HYNDBURN BOROUGH COUNCIL SPECIFICATION FOR GENERAL ENGINEERING WORKS

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1. Except where otherwise specified materials used shall comply with the requirements of the appropriate current British Standard or the standard of a member state of the European Community provided that the standard offers guarantees of safety, suitability and fitness for the purpose equivalent to those in the standard specified in the Contract Documents.

2. Wherever in respect of any Standard, a Scheme of Supervision and Control is in operation, all materials required to comply with that standard shall be marked in order to indicate that compliance. Where such materials are required, the Contractor shall submit to the Engineer test certificates confirming such compliance.

102 WORK ON EXISTING HIGHWAYS

1. Where work has to be carried out on or adjacent to an existing public highway or a highway to which the public have access the work shall be executed in accordance with Chapter 8 of the Traffic Signs Manual “Traffic Safety Measures for Road Works” published by HMSO.

2. The minimum lane width to be maintained shall be:-for two way traffic, 6.75 metres or for one way traffic 3.7 metres. Greater widths will be required at curves and junctions.

3. Where these widths cannot be maintained or where one way working is necessitated, the approval of the Engineer to any proposal must be obtained. Traffic may be controlled by a system of vehicle-actuated light signals to DoE Circular Roads 49/75, “Portable Traffic Signals for use at Road Works” or other means approved by the Engineer.

4. In accordance with Clause 29 of the Conditions of Contract, the Contractor is responsible for maintaining access to all public and private highways and property. Where the works necessitates the closure of a road, part of a road, or an access, the approval of Lancashire County Council shall be sought at least six weeks prior to programmed closure and any approved diversion shall be carried out by the Contractor in accordance with the recommendations of Chapter 8 of the Traffic Signs Manual.

5. Where the works involve the obstruction of a footway, the Contractor shall provide an alternative safe footway of not less than 1.5m width adequately signed, guarded and lit, in accordance with Chapter 8 of the Traffic Signs Manual

103 MATERIALS DEPOSITED ON HIGHWAYS

1. Mud, debris or other materials must not be deposited on the highway so as to damage it, obstruct it, or create a nuisance or a danger.

2. Highways in the vicinity of the works must be kept free from mud, debris, and dust falling from vehicles or the wheels of vehicles connected with the works or spreading from the works or associated tips.

3. Warning signs must be exhibited whilst work is in progress and carriageways and footways affected must be regularly cleaned.

104 PROTECTION AGAINST DAMAGE

1. The Contractor shall take all necessary precautions to avoid causing any damage to roads, lands, properties, trees and other features and, during the currency of the Contract, shall deal promptly with any complaints by owners or occupiers.

2. Services. Where any portion of the Works is close to, across or under any existing apparatus of Public Utilities or other parties, the Contractor shall temporarily support and work round, under or adjacent to all apparatus in a manner designed to avoid damage, leakage or danger and to ensure uninterrupted operation.

3. Should any leakage or damage be discovered, the Contractor shall at once notify the Engineer and the Statutory Authority or owner concerned and the Contractor shall afford every facility for inspecting the repair or replacement of the apparatus affected.

105 PUBLIC UTILITY AND PRIVATELY OWNED SERVICES

1. The positions of Public Utility and privately owned services close to the Works are shown in the Contract so far as they are believed to exist, but no warranty is given as to the accuracy or completeness of this information.

2. The Contractor shall consult all relevant Statutory Authorities and service owners before commencing any excavations, and shall be satisfied as to the exact position of existing services which may affect or be affected by the construction of the works.

3. The approved programme of works shall show information necessary to enable the Engineer to arrange for all diversions, or removals of services shown in the Contract to be carried out at the appropriate time.

4. The Contractor shall make his own arrangements for any diversion or removal of services which he may require for his own convenience or because of his proposed method of working, and shall, in all cases, inform the Engineer in advance of his proposals, which must be satisfactory to the owners of the service.

5. Should any service be found to exist which is not shown in the Contract, the Contractor shall at once give written notification to the Engineer.

106 EMERGENCY ARRANGEMENTS

1. The Contractor shall maintain arrangements whereby he can quickly call out labour outside normal working hours to carry out any work needed for an emergency with the works. The Engineer shall be provided at all times with a list of addresses and telephone numbers of the Contractor's staff who are currently responsible for organising emergency works.

2. Further to these requirements, if a responsible member of the Contractor's staff cannot be contacted, the Contractor shall be deemed to be unwilling to carry out the work at once.

3. In addition to the above, in order that direct contact can be made with the site and as an additional safety measure, the Contractor shall ensure that a suitable mobile communications system is available at the site during working hours. Full details of mobile telephone numbers or the means of accessing direct communication with the site shall be provided to the Engineer prior to commencement of the Works and shall be updated and revised as necessary.

107 WASTE TRANSFER - DUTY OF CARE

1. In order to ensure compliance with the Environmental Protection Act, the Contractor shall supply to the Engineer a copy of the Registration document of each waste carrier to be used. The document supplied shall be a certified copy of the original and shall be issued only by the appropriate waste regulatory authority.

2. Details of the tips to be used and the source of all imported materials must be supplied to the Engineer.

108 CONTROL OF NOISE

1. The Contractor shall employ "best practicable means" as defined in the Control of Pollution Act 1974 to minimise noise and vibration resulting from his operations and shall have regard to (Code of Practice for noise control on construction and demolition sites).

2. Without prejudice to the generality of the Contractors obligations under the preceding paragraph, the Contractor shall comply in particular with the following requirements.

    a) the Contractor shall ensure that all vehicles, plant and machinery used during the operations are fitted with effective exhaust silencers and that all parts of such vehicles, plant or machinery are maintained in good repair and in accordance with the manufacturers instructions and are so operated as to minimise noise emission.

    b) only 'sound reduced' compressors or other alternatives approved by the Local Authority are to be used and any equipment or panel fitted by the manufacturer for the purpose of the reduction of noise shall be maintained and operated so as to minimise noise. Any pneumatically operated percussive tools shall be fitted with approved mufflers or silencers which shall be kept in good repair.

c) any machinery which is in intermittent use shall be shut down in intervening periods of non-use or when this is impracticable shall be throttled back to a minimum.

3. The sound level at any point one metre from the facade of any noise sensitive building shall not exceed the following levels due to noise arising from the Contractors operations.

i) between 0700 hours and 1900 hours
An equivalent continuous sound level (leq 12 hr) of 75 db(A) subject to an overall maximum 5 minutes leq of 85 db(A).

ii) between 1900 hours and 2200 hours
An equivalent continuous sound level (leq 3 hr) of 60 db(A)

iii) between 2200 hours and 0700 hours
An equivalent continuous sound level (leq 9 hr) of 55 db(A)

4. The sound levels shall be monitored by the methods set out in appendix of BS 5228. All measurements shall be made on a sound level meter of BS 4197 set on slow response.

For the purpose of monitoring the noise level readings shall be taken one metre in front of the following sensitive buildings.

110 CONSTRUCTION (DESIGN AND MANAGEMENT) REGULATIONS

Where the Construction (Design and Management) Regulations 2007 apply, the Contractor will be the Principal Contractor thereunder and he must carry out all his duties as indicated therein.

The main duties are summarised below.

a) To demonstrate how the Health and Safety Plan will be developed.

b) To develop the Health and Safety Plan prior to commencement on site and to maintain it until the end of the construction phase.

c) To provide the CDM Co-ordinator with information for the Health and Safety File.

d) To be responsible for Health and Safety during all works on site.

e) To ensure so far as is reasonably practicable co-operation between all contractors on site in order that each of them are enabled to comply with the Statutory requirements and prohibitions placed on them.

f) To ensure so far as is reasonably practicable that every Contractor and employee on site complies with the Health and Safety Plan.

g) To take reasonable steps to ensure that only authorised persons are allowed on site.

h) To display the notices given to the Health and Safety Executive on site.

i) To ensure as far as is reasonably practicable that every Contractor is provided with comprehensible information on risks.

j) To ensure as far as is reasonably practicable that every Contractor who is an employer provides his employees with information and Health and Safety training required under the Management of Health and Safety at Work Regulations.

k) To ensure that employees and self employed persons are able to discuss with him and give advice on matters which affect their Health and Safety and to ensure that there are arrangements for the co-ordination of the views of employees or their representatives where necessary for reasons of Health and Safety,

l) All the above and any other duties on the Contractor as Principal Contractor must fully comply with the terms of these regulations.

m) The Contractor shall price for the administrative functions of these regulations. Safety during the Works shall be deemed to be within the price indicated for the work.

CLAUSE 111.1 Not Used

CLAUSE 111.2 Not used

CLAUSE 111.3 SPECIFIC REQUIREMENTS RELATING TO GAS PIPELINES

The Contractor shall comply with the following General Conditions and Precautions issued by British Gas.

PRECAUTIONS TO BE TAKEN WHEN CARRYING OUT WORK IN THE VICINITY OF UNDERGROUND GAS PIPES.

Please ensure that a copy of these conditions is read by your site management and a pocket card is issued to your site operatives.

1. Various materials are used for gas pipes and services. Cast iron, steel and plastic pipes are the most widely found. Modern plastic pipes are bright yellow in colour.

   Cast iron water pipes are very similar in appearance to cast iron gas pipes and if any cast iron pipe is uncovered, it should be treated as a gas pipe.

   <u>Locating Gas Pipes</u>

2. It should be assumed when working in urban and residential areas that gas mains and services are likely to be present. On request, the local Gas Region will give approximate locations of pipes derived from their records. The records do not normally show the position of service pipes but their probable line can be deduced from the gas meter position. Gas staff will visit any site at reasonable notice to assist in the location of gas plant and advise on any precautions that may be required. The records and advise are given in good faith but cannot be guaranteed until hand excavation has taken place. Proprietary pipe and cable locators are available.

Safe Working Practices

3. To achieve safe working conditions adjacent to gas plant the following must be observed.

Observe any specific requests made by gas staff.

Gas pipes must be located by hand digging before mechanical excavation. Once located, mechanical excavation must proceed with care. A mechanical excavator must not in any case be used within 0.5 metre of a gas pipe and greater safety distances may be advised by the Region depending on mains pressure.

Where heavy plant may have to cross the line of a gas pipe during construction work, the number of crossing points should be kept to a minimum. Crossing points should be clearly indicated and crossing at other places along the line of the pipe should be prevented.

Where the pipe is not adequately protected by an existing road, crossing points should be suitably reinforced with sleepers, steel plates or a specially constructed reinforced concrete raft as necessary. Gas staff will advise on the type of reinforcement necessary.

No explosives should be used within 30 metres of any gas pipe without prior consultation with the local Gas Region.

The local Gas Region must be consulted prior to carrying out excavation work within 10 metres of any above ground gas installation.

Where it is proposed to carry out piling or boring within 15 metres of any gas pipe, the local Gas Region should be consulted prior to the commencement of the works.

Access to gas plant must be available at all times.

Support and backfill

4. Where excavation of trenches adjacent to any pipe affects its support, the pipe must be supported to the satisfaction of gas staff and must not be used as an anchor or support in any way. In some cases, it may be necessary to divert the gas pipe before work commences.

Where a trench is excavated crossing or parallel to the line of the gas pipe, the backfill should be adequately compacted, particularly beneath the pipe to prevent any settlement which could subsequently cause damage to the pipe.

In special cases it may be necessary to provide permanent support to the gas pipe, before backfilling and reinstatement is carried out. Backfill material adjacent to gas plant must be selected fine material or sand, containing no stones, bricks or lumps of concrete, etc., placed to a minimum depth of 150mm around the pipes and well compacted by hand.

No power compaction should take place until 300mm of selected fine fill has been suitably compacted.

If the road construction is in close proximity to the top of the gas pipe, a "cushion" of selected fine material such as sand must be used to prevent the traffic shock being transmitted to the gas pipe. The road construction depth must not be reduced without permission from the local Highway Authority.

No concrete or other hard material must be placed or left under or adjacent to any cast iron pipe as this can cause fracture of the pipe at a later date.

Concrete backfill should be used closer than 300mm to the pipe.

Damage to Coatings

5. Where a gas pipe is coated with special wrapping and this is damaged, even to a minor extent, the local Gas Region must be notified so that repairs can be made to prevent future corrosion and subsequent leakage.

Welding or "Hot Works"

6. When welding or other "hot works" involving naked flames are to be carried out in close proximity to gas plant and the presence of gas is suspected, the local Gas Region must be contacted before work commences to check the atmosphere.

Even when a gas free atmosphere exists care must be taken when carrying out hot works in close proximity to gas plant in order to ensure that no damage occurs.

Particular care must be taken to avoid damage by heat or naked flame to plastic gas pipes or to the protective coating on other gas pipes.

Leaking from Gas Mains or Services

7. If damage or leakage is caused or an escape of gas is smelt or suspected the following action should be taken at once:

Remove all personnel from the immediate vicinity of the escape
Inform the local Gas Region by telephone
Prevent any approach by the public, prohibit smoking, extinguish all naked flames or other source of ignition for at least 15 metres from the leakage.
Assist gas personnel, Police or Fire Service as requested.

Remember if in doubt, seek advice from the local Gas Region. The address and telephone numbers for all emergencies and enquiries can be found in the telephone directory under "Gas".

Plant Protection Team **Tel: 0800 688 588**

GENERAL CONDITIONS AND PRECAUTIONS TO BE TAKEN AFFECTING THE DESIGN AND CONSTRUCTION OF PLANT ETC. IN THE VICINITY OF SUPER HIGH PRESSURE NATURAL GAS TRANSMISSION AND FEEDSTOCK PIPELINES

Extracts from British Gas Engineering Standard BGC/PS/SSW2

5. ESSENTIAL PRELIMINARIES

5.3 Locating the pipeline

Before any work is carried out in the vicinity of existing British Gas pipelines, the Engineer or the British Gas representative shall locate and peg out the line of the pipeline and shall then supervise the hand digging of any trial holes necessary to confirm the position of the pipe.

5.4 Other considerations

The following should be taken into account:

a) Storage of materials or lighting of fires within the easement strip or in the vicinity of above ground installations associated with pipelines shall not be permitted.

b) The new works shall not reduce or increase the cover above the existing pipeline unless agreed by the Engineer.

c) Facilities for inspecting all works carried out shall be given to the Engineer or to the British Gas representative.

d) The Health and Safety at Work Act 1974.

7. NOTIFIABLE CONSTRUCTION ACTIVITIES

7.2 Use of naked flame

Welding or other hot works involving naked flame shall not take place within the easement strip without the written consent of British Gas.

7.3 Use of explosives

Before a decision is made to use explosives for blasting within 400m of any part of the British Gas transmission system, advise shall be sought from British Gas Pipelines Department.

7.4 Piling

British Gas shall be consulted before any piling is carried out within 15m of an existing British Gas pipeline.

8. RULES FOR CONSTRUCTION TRAFFIC

8.1 Construction traffic shall cross a British Gas pipeline only at previously agreed and clearly marked crossing lanes and when all the requirements in 8.2 to 8.4 inclusive have been met.

8.2 All crossing lanes shall be fenced on both sides over a width to be specified by the Engineer. These fences shall be returned along the easement strip on both sides for a distance of 6m away from the crossing.

8.3 When required by the Engineer, the crossing lane shall be protected by laying approved sleeper rafts or by protection made from other approved materials.

8.4 Suitable warning notices, drawing attention to a danger of not using the crossing, shall be erected and maintained in a clearly legible condition.

9. EXCAVATION

9.1 Where it is necessary to excavate below a British Gas pipeline, the pipeline shall, during all stages of the operation, be supported to the satisfaction of the Engineer. On completion, permanent supports shall, if necessary, be constructed to avoid future settlement.

9.2 Mechanical excavation by powered tools shall not be permitted within 3m and the use of hand held power assisted tools shall not be permitted within 1.5m of a British Gas pipeline or associated equipment.

Consideration may be given to a relaxation of these limits provided that prior notice is given to British Gas of the excavating methods and the safeguards to be employed. In certain circumstances, the Engineer may agree to such a relaxation if, after inspection on site at the time of the excavation, he is satisfied that the pipeline can be adequately protected. Details of the conditions of any such relaxation must be stated in writing.

Excavation machinery operating within the easement strip may do so only in accordance with the above conditions and only when the British Gas representative is present.

9.3 To avoid damage during construction work, exposed British Gas pipelines shall be protected by cladding (eg timber) as directed by the Engineer.

9.4 Where excavation machinery is operating outside the easement strip, but in close proximity to it, a fence shall be erected to demarcate the easement strip and exclude access.

10. BACKFILLING

10.1 Those responsible for the new works shall give British Gas at least 48 hours notice of intention to backfill under, over, or adjacent to an existing British Gas pipeline.

10.2 The British Gas representative shall be in attendance during the whole of the backfilling operations and shall advise as to the suitability and degree of consolidation of backfill material round the pipeline.

10.3 Any damage to the coating of the British Gas pipeline, even if minor in extent, shall be brought to the notice of the British Gas representative so that he can arrange for repairs to be made before backfilling is completed. Minor damage to pipe coating and test leads notified to British Gas in this way will be repaired by British Gas free of charge.

11. SAFETY PROCEDURE IN CASE OF DAMAGE TO THE PIPELINE

If a British Gas pipeline is damaged, even slightly, the following precautionary measures shall be taken immediately.

a) Evacuate all personnel from the vicinity of the pipeline damage.

b) Notify British Gas, using the contact and telephone number given below.

c) Shut down all working plant and machinery in the vicinity of the pipeline damage and ensure that there are no other potential sources of ignition in the vicinity.

d) Ensure that no one approaches the pipeline without the authority of the Engineer.

e) Ensure that assistance is given as necessary, or as requested by British Gas or the Police, to safeguard persons and property.

IMPORTANT NOTE

IN THE EVENT OF A GAS LEAK OCCURRING OBSERVE THE ABOVE PRECAUTIONS BUT DO NOT ATTEMPT TO STOP THE LEAK

The British Gas pipelines are the responsibility of:

The Transmission Engineer, North West Gas, Welham House, Altrincham, Cheshire,
WA15 8AE - Tel: 0161 928 6311

Local contact no. 01772 202404

CLAUSE 111.4 SPECIFIC REQUIREMENTS RELATING TO BRITISH TELECOM

The Contractor shall comply with the following special requirements issued by British Telecom.

1. Before commencing any work or moving heavy plant or equipment over any portion of the site the Contractor shall confirm details of British Telecom underground plant within the site with the appropriate Telephone Manager.

2. Where such details show the Contractor's works or the movement of plant or equipment may endanger the British Telecom plant, the Contractor must give the Telephone Manger at least one week's notice of the date on which it is intended to commence such work or movement of plant and equipment in order that the presence of buried plant can be indicated by markers to be supplied by British Telecom and placed by the Contractor under the supervision of a British Telecom representative. The Contractor shall ensure that British Telecom plant is protected from damage.

3. In the event of a British Telecom marker being disturbed for any reason, it shall not be replaced other than in the exact position and to its former depth unless the repositioning is carried out at the direction and under the supervision of a British Telecom representative.

4. The above requirements do not relieve the Contractor of any of his obligations under the Contract.

CLAUSE 111.5 SPECIFIC REQUIREMENTS RELATING TO NATIONAL GRID COMPANY PLC AND AREA ELECTRICITY BOARDS

The Contractor shall comply with the following Special Requirements issued by the National Grid and Area Electricity Boards:-

1. In these special requirements the following expressions shall have the meanings assigned to them:-

   i) "Boards" means the National Grid Company plc and./or the Area Electricity Board(s) concerned.

   ii) "Boards" Engineer means the District Engineer of the National Grid Company and/or the Area Board(s) concerned or his/her nominated representative.

   iii) "Plant or Equipment" means any plant, equipment, gear, machinery, apparatus or appliance or any part thereof as defined in the Construction (General Provisions) Regulations 1961 and the Construction (Lifting Operations) Regulations 1961.

2. The work should be carried out to conform with the Requirements of the Health and Safety Executive Guidance Note No GS6 "Avoidance of Danger from overhead electric lines" and GS33 "Avoiding danger from buried electricity cables".

