

CAVAN COUNTY COUNCIL
HOUSING DEPARTMENT
GENERAL SPECIFICATION

Applicable to all Lots

Lot 1 – Cavan Belturbet MD

Lots 2 – Bailieborough – Cootehill MD

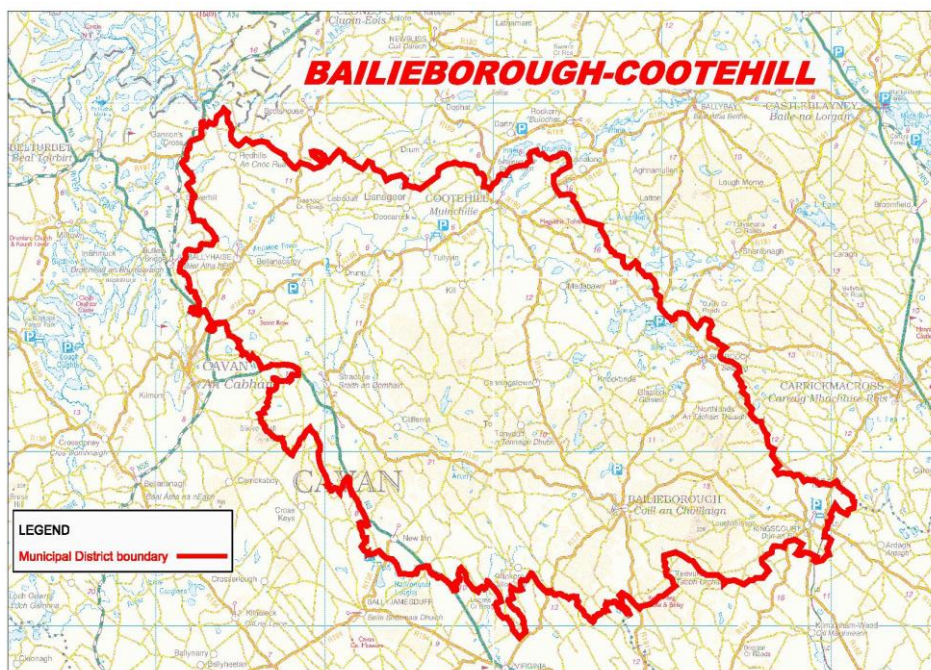
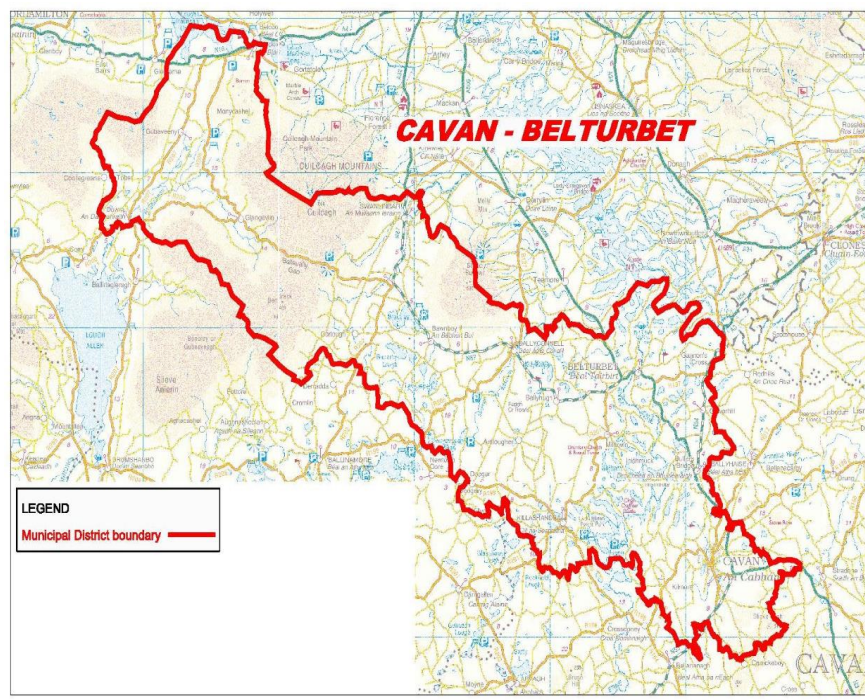
Lot 3 – Ballyjamesduff MD



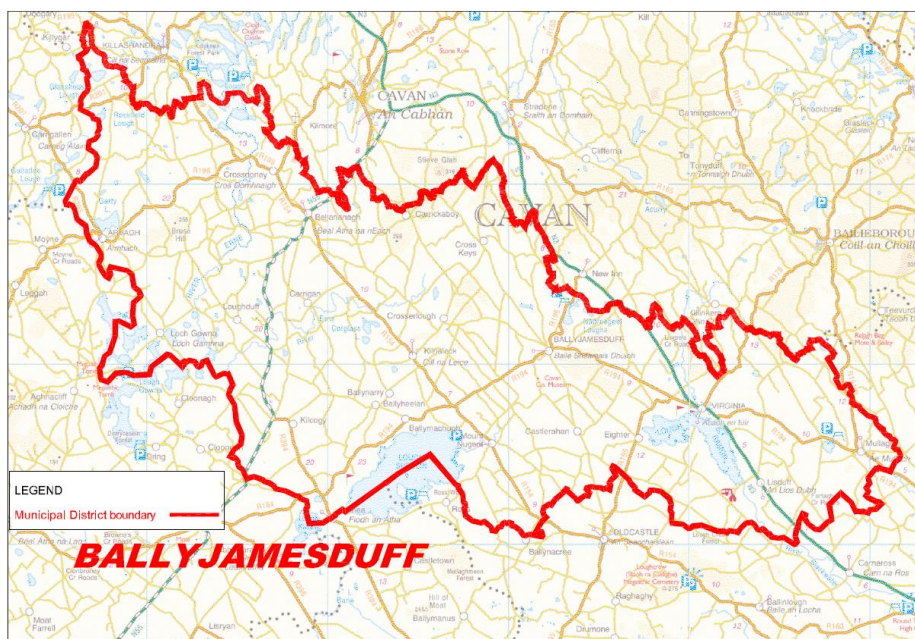
Comhairle Contae an Chabháin
Cavan County Council

May 2023

Municipal Districts



LAST REVISION DATE: May 2023



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GENERAL CONDITIONS

1.1 Contract Conditions

Introduction:

This is a General or Standard Specification provided by Cavan County Council's Housing Section for use on a variety of Projects. It should be read in conjunction with the Project Drawings and Project Specification (if one is provided). All items shown on the drawings, listed in the Project Specification, or reasonably to be inferred from either, are to be provided in accordance with the details of this Specification.

1.2 Parties

Employer:

Cavan County Council

Contractor:

To be selected after tender process

1.3 Definitions & Explanations

Headings:

The Clause headings used in the Specification shall not be deemed to be part of the text.

Approved:

"Approved" shall mean approved in writing by Cavan County Council's Engineer (the Engineer).

Instructed:

"Instructed" shall mean instructed in writing by the Engineer.

IS, BS + EN:

'IS', 'BS' and 'EN' followed by a number means respectively the Irish, British or European Standard Specification relating to a particular product. Where one of these standards is specified, items complying with a similar International or National Standard of another member of the E.U. may be used only if approved by the Engineer.

Standard Specification:

The Standard Specification of Cavan County Council is also known as the "General Specification" and the "Specification". Any reference to any other specification shall be referred to by full name and by who prepared it or other information to distinguish it from the Standard Specification of Cavan County Council.

Manufacturer and Type:

Where “Manufacturer” is used in the Specification of materials, it shall mean the firm under whose name the particular product is marketed. Where ‘Type’ is used, it shall mean the proprietary brand name, reference to other quality by which the product is identified. The phrase “or equal approved” shall be deemed included whenever materials are specified by manufacturer’s name. Approval will be issued for any alternative material that is, in the opinion of the Engineer, equal to the Specified/Named Material. The contractor shall include in his tender for the item or product as specified/named in the Specification. After tender the contractor may put forward alternatives as options for consideration but no commitment is given to accept any alternative, it will always be assumed that the tender includes for the items as specified/named.

Proprietary Names:

The phrase “or equal approved” shall be deemed included whenever materials are specified by proprietary name. Approval will be issued for any alternative material that is, in the opinion of the Engineer, equal to the Specified/Named Material. The contractor shall include in his tender for the item or product as specified/named. After tender the contractor may put forward alternatives as options for consideration but no commitment is given to accept any alternative, it will always be assumed that the tender includes for the items as specified/named.

Supplied Goods:

Where materials and components are to be supplied by Nominated/Novated Suppliers, whether specified to be fixed only or otherwise used or incorporated in the works, they shall include taking delivery, unloading, handling on site, providing adequate storage and being responsible for safekeeping, assembly, hoisting, placing in position and fixing, providing all necessary materials for fixing, returning packing materials carriage paid to the Nominated/Novated supplier in good condition and obtaining credits for them.

Variation or Change Order:

A variation or change order shall be deemed to be an alteration arising from the Engineer’s instructions to the extent or quality of the works as expressed or implied in the Contract Documents. See Contract for more detail.

Prices Schedule of Rates:

The Contractor shall be required to submit to the Engineer before the signing of the Contract a copy of his fully priced and detailed estimate upon which his tender is based, written in ink. The foregoing should also contain the breakdown of all sub-contractors’ work, e.g. electrical, plumbing and painting.

1.4 Standards, Codes of Practice

Standards and Codes of Practice:

References herein to Irish, British and EU or other National Standards or Codes of Practice do not give the year of issue or dates of amendments. The latest relevant published version including any relevant amendments at date of invitation to tender shall apply. Where a Standard or Code of Practice has been suspended, the latest edition of the superseding publications shall apply. Any discrepancies should be notified in writing to the Engineer.

Standards, Codes of Practice and Text:

The Specification shall take precedence over the Standards and Codes of Practice that are referred to where the Specification requires a higher standard. All aspects of the Works are to be carried out in accordance with the current Building Regulations and other subsequent amendments. The Home Bond House Building Manual shall be used as a supplementary guidance document for instances that are not specifically referred to in the Building Regulations. Any discrepancies should be notified in writing to the Engineer.

Best Practice

In the event of a dispute or where a standard or regulation it is unknown or unspecified, best practice will be adopted. Best practice in this case is defined as; the best method for the performance of a task whether or not it is commonly used, any such method that is to be adopted for the construction contract must be approved by the Engineer. Any perceived ambiguity shall be drawn to the attention of the Engineer before the tender is submitted.

In any situation where the contractor is unsure of the construction method to be used best practice will be adopted and priced for in the tender. The Engineer in consultation with the Contractor and Clerk of Works will make the final decision as to what method will be used on site. The Home Bond House Building Manual shall be used as a supplementary guidance document for instances that are not specifically referred to in the Building Regulations.

1.5 Statutory Obligations

Local Authority Approval:

Obtain approval from the Local Authority for the location of temporary offices, entrances, hard standings and crossings required for the works. Comply with the requirements of the Local Authority regarding maintenance and reinstatement. Pay all necessary Local Authority charges.

Building Regulations:

All aspects of the Works are to be carried out in accordance with the current Building Regulations and additional amendments.

Safety, Health and Welfare:

Comply with all statutory safety, health and welfare regulations and in particular the current Safety, Health and Welfare at Work (Construction) regulations.

FULL COMPLIANCE WITH ALL SAFETY AND HEALTH REGULATIONS ARE REQUIRED FOR THIS PROJECT WITH PARTICULAR EMPHASIS ON THE FOLLOWING: IN PURSUANCE OF THE ABOVE THE CONTRACTOR SHALL ENSURE THAT ALL PERSONNEL HAVE APPROPRIATE QUALIFICATIONS, EXPERIENCE AND/OR TRAINING FOR TASKS ALLOCATED TO THEM. THE CONTRACTOR SHALL ARRANGE FOR ALL NECESSARY SITE TRAINING OF HIS STAFF AND SUPPLY ALL NECESSARY PERSONAL PROTECTIVE EQUIPMENT INCLUDING 2 SPARE REFLECTIVE WAISTCOATS AND 2 SPARE CONSTRUCTION HELMETS FOR THE USE OF THE ENGINEER, CLERK OF WORKS OR ANY VISITOR TO THE SITE AUTHORISED BY THE ENGINEER.

The Contractor shall arrange regular “tool box” talks where he shall arrange for all operatives including subcontractors working on the site to attend and participate in a Safety, Health and Welfare briefing. The Contractor shall arrange and pay for site inductions for each visitor and operative including subcontractors and delivery drivers that access the site providing them with all Safety, Health and Welfare information they will require in the course of their work/visit on the site.

Project Supervisor for Design Process:

The client has appointed Cavan County Council as Project Supervisor for the Design Process of the Project to carry out the duties set out in Part 2 of the Regulations.

Project Supervisor Construction Stage:

The main contractor will be appointed as Project Supervisor for the Construction Stage of the Project unless otherwise notified by the Engineer.

Duties of Project Supervisor Construction Stage:

It shall be the duty of the project supervisor appointed for the construction stage:

- To prepare the construction stage safety and health plan prior to commencement of construction.
- To continually update the safety and health plan AND file as the project progresses.
- To co-ordinate the implementation of the general principals of prevention
- To co-ordinate the implementation of relevant requirements of regulations by contractors
- To follow the provisions of the Health & Safety Plan where required
- To organise co-operation between contractors and co-ordination of their activities in relation to a project with a view to protecting persons at work and preventing accidents and injury to health

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- To organise the provision of information
- To co-ordinate the implementation by contractors of their duty to provide the project supervisor with the information in relation to any death, injury, condition or dangerous occurrence which the contractor is required to notify or report under the current Safety, Health and Welfare (General Application) Regulations.
- To provide appropriate information to the site safety representative
- To co-ordinate arrangements for checking implementation of safe working procedures
- To co-ordinate measures for permitting authorised persons only onto the construction site
- To co-ordinate arrangements which facilitate the provision and the maintenance, in an appropriate condition of site welfare provisions to all persons at work on the construction site
- To co-ordinate measures to ensure that relevant persons have Safe Pass training and have been issued with a registration card
- To co-ordinate measures to ensure that relevant persons have CSCS training and have been issued with a registration card
- To keep records relating to Safe Pass and CSCS
- To co-ordinate consultation
- To facilitate, where more than 20 persons are normally employed at any one time on the site at any stage of the project, the appointment of a site safety representative
- To inform the site safety representative when an inspector arrives on site for the purpose of making a tour of inspection.
- To take account of representations made by a site safety representative
- To give notice to the H.S.A. before commencement (Form AF2), where work is planned to last longer than 30 working days or on which the volume of work is planned to exceed 500 person days.
- To provide directions to designers, contractors or other in order for the PSCS to comply with their duties and if necessary, submit them in writing.
- To supply information to the PSDP for the Safety File.

The PSCS may appoint a competent person as health and safety co-ordinator to undertake on behalf of the Project Supervisor the above duties.

Competency of Project Supervisor Construction Stage:

For this appointment the client must make reasonable enquiries to check the person or company to be appointed is able to fulfil the responsibilities of the position. The enquiries include the following:

- The Company's safety and health policy and the arrangements in place for the effective organisation and co-ordination of safety and health matters.
- Knowledge and experience of construction, particularly in relation to the nature of the project
- The availability of sufficient staff to carry out the role and also, their skills, knowledge, experience and training

- Experience of working with, and co-ordinating the activities, of different contractors involved in a project
- Experience in developing and monitoring compliance with safety and health plans
- Experience in preparing safety files
- Details of notifiable accidents in the last 3-5 years
- Evidence of ISO certification or other Quality Assurance Scheme, if any.

THE CONTRACTOR WILL PROVIDE DOCUMENTARY EVIDENCE OF THE ABOVE WITH THEIR TENDER.

The client may seek the advice of the project supervisor design process if other than Cavan County Council when appointing the project supervisor construction stage.

Preliminary Safety & Health Plan

In accordance with Part 3.1.4 of the regulations, a preliminary Safety & Health Plan in a form as defined in the regulations has been prepared for the purpose of providing information to the Project Supervisor for Construction Stage. The copy of the said plan attached.

Social Welfare Regulations:

Comply with all statutory social welfare regulations regarding registering of work people, including those employed by sub-contractors, employed on the site.

Insurance, All Risks:

Effect and maintain All Risks Insurance for the works and Ancillary items.

Insurance, Proof:

Submit proof to the Employer that insurances in accordance with the Instructions to Tenderers are in effect (or will come into effect on the day of commencement) at least two weeks before commencing the works.

1.6 Scope of Contract

Materials

(a) New Materials:

All material used in the Works shall be new unless otherwise described.

(b)Quality:

Where materials or components are specified to comply with an EU Standard Specification, the relevant Standard number shall be marked on the commodity itself or on the delivery note accompanying the commodity.

(c)Manufacturers' Certificates:

Provide in respect of materials or components manufacturers' certificates or compliance with Standards when requested by the Engineer.

(d) Test and Samples:

Pay the cost of fees and charges for testing of all relevant site materials that the Engineer may require. Approval to be obtained from the Engineer for the use of factory designed and manufactured roof trusses, certificates and documentation to be provided from manufacturer's Engineer certifying that the roof trusses are fit for the intended use.

The sizing of structural members, bracings, etc. to be certified by the Contractor's Engineer and approval of same must be requested from the Engineer. Roof trusses to be from a manufacturer approved by the National Standards Authority of Ireland (N.S.A.I.) and included on the N.S.A.I. Approved Roof Truss Manufacturers List.

1.7 Planning & Procedures**Staff Supervision****(A) Clerk of Works:**

The Employer reserves the right to employ a Clerk of Works who shall be paid by him. He shall be afforded all facilities by the Contractor in the performance of his duties. Neither the appointment nor the actions of the Clerk of Works will invalidate the responsibility of the Contractor and the Clerk of Works shall have no power to authorise variations or change orders.

(b)Quality Assessment:

Assessment of the quality of materials and workmanship shall be made in the presence of the Engineer or Clerk of Works (if nominated by the Engineer), unless otherwise instructed.

(d)Progress Meetings:

The Contractor, or a responsible official from his organisation, shall arrange progress meetings in a suitable office on site, which will be held at monthly intervals. Inform such Sub-Contractors and Suppliers as are necessary that their attendance at progress meetings may be required.

1.9 Completion

Completion Date:

Notify the Engineer/Clerk of Works in writing of the date on which it is considered Practical Completion has been achieved. The date of Practical Completion is to be agreed and certified in writing by the Engineer if valid.

Completion and hand over of Safety File:

Return to the Engineer at Practical Completion two copies of the updated Safety File for the Project.

The Safety File shall include:

Names of Contractors, Subcontractors, Engineers, Foreman, Clerk Of Works etc.

As built drawings of all installations, mechanical, electrical, house plans, utilities and services, site plan etc.

Manufacturers' specifications of all fixed appliances and materials provided in the works
Certificates; fire safety cert. (if applicable) foundation cert's, pile load test cert's, electrical installation cert's, supplier/manufacture's cert's etc.

Operation and maintenance manuals; mechanical, electrical and fixed appliances.

Emergency procedures, description of escape routes, local emergency services details

Any other environmental information.

Information describing any particular or unusual hazards discovered or covered during the construction process.

1.10 The Site - Precautions, Restrictions

The Site

(a)Use of Site:

Do not use the site for any purpose other than carrying out the works.

(b)Site Visit

The Contractor is advised to visit the site and ascertain all local conditions and restrictions likely to affect the execution of the works. No claim arising from failure to do so will be considered.

Precautions, Restrictions

(a)Trespass:

Take adequate precautions to prevent trespass on adjoining property by employees or by sub-contractors' employees.

(b)Permission, Adjoining Property

Obtain permission from the owner of adjoining property if it is necessary to use that property for any purpose in connection with the works. Indemnify the Employer against all charges arising there from.

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(c) Damage and Nuisance, Adjoining Property:

Take all reasonable precautions to prevent damage to adjoining property and to avoid causing a nuisance to adjoining occupants and to the public. Make good any damage caused to adjoining property.

(d) Fire Precautions:

Flammable liquids or compressed gases to be stored only in designated areas as specified in the Health and Safety Plan.

(e) Damage to Roads:

The Contractor shall be responsible for all damage to existing roads caused by his own or sub-contractors' or suppliers' transport to and from the site.

(f) Damage to Employer's Roads:

Maintain the Employer's existing roads and footpaths during the Contract and make good any damage caused by site traffic or site operations.

(g) Underground Services:

Protect all underground services encountered during the execution of the works. The Contractor shall make good any damage caused by his own, by sub-contractors' or by suppliers' operations.

(h) Protection of Services:

Protect all overground and underground services encountered during the execution the works. The contractor shall make good any damage caused by his own, by sub-contractors' or by suppliers' operations.

(I) Nuisance Precautions, Generally:

Take adequate precautions to protect persons and property from damage or nuisance caused by water, smoke, dust, rubbish and otherwise.

(j) Nuisance Precautions, Restriction of Work Days:

The Contractor or any sub-contractor or supplier shall not be permitted to work on the site on Saturdays or Sundays or any hours considered unsociable unless permission has been received, in writing from the Engineer.

(k) Nuisance Precautions, Convenience of Occupants:

The Employer will remain in possession of those parts of the premises or property, not for the time being in possession of the Contractor and shall be allowed to continue to enjoy unimpeded use of such parts. The Contractor shall so manage his work as to cause the minimum of interference with, or inconvenience to the Employer.

(l) Nuisance Precautions, Advertising:

Do not display or permit advertisements to be displayed on the site without approval.

(m) Securing Of Site:

Provide approved unclimable perimeter fencing to site and keep in good repair for the duration of contract. Remove after the completion of contract and make good.

1.11 Temporary Works & Services**Temporary Works****(a) Generally:**

Maintain, adapt, remove and make good after removal of temporary works and temporary services.

(b) Temporary Roads & Tracks:

Provide temporary roads, drainage, tracks, entrances, and hardstandings and designated adequate car parking and crossings. On Commencement of the Contract to facilitate access, strip topsoil and reduce or make up levels as required and lay a 225mm capping layer well consolidated with 8 passes of a 10-ton roller over entire areas of carriageways. The capping layer will be crushed rock with no organic content with a maximum aggregate size of 100mm and maximum fines of 10%, the material will be well graded throughout all sizes. Temporary drainage trenches will be dug along sides of roadways and diverted to surface water drainage sumps to prevent saturation or washing away of the roadway and, where necessary to facilitate access, such trenches will be piped and filled with drainage stone. All such trenches will be reinstated and made good unless otherwise stated on the contract drawings or instructed by the Engineer.

(c) Temporary Buildings:

Provide temporary sheds, offices, mess rooms and sanitary accommodation required for own use and for use by sub-contractors. Comply with the current requirements of the Safety, Health and Welfare at Work (Construction) Regulations, and subsequent amendments.

(d) Hoarding:

Provide temporary fencing, hoarding, fans, planked footways, guard rails, as may be necessary to protect the public and others, for the proper execution of the works and to prevent unauthorised entry to, or trespass beyond the boundaries of the site. The hoarding will be subject to approval by the Local Authority, any modifications required will be at the Contractor's expense.

(e) Water:

Provide an adequate supply of clean potable water for the works and pay all charges.

Temporary Services**(a) Power and Light:**

Provide all necessary power and light for the works and pay all charges.

(b) Telephone:

Provide temporary telephone facilities as required and pay all charges.

1.16 General Works & Services**Attendance on Other Parties****(a) General Attendance:**

Provide for the duration of the Contract, general attendance on nominated sub-contractors, public / statutory bodies and service providers engaged on the works concurrent with the Contract as follows:

Use of Contractor's temporary roads, paving and paths.

Use of the Contractor's standing scaffolding and standing power operated hoisting plant.

Use of mess room, sanitary accommodation and welfare facilities, space for office accommodation and storage of plant and materials.

Temporary lighting and water supplies.

Clearing away of rubbish.

(b) Site Instruments:

Automatic "Dumpy" level and 50 metre decimal measuring tape to be provided by Contractor.

(c) Site Survey:

Provide the necessary attendance for the Engineer or his representative when required for surveying site and/or checking levels and/or dimensions.

Scaffolding**(a) General Scaffolding:**

Provide as necessary all general scaffolding required for the execution of the works. Competent person to be identified in the Health and Safety Plan whose charge will be to certify the safe erection, changing, dismantling and routine inspection of the scaffolding during the construction of the Project. The type of scaffolding provided should be suitable for the type of works encountered and comply with current safety standards.

Hydraulic Platforms:

May be used at the discretion of the contractor provided that they are only used in the correct application by suitably trained and qualified operators.

1.17 Setting Out

Bench Marks:

Establish a fixed master bench mark on the site and two additional fixed points for triangulation for the duration of the Contract.

Setting Out, Base Reference Lines:

Set out the works in accordance with the Drawings. Establish, in an approved manner, base reference lines for setting out the works.

Approval of setting out to be obtained prior to commencement of works.

Measurements:

Use dimensions figured on the drawings for setting out the works.

1.12 Protecting

Safeguard Against Damage:

Safeguard the site, the works, materials and plant against unauthorised entry, damage and theft. Make good any damage caused by ineffective protection. Provide watching, lighting and CCTV, where necessary, for the security of the works.

Watching and Lighting:

Provide watching and lighting necessary for the protection of the public and to the satisfaction of the Local Authority.

Protection against the Weather:

Protect the works, materials and plant from the weather and make good any damage caused.

Protection of Finished Work:

Keep finished surfaces clean as work proceeds and protect from dirt, staining and damage.

Approval for Holes & Chases:

Obtain approval for cutting holes or chases in the structure.

Existing Features:

Protect existing buildings, fences, gates, walls, power lines and other site features, which are to remain in position during the execution of the works, from damage by site operations. Make good any damage to existing features resulting from the works.

Trees, Shrubs and Lawns:

Protect from damage during the execution of the works all trees, shrubs and lawns on the site which have been scheduled for retention. Replace all damaged trees, shrubs and lawns with well-established growths guaranteed for a period of twelve months after planting. Trees that are to be

retained are to be fenced off in a manner approved by Engineer. For further information refer to section on Soft Landscaping following.

Pollution:

Do not deposit deleterious material into surface water channels or lakes. Comply with the requirements of the Rivers Pollution Act, the Public Health (Ireland) Acts, and the Fisheries Acts.

Storage of Materials:

Store materials in a tidy manner. Separate different materials and protect them from dirt, damage, reaction with other materials, marking or staining, micro-organisms, mildew, fungus and vermin, appropriate bunds to be provided where liquids are stored on site.

Storage of Materials, Precautions:

Do not store materials in ways which may cause damage to the works or to the materials or endanger the safety of people or property.

Manufacturers' Recommendations:

- (a) Obtain up to date copies of all Manufacturers' instructions and keep copies on site.
- (b) Handle and store materials in accordance with the manufacturers' recommendations. Do not use materials that have been stored for a period in excess of the manufacturers' recommended shelf life.

1.13 Cleaning

Rubbish:

Remove all rubbish from the works as it accumulates and maintain the Works in a clean and tidy condition for the duration of the Contract. Remove and dispose of all rubbish off site, no rubbish to be burned on site.

Cleaning:

Clean roads serving the site continuously with a mechanical road sweeper when earth moving is in progress and wash several times each day when dusty or when dirt cannot be removed by sweeping only. Otherwise clean roads serving the site twice daily or at whatever intervals are required to keep the roads clean and free from debris and dust.

Clean the works internally and externally, remove all rubbish and leave the entire works in a tidy condition ready for occupation or use. Engage a cleaning contractor to leave dwellings suitable for habitation.

Cost of Cleaning:

Cost of cleaning to be borne by the contractor.

1.14 Drying the Works

Drying Out:

Dry out the works as required to facilitate progress and to prevent damage to or deterioration of the work.

Humidity Control:

Control humidity as required to facilitate progress and to prevent damage to or deterioration of the work. Mechanical de-humidifier to be employed at all times or at the Engineer's discretion.

Heating:

The permanent heating installation may be used for drying out the works on condition that any warranties are not invalidated and that the Contractor will remain responsible for any minor defects in same under the defects liability period and shall clean and commission the heating installation to hand it over as new at Practical Completion. The Contractor shall be responsible for all charges in connection with the use, maintenance and safety of the installation until Practical Completion. The Employer will not accept liability if, for any reason, the installation is not available for use.

Equipment, Fuel and Attendance:

Provide all temporary equipment, fuel and attendance for drying out and controlling the humidity of the works to prevent any mould or fungal growth. Any mould or fungal growth in any part of the works must be removed and the affected area treated with an appropriate biocide and painted with an antifungal paint if appropriate. If any part affected by mould or fungal growth cannot be made good as new, then that part and any other part affected/damaged by it (or by its removal) must be replaced at the Contractor's expense.

Site Clearance & Demolition

2.1 Site Clearance

General:

Demolish buildings, walls and other structures and obstructions scheduled for removal. Grub up and remove trees, hedges, bushes and shrubs scheduled for removal from the site. Leave the site ready for excavation work.

Trees:

Cut down trees shown for removal as close as possible to ground level. Remove the trees and stumps from the site and backfill the holes with suitable earth filling.

No unauthorised felling of trees without prior approval from Cavan County Council. In all cases where unauthorised felling of trees takes place, the contractor must replace trees to a minimum girth of 100mm.

Old Foundations:

Break out and remove foundations, beds and paving scheduled for removal. Backfill with suitable earth filling.

Materials Discovered:

The owner of minerals, sand, gravel or archaeological objects discovered in the course of excavation shall be deemed to be the Employer. In the event of an archaeological find, stop work in the immediate vicinity and inform the Engineer at once.

Drains, Waterways & Underground Services:

Notify the Engineer and obtain instructions when drains, waterways and underground services are encountered.

Reinstate Grounds:

Before completion of Contract, remove from gardens (front and rear) and open spaces all rubbish, large stones, builder's debris, etc. and leave surfaces generally clean and level to Engineers satisfaction.

2.2 Demolition

Standard:

Carry out all demolition work in accordance with B.S. 6187 and best practice.

Demolition Survey:

Before starting demolition work, examine available information and carry out a survey of the structures, site and surrounding area.

Submit a report and Method Statement describing:

Form, condition and details of the structure, site and surrounding area.

Form, location and removal of flammable, toxic or hazardous materials.

Form, location and removal methods of materials for re-use or recycling.

Type and location of adjoining or surrounding premises, which may be adversely affected by noise, vibration, dust or removal of structure.

Identification and location of services above and below ground, including those required for the contractors own use. Arrangements for disconnection and removal of services.

Type and location of features of historical, archaeological, geological or ecological importance.

Sequence and method of demolition including details of specific pre-weakening.

Arrangements for protection of personnel and the public including exclusion of unauthorized persons.

Arrangements for control of site transport and traffic.

Proposed programme and method of work.

Demolition:

Demolish completely the structures indicated on the drawings. Remove foundations. All materials to be removed from site unless otherwise instructed by the Engineer.

Safety:

Ensure the safety of the works and of the public during demolition work. Carry out demolition work in such a manner as to cause no inconvenience (or minimal inconvenience if no reasonable alternative) to the public and to adjoining owners.

Supervision:

Carry out demolition under the supervision of a nominated responsible person experienced in demolition work who shall ensure that adequate safety precautions are taken.

