U2 Unacceptable Material in accordance with statutory regulations and legislation.

For contaminated unacceptable material Class U2, transportation off site will be in accordance with statutory regulations and legislation and shall comply with the requirements of the statutory authorities.

Prior to removal of contaminated material from the site, the Contractor shall submit to CA copies of Waste Disposal Notices and Waste Carrier Notices. During the tipping operation the Contractor shall submit to CA copies of the transfer notes which shall include a description of each classification of U2 contaminated material.

If the Contractor does not possess the relevant licences for handling the Class U2 Unacceptable Material, including asbestos, he shall appoint a licensed subcontractor to handle the material.

APPENDIX 6/3 - REQUIREMENTS FOR EXCAVATION, DEPOSITION, COMPACTION (OTHER THAN DYNAMIC COMPACTION)

6.3.1 EARTHWORKS REQUIREMENTS

Cut and Fill earthworks shall be carried out to produce the required landform in accordance with the contract drawings.

No ground disturbing activities, including any earthmoving activities, are to commence prior to the Contractor obtaining any necessary permits or licences relating to protected species or habitats.

Where earthworks are to be constructed over existing road pavement or concrete hardstanding, the existing road pavement or concrete hardstanding is to be completely removed and treated as Class U1B or Class U1A for concrete material only. Material excavated and designated for treatment as Class U1A shall be transported to the appropriate process area for stockpiling and treatment.

The Contractor shall be responsible for the collection and disposal of all surface and groundwater accumulating in the temporary and permanent works and all water from dewatering systems. The Contractor shall be responsible for all aspects of any groundwater dewatering and monitoring systems he considers are necessary to construct the Works. This shall include design, installation, operation, monitoring, protection, maintenance and removal. Wherever temporary dewatering systems are used the Contractor shall ensure that no damage occurs to adjacent vulnerable assets such as structures, services, pipelines, roads, etc immediately or in the long term and he shall put in place monitoring to demonstrate that he is controlling the work in a safe Manner.

6.3.2 BLASTING FOR EXCAVATION

Blasting for excavation is not permitted.

6.3.3 EXCAVATIONS

Where excavations are required adjacent to or around existing structures and roads, appropriate measures shall be taken by the Contractor to prevent differential settlement to avoid damage to the existing structures. The Contractor shall be responsible for all necessary temporary supports and/or restrictions on sequence of construction.

The Contractor shall be responsible for the control and prevention of groundwater ingress into excavations.

6.3.4 FORMING OF CUTTING FACES (SHW CLAUSE 603)

Areas and gradients of permanent cut faces are shown on the drawings. The Contractor shall not deviate from the gradients shown on the drawings. Any undercutting required for trench or other

excavations (e.g. foundations) are shown on the contract drawings. Such excavations shall only remain open for minimum periods necessary, so as to prevent risk to permanent works.

The Contractor shall be responsible for all necessary temporary supports and/or restrictions on sequence of construction. The work will be carried out with suitable plant in such a way that it will not cause slope failures by overloading the crest or undercutting the final faces. Foundation excavations on slopes shall be carried out in a manner that it will not cause slope failures. Any slope failures on the final faces will be made good before topsoiling where required.

Temporary slope faces shall not be left unprotected and unsupported for long periods before construction of the retaining structure and granular backfilling.

6.3.5 FILL REQUIREMENTS

The locations of all fills, including embankments and the slope gradients are shown on the drawings. Embankments and other areas of unsupported fills shall not be constructed with steeper side slopes or to greater widths than those shown on the drawings, except to permit adequate compaction at the edges before trimming back or to obtain the final profile following any settlement of the fill and the underlying material.

The classes of materials permitted for fills are given in Appendix 6/1, complying with Table 6/1. The excavated material shall be screened, where necessary, to remove oversized materials or any other unsuitable materials as specified in Appendix 6/1. Granular and cohesive made ground, granular and cohesive natural soils, selected granular fill (as fill to structures), crushed suitable building materials, etc shall be stockpiled separately based on the visual assessment of class of fill in accordance with Table 6/1 of SHW. Contaminated made ground shall not be used in the works (See Appendix 6/2).

Any areas requiring filling shall be made level, by terracing if necessary with a nominal fall of 1 in 50. The base of any such area shall be surveyed prior to placement of any engineered fill, to enable contoured plots of the base of the engineered fill to be placed.

All soft spots present beneath the excavation level shall be removed and replaced with suitable Class 1 or Class 6F or 6N or Type 1 material. The formation below the excavation level shall be proof rolled prior to deposition of first fill layer.