3. i) A distance of 15 metres shall be maintained at all times between any part of any plant or equipment or anything connected to such plant or equipment (eg the jib of a crane, hoist, rope, load etc.) and the Board's overhead electric lines except under such restrictions as the Board's Engineers may impose for the safety of persons and the protection of property. The permission of the Board's Engineers must be obtained in writing before any plant or equipment is operated or work of any kind is carried out within 15 metres of overhead lines.

   ii) The Contractor shall give at least two weeks notice to the Board's Engineers of the dates upon which it is intended to operate plant or equipment or carry out any work for which permission has been given by the Board's Engineers under the preceding paragraph. Such operations or work shall only be carried out in the presence of the Board's Engineers unless notice shall have been obtained in writing from the Board's Engineers that they do not require to be present.

   iii) In the event of the Board requiring work to executed on the overhead lines or supporting pylons during the period of the contract, the Contractor shall afford all facilities to the Board's Contractor or workmen and the Contractor shall amend his programme of working to suit any and all requirements of the Board during such period of working.

   iv) The Contractor shall consult the Board's Engineers not less than fourteen days before it is proposed to commence work to ascertain whether any underground electricity cables or apparatus will be affected by the proposed work in which event the Contractor shall make all necessary arrangements with Boards to safeguard the cable or apparatus.

4. The above requirements will not relieve the Contractor of any responsibility for taking every precaution to avoid risk to persons or damage to property. Risk to persons can be avoided by compliance with Regulation 44(2) of the Construction (General Provisions) Regulation 1961.

Local contact nos.

National Grid	01772 744476
Norweb	01772 253333

CLAUSE 111.6 SPECIFIC REQUIREMENTS RELATING TO THE ENVIRONMENT AGENCY

1. The Contractor is required to comply with the provisions of the Water Industry Act 1991, the Water Resources Act 1991 and any Bylaws made thereunder, the Land Drainage Act 1991, the Wildlife and Countryside Act, 1981 and the Salmon and Freshwater Fisheries Act 1975, and be responsible for obtaining any licences to abstract water for use on the works in accordance with the requirements of the Water Resources Act 1991, allowing 4 months for any decision on the granting of an abstraction licence.

2. The Contractor is required to comply with the guidelines laid down in the document 'Guidelines to Pollution Prevention on Civil Engineering Contracts' produced by the National Rivers Authority.

3. The Contractor shall, before carrying out any temporary diversions of temporary works in the main channels of any river, stream or water course, submit details of such work to the Engineer for his approval and the approval of the appropriate Flood Defence District Manager and Area Fisheries Manager of the National Rivers Authority and allow 8 weeks for the agreement of such details.

4. The Contractor shall give seven days notice of any works authorised by the above approval to the appropriate Flood Defence Distract Manager and Area Fisheries Manager of his intent to commence work.

5. The Contractor shall take all precautions during the carrying out of the works so as not to obstruct, impede or interfere with the flow of water in, into or out of the river, the passage of fish either upstream or downstream and shall maintain the flow of the river at all times.

6. The Contractor shall take all necessary precautions to secure the efficient protection of all rivers, streams, waterways, lakes and the like against silting, erosion and pollution which may be likely to contaminate water supplies or to cause injury to fish or plant life.

7. On completion of the works, any damage to the banks or bed of the river channel shall be made good to the satisfaction of the Engineer and the appropriate Flood Defence District Manager and the river shall be left in a clean and tidy condition.

8 In connection with these requirements the Contractor should contact the following:-

Environment Agency
(North West Region)
Lutra House, Dodd Way
off Seedlee Road
Walton Summit
Bamber Bridge
PRESTON
Lancs PR5 8BX

9. The above requirements do not relieve the Contractor of any of his obligations under the Contract.

Guidelines to pollution prevention on civil engineering contracts

10 GENERAL

10.1 The Project Originator will be considered to have sole responsibility for pollution prevention measures being effected unless the Authority's Pollution Control Section is notified formally that pollution prevention measures are vested with a third party.

10.2 The site shall be described as any land disturbed from its natural state due to the activities of the project and shall include site services, accommodation and plant maintenance.

10.3 Discussions between the Pollution Control Section, Project Originator (if appropriate and Main Contractor) should take place as early as possible after the contract has been let and before work starts to agree matters of detail outlined in these guidelines.

10.4 No materials should be stored near a watercourse or in such a situation that these can fall or be carried into the watercourse. Any drainage arising from the storage of such materials should not enter a watercourse.

10.5 Refuse and debris arising from the site should not be allowed to enter any watercourse.

10.6 All temporary sewerage facilities should be connected to the public foul system. Where these are not readily available, then a sealed tank without an overflow shall be provided.

10.7 The guidelines relate only to water quality aspects and do not remove the need to consult with other relevant departments.

11 SITE INVESTIGATIONS AND PREPARATIONS

11.1 Details of site investigations should be referred to the Pollution Control Section of the Authority as soon as available to discuss the pollution potential for the site.

11.2 All proposed exploratory and production boreholes should be discussed with the Pollution Control Section of the Authority before work commences.

11.3 Consideration should be given at design stage to the composition of material used for backfilling excavations and in the replacement of native soils.

This would include:-

i) Backfilling of drainage trenches
ii) Backfilling of stream crossings
iii) Infilling of standing water
iv) Backfilling of areas where the material will come into contact with the natural water table

11.4 Backfilling/infilling should be with inert, non toxic materials. It is important to note that Blast Furnace Slag is unsuitable for use in the above circumstances.

11.5 Necessary direct discharges of any water during the project which are pre-planned should be discussed with the Pollution Control Section of the Authority and confirmed by telefax prior to discharges commencing.

12 SITE OPERATIONS

12.1 Installation of wheel washes should be designed on total recirculation. Where this is considered by the Authority to be inappropriate, then discharge should not take place without adequate settlement and oil removal. Use of detergents in this instance would not be permitted. In these latter circumstances the consent of this Authority would be required under the Water Resources Act, 1991.

12.2 Cut-off drains should be installed to intercept field tiles, drains, culverts and watercourses. This drainage should be diverted through the site in enclosed pipe or around the periphery of the site.

12.3 After prior agreement with the Pollution Control Section drainage channels and settlement lagoons should be installed prior to site operations commencing. Maintenance should be at a frequency to ensure their effective performance.

12.4 Top soil and sub soil banks created after land stripping should be in locations remote from watercourses. Permanent and semi permanent soil banks should be seeded as soon as practicable after deposition to minimise scour. If this is considered not to be a practical proposition, then such drainage must be regarded as trade effluent.

12.5 Drainage from borrow pits or site quarries should only be discharged after agreement with Pollution Control Section of the Authority.

13 MAJOR RIVER CROSSINGS

13.1 Where the geology of the river bed is appropriate, in-river bunds should be by sheet piling.

13.2 In-River Bunds

Where native material is subject to excess scouring, imported impervious material such as puddle clay or sand bags should be used for the formation of in-river bunds after consultation with the Pollution Control Section of the Authority.

13.3 Where river flows are controllable arrangements should be made to reduce the river levels during the period of the crossing subject to agreement with the relevant departments within the Authority.

13.4 Dewatering of excavations should be discharged in order of preference to:-

i) Soakaway

ii) Back to river after treatment. The degree and practicability of this treatment will be by agreement following discussions with the Pollution Control Section. Discharges to sewer may be applicable in certain circumstances, following agreement with the Trade Effluent Officer (NWW Ltd).

13.5 Regular crossings of major watercourses should be by way of temporary pipe bridges or culverts and should have the prior agreement of the relevant departments of the Authority.

13.6 Run-off from easements and roadways should be intercepted and treated prior to discharge to any watercourse.

13.7 Blasting activities should be referred to the relevant departments of the Authority in writing or fax five working days beforehand.

13.8 Vehicles should be cleaned before accessing watercourses.

14 CONCRETE AND CEMENT

14.1 Drainage in excavations where concrete is being or has been newly poured is likely to caustic. Dewatering methods should recognise this and no discharge to river should be outside the range of pH 5-9 on the recognised scale and after agreement with the Pollution Control Department.

14.2 Both site operators and contractors are advised to equip themselves with appropriate means of accurately measuring the pH.

14.3 Direct contact of river water and wet cement or concrete should not take place.

14.4 The first flush of water over artificial stream beds constructed of materials including cement may require treatment

14.5 Concreting/cement use in the river bed should only take place after separation of the working area by a bund. Alternatively the river can be diverted down a temporary course for the duration of the crossing. Methods of working should be by agreement by Pollution Control staff of the Authority.

14.6 Tools equipment and plant should not be washed in watercourses or allowed to drain to any surface water drainage system.

14.7 Spray concreting of surfaces in the vicinity of watercourses should only be done after adequate protection of the watercourse as agreed by the Pollution Control Section of this Authority.

14.8 Batching plants may require a consent under the Water Resources Act 1991 for any discharges to soakaway. A direct discharge to stream is not permissible and recirculation is strongly advocated.

15 OIL

15.1 All deliveries should be supervised by a responsible person.

15.2 All stored oils, lubricants and chemicals should be in a bund of capacity equivalent to 110% of the largest tank. An integral sump is advisable.

15.3 Delivery points and vent pipes should be within the bunded area.

15.4 Outlet valves to oil storage tanks should be locked when not in use.

15.5 Bunded areas should have no outlet. Disposal of bund contents should only take place after authorisation by the site management.

15.6 Mobile fuel and lubricant servicing units should be provided with appropriate quality delivery hoses and be fitted with a trigger type delivery nozzle. Refuelling by mobile units should be away from any watercourse.

15.7 When not in use vehicles referred to in 15.5 above should be parked in a secure area within a bund.

15.8 In-service pumps should be provided with temporary localised bunds to prevent spillages during operation or filling.

15.9 Spillages should be immediately removed. It is advised that an adequate supply of oil absorbent material and oil retention booms are retained on site for such emergencies, as agreed with the Pollution Control Section.

15.10 All settlement lagoons and surface water outlets should be so designed to ensure oil spillages are prevented from being discharged.

15.11 In-river work should be done only by plant known to be secure from oil or fuel leaks.

16 BRIDGE WORK

16.1 Where concreting, bitumen spraying, cleaning or sand blasting operations are involved, adequate protection to the river should be provided as agreed with the Pollution Control Section of the Authority.

17 PIPELINES AND STORAGE FACILITIES

17.1 The details of chemicals in sterilising, flocculation, chemical treatment, pressure testing or other activities should be agreed with the Pollution Control Section of the Authority prior to use.

17.2 Discharges shall only take place after the agreed details have been received in writing by EA and the user has been:-

a) Notified in writing or by fax

or

b) Granted a consent under the Water Resources Act, 1991, as deemed appropriate by the Authority.

SECTION 200 Not used

SECTION 300- Not used

SECTION 400 - DEMOLITION AND SITE CLEARANCE

401 GENERAL CLEARANCE

1. General clearance shall consist of demolition, uprooting, breaking up and removal from site of all superficial objects, rubbish, bushes, undergrowth, hedges or small trees, the timbers of which are less than 500mm in girth at 1m above ground level, tree stumps less than 150mm and other materials within the area indicated on the drawings save which is expressly required to be removed in other items.

2. All materials, subject to the provisions of Clause 32 or expressly required by the Engineer, shall become the property of the Contractor.

3. All areas of the site shall immediately after general clearance be sprayed with a total weedkiller having a short residual effect.

4. All docks and other injurious weed throughout the site shall be similarly treated.

5. The application of the weedkiller shall be carried out as early as is practicable within the growing season.

402 TREES AND STUMPS

1. The Contractor shall take precautions when felling trees to prevent damage to persons or property. With larger trees the main branches shall first be lopped and the direction in which the trunk falls shall be controlled by ropes or cables. Roots shall be grubbed up and disposed of.

2. All felled timber shall be removed from the site as directed by the Engineer.

3. Holes left by the stumps or roots shall be filled with suitable approved material and compacted to the satisfaction of the Engineer.

403 CLEARANCE OF RUBBISH

1. All rubbish and deleterious material within the areas indicated on the drawings shall be collected and removed from site. This work shall proceed without damage to the plant, shrubs and trees within these areas. All heavy plant movements across these areas shall be prohibited.

404 DEMOLITION

Preliminary Procedure

1. In accordance with Clause 11 of the Conditions of Contract, the Contractor is advised to ascertain the nature and condition of construction building to be demolished and its relationship to and the condition of adjoining properties.

2. The Contractor shall not commence demolition works until he has ascertained that all Public Utility services have been disconnected and all equipment required by these bodies has been removed.

3. All existing drains within the demolition areas shall be located and sealed with a 450mm long GEN 3 MIX DESIGNATION concrete plug.

4. The Contractor should submit a detailed programme of his proposed demolition procedures 14 days prior to the commencement of demolition works.

5. Where required, the Contractor must obtain a Hoarding Licence and comply with the requirements contained therein.

General

6. All frontages which abut on a highway, footpath, passage or other public place, shall be hoarded by a close boarded fence of not less than 2m in height. Where it is proposed to place this structure on the highway, a Hoarding Licence shall be sought.

7. Every elevation of greater than two storeys in height and adjacent to a highway shall, prior to demolition, be completely independently scaffolded to BS 5973. The scaffold shall contain adequate walkways and fans. Fans to be at first and alternate floor level. No material shall be allowed to fall on the highway.

8. Demolition shall consist of the breaking down and removal from site of buildings indicated on the drawings, including all structural elements, fittings, fixings, refuse and materials generated down to the original surface level indicated on drawings. The works shall be carried out in accordance with BS 6184. Demolition by progressive collapse, or by use of explosives will not be permitted. Materials shall not be stored on site but shall be removed as they accrue. Fires on the site will not be permitted. Any charges made by the Fire Brigade as a result of their attendance on site will be recharged to the Contractor. The Contractor shall take measures to reduce the amount of nuisance caused as a result of dust from the site. The Contractor is reminded of his obligations with regard to Clauses 104 and 107 of the Specification and Clause 62 of the Conditions of Contract.

405 HAZARDOUS MATERIALS

1. The treatment of hazardous materials encountered in site clearance shall comply with relevant statute. Disposal must be to an appropriate licensed facility.

2. The treatment of hazardous materials must be clearly identified in the Health and Safety Plan for the Works.

SECTION 500 - EARTHWORKS AND LANDSCAPING

501 ROCK

1. Rock shall be defined as hard ground which cannot be excavated by the use of hand tools or excavating machines of adequate size and for the removal of which, the use of explosives, compressed air tools (excluding clay spades) or other special equipment for the purpose, would normally be required, provided that it is of one or other of the following descriptions:

   a) A boulder of not less than one cubic metre
   b) In an excavation of not more than 2m width any isolated volume exceeding 0.25 cubic metres.

2. No shale, agglomerate, fireclay or similar material, which the Engineer considers may be got with pick and shovel, will be considered or paid for as rock.

3. In calculating the volume of rock to be measured, the dimensions used will be the minimum trench widths stipulated, irrespective of the actual excavation widths on site.

4. All rock excavated shall be measured, as the work proceeds, by the Engineer and the Contractor, and any subsequent claim for rock not measured by the Engineer will be dismissed.

502 UNSUITABLE MATERIAL

1. Where directed by the Engineer in writing, the Contractor shall excavate any hard and soft zones and make good with well-compacted granular bedding material, concrete, hardcore or stone sub-base materials as directed by the Engineer.

2. Such work shall be measured and paid for in accordance with the Conditions of Contract except where in the opinion of the Engineer such work has arisen from negligence on the part of the Contractor.

3. The following materials are unsuitable for formation of paved areas:

   a) Material from swamps, marshes or bogs
   b) Peat, logs, stumps or vegetable matter
   c) Material susceptible to spontaneous combustion
   d) Frozen material
   e) Clay of liquid limit exceeding 90 and/or plasticity index exceeding 65
   f) Saturated material
   g) Chemical and industrial organic waste.

503 UNAUTHORISED EXCAVATION

1. Unauthorised excavation below the final surface, shall be made good at the Contractor’s expense with properly consolidated granular bedding material, concrete, hardcore or stone sub-base as directed by the Engineer.

504 EXCAVATION

General

1. The Contractor shall carry out his operations in such a manner as to avoid damage to, or deterioration of the final surface of excavations and to suitable material derived from the excavation.

2. If the Contractor encounters ground in the final surface which he considers unsuitable, or if the final surface is damaged or allowed to deteriorate, the Engineer shall be promptly informed.

3. No excavated material suitable for re-use in the works shall be removed from the site except on the direction, or with the permission of the Engineer.

Trenches

4. The sides of trench excavations shall be adequately supported at all times and, except where required by or permitted under the Contract, shall not be battered.

5. The minimum clearance around the outside of pipe barrels and joints shall be 150mm.

505 DEALING WITH WATER

1. The Contractor shall not allow water to accumulate in any part of the works. Any proposed temporary measures to prevent the accumulation of water must be approved by the Engineer.

506 BACKFILLING

1. Backfilling shall, where practicable, be undertaken immediately the specified operations preceding it have been completed and inspected and the works to be covered have achieved sufficient strength to withstand the loading which, in the Engineer's opinion, could be imposed thereon.

2. The required filling material shall be deposited in layers not exceeding 250mm 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 to maintain stability of the trench walls and form a stable backfill.

3. Backfilling of over excavations taken below the final surface shall be carried out in the manner and in the materials required by the Engineer.

507 GENERAL AND COMPACTION FILLING

1. Embankments and other areas of fill not specifically required for highway construction shall be formed of suitable material capable of normal compaction to form a stable fill, deposited and compacted as soon as practicable after excavation, in layers of thickness appropriate to the compaction plant being used.

2. The filling shall be built up and compacted evenly and shall be maintained at all times with a sufficient camber or cross-fall and a surface sufficiently even to enable surface water to drain readily from it.

3. For embankments required for highway construction the filling and compaction shall be carried out in accordance with the DTp. Specification for Highway Works.

508 HARDCORE

1. Where hardcore is to be incorporated into the works, it shall consist of clean demolition rubble or quarry rejects not exceeding 225mm in any dimension, free from soil, clay, timber, plaster, vegetable matter and rubbish. It shall be spread and compacted in layers not exceeding 300mm thick.

509 NOT USED

510 EXISTING VEGETATION

1 All areas of the site receiving less than 300mm of fill or areas where no excavation is to be carried out shall be treated with herbicide in accordance with HSE/HSC Approved Code of Practice for the Safe Use of Pesticides for Non-Agricultural Purposes, the Code of Practice for the Use of Approved Pesticides in Amenity and Industrial Areas and the Statutory Code of Practice for the Safe Use of Pesticides for Non-Agricultural Purposes. Spraying shall be undertaken only by operatives possessing National Proficiency Test Council Certificates and after an adequate risk assessment has been undertaken in accordance with the Control of Pesticides Regulations.

2. The treatment of all docks and injurious weed shall be by a combination use of contact (foliar acting) herbicide and persistent (residual) herbicide or by spot treatment.

3. The application of the herbicides shall be carried out as early as is practicable within the growing season.

4. Unless indicated elsewhere in the Contract Documents, the site shall be free of all weed in excess of the grass height in informal areas. All newly seeded and formal areas shall show no greater than 0.25% of the area covered by weed growth.

511 GRADING OF SUBSOIL

1. After completion of subsoil moving the formation shall be graded so as to produce a surface free from excessive undulation. The subsoil shall be loosened with a subsoil ripper or disc harrow to a depth of 150mm or the full depth of the imported subsoil whichever is the less.
2. The finished levels at the perimeter of seeded areas and shrub beds shall unless topsoil is to be applied or otherwise stated, be 25mm above the adjacent hard surface kerb or edging and 150mm below the damp proof course of adjacent buildings.

512 IMPORTED SOILS

Subsoil

1. Imported subsoil shall be that layer of soil found immediately below the topsoil and above the inert parent material. It will be less well structured and biologically active than the topsoil but will act as a source of plant nutrient and moisture and shall be free from chemical pollution.

Topsoil

2. Imported topsoil shall be from an approved source. A sample of topsoil shall be delivered to the Engineer seven days prior to its incorporation into the Works for his approval which shall be in writing. The source shall be capable of supplying sufficient material of a consistent nature for the whole of the Works.

3. The imported material shall comply with BS 3882. It shall be completely free from stone in excess of 25mm gauge, subsoil, roots, obnoxious or perennial weeds and chemical pollution.

4. The topsoil to be incorporated into the Works shall be medium (contain a high proportion of loamy material) not more than slightly stony (not more than 15% by weight stone content) slightly acid to neutral (pH6.0 - 7.0).

Spreading Topsoil

5. Topsoil shall be spread evenly on the formation to the firmed depth required. As topsoiling proceeds all consolidated wheel tracks are to be forked or raked over.

6. The finished levels at the perimeter of seeded areas and shrub beds shall, unless otherwise stated, be 25mm above the adjacent hard surface, kerb or edging and 150mm below the damp proof course level of adjacent buildings.

513 PREPARATION OF SURFACES - WEED CONTROL

1. After grading and loosening of subsoil or spreading of topsoil the area shall be left for a period of 28 days within the growing period to allow germination of annual seeds, perennial grasses and broad leafed weeds.