Operatives:

All operatives to hold appropriate training in demolitions relevant to CIPD Certs of Competence or equivalent.

Explosives Not Permitted:

The use of explosives for demolition shall not be permitted.

Burning:

Do not burn any materials on site.

Nuisance:

Take the necessary precautions to cause no nuisance arising from demolition work. Any action by the Contractor that results in legal action by a third party shall be the responsibility of the Contractor and any costs associated with same shall be borne by the Contractor including any costs incurred by the Employer in defence/investigation of any action.

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Protection, Adjoining Work:

Take all reasonable precautions to protect adjoining work from damage during demolition work and provide temporary screens and coverings required.

Protection, Adjoining Structures:

Protect adjoining structures from damage and provide adequate support at each stage of demolition. Do not disturb adjoining structures.

Ordnance Survey Marks:

Notify the Engineer of Ordnance Survey marks found on structures scheduled for demolition. Do not move, remove or destroy such marks unless instructed to do so by an authorised person.

Disconnect Services:

Before starting demolition work, arrange the appropriate authorities/service providers to disconnect services to the structures scheduled for demolition. Pay all charges for disconnection of services and rerouting of same if required.

Tanks & Pipes:

Remove tanks and pipes which may have contained inflammable liquids and gases in accordance with B.S. 6187.

Report Defects:

Notify the Engineer of any apparent structural defects of decay uncovered during demolition work in parts of structures to be retained.

2.3 Taking Down**Take Down Items:**

Take down carefully all items indicated on the drawings.

Temporary Support:

Provide and maintain all necessary temporary support. Do not remove such support until new work is capable of supporting the structure. Make good any damage. The Contractor shall be responsible for the design of temporary support.

New Openings:

Form new openings in the existing structures as indicated on the drawings. Include for any additional cutting away and making good that may be required. Provide new lintels, where required.

Building up Openings:

Build up existing openings as indicated on the drawings.

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2.4 Ownership & Disposal Of Materials

Materials, Property of Contractor:

Materials and debris arising from site clearance and demolition work shall become the property of the Contractor unless instructed otherwise by the Engineer. Remove from the site debris and materials not for re-use.

Credit, Materials Re-used:

The Employer shall be credited with the value of materials arising from demolition which are re-used.

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Excavation & Loose Fill Work

Excavation Work

3.1 Definitions (Excavation Work)

‘Solid Rock’ shall mean rock in natural ledges or masses that can be moved only by blasting, by pneumatic or hydraulic tools or similar equipment or by wedges and sledgehammers. All solid boulders or detached pieces of rock exceeding 0.3m in size in trenches or 0.6m in general excavation shall be regarded as solid rock. Where documents or drawings state rock assume solid rock.

Thinly Bedded or Shaley Rock:

‘Thinly Bedded or Shaley Rock’ shall mean stratified rock-like material with bedding planes at not more than 150mm intervals and which can be removed by a bucket type excavator.

Topsoil:

‘Topsoil’ shall mean good quality soil capable of supporting plant growth free from stones and debris.

Dry Filling:

‘Dry Filling’ shall mean 50mm broken brick or stone.

3.2 Site Conditions

Nature Of Ground:

MAKE ALL NECESSARY ENQUIRIES ABOUT THE NATURE OF THE GROUND.

Services:

CONSULT THE RESPONSIBLE AUTHORITIES AND SERVICE PROVIDERS, BEFORE COMMENCING EXCAVATION, ABOUT THE POSITION AND TYPE OF UNDERGROUND SERVICES WHICH ARE LIKELY TO BE ENCOUNTERED.

Ground Water Level:

PROVIDE A PUMP AND PUMP SUMP TO CONTROL THE GROUND WATER LEVEL AND ALLOW FOR VARIATIONS FROM THAT LEVEL.

3.3 Rock & Shale Excavation

Any material other than those described as ‘solid rock’ or ‘shaley rock’ above will be paid for at rates quoted for soil excavation.

Bearing Stratum:

If, in the Contractor's opinion, a bearing stratum is obtained at a lesser depth than that shown on the drawings, he shall inform the Engineer.

Excavation Bottoms, Earth:

Level and compact the bottoms of excavations in earth using an approved mechanical levelling plate.

Excavation Bottoms, Rock:

Trim bottoms of excavation in rock.

Formation:

Excavate the last 75mm of earth above formation level immediately before overlying construction is commenced.

Tiering:

Tier surface of sloping ground as directed OR as required providing for safe working and stable slopes.

Reinstatement of Excavation:

Reinstate to formation level with approved filling surfaces of excavations, which have been rendered unsuitable during the progress of the works.

Additional Excavation:

Any additional excavation required to accommodate the temporary support of sides of excavations shall be provided and backfilled at the Contractor's expense.

Unauthorised Excavation:

Backfill unauthorised or excess excavations with approved filling at no expense to the Employer.

Blasting:

The use of explosives is not permitted.

Planking and Strutting:

Sides of excavations should be sloped to avoid the need for support if possible. Support sides of excavations as necessary and in accordance with statutory requirements. Trench-boxes or other suitable shoring must be employed where any operatives are working in trenches.

Rock:

The Engineer shall determine what is 'solid rock' or 'shaley rock' and his decision will be final and binding on the Contract.

The Contractor must include in his price for trimming the surface of Rock and Shale and also for any trimming required to vertical faces.

Verification of Rock Excavation:

The exact amount of rock and shale excavated shall be measured by the Contractor and verified by the Engineer or his agent and checked and certified by the Engineer before any payment for same shall be made. The payment for rock and shale excavation shall be settled at the final settlement of accounts after Practical Completion of the Contract.

Rock In Foundation Trench:

In the event of rock being located in foundation trenches 50mm sand blinding well consolidated shall be laid under concrete foundation.

Rock Excavation:

The rock excavation will be measured separately and paid for at the extra price over earth excavation, but only the quantity excavated to the widths and depths of the trenches, etc. shown on the drawings will be paid for regardless of the actual widths and depths excavated.

Width of Services Trenches in Rock:

In all cases, except drain and cable trenches the widths of the foundations shown on the drawings will be taken for the purpose of computing quantities of rock excavation. In the case of service and cable trenches, the following widths will be used: For 100mm pipes - 525mm wide. For 150mm pipes - 600mm wide. For 225mm pipes - 675mm wide. For 300mm pipes - 750mm wide.

Excessive Excavation:

Should the Contractor excavate to greater widths or depths than those indicated on the drawings, he will be paid only for the size of the foundations, columns, etc. indicated on the drawings, and he will not be paid for any casing necessary to confine the concrete to those dimensions.

Provisional quantities:

If provisional quantities for rock and shale are shown in the pricing document the Contractor must fill in the rate per cubic meter at which he is prepared to carry out additional rock excavation etc.

3.4 Disposal of Water**Surface Water:**

Keep excavations free from surface water.

Pumping:

Do not pump water from excavations into permanent drainage systems,

IT IS THE DUTY OF THE CONTRACTOR TO ENSURE THAT EVERY CARE IS TAKEN TO ENSURE THAT WATERCOURSES ARE NOT CONTAMINATED.

Continuous Pumping:

Where continuous pumping is proposed / required, notify the Engineer.

Silt:

Prevent silt from entering the permanent drainage system and watercourses when disposing of water. In sensitive locations, pumped water to be tankered off site and suitably treated.

3.5 Disposal of Materials

Surplus Materials, Stockpile:

Stockpile surplus excavated materials in temporary spoil heaps on site.

Unsuitable Materials:

Remove excavated materials unsuitable for filling from the site.

Surplus Materials, Removal from site:

Remove surplus excavated materials from the site.

Underground Services:

Notify the Engineer and the responsible authority and obtain instructions when underground services other than those shown on the drawings are encountered.

Notice:

Notify the Engineer when the excavations are ready for inspection and obtain his approval before proceeding with construction. On no account shall any concrete be placed until the Engineer is satisfied with bottom of trenches, etc.

Filling Work

3.6 Filling Work - Definitions

Hardcore:

‘Hardcore’ shall mean hard stone, concrete, coarse gravel and approved recycled material, free from unsuitable filling material and capable of passing through a 75mm sieve size.

The material shall lie within the following grading limit.

Sieve size - % by weight passing

| 75mm – 100% | 37.5mm – 85% | 10mm – 40% | 5mm – 25% | 60micron – 8%

| 75micron - 0 – 10% |

The material passing the 425micron sieve shall be non-plastic. Material used shall be frost resistant.

Rock Fill:

‘Rock Fill’ shall mean sound hard rock or broken stone. The material shall lie within the following grading limit.

Sieve size - % by weight passing

| 100mm – 100% | 37.5mm – 85% | 10mm – 40% | 5mm – 25% | 60micron – 8%

| 75micron - 0 – 10% |

The material passing the 425micron sieve shall be non-plastic. Material used shall be frost resistant.

Suitable Earth Filling:

‘Suitable Earth Filling’ shall mean material either arising from excavation or imported which is capable of being compacted as specified subject to approval of the Engineer.

Unsuitable Filling:

‘Unsuitable Filling Material’ shall mean any of the following - Perishable material, logs, stumps, slurry and mud material from marshes or bogs, material susceptible to spontaneous combustion, material in a frozen condition, clay of liquid limit exceeding 80% and/or plasticity index exceeding 55 as determined in accordance with B.S. 1377. Materials with a water soluble sulphate content in excess of 0.1%. Materials having a moisture content greater than the minimum permitted. For cohesive soils the permitted moisture content shall be not greater than the soils plastic limit multiplied by 1.1 subject to approval of the Engineer.

Topsoil Excavation**Surface Excavation:**

Excavate topsoil from the area indicated and preserve for re-use. Excavate generally, as necessary to finished levels as shown on drawings.

Topsoil, Stockpile:

Stockpile excavated topsoil in temporary spoil heaps where directed. Keep separate from other materials.

3.7 General Excavation

If the Contractor is not satisfied as to the accuracy of the levels shown on the drawings, he must give written notice thereof to the Engineer before any excavations are commenced otherwise no claim in respect of inaccuracy of levels will be entertained.

Foundation Excavation:

Excavate as necessary to allow for finished work to be dimensions, levels, lines and profiles shown on the drawings, or as directed.

Filling Work**Placing Earth Fill:**

Spread and level earth filling in 150mm deep lightly compacted layers in open areas only, in other areas earth must be compacted as appropriate to final use of area.

Placing Earth Fill, Drainage:

Place fill so that water may drain freely from exposed surfaces.

Protection of Fill:

Reinstate compacted fill where damaged during the progress of the works.

Rock Fill:

Spread and level rock fill in layers of not more than 450mm loose depth.

Backfilling Trenches:

Backfill foundation trenches and isolated footings with earth filling and mechanically compact in 150mm deep layers.

Backfilling:

Backfill and compact excavations wider than required without expense to the Employer.

Backfilling, Excessive Depth:

Backfill excavations deeper than required with compacted lean mix concrete without expense to the Employer.

Backfilling Trenches:

Backfill trenches inside external rising walls to underside of concrete floor slabs with hardcore compacted with a mechanical punner in 150mm thick layers to the required depth.

3.8 Compaction Work**Compaction:**

Compact and consolidate each layer of fill thoroughly.

Hardcore:

Lay hardcore in 150mm thick layers and with a 50mm thick top blinding layer of sand/quarry dust. Consolidate/compact to an even surface and to the required levels and contours with a 3 tonne roller

or with a mechanical punner capable of equivalent compaction. Compact hardcore under paths and pavings for pedestrian traffic with a similar roller and compact hardcore under pavings for vehicular traffic with eight passes of a 10 tonne vibrating roller per 150mm deep layer

Rock Fill:

Compact rock fill in 200mm thick layers by not less than twelve passes of a towed vibrating roller with a static load of at least 50 kg per 25mm of a roll or a grid roller with a load of at least 225 kg per 25mm width of roll.

External Works

4.1.1 General

Site Inspection:

The Contractor shall be deemed to have visited the site and to have fully acquainted himself with local ground conditions and facilities for access to the site and storage of materials.

Site access:

The Contractor shall agree the conditions of access to the site with the Employer.

Storage of Materials:

The Contractor shall provide all temporary accommodation for the storage of equipment and in a location agreed with the Main Contractor.

Building Regulations, standards and codes of practice:

Compliance with the following standards and codes of practice will be required in the execution of the works.

B S 5606: Code of practice for accuracy in building.

B S 5964: Methods of setting out and measurement of buildings, permissible measuring deviation.

B S 6954: Parts 1-3: Tolerances for buildings.

B S 3936: Nursery stock

Part 1 (1992) Trees and shrubs.

Part 2 (1990) Roses.

Part 3 (1987) Bulbs Corms and Tubers.

Part 4 (1995) Ground cover plants.

Part 6 Herbaceous Perennials and Alpines.

B S 4043: Transplanting root-balled trees.

B S 3882: Topsoil.

B S.7370: Ground Maintenance

Part 4 (1993) Recommendations for the maintenance of soft landscape.

B S 4428: Code of practice for general landscape (excluding hard landscape)

B S 5236: Recommendations for cultivation and planting of trees in advanced nursery stock.

These standards shall be considered as the minimum requirements for the works described. The schedule above is not exhaustive and should be supplemented by those listed under each relevant section.

Where there is in existence a relevant British Standard, Draft B S, Code of Practice, DIN Standard or EN codes applicable to the design, execution, performance or application of the works, then the recommendations and requirements of such documents shall be considered a minimum standard for the works described.

Nothing herein relieves the Contractor of his responsibility to provide a higher standard than the relevant code or standard, where necessary, to comply with other sections of this specification.

Drawings:

Do not scale drawings. Work to figure dimensions only. Should dimensions or details between drawings conflict this must be immediately referred to the Engineer for clarification. The contractor also is responsible for checking that there is no conflict between existing dimensions and proposed dimensions.

Supervision:

The landscape works will be supervised by the landscape designer on behalf of the client. The contractor will carry out works in accordance with specification, drawings and, when required, direction from the landscape designer.

Defects Liability Period:

Maintenance and guarantee of extra heavy-standards and semi mature-trees for 2 years after completion of all planting and all other trees, shrubs or herbaceous perennials for 1 year after completion of planting. Any of the works found to be defective within the defects liability period, due to materials or workmanship and at variance with the specification, shall be replaced by the contractor at his own expense. Any aftercare generated by this making good shall be agreed with the landscape designer and a suitable time frame agreed.

Health & Safety:

The Contractor shall be responsible for the safety of his staff. He shall comply with all the Statutory instruments and regulations in existence, listed or not in this document.

Hazardous Substances:

The following routine precautions should be adhered to the handling of herbicides, pesticides and other hazardous substances:

Read the label, especially the safety precautions, carefully before use.

Use all products only as recommended on the label.

Avoid drift onto livestock, neighbouring property or wildlife habitats and take care to prevent contamination of any watercourse, sewer or drain. Report any contamination immediately to relevant authorities and take prompt remedial action.

Products shall be stored only in the manufacturers' containers in which they were supplied. Do not transfer them into other storage containers, especially soft drinks bottles.

Close tightly any partially full containers. Do not store any hazardous substances on site unless properly secured in an appropriately designed area. Keep away from food stuffs, and out of reach of children or animals.

Wash any accidental spillage from surface of protective clothing immediately.

Wear all protective clothing recommended for the product. Clean all protective clothing used, when the job is complete.

Wash hands and exposed skin before eating, drinking or smoking and after the job is complete.

Remove all used containers from site after each day's work and dispose of them safely.

Do not use empty herbicide or pesticide containers for any other purpose.

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Immediately report any theft of hazardous substances to the Garda Síochána.

Public Roads:

The Contractor shall take all precautions for the safety of the users of public roads. He shall comply with all regulations governing road safety, and shall include for warning of any temporary obstructions. No vehicle entering or leaving the site shall deposit mud or material of any kind on the surrounding roads, any such deposits will be cleaned up immediately, not washed into drains.

4.1.2 Earth Works**Notice for inspection:**

As and when the course of the work requires the contractor is to give 48 hour minimum notice to the landscape architect in advance of the final shaping up of the various banks before the topsoil is placed so that they can be inspected and approved by the landscape designer.

Double handling:

Grading is intended to be carried out without double handling any topsoil or subsoil. In particular the soil moving connected with the formation of earth banks should be carried out as a single operation.

Protection:

The contractor shall be responsible for the protection and conservation of existing topsoil in all parts of the site including in his operations, whether in areas affected by earth moving or not.

Subsoil:

On no account is the contractor to permit the subsoil to be mixed with the topsoil. Should the grade and/or surface of the existing topsoil be disturbed or destroyed during the provision of access of his equipment or machinery, he should notify the landscape architect and make good. Any subsoil which has become compacted by site traffic, stock piling of materials or temporary structures will be loosened to a minimum depth of 600mm at the expense of the contractor. The method and equipment used shall be agreed prior to commencement of work. 75 mm corrugated land drains, additional to those indicated on drawings, will be laid at 600mm depth, surrounded with 50 mm clean drainage stone at 3 metre centres and discharged to a suitable collection system as directed on site. Re-level subsoil taking care not to over compact and grade surface as directed in preparation for receiving topsoil layer.

Topsoil:

Before any areas are excavated or filled the existing topsoil, to its full depth, is first to be removed and stored in mounds not more than 1 metre high. The topsoil will comprise of clean uncontaminated friable soil of medium texture with adequate humus content obtained from previously cultivated land: pH value neutral to slightly acid. Free from unrotted vegetable material other than soil and a maximum 20% content (by dry weight) of stones not exceeding 50mm.

Levels:

Levels shown are finished levels, and are to allow for the spreading of topsoil over all disturbed areas. Unless otherwise stated, finished levels of grass area shall be 25mm proud of adjoining paving or kerbs. Levels shall be arranged to give gentle falls, minimum 1:60, for drainage and to avoid ponding hollows. When finished levels are not given, the levels shall be such that the finished surface will have a smooth, even fall (or gently rolling curve if shown) between the finished levels and the boundaries of the area. When the contours of the banks adjoining roads etc. which are shown on the landscape drawings and there are discrepancies which require adjustment of levels, these are to be modified as agreed with the landscape architect on site.

Slopes: Grass slopes are to be a maximum 1:4 gradient and minimum 1:60 gradient.

Surplus fill:

If it should prove, during the course of the work, that more or less materials should be used on various mounds than has been provided for in the contours shown on the drawings, subject to the general confirmation of the contours being unchanged, the landscape architect may authorise such modifications as prove to be necessary as the works proceed. Uneven settlement which becomes apparent within the defects liability period is to be rectified and reinstated at the contractors expense at a time agreed with the landscape architect.

Gradients adjacent to roads, paths, etc:

In all cases, at foot of all banks adjacent to paths, paving surfaces, walls or buildings, there is to be a horizontal strip, 450mm wide, lightly hollowed, towards the bank. The slopes are to rise in an open curve from this up the bank. Under no circumstances are changes of direction in the slope, whether horizontal or vertical, to be sharp or angular, unless as shown on drawing.

Fill for forming banks:

Where fill is required to make up levels to required grades this is to be made up with approved subsoil, allowances being made for the subsequent spreading of 200mm deep of topsoil generally and 300mm in plant beds.

Hardcore:

Hardcore broken brick etc. may be deposited only where and when directed on site.

Rubbish:

Rubbish is to be removed from site and disposed of in an approved manner.

Settlement:

The contractor is to take all due care in the course of the earth moving work to insure that all deposited material is evenly consolidated, and especially that any lumps of soil are completely broken up in the course of the grading work. The placing of all soil to grades as shown is to allow for settlement. A suitable period is to be allowed to elapse subsequent to the soil being placed and prior to finished grading. Should special problems connected with the programming of the work

arise these are to be resolved with the landscape architect before further work proceeds. Uneven settlement which becomes apparent within the defects liability period is considered to be part of the main contract and is to be rectified and reinstated at the contractors expense at a time agreed with the landscape architect.

Vehicles & Equipment

Only lightweight rubber tyred vehicles and equipment are to be used after the grading has been shaped up and approved. Under no circumstances may heavy or track equipment be taken onto such areas.

Earth moving near existing trees:

Where earth moving takes place near existing trees roots the greatest care is to be taken to insure that they are no way damaged or destroyed whether by compaction, reduction of levels or by the placing of fill. The contractor shall in no case lower the existing level of the ground within the root spread of trees or place fill without specific prior instructions. Where fill is placed it is not to exceed 75mm overall additional depth without the approval of the Landscape Architect.

Final grading:

Final grading is to be free from any pronounced local mounds or depressions and all areas are to be graded to a true and even surface at the levels and slopes shown on the drawings.

Contamination:

Topsoil should not be contaminated by contact with salt, cement, lime etc, or by petrol, oil or other harmful liquids.

Topsoil:

Before application of topsoil all rubbish, stones exceeding 50mm gauge and extraneous material is to be removed from site.

Application:

The topsoil application is to be carried out in such a manner that, duly consolidated, the topsoil forms a finished surface at no point less than 200mm in depth.

Reinstatement:

If, after topsoil application is completed, the upper level of soil with a depth of 250mm from the surface is considered by the landscape designer to be unduly compacted as a result of prolonged operational traffic or from working under unfavourable weather conditions, the contractor shall loosen the soil to the required depth over such areas as shall be indicated to him at his own expense. This loosening shall be done by transverse operations of a rotovator or other approved equipment, followed by chain harrowing. No rotovation shall be done if the soil is wet, or during wet weather.

4.1.3 Grass Seeding

Generally:

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.

Preparation:

Loosen and aerate compacted and undisturbed sub-soil with a ripper to a depth of 600mm then level and lightly compact the subsoil before spreading topsoil.

Within a few days before planting, but in suitably dry weather and ground conditions, cultivate the full depth of the topsoil of all proposed grassed areas and lawns, using suitable plant to loosen, aerate and break up the soil into particles of 2-8 mm.

Leave surface regular and even.

Remove weeds, perennial weed roots and undesirable material brought to the surface including stones and clods larger than 50 mm in any dimension, roots, tufts of grass and foreign matter. Fork over by hand in restricted areas. Break up any large lumps of soil and rake and fork to produce a fine tilth of soil suitable for planting of grass seed.

Topsoil:

All topsoil shall be carefully conserved and additional topsoil shall be incorporated where necessary to provide a minimum depth of 200mm after re-levelling

Additional topsoil:

The contractor shall include in his tender for loading, carting and spreading such additional topsoil as may be necessary to achieve this standard.

Topsoil Sample:

Do not deliver topsoil until a 5 cubic metre load has been inspected and approved. Keep the approved delivery on site as a standard of compliance.

Levels:

Topsoil level shall be 25mm above adjoining paving and 150mm below the damp-proof course level of buildings.

Drainage:

Where necessary provision shall be made to take surface water from damp patches and ponding hollows, by means of land drains.

Fertilising:

Seed bed, free of weed, shall be formed; the area being seeded to be dressed with two approved fertilizers, each at 28 g per m². the first to contain sulphate of ammonia with a minimum of 20% nitrogen and the other super phosphate containing a minimum of 18% phosphoric acid (water

soluble). These are to be applied 3 to 5 days before seeding, unless in granular form; (if applied by mechanical distributor two equal applications are to be made in opposite directions) then rake and consolidate to provide a suitable tilth for the germination of the seed.

Seeding front & rear gardens:

Grass seed to the following mixture shall be supplied and cross sown at the rate of 40g per m² 'Coburns Heavywear Mixture' 25% Talgo Dwarf Perennial Ryegrass, 25% Darius Dwarf Perennial Ryegrass, 50% Herald Strong Creeping Red Fescue. (Irish grown) or similar approved

Seeding amenity areas:

Grass seed to the following mixture shall be supplied and cross sown at the rate of 40g per m² 'Coburns Urban Parks Mixture' 30% Darius Dwarf Perennial Ryegrass, 15% Numan Dwarf Perennial Ryegrass, 30% Herald Strong Creeping Red Fescue 20% Wilma Chewing Fescue, 5% Highland Brown top Bentgrass (Irish grown) or similar approved

Origin of seed:

The contractor shall satisfy the landscape designer regarding the origin and germination of the seed, and obtain approval to any variation in the mixture. The landscape designer may take samples of seed, when delivered to site, to be tested for purity and germination.

Raking:

The seed bed shall be raked or harrowed and rolled as necessary.

Protection:

The contractor shall protect newly seeded areas at all vulnerable points to prevent the destruction of seedlings by pedestrians or any extraneous traffic. For this purpose he shall provide and fix 2 no. rows of wire supported on wooden posts projecting 1m out of the ground at approximately 2m centres, or other approved type. These fences shall be maintained by the contractor, and when the grass is established, shall be removed and cleared away and the grassed area made good. Any damage to grass shall be made good until the areas are handed over.

Maintenance:

When the grass has grown 100mm high it shall be cut, avoiding root pull, and cut again after a further 25mm growth. Thereafter it shall be kept cut to 25mm high until the end of the current growing season and maintained to establish a reasonable cover of the specified mixture free of weed is established and to be handed over in pristine condition at the end of the contract Maintenance Period. Any shrinkage below the specified levels during the contract Maintenance Period should be rectified.

4.1.4 Grass seeding: Woodland area**Generally:**

Refer to general clause in *Grass seeding*.

Grass:

Shall be established where ever shade is not too dense.

Preparation:

All areas shall be cultivated to a depth of 100mm and all large stones, perennial weeds and rubbish removed to tip. Care should be taken to avoid damage to tree roots.

Topsoil:

Refer to topsoil clause in *Grass seeding*

Additional topsoil:

See Grass seeding

Levelling:

Shall be carried out to eliminate ponding hollows and to maintain the ground level around existing trees. To avoid damage to tree roots topsoil may need to be imported.

Fertilising:

Seed bed free of weed shall be formed; super phosphate (minimum 18% phosphoric acid-water soluble) and sulphate of ammonia (20%N) supplied and evenly distributed at the rate of 28g per m² each then raked and consolidated to provide a suitable tilth for the germination of seed.

Seed:

Grass seed to the following mixture shall be supplied and cross sown at the rate of 40g per m² :
30% Rough Stalked Meadow Grass (*Poa Trivialis*) 40% Wood Meadow Grass (*Poa Nemoralis*), 30% Perennial Rye Grass (*Lolium Perenne*) or suitable similar mixture may be approved subject to specialist recommendation

Grass seeding:

Renovation of existing grassland (disturbed during development)

Clearing grass:

Existing grass over the whole of the site less than 100mm high, removed, and properly disposed of. All rubbish shall be removed to tip.

Levels:

All slopes in the area shall be levelled to falls not greater than 1 in 4, and any ponding hollows eliminated keeping topsoil on top.

Fertilizing:

Sulphate of ammonia (20 % nitrogen) shall be supplied and evenly distributed at the rate of 125 kg per hectare and harrowed in.

Bare patches:

Shall be aerated and cultivated sufficiently for germination of grass seed.

Seed:

Supply and cross sow the following mixture at the rate of 60kg per hectare: 60% Timothy (*Phleum pratens*) and 40% Wild White Clover-percentages by weight.

4.1.5 Clover seeding for use as temporary cover for tips & wasteland**General:**

Operations shall be planned so that seed germination period does not coincide with periods of frost.

Preparation:

Areas to be graded to falls; minimum 1 in 60, maximum 1 in 4 , eliminating ponding hollows ,and brought to a tilth suitable for the germination of the seed

Fertilising and sowing:

Areas for seeding are to be dressed with two approved fertilizers, each at 25g per m² the first to contain sulphate of ammonia with a minimum of 20% nitrogen and the other superphosphate containing a minimum 18% phosphoric acid (water soluble). They are to broadcast and crossdrilled.

Seeding:

Supply and cross sow at the rate of 14 kg per hectare the following seed –White Wild Clover of approved source.

Origin of seed:

See Grass Seeding clause.

Raking:

See Grass Seeding clause.

4.2. Planting**4.2.1. General requirements****Spreading of Topsoil:**

At the commencement of planting the areas to be planted will be covered by topsoil as spread by the Main Contractor. Carry out all works as specified in previous section *titled* Earth Works.

Topsoil:

See definition in *Grass seeding* clause.

Site Clearance:

Remove rubbish, concrete, metal, glass, decayed vegetation, contaminated topsoil, and stones with largest dimension exceeding 50mm.

Contamination includes subsoil, rubble, fuel, lubricants or other substances injurious to plant growth.

Grub up and dispose of large roots without undue disturbance of soil and adjacent areas.

Apply a suitable non-residual herbicide, as per clause 0 below, to areas other than those areas, if any, in which vegetation is to be retained.

Do not use machines within the root spread, drip line (or, within 3m of the trunk, whichever is greater) of existing trees to be retained (in same position or retained and relocated on site).

Weed Control For All Areas:

Prevent weeds from seeding and perennial weeds from becoming established, by hand weeding or application of herbicide as follows:

Glyphosate: 'Roundup', manufactured by Monsanto plc, or equal and approved, to manufacturers recommendations. Do not apply if rain is forecast within six hours or if wind speed is likely to exceed 25kph, or cause spray drift. Ensure complete, consistent cover. Ensure that symptoms are fully visible on foliage before cultivation. Do not allow the herbicide to come in contact, either directly, or indirectly with any part of any existing plant to be retained, or any plants stored on site.

Propyzamide: 'Kerb 50W', or equal and approved, as for 'Roundup'. Apply between 1st October and 20th December, when ground is damp.

General Fertiliser:

'Sierrablen flora Yellow (granular)' by Scotts controlled release fertiliser with 24 month longevity shall be applied to all areas to be planted at a rate of 120g/m² immediately before cultivation.

4.2.2 Protecting Existing Trees**Site Clearance:**

It is the responsibility of the Contractor to remove and dispose of, off-site, any rubbish still occurring in areas to be fenced off for tree protection, including rubble, wire & concrete. Any masonry or stonework found are to be reported immediately to the Landscape Designer. Care is to be taken by the Contractor at this stage to minimise disturbance of the existing ground conditions and vegetation.

All scrub areas in the construction zone, ie not to be protected, shall be grubbed and all existing plants of same shall be removed and disposed of, off site, to licensed tip including all root systems unless otherwise specified.

Extreme care shall be taken when felling, removing and transporting trees and during tree surgery operations, so that no damage is done to existing trees to be retained and the ground flora.

Maintenance of Tree Protection Fencing: The Contractor is to maintain the line of tree protection fencing and the land inside it's protection for the duration of the project. Under no circumstances must rubbish, building material, waste, plant or machinery be stored or deposited behind protection

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fence. Under no circumstances must vehicles or machinery track over the ground protected by the fence.

All litter collected along the base of the fence, in the debris cloth or in the land bounded by the tree protection fence is to be removed by the Contractor at the end of each week.

Existing stones, rocks, deadfall and undergrowth to be left untouched. There is no requirement to cut the grass, prune undergrowth or spray weeds behind the tree protection fence unless otherwise directed by the Landscape Architect.

Tree Surgery & Removal:

Tree Surgery must be carried out by a licensed Tree Surgeon at any time of the year except nesting season, February to May.

Before starting work the Contractor shall verify with the Landscape Architect and Arboricultural Consultant the full extent of the priced works to be undertaken.

The Contractor shall liaise with the Landscape Architect and Arboricultural Consultant to clearly mark or otherwise indicate on site, trees to be removed and trees where surgery will take place.