The base of any excavation or surface prepared to accept fill material shall be proof rolled using an appropriate roller and any soft spots encountered will be removed as necessary and replaced with suitable fill materials. The top 300mm of the ground surface and any additional pockets of topsoil should be stripped off before carrying out proof rolling.

Once a clean surface has been exposed and approved suitable by CA, suitable fill materials shall be laid and compacted in accordance with SHW and the Appendices 6/1 to 6/3. The layer thickness and type of compaction plant shall be chosen by reference to SHW. Where fill is placed

against existing slope benching will be required. The edge of the existing ground surface should be cut to form benches each having a minimum width of 600mm and a height requirement equal to the layer thickness of compacted fill.

If following placement of the general fill, adverse weather conditions render the upper level of general fill unacceptable, this material shall either be removed and replaced with acceptable material or rendered acceptable through processing or modification to the satisfaction of the CA.

Where filling and compaction is required adjacent to or around existing structures and roads, appropriate measures shall be taken by the Contractor to prevent differential settlement to avoid damage to the existing structures, roads and footpaths.

6.3.6 COMPACTION

Compaction of acceptable material as general fill shall be in accordance with the Specification for Highway Works Clause 612 – Method Compaction

The general fill material, except Type 1 material, shall be compacted to achieve a minimum of 95% of the maximum dry density placed at optimum moisture content, OMC -2% and OMC +2.0%.

The compaction requirements for Type 1 materials will be in accordance with Highways Agency 'Specification for Highway Works', clauses 801 and 802.

The fill will be placed in accordance with the appropriate compaction method stated in Table 6/1 and specified in Table 6/4. Site-won materials should be excavated in a manner which exposes minimum surface area of intact materials to the weather.

The Contractor shall carry out his own laboratory tests and site trials in choosing the appropriate methods for compacting different material types to be excavated in accordance with this Specification and determining the requirements for conditioning the soils.

Where several different types of fill material are to be employed, they shall be deposited in such a way that all parts or particular sections of the site receive roughly equal amounts of a given material, in roughly the same sequence, thus ensuring a uniform distribution of fill types over the whole fill thickness.

All necessary steps shall be taken to ensure that the fill is placed at the moisture content necessary to achieve the specified level of compaction and shall, where necessary, add water to or dry the fill, in order to obtain this value. Cobbles, boulders, rock or waste fragments, the largest dimension of which is greater than two-thirds of the compacted layer thickness, shall not be incorporated into the fill.

No fill shall be placed and left uncompacted at the end of the working day. Compacted fill shall be graded to falls to ensure free run off of rainwater without ponding.

Compaction plant and compaction method shall be selected having regard to the proximity of existing trenches, excavations, retaining walls or other structures and all work shall be performed in such a way as to ensure that their existing stability is not impaired.

If weather conditions are such that the specified moisture content and density values cannot be achieved, the contractor shall cease work until such time as the fill can be placed and compacted to meet specification requirements.

If the results of control tests indicate that the fill is being placed and compacted in such a way that the desired level of compaction is not being achieved, the contractor shall further compact or if necessary, shall excavate the affected area and replace with new fill, compacted to meet the specification requirements.

6.3.7 CLASSIFICATION AND VERIFICATION TESTING

Testing requirements for classification and verification for the compacted site won or imported general fill shall be as shown in Appendix 1/5.

APPENDIX 1/5 : TESTING TO BE CARRIED OUT BY THE CONTRACTOR

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificates	Comments
601, 631 to 637 640	Acceptable material				
	Site-won General Cohesive Fill/General Granular Fill Class 1, Class 2	Grading / plastic limit/mc	1 per 250m³ up to maximum 5 per day	Required	
		Optimum dry density/mc	1 per 250m³ up to max of 5 per day	Required	
601, 631 to 637 640	Imported Granular Fill Class 1A, 1B	Grading / Uniformity coefficient/mc	1 per 250m³ up to max of 5 per day	Required	
		Optimum Dry Density/mc	1 per 250m³ up to max of 5 per day	Required	
	Selected Granular Fill Class 6F1/6F2, 6F5, Type 1	Grading/uniformity Coefficient/mc	Source approval and 1 per 400 tonnes up to max of 3 per source	Required	
		Frost Susceptibility	Source approval and 1 per 400 tonnes up to max of 3 per source	Required	
		Los Angles Coefficient	Source approval and 1 per 400 tonnes up to max of 5 per source	Required	