2. The area shall then be treated with contact herbicide which is translocated and non-persistent in the soil. Spraying shall be undertaken by persons who have achieved the appropriate NPTC standard.
3. All vegetation shall be removed from the surface of the treated area ten days after the application of the herbicide.

514 PREPARATION OF SURFACES - CULTIVATION

1. After compliance with the preceding clause cultivation to crumb size of the upper 150mm of the area shall be carried out.

2. If cultivation is carried out on subsoil the addition of such compounds as indicated in the Bill of Quantities shall be undertaken.

3. Cultivation shall be by the use of disc or rotary cultivators used in transverse directions.

4. All areas shall be rolled and cross rolled with a flat roller and all depressions exposed filled with appropriate material and well consolidated.

5. All stone and other materials over 25mm gauge exposed on the surface shall be removed.

515 PRE-SEEDING FERTILISER

1. Fertiliser shall be applied by hand or mechanical means in two equal applications in transverse directions. The fertiliser shall be of granular form having an analysis of 10%N 15%P 10%K and the application shall be at the rate of 70g/m^2. The fertiliser shall be obtained from an approved manufacturer and a sample shall be approved of by the Engineer prior to application.

516 SEEDING

1. Seeding may not be undertaken before the residual effect of any herbicide has been satisfactorily reduced.

2. The grass seed mixture and the rate of spread shall be as indicated in the Bill of Quantities and Appendix 1 to the Specification.

3. A certificate as to composition, purity, germination, year of harvest and country of origin shall be provided prior to seeding. The Engineer's representative may take samples from site for testing purposes. Seed shall be delivered to the site 21 days before sowing to allow these samples to be taken. The Engineer's representative shall be notified 48 hours before any proposed seeding operation and written consent for sowing to take place obtained. This will be given providing the necessary preparatory work has been completed.

4. Operations shall be planned for sowing in the spring or late summer i.e. from the beginning of April to mid May, or from the beginning of August to the end of September, subject to compliance with the requirements for weed control.

5. Immediately prior to seeding the surface of the area shall be brought to a fine tilth by approved mechanical means or by handraking. Sowing shall be carried out during clam weather conditions by hand or an efficient broadcast machine. Following seeding the area shall be lightly raked or harrowed and shall then be consolidated by the use of a light roller.

6. The Contractor shall protect newly seeded areas from the effects of access by pedestrian or other traffic at all vulnerable points in order to prevent the destruction of seedlings. For this purpose, he shall provide and fix suitable temporary fencing to be maintained until the grass is established. Areas exhibiting poor or no growth shall be recultivated and reseeded at the Contractors expense.

Hydroseeding

7. The Contractor shall submit for the Engineer's approval, details of constituents of the hydroseeding slurry to be used with his programme of works. Any damage caused by the Contractor's plant shall be made good by the Contractor.

Acceptance of seeded areas

8. The grassed area will only be accepted when a smooth surfaced site free of all vegetation other than the grass seed mix indicated and with an established sward has been achieved.

9. Priority should be given to obtaining the earlier mentioned cultivar of each species in order that the required properties of the resultant grassland may be obtained.

GRASS SEED TYPE 1

Low maintenance quick establishment grass seed for use on poor quality soils.

Species Composition

Botanical name	English name	Cultivars	% by weight
Festuca rubra L ssp litorailis	Slender creeping red fescue	Logro	35
Lolium perenne commutata	Perennial ryegrass	Lorina	58
Agrostis castellana	Browntop bent	Highland	5
Trifolium repens	Wild white clover		1
Lotus corniculatus	Birdsfoot trefoil		1

Sowing rate 35g/m² (350kg/ha)

GRASS SEED TYPE 2

Nil or very low maintenance grass seed for semi natural areas, woodland ground cover for use on acid soils.

Species composition

Botanical name	English name	Cultivars	% by weight
Festuca longifolia Thuill	Hard fescue	Biljart Valda Waldina	55
Agrostis tenuis	Browntop bent	Bardot Saboval Duchess	35
Trifolium repens	Wild white clover	S184 Kent	5
Lotus corniculatus	Birdsfoot trefoil		5

Sowing rate 7g/m² (70Kg/ha)

GRASS SEED TYPE 3

Nil or very low maintenance grass seed for semi natural areas, woodland ground cover for use on neutral or slightly acid soils.

Species Composition

Botanical name	English name	Cultivars	% by weight
Festuca longfolia Thuill	Hard fescue	Biljart Valda Waldina	60
Agrostis tenuis	Browntop bent	Saboval Duchess	20
Trifolium repens	Wild white clover	S184 Kent Pronitro	20

Sowing rate 8g/m² (80Kg/ha)

GRASS SEED TYPE 4

Ornamental area low maintenance grass useful in shaded areas on low fertility soils

Species composition

Botanical name	English name	Cultivars	% by weight
Festuca rubra L ssp commutata	Chewings fescue	Frida	45
Festuca rubra L ssp rubra	Creeping red fescue	Novorubra Moncorde	25
Festuca longifolia Thuill	Hard fescue	Biljart	25
Agrostis castellana	Browntop bent	Highland	5

Sowing rate 35g/m² (350Kg/ha)

GRASS SEED TYPE 5

Low maintenance grass for light grazing or infrequent cutting good wear tolerance not suitable for semi natural areas.

Species composition

Botanical name	English name	Cultivars	% by weight
Festuca rubra L ssp litoralis	Slender creeping red fescue	Logro Jupiter Merlin	25
Festuca rubra L ssp commutata	Chewings fescue	Frida Waldorf Atlanta	30
Poa pratensis L	Smooth stalked meadow grass	Baron Julia Enprima	20
Trifolium repens	Wild white clover	S184 Kent Pronitro	10

Sowing rate 9g/m² (90Kg/ha)

GRASS SEED TYPE 6

Species composition

Botanical name	English name	Cultivars	% by weight
Festuca rubra L ssp commutata	Chewings fescue	Frida	40
Festuca rubra L ssp rubra	Creeping red fescue	Novorubra Moncorde	40
Poa pratensis L	Smooth stalked meadow grass	Julia Fylking	15
Agrostis castellana	Browntop bent	Highland	5

Sowing rate 25g/m² (250Kg/ha)

517 NURSERY STOCK

1. Nursery stock shall comply with and be handled and planted in accordance with the requirements of BS 3936, BS 4043 and BS 5236. It is recommended that the Contractor uses the General Conditions, Specification and Schedules of Quantity for the Supply and Delivery of Plants, a leaflet available from the Horticultural Traders Association, when ordering plants.

   The Engineer's inspection of the stock must be sought prior to planting.

Preparation

2. Where seedlings, transplants and whips are to be planted in a bed, the bed shall be constructed to the required dimensions. The bed shall be cultivated to an overall depth of 300mm, all weeds shall be removed from the bed.

3. All plants should be placed in pits of the type and size shown on the Drawings. Subsoil at the base of pits shall be broken up to a further depth of 150mm. Backfill shall consist of topsoil and tree planting compost at the rate indicated by the manufacturer.

Planting

4. The whole of the planting is to be carried out during the dormant season normally between October and April inclusive and in suitable weather conditions. Evergreens are to be planted in April or September and sprayed with S600.

5. All stock planted in dry weather shall be firmed and watered. Stock lifted by frost action shall be refirmed.

6. Stock must be planted such that the mark indicating original soil level shall be at finished soil level after settlement of the firmed soil. Broken or damaged roots shall be removed. Backfill soil shall be firmed as filling proceeds. The root system shall be in close contact with the soil particles and free of air pockets.

7. No three plants are to be placed in line unless indicated by the Bill of Quantities.

8. Transplants, which shall be at least 2 years old (1 + 1) and have minimum dimensions as indicated in Table 2 of BS 3936 Pt 4, and whips shall have a 400mm radius Tree Pat of approved material placed around them. The edges of tree pats shall be held firm by embedding in the surrounding ground.
9. Where transplants and whips are to be pit planted a hole 300mm square and 300mm deep shall be made the bottom shall be broken up to a further depth of 150mm. Backfill shall be topsoil mixed with tree planting compost at the rate recommended by the manufacturer.

Stakes and Ties

10. When indicated in the Bill of Quantities, trees shall be provided with stakes and ties as shown on the Drawings. These shall be positioned on the windward side of the plant.

11. Stakes shall be of sweet chestnut or peeled larch with a pointed end and the lower 1.0m to 1.2m which will be below ground, coated with a non-injurious wood preservative, not creosote or tar.

Tree Guards and Tree Shelters

12. Tree guards or shelters shall be fitted when indicated in the Bill of Quantities. Guards to standard and heavy standards shall be 1.8m in height and formed of 25 x 75mm x 10g hot dipped galvanised metal. The guard shall be firmly secured to the stake. Guards to whips shall be of spiral plastic to a nominal height of 600mm.

518 PLANTING OF SHRUBS, HEDGES AND BULBS

Shrubs

1. Shall comply with the appropriate requirements of BS 3936 and shall be well formed and healthy specimens at the time of planting and shall be of the size indicated on the Drawings or in the Bill of Quantities.

   An Engineer's inspection of the stock must be sought prior to planting.

Preparation

2. Where shrubs are to be planted in a shrub bed, the bed shall be constructed to the required dimensions. The subsoil at the base of the bed shall be broken up to a depth of 150mm and the bed shall be backfilled with topsoil. Prior to planting, the bed shall be prepared by ridding the bed of all the weeds.

3. Where shrubs are to be planted individually, this shall be in a hole 150mm wider than the root spread and 450mm deep the bottom shall be broken up to a further depth of 150mm. Backfill shall be topsoil mixed with tree planting compost at the rate recommended by the manufacturer.

4. Deciduous shrubs shall be planted between October and April; conifers and evergreens shall be planted in early Autumn or late Spring; herbaceous plants shall be planted from September to October and from March to April. The work shall be carried out in suitable weather, when dry the shrubs shall be firmed and watered. Shrubs lifted by frost action shall be refirmed.

Planting

5. The shrub shall be set in the hole so that the soil level after settlement will be at the original soil mark on the stem of the shrub. The hole shall then be backfilled to half its depth and firmed. The hole shall then be filled and firmed again. Backfill shall consist of topsoil and tree planting compost at the rate indicated by the manufacturer. No three shrubs shall be in a line. Where necessary, shrubs shall be supported with a diagonally driven stake.

Mulching of Planted Areas

6. Mulching of planted areas shall consist of a surface layer of 100mm thickness of coarse tree bark chippings.

Hedging

7. Preparation of trenches for hedges should be to the required dimensions and in the same way as shrub beds. The ground should be well prepared by trenching and the incorporation of tree planting compost. Planting shall be carried out as shrub planting.

8. After planting, certain quick growing species such as privet and thorn shall be cut back to encourage bushy growth.

Bulbs

9. All bulbs and corms shall be planted in the appropriate season with a suitable planting tool to the correct depth. Bulbs shall not be planted in rows unless required but shall be scattered by hand in their allocated areas and planted where they fall. Soil shall be firmed back over the bulb.

Ground Cover Plants

10. Shall comply with the appropriate requirements of BS 3936 and their heights or spread (as appropriate) shall be within the ranges specified. They shall be well formed and healthy at the time of planting.

11. Planting holes shall be excavated in the bed or general planting areas at least 150mm wider than the root spread and of sufficient depth such that the soil level after settlement will be at the original soil mark on the stem and such that the bottom of topsoil, when replaced, will be at least 75mm below the root system. The bottom of the hole shall be broken up to a depth of 150mm.

Planting

12. The shrub shall be set in the hole and the hole backfilled with topsoil in stages, firming the topsoil at each stage.

13. The Contractor shall be responsible for ensuring that adequate protection at vulnerable places is provided to all planting.

519 MAINTENANCE OF LANDSCAPED AREAS

1. All landscaped areas within the Contract shall be handed over at one time except as provided for in sections of the Works as indicated in the Appendix to the Form of Tender.

2. The Contractor shall notify the Engineer on each occasion that maintenance of landscaped areas is to be undertaken. The basis of payment is 'the visit' and the Contractors attention is drawn to the Conditions of Contract which indicate that full opportunity for the Engineer to examine and measure the Works must be afforded.

3. The Contractor shall be responsible for litter picking and grass cutting and for litter picking and removing weed from planted areas along with such other operations specified until written notification is received from the Engineer that the maintenance responsibility has been taken over.

   This will normally be on the expiration of the Period of Maintenance subject to all remedial planting of trees, shrubs or other plants. The grassed area will only be accepted when a smooth surfaced site free of all vegetation other than the grass seed mix indicated and with an established sward has been achieved.

Grass

4. Two months after sowing, an approved selective contact translocated herbicide shall be applied to all grassed areas at the rate and in the manner recommended by the manufacturer. Spraying shall be undertaken by persons who have achieved the appropriate NPTC standard. The initial cut shall then be carried out. This shall consist of stone picking the area and subsequent rolling with a light roller 48 hours before cutting. Cutting shall be carried out only when conditions are not excessively wet or damp so as to leave 20mm growth and avoiding root pulling. The Contractor shall make good all bare patches depressions or subsidence particularly adjacent to the edge of hard surfaces by the addition of topsoil cultivating fertilising and seeding as specified. All cuttings stone rubbish and other materials arising from this operation shall be removed from site.

5. Cutting shall be repeated at not greater than 21 day intervals and shall include edging off as necessary. All cuttings stone rubbish and other materials arising from this operation shall be removed from site.

6. Except where otherwise stated grassed areas shall at the time maintenance responsibility is taken over be capable of being mowed on a regular basis by use of a cylinder mower (see also 3 above).

Planting Areas

7. The site shall be visited at not greater than 21 day intervals. All areas shall be kept weed free, mulch shall be replaced as necessary so as to maintain the minimum thickness specified. Any plants dying or in need of replacement including loss from drought, severe frosts or windchill prior to or during the Period of Maintenance are to be replaced by and at the expense of the Contractor.

Tree Whips and Transplants

8. The site shall be visited at not greater than 21 day intervals. All trees must be restaked and tied as necessary and all guards shelters and tree pats must be maintained for the duration of the Period of Maintenance, including those lost as a result of any unauthorised action. Any tree whips or transplants dying are to be replaced by and at the expense of the Contractor. The Contractor shall be responsible for all stock loss including that from drought, severe frosts or windchill.

Shrubs, Hedges and Bulbs

9. The site shall be visited at not greater than 21 day intervals. All shrub beds and hedging beds shall be kept weed free. All stakes, shelters or guards shall be replaced as necessary. Any plants dying or in need of replacement prior to or within the Period of Maintenance shall be replaced by and at the expense of the Contractor. The Contractor shall be responsible for all stock loss including that from drought, severe frosts or windchill

SECTION 600 - CONCRETE AND ASSOCIATED WORKS

601 CEMENT

1. Cement generally is to be 'Ordinary Portland Cement' with BS 12. Sulphate Resisting Cement shall be from an approved British Manufacturer and shall comply with BS 4027. Rapid Hardening Cement shall comply with the requirements of BS12.

602 AGGREGATES FOR CONCRETE

1. Coarse aggregates shall consist of crushed naturally occurring rock complying with Clause 2.2.2 and Table 4 of BS 882.

2. Fine aggregates shall consist of crushed naturally occurring rock complying with Clause 2.3 and Table 5 of BS 882.

603 WATER

1. If water for the works is not available from the Public Supply, approval shall be obtained regarding the source of supply and manner of its use. When required by the Engineer, the Contractor shall arrange for tests of the water to be carried out in accordance with BS 3148.

604 CONCRETE MIXES

1. Concrete shall be provided in accordance with the relevant requirements of BS 5328.

2. Ordinary prescribed mixes shall be in accordance with Section 2 of BS 5328.

3. Before concrete of a designed mix is supplied, the Contractor shall provide the following information:

The proposed quantities of each ingredient per cubic metre of fully compacted concrete and either:-

a) data showing that the proposed mix proportions and method of manufacture will produce concrete of the required quality with the intended workability, *or*
b) details of tests on trial mixes, *or*
c) a statement that, for initial production, the appropriate mix proportions given by tables 1 and 2 in BS 5328 will be used.

605 USE OF CALCIUM CHLORIDE

1. Calcium chloride or admixtures containing calcium chloride shall not be used in the production of reinforced concrete or concrete in which steel items will be embedded.

606 ADJUSTMENTS TO DESIGNED MIX PROPORTIONS

1. During production of designed mix concrete, the Contractor shall adjust mix proportions within the limits prescribed in BS 5328 to achieve the required strength.

607 TRIAL MIXES

1. Where trial mixes are required, three separate batches of concrete shall be made using materials typical of the proposed source of supply and, where practicable, under full-scale production conditions.

2. The workability of each of the trial batches shall be determined and three cubes made from each batch for test at 28 days.

3. The trial mix proportions shall be approved if the average compressive strength of the nine cubes tested at 28 days exceeds the required strength by 10N/mm² for concrete having a characteristic strength of 20N/mm² and over, or 5N/mm² for concrete having a characteristic strength of 15N/mm² or lower.

4. Additional sets of cubes from each batch may be required for tests at an earlier age.

608 WORKABILITY

1. Workability of fresh concrete shall be such that the concrete can be handled and placed without segregation and, after completion, shall completely fill the formwork and surround all reinforcement and ducts.

2. The quantity of water used shall not exceed that required to produce a concrete with appropriate workability to be placed and compacted in the required location.

609 TRANSPORTING, PLACING AND COMPACTING

1. Concrete shall be transported from the mixer and placed in the works as rapidly as practicable by methods which will prevent the segregation or loss of any of the ingredients and will maintain the required workability. It shall be deposited as nearly as practicable in its final position, and all equipment for transporting concrete shall be kept clean.

2. The Contractor shall give adequate notice of his intention to commence concreting.

3. Concrete shall be thoroughly compacted in its final position within 30 minutes of discharge from the mixer, unless carried in purpose-made agitators operating continuously, when the time shall be within two hours of the introduction of the cement to the mix and within 30 minutes of the discharge from the agitator.

4. The plant used for compaction shall be operated continuously during the placing of each batch of concrete until the expulsion of air has virtually ceased, and in a manner which does not promote segregation of the ingredients.

5. Whenever vibration has to be applied externally, the design of formwork and disposition of vibrators shall be such as to ensure efficient compaction and to avoid surface blemishes.

610 READY-MIX CONCRETE

1. Where concrete is to be obtained from a ready-mix supplier, the Contractor shall obtain the Engineer's approval of the source and shall satisfy the Engineer that the supplier has the facilities for, and operates procedures for, maintaining adequate quality control. The concrete shall comply with BS 1926.

2. Each load of ready-mixed concrete shall be accompanied by a delivery ticket, on which the supplier has entered the following information:

   a) Name and number of ready-mixed concrete depot
   b) Serial number of ticket
   c) Truck number
   d) Date
   e) Name of purchaser
   f) Name of location and job
   g) Specified grade of concrete including, where specified, minimum cement content per cubic metre of concrete.
   h) Specified workability
   i) Type of cement
   j) Type of aggregate
   k) Maximum size of aggregate
   l) Type of name of admixture, if any, and the proportion to be added
   m) Amount of concrete in cubic metres
   n) Time of addition of cement to aggregate (time of loading).

3. The following information shall be added to the delivery ticket and certified by the Contractor before the ready-mix truck departs:

   o) Time of arrival on site
   p) Amount of extra water added on site
   q) Time when discharge completed
   r) Position where the concrete is placed in the Works.

4. All delivery tickets shall be kept at the site and shall be made available for inspection by the Engineer.

611 CONCRETING IN COLD WEATHER

1. Concreting at ambient temperatures below 2°C may be carried out only if the following conditions are met:

   a) The aggregate and water used in the mix shall be free from snow, ice and frost.
   b) Before placing concrete, the formwork, reinforcement and any surface with which the fresh concrete will be in contact shall be free from snow, ice and frost and shall be at a temperature above 0°C.
   c) The initial temperature of the concrete at the time of placing shall be at least 5°C

d) The temperature at the surface of the concrete in the most unfavourable position shall be maintained at not less than 5°C until the concrete reaches a strength of 5 N/mm² as confirmed by tests on cubes matured under similar conditions.

2. The Contractor shall take precautions to prevent the temperature of any concrete falling to 0°C during the first five days after placing.

612 CONCRETE TEMPERATURE

1. The resultant temperature of the combined materials in any batch of concrete at the point and time of delivery to the works shall not exceed 6°C above the prevailing shade temperature when the latter is over 21°C.

2. The Contractor shall not permit any cement to come into contact with water at a temperature greater than 60°C.

3. Where the temperature of the fresh concrete is likely to exceed 32°C, concreting shall not be permitted unless measures are taken to keep the temperature below that level.