If tree work shall be in accordance with current arboricultural practice and all operations shall be carried out with due regard to current safety regulations and requirements and using appropriate machinery tools and guards for the same as necessary.

All tree works to comply with BS 3998 'Tree Work' and the Forestry and Arboriculture Safety and Training Council Safety Guides.

Tree removal shall include the grubbing up of rootball and stump in areas where construction is to take place. In areas where no construction is to take place the Contractor shall grub up all roots of shrubs and smaller trees if directed by the Landscape Architect.

The Contractor shall allow for backfilling of all voids created as a result of tree stump removal, with approved compacted fill material.

All branches, roots, debris and all arising to be chipped and disposed of in the fell area. All large timber (as identified by the Landscape Architect) to be left on site in approved storage location (to be determined). All large timber to remain the property of the Employer unless the Contractor is instructed to remove it from site, or purchases it at a price to be agreed.

The Contractor is to ensure that trees are taken down carefully in small sections to avoid damage to adjacent trees, structures that are to be retained, where tree canopies overlap and in confined spaces generally.

The Contractor is to obtain the Landscape Architect's approval before removing stumps by winching and must not use other trees as supports or anchors during removal.

No temporary buildings, machinery, storage areas, or materials are to be located within 5m (horizontal distance) of the canopy spread of trees or shrubs unless approved by Landscape Designer.

Replacement Costs:

The value of all trees to be retained shall be calculated in accordance with the Arboricultural Association guidelines.

The Contractor shall be liable for vegetation loss or damage to roots, trunks or branches, which in the opinion of the Contract Administrator significantly affects the value or life of existing trees to be retained. Replacement plants or any tree surgery work that the Landscape Architect may decide to be appropriate as a result of damage by the Contractor's works, shall be carried out by the Contractor, at the Contractor's own expense and to the requirements and satisfaction of the Landscape Architect.

Soil Conditions:

Cultivate and plant into moist friable soil that is not waterlogged.

Do not plant into frozen or snow covered soil without prior approval of the Landscape Architect. Provide adequate additional root protection and prevent planting pit sides and bases and backfill materials from freezing.

Climatic Conditions:

Carry out the work while soil and weather conditions are suitable for the relevant operations. Do not plant during periods of frost, heavy rain, snow, hail or strong winds. Plant only during the following periods:

Deciduous trees and shrubs: Early November to late March.

Conifers and evergreens: September/October or April/May.

Herbaceous plants (including aquatic and marginal): September/October or March/April.

Container grown plants: At any time if ground and weather conditions are favourable. Ensure that adequate watering and weed control is provided.

Machines and tools:

Use only machinery and tools suitable for the site conditions and the work to be carried out. Use hand tools around trees, plants and in confined spaces where it is not practical to use machinery. Comply with clause 112 of this document.

Watering generally:

Ensure the full depth of topsoil is thoroughly wetted, to field capacity.

Use a fine rose where appropriate to avoid damaging or loosening plants.

Do not over-water.

Do not flood or cause any areas to be water logged.

Do not cause mud or other materials to be splashed onto foliage.

Water as necessary to ensure the establishment and continued thriving of all planting.

Water when specified and when instructed by the Landscape Architect.

Watering Tubes:

When planting semi-mature and extra heavy standard trees install a 100mm diameter wavin perforated coil.

Install the tube around the full diameter of the root-ball, in a spiral fashion, as close to the surface of the root-ball as possible. Position the lower end of the tube at the same level as the underside of the rootball. Extend the upper end 100mm above the finished bark mulch level.

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Securely fit a dust cap to the upper end of the tube.

Where the tree is planted in hardscaped areas ensure that the watering tube and dust cap are integrated with the tree grille as specified.

Water Restrictions:

If water supply is or is likely to be restricted by emergency legislation, do not carry out planting until instructed. If planting has been carried out, obtain instructions on watering.

Notice

Provide three working days notice of the following operations, to give the Landscape Architect the opportunity of being present:

Setting out

Application of herbicide

Application of fertiliser

Delivery of plants

Planting of shrubs, herbaceous perennials and biennials

Planting of trees into previously dug pits

Installation of semi-permeable membranes

Watering

Each site visit during maintenance period

Replacement planting.

4.2.3 Preparation, Planting And Mulching Materials Generally:**Contaminated material:**

Do not use materials containing concentrations of toxins, pathogens or other extraneous substances harmful to plant, animal or human life, except as specified elsewhere.

Submit to the Landscape Architect a supplier's certificate for the following materials and obtain approval before ordering or using the materials:

Topsoil

Compost

Mulch

The certificate(s) must provide the following information:

Source of supply

Analysis of content

Confirmation of suitability for proposed purpose

Confirmation of absence of harmful substances.

Samples, if requested, should be provided and be kept on site as a standard of compliance.

Back filling Material:

Backfill with a mixture of topsoil excavated from the pit and additional topsoil as required, together with (30% by volume) loosened organic matter such as 'Danu' organic manure or similar approved, and general fertiliser as per clause

After planting:

Water plants thoroughly, immediately after planting, use a fine rose or sprinkler to avoid damaging plants.

Lightly firm soil around plants.

Fork or rake soil, without damaging roots, to a fine tilth with gentle cambers and no hollows.

Mulching Planting Beds:

Chipped bark mulch (medium grade) of approved source free of pests, disease, fungus and weeds.

Clear all weeds, water soil thoroughly and mulch total area of planting beds to a minimum depth of 75mm.

Also see section *titled* 'Maintenance period'

4.2.4 Trees/Plants Generally

Materially undamaged, sturdy, healthy, vigorous, of good shape and without elongated shoots.

Grown in a suitable environment and hardened off.

Free from pests, diseases, discoloration, weeds and physiological disorders.

Budded or grafted plants to be bottom worked, unless otherwise specified or approved.

With balanced root and branch systems, root system and condition in accordance with the relevant part of the National Plant Specification. True to name.

Semi-Mature Trees:

To BS 4043, sizes and other criteria as scheduled.

The Contractor must confirm the details of the supplier in writing to the Landscape Architect.

Do not arrange for the delivery on site of any semi-mature trees without the prior approval of the source of supply by the Landscape Architect. The Landscape Architect reserves the right to tag specific trees at specific nurseries for use on this project.

Origin/Provenance:

All native species must be of Irish origin unless otherwise specified by the Landscape Architect.

Origin and Provenance have the meaning given in the National Plant Specification.

Where trees are specified as clear-stemmed it is the Contractor's obligation to source trees that have been cultivated as such in the nursery. Trees which have been cultivated as feathered and pruned immediately before arrival on site to form clear-stemmed trees will not be accepted. New pruning cuts will be deemed unacceptable and the Contractor will be obliged to source properly clear-stemmed trees elsewhere to the approval of the Landscape Architect.

Trees/plants:

To the relevant part of BS 3936, name, forms, dimensions and other criteria as scheduled.

Container Grown plants:

Supplied in a growing medium with adequate nutrients for the plant to thrive until permanently planted and centred in the container, firmed and well watered. The plant should have root growth substantially filling the container, but not bound and in a condition conducive to successful transplanting. The roots should be established to such an extent that the root-ball remains totally intact upon removal of the container.

The plants in question should be grown in the open at least two months before being supplied and grown in containers with holes adequate for drainage when placed on a substrata commonly used under irrigation systems.

Containers and growing medium are to be free from all forms of pest including adult vine weevil, their eggs and larvae.

Climbing plants are to be supplied in deep containers.

Labelling: Label all trees and plants in accordance with the relevant part of B S 3936.

Substitutes: If specified plants are unobtainable or known to be likely to be unobtainable at the time of ordering, submit alternatives to the landscape architect stating cost and how they differ from the specification. Such substitutions may not be deemed suitable, additional submissions may be required. Approval must be obtained before any substitutions are made.

Delivery to site:

No plants are to be stored on site for more than 48 hours prior to planting.

Do not store semi-mature trees on site.

Prepare the planting pit and make all necessary arrangements for planting before the delivery on site of semi-mature, extra-heavy standards and heavy standards. Pits and preparation work not to be more than 48 hours in advance of delivery.

Plant and tree handling:

Protect trees from frost wind and droughts. Handle plants and trees with care. Protect from mechanical damage and do not subject to shock.

Planting:

Before planting remove containers, ties wraps and other materials that might restrict the growth of the roots. Plant upright and/or well balanced with best side to front. Plant to the nursery line. In naturally occurring wet or boggy conditions there may be a requirement to 'mound' plant. Where this is the case obtain instructions from the landscape architect prior to proceeding.

Tree wounds:

Keep wounds as small as possible and cut cleanly back to sound wood using sharp clean tools. Set cuts so that water does not collect on cut area. Do not apply fungicide or sealant unless instructed.

Protect existing grassed areas:

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Protect existing grass/field layer, during planting operations, by laying boards or tarpaulins. Do not place excavated materials directly onto grass/field layer.

Surplus materials:

Remove all surplus material including subsoil, stones, debris, wrapping material, canes, ties temporary labelling etc. and properly dispose.

4.2.5 Preparation of planting beds & planting material**Weed Control For All Areas To Be Planted:**

Prevent weeds from seeding and perennial weeds from becoming established, by hand weeding or application of herbicide as follows:

Glyphosate: 'Roundup', manufactured by Monsanto plc, or equal and approved, to manufacturers recommendations. Do not apply if rain is forecast within six hours or if wind speed is likely to exceed 15mph/25kph, or cause spray drift. Ensure complete, consistent cover. Ensure that symptoms are fully visible on foliage before cultivation. Do not allow the herbicide to come in contact, either directly, or indirectly with any part of any existing plant to be retained, or any plants stored on site.

Propyzamide: 'Kerb 50W', or equal and approved, as for 'Roundup'. Apply between 1st October and 20th December, when ground is damp.

Peat:

Horticultural moss peat, dark brown, medium grade (Bord na Mona or equivalent), free from pests, diseases and contaminants.

Planting beds:

To have a minimum depth of 300mm topsoil.

Soil Conditioner/Ameliorant:

'Danu' organic manure, or equal and approved.

Apply a 50mm layer evenly over all planting areas and thoroughly work the compost in to the top 300mm before planting.

Cultivation:

Break up any compacted topsoil to full depth.

Within a few days before planting, but in suitably dry weather and ground conditions, cultivate top 300 mm of all planting beds, using suitable plant to loosen, aerate and break up the soil into particles of 2-8 mm.

Leave surface regular and even and within 50 mm of levels specified on drawings.

Remove weeds, perennial weed roots and undesirable material brought to the surface including stones and clods larger than 50 mm in any dimension, roots, tufts of grass and foreign matter.

Do not dig or cultivate within the root spread or drip line of trees and shrubs to be retained unless otherwise instructed by the Landscape Architect.

Mulch Matting/Geotextile Fabric:

Terrain 1000 or equal and approved for use between drainage layers and topsoil.

Water soil thoroughly before laying. Lay before planting, taking care to ensure close contact with the soil surface. Lap joints as recommended by manufacturer with no gaps.

Shrub Planting pits:

Excavate not more than 2 days before planting and retain topsoil for reuse where specified. The pit to be 150mm wider and deeper than the root spread of the plants to be planted. Break up bottom of pits to a depth of 150 mm.

Backfilling material to be as removed from planting pits prior to planting or mixed elsewhere on site and imported to the planting pit and to comply with clause 0 and clause 0

Hedges:

Shrubs or transplants for hedges as specified on drawing to be consistent in species, cultivar and clone, to insure a uniform hedge. Plant shrubs or transplants in trenches large enough to take full spread of roots plus 150mm in all directions. Trim hedge to height agreed with Landscape Architect during the first two weeks of august.

4.2.6 Tree Planting:**Setting out:**

As shown on accompanying drawings.

The exact setting out of trees to be agreed with the Landscape Architect on site.

Conifers/evergreens:

Dip in or thoroughly spray with anti-desiccant before delivering to site. Apply again soon after planting. Do not apply in rainy or frosty weather. Ensure full coverage of underside of foliage.

Tree pits:

Excavate square shaped pits with slightly raised centre. Retain topsoil for re-use where specified. In sloping ground, maintain horizontal bases and vertical sides with no less than minimum depth throughout.

Size(s): Large enough to accommodate the full spread of the roots plus minimum 400mm in all directions.

Break up bottoms of pits to a depth of 150mm and scarify sides.

Backfilling material: As per clause 0 of this document.

Tree pits in hard landscape:

Excavate square shaped pits with slightly raised centre. Retain topsoil for re-use where specified. In sloping ground, maintain horizontal bases and vertical sides with no less than minimum depth throughout.

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Size(s): Large enough to accommodate the full spread of the roots plus minimum 400mm in all directions. Break up bottoms of pits to a depth of 150mm and scarify sides.

Tree pit drainage:

Where shown on drawings/schedules:

Increase depth of excavation from specified size to allow for aggregate layer, with base slightly falling to outlet.

Lay 200 mm deep clean gravel or broken stone, with no fines, graded 40 to 20 mm.

Lay wavin, perforated PVC coil, 100 mm diameter, around perimeter of pit within aggregate layer and connect to soakaway or land drains as shown on drawings.

Lay Terrain 1000' geotextile filter, or equal and approved, over aggregate before completing backfilling.

Semi-mature trees:

Prepare roots and transplant to BS 4043 unless specified otherwise, and in accordance with clause 113 of this document.

Backfilling material:

As defined in Grass Seeding.

Stakes:

Softwood, peeled chestnut, larch or oak, free from projections and large or edge knots and with pointed lower end.

Cross braces: Softwood, peeled chestnut, larch or oak, free from projections and large or edge knots.

Nails:

To BS 1202:Part 1, galvanised, minimum 25mm long and with 10mm diameter heads.

Tree ties: 37.5mm wide nylon reinforced rubber belt with rubber pad.

Minimum stake sizes:

(Note: the overall length of stake varies to ensure height above ground as below and minimum 300mm into the base of the tree pit)

Short single staking for standard trees: as per schedule below

Four stakes per tree for semi-mature trees:

Drive 4 stakes, 1m apart, vertically at least 300 mm into bottom of pit to form 4 corners centred around the centre of the tree. Consolidate material round stakes during backfilling.

Cut stake to approximately 1000 mm above ground level.

Firmly fix 4 no. cross bars, 1000mm x 100mm x 30mm, to form quadrangle with tree at centre.

Secure tree firmly but not rigidly to cross braces from each corner with tree ties in a figure-of-eight. Ensure that the tree does not come into contact with the stakes or cross braces.

Ensure that the tree is secure and does not move to such an extent that the stem or bark is damaged, but that the tree tie is not tight around the stem.

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Make provision for adjusting the tie regularly during the defects liability period.

Trees/ Shrubs Size & Type	Length of Stake	Height above ground	Cross section of stake	No. of stakes per trees
Standard Trees	1.8m	750mm	75mm	1
Heavy Standard	2.4m	1000mm	100mm	2
Extra Heavy Standard	2.4m	1000mm	100mm	2
Semi-mature	2.4m	1000mm	100mm	4

Drive stakes, 1 m apart, vertically at least 300 mm into bottom of pit on either side of tree position before planting. Consolidate material round stakes during backfilling.

Cut stake to approximately 1000 mm above ground level.

Firmly fix cross bar, 1000mm x 100mm x 30mm, on windward side of tree and as close as possible to stem.

Secure tree firmly but not rigidly to cross brace with tree tie, as per clause 535 of this document, using a flat-back rubber pad.

Ensure that the tree does not come into contact with the stake or cross brace. Use a pad of sufficient size to maintain a gap of minimum 25mm and maximum 50mm between the tree and the stake. Use two pads if necessary.

Ensure that the tree is secure and does not move to such an extent that the stem or bark is damaged, but that the tree tie is not tight around the stem.

Make provision for adjusting the tie regularly during the defects liability period.

Backfilling material:

As defined in previous clause of this document.

Mulching trees:

As defined in previous clause of this document.

4.3 Maintenance period:

Maintenance

Carry out the following operations from completion of the planting to the completion of the defects liability period. Make visits at approximately fortnightly periods, more often during the growing season and as often as is necessary to fulfil the obligations of the contract.

Defects liability period

Unless otherwise stated the defects liability period shall be, in the case of extra-heavy standards and semi-mature trees, 24 months from completion of planting and 12 months for all other operations.

Failure of planting

Any shrubs plants or trees which have failed to thrive, due to poor materials or placement, during the defects liability period, will be regarded as being defective and not in accordance with the contract. Unless otherwise stated, they must be replaced at the contractors expense by approved equal materials. Replacements must take into account the increase size due to growth since the completion of planting and must match the size of adjacent, or near bye plants of the same species or should match the original specification, whichever is the greater.

Protection

The contractor shall protect newly planted and seeded areas to prevent the destruction of planting or seedlings by pedestrians or any extraneous traffic. For this purpose he shall provide and fix 2no. rows of wire supported on wooden posts projecting 1m out of the ground at approximately 2m centres, or other approved type. These fences shall be maintained by the contractor, and when the grass or planting is established, shall be removed and cleared away and the grassed area or planting made good. The fencing will remain the property of the contractor. Any damage to grass or planting shall be made good until the areas are handed over at the end of the defects liability period.

Clean up:

At completion and at each visit, remove soil and other debris from all hard surfaces and grassed areas and leave the work in a clean tidy condition. Do not contaminate the mulch with soil or any other debris.

Planting maintenance generally:

Maintain a weed free area round each tree and shrub to a minimum diameter of the original planting pit or 1m diameter whichever is the greater.

Keep planting beds clear of weeds by hand weeding and the appropriate use of herbicides. The application of herbicides must achieve the same standard as hand weeding. Remove and dispose of all debris arising from the fore mentioned.

Fork beds as necessary to keep soil loose with gentle slopes and no hollows. Due care should be taken not to reduce depth and effect of mulch.

Ensure that trees and shrubs are not damaged by the use of mowers, strimmers or other mechanical tools. Check condition of stakes, ties guys and guards at least every 3 months and immediately after periods of high wind. Replace damaged and missing items immediately. Adjust if necessary to allow for growth and to prevent rubbing of bark. Cut back any damaged bark. Re-firm soil and top up mulch where necessary. Spray crown of trees when in leaf during warmer weather this work to be carried out in the evening.

Remove all litter from grass and planted areas on a weekly basis.

Fertiliser:

In March or April evenly spread 'osmocote 5-6 month' 10:11:18 controlled release fertilizer by Scotts. This is to be carefully incorporated beneath mulch materials at 50g/m².

Pruning:

Prune at appropriate times, to remove dead dying and diseased wood and suckers to promote healthy growth and a natural shape. Prune trees to favour a single central leading shoot unless specified otherwise. Trim hedges at appropriate time to maintain a neat line and appropriate height and to promote a dense hedge to the required profile. The exact dimensions of hedges are to be confirmed with the landscape designer on site.

Watering:

Ensure the full depth of topsoil is thoroughly wetted, to field capacity.
Use a fine rose where appropriate to avoid damaging or loosening plants.
Do not over-water.
Do not flood or cause any areas to be water logged.
Do not cause mud or other materials to be splashed onto foliage.
Water as necessary to ensure the establishment and continued thriving of all planting.

Maintenance instructions:

During the defects liability period and until re-establishment is completed, all planted areas are to be kept hoed and cleaned free of weeds and rubbish.

Final mulching:

At the end of the defects liability period apply medium grade bark mulch to a depth of 75mm ensuring that the soil is moist prior to the application, allow for watering where required.

4.4 General Requirements

General Requirements deleted, see all other sections for specific requirements (LMacC 11 May 2010)

4.5 Paving

The structural design of pavements with clay or concrete block pavers, should comply with the requirements of BS 7533. In areas where it is envisaged that any significant consolidation will occur geotextile membranes shall be laid with hardcore compacted in 150mm deep layers to support pavements.

Materials:**Pavers:**

To be Acheson and Glover block size 200 x 100 x 80 or similar approved to selected colour or as specified on contract drawings.

Paving Slabs:

To be 600 x 600 x 50 concrete slabs approved type or as specified on contract drawings.

Sand for Bedding:

To be to B.S. 882, not more than 10% retained on a 5mm sieve, not more than 3% of weight of silt, clay or fine dust and free from salts and contaminants: unless otherwise approved, obtain from a single source.

Kerbs and Footpaths:

To be 250 x 125 half batter type, hydraulically pressed kerbs. Concrete Footpaths: Footpaths to be formed in suitable concrete to a steel trowelled and brushed finish to fall towards kerb or to gullies at a fall of 1 in 40. Footpaths within the curtilage of each house shall be 100mm thickness of suitable concrete on 150mm of compacted hardcore and public paths and areas trafficked by vehicles shall be 150mm thick suitable concrete on 150mm compacted hardcore. Joints to be placed at 3m centres with incorporated proprietary patented built-in contraction joints. Ramp footpaths as required and form dishings (drop down kerbs) at entrances and road crossing points. Public paths where abutting roads shall be ordered with 250mm x 125mm kerbs with 150mm showing proud of roadway. Dropped kerbs at roadway crossing points shall have tactile paving suitable for visually impaired persons. See section on Concrete for exposure class etc required.

Concrete Yards:

Shall be laid in 150mm thick suitable concrete all as specified for house footpaths with incorporated proprietary patented built-in contraction joints. See section on Concrete for exposure class etc., required.

Garden Edging:

To be 180 x 50 double bull nosed kerbs.

Manufacturer's Instructions:

Comply with Manufacturer's instructions for the preparation and laying of paving materials including thickness of sub-base, etc.

Preparing Existing Ground:

Prepare the existing ground under paving as follows:

(a) Excavate only when the paving operations can commence immediately after excavation and the ground is reasonably dry.

(b) Strip/excavate to required levels.

(c) Compact for pedestrian paving with a minimum of two passes of 2 tonne vibrating roller or other plant attaining equivalent compaction.

Laying the Sub-base:

Place the specified material immediately after compaction of the sub-grade and compact in layers using plant as specified above.

Before laying sand bed and blocks: Ensure that:

- a) All kerbs and edge restraints are completed.
- b) All levels and falls are correct.
- c) Drainage outlets and channels, etc. are ready for the paving operations.
- d) There is an adequate supply of sand of uniform moisture content.

Precompaction of Bedding:

- a) Spread the course sand in a loose uncompacted layer to approximately the final depth below the finished paving level.
- b) Compact with vibrating plate.
- c) Spread a further layer of sand to receive the pavers.

Laying the Bedding:

Screed the sand to specified grades and levels to receive the pavers.

Laying Pavers:

- a) Commence as soon as the sand bed is laid.
- b) Commence from a straight line or perimeter restraint and follow an order to laying that maintains an open working face and does not trap pavers.
- c) Lay hand tight to specified pattern.
- d) Use edge blocks or cut cleanly (by machine if necessary) to maintain pattern at perimeters and obstructions.
- e) Avoid using pavers cut to less than one third size.
- f) Subject to approval, suitable in-situ concrete (coloured) may be used to make up around awkwardly shaped obstructions.
- g) Brush dry sand (Grade F table 5 BS882) over the surface and into the joints before commencing compaction.
- h) Commence compaction when approximately 40m of paving is completed but not before all edge restraints, gullies and the like are secure.
- i) Compact with vibrating plate but not within 1m of an unrestrained edge
- j) Excluding unrestrained edges, do not leave any paving not compacted at the end of any day.
- k) Upon completion of all paving brush sand as (g).
- l) Subject to approval leave 1 - 2 mm of sand as last over the entire area.

Compaction:

Provide adequate vibrators to ensure thorough compaction of the pavers as the work proceeds.

Performance of vibrators to be as follows:

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- a) Plate area 0.20 - 0.40m.
- b) Force transmitted 50 - 75N/m.
- c) Frequency 60 - 1900Hz

Paving Slabs:

Lay on 150mm (minimum) hardcore sub-base well compacted, with 50mm coarse sand bedding screeded and levelled. Point joints with 3:1 cement mortar on completion.

Protection:

Provide general protection. Protect from any contamination or traffic that could harm the paving. Lay temporary covers where necessary.

4.6 Roadways (Where Shown)**Materials****Generally:**

All materials for coated macadam to B.S. 4987 and other relevant BS referred to therein.

Dense Bitumen Macadam Roadways:

The contractor will be responsible for establishing sub-grade strength by means of the California Bearing Ratio (CBR) test in accordance with BS 1377: Part 4: Section 7. Samples shall be taken at the rate of 2 per 50m of road and where variations in soil type or consistency are anticipated.

Additional samples will be taken where there is a significant difference in strength between two adjacent samples. In preparing the test specimen the method of compaction should be the static compaction method 2, as specified in paragraph 7.2.3.3 of BS 1377: Part 4.

Surface soil shall be cleared off the area of carriageways to depths or levels indicated allowing for a GEOTEXTILE MEMBRANE if the CBR is less than 2% and a total road construction depth of approximately 720mm depending on the gradients to be attained, the existing levels and the CBR. The minimum capping layer thickness will be 300mm of crushed rock with a maximum size of 100mm and maximum fines of 10%, the material will be well graded throughout all sizes. The sub-base thickness will be 300mm of Type B granular material in accordance with Clause 804 of the Specification for Roadwork's with grading limits as set out in the table below (see next page).

NOTE: CAPPING LAYER IS REQUIRED UNLESS SUBGRADE CBR IS GREATER THAN 15%. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PROVE THAT THE CBR IS SUFFICIENT BEFORE REQUESTING THAT THE CAPPING LAYER BE DISPENSED WITH; ALSO SEE SECTION RE ACCESS. FOR THE PURPOSES OF PRICING THE CONTRACTOR SHALL ASSUME THAT A CAPPING LAYER AND GEOTEXTILE WILL BE REQUIRED.

Sieve size IS24	Percentage by mass passing
75mm	100
37.5mm	85-100
10mm	40-70
5mm	25-45
600 micron	8-22
75 micron	0-10

Surplus soil shall, under the permission the Engineer, be carted away off site or subsequently spread on site as required under the Contract. Further depths to be made up subsequently to within 420mm of finished road surface shall be achieved with similar materials.

The whole area of carriageways shall have an 80mm minimum depth base course of 28mm nominal size Dense Bituminous Macadam to BS 4987. The road surfacing will consist of a layer of 40mm minimum thickness of rolled 10mm nominal size Dense Bituminous Macadam wearing course laid to falls to road gullies and to an even surface. All work shall be carried out in accordance with B.S. 4987 and “Recommendations for site development works for Housing Areas” from the Department of the Environment and Local Government.

Tarmac Driveways: (Where required, driveways will normally be 150mm thick suitable concrete with 10mm aggregate size with incorporated proprietary patented built-in contraction joints):

Surface soil shall be cleared off area off driveway. Surplus shall be carted off site or subsequently spread on site as required under the Contract. Lay two 75mm deep layers of clause 804 stone and consolidate each layer with at least eight passes of 2 ton motorised hand roller to a finished thickness of 150mm. The whole area of driveway shall be surfaced with a finished 50mm minimum thickness of rolled 12mm wearing course to falls and to an even surface. All work shall be carried out in accordance with B.S. 4987.

Surface Dressing (Where required):

Surface dressing should be carried out in accordance with the manual “Surface Dressing” published by the Department of the Environment. The binder should be cutback bitumen or cationic bitumen emulsion, complying with the specifications issued by the Department of the Environment. Other binders may be used, subject to approval.

Cutback bitumen should be of the appropriate grade recommended in the manual. Chippings should be of a single size, (as approved by the local authority), cubical in shape.

Workmanship**Code of Practice:**

Comply with Appendix A and B of B.S. 4987 Recommendations for Laying Coated Macadam subject to any qualifications given thereunder.

Choice of Specialist Firm:

Ensure that macadam paving and sub-grade are laid by Specialists who are experienced in this type of work.

Laying Macadam:

Prepare and Lay macadam as follows:

- a) Mix surface dry aggregate in the specified gradings for each course and at the correct temperature all in accordance with B.S. 4987.
- b) Keep coated macadam dry until laid and compacted.
- c) Lay each course in a manner that prevents segregation and compact without displacement.
- d) Lap in the joints of each layer to ensure complete fusion. Joints in different courses shall not coincide.
- e) Using rollers as specified at Clause 737, roll each course when the material is at a suitable temperature until no roller marks are left.
- f) Lay and compact in restricted area by methods that produce a compacted finish equivalent to that achieved by the heavy rollers.
- g) Brush apply bitumen paint to manhole frames and other items in contact with the paving.
- h) If necessary re-set frames to manholes and gratings, etc. to suit the finished paving levels. The frames should be seated on at least 2 courses of Class B engineering brick.

Parking Lines:

Apply 100mm wide surface markings as detailed in white thermoplastic marking paint at each parking space.

4.8 Kerbs & Channels**Workmanship:**

Laying Kerbs and Edgings:

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Bed in suitable concrete haunched half way up back. Joint with cement: sand mortar (1:3) as the work proceeds neatly flush pointed.

Forming Curves in B.S. Units

Form curves up to 12m radii with standard B.S. quadrants and radius units: form curves of greater radii using straight units and angling the joints.

4.9 High Division & Screen Walls

High Division and Screen Walls:

Walls between gardens shall be constructed in 225mm solid blockwork laid in cement mortar and plastered/rendered as specified. In instances where a depth of 600mm or over of fill or earth requires to be retained, the retaining walls shall be constructed in 325mm solid concrete blockwork for retaining up to 1300mm depth of earth. Wall thickness must be increased for retaining greater than 1300mm, Contractor to ensure that adequate measures are taken to retain the height required. Finish with suitable 20mm concrete saddleback coping cast in-situ twice throated and finished fine on exposed surfaces - minimum height to top of coping 2.10m from finished ground level at highest side. Walling to be in stepped level runs with 450mm x 450mm piers well bonded for every 3.6m length of unrestrained wall. Movement joints to be provided at 6.00m centres or at nearest pier. Footings for walls to be suitable concrete. Reinforcement shall be as per schedule for main foundations (minimum of two layers A393 mesh in top and bottom of foundations). Both faces and ends of screen walls shall be plastered to match house finishes unless otherwise shown and division walls shall be similarly finished with bands on ends. Form bellcast and smooth plinth as described under plaster. Where a wall is retaining earth a 100mm diameter land drain, vertical DPM and clause 505 stone will be installed behind the wall. Segmental retaining walls to have proprietary capping blocks stuck in place with water cured, gap filling adhesive as supplied by Acheson & Glover or similar approved.

4.10 Front Boundary Walls, Piers & Garden Division Walls

Unless otherwise specified on contract drawings, front boundary walls and front division walls to be 900mm high, from ground level to the top of concrete coping, in the case of walls between areas (or gardens) with a change in level walls will be required to be at least 1100mm high in compliance with the Building Regulations (check with Engineer or Clerk Of Works for each particular situation). Such walls shall be constructed in 225mm solid blockwork or brickwork. Finish with suitable 20mm concrete saddleback coping cast in-situ twice throated and finished fine on exposed surfaces. Walling to be in stepped level runs with 450mm x 450mm piers well bonded for every 3.6m length of unrestrained wall. In instances where a depth of 600mm or over of fill or earth requires to be retained, the retaining walls shall be constructed in 325mm solid concrete blockwork for retaining up to 1300mm depth of earth. Wall thickness must be increased for retaining greater than 1300mm, Contractor to ensure that adequate measures are taken to retain the height required. Footings for walls to be suitable concrete. Reinforcement shall be as per schedule for main foundations (minimum of two layers A393 mesh in top and bottom of foundations). Both faces and

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ends of screen walls shall be plastered to match house finishes unless otherwise shown and division walls shall be similarly finished with plaster bands. Form bellcast and smooth plinth as described under plaster.