APPENDIX 1/5 : TESTING TO BE CARRIED OUT BY THE CONTRACTOR

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificates	Comments
612	Compaction of Fills End Product Compaction				See Appendix 6/1 requirements and drawings for additional requirements
	General Fill	Grading	1 per 15m x 15m area on each layer placed	Required	Refer to Table 6/2
		mc	1 per 15m x 15m area on each layer placed	Required	
		In situ density (NDT)	1 per 15m x 15m area on each layer placed (Lab or field calibration tests required to determine correlation between NDT and insitu density)	Required	End product to achieve 95% maximum dry density.
		In situ density, Sand replacement test	1 per 6 NDT On finished layer only	Required	
WAC testing	AS specified in EA 2005	As required by the landfill operator	Required	For material to be disposed off site.	
		In situ CBR	On final layer along access road/car parking/ hardstanding areas	Required	

Notes:
1. Tests comparable to those specified in this Appendix will be necessary for any equivalent work, goods or material proposed by the Contractor.
2. All compliance and validation testing shall be UKAS accredited.
3. Earthworks testing requirements shall also be in accordance with information on the drawings. Testing will be undertaken at the frequency proposed. This frequency may be reduced at the discretion of CA.

Q20 GRANULAR SUB-BASES TO ROADS/PAVINGS

110 THICKNESSES OF SUB-BASE/SUBGRADE IMPROVEMENT LAYER(S)

Specified in the following related sections:

Q22 Coated macadam/Asphalt roads/pavings

120 CHECKING CBR OF SUBGRADE

The specified thicknesses of sub-bases and capping layers are based on an assumed subgrade of clay with gravel with an assumed CBR of 2-5%.

If the subgrade material appears to be different from this, or if there are extensive soft spots, test CBR of subgrade, report results to Engineer, and if different from the assumed CBR obtain instructions before proceeding with laying sub-base.

140 COMPACTION OF SUBGRADE

Defer final excavation to formation level until immediately before compaction of subgrade.

Soft spots must be brought to the attention of the Engineer.

Obtain instructions before proceeding.

Subgrade must be relatively dry at time of compaction.

Where use of a roller is impracticable use a suitable mechanical rammer.

Where local excavation and backfilling has taken place make additional passes of the roller.

150 SUBGRADE FOR VEHICULAR AREAS

Immediately before placing sub-base prepare and compact subgrade in accordance with Department of Transport Specification for highway works, clauses 616 and 617.

160 SUBGRADE FOR PEDESTRIAN AREAS

Immediately before placing sub-base thoroughly compact subgrade with a roller weighing not less than 2.5 tonnes or equivalent other plant.

200 SUBGRADE IMPROVEMENT LAYER (CAPPING) MATERIAL

To Department of Transport Specification for highway works, Table 6/1, Class 6F2.

Place and compact to Department of Transport Specification for highway works, Table 6/1, clause 612 and clause 613.3, 613.9 and 613.10.

210 GRANULAR MATERIAL: To Department of Transport Specification for highway works, clause 803 (type 1) or approved equivalent. Test materials as clause 803.5 if required by the Engineer.

230 PLACING GRANULAR MATERIAL GENERALLY

Ensure that subgrade is free from loose soil, rubbish and standing water.

Take all necessary precautions to ensure stability of adjacent structures.

Place and compact material against or over structures, membranes or buried services in a sequence and manner which will ensure stability and avoid damage.

240 GRANULAR SUB-BASES FOR VEHICULAR AREAS

Spread and level in layers and as soon as possible thereafter compact each layer.

Maximum depth of compacted layer, type of compaction plant and minimum number of passes per layer to be as Department of Transport Manual of Contract Documents for Highway Works, Volume 1, Specification for Highway Works including all amendments current at November 1997 table 8/1.

250 LAYING GRANULAR SUB-BASES FOR PEDESTRIAN AREAS

Spread and level and, as soon as possible thereafter, compact with a roller weighing not less than 2.5 tonnes or other equivalent plant.

310 ACCURACY

Maximum permissible deviation from the required levels, falls and cambers to be as follows:

	Roads	Footways
	Parking areas	Recreation areas
Subgrade	+/-25 mm	+/-20 mm
Sub-base	+/-20 mm	+/-12mm

320 BLINDING

Surfaces to receive interlocking brick or block paving to section Q24 to have sufficient sand, fine gravel, PFA or other approved fine material applied and surface vibrated to provide a close and smooth surface.

330 COLD WEATHER WORKING

Do not use frozen materials containing ice.

Do not lay materials on frozen surfaces.

340 PROTECTION

Cover sub-bases as soon as practicable with subsequent layers, specified elsewhere.

Prevent damage to subgrades and sub-bases from construction traffic, construction operations and inclement weather.

R12 DRAINAGE BELOW GROUND

GENERALLY

100 EXISTING DRAINS:

Before starting work, check invert levels and positions of existing drains, sewers, inspection chambers and manholes against information shown on drawings and report any discrepancies to Engineer.

Adequately protect existing drains and maintain normal operation during construction.