613 CURING

1. Concrete shall be cured for at least five days by methods that shall ensure that cracking, distortion and efflorescent are minimised.

2. In cold weather, when the temperature of freshly placed concrete may approach 0°C, water curing shall not be employed.

3. Components which are intended to have a similar exposed surface finish shall receive the same treatment.

614 RECORDS OF CONCRETING

1. The Contractor shall keep up-to-date records of the dates and times shown concreting is carried out and of the weather and temperature conditions at the time. These records shall be available for inspection by the Engineer.

615 FORMWORK

Construction

1. Formwork shall be sufficiently rigid and tight to prevent loss of mortar matrix from the concrete and to maintain the correct position, shape and dimensions of the finished work. Formwork shall be so constructed as to be removable from the cast concrete without shock or damage.

2. The forms shall be capable of producing a consistent quality of surface as required in the Contract.

The following tolerances shall apply:
Verticality 15mm from plumb
Variation from target plane ± 20mm
all other dimensions ± 20mm

3. Where holes are required in forms to accommodate projecting reinforcement, fixing devices or other built-in items, precautions shall be taken to prevent loss of mortar matrix.

4. Formwork shall give access for the preparation of joint surfaces before the concrete has hardened.

Cleaning and Treatment of Forms

5. The interiors of all forms shall be thoroughly cleaned out before any concrete is placed. The faces of the forms in contact with the concrete shall be clean and treated with a suitable release agent, where applicable.

6. Where a concrete surface is to be permanently exposed, only one release agent shall be used throughout the entire area. Release agents shall be applied evenly and contact with reinforcement and other embedded items avoided. Where the concrete surface is to receive an applied finish, care shall be taken to ensure the compatibility of the release agent with the finish.

Striking of Formwork

7. Formwork shall be removed without shock to or disturbance of the concrete.

8. Formwork to vertical surfaces or sloping formwork not supporting concrete in flexure shall not be removed until, as may be relevant, the following criteria are met:-

   a) A minimum period shall have elapsed since the concrete was poured equivalent to 11 hours at 15°C for unsealed plywood forms or 8 hours at 15°C for impermeable forms
   b) The concrete strength shall be sufficient to meet any wind loading upon the concrete likely to arise at the time when the formwork is removed.

9. Formwork supporting concrete in flexure shall not be removed until the concrete strength (as confirmed by tests on cubes cured under representative conditions) has reached 10 N/mm² or twice the sets to which the concrete will then be subjected, whichever is the greater.

10. In the absence of cube test results or any formal procedure agreed in writing with the Engineer, the periods before striking given in the following table shall be used:-

Type of Formwork	Ordinary Portland and sulphate resisting Cement Concrete		Rapid Hardening Portland Cement Concrete	
	Mean ambient temperature		Mean ambient temperature	
	15°C	5°C	15°C	5°C
Soffit forms to slabs	5 days	7 days	4 days	7 days
Soffit forms to beams	5 days	7 days	4 days	7 days
Props to slabs	10 days	15 days	10 days	15 days
Props to beams	10 days	15 days	10 days	15 days

When other types of cement or admixtures are used, longer or shorter periods may be required by the Engineer.

In cold weather the period shall be increased in order to achieve the same minimum maturity at striking.

11. Notice shall be given to the Engineer of his intention to strike formwork.

12. Top formwork shall be provided to slope 30°C or more from the horizontal.

616 REINFORCEMENT

Cutting and Bending.

1. Steel reinforcement shall comply with the requirements of the following British Standards, Hot Rolled Steel Bars B.S. 4449, Steel Fabric B.S. 4483.

2. Cutting and bending of reinforcement shall be in accordance with B.S. 4466 and shall be done without the application of heat and in a temperature of not less than 5°C. Bends shall have a substantially constant curvature.

3. Reinforcement shall not be straightened or re-bent without the approval of the Engineer. If permission is given to bend projecting reinforcement, care shall be taken not to damage the concrete and to ensure that the radius is not less than the minimum specified in B.S. 4466.

Fixing

4. Reinforcement shall be firmly supported in position and secured against displacement.

5. Non-structural connections for the positioning of reinforcement shall be made with tying wire or other fixing devices. Precautions shall be taken to ensure that projecting ends of ties or clips do not encroach into the concrete cover.

6. The concrete cover shall be not less than the required cover minus 5mm and, where reinforcement is located in relation to only one face of a member, not more than the required cover plus:-

   5mm on bars up to and including 12mm size
   10mm on bars over 12mm up to and including 25mm size
   15mm on bars over 25mm size.

Surface Condition of Reinforcement

7. Concrete shall not be placed until reinforcement is free from any substance which might adversely affect the steel or concrete chemically or reduce the bond.

Laps and Joints

8. Laps and joints in reinforcement shall be made only at the position shown on the Drawings or as agreed by the Engineer.

Welding of reinforcement

9. Reinforcement shall not be welded on site except where permitted in the Contract. All welding procedures shall be subject to the prior approval of the Engineer in writing.

617 BUILT-IN ITEMS

1. Where pipes, sleeves, water bars or other items are built into concrete, they shall be rigidly secured in position to prevent movement and shall be free from external coatings which might adversely affect the bond. The Contractor shall take precautions to prevent the formation of air pockets, voids or other defects whilst the concrete is being placed.

618 CONSTRUCTION JOINTS

1. Except where construction joints in concrete are shown in the Contract, the Contractor shall obtain the Engineer’s approval to the positions and details of such joints before any work is commenced.

2. Joint lines shall be clean, true and regular, and, wherever possible, arranged to coincide with features of the finished work.

3. Concreting shall be carried out continuously up to construction joints.

4. Concrete shall not be allowed to run to a feather edge. Vertical joints shall be formed against a stop board suitably notched to the reinforcement. The top surface of each lift of concrete shall be straight and level unless shown otherwise in the Contract.

5. Where a kicker is used, it shall be at least 70mm high and shall be incorporated with the previous concrete.

6. The surface of any concrete against which new concrete is to be cast shall be free from laitance and shall be roughened to the extent that the large aggregate is exposed but not disturbed. The joint surface shall be cleaned immediately before the fresh concrete is placed against it.

7. Where practicable, such preparation of joints shall be carried out when the concrete has set but not hardened.

619 SURFACE FINISHES PRODUCED WITHOUT FORMWORK

Type 1 finish.

1. The Concrete shall be levelled and screeded to produce a uniform plain or ridged surface as required. No further work shall be applied to the surface unless it is a first stage for a Type 2 finish.

Type 2 finish.

2. When the moisture has disappeared and the concrete has hardened sufficiently to prevent laitance from being worked to the surface, the surface to a Type 1 finish (plain) shall be steel trowelled under firm pressure to produce a dense, smooth, uniform surface free from trowel marks.

3. Where the type of finish is not given, it shall be Type 1 (plain).

620 SURFACE FINISHES PRODUCED WITH FORMWORK

Type A finish

1. This finish is obtained by the use of moulds or properly designed forms of closely-jointed sawn boards. The surface shall be free from substantial voids, honeycombing or other large blemishes.

Type B finish.

2. This finish is obtained from forms designed to produce a hard smooth surface with true, clean arrases. Only very minor surface blemishes will be permitted and there shall be no staining or discoloration. Fins and other projections shall be removed and the surface made good.

Type C finish

3. This finish is obtained by first producing a Type B finish and then filling all surface blemishes with a fresh, specially prepared cement and fine aggregate paste while the concrete is still green where possible. After the concrete has been properly cured, the faces shall be rubbed down, if required, to produce a smooth and even surface. If the surface is to be exposed in the final work, every effort shall be made to match the colour of the concrete.

621 GRANOLITHIC CONCRETE

1. Granolithic concrete shall be provided, laid and finished in accordance with the provisions of CP 204, Part 2. The aggregate shall comply with BS 1201 Part 2 and be graded in accordance with Table 3.

622 TIE BOLTS FOR FORMWORK

1. Tie bolts or other devices to be built into concrete shall be approved by the Engineer.

2. Only tie bolts which avoid embedding any metal parts permanently within 50mm of the concrete surface will be permitted. Voids remaining after the removal of all or part of each tie bolt shall be filled flush with the surrounding concrete using a freshly prepared cement and fine aggregate paste. In the case of water retaining structures, The Contractor shall ensure that the measures adopted will not impair the watertightness of the structure.

SECTION 700 - PIPES, PIPEWORK AND ASSOCIATED WORKS

701 PIPELAYING GENERALLY

1. Where pipes are to be laid on granular bed, joint holes shall be formed in the bedding material to ensure that each pipe is uniformly supported throughout the length of its barrel, and to enable the joint to be made to the manufacturer's requirements. The tolerance of pipelines shall be ± 20mm.

2. Pipes shall only be laid on setting blocks where a concrete bed or surround is used.

3. Suitable measures shall be taken to prevent soil or other material from entering the pipes and to anchor each pipe to prevent flotation or other movement before the works are complete.

702 GRANULAR BEDDING

1. Type A granular bedding shall be crushed stone or gravel complying with the following grading:-

BS 410 test sieve	Percentage by mass passing	
	Type A.14	Type A.10
20 mm	100	-
14mm	85-100	100
10mm	0-50	85-100
5mm	0-10	0-25
2.36mm	-	0-5

The materials shall have a compaction fraction value not exceeding 0.2 as determined by the method in the Road and Bridges Specification.

2. The bedding shall be constructed by spreading and compacting granular bedding material over the full width of the trench. After the pipeline has been laid, additional material shall be placed and compacted equally on each side of the pipes and this shall be done in sequence with the removal of any trench supports.

703 COMPLETION OF PIPE SURROUND IN TYPE B MATERIAL

1. Type B material shall be uniform, readily compactable material free from tree roots, vegetable matter, building rubbish, frozen soil and excluding clay lumps retained in a 75mm sieve and stones larger than 20mm.

2. The materials shall, where required, be placed and compacted over the full width of the trench in layers not exceeding 150mm before compaction to a minimum finished thickness of 300mm above the crown of the pipe.

704 CONCRETE BED AND SURROUND

1. Pipes to be bedded on or surrounded with concrete shall be supported on precast concrete setting blocks, the top face of each block being covered with two layers of bitumen damp-proof sheeting complying with BS 5743 Type G. The blocks shall have rectangular faces, adequate plan area and be of GEN 3 mix designation concrete.

2. Concrete provided as a protection to pipes shall be placed to the required depth in one operation.

3. Concrete protection shall be interrupted over its full cross-section at each flexible joint by a shaped former of compressible material consisting of bitumen impregnated insulating board to BS 1142 Part 3. The thickness of the former shall be 18mm for diameter of pipe below 450mm and 36mm for diameters over 450mm.

705 PRECAST CONCRETE MANHOLES

1. Precast units shall comply with the relevant requirements of BS 5911 Part 1. Tongue and groove joints will not be permitted. Units which bed on to bases or immediately below the cover slab shall be plain ended.

2. Cover slabs shall have a 600mm square opening.

3. Precast concrete chamber and shaft rings shall be set vertical with step-iron and slabs aligned correctly.

4. Joints shall be made so that the required jointing material completely fills the joint cavity. Any surplus jointing material which is extruded inside the chamber or shaft shall be trimmed off and joints shall be pointed on completion.

5. Where manholes are to have a concrete surround, the concrete shall be GEN 3 mix designation and the height of each concrete pour shall not exceed 2m. Each construction joint shall break joint with that of the chamber of shaft ring by at least 150mm.

706 INVERTS AND BENCHINGS

1. Manhole inverts and benchings shall be formed of the materials detailed in the Contract and, where there is no change of diameter, the invert shall follow the same gradient as the outgoing sewer.

2. Where a granolithic lining is required, the invert and benching shall be formed in GEN 3 mix designation concrete with surface finish Type 1 or Type A, as required, and the granolithic concrete shall be applied as soon as practicable thereafter.

3. Where the finished surface is to be in-situ concrete, the concrete shall be C25 and the surface finish Type 2 or Type B, as required.

4. Where practicable, the pipeline may be laid through the manhole and the crown broken out to the half diameter, provided flexible joints are situated on each side, no further than 600mm from the inner face of the manhole wall.

707 WATERTIGHTNESS OF MANHOLES AND CHAMBERS

1. Manholes and chambers shall be substantially watertight, with no identifiable flow of water penetrating the Permanent Works.

708 SETTING MANHOLE COVERS AND FRAMES

1. Manhole frames shall be set to the required level on at least two and not more than three courses of Class B engineering brickwork 225mm in thickness. The frames shall be set to level, bedded and haunched over the base and sides of the frame in sand/cement mortar.

709 PIPES, FITTINGS, ROAD GULLIES AND MANHOLES

1. Clay pipes and fittings shall have flexible mechanical joints and comply with the requirements of BS 65/BSEN 295.

2. Concrete pipes and fittings shall comply with the relevant requirements of BS EN124 Part 1 and have gasket type flexible joints.

3. Manhole covers and frames shall comply with the relevant requirements of BS 1247 and have a minimum clear opening of 600mm.

4. Manhole step irons shall comply with the relevant requirements of BS 1247.

5. Road gullies shall be either precast concrete to BS 5911 Part 2 or gullies to BS 65/BSEN 295. Road gully gratings and frames shall comply with the relevant requirements of BS EN124

710 CLEANSING OF PIPELINES

1. On completion of construction, and before any sterilisation, internal surfaces of pipelines shall be cleaned thoroughly in such a way as to remove all oil, grit and other deleterious matter.

711 TESTING OF PIPELINES

1. The Contractor shall notify the Engineer at least one clear working day beforehand of his intention to test a section of pipeline.

2. Gravity pipelines laid in open cut shall be tested after they are jointed and before any concreting or backfilling is commenced, other than such as may be necessary for structural stability whilst under test.

3. The pipelines shall be tested by means of an air or water test in lengths determined by the course of construction, in accordance with a programme approved by the Engineer.

4. A further test shall be carried out after the backfilling is complete.

Water Test

5. The test pressure for gravity pipelines shall be not less than 1.2m head of water above the pipe soffit at the highest point and not greater than 6m head at the lowest point of the section. Steeply graded pipelines shall be tested in stages in cases where the maximum head, as stated above, would be exceeded if the whole section were tested in one length.

6. The pipeline shall be filled with water and a minimum period of two hours shall be allowed for absorption, after which water shall be added from a measuring vessel at intervals of 10 minutes and the quantity required to maintain the original water level noted. Unless otherwise specified, the length of pipeline shall be accepted if the quantity of water added over a 30 minute period is less than 0.5 litre per linear metre per metre of nominal bore.

7. Notwithstanding the satisfactory completion of the above test, if there is any discernible leakage of water from any pipe or joint, the pipe shall be replaced and/or the joint re-made, as appropriate, and the test repeated until leakage is stopped.

Air Test

8. Gravity pipelines to be air tested shall have air pumped in by suitable means until a pressure of 100mm head of water is indicated in a U-tube connected to the system. The pipeline shall be accepted if the air pressure remains above 75mm head of water after a period of five minutes without further pumping, following a period for requisite stabilisation. Failure to pass the test shall not preclude acceptance of the pipeline if a successful water test, ordered by the Engineer, can subsequently be carried out.

712 INFILTRATION

1. Pipelines and manholes shall be tested for infiltration after backfilling. All inlets to the system shall be effectively closed and any residual flow shall be deemed to be infiltration.

2. The pipeline, including manholes, shall be accepted as satisfactory if the infiltration, including infiltration into manholes, in 30 minutes does not exceed 0.5 litre per linear metre per metre of nominal bore.

3. Notwithstanding the satisfactory completion of the above test, if there is any discernible flow of water entering the pipeline at a point which can be located visually, the Contractor shall take such measures as are necessary to stop such infiltration.

713 FRENCH DRAINS

1. Pipes shall comply with the following:-

   i) Clay Pipes
      a) Unperforated clayware field land drains to BS 1196
      b) Perforated clay pipes with flexible sleeve couplings conforming to the strength and manufacturing requirements of BS 65.

   ii) Concrete Pipes
      a) Porous concrete pipes to BS 1194
      b) Perforated concrete pipes conforming to the strength and manufacturing requirements of BS 5911 Part 1

   iii) Plastic Pipes
      a) Perforated or slotted to BS 3506 or BS 4660
      b) Light duty subsoil drains conforming to BS 4962

2. Slots shall be no wider than 4mm nor less than 0.6mm and perforations not greater than 10mm nor less than 3mm diameter.

3. Backfill shall consist of Type B filter material consisting of crushed limestone having a grading with the following limits:-

BS Sieve Size	% By Weight Passing
63mm	100
37.5mm	85-100
20mm	0-20
10mm	0-5

   The pipes shall be sized in accordance with general pipelaying requirements. The fill shall be deposited in layers not exceeding 225mm and lightly compacted.

714 ABANDONMENT OF MANHOLES, GULLIES AND OTHER DRAINAGE STRUCTURES

1. Gullies shall be broken out and disposed of off site. Unless stated elsewhere metal castings shall become the property of the Contractor and be disposed of off site. The void shall be filled and compacted with the material stated in the Bill of Quantities. The outlet pipework shall be sealed with a plug of GEN 3 mix designation concrete 450mm long.

2. Manholes and other drainage structures shall be broken out to a depth of 1m below the original surface or 0.5m below the final surface in areas where works other than the abandonment are proposed. Spoil shall be disposed of off site. Unless stated elsewhere metal castings shall become the property of the Contractor and be disposed of off site. The void shall be filled and compacted with the material stated in the Bill of Quantities. The inlet and outlet pipework shall be sealed with a plug of GEN 3 mix designation concrete 450mm long.

715 CEMENT GROUT

Grout for filling voids, or derelict sewers etc. shall have an initial composition of 1 part cement to 9 parts Pulverised Fuel Ash (PFA). The PFA shall be obtained from an approved source and shall comply in all respects with BS 3892. Sufficient water shall be added to the dry grout mix to render it of a workable consistency and slump nature for the grouting to be undertaken.

Pulverised Fuel Ash Grout shall not be used on the work until the Contractor has made a trial mix and a sufficient number of test cubes to prove to the Engineer that the mix is satisfactory.

716 MANHOLE SAFETY CHAIN

Manhole safety chain, hooks and eyes, shall be manufactured from stainless steel type EN 58J softened and descaled and complying in all respects with BS 970.

The chain shall be 8mm diameter short link type with welded links and shall comply with the requirement of BS 590.

The length shall be as detailed with one end securely fastened to a 9.5mm diameter fishtailed hook.

717 LAMINATED FILTER DRAIN

1. Laminated filter drains shall consist of a structured plastic core sandwiched between two layers of permeable geotextile having a pore size 0 of 0.11mm.

2. If the filter drain is also to be used as a cut off, one layer of the geotextile may be replaced with a waterproof polyethylene film. The polyethylene film shall be placed on the side of the trench indicated by the Engineer.

3. The filter drain shall have a water permeability of not less than 35 litres/square metre/second under a 100mm head.

4. The drain shall be installed vertically against the trench wall and, where indicated, shall be slotted into a plastic pipe to act as a collector drain or placed in close contact with a perforated plastic pipe wrapped in a geotextile of similar nature to that in the filter drain.

5. The collector drain and the lower portion of the filter drain shall be placed in Type A10 bedding material. The remainder of the trench shall be filled with Type B material or filter media as indicated.

6. Where it is necessary to join lengths of laminated filter drain the core shall be butt jointed and the geotextile or polyethylene film shall overlap the joint by at least 100mm and be firmly taped.

SECTION 800 – Not used

SECTION 900 - TIMBER

1. All timber shall be seasoned to provide a moisture content of 20% or less of the dry weight on delivery to site.

2. All hardwood shall be either mahogany or meranti and be marked to BS 4987: 1973. Longitudinal beams shall be of SS grade and decking shall be of MSS grade.

3. All screws and nails used for jointing timber shall be hot dipped galvanised in accordance with BS 729.

4. The spacing of screws and nails shall comply with the requirements of CP 112.

5. All screws used for jointing timber shall be countersunk head wood screws drilled into pre-drilled holes not greater than 0.9 times the diameter of the screw thread adjacent to the shank.

6. All timber shall be painted on completion with two coats of Cuprinol Preservative Wood Stain, or similar approved and one coat of Cuprinol Exterior Varnish or similar approved in accordance with the manufacture's instruction

SECTION 1000 Piling Not used

SECTION 1100 - ROADS AND PAVINGS

1101 HORIZONTAL ALIGNMENTS AND SURFACE LEVELS OF PAVEMENT COURSES

1. Surface Levels of Pavement Courses

All materials shall be laid to the levels, falls and contours shown on the Contract Drawings or as directed.