4.11 Gates and Railings

Gates:

Shall be as per detailed drawings and hot dip galvanised and painted as specified.

Railings:

To be solid steel bow topped railing, hot dipped galvanised and powder coated finish. Unless otherwise stated, height of railing to be 1200mm to be provided between houses and along front boundaries. Bars to be solid steel, 13mm diameter up to 1400mm high and 19mm diameter when over 1400mm high. On slopes steeper than 1:36 railing to be custom made to run with the slope, all bars to be vertical. Maximum step between panels to be 75mm.

4.12 Fencing

Post and Wire:

To be constructed where shown and composed of precast concrete posts reinforced with 4 no. 6mm mild steel bars running full length of posts. Posts to be 1.9m long, 125mm x 125mm at base and tapering to 125mm x 125mm at top and set in suitable concrete base 600mm x 600mm. An indent 25mm deep to be provided on posts for end of struts. Struts to straining posts to be 1.9m long x 125mm x 87mm similarly reinforced as posts and fixed at an angle of 45° with the horizontal. Base plates for struts for corner straining posts. In all posts form 6mm holes at regular intervals to take special high tensile steel wires five (5) no. in full height with a tensile strength of not less than 1081 m/mm (70 tonne per sq. inch). Winders to be galvanised ratchet type with galvanised eyebolt. Straining complete with strong galvanised staples to take wire to be fixed at corners, at ends of each length of fencing and at either side of gates. Intermediate posts to be spaced at 2.4m centres. All to comply with B.S.4102 "*Steel Wire for Fences*"

Chain-link Fencing:

1.2m and 1.8m high shall be constructed as post and wire fencing but with the addition of an approved type 50mm galvanised mesh chain-link fence wired to posts and horizontal wires. Chain link wire mesh is woven from wire complying with I.S.126: 1964 Mesh to be 12 standard wire gauge and wired to 4 no. horizontal strained wire of 12 standard wire gauge.

Double Sided Close Boarded fencing:

1.8m high supported on 100 x 100mm galvanised steel posts set in 800mm deep suitable concrete foundations. Boarding to be 100 x 20mm treated fence boards with 12mm spacing between each board and next. Boards to be vertical, both faces to be boarded with spacing staggered to obscure view through fence. Fences to be adequately braced and propped to resist wind load.

Concrete

5.1 Materials

Concrete Generally:

Under this contract the Contractor shall carry all risk associated with defective concrete whether ready mixed or produced on site. Any concrete found to be defective shall be removed and replaced at the Contractor's expense whether or not the defect was caused by any action of the Contractor, any Subcontractor or any Supplier or any Agent employed by the Contractor or any environmental action or other element or agent affecting the concrete. All work involving the use of concrete shall comply with I.S. EN 206-1 Concrete – Part 1: Specification, Performance, Production and Conformity (Consisting of I.S. EN 206-1:2002 AMDS 1 & 2 and The Irish National Annex, 2007) and subsequent amendments.

The Contractor shall ensure that the concrete is of adequate strength for the purpose for which it is intended and the composition of the mixture is optimized to resist the environmental actions and relevant exposure conditions that impact concrete's durability. This means appropriate cementitious materials for adequate strength, low permeability (where appropriate), sulphate resistance, entrained air for freezing and thawing and scaling resistance, adequate protection to prevent corrosion either from carbonation, chloride content/ingress or depth of cover, a low paste content to minimize drying shrinkage and thermal cracking, and the appropriate combination of aggregates and cementitious materials to eliminate the potential for expansive cracking related to alkali silica reactions.

All concrete shall be ready mixed concrete produced by a recognised concrete producer independently certified by a National Certification Body such as the National Standards Authority of Ireland, British Standards Institute or equivalent certification by recognised independent certification body such as the Quality Scheme for Ready Mixed Concrete. Concrete production on site will only be allowed in exceptional circumstances and only if approved by the Engineer. Any concrete produced on site must be tested to ensure that it is suitable for the purpose intended and of adequate strength with the appropriate characteristics to resist the environmental actions and relevant exposure conditions that impact concrete's durability. If concrete is produced on site concrete test cubes must be made in compliance with B.S. 1881 'Methods of Testing Concrete' and as described below under the heading "Concrete Test Cubes". The Contractor must demonstrate and provide evidence/certification that he and/or his employees are experienced in the use of additives/admixtures and the production of concrete if producing concrete on site. The Contractor must appoint a person to control the quality of the concrete and carry out tests, sampling and production of concrete test cubes and to keep all records associated with batching and all aspects of concrete production.

If the Contractor considers that it will or might be necessary to make concrete on site at some time during the contract he should first notify the Engineer in writing seeking approval and then if approval is granted he should make a trial concrete mix and test the concrete produced for all of the relevant properties including strength, air content, consistence (slump test) and all other tests

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required to show that concrete produced on site would be fit for purpose if produced in the same manner. The Contractor must also demonstrate a suitable system for quality control if concrete is to be produced on site and must keep and use a suitable meter or kit for testing the air content of concrete produced on site. All testing and other associated work will be at the expense of the Contractor.

Ready Mixed Concrete:

Ready Mixed Concrete from an approved supplier may be used for all or any of the concrete works covered by this Specification. The concrete shall be delivered in a truck-mixer or agitator designed for the purpose and the discharge shall be completed within one and a half hours of either the introduction of the mixing water to the cement and aggregate, or the introduction of cement to the aggregate, whichever, is the longer. The temperature of the concrete at the point and time of delivery shall not be less than 4 degrees C. (39F) unless otherwise agreed with the Engineer. The Contractor when ordering ready mix concrete shall specify to the supplier the strength and requirements as set down in this Specification. The Concrete shall be discharged from the mixer and transported to the works by means approved by the Engineer and which shall prevent segregation or contamination of the concrete or loss of material from the mix. All mixing water shall be added to the mix at the Supplier's Plant Depot, and no further water shall be added without the prior approval of the Engineer, any additional water added is at the Contractor's risk, any concrete that fails due to the addition of further water to be broken out and replaced. On addition of the mixing of the water, the concrete shall be supplied to the site in purpose made agitators in accordance with B.S. 1926. The agitator shall continue to operate until the batch is fully discharged. From the addition of water to the complete discharge of the drum shall not exceed in time 2 hours. The time of discharge to the time of placing in its final position within the works shall not exceed 30 minutes.

The Use Of More Environmentally Friendly Cements:

The COUNCIL requires the specification and use of more environmentally friendly cements in publicly funded construction projects, in compliance with EU procurement and environmental policies.

This will involve the partial substitution of Portland Cement by existing waste products which will yield significant improvements in the environmental performance of concrete. See the sections with headings "Cement" and "Cement Additions (substitution)" below for further information.

Cement:

Normal setting Portland cement of an approved brand shall be used compliant in all respects with IS EN 197-1 Composition, specification and conformity criteria for common cements.

The cement shall be delivered to the site of the works in 25kg bags with an unbroken seal fixed by the makers and marked with their brands. All measurements of cement shall be weighed and normally the 25kg bag shall be taken as the unit. The cement shall have suitable cement additions added in compliance with the section under the heading "Cement Additions (substitution)" below and the relevant standards for each type of cement addition (substitute).

Cement Additions (substitution):

Ground Granulated Blast furnace Slag (GGBS) must comply with IS EN 15167–1 Ground granulated blast furnace slag for use in concrete, mortar and grout – Part 1 Definitions, specifications and conformity criteria.

Pulverised Fuel Ash (PFA) may be used. The properties of PFA suitable for use in concrete are specified in I.S. EN 450 and BS 3892 part 1.

GGBS is permitted in IS EN 206–1:2007 to be used as a Type II addition to CEM I or CEM II cements in concrete. Where GGBS is added it replaces the CEM I or CEM II cement on a one-for-one basis; the total cementitious material content of the concrete mix does not change, and the GGBS counts fully towards the total cement content and water/cement ratio in concrete. GGBS shall comply with IS EN 15167–1 and be ground to a blaine of > 4000 cm²/g.

A cement combination comprising 50% GGBS and 50% CEM I or CEM II is to be used in all concrete throughout the Project, unless otherwise specified on the drawings or by the Engineer or unless the exposure of the concrete prohibits the use of GGBS.

If GGBS is not being used then PFA can be used at a replacement level of 10% to 20% with CEM II/A or CEM I cement respectively unless otherwise specified on the drawings or by the Engineer or unless the exposure of the concrete prohibits the use of PFA.

Aggregates:

Coarse and fine aggregates shall be from natural sources and shall comply with IS EN 12620.

Aggregates to be utilised in concrete for the casting of pre-stressed or steam cured concrete shall be free from chloride.

Fine Aggregate Sand:

The fine aggregate shall be natural pit sand or fresh water and free from clay, silt, shells, flat particles and organic matter and shall all pass through a sieve of square meshes 5mm wide in the clear and shall be graded from the largest to the smallest size particles to the satisfaction of the Engineer. The particles of the sand shall be sound and strong. The sand shall comply with Irish Standard No. 5: 1974 or B.S. 883 for coarse and fine aggregates but shall exclude the use of all-in aggregates. Not more than 10% of the aggregate to be retained on a 5mm sieve, not more than 3% of weight of silt, clay or fine dust and free from salts and contaminants: unless otherwise approved, obtain from a single source.

Washing Sand:

All sand shall be washed to the satisfaction of the Engineer if he so deems necessary.

Coarse Aggregate:

Coarse Aggregate may be either hard crushed stone or clean gravel free from dirt and impurities. In either case all of it shall be coarser than 5mm (retained on 5mm screen) and shall be graded from this size to a maximum of either 20mm or 40mm as specified for the different classes of concrete which follow. The coarse aggregate shall comply with Irish Standard No. 5: 1974 for coarse and

fine aggregates but shall exclude the use of all-in aggregates as specified under (d) page 6 of the said Standard except for manholes, pipes, beds and benching.

Quality and Washing:

All coarse aggregates shall be graded to the satisfaction of the Engineer, between the sizes specified. The particles of the coarse aggregate shall be sound and strong. All of the coarse aggregate shall be washed to the satisfaction of the Engineer.

Shape of Coarse Aggregate:

The shape of the particles of coarse aggregate shall be as nearly cubical, if of crushed stone, or spherical of gravel as possible.

A sample of all proposed aggregates shall be submitted to the Engineer.

Other Aggregates:

Other aggregates may be required when specialist features are specified on contract drawings i.e. in-situ paving, steps, etc. Several samples may be required before a final decision is made regarding type and quality.

Grading of the Aggregate:

The grading of the fine and coarse aggregates shall be such that the material between maximum and minimum sieve sizes shall be well graded and an adequate percentage of all intermediate particles included.

The proportion of fine to coarse aggregate to be used in each class of concrete shall be decided by the Engineer from grading analysis carried out on samples of each.

Aggregate Sample Sizes for Test:

The Contractor shall supply samples of proposed aggregates for test. Each sample shall consist of not less than 25kg in the case of sand and not less than 50kg in the case of coarse aggregates.

Consistency and Measurement of Materials:

The water used for all concrete shall be measured for each batch in a graduated vessel and shall be the minimum required to produce a workable mix. The wetness of the mix shall be controlled by regular slump test and the slump shall not exceed that fixed by the Engineer. The slump shall be within the required tolerances for the required slump for the mix as specified.

Under no condition whatsoever is concrete containing high alumina cement to be used in any part of the work.

Aggregates may be measured by weight, by volume in batching bins if used, or by volume in specially constructed measuring boxes to be provided by the Contractor. If aggregates are measured by volume, suitable apparatus shall be used to determine the extra amount of sand to be added to each batch to allow for bulking of the sand when it is damp but not saturated with water.

Additives/admixtures:

Additives/admixtures must comply with I.S. EN 934-2:2001. Proprietary additives/admixtures or other materials shall not be used without the prior approval of the Engineer. Proper dosing equipment shall be used for the addition of approved admixtures such as air training agents, plasticizers etc. The Contractor must demonstrate and provide evidence that he and/or his employees are experienced in the use of additives/admixtures and the production of concrete if producing concrete on site.

Transport and Storage:

The cement shall be delivered to the works in the original sealed bags of the Manufacturer and stored in a suitable building.

Aggregates shall not be placed in storage directly in contact with the topsoil, but shall be stored on a prepared concrete or other clean and hard surface.

Waterproofed Concrete:

All concrete that is to be waterproofed shall have 'Sika' water-proofing agent or equivalent approved incorporated in the liquid form by the concrete producer under controlled conditions in accordance with the manufacturer's instructions and subject to the Engineer's approval and independent certification of compliance.

5.2 Mixing

Mixes:

The following paragraphs set out the basis by which the required minimum crushing strength at 28 days shall be determined and the same strength shall be specified for various sections of the work. All material to be used in the mix shall be measured separately by means of an approved weighing device.

The concrete mix shall be the most appropriate combination of the materials available, of the maximum practicable size of aggregate, of the most suitable cement content, and of the required strength and workability. In no case shall the ratio of dry aggregates to cement exceed the limits given in Table 1 and 2 of B.S. 5328:1976. The aggregates and cement shall be mixed until there is a complete distribution of the materials and the entire mass is of uniform consistency. Concrete which has shown any indications of setting shall not be re-mixed.

The amount of water to be introduced into any mix shall be regulated to ensure a constant water/cement ratio. This ratio shall be the minimum required to produce concrete in conformity with the Specification requirements. Frequent tests shall be made of the water content of the aggregates, and appropriate allowance shall be made at the weighing machine.

As often as it is required by the Engineer the Contractor shall make slump tests (assume one slump test for each batch). The Contractor shall provide on site the appropriate slump test apparatus.

Concrete Mixes:

Various classes of suitable concrete shall be used in various sections of the work and each concrete shall be suitable for the environment to which it will be exposed.

The Contractor shall ensure that the concrete is of adequate strength for the purpose for which it is intended and the composition of the mixture is optimized to resist the environmental actions and relevant exposure conditions that impact concrete's durability. This means appropriate cementitious materials for adequate strength, low permeability (where appropriate), sulphate resistance, entrained air for freezing and thawing and scaling resistance, adequate protection to prevent corrosion either from carbonation, chloride content/ingress or depth of cover, a low paste content to minimize drying shrinkage and thermal cracking, and the appropriate combination of aggregates and cementitious materials to eliminate the potential for expansive cracking related to alkali silica reactions.

Mix proportions shall be selected to ensure that the consistence (workability) of the fresh concrete is suitable for the conditions of handling and placing on the site with particular attention to the importance of proper curing, full compaction and the necessity of maintaining the correct water/cement ratio. The concrete shall comply with the requirements in the relevant tables based on N.D.2 Form A which form part of this specification (see following pages for forms referred to). 28 day strengths specified for Normal cement shall at all times be achieved. Where Rapid Hardening cement is used, performance is to be assessed on 7 day test results.

Each concrete shall have the correct cement content and entrained air to resist freeze thaw action where required.

Water used for concrete is to be clean and free from all impurities; potable water from a supply guaranteed to be free from elements harmful to concrete shall be used.

Blinding Concrete less than 75mm thick

ND.2 Form A - Schedule for the specification requirements of designed mixes	
The mixes below shall be supplied as designed mixes in accordance with the relevant clauses of EN 206-1	
1. Mix reference:	Blinding Concrete less than 75mm thick
2. Strength class (as in EN 206-1):	C12/15
3. Nominal maximum size of aggregate, in mm (D):	40mm (Contractor to check compatibility)
4. Types of aggregate:	Coarse and fine crushed stone appropriately graded for particular application to I.S. EN 12620 (see further detail in specification and drawings for decorative finishes etc if applicable)
5. Cement type(s) complying with:	CEM I N; CEM I R; SRPC; CEM II/A-V; CEM II/A-S; CEM II/B-S; CEM III/A (as in EN 206-1 and other standards referred to therein)

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6. Additions complying with:	GGBS or PFA (as in EN 206-1 and other standards referred to therein)
7. Sulfate class, if applicable	Only applicable to concrete in contact with sulphate containing ground and ground water. Contractor to check and order appropriately.
8. Exposure Class (as in EN 206-1)	X0
9. Chloride Class	Contractor to order appropriately for application
10. Minimum cement content, kg/m ³	Contractor to order appropriately for application
11. Maximum free water / cement ratio	Contractor to order appropriately for application
12. Quality assurance requirements	Certificate of conformity with the Quality Assurance Scheme for Ready-mixed Concrete in Ireland I.S. EN 206-1:2002 and EN ISO 9001 or equivalent.
13. Rate of sampling intended by the purchaser for strength testing (for information)	All sampling to be done by Contractor in compliance with Specification
14. Other requirements (alkali, etc. as appropriate)	Materials to be selected by concrete producer to avoid cracking due to alkali silica reactions etc
In the case of fresh concrete the following shall be completed by the Contractor.	
15. Consistence	
16. Method of placing	
17. Other requirements by the purchaser of fresh concrete	Note: It is recommended that Self Compacting Concrete is used in any circumstances where access to adequately compact the concrete is restricted. This should be communicated by the Contractor to the concrete producer.

Blinding Concrete greater than 75mm thick

ND.2 Form A - Schedule for the specification requirements of designed mixes	
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The mixes below shall be supplied as designed mixes in accordance with the relevant clauses of EN 206-1	
1. Mix reference:	Blinding Concrete greater than 75mm thick
2. Strength class (as in EN 206-1):	C25/30
3. Nominal maximum size of aggregate, in mm (D):	40mm (Contractor to check compatibility)
4. Types of aggregate:	Coarse and fine crushed stone appropriately graded for particular application to I.S. EN 12620 (see further detail in specification and drawings for decorative finishes etc if applicable)
5. Cement type(s) complying with:	CEM I N; CEM I R; SRPC; CEM II/A-V; CEM II/A-S; CEM II/B-S; CEM III/A (as in EN 206-1 and other standards referred to therein)
6. Additions complying with:	GGBS or PFA (as in EN 206-1 and other standards referred to therein)
7. Sulfate class, if applicable	Only applicable to concrete in contact with sulphate containing ground and ground water. Contractor to check and order appropriately.
8. Exposure Class (as in EN 206-1)	XC1
9. Chloride Class	Contractor to order appropriately for application
10. Minimum cement content, kg/m ³	280kg/m ³
11. Maximum free water / cement ratio	0,65
12. Quality assurance requirements	Certificate of conformity with the Quality Assurance Scheme for Ready-mixed Concrete in Ireland I.S. EN 206-1:2002 and EN ISO 9001 or equivalent.
13. Rate of sampling intended by the purchaser for strength testing (for information)	All sampling to be done by Contractor in compliance with Specification
14. Other requirements (alkali, etc. as appropriate)	Materials to be selected by concrete producer to avoid cracking due to alkali silica reactions etc
In the case of fresh concrete the following shall be completed by the Contractor.	
15. Consistence	
16. Method of placing	

17. Other requirements by the purchaser of fresh concrete	Note: It is recommended that Self Compacting Concrete is used in any circumstances where access to adequately compact the concrete is restricted. This should be communicated by the Contractor to the concrete producer.
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Internal Concrete

ND.2 Form A - Schedule for the specification requirements of designed mixes	
The mixes below shall be supplied as designed mixes in accordance with the relevant clauses of EN 206-1	
1. Mix reference:	Internal Concrete
2. Strength class (as in EN 206-1):	C30/37
3. Nominal maximum size of aggregate, in mm (D):	20mm (Contractor to check compatibility)
4. Types of aggregate:	Coarse and fine crushed stone appropriately graded for particular application to I.S. EN 12620 (see further detail in specification and drawings for decorative finishes etc if applicable)
5. Cement type(s) complying with:	CEM I N; CEM I R; SRPC; CEM II/A-V; CEM II/A-S; CEM II/B-S; CEM III/A (as in EN 206-1 and other standards referred to therein)
6. Additions complying with:	GGBS or PFA (as in EN 206-1 and other standards referred to therein)
7. Sulfate class, if applicable	Only applicable to concrete in contact with sulphate containing ground and ground water. Contractor to check and order appropriately.
8. Exposure Class (as in EN 206-1)	XC4
9. Chloride Class	0,10
10. Minimum cement content, kg/m ³	320kg/m ³
11. Maximum free water / cement ratio	0,55
12. Quality assurance requirements	Certificate of conformity with the Quality Assurance Scheme for Ready-mixed Concrete in Ireland I.S. EN 206-1:2002 and EN ISO 9001 or equivalent.

13. Rate of sampling intended by the purchaser for strength testing (for information)	All sampling to be done by Contractor in compliance with Specification
14. Other requirements (alkali, etc. as appropriate)	Materials to be selected by concrete producer to avoid cracking due to alkali silica reactions etc
In the case of fresh concrete the following shall be completed by the Contractor.	
15. Consistence	
16. Method of placing	
17. Other requirements by the purchaser of fresh concrete	Note: It is recommended that Self Compacting Concrete is used in any circumstances where access to adequately compact the concrete is restricted. This should be communicated by the Contractor to the concrete producer.

Foundation Concrete

ND.2 Form A - Schedule for the specification requirements of designed mixes	
The mixes below shall be supplied as designed mixes in accordance with the relevant clauses of EN 206-1	
1. Mix reference:	Foundation Concrete
2. Strength class (as in EN 206-1):	C40/50
3. Nominal maximum size of aggregate, in mm (D):	40mm (Contractor to check compatibility)
4. Types of aggregate:	Coarse and fine crushed stone appropriately graded for particular application to I.S. EN 12620 (see further detail in specification and drawings for decorative finishes etc if applicable)
5. Cement type(s) complying with:	CEM I N; CEM I R; SRPC; CEM II/A-V; CEM II/A-S; CEM II/B-S; CEM III/A (as in EN 206-1 and other standards referred to therein)
6. Additions complying with:	GGBS or PFA (as in EN 206-1 and other standards referred to therein)
7. Sulfate class, if applicable	XA3
8. Exposure Class (as in EN 206-1)	XC2 (note sulfate class XA3)
9. Chloride Class	0,10

10. Minimum cement content, kg/m ³	400kg/m ³
11. Maximum free water / cement ratio	0,45
12. Quality assurance requirements	Certificate of conformity with the Quality Assurance Scheme for Ready-mixed Concrete in Ireland I.S. EN 206-1:2002 and EN ISO 9001 or equivalent.
13. Rate of sampling intended by the purchaser for strength testing (for information)	All sampling to be done by Contractor in compliance with Specification
14. Other requirements (alkali, etc. as appropriate)	Materials to be selected by concrete producer to avoid cracking due to alkali silica reactions etc
In the case of fresh concrete the following shall be completed by the Contractor.	
15. Consistence	
16. Method of placing	
17. Other requirements by the purchaser of fresh concrete	Note: It is recommended that Self Compacting Concrete is used in any circumstances where access to adequately compact the concrete is restricted. This should be communicated by the Contractor to the concrete producer.

External Concrete

ND.2 Form A - Schedule for the specification requirements of designed mixes	
The mixes below shall be supplied as designed mixes in accordance with the relevant clauses of EN 206-1	
1. Mix reference:	External Concrete
2. Strength class (as in EN 206-1):	C40/50
3. Nominal maximum size of aggregate, in mm (D):	20mm (Contractor to check compatibility)
4. Types of aggregate:	Coarse and fine crushed stone appropriately graded for particular application to I.S. EN 12620 (see further detail in specification and drawings for decorative finishes etc if applicable)
5. Cement type(s) complying with:	CEM I N; CEM I R; SRPC; CEM II/A-V; CEM II/A-S; CEM II/B-S; CEM III/A (as in EN 206-1 and other standards referred to therein)

6. Additions complying with:	GGBS or PFA (as in EN 206-1 and other standards referred to therein)
7. Sulfate class, if applicable	Only applicable to concrete in contact with sulphate containing ground and ground water. Contractor to check and order appropriately.
8. Exposure Class (as in EN 206-1)	XF4
9. Chloride Class	0,10
10. Minimum cement content, kg/m ³	400kg/m ³
11. Maximum free water / cement ratio	0,45
12. Quality assurance requirements	Certificate of conformity with the Quality Assurance Scheme for Ready-mixed Concrete in Ireland I.S. EN 206-1:2002 and EN ISO 9001 or equivalent.
13. Rate of sampling intended by the purchaser for strength testing (for information)	All sampling to be done by Contractor in compliance with Specification
14. Other requirements (alkali, etc. as appropriate and complying with I.S. EN 206-1)	Materials to be selected by concrete producer to avoid cracking due to alkali silica reactions etc
In the case of fresh concrete the following shall be completed by the Contractor.	
15. Consistence (slump as in I.S. EN 206-1)	
16. Method of placing (complying with I.S. EN 206-1)	
17. Other requirements by the purchaser of fresh concrete (complying with I.S. EN 206-1)	Note: It is recommended that Self Compacting Concrete is used in any circumstances where access to adequately compact the concrete is restricted. This should be communicated by the Contractor to the concrete producer.

Concrete Test Cubes:

At least one set of concrete test cubes will be made per day.

The dimensions of the test cubes shall be 150mm and shall be cast and cured, entirely in accordance with B.S. 1881 'Methods of Testing Concrete' which state that where the concrete is being vibrated in the manner described in B.S. 1881.

Six cubes shall be taken for each test. Of these 6 cubes, 3 shall be dispatched in time for testing at 7 days, and the remaining 3 for testing at 28 days. The cubes shall be removed from the moulds 24 hours after casting. The cubes shall be marked as directed and dated and immediately stored in water at a controlled temperature until ready for dispatch for testing. The cubes shall then be packed in damp sand, in substantial wooden boxes and sent to an approved testing laboratory entirely at the expense of the Contractor.

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In the case of cubes crushed at 7 days, the equivalent crushing strength at 28 days shall be taken at 50% above the 7 day value. The Contractor shall provide in his price for the entire cost of all preparation and transportation of cubes to the testing laboratory and for the testing of all concrete cubes. Contractor to provide test results for each batch of concrete used in the works.

Procedure for Works Test:

For test cubes taken during the progress of the works, the crushing strength shall be not less than the required minimum crushing strength of the concrete at 28 days or the equivalent value in the case of cubes crushed at 7 days.

With the exception of blinding concrete, 6 cubes shall be made of each concrete, for each 40 cubic metres of concrete, or part thereof placed within each days work. This number of cube tests may be reduced at the discretion of the Engineer, if satisfactory results are consistently produced. Of each set of 6 cubes taken, 3 shall be tested at 7 days and 3 at 28 days. The test results shall be accompanied by a statement of conformity from the testing laboratory or other qualified person estimating the actual strength attainable for the concrete family being tested at 7 days, 28 days etc. and whether or not the concrete batch tested conforms. The Contractor shall ensure that each sample of concrete for testing shall be sufficiently large to enable one set of 6 cubes to be made and to carry out any further tests that may be requested at the same time. The location of each sample shall be carefully noted and recorded.

Failure to Meet Cube Strength:

In the event of test cubes failing to meet the requirements of the tests, the Contractor shall submit to the Engineer, for his approval, proposals for adjusting the mix design before proceeding with concreting.

The completed concrete involved shall be liable for rejection and if so directed, shall be cut out removed from site and replaced at the Contractor's expense. Any other items affected or damaged by the removal of defective concrete shall also be removed and replaced at the Contractor's expense.

Where applicable, the Engineer may require that the Contractor carry out a loading test not exceeding 125% of the design live load, after making allowance for all dead loads, and to the entire approval of the Engineer. Where the results of such tests are accepted, the testing shall be paid for on a day work basis. In the event of non-acceptance, the cost of testing and reconstruction shall be entirely borne by the Contractor

Records:

A complete record of all tests on aggregates and cement and test cubes shall be kept at all times on the site and shall be included in the Safety File. The records shall identify the test with the parts of the works to which they are related.

The Contractor shall ensure that a record is kept of the time and date of all concrete placed within the works. Similarly, the maximum and minimum overnight air temperatures shall be recorded, together with the air shade temperature at three agreed times each day. A suitable thermometer shall be kept on site at all times in a suitable location where it can be inspected and used by the Engineer and/or Clerk of Works. All records shall be retained on site for inspection.

5.3 Workmanship

Transporting of Concrete, Placing and Compaction:

The placing and compaction of concrete shall be carried out under the direct supervision of a competent member of the Contractor's staff. The concrete shall be transported from the mixer to the framework as quickly as is practicable by methods which shall prevent the segregation or loss of any of the ingredients of the mix, while at the same time maintaining the required workability. The concrete shall be deposited as neatly as is practicable in its final position in order to avoid re-handling. During this procedure no extra water shall be added to the mix once it has left the mixer. Containers used for the transport of concrete made from Portland Cement, or from super sulphated cement, shall be free from any concrete or mortar containing any other type of cement. Generally, the concrete shall not be placed in such a manner as to cause segregation of the mix, this implies that it shall not be thrown or dropped or deposited in such a way to cause segregation. The concrete shall not be placed in lifts exceeding 2.5 metres without the prior submission of the proposed methods of handling and compaction, to the Engineer, for his approval. As soon as possible after mixing, the concrete shall be placed and compacted in its final position. Care shall be taken to avoid the displacement of reinforcement or the movement of form-work or any damage to the surfaces of the form-work.

Compaction of the concrete shall take place within 30 minutes of the time when agitation of the mix has ceased. All concrete, unless otherwise specified on the drawings or in written instruction, shall be vibrated with an approved internal type vibrator, or vibrators. All vibration shall be carried out in accordance with a scheme to be approved by the Engineer. No operative shall be allowed to use a vibrating tool without having received prior instruction and training in its use. Care must be taken to avoid separation of the mix, and to avoid excessive vibration. As far as possible internal vibrators must be kept a minimum of 75mm from the finished face of the concrete. Under no circumstances must traffic be permitted over concrete until it has attained complete setting – minimum of 7 days for pedestrian traffic, Contractor to ensure that concrete is not damaged.

Inform Engineer:

Inform Engineer in good time of intention to pour concrete. Unless otherwise directed the concrete shall not be placed unless the Engineer or his representative is present on site and has had the opportunity of examining and approving the positioning, fixing and condition of the reinforcement, and of any other items to be embedded in the concrete, and the cleanliness, alignment and suitability of the containing form-work. Concrete shall not be placed in standing water. Where ingress of water into the work is unavoidable the Contractor must make provision for rapid removal of water and control of further ingress of water. The cost of any and all measures required to control/remove water from the work is at the Contractor's risk and expense.

Curing Concrete:

All concrete surfaces shall be covered with a curing membrane immediately after placing and shall be covered and protected from traffic and kept so covered for at least 14 days and for such longer period as the Engineer may decide, the covering being sprayed with water three times each day. When the temperature is below 4 degrees centigrade the spraying or covering and spraying shall be

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continued for a further period of at least 7 days. Any concrete which has not cured or is found to be in any way defective will be broken up removed and replaced with concrete of sufficient quality for the intended purpose at the contractor's expense.