An existing drain is present which serves the existing Farm yard. This drain must be diverted and protected through the construction period and left in a good conditions free from silt or damage.

107 IN SITU CONCRETE:

Unless specified otherwise, in situ concrete for use in drainage below ground to BS 8500-1:2002, BS 8500-2:2002, BS EN 206-1:2000

Designated mix GEN 1 or GEN 3

Different mixes may be used for different parts of the drainage work.

TYPE(S) OF PIPELINE

121 CLAY PIPELINES

Pipes, bends and junctions: Vitrified clay to BS EN 295-01, with flexible joints, Kitemark certified.

Manufacturer and reference: To be approved.

Strength: Extra strength.

Sizes (s): DN 150, 225mm

Assumed type of subsoil: As indicated in Site Investigation Report.

Bedding class: S or Z.

Warning marker tape: Not required.

Wire detection aid: Not required.

131 CONCRETE PIPELINES

Pipes, bends and junctions: Precast concrete to BS 5911:-1:2002 + A2:2010, with flexible joints, Kitemark certified.

Manufacturer and reference: To be approved.

Cement type: SRC

Strength class: 120

Assumed type of subsoil: As indicated in Site Investigation Report.

Bedding class: S or Z

Warning marker tape: Not required.

Wire detection aid: Not required.

151 PLASTIC PIPELINES

Pipes, bends and junctions in PVC-u to BS 4660:2000 or BS EN 1401:-1:1998, class SN4 with flexible joints, Kitemark certified.

Bedding class S or Z

EXCAVATING/BACKFILLING

205 EXCAVATED MATERIAL:

Unless otherwise specified, set aside turf, topsoil, hardcore, etc. for use in reinstatement.

221 LOWER PART OF TRENCH:

Where bedding class S is specified (see clause 370) trench width to be not more that the following, regardless of depth of cover:

Nominal pipe size (DN)	100	150	225	300
Maximum trench width (mm)	600	700	800	900

230 ASSUMED TYPE OF SUBSOIL:

Where the type of subsoil at the level of the crown of the pipe differs from that stated for the type of pipeline, obtain instructions before proceeding.

240 FORMATION FOR BEDS GENERALLY:

Excavate to formation immediately before laying beds or pipes.

Remove mud, rock projections, boulders and hard spots and replace with consolidated bedding material.

Harden local soft spots by tamping in bedding material.

Inform Engineer in advance to give him reasonable opportunity to inspect excavation formation for each section of the work.

250 COMBINED TRENCHES:

Where one pipe is at a lower level that another adjacent pipe in a common trench:

A subtrench is permissible provided the soil of the step is stable and unlikely to break away.

If a subtrench is not permissible, the whole trench must have a depth related to the lower pipe, with increased thickness of bedding to the upper pipe as necessary.

The lower pipe must be backfilled with compacted granular material to not less than half way up the higher pipe.

260 TRENCH SUPPORTS:

Remove trench supports and other obstacles sufficiently to permit compacted filling of all spaces.

281 BACKFILLING UNDER ROADS AND PAVINGS

Backfill from top of specified surround or protective cushion up to formation level with Granular Subbase Material Type 1 to Specification for Highway Works, Clause 803, laid and compacted in layers not exceeding 150mm.

281 BACKFILLING OVER CONCRETE:

Do not start backfilling within 24 hours of placing concrete. Do not use heavy compactors and prevent imposition of traffic loads within 72 hours of placing concrete.

290 TEMPORARY BRIDGES:

Provide temporary bridges over trenches as necessary to prevent construction traffic damaging pipes after backfilling.

BEDDING/JOINTING

310 INSTALLATION GENERALLY:

Obtain pipes and fittings for each pipeline from the same manufacturer unless otherwise specified.

Joint differing pipes and fittings with adaptors recommended by pipe manufacturer.

Lay pipes to true line and regular gradient on an even bed for the full length of the barrel with sockets (if any) facing up the gradient.

Joint using recommended lubricants, leaving recommended gaps at ends of spigots to allow for movement.

Adequately protect pipelines from damage and ingress of debris.

Seal all exposed ends during construction.

Arrange the work to minimise time between laying and testing.

Backfill after successful testing.

370 CLASS S GRANULAR SURROUND:

Lower part of trench width to be as clause 221.

Granular material Grading: To BS 882:

Bedding Size to WIS 4-08-01 (see table below)

Lay and compact to a thickness not less than 50 mm for sleeve jointed pipes, 100 mm for socket jointed pipes, over full width of trench.

Where trench bottom is uneven due to hard spots or other reason, increase depth to 100 mm.

Scoop out locally at couplings/sockets and lay pipes digging slightly into bed and resting uniformly on their barrels.