The levels of pavement courses and formation shall be determined from the true pavement surface, which shall be the surface of the wearing course for flexible pavements or of the slab for concrete pavements. The vertical depth below the true pavement surface or any point on the constructed surface of the formation of intermediate courses shall be within the following tolerances:-

Formation + 0 - 50 millimetres

Sub-base ± 20 millimetres

Road base ± 12 millimetres

Basecourse ± 6 millimetres

2. The surface level of the laid wearing course or concrete slab shall not deviate vertically at any point from the true pavement surface by more than ± 6 millimetres. However, for flexible pavements the adjacent tolerances shall not be applied so as to reduce the thickness of the wearing course by more than 6 millimetres.

3. The laid roadway pavement surface and the basecourse surface shall be tested with a 3 metre straight edge parallel to the centre line of the road and shall have no greater depression under the straight edge than 3 millimetres and 6 millimetres respectively.

4. Rectification

Where any tolerance is exceeded, the Contractor shall rectify the defective surface in the following manner:-

i) Formation level

If the surface is too high, it shall be trimmed and re-compacted in accordance with Clause 1102. If the surface is too low, the deficiency shall be corrected by the addition of sub-base material.

ii) Roadbases and sub-bases

The top 75 millimetres of the defective area shall be scarified, re-shaped , with added material as necessary and re-compacted all in accordance with the relevant specification clause.

iii) Binder and Surface courses

These shall have level or tolerance measurements made while the material is still warm and rectification, where necessary, carried out immediately. Otherwise the Engineer may require the full depth of the layer removed over the defective area and replaced with fresh material laid and compacted in accordance with the relevant specification clause.

The Engineer may reject all or any materials, the temperatures of which do not fall within the specified limits when measured with equipment approved by him.

Laying of Materials

5. Bituminous macadam materials shall not be laid in running or standing water, and only on damp or wet surfaces with the consent of the Engineer and after the use of an approved emulsion on the surface on which materials is to be laid.

6. The Contractor shall comply with Clause 1105 with regard to cold weather working.

7. Wherever practicable bituminous macadam shall be spread, levelled and tamped by approved self-propelled pavers. The mixed materials shall be delivered with minimum delay to the paver and in such quantities as to permit its continuous operation and it shall be so operated.

8. The rate of travel of the paver and its method of operation shall be adjusted to ensure an even uniform flow of material across the full laying width, freedom from dragging or tearing of the material and minimum segregation.

9. The materials shall be laid generally in conformity with the recommendations for laying in the British Standard to which it has been made subject also to the following additional overriding requirements.

10. Hand-laying of any bituminous material will be permitted only in the following circumstances with the prior approval of the Engineer:

    i) for laying regulating courses of irregular shape and varying thickness.

    ii) in confined spaces where it is impracticable for a paver to operate.

    iii) for footways or

    iv) where directed in the contract.

11 Hand raking of wearing course material which has been laid by a paver and the addition of such materials by hand spreading to the paved area for adjustment of level will be permitted only in the following circumstances:

    i) at the edges of the layers of materials and at gullies and manholes
    ii) where otherwise directed.

12 Hand laid work shall conform to all the specification requirements of this Clause except those relating to the manner of operating pavers.

13 When laying wearing course, the Contractor shall so organise his work that as far as possible there are no longitudinal joints left at the end of any days work. Where joints between laying widths or transverse joints have to be made, the material shall be fully compacted and the joint made flush by cutting back the exposed joints to a vertical face of not less than the specified thickness, discarding all loosened material and coating the vertical face completely with a grade of hot bitumen suitable for the purpose before the next width is laid.

14 All joints shall be offset at least 300mm from parallel joints in the layer beneath.

Compaction

15 Material shall be compacted as soon as rolling can be effected without causing undue displacement of the mixed material and while this has at least the minimum rolling temperature set down in Clause 1104.

16 Roads and car parking areas shall be uniformly compacted by an 8-10 tonnes smooth steel wheeled roller having a width of roll not less than 450mm. The material shall be rolled in a longitudinal directed from the sides to the centre of the roadway, overlapping on successive passes by at least half the width of the rear roll.

17 Pedestrian areas shall be uniformly compacted by a 0.30 tonnes vibrating roller.

Chippings

18 All chippings shall be applied uniformly to the surface and be rolled into the wearing course in such a manner that they are effectively held and provide any specified texture depth.

Uncovered Basecourse

19 Carriageway basecourse material shall not remain uncovered by either the wearing course or surface treatment whichever is specified in the Contract for more than three consecutive days after being laid. Consent may be given for the extension of this period by the minimum amount of time necessary if compliance therewith is impracticable because of weather conditions or for any other reasons such as waiting for the results of tests made.

Any depressions or hollows shall be filled up to the required levels with material of the subsequent course of layer.

Tack Coats

21 The tack coat shall consist of bitumen emulsion Class A1-40 or K1-40 to BS434, applied uniformly without pooling, preferably by a pressure sprayer, at a rate of 0.5 litres per square metre or as directed. The surface shall be cleaned off immediately before the application of tack coat.

22 The Contractor shall obtain the Engineer's permission before proceeding with the laying of tack coat, basecourse and wearing course to each section of road. This permission will only be given when in the Engineer's opinion progress on site is sufficiently advanced.

1102 PREPARATION AND SURFACE TREATMENT OF FORMATION (PREPARATION OF SURFACES)

General

1 Preparation and surface treatment of the formation shall be carried out:

a) immediately prior to the laying of the sub base
b) only after the installation of sub-grade drainage, sewers and pipelines
c) except where otherwise stated in the Contract, only after the installation of undertakers mains, services or ductwork.

The sequence of operations shall be as follows:-

i) all major depressions and any difference between the new formation level (i.e. after site strip) shall be brought up to the required level in hardcore as specified to the requirements of Clause 508.

ii) All soft areas shall be removed and reinstated as directed by the Engineer.

iii) All surfaces shall be well cleaned and reinstatement free from slurry.

iv) Treat the whole of the surface with sodium chlorate weedkiller in accordance with manufacturers instructions.

v) The surface shall be compacted as follows:-

a) Roads and Car Parking areas - at least four passes of a self propelled smooth steel wheeled rollers of 8-10 tonnes or equivalent.

b) Pedestrian areas - at least four passes of 0.30 tonnes vibrating roller or equivalent.

vi) The formation shall be checked, regulated in accordance with Clause 1101 and re-compacted as above

The completed formation shall be immediately covered with the sub-base.

1103 SUB BASE

1. The sub-base shall comprise one of the following types of material:

a) Crusher run limestone shall be clean 75mm down crushed white limestone direct from the secondary crusher, with no intermediate sizes removed. For sub-base layers of 100mm or less this shall be 40mm down.

The material passing the 450 micron sieve shall have a Liquid Limit notgreater than 25% and a Plasticity Index not greater than 6 when tested in accordance with BS 1377.

b) Granular sub-base Type 1 shall comprise crushed white limestone rock complying with the following grading limits prior to compaction.

B.S SIEVE SIZE	% BY-WEIGHT-PASSING
75mm	100
37.5mm	86-100
10mm	40-70
6mm	25-45
600 MICRONS	8-22
75 MICRONS	0-10

The material passing 425 micron sieve shall have a Liquid Limit of not greater than 25% and a Plasticity Index not greater than 6% when tested in accordance with BS 1377.

Laying Sub-Base

2 Sub base Type 1 or crusher run limestone shall be spread by mechanical plant to an even depth which after compaction will produce a layer thickness not less than 100mm (not greater than 150mm). Wherever practicable it shall be tipped on to previously spread sections of crushed limestone at a suitable distance from the point of spreading so as to ensure that the whole of the stone is turned over during the process of spreading. After preliminary shaping with 4 passes of a 6-8 tonnes roller, or other approved means, each layer shall be raked in with white limestone blinding dust approved by the Engineer and the fines then vibrated into the interstices by means of a vibrating roller of 1.25 tonnes weight, or by other approved plant. Should hungry patches develop during the compaction additional white blinding dust as above shall be applied and compaction continued until no more can be taken. Once this stage is reached, all excess fines shall be removed and the layer rolled with a 6-8 tonnes roller until movement of the surface ceases and the surface is free from irregularities and loose materials.

3. Granular sub-base material Type 2 shall be spread by mechanical plant to an even depth which, after compaction, will produce a layer thickness not less than 100mm not greater than 150mm.

Compaction of each layer will be by a 6-8 tonne roller and shall be continued until the surface is well closed and free from movement under the roller. The final layer shall be compacted to a smooth and even surface with not less than 8 passes of the roller, free from irregularities and loose material.

4. Where footpaths or parking areas are not to receive bituminous surfacing white limestone binding dust approved by the Engineer shall be raked into the surface and the fines then vibrated into the interstices until a layer of the thickness indicated on the Drawings is obtained. Should hungry patches develop during the compaction additional blinding dust as above shall be applied and compaction continued until no more can be taken. Once this stage is reached, all excess fines shall be removed and the layer sprayed with water and rolled until movement of the surface ceases and the surface is free from irregularities and loose materials.

5 The above laying requirements shall applied to pedestrian areas but the approved compaction plant shall be a 0.3 tonnes vibration roller and 2.5 tonne smooth wheeled roller.

1104 TRANSPORT LAYING AND COMPACTION OF BITUMINOUS MATERIALS

1 The materials and general requirements shall comply with the relevant Clauses of BS 4987.

Notice

2 Forty eight hours shall be given to the Engineer of the Contractor’s intention to commence the laying of any bituminous material.

Transport

3 Bituminous material shall be transported in clean insulated vehicles and shall be covered over when in transit or awaiting tipping. The use of dust, collated dust, oil or water on the interior of the vehicles to facilitate the discharge of the mixed materials is permissible but the amount shall be kept to a minimum and any excess shall be removed by tipping or brushing.

Temperature of Materials

4 The temperature of the mixed materials shall be within the appropriate range appended herewith.

Type of mixture including binder type and grade	Min. temperature of mix in lorry 30min. after arrival on site	Min. temperature of mix immediately prior to rolling
Bitumen		
Close graded/dense 100s/200s	75°C	50°C
Close graded/dense 300 pen	100°C	80°C
Close graded/dense 200 pen	110°C	85°C
Close graded/dense 100 pen	120°C	95°C
Open/medium graded 50s	-	-
Open/medium graded 300 pen	60°C	40°C
Open/medium graded 200 pen	85°C	65°C
Open/medium graded 100 pen	95°C	75°C
Previous macadam 100/200 pen	110°C	85°C

1105 COLD WEATHER WORKING

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

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

3 Laying materials other than wearing course containing bitumen binders or mixtures thereof, 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 Laying of wearing courses shall cease if the temperature of the surface of the basecourse is at or falls below 5°C. Where, however, the surface is dry, unfrozen and free from ice, laying may proceed at surface temperatures at or above 4°C on a rising thermometer.

1106 USE OF SURFACES BY CONSTRUCTION TRAFFIC

1 Construction traffic used on pavements under construction shall only be that being used in the actual construction of the pavement at that time; it shall be suitable in relation to the courses it traverses so that damage is not caused to the sub-grade or the material constructed.

2 The wheels or tracks of plant moving over the various pavement courses shall be kept free from deleterious materials.

3 Bituminous base course material shall be kept clean and uncontaminated for so long as it remains uncovered by a wearing course or surface treatment. The only traffic permitted access to base course materials shall be that engaged in laying and compacting the wearing course or, where the base course is to be blinded and/or surface dressed that engaged on such surface treatment. Should the base course become contaminated the Contractor shall make good by cleaning it to the satisfaction of the Engineer and if this proves impracticable by removing the layer and replacing it.

1107 CARRIAGEWAY MARKINGS

1 The materials used shall normally be superimposed thermoplastic material conforming to BS 3262.

2 Bill items referring to Diagrams related to diagrams in the Traffic Signs Regulations and General Direction 1994. Items should also state colour, whether reflective material and reference dimensions if a choice is available.

3 Unless stated elsewhere the materials shall be machine applied.

4 The permitted tolerances stated in Chapter 5 of the Traffic Signs Manual shall apply.

5 The carriageway to be marked shall be clean and marking shall not proceed if the surface is damp or during inclement weather.

1108 SURFACE BOXES

1 Surface boxes shall include manhole covers, inspection covers and frames.

2. Cast iron and steel manhole covers and frames shall comply with BS:EN124:1994. Manhole covers in carriageways shall be Class D400 with a minimum clear opening of 600mm x 600mm, a minimum depth of frame of 150mm, a minimum weight (cover plus frame) of 135kg and the cover shall be capable of withstanding an additional test load of 400kn placed anywhere on the cover using a 300mm diameter test block.

   Manhole covers in footways and verges shall be Class B 125 with a minimum clear opening of 600mm x 600mm, a minimum depth of frame of 100mm, a minimum weight (cover plus frame of 80kg and the cover shall be capable of withstanding an additional test load of 150kn placed anywhere on the cover using a 300mm diameter test block.

   All covers shall be the solid type and separate sections of covers shall be loosely bolted together.

3. Small surface boxes shall comply with BS5834 Part 2 or 3. Fire hydrant boxes shall also conform with the loading requirement of BS5750:1984. All shall be Grade A in carriageways and Grade B in footpaths and verges. Exceptionally Grade C covers will be allowed in footways where there is no possibility of overrunning by vehicles.

4 The Contractor shall adjust all surface boxes, manhole covers, gully gratings and the like to the correct final levels before laying the final surfacing materials. Boxes of less than 0.1m^2 area shall be bedded on 112mm thick engineering brickwork and above 0.1m^2 area on 225mm thick engineering brickwork.

1109 FLAG LAYING

1 Precast concrete flags shall be hydraulically pressed and comply with BS 7263 Pt 1. Flag paving shall be laid on a full bed of semi dry mortar mix (3:1 sand to cement) or on a full bed of sand complying with BS 6717 Pt 3. The bed depth shall be as detailed in the Bills of Quantity. Care must be taken to ensure that the flag is fully supported. The five spot mortar method of laying flags will not be permitted.

2 Joints shall be of a close nature and between 2 and 4mm in width, unless otherwise specified. Joints should be filled and compacted to within 3mm of the flag surface with a semi dry 4½:1 sand:cement mix or by brushing in a concrete quality sand. The flagging shall be brushed clean after joint filling and all elements of the surface shall be non-rocking and trip free.

3 Gaps not exceeding 50mm in width between buildings and flag paving may be made up using granolithic concrete coloured to match the adjacent flags. A minimum depth of 50mm of concrete shall be placed and the surface shall be trowelled smooth and provided with a fall away from the building.

Where flags are cut to suit manholes, gullies, other surface boxes and the like granolithic concrete make up strips shall be provided in a similar manner.

4 All cuts shall be to the full depth of the flag and provide a smooth edge enabling joints as specified to be made.

1110 KERBS, CHANNELS AND EDGINGS

1 Precast concrete kerbs, channels and edgings shall be hydraulically pressed and shall comply with BS 7263 Pt 1. The concrete aggregate shall have a 10% fines value of not less than 12 tonnes. In situ concrete foundations and haunches shall be placed and compacted adequately.

2 Kerbs generally shall be half-battered 125 x 255mm Type HB2 and shall be bedded on a 13mm bed of cement mortar on a 150mm thick concrete foundation and haunched one side with 150mm thick concrete to the details shown on the drawings. For radii of 12m or less, special kerbs shall be used.

3 Channels generally shall be 255 x 125mm Type CD with a dished top surface and shall be bedded on a 13mm bed of cement mortar on a 100mm thick concrete foundation and haunched both sides with 100mm thick concrete.

4 Edgings generally shall be square topped 50 x 200mm Type EF and shall be bedded on a 250mm x 100mm thick concrete base, haunched a further 100mm deep at both sides to the detail shown on the drawing.

5 At vehicular footway crossing 125 x 150mm Type BN kerbs shall be used together with special ramped drop kerbs Type DL1 and DR1 at each side of the vehicular crossing.

6 All kerbs, channels and edgings shall be butt jointed when laying unless indication to the contrary is given elsewhere in the Contract documents.

They shall be laid and bedded in a layer of Type 1 mortar, complying with Specification Clause 1404, not less than 10mm and not more than 40mm thick, on the concrete pavement or on a concrete foundation formed from a designated concrete mix complying with the requirement of GEN 3 concrete to BS 5328. Alternatively, they may be laid and bedded directly in a GEN3 concrete foundation within half an hour of the discharge of the concrete from the mixer. After laying all precast units shall be haunched as indicated.

7 The kerbs, channels and edgings shall be properly set out with road pins and string lines and any unit deviating more than 3mm from line or level at either end shall be made good by lifting and re-laying. Fine adjustments shall be made so that a smooth flowing alignment is achieved free from sudden deviations or imperfections. Any necessary cutting shall be carried out with equipment which will give a smooth face to the unit. The minimum length of any cut unit shall be 450mm.

Timber Edgings

8 Timber for edgings and support pegs shall be Pressure Creosoted to BS 913 to Motorway Fencing Standard. Certification shall be given to the Engineer prior to the timber's incorporation into the works.

9 The edging should be fixed to give a smooth flowing alignment which generally follows the approved formation. The cut ends of units which may be required to achieve the alignment or for general fitting shall be treated with creosote brushed into the end grain. The edgings shall be fixed vertically to pegs driven into the sub-soil which should generally be on the outside of the edging. No pegs shall protrude above the top of the edging.

1111 TYING INTO EXISTING SURFACE

Where a junction between proposed and existing surfacing is indicated, the Contractor must break out the existing surfacing to produce a straight horizontal junction, the face of the existing surfacing must be vertical to the depth to receive the new surfacing. New surfacing will not be allowed to 'feather out' to meet the existing.

1112 CONCRETE BLOCK PAVING

1 The concrete blocks shall be hydraulically pressed to the dimensions and colour described in the contract and shall comply with BS 6717 Precast concrete paving blocks.

2 The required edge restraints (which shall be vertically edged to receive the full depth of construction) shall be provided in advance of the laying of paving blocks. The perimeter of the work and all surface obstructions shall receive a single course of blocks laid longitudinally to form a margin. Blocks shall be cut to fit, into the pattern where the pattern meets the linear course, with a hydraulic splitter. In exceptional circumstances small gaps left at the edges of block paving, including against obstructions with a paved area, shall be filled to the full depth of the paving block with a sand:cement mortar, not leaner than 4:1, compacted in.

3 Any irregularities in the sub-base surface are to be made good before the sand laying course is laid. The sand shall be struck off to such a level that, when blocks have been vibrated, the upper face of the blocks shall be true to the finished level as shown on the drawings. Before the blocks are laid, the laying course shall not be subjected to any form of trafficking including pedestrian trafficking, before, after, or during screeding.

4 The surface course shall be subject to passes of a vibrating plate compactor which shall have a centrifugal force of approximately 16-20kN and a frequency of approximately 75-100Hz and a plate area between 0.35 and 0.5m^2. Sufficient passes shall be made to compact the laying course and produce an even surface.

5. Vibration shall not be carried out within one metre of an unrestrained edge.

6. After initial vibration, sand shall be brushed into joints and further passes of the vibrating plate compactor made to fill the joints, more sand being spread over the surface if required.

7. The formation and sub-base shall not deviate from true level by more that + 10mm and the finished wearing surfacing level shall not deviate vertically at any point from the true pavement surface by more than ± 10mm. Immediately adjacent to gullies and manholes the tolerance shall be + 30mm, - 0mm.

8. The maximum deformation within the completed surface, measured by a 3m straight edge placed parallel to the centre line of the road, should not exceed 10mm except in parts of the carriageway where vertical curves necessitate a greater deviation. The levels of two adjacent blocks shall not differ by more than 2mm.

1113 SETT PAVING

1. Second hand setts shall be selected, rejecting all excessively weathered, worn or chipped or stained units. Setts should be free from all bedding and jointing materials.

2. The setts shall be laid to falls, cambers or with courses stepped to take up differences in level and to bonding patterns as required.

3. Concrete beds shall be laid semi dry and shall be well rammed prior to the laying of the setts which shall then be firmly bedded into the concrete.

4. Joints shall be filled with cement mortar, well rammed and finished with a recessed joint.

5. On completion, all cement marks shall be removed from the surface of the paving.

1114 BOLLARDS

1. Bollards shall be produced to BS EN IS0.9002 standard.

2. Bollards shall be set to a minimum depth of 400mm below proposed ground level and set on and surrounded by 150mm thick GEN 1 mix designation concrete or to manufacturers instruction.

1115 SURFACE DRESSING

Chippings

1. Chippings shall consist of 6mm size Ingleton Green Granite.

Cleanliness

2. The Contractor shall ensure that the surface is free from caked mud, leaves, general detritus etc., prior to applying the surface dressing.