Joints in concrete:

All concrete between construction joints shall be placed in a continuous operation. "Tru Flow" construction joints or equivalent to be used where required, Contractor to ensure that no cracking occurs by positioning a sufficient number of straight joints correctly. Any concrete that cracks shall be removed and replaced at the Contractor's expense. Appropriate preformed straight, square or circular control joints to be provided at all potential points of contact between cast in-situ concrete and other elements of construction (for example but not exclusively between concrete floor slab and wall or column). Appropriate preformed contraction and expansion joints to be provided in cast in-situ concrete at centres not exceeding 24 times the depth/thickness of the member (for example but not exclusively in a 150mm thick concrete floor slab contraction joints are to be provided at 3600mm centres or less). Control joints and contraction or construction joints shall be located appropriately to allow them to work together and shall be continuous where possible (for example but not exclusively at column to slab junctions a control joint shall be provided around the column and contraction or construction joints shall meet the control joint at the corners if square shaped).

Cold Weather Concreting:

Water and aggregates to be used in the concrete mix shall be free from snow, ice and frost. Similarly, the insides of the form-work, the reinforcement, and any surfaces with which the fresh concrete may come in contact with shall be similarly free from snow, ice and/or frost. The concrete shall not be cast while the air temperature in the shade is below 2°C on a rising thermometer or below 5°C on a falling thermometer. In special and particular circumstances the Engineer may give his approval for concreting below the above temperatures, provided that special precautions are used and certified by the Contractor's Engineer. At all times, the concrete must have a minimum temperature of 5°C and its maximum temperature must not exceed 30°C without approval from the Engineer.

Defective Concrete:

Concrete injured by frost or otherwise defective shall be cut out and the work re-constructed. No concrete thus cut out shall be re-used. Defective concrete is to be removed and replaced at the Contractor's expense. The risk of defective concrete is to be carried in full by the Contractor.

Water:

The Contractor shall allow for and provide all water necessary for mortar, concrete or other purposes on the works. All water used on the works shall be tested for suitability and shall be fresh clean water, free from all harmful impurities.

5.4 Formwork

Materials:

Form-work or shuttering shall be constructed of timber, steelwork, and glass fibre subject to approval of the Engineer.

Form-work Design:

The form-work shall be so designed and constructed that concrete can be properly placed within it, and thoroughly compacted. The formwork shall be firmly braced, tied, strutted and supported in a firm and adequate manner. It shall be such that it shall be capable of adjustment to the lines and dimensions of the finished concrete and it shall be sufficiently rigid and stiff to resist without excessive distortion the pressure of the wet concrete during the placing and compaction, and any other loads to which it may be subjected during this operation or otherwise. Its materials and construction shall be such that it shall not suffer distortion under weather conditions.

Camber and Deflection:

In designing and fixing the formwork, the Contractor shall make due allowance for any settlement or deflection of the formwork that may arise during construction, so that the completed hardened concrete conforms accurately to the specified line and level. The camber specified by the Engineer, in order to make allowance for the elastic deflection of structural members and deflection due to creep of the concrete.

Supports:

The formwork shall be so constructed that the formwork to the sides of members can be removed without disturbing the soffit formwork or its supports. The props and supports to the same formwork shall be designed to permit the formwork to be adjusted accurately to line and level, and to be erected and taken down in an approved sequence without injury to the concrete.

Vertical propping to any formwork shall be carried sufficiently far down any building or structure in order to provide the necessary support without damaging or over stressing or displacing any part of the building structure or construction.

Joints and Arises:

The joints in formwork shall be entirely close fitting in order to prevent leakage of grout from the concrete. At construction joints the formwork shall be tightly secured against the previously cast or hardened concrete, in order to prevent the formation of steps or ridges in the concrete. Formwork panels shall have true and straight edges in order to permit accurate alignment at sides and to provide a clean line at construction joints in the concrete. The panels shall be so fixed that their joints are either vertical or horizontal unless otherwise specified. Slip forming shall be used where possible/appropriate.

Opes & Fixings:

The Contractor shall provide for forming any holes or openings for services in the structure of building in order to accommodate pipes, conduits or other fixings shown on the

Cleaning & Preparation of Formwork:

Any debris, loose concrete, chippings, shavings, sawdust, oil or dirt or deleterious material shall be removed from the interior of the formwork prior to the placing of concrete. The formwork that is to come into contact with the concrete shall be thoroughly cleaned and either entirely wetted or treated with a suitable mould oil of approved composition. Care shall be taken that the oil or mould composition is kept from coming in contact with the reinforcement of the concrete. Retarding agents shall not be used without the prior permission of the Engineer. Following each use the formwork shall be thoroughly cleaned. Any damaged or distorted formwork shall not be re-used.

Striking of Formwork:

All formwork shall be removed without shock or vibration, such that would damage the concrete. Before the soffit and vertical props are removed, the surface of the concrete shall be exposed when necessary in order to ensure that the concrete has hardened sufficiently. Forms shall not be disturbed until the concrete has been adequately hardened.

Where cube test results are not available the preliminary period allowance before striking for ordinary Portland cement concrete shall be in accordance with B.S. 8110 or as outlined in the following table.

Table: Minimum Period before Striking Formwork

Type of Formwork	Minimum Period before Striking	
	Surface Temperature of Concrete	
	16 Degrees	7 Degrees
Vertical Formwork to columns walls & large beams	9 hours	12 hours
Soffit of formwork to slabs	4 days	7 days
Props to slabs	11 days	14 days
Soffit formwork to beams	8 days	14 days
Props to beams	15 days	21 days

In cold weather the curing period should be increased. The value for the temperature of 7°C shall be increased by half a day for each day that the concrete temperature is between 2°C and 7°C, and a whole day for concrete that has been at a temperature below 2°C. The formwork to vertical

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surfaces such as walls, columns and the sides of beams may be removed after 12 - 14 hours normal weather conditions. However, care must be taken to ensure that damage to the concrete is avoided, especially to arises and any features. In cold weather, a longer period may be necessary before striking and protection against frost action should be provided to exposed surfaces. The Contractor shall be responsible for any injury to the concrete and for damage caused by or arising from the removal and striking of the formwork and its supports. The Contractor shall not be relieved of his responsibility in this respect by any advice or permission or approval that may be given by the Engineer.

Surface Finish:

Any concrete surfaces which are not to be exposed shall be left as struck from the formwork, except any surfaces which are found to be honey combed. The latter shall be made good as soon as they have been inspected by the Engineer. The making good of such areas shall be executed with a mixture of fine aggregate and cement in similar proportions to the concrete and as dry as reasonably possible. If voids in concrete are found to be excessive it shall be removed and replaced at the Contractor's expense.

5.5 Reinforcement**Materials:**

All reinforcement to be incorporated in the works shall comply with the requirements of B.S. 4449, 4461, 4482, and 4483 or such other reinforcement that may be approved by the Engineer. Wire used for tying and securing reinforcement shall be 16 S.W.G. annealed iron tying wire. Any alternative securing devices shall only be accepted on the approval of the Engineer. The Contractor when requested shall supply a signed statement from the manufacturer that each consignment of steel complies with the relevant British Standard. From time to time, the Engineer may additionally require samples to be taken from steel, reinforcement on the site of the works for testing in accordance with the relevant Specification at an approved testing laboratory.

Storage:

All reinforcement delivered to site shall be stored clear of ground level and in such a manner as to ensure that it is not damaged by distortion or contaminated by any deleterious material.

Cleaning:

All reinforcement shall be clean and shall be free from loose mill scale, rust and corrosive pitting immediately prior to being placed in position in the formwork or shuttering. Should the steelwork be in a position within the formwork and exposed to dirt, dust, rain or other adverse condition before placing of the concrete, then the steel shall be cleaned once more prior to the commencement of the concreting operations or replaced if damaged or corroded.

Bending:

Reinforcement bars shall be cut and bent in accordance with the Schedules supplied and in accordance with B.S. 4466. The Contractor shall note that onus is upon him to check the length of the bars.

Placing Reinforcement:

Steel reinforcement shall be accurately placed in the positions shown on the Drawings, and secured against displacement by using annealed iron wire of not less than No. 18 gauge or suitable clips at intersections and shall be supported by concrete or metal spacers or metal hangers. The binders, stirrups, or spacing bars shall be so taut that the main bars shall be properly braced in every direction and all main reinforcement shall be temporarily supported during the progress of concreting so that the requisite cover may always be obtained. Concrete must not be placed until the reinforcement has been checked and approved by the Engineer. Laps shall be 50mm greater than the minimum required where possible.

Fixing:

The entire fixing of any section of the reinforcement in the works shall be completed before the commencement of concreting on the same section of the works.

The reinforcement shall be so arranged and fixed that construction joints, expansion joints or other features of the reinforced concrete may be properly prepared and fixed as specified.

Fabrics:

Steel Fabric to B.S. 4483.

Spacers and Chairs: Provide as necessary to support reinforcement in position.

Cover Spacers:

Any of the following types, unless specified otherwise:

a) Concrete:

Made with 10mm aggregate. In exposed work to match surrounding concrete.

b) Mortar:

Made with cement-sand mortar 1:2.

c) Plastics:

Type(s) to be submitted to the Engineer for approval or rejection.

Laps In Fabric

a) Square meshes minimum 450mm side and laps.

b) Rectangular meshes.

Unless otherwise indicated on the drawings, for the longitudinal wires in the longitudinal fabric the laps shall be at least 300mm for fabric weighing less than 4 kg per square metre, 400mm for weights between 4 and 8 kg per square metre and 600mm for heavier fabric. The cross wires for such meshes shall be lapped a minimum of 225mm.

Cover:

Cover to concrete reinforcement shall be in accordance with the Code of Practice. For external concrete and foundations it shall be a minimum of 50mm.

5.6 Foundations**Foundations:**

Lay in suitable concrete foundations to main external walls, main party walls, ground floor party walls, and to all walls and piers generally, to widths and depths required. Step foundations in horizontal benches to suit gradients of the site: steps to be in units of 112.5mm, the higher level foundation in all cases lapping a minimum of 600mm over the lower level. Stepping to foundations will be allowed only as necessary. No steps are to occur in foundations, except where shown on drawings, or where a specific direction is given on site by the Engineer. Over outcrops of rock, etc. reinforce top of all foundations as specified for bottom and to lengths as directed or at least exceeding 900mm beyond end of rock etc.

Reinforce foundations longitudinally as follows:

900mm wide: 4 No. 12mm bars at 267mm centres

750mm wide: 3 No. 12mm bars at 325mm centres

Tie longitudinal reinforcement with 6mm transverse bars at 450mm centres. Where directed reinforce foundations with approved mesh reinforcement.

5.7 Concrete Floors**Concrete Floors:**

Shall be 100mm thick suitable concrete screeded floor on 150mm thick suitable concrete sub-floor with one incorporated layer of A393 mesh at 50mm from surface. Concrete sub-floor to be laid over 2 layers of 75mm thick foil backed closed cell polyurethane board insulation (insulation 150mm thick in total) or equivalent approved on radon barrier on 50mm compacted sand blinding on 150mm minimum consolidated hardcore. 50mm thick insulation to be placed on internal face of external walls and on internal and party walls between entire floor make up and wall. Completed floor to achieve an elemental u-value of less than 0.25 W/m²K (Radon Specification is described in section 17.1 of the general specification).

5.8 Alternative Concrete Floors

In situations where the depth of fill required below a concrete floor is greater than 900mm deep approved proprietary pre-stressed precast concrete hollow core slabs will be used. Slabs will be from an approved manufacturer and will be installed in accordance with the manufacturer's instructions and details except where they conflict with the Engineer's requirements. All slabs will have a minimum end bearing of 100mm on a 215mm (minimum thickness) solid concrete block on

flat rising wall. Under-floor void to be ventilated and gap of 150mm to be left below underside of floor. Gaps between slabs will be filled with a sand/cement mix to slab manufacturer's specification before installation of Radon Barrier/Membrane. Radon Barrier/Membrane to be installed over precast hollow core concrete slabs; Radon Specification is described in section 17.1 of the general specification. 100mm thick concrete screed on 150mm thick polyurethane insulation to be laid on suspended concrete slabs.

THE LEVEL OF THE UNDER-FLOOR WILL BE ABOVE EXTERNAL GROUND LEVEL (unless otherwise specified by the Engineer). Fill to be compacted dry inorganic earth or stone to be approved by the Engineer on site and shall be blinded with 50mm thick compacted sand.

5.9 Front & Rear Door Steps

THERE WILL NOT BE ANY STEPS TO DWELLINGS UNLESS SPECIFICALLY REQUIRED BY A PARTICULAR CIRCUMSTANCE IDENTIFIED BY THE ENGINEER. ANY STEPS OR RAMPS IN PUBLIC AREAS OR IN HOUSES SPECIALLY ADAPTED FOR THE USE OF DISABLED PERSONS WILL HAVE APPROPRIATE DESIGN AND CORDUROY HAZARD WARNING SURFACES EXTENDING 400mm WIDER THAN STEPS AND AT LEAST 800mm BEYOND END OF STEPS.

Front and Rear Door Steps:

Form 113mm to 125mm deep on riser, weathered steps in suitable concrete finished with nosings slightly rounded.

Concrete Paths:

Lay 100mm thick suitable concrete paths where shown. Grade to falls with tamping boards and trowel smooth in one operation while green. Paths to have a suitable Nap finish and shall be set a minimum of 150mm below floor levels except where an 'Aco' drain or equivalent is employed to allow the level of the path to be raised to floor level and where a similar drain is employed at ramps.

5.10 Steps To Paths

Steps to Paths:

Paths to be ramped if possible, in exceptional circumstances only may steps be provided and alternative ramped access must also be provided if possible (for example but not exclusively if access is steep then a flight of steps can be used to allow the a path to run straight from the entrance gate to the front door and an alternative ramped access shall also run back and forth across the slope to achieve the required gradient for access for disabled persons). If steps are required form 150mm high steps in flights not exceeding 6 no. risers without intervening landings or form 1200 landings to slope 100mm with 150mm steps where distance and gradients permit: all to suit relative levels between public footpaths and house floor levels whether such steps are specifically shown or not on small scale site layout plans.

All external concrete surfaces (include screeds) to be laid in such a way and to such a finish that surface water will not lie on any part and neat channels and dishings to be formed towards gullies, etc. where necessary to achieve this end or to guide rainwater from downpipes. Should rainwater

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lodge on paths, the Contractor will be required to remove and replace paths to proper falls at his own expense.

5.11 Floor & Foundations To Out Offices and Sheds:

Lay in suitable concrete (a) 125mm thick concrete floor trowelled finish and (b) 750mm x 300mm thick foundations reinforced longitudinally and transversely as per main foundations.

5.12 Spud Blocks

Spud Blocks:

To front and rear door frames to be rebated and splayed to suit frames and to raise 75mm over floor level. Blocks to be well bonded into walls and to be holed for spud 10mm.

5.13 Copings To Low Level & Screen Walls

Copings to Low Level and Screen Walls:

Copings to dividing and screen walls to be 'Cast-in-Situ' in suitable concrete weathered from 100mm to 75mm finished fine on exposed surfaces and with 20mm throating underneath.

5.14 Precast Concrete Units

Precast Concrete Units:

Precast units as hereunder to be suitable concrete waterproofed in the case of thresholds and cill cast in well oiled moulds and finished fine on exposed faces with 20mm homogenous cast facing of two and a half to one washed sand and cement except where specified 'rough-finish' where facing is to be omitted and surface left rough for plastering. Cover to reinforcement to be 40mm.

Include for returned ends to copings. Finished surfaces to be free from air or water voids and all arises to be true and even.

Internal Door Lintels (Rough Finish):

Lintels to be 100mm x 75mm pre-stressed suitable concrete and 450mm wider than opes.

Window Cills:

To be profiles shown on drawings. If no profiles are shown, window cills to be 305mm x 125mm and 150mm longer than opes, twice sunk, weathered, stooped, throated and rounded on edge and reinforce with 3 no. 12mm diameter mild steel bars, all to detail. D.P.C. to be bonded on underside and turned up on inside edge not less than 150mm.

External Door and Window Lintels:

Cast 225mm thick x 100mm split lintels in suitable concrete and bearing 225mm on both ends. Reinforce with 3 no. 12mm M.S. bars (unless otherwise shown on drawings).

5.15 Chimney Cappings:

Chimney Cappings:

All chimney stacks to have suitable concrete caps cast in-situ weathered from 200mm thick to 100mm thick on face, cored for flue liners on DPC and packed with Lica filling or similar approved 20 parts Lica to 1 part cement (no sand) and consolidated and reinforced and over lapped 25mm from the outside edge. Projection over face of stack to be 50mm and 20mm splayed, throating to be carried underneath. Build in a lead tray DPC across full width of chimney with upstands and apron flashing and fully integrate with roof flashing

5.16 Floor Finish:

Ground floor shall be finished in 2.5mm approved vinyl sheeting. Back of sheeting shall be primed before laying on approved adhesive in accordance with manufacturer's instructions. Sheetting to be in accordance with C.P. 203. All bathroom and toilet area floors shall be finished in Polysafe Vogue, Marine Breeze, 4700, Weld Rod vinyl non-slip flooring.

5.17 Floor covering for wet areas:

For shower rooms and other wet areas such as bathrooms a floor covering that has good slip resistance for both barefoot and shod users is required. Typically a Pendulum Test Value of 36+ is required in such areas however it is up to the Contractor and Supplier to provide flooring that is suitable, appropriate and of adequate quality to do the job intended. Safety of the end user (particularly the elderly and people disabilities) is the most important factor to consider when floor covering is being specified/selected.

In wet areas a Low Slip Potential is required and the floor should comply with at least one (and maybe all) of the following:

- R11 under DIN 51130
- Grade "C" under DIN 51097
- Coefficient of Friction greater than 0.4 under BS4592
- Pendulum Test Value of 36+
- Surface Roughness Rz greater than 20 microns
- 5 year guarantee when

The flooring Supplier and/or Manufacturer should be able to tell the Contractor/PSDP what floor covering they can provide that is suitable for the intended use and also provide instructions on how such floors should be cleaned and maintained.

Blockwork & Brickwork

6.1 Blockwork & Brickwork Generally

Materials

Certified Cement:

Portland Cement used in concrete products and other cement based materials shall be certified as complying with I.S. EN206-1 as amended, in accordance with the Irish Standard Mark Licensing Scheme of Eolas Particular Regulations for Portland Cement, Ref. 19). Manufacturer's or Suppliers' certificates of compliance with the Standard shall be provided when requested.

Concrete Blocks:

Concrete blocks shall comply with I.S. 20. Strength in compression shall be not less than 5N/mm^2 . Use only special Fairface blocks where Fairface blockwork is specified and blockwork is not plastered. Blocks are not to be used for 28 days after casting.

Clay Facing Bricks:

Clay facing bricks shall comply with I.S. 91 and B.S. 3921.
Type and Manufacturer to be as shown on drawings or Project Specification.

Calcium Silicate Bricks:

Where specified to be Castlemore or equal approved.

Sand:

Sand for general purpose mortar shall comply with B.S. 1200.

Hydrated Lime:

Hydrated Lime shall comply with I.S. 8.

Readymix Mortar:

Mortar shall be as follows:

Type: Trowel Ready Mortar (mix 1:6 for Blockwork, 1:5 for Brickwork) mortar exposed to frost to be adequately protected and to contain an approved admixture enhancing performance and resisting damage from environmental actions including frost, efflorescence, mosses, lichens, pollution and any other reasonably foreseeable action in the location where it is to be used.

Manufacturer:

To be approved by Engineer.

Mortar is to be stored and used in accordance with Manufacturer's instructions.

Water:

The water to be used in the mix shall be clean and free from harmful matter. Obtain approval of source of water supply if the supply is not obtained from a public mains supply. Test of water for compliance is at Contractor's expense.

Cavity Wall Insulation:

Slabs for cavity insulation to be 100mm thick Polyurethane Board (Shelterwall or similar approved) with maximum size of 450mm x 1200mm. See drawings for further information, in some cases the drawings will call for additional insulation, in such exceptional cases the drawings overrule this specification and the Contractor should base the cost of insulation on what is required by the drawings and install it accordingly only if superior to this specification. Please note that the specification also calls for internal insulation on timber battens, see section 8.9 Types of Internal Plastering for more detail.

Wall Ties, Metal:

Metal ties for cavity wall construction shall be stainless steel suitable for use with the cavity insulation to B.S. 1243 or approved by Eolas as suitable for the use. Obtain Engineer's approval of the type proposed.

Lintels Steel:

Shall be as follows:-

Type: Ref. L1/S80 (insulated and with expanded metal for internal plaster).

Manufacturer: I.G. (or similar approved).

Lintels Concrete:

To be as precast concrete specification.

Cills, Precast Concrete:

Precast concrete cills to be as shown on drawings and in concrete Specification and to the dimensions specified in S. 15.

Flexible P.V.C.D.P.C.:

Flexible P.V.C.D.P.C. to be to I.S. 57 or equivalent. Obtain Engineer's approval of type to be used. Where freeboard between D.P.C. level and ground level cannot be maintained due to ramping or any other feature an ACO drain or equivalent will be installed to provide drainage directly beside the plinth.

Two-Part Polysulphide Sealing Compound:

Two-part polysulphide sealing compound shall be low shrinkage and comply with B.S. 4254.

6.2 Quality Control

Samples:

Provide three sample panels of brickwork or Fairface blocks where shown on drawings, size approximately one metre square for Engineer's approval. The approved sample to be kept onsite as a control sample until completion. Remove samples on completion.

Provide sample panels of blockwork cavity wall with insulation and wall ties size approximately one metre square for Engineer's approval (Clerk of Works may be nominated by Engineer) The approved sample to be kept on site as a control sample until completion. Remove samples on completion.

6.3 Preparations

Stacking, Concrete Blocks and Concrete Bricks:

Provide a free circulation of air around concrete blocks and concrete bricks when stacked before use.

Stacking, Facing Blocks and Facing Bricks:

Stack blocks and bricks for facing works on a raised clean platform and protect from damage or staining.

Protection, Blocks and Bricks:

Keep dry during delivery and before use all facing blocks and bricks.

6.4 Laying Blocks & Bricks Generally

Stability:

Ensure the stability of blockwork and brickwork during erection.

Minimum Temperature:

Do not lay blocks or bricks while the air temperature is below 2°C on a rising thermometer or below 5°C on a falling thermometer.

Uniformity in Walls:

Build walling in level lifts. Where walling is raked back no part shall rise more than 1.2m above the general level. In facing work complete the lift in one operation and leave no work raked back at the end of each day.

Cutting & Fitting:

Cut and fit blockwork and brickwork neatly to the line and profile of parts of the structure which the walling abuts or surrounds.

Mortar Beds:

Lay solid blocks and bricks on full bed of mortar and with bed and vertical joints fully filled to consistent thickness.

Fair-Faced Work:

Lay blocks and bricks of fair-faced work with the fair face in line.

Bonding Generally:

Lay blocks and bricks with cross-joints in any course not less than one quarter of the length of the unit from those in the course below. Bats shall be used where required to obtain bond.

Ducts, Channels & Openings:

Form ducts, channels and openings in walling as the work proceeds. All ducts and pipework to be boxed out and finished by the main contractor.

Protection, Blockwork and Brickwork:

Keep dry each lift of facing blockwork and facing brickwork including the top surfaces until the commencement of the next lift or other superimposed work.

6.5 Cavity Walls

Cavity Walls Generally:

- a) To have 105mm cavity with cavity insulation fitted in accordance with the manufacturer's instructions.
- b) Keep cavities and ties free from mortar and debris.
- c) Overall elemental U-value of all external walls to be 0.27 W/m²K (see drawings for additional requirements)

Cavity Closer at Eaves & Opes:

Close tops of cavities with a course of concrete blocks on flat or as per contract drawings or as directed.

Fit Thermabate cavity closer to window and door opening surrounds.

Weep Holes:

Form weep holes at intervals not exceeding 900mm in vertical joints at the base of the cavity.

Wall Ties, Setting/Spacing:

Set wall ties in mortar joints to a depth not less than 50mm in each leaf and not less than 20mm from face of wall. Wall ties to be spaced at a maximum of 750mm horizontally and 225mm vertically with a minimum of four wall ties per sq m. Where quoins are shown wall ties must be provided to tie each individual quoin block to the inner leaf.

Wall Ties at Openings:

Provide wall ties at openings at centres not exceeding 225mm vertically and 150mm maximum from the edge of the opening

Horizontal Reinforcement:

Provide “brick force” or similar approved horizontal stainless steel reinforcement under and over window opes and over door opes. Reinforcement to extend 600mm either side of ope and be placed in 2no. consecutive mortar beds. Care should be taken to insure that the correct width is used to provide adequate mortar cover minimum 20mm.

Wall Tie System at New & Existing Walls

Provide “Wall Start” or similar approved connection system and fit in strict accordance with manufacturer’s instructions. Install vertical D.P.C. in conjunction with above system.

Cavity Wall Construction:

Take care to clean out all mortar droppings in the cavity or lying on ties and leave special openings for cleaning. The cavity is to extend 225mm below the D.P.C. Wall ties to be at a minimum spacing shown above or closer as necessary to suit insulation and openings.

General Labours:

Where required, pockets shall be cut or formed in concrete block and brickwork for ends of window cills, steps, etc. Cut or form holes for passage of pipes, etc. in concrete block walls, floors, etc., or whatever required as the work proceeds and make good. All external angles, both inside and outside, throughout the building, including jambs and soffits of openings, except where otherwise specified, shall be square. Do all necessary rough cutting, beam filling and everything required to complete the work to the satisfaction of the Engineer.

Jambs with Open Cavity:

Leave cavities open at jambs of openings until inspected and approved. Close cavity with Thermabate cavity closer, insulation and vertical D.P.C. as shown on drawings.

6.6 Built In Components**Built in Components:**

Build in cills, lintels, copings, pad-stones and other components in mortar similar to that in the adjacent walls. All lintels to bear 225mm at each end.

Window Cills:

Where one-piece window cills are used, bed ends only and point horizontal joint for the full length of the cill with mortar to a depth of 20mm. Lintels: All cills to bear 225mm at each end.

6.7 Mixing

Admixtures:

Do not use admixtures without approval except those specified.

Colour Consistency:

Ensure that the mortar used in finish work is consistent in colour.

Mortar Mixed on Site:

To be four parts washed coarse river sand to one part cement mixed for at least five minutes in a clean mixer. Mix only sufficient amount for immediate use. Discard any mortar, which has started setting.

6.8 Damp Proof Courses

Flexible D.P.C.:

Lay flexible damp proof courses in a continuous strip on a full bed of mortar for the full width of the wall or for the full width of each leaf in a cavity wall. Lap 150mm at joints and the full width at angles and junctions.

D.P.C. to Base of Walls:

Provide a damp proof course at the base of external walls not less than 150mm above the adjacent finished level of external ground or paving. Where freeboard between D.P.C. level and ground level cannot be maintained due to ramping or any other feature an ACO drain or equivalent will be installed to provide drainage directly beside the plinth.

D.P.C. to window cills:

Provide a flexible damp proof course under cills for the full width of the cill bed and turn up at back and ends of the cills to the full depth and tuck ends underneath window frame. Also provide 50mm minimum insulation at back of cills and a proprietary cavity closer for the cavity, CAVICLOSER by 'Cavity Tray' or other similar approved cavity closer under cills. (150mm thick concrete blockwork may be required in one course below cill, to be confirmed when type of cavity closer is agreed).

D.P.C. to Parapets:

Provide a damp proof course at the base of parapet walls not less than 150mm above junctions with horizontal and sloping surfaces.

D.P.C. Over Openings in Cavity Walls:

Provide a flexible damp proof course in one piece spanning the cavity over the openings in cavity walls and extending not less than 100mm beyond the ends of the lintel. Slope the damp proof course downward to the exterior and carry it through to the outer face of the external leaf.

D.P.C. to Jambs of Openings in Cavity Walls:

Provide a 150mm flexible damp proof course in a continuous strip set vertically in jambs of openings in cavity wall construction. Also provide 50mm polyurethane insulation behind vertical D.P.C.

6.9 Movement Joints**Formation of Vertical Joints:**

Movement joints in walls shall be vertical. Where terraces exceed two houses, provide a movement joint at the party wall of every second house.

Sealing Joints:

Seal joints with an approved suitable two part polysulphide mastic U.V. resistant, low shrinkage sealing compound in accordance with the manufacturer's written instructions (not silicone sealant unless of a type specifically manufactured for the purpose).

6.10 Brick Laying**Stretcher Bond:**

Lay bricks in Stretcher Bond unless otherwise shown or directed, i.e. with stretchers only in each course and with one half brick lap.

Consistency of Colour

Distribute evenly throughout the facing work bricks of varying shades of the same colour. Mix deliveries which vary in colour to avoid contrast between adjoining lifts.

Frogs in Loadbearing Brickwork:

In loadbearing walls, lay single frog bricks with the frog uppermost. Lay double frog bricks with the deeper frog uppermost and fill all frogs with mortar.

6.11 Junction of Masonry With Roofs

Lay approved proprietary cavity trays (stainless steel or plastic) with lead cover flashings at all junctions between roofs and masonry. Obtain Engineer's approval for the type of tray and method of installation.

6.12 Hearths & Fire Surrounds**Hearths and Fire Surrounds:**

Shall be marble surround and granite hearth to Engineer's approval, size 1400mm x 900mm. Surround shall be fitted with brass angle neatly mitred, complete with approved type baskets, frets

and precast firebacks. Fireplace to be formed to take Grant triple pass back boiler or similar approved.

Range/Stove

Supply and install 1 No. Stanley Stove of type referred to in the Tender Document or equivalent with vitreous enamel splashback and horizontal flue outlet and plate rack. Manufacturers recommendations and instructions shall be strictly followed in the installation.

6.13 E.S.B. Ducts

The Contractor is to build in and be responsible for the protection of all ducts for mains cable as supplied by the E.S.B. during progress of the works. On inner face of external wall, build in approved steel conduit at eaves to carry mains cable to meter board. All ducts and pipework to be boxed out and finished by the main contractor.

6.14 Flues

Flue liners to be '*ISOKERN/ANKI EM Single Module Chimney System*' (or equivalent approved by the Engineer) installed in accordance with manufacturer's instructions and Agreement Certificate. All flue gatherers, connections and other associated components to be '*ISOKERN/ANKI*' installed to manufacturer's instructions with Leca fill (or equivalent approved by the Engineer). Provide terminal pot of approved type to a height 112mm over level of highest part of finished capping. Manufacturer's instructions will be followed in all cases except where in conflict with this specifications. All faces of all chimneys will be plastered with a scratch coat, and finished coat; total thickness to be a minimum of 20mm; particular attention to be paid when plastering between joists and within roof spaces, finish to be to the highest standard throughout. Crow-guards / cowls to be fitted to all chimneys.

Chimneys to be constructed with a less than 45 degree bend in the flue above the fireplace to eliminate precipitation from falling directly into fireplace.

Where central heating is provided and the boiler is located inside the dwelling the flue will be completely enclosed fireproofed and insulated and will pass through the roof at the highest achievable point allowing for sufficient height all in compliance with the boiler manufacturer's specifications, the relevant standards and the most recent Irish Building Regulations. The flue will be boxed in with 2 layers of 12.5mm plasterboard supported on aluminium studs and/or beads and surrounded by 100mm thick Rockwool insulation unless otherwise directed by the engineer. Alternatively the flue shall be inside a chimney stack where shown on drawings.