Adjust to line and gradient.

After initial testing, lay and compact more granular material in 100 mm layers to 150 mm (300 mm for adoptable sewers) above crown of pipe.

Table A.2 - Processed granular bedding and sidefill materials for flexible pipes

Pipe nominal bore (mm) See note (d)	Nominal maximum particle size (mm)	Maximum CF value for acceptability See note (b)		Materials specified in British Standards See note (a)
		Non-pressure pipe	Pressure pipe	
100	10	0.15	0.30	10mm nominal single-size
Over 100 to 150	15	0.15	0.30	10 or 14mm nominal single-size or 14mm to 5mm graded
Over 150 to 300	20	0.15	0.30	10, 14 or 20mm nominal single-size or 14mm to 5mrn graded or 20mm to 5mm graded
Over 300 to 550	20	0.15	0.30	14 or 20mm nominal single-size or 14mm to 5mm graded or 20mm to 5mm graded
Over 550	40	0.15	0.30	14, 20 or 40mm single-size or 14mm to 5mm graded or 20mm to 5mm graded or 40mm to 5mm graded

461 CLASS Z CONCRETE SURROUND:

Concrete mix: GEN 1

Lay concrete blinding, 25mm thick over full width of trench and allow to set.

Lay pipes on blinding on folded wedges of compressible board not less that 100mm above blinding.

Form vertical construction joints in surround at face of flexible pipe joints using 18mm thick compressible board pre-cut to profile of pipe.

Fill any gap between spigot and socket with resilient material to prevent entry of concrete.

After initial testing, place and compact more concrete for full width of trench to encase pipe to 150mm above crown or to other height as specified or shown on drawings.

470 TRENCHES LESS THAN ONE METRE FROM FOUNDATIONS:

Where bottom of trench is lower than bottom of foundation, use Class Z concrete surround as clause 461.

Top of concrete to be not lower that bottom of foundation.

480 TRENCHES MORE THAN ONE METRE FROM FOUNDATONS:

Where bottom of drainage trench is below a critical level, (defined below) Class Z concrete surround as clause 461 is to be used, the top of the concrete being not lower that the critical level.

For the purpose of this clause the critical level is ‘D’mm lower than level of foundation bottom, ‘D’mm being equal to the horizontal distance of the near side of the trench from the foundation, minus 150mm.

490 CROSSOVERS:

Where two pipelines (other than plastics pipes) cross with less than 300mm separation, surround each with Class Z concrete surround as clause 461 for not less than 1 m centred on the crossing point.

Extended length of concrete surrounds as necessary to within 150mm of next nearest flexible joints.

512 PIPELINES PASSING THROUGH STRUCTURES:

Where pipelines must be cast in or fixed to structures (including manholes, catchpits and inspection chambers) provide short length or rocker pipes near each external face, with flexible joint at each end:

Pipe size (DN)	Distance to first joint from structure (mm)	Short length (mm)
100 & 150	150	600
225 & over	225	600

Where pipelines need not be cast in or fixed to structures (eg wall to footings) provide either: short length or rocker pipes as specified above, or openings in the structures to give a 50mm minimum clearance around the pipeline and closely fit a rigid sheet to each side of opening to prevent ingress of fill or vermin.

510 BENDS AT BASE OF SOIL STACKS:

Unless specified otherwise, use a 90° nominal rest bend with a minimum radius of 200mm to centreline of pipe.

Invert of horizontal drain at base of stack to be not less than 450mm below centreline of lowest branch pipe.

Stabilise bend(s) by bedding in concrete without impairing the flexibility of couplings.

660 ROADWAY GULLIES: PRIVATE

375 x 750mm PVC gully pot with 100mm dia roddable trapped outlet with stopper and chain to BS 5911:-6:2004 + A1:2010

Make up brick type Class B engineering

Gully grate and frame ductile iron grate and frame, kitemarked heavy duty to EN/124 reference GB- 325 with theft resistant hinge pin grating and frame.

661 ROADWAY GULLIES: ADOPTABLE

Gulley pots to be precast concrete to BS 5911: BS 5911:-6:2004 + A1:2010. Bedded and surrounded in GEN 3 concrete.

Size 450 diameter x 900mm deep internally with a 150mm single seal trapped outlet and cleaning eye with approved stopper and chain.

680 MANUFACTURER:

Obtain each complete assembly of fittings, traps, etc. including appropriate couplings, from the same manufacturer, and check compatibility of components with each other and with the pipe system

MANHOLES/CHAMBERS/SOAKAWAYS/TANKS

710 BRICK MANHOLES/INSPECTION CHAMBERS:

Bases: 200mm thick plain concrete, mix GEN 3.

Brickwork: frogs facing upwards. Class B engineering.