Binder

3. The binder is to be applied at an even rate over the carriageway at the rate of spread specified by the Engineer. It is to be spread by an approved pressure acted spray nozzle mounted on a vehicle, all to conform to BS 1707. The rate of spread is to be agreed with the Engineer.

The material shall be a polymer modified bitumen emulsion to BS 434 for hot application and shall only be applied when the air temperature is above +10°C and the road surface temperature is between +10°C and + 15°C.

The viscosity of the compound shall be a minimum 25 secs at 58 degrees centigrade. The temperature application shall be 170-185 degrees Fahrenheit (80-85 degrees centigrade).

The Contractor is to state in his tender the compound he intends to use.

The Contractor shall, each day, submit to the Engineer all delivery tickets for the amount of binder used, or as otherwise directed.

4. Application of chippings

Immediately after spraying the bitumen emulsion shall be covered with a layer of approved, clean, uncoated chippings of the variety required and shall be rolled with a rubber tyre roller weighting 5-8 tonnes, rolling being continued until a uniform, compact surface has been obtained. The surface is not to be trafficked for a minimum of 24 hours at which time the surface should have acquired its preliminary set.

The rate of spread should be: 6mm chippings - 150/160 sq.m per tonne

The price for this work entered into the Schedule of Rates shall include for initial sweeping of the adjacent car park/highway, and for further sweeping, as required, by the Engineer during the progresses of the contract and within 21 days of the completion of the surface dressing works.

5. Samples

Before commencing work on site, samples of the bitumen emulsion and of chippings that the Contractor proposes to use shall be submitted to the Engineer together with the manufacturer's specification, if applicable. The Contractor shall provide, if so required by the Engineer, approved light metal trays to enable "Road Tray Tests" to be carried out.

Samples for testing will be taken by the Engineer or his representative from time to time of chippings delivered and, if any samples fail to comply, the Contractor shall repay to the Council the expenses.

1116 SAND LAYING COURSES FOR BLOCK PAVIOURS

1. General

Sand laying courses shall comply with the requirements of BS.6717:Part 3.

2. Adopted Highways and other heavily trafficked areas

Sand laying courses shall comprise naturally occurring alluvial silica sands from quaternary period beds complying with the following grading table.

Sieve size	Initial % passing	%passing after ball-mill testing
600 micron	less than 60%	less than 75%
300 micron	8-35%	8-55%
150 micron	less than 10%	less than 20%
75 micron	less than 3%	less than 5%

3. Severely Channelised traffic

Sand laying courses shall comprise naturally occurring alluvial silica sands from quaternary period beds complying with the following grading table

Sieve size	Initial % passing	%passing after ball-mill testing
600 micron	less than 60%	less than 70%
300 micron	8-35%	8-50%
150 micron	less than 10%	less than 15%
75 micron	less than 0.3%	less than 1%

Testing of Materials

4. Testing of Sand Laying Course

Laying course sand shall if the Engineer deems necessary be tested in accordance with the testing regime laid out by Lilley and Dawson (1988) Laying course sand for concrete block paving. Proc. 3rd International Conference on Concrete Block Paving, Pavitalia, Rome pp 457-462.

1117 JOINT FILLING SAND FOR BLOCK PAVIOURS

1. Joint filling sand shall comprise either natural or crushed single sized silica sand, kiln dried with 55-100% passing a 600 micron BS sieve. The joint filling sand shall only be laid dry.

1118 CLAY PAVERS AND FITTINGS

1. Clay pavers shall be of the Type PA or PB in accordance with BS6677 Part 1 to the requirements of the traffic to be carried, which shall generally be stated in the contract documents.

2. Pavers shall be of the type, colour and pattern indicated and shall have chamfered or square edges.

3. All required edge restraints, which shall have a vertical face, shall be laid in advance of the laying of paving blocks. The perimeter of all work and surface obstructions shall have a single course of blocks laid longitudinally to form a margin unless clay paver fittings are indicated in the contract documents.

4. Blocks shall be cut using a saw, not by hydraulic splitter or by chisel and shall generally be discarded if less than one third of a full block size. The manufacturer will generally assist in indicating patterns and techniques to overcome the problem of small blocks.

5. Prior to laying of any blocks or irregularities on the sub base shall be made good. A sand laying course in accordance with Specification Clause 1116 shall be laid to the depth indicated by spreading until the compacted depth is approximately equal to the final depth below the surface profile. Vibration compaction equipment shall be used to consolidate this layer which should then be screeded off. A further layer should be applied and screeded off to provide loose material on which the pavers can be laid.

6. Pavers shall be laid to the pattern indicated and with joint widths of 3mm. The use of preformed spacers to ensure a consistent joint width is recommended. Some clay pavers are provided with an integral spacer.

7. Pavers shall be laid by drawing blocks from a minimum of three packs in order to ensure a good mix of block which may exhibit minor colour variation.

8. Suitable dry joint filling as supplied by the manufacturer or complying with Specification Clause 1117 shall be brushed into joints prior to bedding the surface by the use of rubber soled vibrating compaction plates.

9. No compaction shall be undertaken prior to infill around the boundaries and obstructions or within one metre of an otherwise unrestrained edge.

10. Joint filling sand should be added to the surface and vibrated into the joints until complete filling of the joints is achieved.

11. Where indicated, application of a joint sand stabiliser shall be carried out in accordance with the manufacturers instructions.

1119 TRANSPORT LAYING AND COMPACTION OF HOT ROLLED ASPHALT

1. The materials and general work requirements shall conform to BS 594 Parts 1 & 2.

Notice

2. Forty eight hours notice shall be given by the Contractor to the Engineer of the intention to lay rolled asphalt.

Transport

3. Asphalt shall be transported in insulated and sheeted vehicles in such a manner as to prevent excessive temperature drop and such that the material is protected from adverse weather conditions.

Asphalt shall be delivered to the site at a rate so as to ensure uninterrupted laying over the whole of the designated work area. The minimum delivery temperatures indicated in BS 594 Part 2 must be adhered to.

The use of a minimal amount of dust or sand to facilitate discharge will be permitted. Diesel oil, kerosene or any other substance likely to soften or to otherwise be deleterious to the asphalt shall not be used on the body of the transport vehicles.

Laying

4. Road Base material shall comply with BS 594 Table 2, column 2/5 designation 60/28 with crushed rock course aggregate to Para 2.2. Fine aggregate shall be sand to Para 2.3. Bitumen bonder shall be to Table 1 Para. 2.1. Penetration to be as indicated in the Bills of Quantity.

5. Base course material shall comply with BS 594 Table 2, column 2/3 designation 50/20 with crushed rock coarse aggregate to Para 2.2. Fine aggregate shall be sand to Para 2.3. Bitumen binder shall be to Table 1 Para 2.1. Penetration to be as indicated in the Bills of Quantity.

6. Wearing course material shall comply with BS 594 Table 6, column 6/4, designation 30/14 Schedule 1A. Crushed rock coarse aggregate excluding limestone to Para. 2.2. Fine aggregate shall be sand to Para 2.3. Bitumen binder shall be to Table 1 Para 2.1. Penetration to be as indicated in the Bills of Quantity.

Coated Chippings

7. Shall comply with the grading indicated in Table 8 of BS 594 Pt 1. They shall be Criggion Green or Harden Red chippings of the size indicated in the Bills of Quantity.

Chippings shall have a minimum PSV of 59 and a maximum AAV of 12. They shall be applied at a rate to achieve shoulder to shoulder cover as indicated in BS 594
Pt 2 and BS 598 Pt 108. Channels shall be kept free of chipping for a width of 225mm.

Sand Carpet

8. Rolled asphalt to BS 594 Table 6; column 6/1, designation 0/3; Schedule 1A. Fine aggregate to be sand to Para 2.3. Bitumen Binder to Table 1 Para 4.1, penetration grade to be agreed.

FOOTWAYS ONLY: 10mm nominal size limestone chippings to be rolled in at a rate of 1.5μ 0.5 Kg/m^2

Tack Coat

9. Where required by the Engineer a bitumen emulsion tack coat, complying with BS 434 Class K1-40 shall be applied at a uniform rate of spread of 0.3 to 0.5 litres/metre squared as directed in accordance with BS 594.1992.

Surfacing joints

10. Surfacing joints shall be formed in accordance with BS 594 Pt 2 Clause 6.6.

Compaction

11. Compaction shall be as detailed in Clause 1101 of this Specification.

SECTION 1400 BRICKWORK AND MASONRY WORK

1401 BRICKWORK

1. Bricks shall be set in mortar with all bed and vertical joints filled solid; exposed work shall be pointed as required, as the work proceeds. The moisture content of the bricks shall be adjusted so that excessive suction is not exerted on the mortar. All brickwork shall comply with CP121 part 1.

2. Brick courses shall joint correctly with the bricks underneath. The courses shall be laid parallel with joints of uniform thickness and shall be kept straight or regularly curved as required and all perpends shall be truly plumb. No four courses including four joints shall rise more than 40mm above such four courses laid dry, and vertical joints shall have a uniform thickness of 10mm. Bricks forming reveals and internal and external angles shall be selected for squareness and built plumb. Bricks with single frogs shall be laid frog upwards.

3. Brickwork shall rise uniformly; corners and other advanced work shall be racked back and not raised above the general level more than 1 metre. No bats or broken bricks shall be incorporated in the work unless essential for bond.

1402 BRICKLAYING IN COLD WEATHER

1. No bricks, blocks or stones shall be laid when the air temperature in the shade is below 3°c unless special precautions are taken which have been approved of by the Engineer. All materials when used shall be free from frost.

1403 BRICKS AND TIES

1. Clay bricks and concrete bricks shall comply with the relevant requirements of BS 3921 and BS1180 respectively. Bricks to be used for manholes and chambers shall be solid Class B Engineering bricks. The shapes and dimensions of special bricks shall comply with the relevant requirements of BS 4729.

2. Metal ties for cavity wall construction shall comply with BS 1243.

1404 MORTAR

1. Cement mortar for brickwork, blockwork and masonry shall be mixed in the proportions given in the following table according to the mortar class described in the contract.

Proportions by volume

Class	Cement:lime:sand	Masonry cement:sand	Cement:sand with plasticiser
1	1 :0 :3		
2	1 :1½:4to4½	1 :2½ to 3½	1 :3to4
3	1 :1 :5to6	1 :4½	1 :5:6

2. The chloride ion content of the mortar determined in accordance with BS.812 shall not exceed 0.3% of the mass of cement for mortar made with Ordinary Portland Cement and 0.2% for mortar made with sulphate resisting Portland Cement. Calcium chloride or admixtures containing calcium chloride shall not be used.

3. For work in which cement mortars of Class 2 or 3 are required, the Contractor shall select the appropriate mortar from one of the mixes given in the table. If the work is to be carried out in frosty weather and the bricks are wet when laid, then a cement sand mortar with an air entraining plasticiser shall be used. The plasticiser shall not contain calcium chloride, and shall comply with BS 4887.

4. The proportions of lime given in the table are for lime putty complying with BS89. If the lime is measured as the dry hydrate, the amount may be increased up to 1.5 volumes for each volume of lime putty. Where a range of sand content is given the higher shall be used for sand that is well graded and the lower for coarse or uniformly fine sand.

5. Mortar shall be mixed thoroughly either by hand or mechanically until its colour and consistency are uniform. The constituent materials shall be accurately gauged, allowance being made for bulking of sand. Mortar shall be made in small quantities only as and when required. Mortar which has begun to set or which has been mixed for a period of more than one hour in the case of a Class 1 mortar or more than two hours in the case of other classes, shall be discarded.

1405 STONEWORK

General

1. Except where otherwise described in the Contract, the length of any stone shall not exceed three times its height. The breadth on the bed shall not less than 150mm, nor greater than three-quarters of the thickness of the wall.

2. All stratified stone possessing bedding planes shall be laid with its natural bed as nearly as possible at right angles to the direction of load. In the case of arch rings, the natural bed shall be radial.

3. Facework quoins shall be built to a height not exceeding 900mm in advance of the main body of the work and adjacent walling stepped down on either side.

4. Stone facework between the quoins shall then be built to a height not exceeding 450mm above the backing which shall then be brought up level with the completed facework. At no time shall the backing be built up higher than the facework.

5. Except for dry rubble walling, all joins shall be sufficiently thick to prevent stone-to-stone contact and shall be completely filled with mortar.

Ashlar

6. All stones shall be dressed to accurate planes on the beds and joints, and they shall be fair and neatly or fine tooled on the face as described in the Contract.

Block-in-course

7. Beds and joints shall be squared and dressed for a distance of at least 25mm from the exposed face. Bond stones shall form not less than one sixth of the area of the exposed face and shall extend at least 900mm into the wall or for the full thickness of the wall if the latter is less than 900mm. Unless described in the Contract as tooled or worked, the exposed face of all stone shall be blocked and left rough. Arrises shall be dressed square at all beds and joints.

Squared Random Rubble Coursed and Uncoursed.

8. All stones shall be truly squared and dressed on the beds and joints for a distance of at least 125mm from the exposed face. Bond stones shall be provided at the rate of not less than one to every square metre of exposed face, and shall measure not less than 150mm x 150mm on the face, and not less than 450mm or the full thickness of the wall if the latter is less than 450mm. Sneck stones shall be not less than 75mm in any dimension. Vertical joints shall not include more than three consecutive stones, and the horizontal lapping of the stones shall be not less than 100mm.

Random Rubble Coursed and Uncoursed

9. All stones shall be carefully set with a bond stone provided at the rate of not less than one to every square metre of exposed face. Bond stones shall measure not less than 150mm x 150mm on the exposed face, and not less than 450mm in length or the full thickness of the wall if the latter is less than 450mm unless otherwise described in the Contract. For coursed work the joints shall be levelled as described in the Contract and the backing flushed up in mortar.

Dry Rubble

10. Dry rubble stonework shall be constructed generally to the requirements of uncoursed random rubble stonework, as specified in Clause 1405.9 but without mortar. All stones shall be carefully shaped to obtain a close fit at all beds and joints, any interstices between the stones being filled with selected stone chippings or spalls. The exposed tops or copings of dry rubble walls shall be formed as described in the Contract.

Special Stonework including Quoins, Copings, Plinths, Voussoirs, etc.

11. Special stonework shall consist of selected and approved stones dressed to the shapes and dimensions and where required, their faces worked, all as described in the Contract.

1406 PROTECTION OF NEW WORK

1. Immediately after laying and for 3 days thereafter, brickwork, blockwork and stonework shall be protected against the harmful effects of weather. The upper surface of newly laid brickwork, blockwork and stonework shall be protected against rain as the work proceeds until such time as the work is completed and the upper damp course, coping or other finishing feature is laid.

2. All visible brickwork, blockwork and stonework and any surface below such work which is visible at the completion of the Works shall be clean and free from damage and spillage. All purpose made open joints shall be free from debris of any description.

1407 - 1409 not used

1410 BRICKWORK AND MASONRY CLEANING

General

1. The Contractor shall carry out his operations in such a manner that full protection is afforded to both the general public and persons carrying out the cleaning operation and in accordance with BS 6270 Part 1.

2. All doors, windows and other openings within the work area must be adequately sealed in advance of the cleaning operations so as to prevent the ingress of dust or grit. Sealing shall be carried out by taping polythene sheeting across the opening and, where necessary, using rigid boarding. All signs etc., shall be removed from the surface to be cleaned and any electrical supply disconnected. Full protection shall be given to all pipes, cables and adjacent paintwork.

3. The Contractors shall take all necessary measures to avoid the blockage of gullies and channels.

4. The Contractor’s attention is drawn to Clause 107 of this Specification - Control of Noise.

Scaffolding

5. Every elevation of the building to be cleaned shall be completely and independently scaffolded. The scaffold shall be in accordance with the provisions of BS 5973. All erection shall be carried out by competent persons. The use of mobile tower scaffolds will not normally be approved of by the Engineer.

6. The scaffold shall be close sheeted in accordance with Clause 36.4 of BS 5973 before any cleaning is commenced.

7. Where the scaffold or other Works are situated on the highway, a scaffold permit must be obtained from the Director of Technical Services and the Contractor shall comply with the requirements of the permit.

Cleaning

8. Air abrasive cleaning by wet or dry methods and high pressure water lance cleaning are considered suitable methods. The use of chemicals must be approved by the Engineer before work commences.

PROHIBITION OF USE OF SILICACEOUS GRIT

9. The use of siliceous grit in air abrasive cleaning is prohibited. The grade and type of abrasive shall be compatible with the surface to be cleaned.

10. Any stone of a ferruginous nature which exhibits staining during wet air abrasion cleaning shall be suitably treated so as to render the iron content passive. Staining due to other metals may be chemically removed.

11. Where cleaning is carried out by high pressure water lance the use of straight tip (pencil point) nozzles is prohibited.

12. The cleaned surface shall be cleared of all dust, slurry or other debris and the approval of the Engineer as to the standard of cleaning shall be obtained.

13. Subject to the carrying out of any pointing work, the cleaned surface shall be treated with two coats of an approved water repellent selected in accordance with BS 3826.

14. When the scaffold is dismantled, any dust, slurry, abrasive material or other debris in the area adjacent to the treated surface shall be removed.

1411 SPECIAL REQUIREMENTS REGARDING CHEMICAL CLEANING

1. The use of chemical cleaners will only be allowed where the Engineer specifically requires its use.

2. The acid cleaner used shall be a proprietary mix of hydrofluoric acid and orthophosphic acid and must possess a current British Boards of Agreement Certificate. Generally, these mixes will require dilution with equal parts of water for use with Brick and Terracotta.

3. The building shall be treated in sections, each section being thoroughly wetted with water prior to application of the acid to ensure the acid acts only on the
surface and is not drawn deeper into the material. The acid shall be brushed on systematically taking care to avoid runs. After an agreed time, which shall be determined by the Engineer's representative, the acid shall be rinsed off thoroughly using a low volume high pressure waterlance. If there are any runs they shall be rinsed off at the same time. The treated surface shall not be allowed to dry prior to rinsing. The treatment shall be repeated once or twice in local areas if the first application fails to remove all the dirt. The use of neutralising agents will not be permitted and the Contractor shall rely on the correct use of the acid and rinsing water to prevent bloom occurring.

4. The Contractor's shall provide barriers to exclude the public and erect adequate warning notices. It will be a specified requirement that the Contractor independently scaffolds and close sheets each elevation to be cleaned.

5. The Contractor shall ensure that his personnel wear, shields which fully protect the face and throat, and full protective clothing shall be acid and waterproof.

6. A First Aid box shall be kept on site which shall contain recommended materials and copies of BRE Technical Information Leaflet 44.

7. The Contractor must safeguard parts of the building which are not to be cleaned with particular attention being given to drainage routes and rainwater goods and glassware, bearing in mind Hydrofluoric Acid's ability to etch glass. Masking shall be carried out with peelable plastics or polythene sheet and masking tape, polythene or polypropylene sheeting should be used to drain away rinsing water. Scaffold poles shall be capped. After work on each section has finished, the insides and outsides of scaffold poles and all scaffolding boards and fixings should be rinsed with water.

SECTION 1501 - PAINTING

1501 PAINTING MASONRY

1. All work shall be carried out in accordion with BS 6150 Painting of Buildings

2. Materials

   Paints and primers shall be as indicated in the systems drawings or Bill of Quantities. They shall be applied in accordance with the manufacturers instructions.

   Stoppers and fillers shall consist of cement mortar. Toxic wash shall be as indicated in the systems drawings or Bills of Quantities.

3. Preparation

   The whole of the area to be painted shall be cleaned by brushing with a stiff fibre brush to remove effluourence and loose material. Organic growths shall be treated with the required toxic wash followed by the removal of all organic material. All surrounding areas and surfaces shall be protected against paint spills and splashes. Stopping and filling of open joints, cracks, local depressions and defective pointing shall be carried out in cement mortar or for minor defects exterior grade water mixed filler can be used allowing sufficient time for adequate drying prior to application of paint.

4. Priming

   A priming coat is required where oil based paint systems are to be used. Where required a thick coat of alkali resisting primer should be used below an emulsion paint system. The primer must not be allowed to form a glossy surface.

5. Finishing

   The finishing coats shall be applied by approved methods in the materials required.

1502 - PAINTING WOODWORK

1. All work shall be carried out in accordance with BS 6150 Painting of Buildings.

2. Paints and primers shall be as indicated in the systems drawings or Bill of quantities. They shall be applied in accordance with the manufacturers instructions. Aluminium primer shall conform to BS 4756. Stoppers and fillers shall be oil based and lead free. Knotting shall conform to BS 1336 Mastics and Sealants. Proprietary one pack, non elastomeric types shall be used.