6.15 Fireback's or Back Boilers

Set Fireback's or Back Boilers and fill solid behind backs and sides with 'Leca' from '*ISOKERN/ANKI*' installed to manufacturer's instructions (or equivalent approved by the Engineer). Back boilers to be Grant triple pass or similar approved.

6.16 Walls to Back Stores or Out Offices

Shall be of the same construction as those of the main house unless indicated otherwise on drawings.

6.17 Rising Walls Generally

Shall be built in solid concrete blockwork with cement mortar. Heights of rising walls relative to contours and levels shall be determined by the Contractor on site, in conjunction with the Contract drawings before his tender is compiled and provision for same shall be made in his price. The minimum requirement for height of rising walls shall be 900mm from the top of the finished concrete foundation. Where steps occur and for calculation purposes the minimum requirement shall be determined at the highest point of the foundation and heights of steps shall be added accordingly. All rising walls shall be built in solid blockwork. In cavity wall construction, solid rising walls shall be built to within 225mm of finished floor levels.

IMPORTANT: WHERE DRAWINGS INDICATE A SLOPING SITE AND/OR FILL AND/OR SOFT OR OTHERWISE POOR GROUND CONDITIONS THE CONTRACTOR WILL TAKE ACCOUNT OF THIS IN THE CALCULATION OF THE HEIGHT OF RISING WALLS. WHERE IT IS FOUND THAT MORE THAN 900mm OF FILL IS REQUIRED UNDER THE GROUND FLOOR, A SUSPENDED CONCRETE FLOOR WILL BE INSTALLED. THE VOID UNDER A SUSPENDED CONCRETE FLOOR WILL BE FILLED WITH COMPACTED SUITABLE FILL BLINDED WITH 50mm DEEP SAND TO WITHIN 150mm FROM THE UNDERSIDE OF THE FLOOR. THE LEVEL OF THE UNDERFLOOR SHALL BE LEVEL WITH OR ABOVE EXTERNAL GROUND LEVEL TO PREVENT A SUMP SITUATION ARISING UNLESS OTHERWISE INSTRUCTED BY THE ENGINEER.

Woodwork, Windows & Doors

Materials

Cavan County Council will permit only legal and sustainable timber or FLEGT-licensed timber in works carried out by the local authority or on behalf of the local authority.

Timber for Carpentry:

To be first quality kiln dried native spruce or white deal free from large, loose or dead knots, shakes, wavy edges in accordance with I.S. 96.

Softwood for Joinery:

To be first quality red deal free from large, loose or dead knots, shakes, wavy edges in accordance with I.S. 96.

Hardwood for Joinery:

To be first quality kiln dried Iroko or similar approved certified as from a sustainable source.

External Timber:

All timber exposed externally to be Iroko or similar approved certified as from a sustainable source.

Roof Insulation:

To be 300mm Rockwool or equivalent alternative providing an elemental u-value of 0.16 W/m²K. In dormer style dwellings Roof Insulation to be 150mm thick rigid polyurethane insulation to achieve an elemental u-value of 0.2 W/m²K and to be well mechanically fixed and taped in place to ensure that a minimum of 50mm air gap is provided between the insulation and the felt. CERTIFICATE FROM MANUFACTURER PROVING COMPLIANCE TO BE SUBMITTED TO THE ENGINEER FOR APPROVAL.

Mastics:

To be suitable for the purpose intended, supplied from a manufacturer approved by the Engineer and laid strictly in accordance with manufacturer's instructions. Low shrinkage mastics to be used.

Eaves Vents:

Provide and fix 2 rows of 'Glidevale' Ref. F.V. 100 eaves vents and R.V. 401F roof vents or equal approved in a continuous run for the entire length of eaves. Fix to manufacturer's instructions.

7.2 Components

Front and rear entrance doors to be hardwood or similar approved doors with a minimum of 800mm wide clear opening when the door is in the open position. Doors to incorporate lever handle set with 3 point locking system of approved manufacture. External thresholds to be 15mm maximum

height to allow ease of access for wheel chair users. Thresholds to be from Exitex, Dundalk, Ireland (or similar approved). Threshold type to be Exitex MWK20/R, with Seal Carrier MWK/SC and Exitex Deflector and Front Ramp (or similar approved).

Front Door Entrance:

uPVC External Doors

Engineered front doors & screen. U value for door set at 1.4 w/m²K with toughened safety glass and equivalent to Munster Joinery Ultratech door product and approved. NOTE Front doors should be fitted with a door chain or opening limiter, door viewer and thumb knob. Comply with requirements of BS EN 12608:2003 Unplasticized polyvinylchloride (PVC-U) profiles for the fabrication of windows and doors. Classification, requirements and test methods Double-glazed units with glass thicknesses in accordance with BS6262: 1982 Code of practice for glazing for buildings and BS6262: Part 4: 1994 Code of Practice for safety related to human impact

External door to be securely fixed to frames using one and half pairs of steel hinges. Any glass panels fitted to the door should be a size, position and type which can't be easily broken or allow direct entry or manipulation of locks or bolts. Front doors should be fitted with a door chain or opening limiter and, in the case of solid doors, a door viewer.

Engineered rear doors & screen. U value for door set at 1.4 w/m²K with toughened safety glass and equivalent to Munster Joinery Ultratech door product and approved.

Red deal store door, framed, ledged and braced 25mm T & G and v jointed, sheeting, galvanised hinges, 863 wide and 1980 high and 200mm bolt

Level Access & Drainage:

IMPORTANT: ACO DRAIN OR SIMILAR TO BE INSTALLED AT DOOR ENTRANCE TO ALLOW LEVEL ACCESS IN COMPLIANCE WITH PART M OF THE BUILDING REGULATIONS. ACO DRAIN TO BE CONNECTED TO GULLEY TRAP PROVIDED SPECIFICALLY FOR ACO DRAIN AND DRAINAGE FROM ROOF OF PORCH IF APPLICABLE.

Out Office Door (if shown):

Supply and fix as indicated to yards and elsewhere shown, double vacuum treated red deal ledged, braced, framed and sheeted doors consisting of 150mm x 25mm ledges, braces and framing, with 150mm x 25mm

Double vacuum treated T. & G. sheeting boards, well screwed to ledges. Hang from 75mm x 50mm wrought deal frame once rebated and moulded and bolted to walls. Side posts and door to be set off ground. Doors shall be fixed on one pair 203mm galvanised steel tee hinges.

Skirting and Architraves:

Ex 150mm x 25mm moulded red deal skirting to be fitted at all internal wall/floor junctions: ex 75mm x 25mm moulded red deal architrave to be fitted to all door opes unless alternative shown on drawings. Where pipes are carried at skirting level, box out skirting and provide 25mm rounded top.

Door Saddles:

To be 10mm thick hardwood or similar approved splayed and rounded each side, and scribed to door frame and architrave, 125mm wide for 75mm partitions, and 150mm wide for 100mm partitions. Include for low profile aluminium carpet fixing strips on all special houses (see drawings for special houses).

Window Boards:

To be ex 225mm x 32mm white deal or equivalent to allow window board to finish 25mm proud of plaster and 40mm each side of ope, rebated out of solid.

Internal Flush Panel Doors:

All internal doors to be flush panel 50mm thick sheeted both sides with birch faced plywood. Hang all internal doors on one and a half pair of 100mm steel butt hinges. All internal doors to give a half-hour fire resistance (FD30). Internal doors protecting stairwell in three-storey situation must have one hour fire resistance with appropriate seals (FD60).

Door frames:

Doorframes in 75mm stud partitions to be 115mm x 50mm white deal rebated in the solid and in block partitions to be 150mm x 50mm rebated in the solid. Provide fanlight, glazed in 6mm clear Georgian wired glass to all first floor doors. A sunscoop roof light shall be provided in corridor/landing beside bedrooms in all houses, fanlights may be omitted at the Council's discretion if sufficient natural light is available via sunscoops. To achieve sufficient natural light sunscoops must have smooth walls not flexible corrugated type.

Hot Press Doors, Frames and shelves:

Doors to be 50mm thick standard flush panel to I.S. 48p. Hang doors on one and a half pairs of 100mm steel butt hinges. Door frames to be 115mm x 50mm rebated in the solid. Transom shall be 115mm x 63mm but twice rebated. Three slatted shelves to be installed in each hot press positioned to protect and accommodate plumbing installation and immersion water heater.

7.3 Ironmongery

Schedule:

Internal Flush Panel Doors: Mortice lock with lever furniture, Basta "Glencar" type.

Hot Press Doors: 1 Mortice lock with lever furniture, Basta "Glencar" type.

Front door entrance: 1 No. cylinder night latch type polished brass.

1 No. knocker and letter plate type polished brass - size 250mm x 75mm.

1 No. 150mm polished brass door handle. Brass Numerals type K930, allow for 75mm brass door numbers for each dwelling.

Rear Door: 3 point locking system as for front door with satin brass lever furniture. 150mm brass shooting bolt.

Store Door: Thumb latch Suffolk type No. 20 - 250mm wrought iron galvanised Tower Bolt and receiver.

Fuseboard Cupboard: 1 No. cabinet handle type 100mm S.A.A. Showell. 1 No. Double ball catch spring loaded type Showell.

Hat and Coat rail: 6 No. hat and coat hooks, type S.A.A. No. K2034.

Allow for brushed steel doorstops with rubber bumpers at every door (internal and external) to prevent door handle from striking wall, fitted to skirting or floor where appropriate.

7.4 Windows

Generally:

Each All Material must comply with Current Building & Fire Regulations and Irish Standards: Particular reference should be made to: Section 1.5.6., Fire requirements, Part B, Technical Guidance Document, 2006 Building Regs.

Section 2, Existing Buildings, Conservation of Fuel and Energy for Dwellings, Part L, Technical Guidance Document, 2011 Building Regs.

Suppliers are to supply U-values for windows and doors that have been independently certified by a third party, such as the Window Energy Performance Certification Scheme (WEP) or equivalent.

P.V.C. Windows:

Window specification: Windows to have overall u-value 0.8 W/m²k and must have Irish Agreement Certificate or equivalent approved by Cavan County Council. Each opening light must be fitted with a stay or restrictor enabling the window to open and close with a smooth action and allowing the window to be set at several different degrees of opening i.e. 1/8 open... 1/4... 1/2... fully open. Each opening light must be fitted with adjustable friction hinges and stays, which can be adjusted to regulate the amount of force required to open or close the window. The hinges must be adjusted to a setting which will allow the windows to be opened and closed easily and smoothly. NOTE: AT LEAST ONE WINDOW TO EACH BEDROOM AND LIVING ROOM TO HAVE AN OPENING LIGHT WITH A CLEAR OPENING OF 750mm HIGH BY 450mm WIDE (or 450mm high by 750mm wide).

...(continued from above) The unobstructed area is to be 0.33 square metres and windows are to be fitted with safety restrictors to prevent accidental opening by children but which can be opened with relative ease by adults. The restrictor should be an integral part of the window stay. All hinges to be suitable for fire escape windows with easy clean slider (hinge that allows window to slide to one side for cleaning of external glass). Include for hot welded P.V.C. windows, all mullions and transoms to be welded, with aluminium or steel folded box section stiffeners. Each window profile to have 3 chambers, the centre chamber to contain the stiffeners. Window sizes given below, allow for possible 200mm variation in sizes and allow for access to second storey windows when pricing.

Roof Windows:

To be Velux roof windows, one window to each room to be an EMERGENCY ESCAPE WINDOW.

NOTE: AT LEAST ONE WINDOW TO EACH ROOM TO HAVE AN OPENING LIGHT WITH A CLEAR OPENING OF 750mm HIGH BY 450mm WIDE (or 450mm high by 750mm wide). HEIGHT TO UNDERSIDE OF OPENING TO BE A MAXIMUM OF 1100mm. The unobstructed area is to be 0.33 square metres and windows are to be fitted with restrictors.

Vents

Provide “Renson” AR60 vents or equivalent approved to head of every window. Final positions to be agreed before ordering of windows. Vents integrated into windows with insect screens and acoustic damping might be accepted as an alternative if approved by the Engineer. Wall vents with draught control, integrated insect screens and acoustic damping to be provided where ventilation in windows alone is not adequate for size/use of room.

7.5 Workmanship

Moisture Content Of Timber

Moisture Content:

The maximum moisture content at time of fabrication and installation shall be as follows:-

Carcassing Timber: (Rafters, Joists, Battens, Studs, etc.) 22%

External Joinery: 17%

Internal Joinery: 15%

7.6 Dimensions

Basic Sawn Sizes:

Timber dimensions in general, which are shown on the drawings or referred to elsewhere, shall be basic sawn sizes, unless otherwise indicated.

Finished Sizes:

Timber dimensions for joinery items or components shown on the drawings or referred to elsewhere shall be basic sawn sizes, unless otherwise indicated. Allowances for planing are set out below.

Tolerance

The maximum permissible dimensional deviations for timber work generally shall be as follows:

Level:

Level for any horizontal surface when measured from the nearest reference level: = 5mm. For any horizontal surface = 2mm in any 1m but not more than 8mm.

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Position on Plan:

For the position of any vertical surface, at the lower edge, when measured horizontally from the nearest reference line = 5mm.

Plumbness:

For plumb of upper to lower edges of any vertical surface = 2mm in any 1m but not more than 8mm.

Cross Section, Basic Sizes:

The permissible dimensional deviation from the basic cross-sectional sizes to sawn softwood timber, measured at 20% moisture content, shall be as follows:-

Thickness and widths not exceeding 100mm -1mm, + 3mm. Thickness and widths exceeding 100mm: -2mm, + 6mm.

Negative deviations shall not be permissible in more than 10% of the pieces.

Planed Sizes, Constructional Timber:

The permissible dimensional reductions from the basic sawn size of planing of two opposed faces of constructional timber shall be as follows:-

Thickness and widths not exceeding 100mm - 3mm. Thickness and widths over 100mm but not exceeding 150mm - 5mm.

Thickness and widths exceeding 150mm - 6mm.

Processed Stress Graded Timber:

Where stress graded timber is processed to exceed the permitted reductions it shall be re-graded.

Planed Sizes, Joinery Softwood:

The permissible dimensional reductions from the basic sawn size of the finished size of planing of two opposed faces of softwood for joinery shall be as follows for thickness and widths:- From 15mm to 35mm: 3mm. From 35mm to 100mm: 5mm. From 100mm to 150mm : 9mm.

Planed Sizes, Joinery Hardwood:

The permissible dimensional reductions from the basic sawn size to be the finished size by planing of two opposed faces of hardwood for joinery shall be as follows for thickness and widths:- From 15mm to 25mm: 3mm. From 25mm to 50mm: 5mm. From 50mm to 100mm: 6mm. From 100mm to 150mm: 9mm.

Distortion:

Distortion in timber due to bow, spring, twist and cup shall be measured in accordance with B.S. 4978 and shall not exceed the following limits:-

BOW Half the thickness in any 3m in length.

SPRING 15mm in any 3m length.

TWIST 1mm per 25mm of width in any 3m length.

CUP 1/25 of the width.

Flatness:

The maximum permissible deviation in flatness of a finished surface at any point under a 1m straight edge placed on the surface in any direction shall be 2mm without any abrupt changes.

Finished Sizes:

The maximum permissible deviation from the finished sizes of timber shown shall be = 0.5mm.

Surfaces Generally:

All surfaces of joinery items or components shall be wrought unless otherwise indicated.

Exposed Surfaces:

Exposed surfaces shall be those exposed to normal view after installation and which may or may not be decorated.

Semi-Concealed Surfaces:

Semi-concealed surfaces shall be those which, are not normally exposed to view, and are the internal parts of cupboards and drawers.

Concealed Surfaces:

Concealed surfaces shall be those, which, after installation, are concealed by surrounding work, not merely by decoration.

Samples:

Provide samples for approval as requested by the Engineer.

7.8 Preparation

Storage Generally:

Store timber and timber products protected from the weather, clear of the ground and supported to prevent distortion. If stored in damp air conditions enclose completely with a suitable covering to prevent deterioration and provide for air circulation and ventilation.

7.9 Preservation Treatment

Organic, Solvent, Double Vacuum Treatment:

All timbers shall be double vacuum treated with an organic solvent preservative to comply with B.S. 5268 Part 5 for the proposed use and the durability of the timber. Treatment shall be carried out by an approved Specialist Firm and certificates for same will be submitted to the Engineer (via the Clerk of Works if applicable).

Re-Drying:

Before fabrication or installation, re-dry to the specified moisture content, timber that has been impregnated.

Treatment Preparation:

Provide a certificate from the processor with each consignment of the timber stating:

- a) The preservation treatment carried out.
- b) The moisture content of the timber prior to treatment.

Timber Preparation:

Before treatment, carry out all sawing and planing to give the finished cross sections and, unless otherwise approved, all cross cutting, drilling or other machining. Ensure that average moisture content does not exceed 25%.

Work after Treatment:

Liberally brush pre-treated timber with two coats of a compatible preservative supplied by the manufacturer or processor on any fresh surfaces exposed by drilling or cross cutting after treatment. Treated timber subsequently rip-sawn and timber for use in ground contact which has been drilled or cut, shall be re-treated by the specified process.

Copper/Chrome/Arsenic Metal Fittings:

Do not apply any metal fittings to timber treated with copper/chrome/arsenic within seven days of treatment.

Erecting & Fixing Timber Sections**Dried Timber Installation:**

Install dried timber in air conditions having an equilibrium moisture content corresponding approximately with those, which will prevail during normal occupancy or service.

Joints in Structural Timber Work:

Joints in structural timber work generally shall be as shown on the drawings and shall comply with C.P. 112 Part 2.

Continuous Lengths:

Install timber members in continuous lengths without splices where possible, unless otherwise shown or approved.

Contact and Bearing Surfaces:

Ensure full contact of surfaces over the area of joints and over the area of other bearing surfaces.

Wall Plates:

Install wall plates level with joints halved and lapped where in one thickness, and 200mm laps where in two thickness. Set in a full bed of cement mortar over masonry or concrete bearing walls. Minimum size of wall plates to be 100mm x 75mm.

Wall Plate Anchors:

Secure wall plates to walls with tie-down anchors fixed at not more than 900mm centres and at 400mm centres either side of joints. Wall plates to be L-shaped and to be fixed to at least 3 courses of blockwork masonry (the number of courses may be reduced or increased at the discretion of the Engineer).

Joists Generally:

Eco-joists or similar approved open webbed engineered joists to be used. Space joists at least 50mm clear of flanking masonry or concrete walls. Lay joists with crown or convex side of any camber upwards and level for flooring in compliance with maximum permissible dimensional deviations described above. Any joists that are excessively cambered shall be rejected, removed from the work and replaced with suitable compliant joists. Care should be taken to ensure that unsuitable joists are removed before flooring is laid as all work associated with later removal will be at the Contractor's expense.

Joists:

Fix joists at 400mm centres, unless otherwise indicated. Skew nail each end to wall plates with 2 no. 100mm, 4.5 diameter round plain head nails. Extend joists at least 75mm beyond nearest edge of wall plates but allow a clear space of at least 10mm between ends of joist and masonry or concrete walls. Follow manufacturer's instructions for engineered joists.

Built in Members:

Allow a clear space of at least 10mm at sides and ends of joists, beams and other members where built into masonry or concrete supporting structure, and provide a minimum bearing of 75mm at supports, unless otherwise indicated.

Rafters:

Fix rafters at 400mm centres, unless otherwise indicated. Skew nail to wall plates with 2 no. 100mm x 4.5mm diameter round plain head nails and nail securely to other roof members.

Purlins:

Purlins shall be in single lengths unless otherwise shown on the drawings or approved. Joints shall be avoided, but where necessary, shall be lapped over a substantial support.

Herringbone Strutting:

Fix 44mm x 35mm herringbone strutting between joists over 125mm deep at spacing not to exceed 2,000mm. Nail each end of strutting with 2 no. 100mm x 4mm diameter round plain head nails.

Metal Cross:

Fix metal cross bridging in accordance with the manufacturers written instructions (alternative to Herringbone strutting).

Notches:

Make notches in structural timbers only in approved locations and to approved methods and dimensions to comply with the relevant Guidance Documents and Building Regulations.

Holes in Joists:

Drill holes where required in joists, centred at half the depth only and with diameter limited to one third of the joist depth, and a minimum distance of 200mm from edge of hole to end of joist, unless otherwise indicated.

Nails and Screws, Lengths Generally:

Unless otherwise indicated the length of nails used shall be not less than twice and screws not less than one and a half times the thickness of the member to be fixed through which they are driven, but they shall not be longer than the combined thickness of the sections being joined, less 5mm.

Fixing Generally:

Do not insert nails or screws in any end split. Where nailing may cause splitting, pre-bore holes. Drill pilot holes for non-ferrous nails in hardwood. Bore lead holes for all screws.

Bolted Joints:

Drill holes for bolts as close as possible to nominal diameter of bolt but do not exceed 1.6mm larger than bolt diameter. Do not insert bolts in any end splits. Install washers under head and nut of all bolts bearing on timber, except under heads of coach bolts. Tighten nuts as far as possible without crushing surface of timber.

Erecting & Fixing Of Timber Sections**Bolted Joints, Inspection:**

Inspect bolted joints 6 - 8 weeks after erection and tighten, if necessary, finishes to area where bolts are located to be left out until after bolts are inspected.

Select Pieces:

Select and arrange individual pieces of timber so that knots and other permitted defects will not interfere with proper jointing or fixing, or otherwise reduce the strength of assemblies.

Fixing to Substrates:

Fix timber sections to substrates as follows, unless otherwise indicated:

- a. Battens to block walls with masonry nails at 600 centres.
- b. Battens to steel purlins with self tapping screws at 600 centres.

Expanding Bolts:

Install expanding bolts and nuts in accordance with the manufacturers written instructions. Space bolts to avoid cracking due to expansion.

Boarding**Boarding Generally:**

Ensure a close and tight fit along full length of boards and adjoining ends. Stagger end joints so they are not less than two board widths apart in all directions. Locate joints over centre of supports, unless boards are end matched. Fix boards at right angles to supports, unless otherwise indicated. Remove any lipping at edges and provide a smooth surface

Internal Boarding:

For internal work, lay and fix boards together under pressure, or otherwise, as directed.

External Cladding:

For external cladding, lay and fix board together under pressure, or otherwise, as directed.

External Cladding Preparation:

Ensure that all surfaces of boarding for external cladding are coated with preservative stain before fixing.

Boarding, Nail Lengths:

The length of nails for boarding shall be not less than two and a half times the board thickness, but not longer than the combined thickness of the sections being joined, less 3mm.

Boarding, Screw Lengths:

The length of screws for boarding shall be not less than twice the board thickness, but not longer than the combined thickness of the sections being joined, less 3mm.

Face Nailing:

Nail boards at each support as follows, with nails punched below the face of boards: T and G.

Boards: Up to 100mm wide - 1 nail. Over 100mm wide - 2 nails

Plain edged boards: Up to 175mm wide - 2 nails Over 175mm wide - 3 nails.

Secret Nailing:

Secret nail boards at each support with one nail angle-driven above tongue.

Screw Fixing:

Screw boards at each support as follows with screws having heads countersunk flush with face of boards:

T and G. Boards: Up to 100mm wide - 1 screw. Over 100mm wide - 2 screws.

Plain Edge Boards: Up to 175mm wide-2 screws. Over 175mm wide - 3 screws.

7.13 Trim Work**Trim Work Generally:**

Install trims where possible in un-jointed lengths between angles or in straight runs. Mitre exposed angle joints unless otherwise indicated.

Scribing:

Scribe timber sections to adjoining uneven surfaces unless other treatment is approved.

Nail Heads:

Punch nail heads below surfaces of timber sections to be painted or requiring a smooth surface.

Screw Heads:

Countersink screw heads or bolts not less than 2mm below surfaces of timber sections in trim work to allow for stopping.

Pelleting:

Countersink screw heads or bolts not less than 5mm below timber surfaces, which are to be, clear finished. Cut pellets from similar grained matching timber and glue in place with grain aligned. Finish flush with surfaces.

7.14 Framing Work**Nail Joints:**

Nail butt joints in framing work as follows:

Studs to Plates: Skew or end nail with not less than two nails at each joint.

Lintels and Stills to Studs: End nail with not less than two nails at each joint.

Nogging to Studs: Skew or end nail with two nails at each joint.

Blocking:

Install timber blocking between studs as required to facilitate installation of finishing materials and fixtures.

Sole Plate D.P.C.:

Insert a full width damp proof course under framing sole plate at ground floor and lap 150mm at joints and the full width at angles and junctions.

Trap Doors:

Trim to form ope size 650mm x 550mm in ceilings with 48mm x 100mm deep framing for access to all roof spaces. Line opening with 50mm x 25mm red deal lining and finish with 50mm x 19mm red deal wrought and twice rounded Architrave's neatly mitred. Provide 20mm M.D.F. trap doors to each with foil-backed plaster slab finish or similar approved to give same surface spread of flame as adjoining ceiling and fit fire retarded polyurethane or polyisocyanurate insulation to upper side of trapdoor to provide the same insulating properties as the rest of the ceiling as specified above. Trapdoor to be draught-sealed and have suitable securing catches allowing the trap door to be secured closed tightly in compliance with Building Regulations. Provide double truss at both sides of trap door and chimneys.

7.15 Joinery Assembly**Quality of Workmanship:**

The quality of workmanship in joinery shall comply with B.S. 1186 Part 2 for requirements as to fit, precision of joints and the use of adhesives, unless otherwise indicated.

Construction as Shown:

Construct joinery as shown on the drawings unless otherwise approved. Where details of joints are not shown, use the same details shown for similar position of use.

Construction Outlines:

The drawings show the final appearance of the work in outline rather than the complete construction. Obtain approval of proposed construction details before starting fabrication.

Arises:

Slightly round sharp arises on exposed and semi-concealed surfaces.

Angle Joints:

Mitre exposed angle joints unless otherwise indicated.

Screw Fixing:

Provide matching clearance holes in addition to lead holes for screws.

Protection:

Provide temporary protective covering for joinery during the construction period, as necessary.

Adhesives:

Apply adhesives in accordance with the manufacturers written instructions, and within any stated shelf life. Maintain mating surfaces in intimate contact to ensure adhesion within the setting time.

Adhesive Staining:

Where work is not to be painted, prevent discoloration of exposed surfaces due to staining by adhesives.

Dowels:

Use dowels of hardwood other than beech, grooved for adhesive and sized for a driving fit.

Clearance for Hinged Items:

Where hinged joinery items, other than full size doors, are fitted flush between straight or rebated frames, leave a gap at all points of not less than 1.5mm and not more than 2.5mm for work intended to be painted or to receive a thick coated finish and not more than 1mm for work to be finished otherwise.

Drawers:

Fit drawers in openings so as to slide freely without undue play vertically or horizontally. Where drawer front is rebated over edges of opening the drawer front size shall be less than the opening size by not more than 1.5mm in width or height. Fit such drawers with accurately secured stops.

7.16 Roof Construction

Trussed Rafter Manufacturer:

Roof trusses to be from a manufacturer approved by the National Standards Authority of Ireland (N.S.A.I.) and included on the N.S.A.I. Approved Roof Truss Manufacturers List. Obtain Engineers approval of manufacturers of trussed rafter.

Trussed Rafters:

Shall be designed and fabricated in accordance with I.S. 193 and the information shown on the drawings. The County Council Specification for Roof Trusses shall be complied with unless approval is given for variation (See end of Specification). All timbers to be double vacuum treated with approved preservative and accompanied with appropriate certificates.

Manufacturers Recommendations:

Submit copy to Engineer. Take delivery, store and erect trussed rafters strictly in accordance with Manufacturers instructions and information shown on drawings. The requirements on the Drawings and Specification are the minimum. Comply with any additional requirements of the manufacturer.

7.17 Cut Roof Assembly

Roofing:

Timbers shall be first quality fir, larch or spruce, free from sap, large and loose knots and other defects and shall be well seasoned. Approved stress graded native timbers within permissible moisture content limits may be acceptable with prior approval of the Engineer.

Wall plates shall be 100mm x 75mm halved and spiked at joints and properly secured to wall at 1.20m centres and built 100mm into gables. Rafters spaced at 400mm centres shall be 175 x 44 in general, all cut carefully to bear fully on 175mm x 44mm ridge piece and on wall plates and purlins. Purlins shall be 225mm x 75mm unless otherwise indicated by Engineer or drawings.

Collar ties shall be 150mm x 44mm securely fastened to every third rafter and ceiling joists shall be similar and shall be accurately levelled, runners shall be 100mm x 50mm and hanging pieces 100mm x 50mm shall be fitted to every collar. Rafters, ridge pieces, collars and runners as also 50mm x 38mm slate laths, joists and trimmers, shall finish clear of all chimney shafts and shall be trimmed around shafts accordingly.

ALL TIMBERS TO BE DOUBLE VACUUM TREATED AND CERTIFIED.

Rafter Erection:

Erect rafters at 400mm centres, spiked at ends to 100mm x 75mm wall plates.

Align rafters vertically and horizontally.

Diagonal Bracing:

Provide 100mm x 25mm diagonal bracing at all gables. This must extend from ridge to both corners and be spiked to underside of each rafter.

Longitudinal Bracing:

Provide 1 no. 100mm x 25mm brace fixed just under ridge and 2 no. 100mm x 25mm members fixed at ceiling level. These bracing members to be continuous, spiked to each truss and finished tight against gable or party walls.

Lateral Support to Gables:

Fix 30mm x 5mm galvanised steel anchors at 1.5 metre centres on gables. Anchor to be turned down 100mm on inner leaf of cavity walls and spiked or screwed to top of three trusses. Solid bridging is to be fixed between rafters under anchors and truss, nearest wall is to be securely wedged.

Fascia Boards And Soffits:

Fascia and soffits to be u.P.V.C. or Aluminium where indicated on drawings, with 10mm continuous or equivalent vent opening along soffit with insect screen.

P.V.C. or Aluminium Fascia and Barge Board:

- a) Obtain Engineer's approval for type to be used and fixed.
- b) Provide 175mm x 22mm continuous white deal ground nailed to feet of trusses and fix P.V.C. fascia to grounds.
- c) Project timber gable verges 220mm from wall and fix P.V.C. barge.

Roof Gutter to Stack:

Form 150 x 22mm white deal wrought gutter to rear of chimney stacks with 75mm x 35mm bearers, spiked to rafters bearing on 50mm x 12mm fillet fixed to stack (turn down at corners). Spike 225mm x 22mm white deal wrought and splayed board to back of rafters. (Leadwork specified in Plumbing section.)

Roofing Felt:

To be Tyvek, Solitex or similar approved high performance U.V. resistant sarking felt breather membrane.

Tile Battens:

Lay 50mm x 38mm sawn white deal battens at gauge to give lap specified.

7.18 Prefabricated Roof Truss Specification**7.18.1 Grading**

The principles of stress grading set out in Code of Practice BSCP 112 (Part 11): 1971 are to apply. Those grading rules are such as to enable classification by visual inspection. The points to be considered are knots, slope of grain, amount of wane, rate of growth and the extent of checks, shakes and splits.

7.18.2 Grade Of Timber

Any grade of timber complying with the requirements of the stress grades given in CP 112: 1971 is suitable for trussed rafters.