Steps: Galvanised ferrous to BS 1247.

Bed in joints to all chambers over 900mm deep at 300mm vertical centres staggered 300mm horizontally, with lowest step not more that 300mm above benching and top step not more than 450mm below top of cover.

Channels, branches and benching; R12.760

Cover slabs: 150 thick, precast bed solid in 1:3 cement:sand mortar to brickwork.

Openings to suit required access covers.

Reinforcement: T12 at 150mm c/c both ways with additional bars at openings and corners.

Access covers and seating: as clause 816.

721 CONCRETE MANHOLES & INSPECTION CHAMBERS:

In situ concrete bases: minimum 225mm thick GEN 3 concrete.

Manholes: To BS 5911:3:2010, Kitemark certified, all components from the same manufacturer.

Manufacturer and reference: As approved.

Cement type: SRC

Chamber rings: Size(s) DN 1200

Cover slabs: Openings to suit required access covers, heavy duty precast to BS 5911:3:2010.

Joints: As recommended by manhole manufacturer.

Steps: Galvanised ferrous to BS 1247.

In situ concrete surround; 150mm min thickness, mix as specified GEN 1.

Channels, branches and benching: As Clause R12.760.

Access covers and seating: To Clause R12.816.

722 INSPECTION CHAMBERS - PLASTICS

To BS 7158 or BS EN 13598-1, or Agrément certified.
Diameter: _475/600mm
Bases:100/110, 150/160 nominal diameters
Shaft units: 150, 175
Access covers and frames: Round ductile iron 440 clear opening
Loading grades to BS EN 124

760 CONVENTIONAL CHANNEL(S), BRANCHES AND BENCHING:

Bed main channel solid in 1:3 cement: sand mortar.

Connect branches to channel, preferably at half channel level, so that discharge flows smoothly in direction of main flow.

Where the connecting angle is more that 45° to direction of flow use three-quarter section channel bends.

Form benching in concrete, mix GEN 3, to rise vertically from top of main channel to a level not lower that soffit of outlet pipe, then slope upwards at 10% to walls.

Within 3 hours float with coat of RC40 with 10 max. aggregate size.

816 CAST IRON ACCESS COVERS AND SEATING:

Covers: Ductile iron to BS EN 124-1:2015, BS EN 124-2:2015, BS EN 124-3:2015, BS EN 124-4:2015, BS EN 124-5:2015, BS EN 124-6:2015

Manufacturer: Contractor selected to be approved

Type(s):

Adoptable highway areas: BS EN 124, class D400 600 x 600 mm clear opening list 5056 or similar approved.

Footways and landscaping areas: BE EN 124, class B125.

Seating: Make up in engineering bricks to BS 3921:1985, BS EN 771-1:2003

Class B, laid in 1:3 cement:sand mortar, or precast concrete cover frame units, Type 1 or Type 2 to suit cover shape.

Bed and haunch frame solidly in 1:3 cement:sand mortar over its whole area, centrally over opening, top level and square with joints in surrounding finishes. Cut back top of haunching to 30 mm below top of surface material.

835 LIFTING KEYS:

Provide suitable lifting keys for each type of access cover and hand over to the Client/Clients Agent at Practical Completion.

861 CONNECTIONS TO SEWERS:

Connect new pipework to existing adopted sewer(s) to the requirements of the Sewerage Authority or its agent.

CLEANING/TEST/INSPECTION

900 CLEANING:

Flush out the whole of the installation with water to remove all silt and debris before final testing, before CCTV inspection is specified and immediately before handover.

Safely dispose of washings and any detritus without discharging them into sewers or watercourses.

910 TESTING/INSPECTION GENERALLY:

Give Engineer advance notice to allow the opportunity to attend all tests and inspections.

Give the Statutory Authority appropriate notice to enable pipelines to be inspected and tested as required.

Provide water, assistance and apparatus as required.

All lengths of drain, manholes and inspection chambers must pass the tests specified.

If permitted test loss or infiltration is exceeded, remedy defect(s) before retesting after an appropriate period.

All tests are to be recorded and kept on record for inspection if required.

Any testing that fails must be rectified before hand over.

920 WATER/AIR TESTING OF GRAVITY DRAINS AND PRIVATE SEWERS UP TO DN 300:

To ensure that pipelines are sound and properly installed, air test short lengths to BS 8301, paragraph 25.6.3 immediately after completion of bedding / surround.

For final checking and statutory authority approval, water test to BS 8301, paragraph 25.6.2 all lengths of pipeline from terminals and connections to manholes/ chambers and between manholes/chambers.