3. Painting shall not start or proceed if the ambient temperature fall below 4C or the relative humidity exceeds 80%. Application shall not proceed when there is a visible film or surface moisture on the surface. Application must cease when it is apparent that insufficient drying time is available prior to the onset of night frost or condensation. The moisture content of the woodwork shall not exceed 18%.

4. Preparation

Dirt and surface deposits exuding resin and soluble salts shall be removed and existing paintwork shall be removed and existing paintwork shall be cleaned by washing down with sugar soap rinsed and allowed to dry. All existing paintwork that has poor adhesion, flaking, peeling, blistering, cracking, crazing, chalking or powdering shall be removed by burning off or in particular circumstances by the use of paint removers. During burning off all flammable materials shall be removed from the working area. Means of extinguishing fire shall be readily available. The burning off shall proceed with extreme care in order that scorching and smouldering of the work and its surrounding and thermal shock to glass is prevented.

Abrasion

All cleaned surfaces and areas where paint has been removed shall be primed with the specified priming paint.

Stopping and filling

Stopping of nail and screw holes, open joints, cracks and local cavities shall be carried out in oil based stoppers after priming. Filling by smoothing and levelling of shallow depressions and rough open textured areas of coarse grained surfaces shall be carried out in oil based fillers. Stopping and filling shall include the repair or removal of defective glazing putties. Exposed rebates shall be primed before reputtying.

Bringing forward

Where defective paint has been removed in a localised area a uniform surface shall be brought forward prior to application of finishing coats. Treatment shall consist of priming, stopping and filling and the application of sufficient coats to restore the original film thickness.

Knotting

All knots shall be treated with two coats of knotting or aluminium primer.

5. Finishing

The finishing system shall be as indicated in the systems drawing or Bill of Quantities. Light abrasion with fine grade abrasive paper and dusting off shall be provided prior to the application of each coat. 24 hours should elapse between each application. The gloss shall be applied in a full coat and evenly spread working out most of it with the brush then it shall be crossed and laid off avoiding runs and sags in order to eliminate brush marks.

1503 - PAINTING METALWORK (SITE APPLICATION)

1. All work shall be carried out in accordance with BS 6150 Painting of Buildings and BS 5493 Code of Practice for Protection of iron and steel structure against corrosion.

2 Materials

Paints shall be as indicated in the systems drawings or Bill of Quantities. They shall be applied in accordance with the manufacturers instructions. Primers to ferrous metals shall be red lead metal primer to BS 2523. Primers to galvanised metals shall be calcium plumbate primer to BS 3698.

3. Preparation

All surfaces shall be dry at the time of painting. New metalwork should normally be delivered to site surface prepared and primed. Iron and steel delivered to site without such treatment shall be blast cleaned in accordance with BS 4232 in order to remove all mill scale and rust and then primed as soon as possible. All off site primed metalwork shall be inspected after erection and areas of damaged or defective primer shall be scraped and wire brushed down to bare metal and reprimed.

All existing metalwork shall be cleaned manually using wire brushes, chipping hammers, chisels, scrapers or vibrator needle guns in order to remove all areas of rust. These areas shall be primed as soon as possible.

All new metalwork, galvanised metalwork and existing metalwork shall be degreased on site using white spirit and a succession of clean swabs, taking care to avoid spreading oil and grease over the surface.

4. Priming

It is essential that priming follows preparation within the same working day. Primed surfaces shall be overcoated as soon as possible. Oil grease and surface deposits shall be removed from the primed surface as indicted in the preparation section above.

5. Finishing

The finishing system shall be as indicated in the systems drawing or Bill of Quantities. Light abrasion with fine grade abrasive paper and dusting off shall be provided prior to the application of each coat, 24 hours should elapse between each application. The gloss shall be applied in a full coat and evenly spread working out most of it with the brush then it shall be crossed and laid off avoiding runs and sags in order to eliminate brush marks.

1504 - PAINTING PLASTICS

1. Preparation

   Painting of uPVC, new or weathered shall be by washing with warm detergent solution, rinsing with clean water and drying.

2. Finishing

   (i) Alkyd Gloss 2 coat application as for woodwork
   (ii) Masonry paint, emulsion type masonry paints may be applied as to masonry.

1505 - PAINTING CEMENT BASED SHEETS AND UNITS

1. Preparation

   Surfaces shall be brushed down with stiff (not wire) brushes to remove loose material. With materials containing asbestos precautions shall be taken to avoid the inhalation of dust. Organic growth shall be dealt with as Clause 1501 using the toxic wash.

2. Priming

   As Clause 1501

3. Finishing

   The finishing coats shall be applied by approved methods in the materials indicated.**SECTION 1600 - WATERPROOFING**

1601 EXTERNAL RENDERING

1. The materials used for external rendering shall respectively comply with BS 12 for cement, BS 890 for lime, BS 1199 for sand BS 4887 for admixtures and plasticisers and the manufacturers instructions for waterproofers. Sharp sand is generally suitable but building sand is not acceptable.

2. The work shall be carried out in accordance with BS 5262 External Render Finishes.

3. The background surface to be rendered shall be cleaned of all residual mould, oil, dust and loose particles, brickwork joints shall be raked out. Existing render plaster or other features proud of the general surface shall be hacked off and removed. The whole of the surface to be rendered including particularly areas showing any organic growth shall be treated with an approved fungicidal wash prior to rendering Where dubbing out is necessary to make up shallow areas it shall be carried out well in advance of the undercoat using a mix at least as strong as the undercoat. Layers shall have a maximum thickness of 13mm. The render shall not extend below damp proof courses or in the absence of a DPC the render shall terminate 150mm above the ground level and shall be finished off squarely to form a drip. Wetting of the background shall be carried out as necessary to control suction.

4. The render shall generally be a two coat render of type III mix to BS 5262 undercoat 8-16mm thick final coat 8-10mm thick.**SECTION 1700**

MISCELLANEOUS WORKS

1701 CHESTNUT PALE FENCING

1. The fence shall conform in all respects with BS 1711 Part 4.

2. All timber shall be of sweet chestnut and shall be round or cleft as specified. The timber shall be free from all insect active attack or rot and cleared of all bark.

3. Pales shall be reasonably straight and of good substance and with a girth of not less than 100mm measured at any point. The section shall be roughly triangular or half round and a consignment may contain either or both of these sections. The length of pales may be permitted to deviate by ± 15mm.

Timber Posts

4. For fences which are to be erected on timber posts the pales shall be set at 75mm spacing and for fences which are to be erected on concrete posts the pales shall be set at 50mm spacing. The pales shall be held onto four inter-twined galvanised steel wires of 2mm diameter mild steel set 150mm from the top and from the bottom of the pales. Where as required by Part 4 of BS 1722 a third wire is required, this shall be set midway between the other two wires. The pales shall be attached to each wire by galvanised staples not less than 19mm x 1.626mm dia and not greater than 19mm x 2.0mm dia.

5. Timber straining posts for fences up to 1.35m in height shall have a girth of 230-250mm and shall be set into the ground 600mm for fences over 1.35m in height, the girth shall be of 250-290mm and the posts shall be set into the ground 750mm. They shall be pointed at the thicker or butt end for a distance of 225mm for driving and shall be notched to receive the struts. Where holes are excavated for posts and are to be filled with concrete they shall be not less than 300mm x 300mm or when formed with an auger 300mm dia. Holes for posts to be refilled with earth shall be as small as practicable to allow for refilling and ramming. Posts shall be natural round not cleft.

6. Timber struts shall be natural round or cleft and shall splay out to the top ends for spiking to the straining posts within the top third of the straining post above ground level using one 100mm galvanised steel wire nail. The girth of the strut shall be equal to that of the straining post. The bottom end of the strut shall be not less than 450mm below ground level. When the hole is to be filled with concrete the hole shall be not less than 300mm wide x 450mm long. Holes for posts to be refilled with earth shall be as small as practicable to allow for refilling and ramming.

7. Timber intermediate posts shall be natural round or cleft and shall have a girth of 190-230mm and shall be set into the ground 600mm for fences up to 1.35m in height, the girth shall be of 250-290mm and the posts shall be set into the ground 750mm for fences over 1.35m in height. Where holes are excavated for posts and are to be filled with concrete they shall allow a minimum concrete surround of 75mm to be placed around the post or when formed with an auger shall be 300mm dia. Holes for posts to be refilled with earth shall be as small as practicable to allow for refilling and ramming.

Erection

8. Straining posts shall be erected at points where a change of direction or gradient occurs. They shall also be erected on straight fences at intervals not exceeding 70m.

   Intermediate posts shall be set at intervals not exceeding 2.25m for fences up to 1.35m height and at intervals not exceeding 2.0m for fences over 1.35m height. The fencing shall be strained tightly by hand between each pair of straining posts and shall be fixed to them with two 30mm x 3.55mm dia staples at each line of wire. The fences shall be fixed to intermediate posts by one such staple at each line of wire.

Concrete posts

9. Reinforced concrete straining posts shall when specified be used for fences over 1.5m in height the posts shall be 125 x 125mm in section throughout their length. They shall be set in holes 300 x 300mm in plan 750mm deep and surrounded to half the depth of the hole by concrete GEN 1 mix designation.

10. Reinforced concrete struts for fences over 1.5m in height shall be 100 x 85mm in section throughout their length. They shall be placed in holes 300 x 450mm in plan to a depth of 450mm and surrounded to half the depth of the hole by concrete GEN 1 mix designation.

11. Reinforced concrete intermediate posts for fences over 1.5m in height shall be 125 x 125mm in section at their base tapering to 75 x 75mm at the top. They shall be placed in holes 300 x 450mm in plan to a depth of 450mm and surrounded to half the depth of the hole by concrete GEN 1 mix designation.

12. Straining posts shall be erected at points where a change of direction or gradient occurs. They shall also be erected on straight fences at intervals not exceeding 70m.

    Intermediate posts shall be set at intervals not exceeding 2.25m.

    The fencing shall be strained tightly by hand between each pair of straining posts and shall be fixed to them by one straining bolt to each line of wire, ring nut fittings or double sets of eye bolts shall be used at intermediate posts. The fence shall be secured to the posts by passing stirrup wires through 10mm dia holes in the posts and by making three complete turns of the stirrup wire on each line of wire either side of the post.

1702 FENCING - WELDMESH

With concrete posts

1. The fence shall conform in all respects with BS 1722 Part 2.

2. All posts shall be of reinforced concrete and subject to a demoulding allowance of 4mm. The tops of the posts shall be rounded.

3. Intermediate posts shall be 100 x 100mm in section at the base and tapered to 75 x 75mm at the top.

   Straining posts shall be 125 x 125mm in section throughout. They shall be designed so as to give a firm bearing for the struts which shall be in the top third of the post length.

   Struts shall be 100 x 75m with parallel sides.

   Intermediate posts and straining posts shall be provided with 10mm diameter holes for the attachment of straining fittings or stirrup wires.

4. Steel line wire shall be 4.0mm in diameter complying with BS 4102. Stirrup wire shall be 3mm diameter and not less than 175mm in length. Wire for securing the mesh to the line wires shall be 1.6mm diameter. The weldmesh shall have a nominal mesh size of 50 x 50mm and shall be constructed of 3.25mm diameter wire, the mesh shall be hot dip galvanised to BS 729 Part 1 after manufacture.

5. Intermediate posts shall be set into the ground a depth of 600mm at a spacing not exceeding 2 metres. After insertion of the posts into the holes which shall be not less than 250 x 250mm in plan the holes shall be filled to half their depth with GEN 1 mix designation concrete. The remainder of the hole shall be filled with well rammed excavated material.

6. Straining posts and struts shall be provided at intervals not exceeding 60m or at acute changes in direction or level. Straining posts shall be set into the ground a depth of 750mm after insertion of the posts into the holes which shall be not less than 450 x 450mm in plan the holes shall be filled to half their depth with GEN 1 mix designation concrete. The remainder of the hole shall be filled with well rammed excavated material. Struts shall be fitted to the straining posts behind the fencing and in the direction of the fenceline. The bottom of the post shall be not less than 450mm below ground and shall be bedded in concrete as the straining posts.

7. Line wires shall be strained tightly between straining posts using eyebolt strainers, spreader bars and or winders at each straining post. The line wires shall be secured to intermediate posts by a wire stirrup passed through a hole in the post and secured to the line wire by three complete turns on either side of the post. The top line wire shall be threaded through adjacent rows of the mesh care being taken to ensure that no row in the mesh is passed by the line except where deviation is necessary at the posts. The fencing shall be attached to the other line wires by wire ties or hog rings. These shall be at 150mm spacing on the bottom line wire and at 450mm spacing on all other wires.

With metal posts

8. Posts shall be rolled hollow section steel to BS 4360 grade 43C. The section for both straining and intermediate posts shall be 50 x 50 x 3.2mm. Struts shall be 40 x 40 x 3.2mm. All components shall be hot dip galvanised to BS 729 Part 1.

9. Posts shall be drilled to take galvanised stirrup wires of 4.75mm diameter at the positions indicated on the drawing. All posts shall be capped.

10. Struts shall be designed to be bolted to the top third of the straining posts and shall be inclined at an angle of not less than 30° to the vertical. Fastenings shall be vandal resistant.

11. Posts shall be set into the ground to a depth of 750mm in holes not less than 300 x 300mm. After insertion of the post the hole shall be filled with concrete GEN 1 mix designation.

12. Struts shall be set into the ground to a depth of 450mm in holes not less than 600 x 400mm. After insertion of the post the hole shall be filled with concrete GEN 1 mix designation.

13. Line wires shall be of high tensile steel of 4.0mm diameter to BS 4102 and shall be galvanised.

14. The weldmesh shall have a nominal mesh size of 50 x 50mm and shall be constructed of 3.25mm diameter wire, the mesh shall be hot dip galvanised to BS 729 Part 1 after manufacture. The fencing shall be attached to the line wires by wire ties or hog rings. These shall be at 150mm spacing on all line wires.

15. The weldmesh shall be secured to straining posts by the use of galvanised stretcher bars and winding brackets. Fastenings shall be vandal resistant.

16. Posts shall be set at intervals not exceeding 3 metres and straining posts shall be provided at intervals not exceeding 40 metres or at any acute changes in direction or level.

1703 FENCING - POST AND WIRE

1. The fence shall conform in all respects with BS 1722 Part 3.

2. Posts shall be of reinforced concrete or round timber. Concrete posts shall be subject to a 4mm demoulding draw allowance from the dimensions indicated. The tops of concrete posts shall be rounded.

3. Concrete straining posts shall be 125 x 125mm in section and have 10mm diameter holes formed in them for the attachment of straining fittings. They shall be designed to give a firm bearing to the struts within the upper third of the above ground section of the post.

   Timber straining posts shall have a minimum diameter of 125mm at their upper end.

4. Concrete struts shall be 100 x 75mm in section throughout their length and shall be of adequate length to suit site conditions. Timber struts shall be 80mm dia minimum at their upper end and shall be fixed to the straining posts by two 125 x 5mm wire nails.

5. Concrete intermediate posts shall be 125 x 125mm in section at the base and taper to 75 x 75mm at the top and have 10mm diameter holes formed in them for the attachment of the line wires.

   Timber intermediate posts shall have a minimum diameter of 80mm at their upper end.

6. Zinc coated low carbon steel of 5.0mm diameter or plastics coated high tensile zinc coated core (tensile strength 1050 N/mm^2 core 3.15mm dia overall dia 4.0mm) shall be tightly strained between winding brackets attached to the straining posts whether concrete or timber and threaded through the holes in concrete intermediate posts or attached to timber intermediate posts by a single staple of 40 x 4mm wire zinc coated in accordance with BS 443. Straining posts shall be provided every 150m or at any acute changes in direction or level and shall when surrounded by concrete be set 750mm into the ground in holes not less than 450 x 450mm in plan or if produced by auger 300mm dia. If no concrete is used the posts should be increased in length by 300mm and this additional length set below ground. Intermediate posts shall be set 600mm into the ground in like manner. The base of all struts shall be not less than 450mm below ground level.

1704 FENCING - POST AND RAIL

1. The fence shall conform in all respects with BS 1722 Part 7.

2. Timber for use in post and rail fences shall be softwood suitably treated with preservative applied by pressure impregnation.

3. All components shall be of the nominal sizes indicated on the contract drawings.

4. Main posts shall be provided at intervals of 1.8m for nailed fences and 2.85m for morticed fences. Main posts shall be set into the ground by 700mm in holes not less than 300 x 300mm in plan or if produced by auger 300mm dia. Holes for posts to be refilled with earth shall be as small as practicable to allow for refilling and ramming. One prick post shall be provided centrally in each bay of mortised fences. Prick posts shall be of the same section as the rail and shall be driven 450mm in the ground.

5. Rails shall not deviate by more than 25mm from a straight line. When rails are to be butt jointed they shall meet within the middle third of the post face and be secured with two 4 x 100mm nails in each end. Rails showing split ends after nailing shall be rejected. Rails for morticed fences shall be scarf jointed, the scarf shall be not less than 150mm in length. Joints shall be staggered so that only one joint per post occurs.

6. Rails shall be nailed to the posts with two 4 x 100mm nails skew driven. If the rail is morticed into the post they shall be fixed using two brass screws of not less than twice the thickness of the rail in length. Rails on morticed fences shall be nailed to the prick posts with two 4 x 100mm nails at each intersection.

1705 STOCK PROOF FENCING

1. The fence shall conform in all respects with BS 1711 Part 2.

2. Timber straining posts for stock proof fences shall have a girth of 380-400mm at the smaller end and shall be set into the ground 750mm in holes not less than 450 x 450mm in plan or if produced by auger 300mm dia and surrounded to half the depth of the hole by concrete GEN 1 mix designation. Holes for posts to be refilled with earth shall be as small as practicable to allow for refilling and ramming.

3. Intermediate posts which shall be pointed for driving shall have a girth of 190-220mm at the smaller end and shall be set into the ground by 450mm in holes not less than 300 x 300mm in plan or if produced by auger 300mm dia. Posts shall be provided at intervals not exceeding 3.5 metres.

4. Struts shall have a girth of 230-250mm at mid length and shall fit into a notch on the straining post.

5. The mesh shall be galvanised to BS 729 and woven to the requirements of BS 4102 shall have a top and bottom wire of 3.15mm dia. The mesh shall have 8 horizontals and vertical wires shall be spaced at 150mm. The mesh shall be strained tightly between adjacent straining posts which shall be provided at intervals not exceeding 150 metres or at any acute changes in direction or level. The mesh shall be fixed to the straining posts by flat stretcher bars secured to the posts by 3 galvanised eye bolts consisting of 250mm x M10 bolts with welded eye. It shall be fixed to intermediate posts with one 38 x 4mm galvanised staple per horizontal.

High tensile mesh fencing

6. The fence shall conform to BS 1711 Part 2.

7. Timber straining posts shall be round in section and be not less than 120mm in diameter at the smaller end.

   Timber struts shall be round in section and be not less than 80mm in diameter at the smaller end.

   Timber intermediate posts or struts shall be round in section and be not less than 60mm in diameter at the smaller end.

8. Straining posts shall be provided at distances not exceeding 400 metres apart and at either end of the proposed fence length and turning posts at corners and lateral changes in direction.

   Posts shall be set in the ground to a depth of not less than 900mm. The holes shall be not less than 450mm square in plan or if round as may be produced by an auger not less than 450mm in diameter. The holes shall have vertical sides. Concrete GEN 1 mix designation shall be placed around each post to half the depth of the hole and the remainder of the hole shall be filled with well rammed excavated material.

   Where a post is used with a strut or struts a cross member shall be fixed with two 125 x 5mm nails at the base of the post on the opposite side to the strut. The cross member shall be set approximately at right angles to the resultant direction of strain.

9. Struts shall be fitted to all straining posts in the direction of each line of fencing and to all turning posts where the internal angle included by the wire is less than 110 degrees. The top of each strut shall be nailed into a notch in the upper third of the straining or turning post with two 125 x 5mm nails. At the bottom end of the strut a thrust plate shall be driven into the ground nailed to the strut with two 125 x 5mm nails and secured to the base of the post by means of a loop of high tensile wire fixed to the post and thrust plat with hair pin staples not less than 4mm in diameter and 40mm long which have been zinc coated to BS 443.

10. Intermediate posts shall be provided between straining posts and turning posts at intervals not exceeding 5 metres. They shall be driven into the ground to a depth of 600mm.

11. The mesh shall be attached to all posts such that the bottom wire is close to the ground and the mesh is extended to its full height up the posts. Every horizontal wire shall be taken around each straining post and fastened to itself by means of tying or the use of a preformed fence connector.