All timber should be visually graded in accordance with Clauses A6 to A17 of CP 112 or machine graded in compliance with Clause A18 to the bending stress levels appropriate to the grade as specified in CP 112. Rafters and ceiling ties, should be graded to the recommendation for beams, but no increases in the size of knots outside the middle third of their length should be permitted.

Internal struts and ties should be graded as compression and tension members respectively, except that where the stress in the internal members can be shown by calculation to be less than one-half of the allowable grade stress, the knot size should be limited to that for edge, arris and splayed knots as defined in CP 112 considering each surface of the member as an edge.

Dead knots or knot holes shall not be permitted within the areas of metal plate fasteners.

Live knots are permitted within the plate area provided that the nails or tooth can be satisfactorily embedded in the material of the knots. In addition, if the force on the fastener is acting towards the end or edge of the member, the distance between a knot and that end or edge shall not be less than the maximum dimension of the knot in the direction of the force.

Wane should not occur on the top edge of the rafters nor within the areas of any joints or bottom edges of ceiling tie. Fissures should not occur within the area of metal plate fasteners. Timber less than 75mm in depth or 35mm in thickness after processing at 20% moisture content should not be used for trussed rafter construction.

The species and grades of timber to be used should be specified on the appropriate design sheets and drawings.

7.18.3 Design

Member Sizes:

The minimum acceptable sizes of roof members are to be as follows:

Rafters:

Basic Size - 38 x 100mm.-Actual size - 35 x 97mm minimum

Ceiling Joist:

Basic Size - 38 x 100mm-Actual size - 35 x 97mm minimum, all joists to be of a uniform depth and thickness.

General:

Prefabricated roof trusses shall be of approved manufacture and designed to carry the following loading at 400mm centres. Imposed load: 1 kN/m². Dead Load: 1 kN/m² + point load of 0.9 kN.

NOTE: Sections smaller than those used for rafters and ceiling ties may be used for internal members provided that their use can be justified by test evidence or by calculations. In no case should the internal members be less than 75mm in depth.

All timber members should have uniformity in thickness and depth for the specified dimensions. The above dimensions apply to spans under 7.83m with trusses at 400mm centres maximum and ceiling ties 7.76 maximum. Each truss should be in accordance with the manufacturer's design specification and design drawings. The handling, storage and erection should be in accordance with the most up-to-date practice as outlined by the Building Research Establishment. Adequate bracing should be provided in accordance with the manufacturer's design specification. Each manufacturer must submit detailed design specification and drawing. The Engineer reserves the right to accept or reject any truss that, in his opinion, is substandard.

7.18.4 Joints

All members should be square cut or bevelled to ensure firm contact at the abutting surfaces of the joints.

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Within each specified design the horizontal and vertical dimensions should not deviate in each batch by more than = 6mm on spans up to and = 9mm on spans greater than 7.5m. All joint plates and gussets should be at least the size specified, and should be located to ensure that the correct number of effective nails, teeth or bursts as required by the designer embedded in each member. The edges of all plates and gussets should not project beyond the upper and lower edges of the rafter and ceiling tie members respectively. Metal plate fasteners should be embedded to ensure penetration of the teeth without embedding the plate itself into the surface of the timber for more than one quarter of its thickness. There should be no significant gap between plate and timber. The lower edge of the plates at an eaves joint which is located above the wall plate or bearing should not be nearer than 3mm to the lower edge of the ceiling tie.

7.18.5 Anchorage

Attention is drawn to the need for adequate anchorage of trussed rafters under all wind loading conditions.

7.18.6 Design Load

Trussed rafters should be designed to carry the sum of the dead and imposed loads in all combinations in which they may reasonably be expected to occur. Trussed rafters should also be capable of resisting without damage the forces and deflections generated, assuming reasonable care, during handling, transportation and erection.

Provision must be made for any additional loads, e.g. water tanks and attic storage space. Extra support must be provided to distribute these loads and to ensure that the roof trusses are not subject to a greater loading than that for which they were designed.

It is essential that the roof trusses are covered while on site to avoid high moisture content developing in the timber, and immediately covered with felt when they are erected in position, and that any truss with more than 20% moisture content is not to be used.

NOTE: The contractor should ensure by consultation with the manufacturer that he is conversant with all necessary requirements for storage, handling and erection of the roof trusses.

7.18.7 Trimming At Chimney

Double trusses to be installed each side of chimney and common rafter and ceiling joist, minimum size 100x50, to be used as infill and supported at node points with suitably sized supports.

7.18.8 Trusses For Dormer Condition

Prefabricated roof trusses will be used for dormer construction, unless otherwise stated on the contract drawings, design of same will have to be approved prior to manufacture, all timbers to be double vacuum treated and certified. Where a cut roof is indicated the contractor will allow for adequately supported steel purlins in the construction of the roof.

7.19 First Floor Construction

First Floor Construction:

Joists to first floor to be 225mm x 44mm at 400mm centres. Solid bridging at 1300mm centres spiked to joists. Trimmer and trimming joists to be 225mm x 75mm secured with 'Catnic' or similar approved joist hangers, tightly fitted and securely fixed. Joists to be not more than 3mm off specified dimensions. Floor over with 100mm x 22mm T. & G. red deal boarding cramped up and twice nailed with flooring brads punched. FLOOR IN BATHROOM, TOILET AND WET AREAS TO BE 19mm THICK W.B.P. PLYWOOD COVERED WITH VINYL SHEET (SEE FLOOR FINISHES). Where indicated over covered way, lay 200mm thick approved polyurethane insulation in floor space. Lateral stability: where joists are parallel to gables fix 30mm x 5mm galvanised steel anchors at 1.5 metre centres. Anchors to be turned down 100mm on inner leaf of cavity wall and spiked or screwed to top of three joists. (Joists notched so that top of anchor is below floor boarding.) Solid bridging is to be fixed between joists under anchor, and joist nearest wall is to be securely wedged. All timbers to be double vacuum treated with approved preservative and accompanied with appropriate certificates.

Trimming around chimney:

All trimming and trimmer joists to be 75mm x 225mm and be fixed with timber to timber metal joist hangers of approved manufacturer.

7.20 Stud Partitions

Stud Partitions:

Where shown to be framed with 75mm x 44mm heads and cills, 75mm x 44mm vertical studs at not more than 400mm centres, with two rows of 75mm x 44mm nogging pieces set staggered. Fix 75mm x 44mm nogging pieces at 900mm centres between ceiling joists over stud partitions where no ceiling joists occur directly over and secure thereto. Completely fill all stud partitions with 100mm thick Rockwool insulation.

7.21 Staircase

Staircase:

Frame stairs in red deal. Riser to be 25mm tongued to 32mm twice grooved treads with rounded nosings. Steps to be glued, blocked and bracketed with ends housed and wedged to 225mm x 50mm red deal wall and outer strings chamfered on exposed edges. Bearers under landings, where indicated, to be 100mm x 44mm housed to 100mm x 100mm newels and wall strings. Fix 75mm x 44mm studding to underside of stairs, ALL TO BE SLABBED AND SKIMMED AND TRIMMED AS PER STUD WALLS. Fit 100mm air vent to stud support under stairs and cover with louvered vent. Handrail to be ex 75x75mm hard wood, type to be selected. balustrade to be formed with select turned balusters, type to be approved, fixed between 100mm x 100mm newels. Balusters to be red deal or similar approved and to have select profile, sample to be supplied prior to approval.

Form 75mm x 35mm nosings at landings and line out opening with 22mm deal lining pieces with 35mm half round cover mould under. Fix 44mm x 35mm fillets to strings to take plasterboard slabbing to soffits.

NOTE PRIOR TO FITTING THE COMPLETED STAIRS AND BALUSTRADE, ALL ELEMENTS ARE TO HAVE 2NO.COATS OF SANDING SEALER IN PREPARATION FOR FINAL FINISH

7.22 Assorted Joinery Items

Bath Panels:

Side of baths to be enclosed with approved type 12mm w.b.p. plywood securely fixed to 50mm x 35mm studs, 100mm high x 50mm toe space to be boxed out at floor level. This side panel should be removable to allow for adjustment of height of bath in the case of leaks due to shrinkage of joints etc. Paint finish to match walls or bath subject to approval of Engineer.

Hot Press Shelving:

Slatted shelving to hot press to be in 3 no. rows of 50mm x 22mm fully wrought white deal at 75mm centres on 50mm x 35mm bearers fixed to partitions (or block walls where indicated). One row of solid shelving to take cylinder to be 22mm T. & G. carried on 100mm x 35mm bearers with skirting carried across front.

Kitchen:

Install kitchen complete. Include units in PVC vinyl wrapped doors with 40mm worktop including stainless steel sink and integrated extractor fan. Include for 9 No floor cupboards and 10 No wall cupboards in locations as shown on the drawings.

Fuseboard cupboard (now Consumer Unit with Circuit Breakers):

Provide ESB approved electricity supply consumer unit with circuit breakers and factory fitted doors.

Pipe Casings:

Form ducts for all exposed pipes and wastes consisting of 50mm x 22mm (twice coated with approved preservative) white deal battens masonry nailed to blockwork and covered with 9mm W.B.P. plywood painted to match finish on adjacent walls.

Plastering

8.1 Materials

Plasters:

To be to I.S. 27, as manufactured by Gypsum Industries.

Plasterboard:

To be foil-backed Gyptex or Gyplath manufactured by Gypsum Industries Ltd.

Expanded Metal:

External angles, stops, etc. to be stainless steel as manufactured by Expamet or similar approved.

Plasterboard Nails:

To be 38mm Gyptex aluminium nails.

Plasticisers:

To comply with B.S. 4887. Do not use without specific Engineers approval.

Cement and Sand:

As for Concrete Specification.

Sands:

For rendering to be natural sand (not sea type) or crushed stone sand. It shall be sharp, clean and free from clay etc. It is to be well washed.

Waterproofing Agent:

To be suitable for use intended, approved by the Engineer and used in accordance with manufacturers' instructions.

Taping Joints:

Joints between plasterboard sheets to be taped and jointed with approved tape and jointing compound.

8.2 Plastering Generally

Cleanliness:

Keep plant and tools clean and free from contamination by previous mixes.

Weather Protection:

Do not commence internal plastering in any area until it is protected at all times from the adverse effects of the weather.

Premature Drying Out:

Avoid premature or localised drying of coatings by protecting with appropriate covering/coating.

Cold Weather Application:

Do not work while the air shade temperature is below 2°C on a rising thermometer or below 5°C on a falling thermometer. Ensure that temperature of coatings remains above 4°C for at least 24 hours after setting.

Embedded Metal:

Ensure that all metal items, to be embedded in plaster and cement rendering, are non-corrosive.

8.3 Fixing Lathing & Accessories - Generally**Fixing Beads and Stops:**

Fix beads and stops, plumb square and level, unless otherwise indicated. Secure with plaster dabs, 38mm long clout nails, masonry nails or tying wire as required by background, at not more than 600mm centres. Fix angles by pairing fastenings at each side of angle.

Expansion Beads:

Fix expansion beads centred over background expansion joints with plaster dabs or galvanised 38mm clout nails at not more than 600mm centres on each side in accordance with the manufacturers written instructions.

Dissimilar Backgrounds:

At junction between dissimilar backgrounds in the same plane and to receive the same coating, fix metal lathing over building paper with suitable fastenings for each background. At single junctions metal lathing shall be not less than 300mm wide, fixed each edge at 100mm centres.

Mixing Thoroughly:

Mix plastering and rendering materials thoroughly to incorporate all the constituents of the mix.

Mixer Washing:

Wash out mixer after each batch has been discharged if the mixer is not in continuous use.

Clean Bankers and Mixing Boxes:

Mix materials on clean bankers or in clean mixing boxes, which shall be washed out after each mixing.

8.4 Coating Work - Generally

Brush Down Undercoats:

Remove dust and loose particles from each undercoat by brushing, and wet lightly and uniformly if surface is porous and dry before application of the following coat.

8.5 Gypsum Plastering – Storage

Gypsum Plaster Storage:

Store gypsum plaster on a raised floor under dry ventilated conditions and protected from the weather. Do not use air-set plaster or plaster aged more than three months from its date of manufacture.

8.6 Gypsum Plastering - Mixing

Mixing Lightweight Gypsum Plasters:

Do not add materials other than water to premixed lightweight plasters, and mix in accordance with the manufacturers written instructions.

Mechanical Application Not Permitted:

Do not use mechanical methods for the application of plastering or cement rendering coats.
ALL INTERNAL CORNERS TO BE PLASTERED AND FINISHED WITH AN APPROPRIATE SPECIFICALLY DESIGNED INTERNAL CORNER TROWEL TO PRODUCE PLAIN, TRUE, STRAIGHT WELL COATED INTERNAL CORNERS.

8.7 Gypsum Plastering - Application

Scrimming Plasterboard:

Scrim all plasterboard intended to receive gypsum plaster coating as follows:-

- a) At all junctions with dissimilar materials which are to be plastered.
- b) At external and internal angles, except where plaster stops, beads or other accessories are fitted.
- c) At all joints between boards in the same plane except in the case of gypsum lath.

Use neat gypsum board finish or lightweight bonding plaster and 100mm jute scrim cloth. Press scrim well in, trowel smooth and allow to dry before applying first coat of plaster.

Plastering on Plasterboard, Generally:

Do not wet plasterboards before plastering, do not allow lime, mixes containing lime or cement sand mixes, to come in contact with plasterboard.

Plastering on Gypsum Lath:

Fill the joints between the rounded edges of gypsum lath with neat gypsum plaster similar to the following coat, and finish flush. Allow to set, but not dry out, before applying the following coat.

8.8 Gypsum Plastering - Finishing

Surface Filling:

Prepare surfaces to receive single coat finish plaster by filling defects with finishing plaster.

Steel Trowel Finish:

Unless otherwise indicated, finish final coat of gypsum plaster to a smooth surface with a steel trowel.

Damage to Galvanised Coating:

Avoid damage to the galvanised coating of plastering beads and other metal accessories due to excessive steel trowelling.

8.9 Types of Internal Plastering

On Blockwork:

Blockwork to be well brushed down to remove any dust or loose particles. Remove nails or other metal objects. Face of blockwork to be well treated to off-set any suction. Apply Gyproc Hard Coat under coat gypsum plaster to a minimum thickness of 11mm. Bring to a true level surface by means of a straight edge or darby. The surface to be closed with a hand float and thoroughly scratched to provide a key for the finishing coat. The floating coat must never be re-tempered after the set has commenced. Apply a finishing coat of Gyproc Skim Coat finishing plaster to depth of 2mm and trowelled to a smooth even finish.

Dry-lining to be provided on all external walls consisting of 42.5mm phenolic insulation, 12mm foil backed plaster boards on 44 x 44 double pressure treated battens with skim plaster and, plaster and skim to internal surface of walls. Plastering and slabbing to all stud partitions and ceilings. Please note that drawings do not show dry-lining but it is required and must be included in the tender submitted.

On Plasterboard:

Plasterboard for stud partitions and ceilings to be foil-backed Gyplath size 1,200mm x 400mm, 12.7mm thick on ceilings under roofs and 9.5mm thick on partitions and ceilings under first floor joists. Fix plasterboard to joists and studs with the rounded paper edges at right angles to the supports using 5 no. nails to each support. (Nails to be 38mm Gyptex aluminium nails.) All butt ends to be staggered with joints occurring centrally on stud, joist or truss. Maintain a 3mm gap between the rounded paper edges to accommodate caulking. Caulk and reinforce all joints using Gyplite Bonding Coat and 100mm jute scrim. When it has set but not dried, apply bonding and then skim. All areas to be bonded (8mm Gyplite bonding) and skimmed (2mm Pinnacle Skim Coat).

8.10 Types of External Rendering

Scudding Coat:

1 part cement - 3 parts sharp sand.

First Render Coat:

1 part cement, 3 parts sand. Add waterproofing agent and plasticiser to manufacturers' instructions. Apply 12mm thick.

Second Render Coat:

1 part white cement, 4 parts white sand 1 part lime. Add waterproofing agent and plasticiser to manufacturers' instructions. Apply 8mm thick.

Finish (Alternative 1) - Smooth Finish:

Bring second Render Coat to a smooth even surface of even overall texture with a wood float.

Finish Coat (Alternative 2) - Pebble Dash Finish:

Mix the following: 3 parts lime putt. 2 parts washed sand 3 parts washed gravel (graded 10mm - 12mm).

Leave mix to mature for at least 3 days. Directly before applying add white cement in the proportion of 1 part cement to 6 parts mix, together with approved colouring medium. Form bellcast finish to dashing over plinth.

Finish Coat (Alternative 3) - Dry Dash Finish:

Aggregate to be 10mm - 12mm sharp rather than round. Aggregate type to be white marble chippings. Throw aggregate onto top render coat while still wet. Lightly press aggregate into surface with a wood float to ensure uniform adhesion over the whole surface.

External Nap Plaster Finish

Mix to be 4:1:1 white sand : white cement : lime (or alternative approved plasticiser)

Samples:

Provide sample panels of external finishes and obtain Engineers approval before proceeding.

External Smooth Plinth:

Where pebble dash or dry dash finishes are used (to houses, boundary or screen walls) provide a smooth plinth from D.P.C. or floor level down to tarmacadam or concrete level or 150mm below floor level. Where freeboard between D.P.C. level and ground level cannot be maintained due to ramping or any other feature an ACO drain or equivalent will be installed to provide drainage directly beside the plinth. Plastering to be as Specification for smooth finish above.

Window Reveals and Bands:

Provide smooth plaster reveals (as smooth plaster specification above) 22mm thick and bands around sides and top of windows. If no size for bands is shown on drawings obtain Engineers instruction (Bands will be 150mm wide unless otherwise instructed). Bands should be 15mm proud of adjoining plaster. White cement and white sand to be used on all window reveals and bands unless otherwise stated. Also include door reveals, porch reveals and soffits.

Patent Reveals:

If bands are not required provide 25mm thick Patent Reveals and Soffits to door and window opes. These should be 15mm proud of external plaster and applied in accordance with Specification for smooth plaster.

8.11 Rendering Application**Time Restriction:**

Use mixes containing cement within two hours in warm weather, and three hours in cold weather, after adding the cement.

Cement-Lime-Sand-Mix:

For cement-sand-plasticiser mix, the proportions and method of adding plasticiser shall be in accordance with the manufacturer's written instructions. Mix cement, sand, plasticiser and water to a workable consistency.

Cement Based Undercoats, Drying Out:

Allow each cement-based undercoat to dry out thoroughly and to ensure that drying shrinkage is substantially complete before applying subsequent coat.

Wood Float Finish:

Unless otherwise indicated, finish final coats of cement-based mixes to a smooth surface of even overall texture with a wood float. If area is too extensive to complete in a day, finish to an approved line.

Pebble Dash Finish:

While final coat of rendering is plastic, throw on washed wet aggregate for pebbledash finish with a wide and even spread to produce a consistent texture. Lightly press aggregate into surface with a wood float to ensure uniform adhesion over the whole surface.

Roughcast Finish:

Provide a roughcast finish by applying mix while wet by throwing on with trowel or scoop to give a wide and even spread to produce a consistent texture. If area is too extensive to complete in a day, finish to an approved line.

8.12 Assorted Applications

Screeding to Floors:

If slab is not power floated apply screed as follows; Ground floor to be finished in 100mm thick cement and sand in preparation for vinyl floor finish as specified. Thoroughly hack all mortar, dirt, etc. off surface of concrete sub-floor, brush and wash until perfectly clean. Brush slurry onto surface with materials composed of 18 parts of cement to 9 parts of water. Dip 6mm chippings into similar slurry and dash on to slurry surface while latter is still wet. Allow 24 hours to harden before applying floor toppings and protect from all dirt during topping operations.

Soffit to Covered Way:

Supply and fix 'Expamet' or other approved expanded metal lathing lapped 150mm at joints and fixed with staples to soft wood and plaster 20mm thick in cement, lime and sand.

Alternative 1: Supply and fix 25mm Ferrokliith slabs with Ferrokliith nails to softwood and finish with 20mm thick cement, lime and sand.

Ceiling Under Pre-stressed, Precast Concrete Floor:

Shall consist of 12.7mm thick Gyptex board on 50mm x 22mm battens finished as specified for 'Internal Surfaces of 225mm hollow block walls'.

Screed to Pre-stressed, Precast Concrete Floor:

Shall be 100mm cement and sand as specified for ground floors.

8.13 Glazed Wall Tiling

Glazed Wall Tiling:

Lay 150mm x 150mm white glazed tiles over worktop in kitchen and over bath and wash hand basin in bathroom. In the bathroom the area to be tiled will be from bath to ceiling on all sides of bath extending 150mm beyond edges of bath and 3 tiles high extending 150mm beyond edge of wash hand basin at either end. Allow for tile trim and bath edging. Additional horizontal tiling will be required on any flat portion where the bath space has been boxed out at either end. In the case of showers the shower enclosure will be tiled from floor to ceiling. Allow for a minimum of 10 square metres of tiling per unit/house. Render wall in 1:3 cement/sand backing to take tiles.

Roof Tiling

9.1 Precast Tiles

Concrete Tiles:

Concrete roofing tiles and fittings shall comply with I.S. 3 Type: To be as specified on Drawings or Project Specification. If no type specified, tiles to be flat type (Stonewold or equal).

Special Concrete Tile Accessories:

Special Concrete tile fittings and accessories shall be as Project Specification. If none specified, all accessories to be by tile manufacturer, suitable for tile used.

Ventilated Concrete Roof Tiles

4 special ventilated roof tiles by tile manufacturer to match tile colour will be fitted to ventilate the roof space and to terminate vent pipes where required.

9.2 Sheet Metal Accessories

Lead Sheet:

Lead sheet shall comply with B.S. 1178. Thickness 2.24mm (Code 5).

9.4 Fasteners & Fixing

Hip Irons:

Hip Irons shall be of mild steel strip galvanised after fabrication 25mm wide x 5mm thick turned up at end to support hip tiles and extending up hip rafter not less than 300mm twice drilled for fixing with 5.6mm diameter galvanised screws.

9.5 Quality Control

Samples:

Provide samples of materials for approval as follows:-

1. Three sample tiles in each available colour.
2. Samples of felt and all accessories.

Weather Resistance:

The roof covering shall be weatherproof and so constructed as not to transmit moisture due to rain, sleet or snow to any part of the building.

Storage Generally:

Store roofing materials so as to avoid deterioration in quality and appearance, breakage or distortion.

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9.6 Tiling Generally

Fixing Generally:

Lay and fix roofing materials in accordance with the manufacturers' written instructions.

Party Wall Firestop:

Install a suitable compressible mineral wool packing between the top of party walls and the underside of the roof covering and also between battens adjacent to the party wall to act as a firestop. Close eaves box at Party Walls with 50mm wire reinforced Mineral Wool securely fixed with no gaps and close cavity wall between adjacent houses with block and mineral wool securely packed against a vertical damp proof course for entire height of wall.

9.7 Fixing Underlay

Generally:

Lay underlay parallel with eaves lapped not less than 150mm horizontally and 150mm vertically. Form horizontal laps under battens with at least 25mm of underlay projecting beyond each edge. Form vertical laps centred over rafters and nailed at not more than 300mm centres.

Hips:

Lay a strip of underlay not less than 600mm wide at valleys and underlapping the main underlay.

Eaves:

Extend underlay over the tilting fillet piece, fascia board and into the eaves gutter and provide 300mm wide D.P.C. under underlay attached to rafters and tilting fillet and neatly dressed into gutter with underlay.

9.8 Fixing Battens

Battens:

Nail battens to each support using battens not less than 1,800mm long and of sufficient length to be fixed to at least three supports and having square sawn ends. Form butt joint over supports and stagger. Do not cantilever or splice battens between supports. Space battens at a constant gauge except at eaves course. Battens to be 50mm x 38mm sawn white deal laid to give lap specified.

9.9 Mortar Work

Mortar:

Mortar for bedding and pointing work shall comply with Work Section F - Mortar. Mix shall be cement:sand 1:3 with plasticiser. All visible mortar to be coloured to match tiles.

Mortar Protection:

Protect fresh mortar from the weather to prevent damage to the mortar itself and staining of the roof covering.

Coloured Mortar:

For coloured mortar the proportion of approved pigment added shall not exceed one part to sixty.

9.10 Roof Tiling

Lap:

Provide a head lap of 75mm or as recommended by the tile manufacturer.

Mechanical Fixing:

Secure every tile at perimeter and each tile in every alternative course by clips in accordance with the manufacturers written instructions.

Eaves:

Project first course of tiles to ensure that water discharges into gutter. Support underlay by a continuous fillet to provide drainage to gutter without any water trap and provide 300mm wide D.P.C. under underlay attached to rafters and tilting fillet and neatly dressed into gutter with underlay.

Eaves Filler Units:

Fit eaves filler units under tiles at eaves in accordance with the manufacturers written instructions.

Dry Verge:

Install proprietary verge system in accordance with the manufacturers written instructions.

Ridges:

Cover ridges with butt jointed ridge tiles of similar colour and texture as main roof tiles, bedded solid in mortar only at joints, ends and edges and without separate pointing. Strike off mortar and lightly trowel to leave a clean face. Colour mortar to match the tiles. Provide a minimum cover of 75mm over the top course of tiles. Mitre ridge tiles at junctions. Fill exposed ends of ridges with pieces of tile set in mortar with exposed edges kept clean.

Concrete Valley Troughs:

Form valleys using proprietary concrete valley troughs laid in accordance with the manufacturers written instructions. Provide a clear unobstructed channel of not less than 100mm having the adjacent tiling neatly cut to a clean straight line and bedded in mortar.

9.11 Flashings**Flashings Generally:**

Provide flashing systems of lead throughout and avoid direct contact between dissimilar metals. In general, flashing strips shall not exceed 2.5m in length with minimum horizontal laps of 100mm and vertical laps of 75mm.

Valleys:

The valleys are to be formed with Universal Valley Troughs exposed 100mm and with the adjacent tiling neatly cut and bedded. (Traditional lead valley may be substituted with the agreement of the Engineer.)

Combined Flashing:

Provide a combined cover and tile flashing metal over single lap tiles at abutments. Form vertical turn-up of not less than 100mm and a flashing over tiles of not less than 150mm. Cut tiles closely to abutment and dress down the flashing over the raised contour of the adjoining tiles. Secure at top edge of wedging.

Wedging Flashing:

Secure flashing by turning the top edge 25mm into joints or grooves in masonry or concrete and fix wedges of the same materials at not more than 500mm apart and point the joints with mortar.

Saddles:

Fit a saddle not less than 450mm square of the specified metal flashing at the junction of hip with gable verges to prevent the entry of water.

Roof Penetration:

Where pipe or other penetrations occur through the roofing, make water-tight by using purpose-made “top-hat” flashing having an integral sleeve sealed at the top by dressing over and down pipe opening or sealed by second flashing attached to pipe.

9.12 Lead Flashings**Lead Flashings:**

Chimney stacks to be flashed with 2.3kg sheet lead, 300mm wide, neatly dressed over tiles having 150mm upstands. Cover flashings to stacks at steps and where required elsewhere shall be 150mm wide set in chase with S. & C. fillet over, complete with lead soakers as necessary.

9.13 Tray Flashing

Chimney stacks to have tray flashing with 50mm upstand and apron flashing. Flashing tray to be manufactured from either lead or stainless steel and to be of approved type.

9.14 Roof Insulation

Provide approved type insulating material equal in quality to 300mm thick rock wool insulation to B.S. 5803 Part 1 and lay from 150mm thick rolls in 2 layers in alternate directions to full area of roof space including inserting insulation into eaves around cavity closer. Eaves ventilation to be provided by 2 rows of 'Cavity Tray' EAVES ROLL-OUT VENTILATOR TYPE EROV or approved equivalent.

Services:

Ensure that all water pipes are under insulation and lagged and that water tank is insulated. (See Plumber).

Steel, Ironmongery, Rainwater Goods & Ancillary's.

10.1 Rainwater Pipes & Gutters

Rainwater Pipes and Gutters:

Rainwater pipes with all necessary swan-neck bends at eaves hopper heads, etc. to be 75mm internal diameter. Aluminium seamless gutter to be 125mm diameter half round. Gutter and downpipe to be fixed and sealed at joints as per manufacturer's instructions.

Provide all necessary angles, stop ends, drops, etc. and fit gutters to even falls towards outlets. Rainwater goods shall be 'Marley' manufacture or other approved equivalent all to B.S. 4576.

10.2 Patent Door Thresholds

Patent Door Thresholds:

Provide and fix patent Thresholds to be from Exitex, Dundalk, Ireland (or similar approved). Threshold type to be Exitex MWK20/R, with Seal Carrier MWK/SC and Exitex Deflector and Front Ramp (or similar approved).

10.3 Vents

All rooms:

Shall be fitted with a 225mm x 150mm cast aluminium louvered vents externally and a 225mm x 150mm adjustable hit and miss vent internally. Provision for suitable openings shall be made in walls during construction and patent P.V.C. ducts shall be carried through cavity between vents. Vents will be provided in windows as described at 7.4 above.

Rooms with Fireplaces:

In all rooms containing fireplaces supply and fit 'Draughtmaster' or other approved equivalent over internal door opening.

10.4 Coal Bunker

Provide a coal bunker with a 6 cwt. capacity, pvc type of approved manufacture for each dwelling.

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Painting

11.1 Materials Generally

Manufacturers:

The top quality products of Dulux or MacPherson shall be used in the painting work.

Substitution:

Substitution for the products of the manufacturers specified shall be subject to approval by the Engineer. The Contractor shall provide test results from an approved testing authority showing the quality compared with the materials specified, if required.

Single Source:

All materials shall be the products of one manufacturer, unless otherwise specified or approved.

Manufacturers Instructions:

Obtain the manufacturer's instructions and recommendations. Keep a copy on site. Comply with all aspects of these instructions (even if not specifically herein). In the event of a conflict between manufacturer's instructions and the Specification, bring to Engineer's attention and ask for clarification.

11.2 Preparation Materials

Preparation Materials:

Paint removers, cleaning agents, anti-fungal agents, rust inhibitors, glue size, knotting, stopping, fillers and other preparation materials for painting work shall be types recommended by the manufacturer of the coating to be used.

White Spirit:

White Spirit shall comply with I.S. 11.

11.3 Quality Control

Requirements Generally

Samples:

Provide samples in alternative colours for each paint type. Approximately three samples 1 metre sq. in each colour.

Material Identification:

Ensure materials are delivered in original containers with labels identifying manufacture and grade of product.

Colours:

Colours shall be selected from the Dulux Colour Dimension range unless otherwise agreed.

Source of Coatings:

Unless otherwise specified, use sealers, priming coats, undercoats and finish by the same manufacturer where possible.

Surface Preparation:

Store and mix material in a clean, dry and ventilated area protected from extreme temperatures. Remove empty containers, waste and rags from the building as they accumulate. Protect water-thinned paints from frost.

Protection:

Protect all floors, equipment, fittings, and surfaces not to be coated by the use of drop cloths or other approved methods.

Weather Protection:

Protect painting work and surfaces from any harmful effects of the weather immediately before and during application and after application until drying is sufficiently advanced to withstand deposition of moisture or wind-borne dirt or dust.