930 TESTING OF ADOPTABLE AND LARGE PRIVATE SEWERS:

Test sewers up to and including DN 750 size in accordance with BS 8005:Part 1 as follows:

Initially, before backfilling, by air test as paragraph 13.3.

Finally, after backfilling, by water test as paragraph 13.4.

Test sewers over DN 750 size before and after backfilling with appropriate equipment on short sections or at joints in accordance with BS 8005:Part 1, paragraph 13.5.

After backfilling check at manholes for infiltration into sewers in accordance with BS 8005:Part 1, paragraph 13.6.

940 WATER TESTING OF MANHOLES/INSPECTION CHAMBERS:

Before backfilling test each manhole or chamber in accordance with BS 8301, paragraph 25.7 for:

Exfiltration: Drop in water level to be not more that relevant dimension in Table 9.

Infiltration: Inflow to be not more than 5 litres per hour per manhole.

975 CCTV INSPECTION OF ADOPTABLE PIPELINES

The appointed Contractor is to provide equipment and personnel to carry out and record internal CCTV inspection of all new sewers and associated manholes after completion. Contractor to allow for full as-built survey of adoptable sewers after completion.

Where pipelines are under highways, all construction except for laying of the wearing course must be completed before the inspection of adoptable sewers.

Obtain instructions from Engineer on remedying any defects which may be revealed.

Q22 COATED MACADAM/ASPHALT ROADS/PAVINGS

TYPE(S) OF PAVING

110 COATED MACADAM CAR PARK: (Private)

Materials and workmanship to Department of Transport Manual of Contract Documents for highway works, Volume 1, Specification for Highway Works including all amendments current.

Surface Course:

Thickness: 20mm

Material: 10mm nominal size dense bituminous macadam surface course to clause 912. 100/150 pen.

Binder Course:

Thickness: 60mm

Material: 20mm nominal size dense bituminous macadam binder course to Clause 906. 100/150pen.

Base Course:

Thickness: 70mm

Material: 32mm nominal size dense bituminous macadam binder course to Clause 906. 100/150pen.

Sub-base – 225mm of type 1 clause 803.

Capping – 6F2 well compacted down to natural clay. May vary if ground conditions change.

111 COATED MACADAM FOOTPATHS: (Private)

Materials and workmanship to Department of Transport Manual of Contract Documents for highway works, Volume 1, Specification for Highway Works including all amendments current.

Surface Course:

Thickness: 20mm

Material: 6mm nominal size close graded bituminous macadam surface course to clause 912. 100/150 pen.

Base Course:

Thickness: 50mm

Material: 20mm nominal size dense bituminous macadam binder course to Clause 906. 100/150 pen.

Sub-base – 150mm of Type 1 clause 803.

112 COATED MACADAM ACCESS RESURFACING:

Materials and workmanship to Department of Transport Manual of Contract Documents for highway works, Volume 1, Specification for Highway Works including all amendments current.

Surface Course:

Thickness: 40mm

Material: 10mm nominal size dense bituminous macadam surface course to clause 912. 100/150 pen.

Base Course:

Thickness: As Existing.

Material: As Existing.

Sub-base – As Existing.

220 MATERIALS GENERALLY:

Not less than 2 weeks before starting work submit to the CA the name(s) of all supplier(s) of bituminous material

At the time of delivery submit to the CA a test certificate for each manufacturing batch of bituminous material, certifying compliance with this specification and the relevant British Standard and giving complete information on the composition of each mix.

240 ACCEPTANCE OF SUB-BASE: Before starting work ensure that:

All Buried services have been identified and made safe.

The base is sound, free of debris, mud and soft spots, and suitably close textured.

The levels and falls of the sub-base are as detailed, within the specified tolerances of +/- 20mm (vehicular areas) and +/- 12mm (pedestrian areas).

Drainage outlets are within +0 to –10mm of the required finished level.

Kerbs and edgings are complete, adequately bedded and haunched and to the required levels.

250 ABUTMENTS: Clean edges of manholes, kerbs and other abutment and paint with a thin uniform coating of bitumen.

LAYING

310 LAYING GENERALLY:

Remove all loose material, foreign matter and standing water form surfaces to receive paving materials.

Form neat junctions with and prevent damage to adjacent work. Keep clean all channels, kerbs, inspection covers etc.

Keep new paving free from traffic until it has cooled to prevailing atmospheric temperature.

Do not allow rollers to stand on paving at any time.

Do not use pavings as a building platform or for storing, mixing or preparing materials.

Lines and levels of finished surface to be smooth and even, with regular falls to prevent ponding.

Finished surface of paving to have an even overall texture. Leave in a clean state on completion.

320 COLD WEATHER:

Do not use frozen materials or la paving on frozen or ice covered surfaces.