12. The mesh shall be tensioned between strained posts using approved tools and fixed to all posts by the use of hairpin staples not less than 4mm in diameter and 40mm long which have been zinc coated to BS 443, at each horizontal wire.

    Where the mesh is joined in mid span the means of joining shall enable the mesh to be strained and retain tension as if it were a single length.

13. Where specified high tensile barbed wire shall be attached at the top of the posts by passing around strain posts and tying back as with horizontal mesh wires. The barbed wire shall be tensioned and fixed to each post with two staples.

    Where a footpath or similar runs alongside the fence the barbed wire shall be placed on the inside of the posts away from the public.

1706 STEEL PALISADE FENCING

1. The fence shall conform in all respects with BS 1722 Part 12.

2. Steel sections shall be grade 43A complying with BS 1449 Part 1 and BS 4360. Hollow sections shall be grade 43C complying with BS 4360 and BS 4848 Part 2.

3. All materials shall be hot dip galvanised to BS 729 giving a minimum thickness of galvanised coating of 200 microns. A certificate of compliance with this requirement shall be supplied by the Contractor prior to erection.

4. Vertical pales shall be corrugated and have a minimum face to view of 60mm for general purpose fences and 70mm to view for security fences. The dimensions of horizontal rails and the oversail of pales shall be as indicated on the drawing.

5. Posts of rsj section shall generally be provided at 2.75m centres except where shown on the drawing to comply with special requirements or as the final panel in a fenceline. Two intermediate supports to the bottom rail consisting of 40 x 40 x 6mm r.s. angle bolted to the rail with M10 bolts shall be supplied for security fencing. The support shall be embedded 100mm in a 150 diameter concrete GEN 3 mix designation foundation.

    Fence posts shall be surrounded with a minimum of 300mm of concrete GEN 3 mix designation foundation for the full embedded depth.

6. Erection shall be carried out in such a manner that the top of the fence follows the approximate profile of the ground to levels indicated by the Engineer and the bottom of the pales shall not be more than 50mm above the mean ground level between posts.

7. All bolts shall be burred over after erection and before painting to prevent removal.

8. Gates shall be manufactured with a rectangular hollow section frame with corrugated pales attached thereto. They shall be fitted with drop bolts and slam plates and a sliding horizontal lock bar. The width of the gates shall be measured between the inside faces of the gate posts. Gate posts of r.s.j. section shall have base plates and pointed tops. The hinges of the gates shall be designed to readily facilitate adjustment of the gates during both erection and service. A suitable method of securing the gates in the open position shall be provided. Gate posts shall be surrounded with a minimum of 600mm of concrete GEN 3 mix designation for the full embedded depth.

1707 1.8m HIGH CLOSE BOARDED FENCING

1. The fence shall conform generally with Type BCM180B or BW180B of BS 1722 Part 5. All timber shall be pressure creosoted with BS 913 to Motorway Fencing Standard or be British hardwood suitably treated with preservative applied by pressure impregnation.

2. Posts shall be of reinforced concrete or sawn timber.

   Reinforced concrete posts shall be 140 x 115mm in section and 2.65m overall length and have 4 nr. 8mm diameter steel reinforcing bars. Concrete posts shall be subject to a 4mm demoulding draw allowance from the dimensions indicated. The tops of concrete posts shall be rounded. The posts shall be of the morticed pattern as figure 1 of the British Standard.

   Timber posts shall be 100 x 150mm in section throughout their length. The tops of the posts shall be weathered to prevent the lodgement of water. The posts shall have 65 x 25mm mortices with their front edges 25mm from the face of the posts and positioned so that when fixed the centre of the bottom rail is approximately 225mm from the bottom of the boards, the centre of the top rail is approximately 225mm from the top of the boards, the middle rail if any is central between the top and bottom rails and the top of the counter rail if any is in line with the top of the boards.

3. Timber arris rails shall be cut from timber 87 x 87mm in section.

4. Timber rectangular rails shall be cut from timber 100 x 50mm in section. The ends of the rails shall be shaped to fit into the mortices for a depth of half the width of the post in order that when fixed the face of the rails will be in line with the front edges of the mortices.

5. Capping if specified shall be 65 x 38mm twice weathered on one wide face. Counter rails shall be either 65 x 25mm or when used with concrete posts 50 x 32mm.

6. Pales shall be 100 x 18mm in section.

7. Gravel boards shall be 150 x 32mm

8. Centre stumps shall be 600 x 50 x 50mm and shall be cut at the top to fit the bottom rail.

9. Cleats shall be 150 x 65 x 38mm.

Erection

10. The top of the fence shall follow approximately the level of the ground. Posts shall be set at intervals not exceeding 3.0 metres and shall be set into the ground 750mm in holes not less than 300 x 300mm in plan or if produced by auger 300mm dia. and surrounded to half the depth of the hole by concrete GEN 1 mix designation. Holes for posts to be refilled with earth shall be as small as practicable to allow for refilling and ramming. The main rails and capping if specified shall be fitted into the mortices. Where timber posts are used the top arris or rectangular rail shall be pinned at each end with a 12mm diameter wooden peg.

In the case of concrete posts the top arris or rectangular rail shall be pinned as for timber posts or bolted with one M8 bolt at each end. Centre stumps shall be fitted under the bottom rail at the centre of each bay and nailed to the rail with one 65 x 3mm nail to BS 1202 Part 1 which shall be galvanised. The opposite end shall be set into the ground. Concrete gravel boards shall be attached to concrete posts with angle cleats which shall be twice bolted to the posts and once to the gravel board using M8 bolts. Timber gravel boards shall be attached to posts with timber cleats which shall be twice bolted to concrete posts using M8 bolts or twice nailed to timber posts using 65 x 3mm nails to BS 1202 Part 1 which shall be galvanised. All cleats shall be positioned so that the pales will rest on top of the gravel board. A 5mm gap shall be left between adjacent pales. They shall rest on the gravel board and be nailed to each main rail and the counter rail if any with 50 x 2.65mm nails to BS 1202 Part 1 which shall be galvanised except that where the 65 x 25mm section is used for a counter rail 40 x 2.65mm nails shall be used. Each nail shall pierce only one pale or board. The top of the pales shall be aligned. Where no gravel board is fitted there shall be a clearance between the bottom of the pales and general ground level. Capping if specified shall be nailed to the counter rail at each end and along the capping at not greater than 450mm centres using 45 x 25mm nails.

1708 FIELD GATES

1. Gates may be of either timber or steel as indicated in the Bill of Quantities and shall conform to the following requirements. The width of the gate shall be from the outside of the hanging stile to the outside of the shutting stile and the height shall be from the bottom of the bottom rail to the top of the top rail.

Timber gates

2. Timber for gates and gate posts shall be British hardwood and shall have a suitable preservative applied by pressure impregnation.

3. Timber hanging posts shall be 200 x 200mm in section and shutting posts 175 x 175mm in section. They shall be set not less than 750mm into the ground and surrounded by 200mm of concrete GEN 3 mix designation concrete. Posts shall be independent of adjacent fencing. Where indicated reinforced concrete posts of the same dimensions may be utilised.

4. The components for timber field gates shall have the following minimum sizes:-

hanging stile	100 x 75mm for gates up to 3m wide
	125 x 75mm for gates over 3m wide
shutting stile	75 x 75mm
diagonal brace	75 x 75mm
top rail	100 x 75mm for gates up to 3m wide
	125 x 75mm for gates over 3m wide
the rail may taper to	75 x 75mm and the top edges shall be chamfered.
under rails	75 x 25mm

5. The rails shall be jointed to the stiles by mortice and tenon with timber pegs inserted into the stile. The diagonal braces shall be jointed to the bottom rail by use of a birdsmouth and bolted to the top rail using an M8 bolt, washer and nut.

6. Gates shall be supplied with galvanised and black painted hinges. The top hinge shall be of a double strap and pin type. The double strap shall be 6mm thick 45mm wide and not less than 600mm long with an eye and drilled to take 3 nr. 9mm bolts. The bolts shall be cup headed square shanked and supplied with washers and nuts in compliance with BS 325. The hook pin shall be 70 x 20mm diameter welded to a shouldered lug not less than 20mm thick with a shank 225mm long and 20mm in diameter and threaded not less than 125mm. The hook shall be supplied with not less than one washer and nut. Lower hinges shall be of a double strap and pin type. The double strap shall be 6mm thick 45mm wide and not less than 600mm long with an eye and drilled to take 3 nr. 9mm bolts. The bolts shall be cup headed square shanked and supplied with washers and nuts in compliance with BS 325. The hook shall conform to the requirements for top hooks except that the shank may be pointed for driving 100mm into the post. The hinge pins shall be set on the back of the post so that the gate may open one way only. Approved arrangements shall be made to prevent the unauthorised removal of the gate from its hinge pins.

   A latch which is self locking on closing shall be fitted. The latch bar shall be a minimum of 38mm in width and 10mm in thickness. Provision shall be made for fitting a padlock.

Steel gates

7. The components for steel field gates shall be fabricated from steel tube to BS 1775 circular hollow section to BS 4 Part 2 or rolled hollow section to BS 4 Part 2.

8. Hanging posts and shutting posts shall be 114.3 o.d. x 3.6mm CHS or 88.9 x 88.9 x 3.6mm r.h.s. shutting posts 175 x 175mm in section. Posts shall be capped and supplied with a base plate. They shall be set not less than 750mm into the ground and surrounded by 200mm of GEN 3 MIX DESIGNATION concrete. Posts shall be independent of adjacent fencing.

9. The component for steel field gates shall have the following minimum sizes:-

Outer frame	42.4 o.d. x 2.6mm	or	38.1 x 38.1 x 2.6mm
Infill horizontal rails	26.9 o.d. x 2.3mm	or	25.4 x 25.4 x 2.0mm
Diagonal braces	21.3 o.d. x 2.0mm		
Vertical braces	21.3 o.d. x 2.0mm	or	25.4 x 25.4 x 2.0mm

10. The hinge pins shall be not less than 19mm in diameter and shall be welded to plates not less than 12mm thick. When steel posts are supplied the hinges shall be welded riveted or bolted to the posts. For wooden or concrete posts bolts shall be of appropriate length and not less than 20mm in diameter. Approved arrangements shall be made to prevent the unauthorised removal of the gate from its hinge pins.
A latch which is self locking on closing shall be fitted. The latch bar shall be a minimum of 38mm in width and 10mm in thickness. Provision shall be made for fitting a padlock.

1709 TIMBER KISSING GATES

1. Timber for kissing gates shall be British hardwood suitably treated with preservative applied by pressure impregnation.

2. The components shall have the following minimum sizes:-

Hanging stile	100 x 75mm
Shutting stile	75 x 75mm
Top rail	100 x 75mm at hanging stile with top edge chamfered
the rail may taper to	75 x 75mm
Vertical palings	76 x 25mm set at 50mm spacing
Under rails	75 x 25mm

The joints between members shall be morticed.
All posts shall be 150 x 150mm in section and set into the ground a distance of 750mm and surrounded with 100mm of concrete GEN 1 mix designation.

3. The distance between shutting posts shall be not less than 600mm and the gate shall be a minimum of 700mm wide.

4. The guard fence joining the shutting posts shall be of the same height as the gate and shall be so positioned that there is a space of 500mm square when the gate is in the mid position. This will necessitate the use of three panels of fencing.

1710 TIMBER BRIDLE GATES

1. Timber for bridle gates and gate posts shall be English or European Oak or a softwood which shall have a suitable preservative treatment as tables 3 and 4 of BS 5709.

2. Timber hanging posts shall be not less than 150 x 150mm in section and shutting posts 125 x 125mm in section. They shall be set not less than 750mm into the ground and surrounded by 200mm of GEN 3 mix designation concrete. Posts shall be independent of adjacent fencing. There shall be a minimum of 1.525m between gate posts.

3. The components for timber bridle gates shall have the following minimum sizes:-

Hanging stile	100 x 75mm
Shutting stile	75 x 75mm
Top rail	100 x 75mm at hanging stile with top edge chamfered
The rail may taper to	75 x 75mm
Under rails	75 x 25mm and not less than four in number
Diagonal brace	75 x 25mm

A minimum height of 1.1m shall exist from the bottom of the bottom rail to the top of the top rail.

4. The rails shall be jointed to the stiles by mortice and tenon with timber pegs inserted into the stile. The diagonal braces shall be jointed to the bottom rail by use of a birdsmouth and bolted to the top rail using an M8 bolt, washer and nut.

5. Gates shall be supplied with galvanised and black painted hinges. The top hinge shall be of a double strap and pin type. The double strap shall be 6mm thick 45mm wide and not less than 600mm long with an eye and drilled so as to ensure fixing to both the hanging stile and top rail. The bolts shall be cup headed square shouldered and supplied with washers and nuts in compliance with BS 325. The hook pin shall be 70mm x 20mm diameter welded to a shouldered lug not less than 20mm thick with a shank 225mm long and 20mm in diameter and threaded not less than 125mm. The hook shall be supplied with not less than one washer and nut. Lower hinges shall be of a double strap and pin type. The double strap shall be 6mm thick 45mm wide and not less than 600mm long with an eye and drilled to take 3 no. M10 bolts. The bolts shall be cup headed square shanked and supplied with washers and nuts in compliance with BS 325.

6. The hinge pins shall be not less than 20mm in diameter and should be bolted through the post or welded to a spike driven into the post. The top pin shall be inverted. The hinge pins shall be set on the back of the post so that the gate may open one way only. Hinge pins shall be set out of vertical to ensure that there is a tendency for the gate to close.

   A latch which is capable of being unfastened without dismounting from a horse and which is self locking on closing shall be fitted. The latch bar shall be a minimum of 38mm in width and 10mm in thickness. Provision shall be made for fitting a padlock.

1711 STILES

1. Timber for stiles and posts shall be English or European Oak or a softwood which shall have a suitable preservative treatment as tables 3 and 4 of BS 5709.

2. The components shall have the following overall dimensions.

Width between uprights	1 m minimum
top rail height above ground	900mm minimum
spacing between rails	300mm minimum
rail section	87 x 38mm minimum
steps	not less than 900 x 175 x 50mm
stile posts	100 x 100mm

3. One or two steps shall be provided as shown on the drawing and depending on the height of the top rail of the stile and the ground profile. The ends of the bottom step shall be not more than 300mm above the ground. The distance between steps shall be not more than 300mm. For stiles with a single step the height of the top rail above the top of the top step shall be not more than 600mm and for stiles with two steps 450mm.

4. Steps shall be provided at right angles to each other and at right angles or 45° to the stile rails. They shall be supported at each end by vertically set supports of not less than 75 x 150mm set approximately 40mm from the front edge of each step and 500mm into the ground. The steps shall be drilled and skew nailed to each support using at least 2 no. 100 x 4mm galvanised nails.

5. The length of the stile posts shall be such that the height between the top step and the top of the top post provides a convenient hand hold. Posts shall have their tops weathered and edges chamfered and shall be set 750mm into the ground. All posts shall be independent of fencing or direction posts.

6. Rails shall have the top edges chamfered and be mortised into the post to a depth of 50mm.

1712 ACCESS BARRIERS

1. Barriers shall be constructed of timber or steel and to the pattern indicated in the Contract drawings.

2. Steel shall comply with BS 970, BS 1449 Part 1, BS 2989 or BS 4360.

3. Timber shall conform to BS 5268 Part 2

4. All fastenings shall be vandal resistant.

5. Provision shall be made for fitting a padlock.

1713 SITE SAFETY FENCING

1. All fencing to the working areas shall be of Sentinel ‘Siteguard’ type or similar approved.

1725 GABION WALLING

1. Steel gabions may be of woven steel wire mesh with flexible joints consisting of not less than one and a half full turns or of welded wire mesh with all joints welded and capable of achieving a strength equal to 80% of the tensile strength of the wire.
   All wire used shall be galvanised to BS 443 prior to weaving. Where welded joints are used the mesh shall be hot dip galvanised to BS 729 Part 1 after welding the mesh.

2. Where specified the wire shall be additionally coated with uPVC capable of resisting the deleterious effects of immersion in contaminated water, exposure to ultra violet light and abrasion.

3. The use of plastic mesh gabions is also permitted and where the contractor chooses to use these he should be able to indicate to the Engineer that strength comparable to the steel gabions indicated in the Bill of Quantities is attainable.

4. The assembly and erection of the gabions shall be in accordance with the manufacturers instructions. Particular care should be exercised to ensure tightness of mesh, well packed filling and secure lacing. All lacing shall be carried out as a continuous operation not with individual twists at intervals.

5. The exposed face of the gabions shall be free from excessive bulges or depressions. Filling with hard durable stone nominal size 125 - 200mm shall be carried out by hand only whilst the units are under tension.

6. Box gabions shall be overfilled by approximately 50mm above their top edge to allow for subsequent settlement.

7. Gabions placed on a completed row must be wired to filled gabions.

SECTION 1800 TRAFFIC SIGNS

1801 REGULATIONS, SIGN CLASSIFICATION AND STANDARD REGULATIONS

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 (Statutory Instrument No. 1519 1994), the 'Zebra' Pedestrian Crossings regulations (Statutory Instrument No. 16 1987) and subsequent amending Regulations. Other relevant requirements are contained in the above Regulations and General Directions.

Sign Classification

2. For the purpose of the Contract the following classifications apply:

   i) Permanent traffic signs. Any of the traffic signs prescribed in the regulations, or specially authorised by the Secretary of State, or any part thereof, designed by the Engineer to remain in position at the completion of permanent works or a traffic cone cylinder or other traffic delineator to be retained by the Employer.

   ii) Engineer's temporary traffic signs. Any of the traffic signs defined in the Regulations, or specially authorised by the Secretary of State, or any part thereof, designed by the Engineer which unless otherwise described shall comply with the requirements of a permanent traffic sign but which will not remain in position at the completion of the permanent works.

   iii) Temporary traffic signs. Any of the traffic signs defined in the Regulations, or specially authorised by the Secretary of State, or any part thereof, designed by the contractor, which will not remain in position at the completion of the permanent works.

Standards

3. Traffic Signs shall comply with BS 873: Part 1 to 8 unless otherwise stated.

1802 GENERAL REQUIREMENTS FOR PERMANENT TRAFFIC SIGNS

1. Each complete traffic sign or part thereof shall be capable of passing the tests in BS 873: Part 1.

2. All lit traffic signs shall comply with Category 1 luminance of BS 873: Part 5 unless otherwise stated.

3. Traffic Signs shall be carefully handled to prevent damage including the use of proper slings, transported and stored in accordance with the sign face manufactures instruction.

1803 FOUNDATIONS FOR PERMANENT TRAFFIC SIGNS AND SIGNALS

1. The type and size of foundation for permanent traffic signs and signals shall be as described, and unless otherwise stated therein shall comply with this Clause.

2. All excavations for foundations shall be carried out in compliance with Clause 504 and shall be approved by the Engineer before placing of concrete and backfilling.

3. Unless otherwise described traffic signs and signals supported by a single post placed in the ground shall have the post installed centrally in 300mm diameter augured holes filled in compliance with Clause 604 with Mix ST2 concrete to within 150mm of the ground surface.

4. Posts shall be supported for a minimum of 3 days after placing concrete. Backfilling shall not take place until at least 48 hours after placing or other period agreed by the Engineer.

5. For traffic signals and illuminated signs provision shall be made for cable entry through the foundation by means of ducting as described.

6. Where pockets are formed in concrete foundations their plan dimensions shall be 100mm larger than those of the post.

7. All backfilling of foundations shall comply with Clause 506 except that where pipes are installed shall comply with Clause 704.

8. Reinstatement of existing surfaces above foundations shall comply with the ‘Specification for the Reinstatement of Openings in Highways’ issued by the Highway Authority and Utilities Committee.

1804 POSTS FOR PERMANENT TRAFFIC SIGNS

1. Posts for permanent traffic signs shall be as described and shall comply with BS 873:Part 7.

2. Posts shall not protrude above the top of the sign unless supporting an external luminaire, in which case the protrusions shall be kept to a minimum.

3. Signs erected on a single post shall be positions so that the post is in the centre of the sign, unless otherwise described.

1805 ERECTION OF PERMANENT TRAFFIC SIGNS

1. All posts shall be erected plumb and where two or more posts are provided for one sign, the faces of the posts shall be lined up.

2. Signs erected on two posts shall have each post positioned so that the distance from the centres of the post to the edge of the sign plate is 300mm unless otherwise described.

3. Traffic sings mounted on posts, except those on gantries, shall be erected to have their face plumb and be orientated in relation to the carriageway in accordance with Chapter 1 of the Traffic Signs Manual.

4. No traffic sign shall be dismantled, re-sited or removed without prior approval of the Engineer.

2000 SURVEYS Not used