Do not lay coated macadam if the temperature of the laying surface is below 2 degC (or –1 degC on a rising thermometer).

Do not lay rolled asphalt if the temperature of the laying surface is below 5 degC or the air temperature is below 0 degC.

330 LEVELS:

levels of finished surface to be within +/- 6mm of required levels (+6mm –0mm adjacent to gullies and manholes).

340 REGULARITY:

Where appropriate in relation to the geometry of the surface, the variation in gap under a 3m straightedge (with feet) placed anywhere on the surface to be not more than:

Wearing course 3mm

Basecourse 6mm

Basecourse/Roadbase 25mm

Roadbase 25mm

Where a straightedge cannot be used the surface must be of a comparable standard of accuracy when judged by eye.

395 PAVEMENT MARKING TO ROADS:

Drawing reference

Materials and application to BA 2151: Parts 1,2, and 3

Class A

Colour: White/yellow as required

Reflectorisation to be incorporated into material

Surfaces to receive marking to be clean and dry. Remove all loose material and apply paint uniformly with no streaks or ragged edges. Use thinners in accordance with paint manufacturer's instructions.

Q10 STONE/CONCRETE/BRICK KERBS/EDGINGS/CHANNELS

TYPE(S) OF KERB/EDGING/CHANNEL

110 PRECAST CONCRETE KERB

To BS 7263
Method of manufacture: Hydraulically pressed.
Manufacturer and reference: To be as approved.
Type/size: As HB2, 125mm wide x 255mm high.
Special shapes: As required.
Finish/colour: Standard/Standard
Joints: Narrow as Clause 320.
Other requirements: Dowelled haunching as Clause 260.

111 PRECAST CONCRETE KERB

To BS 7263
Method of manufacture: Hydraulically pressed.
Manufacturer and reference: To be as approved.
Type/size: As BK, 125mm wide x 150mm high x 915mm. (6mm pedestrian access check).
Special shapes: As required.
Finish/colour: Standard/Standard
Joints: Narrow as Clause 320.
Other requirements: Dowelled haunching as Clause 260.

112 PRECAST CONCRETE KERB

To BS 7263
Method of manufacture: Hydraulically pressed.
Manufacturer and reference: To be as approved.
Type/size: As DK, (dropper kerbs L/R or R/L).
Special shapes: As required.
Finish/colour: Standard/Standard
Joints: Narrow as Clause 320.
Other requirements: Dowelled haunching as Clause 260.

113 PRECAST CONCRETE EDGING

To BS 7263: Part 1
Method of manufacture: Hydraulically pressed.
Manufacturer and reference: To be as approved.
Type/size: As PK, 50mm wide x 150mm high x 915mm
Special shapes: As required.
Finish/colour: Standard/Standard
Joints: Narrow as Clause 320.

210 LAYING GENERALLY

Where necessary cut units neatly and accurately with a masonry saw and without spalling to give neat junctions.

Bed units in mortar, true to line and level along top and front faces, on accurately cast foundations and secure with a continuous haunching of concrete. Allow bedding to set before placing haunching.

Keep exposed faces of units clean and free from concrete and mortar droppings.

220 ADVERSE WEATHER

Do not cast foundations, lay units or place haunching if the temperature is below 3 degC on a falling thermometer or 1 degC on a rising thermometer.

Adequately protect foundations, bedding and haunching against frost and rapid drying by sun and wind.

230 CONCRETE FOR FOUNDATIONS AND HAUNCHING

To BS 5328, Designated mix not less than GEN0 or Standard mix not less than ST1, very low workability.

260 HAUNCHING DOWELS

Mild steel hooped bars to BS 4482, 10mm diameter x 150 mm long.

Insert hooped bars vertically into foundation while concrete is still plastic, at 1000 mm centres, 50 mm from back face of kerb and with 75 mm projecting.

Haunching to be rectangular cross section, so as to fully enclose and protect dowels

290 RADIUS KERBS/CHANNELS

To be used for all radii of 12m or less.

300 ANGLE KERBS

To be used for both internal and external 90 deg changes of direction: cutting of mitres will not be permitted.

310 ACCURACY

Maximum deviations:

Level: +/- 6mm.

Horizontal and vertical alignment: 3 mm in 3 m.

320 NARROW JOINTS

Joints shall be left slightly open (maximum 5 mm) to allow for expansion and the finished Kerb face shall be normally 125mm at the channel for adoptable areas and 100 mm elsewhere.

325 EDGE OF CARRIAGEWAY CHANNELS

Shall be rectangular, 150 mm x 125 mm (BS 7263 Figure 1g Type CS2).

330 UNITS OF KERBING AND/OR CHANNELLING

Shall not deviate by more than 3 mm in 3 metres from true line and level.