Air Conditions:

Do not carry out painting work when the air shade temperature is less than 5°C or the relative humidity is such that condensation is present, or may be expected, in the surfaces or that it will affect the application and/or drying of the coating. Provide adequate ventilation for all painting work. Do not apply coatings when heat is likely to cause blistering or other defects.

Thinning:

Do not thin or reduce any product unless specified or recommended by the manufacturer. Do not add thinners in excess of 5% by volume unless specified by the manufacturer.

Shade Variation:

Vary the shade of each coat of paint to make it readily distinguishable, but not so as to affect the finish coat.

Moisture Content:

Do not apply coatings when moisture content of surfaces exceeds 19% when measured with an electrical meter.

Work Excluded:

Unless otherwise noted, the following surfaces shall not be painted: Acoustical tile. Finished non-ferrous metals such as aluminium, stainless steel, bronze, etc. and plated metals. Factory finished equipment and surfaces. Surfaces not normally exposed. Ceramic and glazed surfaces. Floor and floor coverings. Radiator valves, sprinkler heads, fusible links.

Cabinet Interiors:

Paint interiors of cabinets as for exteriors, unless otherwise indicated.

Moving Parts:

Ensure that the function of any moving parts of components or hardware is not impaired by paint.

Inspection:

Permit paint manufacturers to inspect the work and take samples to ensure correct use and application of materials.

Wet Paint:

Protect surfaces while still wet by the use of barriers and 'Wet Paint' signs where necessary.

11.4 Preparation Generally

Surfaces:

Prepare surfaces in accordance with the coating manufacturers written instructions.

Responsibility for Surfaces:

Ensure that surfaces are in proper condition to accept and assist in the adhesion and proper functioning of the coating specified.

Materials for Preparation:

Use paint removers, cleaning agents, rust inhibitors, size, knotting, stopping fillers and other materials for the preparation of surfaces to be coated in accordance with the manufacturers written instructions.

Drying Out:

Ensure that surfaces are suitably dry before applying coatings. Any dehumidifying or drying out required will be at the Contractor's expense.

Cleaning:

Remove dust, dirt, grease, oil and loose material from surfaces before applying coatings.

Defects:

Ensure that surface defects are repaired and made good before applying coatings.

Splashes:

Remove plaster and mortar splashes from surfaces before applying coatings.

Stopping Generally:

Stop all minor holes and imperfections and finish flush with surrounding surfaces.

Matching of Stopping:

Use a stopping for clear and non-opaque coatings of a colour to match the finished colour of adjoining surfaces.

Anti-Fungus and Anti-Mould Wash:

Apply anti-fungus and anti-mould wash to surfaces to be painted in accordance with the manufacturers written instructions. Contractor is required to remove fungus and mould and treat areas affected before painting.

Sealer:

Remove any loose or flaking material from surfaces to be coated and apply sealer in accordance with the manufacturers written instructions.

Efflorescence:

Remove with a stiff fibre brush any surface salts resulting from efflorescence and leave for 48 hours. Repeat this treatment until the efflorescence ceases before applying any coating. If efflorescence recurs then treat again and repaint.

Fluxing Material:

Remove any traces of fluxing materials remaining at joints that are welded, soldered or brazed, and which are to be coated.

Degreasing Generally:

Remove surface oil and grease from surfaces to be coated using white spirit or other suitable solvent.

Degreasing Metal Surfaces:

Remove oil, grease and dirt from metal surfaces immediately before coating by using an emulsion cleaner followed by thorough rinsing with clean water. Where a solvent is necessary use white spirit before the use of the emulsion cleaner. Dry surfaces and apply primer without delay.

Surface Roughening:

Roughen smooth surfaces with fine abrasive paper and remove dust and loose materials before coating.

Hardware:

Remove surface fixed hardware, except hinges, from surface to be coated and re-fix on completion.

11.5 Preparation - Woodwork**Surface Finish:**

Finish Surfaces to a smooth even finish with abrasive paper and remove sharp arises.

Knotting:

Remove surface resin from knots and other resinous wood and apply two coats of knotting to extend beyond the affected areas.

Stopping for Painting:

Stop nail holes and other local depressions or cavities after priming coat has dried. Finish off flush with adjoining surface and apply primer over all stopping.

Stopping for Clear Finish:

Stop nail holes and other local depressions or cavities in surfaces to have a clear finish with stopping to match the colour of the coated woodwork when finished. Finish off flush with the adjoining surface.

Stopping for Stain Finish:

Stop nail holes and other local depressions or cavities with stopping to match the colour of the stained woodwork when finished. Finish off flush with adjoining surface.

Filling:

Apply filler with knife or brush to fill minor indentations or grain depressions. Remove surplus and sand to a smooth surface.

11.6 Application

Stirring:

Stir thoroughly the contents of all cans and containers before and during use and strain where necessary.

Application Generally:

Apply coatings in accordance with the manufacturers written instructions and at the intervals recommended between successive coats.

Staining:

Protect surfaces adjacent to those being coated and remove any stains or spots as the work proceeds.

Brush Painting:

Apply all coatings by brush unless otherwise specified or approved.

Priming Generally:

Thoroughly brush primers onto surfaces and work into joints, angles and end grain of woodwork. Ensure that sharp edges are adequately coated. Rub down any lead based primers with wet abrasive paper and remove any debris produced before it becomes dry.

Shop Priming, Joinery Components:

Prime joinery components at the joinery shop where possible. Knot the surface to be exposed and then prime all surfaces. Re-prime any surfaces subsequently cut.

Priming Unsealed, Joinery Components:

Store under dry conditions joinery components delivered unsealed. Immediately after delivery to site knot surfaces that are to be exposed and prime all surfaces of items to be painted. Re-prime before fixing any surfaces subsequently cut or planed.

Priming Metal:

Apply primer in dry, dust-free and unpolluted conditions to freshly prepared bare steel or iron surfaces before any deterioration of the cleaned surfaces has taken place and not later than four hours after preparation.

Undercoats:

Provide an even coating over all surfaces. Rub down with abrasive paper and remove dust before applying next coat.

Finish Coat:

Provide an even coating over all surfaces free from brush marks, runs and other defects.

Drying:

Do not apply any coating until the previous coat has dried or cured sufficiently to receive it.

Finish Coat over Water-Thinned Primers:

Ensure that moisture content of woodwork is not above 17% at the time of applying finish coats over water-thinned primers.

Second Gloss Coat:

Where two gloss finish coats are specified, apply the second coat within 48 hours of applying the first coat, unless otherwise recommended by the paint manufacturer.

Wood Stain:

Apply wood stains to prepared surfaces in accordance with the manufacturers written instructions.

Doors, Bottom Edges:

Prime and paint or seal bottom edges of external wood doors before hanging.

Glazing Rebates:

Prime or seal, as appropriate, wood glazing rebates and beads before glazing with putty or glazing compound.

Putty Glazing:

Protect putty glazing with undercoats and extend finish coat up to sight line on glass. Allow putty to harden for at least seven days before painting and complete the work within twenty-eight days of glazing.

11.7 Schedule of Areas & Finishes

Complete painting in accordance with the following schedule:-**Plastered Ceilings and Walls:**

Prepare and paint with three coats of Emulsion. First coat to walls to be white remaining coats to be 10.B.15 unless otherwise stated. Ceiling finish to be white.

Internal and External Woodwork (Softwood):

Prepare and prime and paint two coats undercoat and one coat gloss finish, sand between coats as appropriate in compliance with manufacturer's instructions.

Internal and External Woodwork (Hardwood and Parana Pine):

Prepare and paint three coats of Polyurethane Sealer, sand between coats as appropriate in compliance with manufacturer's instructions.

External Entrance Doors:

Prepare, prime and apply four coats of Ron seal or similar APPROVED (or to door manufacturer's specification if approved by the Engineer even if it is greater than the specification).

External Timber (Hardwood):

Prepare and apply two coats of Sadotop Preservative finish to external timber if specified in Project Specification (otherwise Ronseal as above).

Timber Preservative:

The backs of windows and door frames, skirtings and all other joinery fixtures, wall plates, timber wall plugs, the ends of joists up to 300mm from the wall plates and all other timbers in direct contact with concrete shall be given two coats of approved wood preservative before fixing unless timber has been pre-treated.

External Smooth Plaster:

Reveals, Bands, Chimney caps, Cills, Copings, Plinths, etc. to receive 3 coats Weathershield Masonry paint.

Radiators and other Iron Steelwork:

Apply two coats undercoat and one coat suitable gloss.

Cleaning:

Upon completion ensure that all spots and blemishes have been removed from glass, sanitary fittings, light fittings, tiles, flooring and other surfaces and remove from the site empty containers and debris resulting from painting.

11.8 Glazing**Glass:**

To be best quality flat drawn clear glass, free from bubbles, specks or other defects. Glass to all external doors shall be double glazed 6mm laminated safety glass.

All glass broken or cracked during the progress of the work is to be reinstated. All glass to be cleaned both sides and all glazing to be left clean and perfect on the completion of the Contract. Glass shall be protected from being scratched during construction and any glass that is visibly scratched shall be removed and replaced at the Contractor's expense.

Drainage & Sewers

12.1 Materials

Plastic Pipes:

Unplasticised P.V.C. pipes shall comply with I.S. 424/1990 or equivalent. Pipes shall have a nominal size of 110mm (or as shown on drawings). Sockets may be Rigid Seal, rubber seal rings or solvent cement type. All pipes, fittings, and accessories to be obtained from one manufacturer. Obtain the Engineer's approval of the manufacturer proposed. Obtain the manufacturers full set of instructions and comply with these even if they are additional to the requirements of this Specification.

Concrete Pipes:

Concrete pipes shall be spigot and socket drain pipes of approved manufacturer. All pipes to be laid and sealed in accordance with the manufacturers' instructions. The pipes must be accurately aligned to get a proper seal.

Granular Bedding:

Granular bedding shall comply with I.S. 5: Table 1 or equivalent and be of nominal size of 10mm.

Manhole Covers in Gardens of Houses:

All covers to be lockable. To be approved cast iron manholes compliant with B.S. 497 Part 1 or equivalent. Fit similar lockable 300 x 300 covers and frames to Armstrong junctions required. In soft landscaped areas manholes are to be surrounded with an in-situ concrete surround, minimum thickness 150mm.

Cast Iron Manhole Covers:

All covers to be lockable. All covers in roads, open areas, etc. to be Cast Iron. Cast Iron Manhole covers and frames shall comply with B.S. 497 Part 1 or equivalent and have minimum clear opening of 550. Group and classes shall be as follows.

In Tarmac, Concrete Areas and access manholes to storage tanks and sumps whether or not they are in Tarmac, concrete or grassed areas: Group 4, D400, lockable heavy duty cast iron. All frames to be seated on 2 courses of Class B engineering brick.

In Grassed Areas: Group 2 B125 lockable (heavy cast iron, not light galvanised steel or plastic).

Cast Iron Road Gullies:

All covers to be lockable. All road gullies to be cast iron Corporation type hinged gully grating and frame in accordance with B.S. 497 - Part 1, Group and class to be Group 4 and class D400 (heavy duty wheel loading and lockable and to be opened by an Allen Key).

U.P.V.C. Gully Traps:

U.P.V.C. Gully Traps to be back inlet type with precast concrete surround, approved by the Engineer, with a metal cover.

12.2 Quality Control

Provide for subjecting all runs of drains to hydraulic test and provide all necessary attendance during testing. No drains to be benched up or covered in until satisfactory tests have been carried out in the presence of the Engineer or Clerk of Works and Area Engineer.

12.3 Preparations**Storage:**

Store pipes by stacking parallel to one another on a reasonably level surface free from stones and sharp objects and avoid overloading the bottom layers. Secure end pipes in the bottom row to prevent collapse of the stack. Stack pipes of different sizes separately.

Jointing Rings:

Store rubber jointing rings in a cool, dry, dark place and avoid contamination by oils, petrol or other greases.

12.4 Excavation Work**Excavation Generally:**

Excavate for drainage work in accordance with the requirements of Work Section 3 Excavation work.

Excavation Start:

Do not excavate for any drain until all the materials necessary for that section are available.

Trench Width and Sides:

Trench width shall be as narrow as is practicable but not less than the outside diameter of the pipe plus 150mm on each side and with the bottom section, where possible, having vertical sides to a height not less than 300mm above the top pipe, unless otherwise shown on the drawings.

Surface Material:

Remove topsoil, turf or other surface material and set aside for use in reinstatement.

Excavated Material:

Deposit excavated material not less than 500mm from the edge of trenches and avoid endangering the stability of the excavation.

Existing Services:

Avoid damaging existing pipes, ducts, cables or other services exposed by excavation and provide temporary support as is necessary. Provide a minimum clearance of 150mm between any existing services and new pipework.

Warning Tiles:

Place warning tiles or slabs over and close to pipelines at their points of intersection with other services.

Trench Wall Supports:

Provide temporary support to trench walls as is necessary to maintain a safe working area.

Land Drains, Disruption:

Restore any land drains disrupted during excavation work.

Trench Excavation:

Excavate trenches immediately before laying bedding material or pipes. Stabilise local soft spots in trench bottoms by tamping in granular material. Remove large hard objects such as, boulders or large roots and replace by tamped granular material.

Surface Water:

Keep excavation free from surface water.

Ground Water:

Keep excavation below ground water level free from water.

Pipe Laying Generally (See Appendix 1 or Sewers & Watermain requirements)**Levels:**

BEFORE LAYING NEW DRAINS, CHECK THE INVERT LEVELS OF EXISTING DRAINS AND SEWERS AGAINST THE LEVELS SHOWN ON THE DRAWINGS BRING ANY DISCREPANCY TO THE ATTENTION OF THE ENGINEER BEFORE PROCEEDING AND MODIFY GRADIENTS IF NECESSARY SUBJECT TO THE ENGINEER'S APPROVAL.

Installation:

Install pipes, fittings and accessories in accordance with the manufacturers written instructions.

Sealing Open Ends:

During construction, provide a temporary seal to the open ends of pipework and maintain in position until completion of work.

Main Sewer Connection:

Connect new drains to the existing sewer as directed by, and to the satisfaction of, the Council's Engineer.

Laying:

Lay pipes straight to line and true to gradient on a firm and even foundation for the full length of the barrel. Form joints in the trench.

Low Temperature Laying, U.P.V.C.:

Do not lay U.P.V.C. pipes when temperature of pipes is below 0°C.

Sockets:

Lay pipes with sockets facing up the gradient. Form depressions under sockets to avoid pipes resting on the sockets and re-pack after pipe-laying.

Pipes through Walls:

Where pipes pass through walls, or other rigid structures other than manholes, provide a minimum clearance of 25mm around the pipes and fill with suitable compressible and resilient packing such as fire resistant expanded polyurethane foam, all packing used shall be fire resistant or fire proof where used to seal a fire compartment wall.

Pipes through Walls, Fixed:

Where pipes are rigidly fixed to structures, provide flexible joints, as close to the structures as possible, in adjoining short length pipes. Lengths shall not exceed 600mm for 100mm and 150mm nominal bore pipes and 900mm for 225mm and 300mm nominal bore pipes.

Hard Packing:

Do not rest pipes in trenches on blocks or similar hard non-resilient permanent packing.

Compaction:

Remove trench sheeting and other temporary obstructions to an extent sufficient to allow compaction of bedding and surround fill, while maintaining trench support as the work proceeds.

Bridges:

Provide temporary bridges over trenches after backfilling to prevent damage to pipes by heavy construction traffic.

Manhole Branches:

Arrange branch drain connections at manholes so that discharge is in the direction of the main drain and that interference with the main flow is avoided.

Benching:

Bed channels in cement and sand mortar 1: 3 on manhole bottoms and form a benching in suitable concrete to rise vertically from both sides of channel to a height equal to top of outlet pipe and then slope upwards at 1 in 10 to walls. Finish with a steel trowel to a smooth surface.

U.P.V.C. Channels:

Anchor U.P.V.C. channels in sand and cement mortar by using suitable built-in retaining clips or by providing a mechanical key on the surface by roughening and then coating with solvent cement into which clean dry sharp sand has been sprinkled.

Step Irons:

Built in step irons in manhole walls at 300mm vertical centres and staggered 300mm horizontally.

Step Irons, Ring Type:

Built in ring type step irons to a depth of 125mm into manhole walls and space in line vertically and at 300mm centre.

Manhole Covers:

Bed frames for manhole covers solidly in suitable concrete with covers in position to prevent twist. Locate covers square and level with adjoining finishes. In soft landscaped areas manholes are to be surrounded with an in-situ concrete surround, minimum thickness 150mm.

12.6 Jointing

Flexible Jointing:

Form flexible joints in pipes in accordance with the manufacturers written instructions. Use only the lubricant recommended, if any, and ensure that the components are clean.

Solvent Welded Joints:

Form Solvent-Welded joints in plastic pipes in accordance with the pipe manufacturers written instructions. Ensure that the surfaces to be joined are clean and avoid an excessive accumulation of solvent-cement on the joint. Remove any spilled solvent from the vicinity of the pipe.

12.7 Pipe Laying - Flexible Pipes

Granular Bedding and Support:

Lay a bed of granular material not less than 100mm thick on trench bottom and on it set pipes to rest uniformly on their barrels to the required levels and gradient. After testing for water tightness, lay and compact granular materials to the full width of the trench at both sides of and over the crowns of pipes to a depth of 100mm for 110mm pipes and 150mm for larger pipes. Compact granular materials with hand rammers or light plate vibrators as necessary.

12.8 Backfilling

Initial Selected Backfill:

Fill up to a level 300mm above the pipes with selected stone backfill free from large stones (over 40mm), building rubbish, tree roots, vegetable matter and large lumps of clay (over 75mm). Compact by hand or light plate vibrator in 100mm layers.

Main Backfill:

Lay the main backfilling consisting of suitable earth filling in layers of not more than 300mm thick and with each layer thoroughly compacted before the next layer is placed. Do not use heavy compactors until there is a minimum of 600mm cover over the pipes. Remove any trench sheeting as the work proceeds to permit compacted filling of all spaces.

IN ROADWAYS MAIN BACKFILLING WILL BE 75mm DOWN WELL GRADED STONE WITH NO VEGETABLE MATTER CONTENT OR FOAMED CONCRETE IF PIPE RUN IS SHALLOW

12.9 Manholes

Manhole Construction:

Construct manholes with walls not less than 190mm thick of solid concrete blocks laid in flat stretcher bond in cement: sand mortar 1: 3 with all joints fully filled and in accordance with Section 6 - Blockwork and Brickwork. Form a concrete base slab the same size as the external dimensions of the manhole and not less than 150mm thick of C40/50 suitable concrete. Cast a 150mm thick suitable C40/50 concrete slab over the chamber in a similar mix, suitably reinforced to carry all probable superimposed loads and with an opening for the metal cover and frame. Render the insides of walls with cement: lime: sand mix, 1: half: 4 in accordance with the Work Section - plastering and rendering. In any case where precast concrete rings are allowed for forming manholes the manholes must be surrounded with concrete backfill (lean mix or foamed concrete) and must comply with the Water (Sanitary) Services and Site Development Guidelines.

Manhole Channels:

Channels to be brown glazed stoneware of appropriate section with proper taper channels where drain sizes change. Lay main and branch channels to extra fall of 25mm over and above general fall of drain. All branches to enter main channel about invert level, curl over branches being in use in all cases where angle of junction exceeds 130°. Bench strike wall of manhole and finish fine with a steel trowel. Branches carrying rainwater or surface water only, may enter manholes above benching levels.

12.10 Testing

Testing Generally:

Test drains after laying and jointing, but before placing of surrounds or concrete beds. Re-test after completion of backfilling.

Drainage Authority:

Carry out tests of the drainage installation to the approval of the Local Authority.

Water Tests:

Form temporary seals at low ends of drains and fill the system with water. Erect a standpipe to provide a head of 1,200mm at high end and not more than 2,400mm at low end. Allow for initial absorption and top up before starting the test. Measure loss of water over a period of 30 minutes by adding water from a measuring vessel at 10 minute intervals to maintain the original level in the standpipe. The loss of water for drains up to 300mm nominal bore shall not exceed 0.06 litre per hour per 100 linear metres of nominal bore.

Cleaning:

Remove any accumulated deposits and debris from inside of drains and thoroughly flush out with clean water catching all dirt before handing over.

Video Survey:

A video survey is to be carried out on each drain and sewer in the scheme. Each section of pipe surveyed is to be clearly identified on the survey and cross referenced with a marked up site layout plan showing which survey relates to which pipe run. All pipes are to be surveyed including surface water drains and foul water sewers and each individual house connection is to be surveyed also. The company carrying out the video survey should also remove any debris found in the process of the survey and resurvey the cleaned pipe runs.

12.11 Sewage Treatment System

In the case of rural dwellings where a connection to the public sewer cannot be made an “Envirocare P161PS” sewage treatment system or similar approved designed to handle the domestic requirements of 6 adult occupants of a single dwelling shall be installed. It shall include for a pumped outlet to the raised percolation area. The Percolation area shall be constructed in accordance with S.R. 6:1991 and current Environmental Protection Agency guidelines. Contractor shall assume in his price that free draining topsoil will have to be imported to the site to form the percolation area and that it shall be a raised percolation area requiring a pump and pump chamber to pump the effluent up to the percolation area.

12.12 Soakpits

Soakpits:

To be provided at low point in each garden to take some of the clean water from surface water drains only. Surface water drains in general to be connected to main drainage system. Soakpit only to be used for land drains from garden and subject to approval of Engineer some drainage of paths or small areas of roof may also be permitted to soakpits.

Soakpits to be filled with a minimum of 1.2m deep and 2.5m x 2.5m in plan (7.5 cubic metres) of clean drainage stone. In the case of rural dwellings where main surface water drainage is not available then two number 7.5 cubic metre soakpits are to be provided per dwelling to take all surface water, an overflow shall be provided from each soakpit to a surface water drain connected to main surface water drainage (or field drain if no alternative available). The inlet and outlet to each soakpit shall be via an inspection and cleaning chamber with 300mm deep sump to catch grit etc. A 300mm diameter perforated pipe shall connect the inlet and outlet chambers at 450mm below ground level and the trench and clean drainage stone shall be surrounded and covered with a permeable membrane to prevent soil particles from contaminating the stone.

Site Water Supply

13.1 General

General:

The work includes the laying of 100mm diameter cast iron spun watermain and connecting up existing mains in the public roads. The supplying and fixing of sluice valves and chambers, hydrants, blank C.I. Caps, anchor blocks and all restoration of roads to the approval of the Engineer and all other associated works as indicated on the site layout plans.

13.2 Cast Iron Pipes & Special Fittings

Pipes:

Shall be C.I.S. and S. cast vertically in dry sand or cast centrifugally by an approved process. The pipes and special castings shall be in accordance with the most recent British Standard Specification for cast iron pipes. All pipes shall be Class B. Class B flanged shall be bracketed and faced and all flanged joints shall be machined. The necessary nuts and bolts and joining material shall be provided.

Cast Iron Pipe Coating:

All cast iron pipes and castings are to be coated inside and out according to Dr. Angus Smith's processing and coating to be applied carefully at the proper temperature and in a proper manner.

Cast Iron Taste:

If in the opinion of the Engineer any taste or odour be found to exist or be detectable in the water flowing in the pipes after the said pipes have been three days in use and if in the opinion of the Engineer this taste, odour or other defect arises from, or be attributable to the coating on the pipes, the Contractor will be held fully responsible thereafter and will pay all costs associated with rectification of the problem.

13.3 P.V.C Pipes

P.V.C. Pipes:

Shall be a minimum of 100mm internal diameter with 12.5 Bar pressure rating, either MDPE or HDPE laid in accordance with the manufacturer's instructions.

Trenching P.V.C. Pipes:

Excavation of the pipe trench with the correct profile should be carried out immediately prior to pipe installation. A minimum cover of 1 metre from pipe crown to the ground surface is essential with a bottom width of trench sufficient to allow pipe jointing and compaction of backfill. The minimum trench width shall be not less than the overall pipe diameter + 300mm.

Pipe Bedding:

Before laying down the pipe bed, the trench bottom should be checked for profile and any large and sharp stones or rocks should be removed. The pipe bedding should consist of sand with a compacted depth of 50mm for pipes up to 200mm diameter and 80mm for larger pipes.

Backfilling:

See Appendix 1 or Sewers & Watermain requirements.

Shall consist of sand to a height of 150mm above the pipe crown and shall be placed and hand tamped in 100mm layers with particular attention given to filling and tamping if the volume between the trench wall and the side of the pipe as this gives vital side support and prevents earthload deformation of pipe when it is not under working pressure. Thereafter filling shall consist of selected stone filling containing no particles in excess of 20mm in diameter. Mechanical tamping of backfill shall not commence until there is a minimum of 300mm cover over the pipe crown. Backfilling in roads shall be sand and compacted clause 804 stone or lean mix concrete or foamed concrete where cover is limited.

Sluice valves

S. & S. or plain ended valves complying with B.S. No. 5163 and made by an approved manufacturer shall be supplied and fixed in suitable positions on the new 100mm main as near as possible to the connection with the existing main in public road and where shown on site plans or if not shown then the sluice valves shall be located to allow the water supply to each group of twenty houses to be isolated or half of the number of houses to be isolated, whichever is the lesser number.

Air valves

Double air valves shall be installed at all high points on water main and at the end of cul-de-sacs and in turning areas where appropriate, level survey to be checked to ascertain location and number required if not shown.

Scour valves

Scour valves shall be located at lowest point in each section of water main between pairs of sluice valves to allow emptying of one section of water main without affecting other sections.

13.5 Hydrants**Hydrants:**

Shall be located in footpaths at street or road junctions and shall be screw down type with male instantaneous outlets, cast iron cover and permanent scotch light marker. They shall conform to B.S. no. 750 for underground fire hydrants. Intermediate hydrants shall be provided where necessary so that no house is more than 40 metres from the nearest one. The maximum depth to the top of the hydrant outlet from ground level shall be 200mm. Where necessary double flanged distance pieces shall be provided to lift the hydrant adequately to meet this specification.

13.6 Chambers

Chambers:

Construct around sluice valves; chambers of 300mm internal diameter constructed in precast concrete units 75mm in thickness and covered with a cast iron (CI) cover of 100mm clear opening. The cover is to be bedded in cement mortar.

13.7 Foundation of Valve Chambers

Foundation of Valve Chambers:

A 150mm thick C40/50 suitable concrete floor is to be constructed under all chambers to form a foundation for the chamber, and opening is to be left in the wall at the lowest point for the draining of water.

No building is to rest on the mains.

13.8 Testing of Pipe Line

Testing of Pipe Line:

When the extension of the pipeline has been laid and before the trenches are back filled, the pipe shall be filled with water and tested to twice working pressure in the presence of the Engineer or Clerk of Works. The Contractor shall take any precautions necessary to prevent change of alignment in the pipes during testing. Any defective pipes found shall be removed forthwith and replaced by new sound pipes and any leaking joints shall be made good. Burning, plugging or other such repairs shall not be permitted.

13.9 Water Meter

Provide 'Kent' meter or equivalent approved meter reading in m³ and Talbot matrix box at the entrance to the drive to each house and a bulk meter at the point where the connection is made to the water main.

All external pipework to be lagged and 100mm thick layer of closed cell polyurethane insulation to be fitted in water meter chamber above the meter, lifting handle for insulation to be fashioned from one piece of 600mm long heavy gauge wire or equivalent approved method.

Plumbing & Heating

14.1 Work Generally

Work Generally:

All work to be carried out by an approved firm of Plumbing Contractors tidily and in the best approved manner. All fittings to be tested and stamped. Contractor to provide for carrying out all cuttings, chasing, making good, trenching, etc. Pipe runs to be tidy and as straight as possible, pipes to be clipped or held in place by other appropriate fixings. Care must be taken not to leave any leaks to avoid damage to finishes. All plumbing work to be tested by plumber to ensure that no leaks are present. Sign-off system to be used where Main Contractor will get plumber to sign document stating that all plumbing work has been completed and tested and no water, carbon monoxide, gas or oil leaks have been detected. For gas and oil installing, fitting, commissioning and servicing only plumbing contractors with appropriate qualifications and experience and registered with appropriate organisations shall be permitted to carry out the work.

Gas installers shall be registered with the Register of Gas Installers of Ireland.

Oil installers shall be registered with the Oil Firing Technical Association.

14.2 Cold Water Supply

Supply and Service Pipes:

Copper pipes to be I.S. 238. Jointing to be kept to a minimum and all couplings, tees, etc. to be approved type. All pipes to be securely fixed to wall with strong clips. Lugs, etc. to be spaced as to prevent all tendency of pipes to sag, bond or shake. All piping shall be jointed with compression fittings to I.S. 239 bearing the Standard Mark of Eolas. P.V.C. to be of best quality "Hydrodare" type heavy gauge or approved equivalent to I.S. 134, I.S. 135.

Supply from Mains:

Provide standard 15mm ferrule and pay all fees in connection with tapping of watermain by Council. Lay 15mm "Hydrodare" branch from stub and fit with a stopcock I.S. 239 set at 600mm below finish paving level. Fit standard cast iron cover in paving over and surround stopcock with dry chamber. Carry to each house 15mm diameter cold water supply in P.V.C. as specified at a depth of not less than 600mm under finished ground level.

Internal Stopcocks:

Provide 15mm brass "screw down" stopcock I.S. 239 on supply line inside each house at the point of entry of cold water supply.

Cold Water Supply and Services:

Take 15mm P.V.C. supply to 270 litres glass fibre storage tank in roof space together with condensation tray and cover. Tank to be provided with approved tested high pressure ball valve and 22mm P.V.C. overflow pipe to be taken down to discharge between rafters at eaves level. Tank to

be carried on strong 175mm x 44mm timber primary, secondary and spreader bearers which in turn are to be covered with 19mm W.B.P. plywood fixed to framing as directed.

Take 15mm P.V.C. supply from rising main to cold water tap in kitchen sink. From storage tank take 22mm P.V.C. pipe to bath and 15mm P.V.C. branches to w.c. basin, complete with all necessary standard compression joint fittings, wall hooks and all ferrules, bibcocks, etc. which are to be tested and stamped by and approved testing department.

14.3 Hot Water System

Dual coil cylinder to be installed in each house.

Hot Water Supply Indirect System:

Flow and return pipes from boiler to cylinder to be 28mm 18 gauge. Boiler to be “Grant” multipass 95% efficient condensing boiler or other approved equivalent if applicable fitted with a draincock and flue to extend 1200mm above eaves level. Cold water storage tank to comply with Building Regulations. Cold supply from tank to cylinder to be 22mm x 18 gauge copper. Hot water branches to sink and w.h. basin to be 15mm x 18mm gauge copper and 22mm x 18 gauge copper main supply to bath. A further 45 litre tank shall be provided with the indirect system including similar pipework, connections and supports. Provide for 2 no. approved safety valves on the system.

Hot Water Supply Direct System:

Flow and return pipes from boiler to cylinder to be 22mm x 18 gauge. Boiler to be “Grant” or other approved and fitted with draincock and condensate drain both discharging to foul water sewer (not surface water drain). Provide and fit 300 litre indirect stainless steel triple coil water cylinder ready for solar hot water connection with factory fitted insulation and 22mm x 18 gauge expansion pipe carried up to discharge over tank in roof. Cold supply from tank to cylinder to be 22mm x 18 gauge copper. Cylinder to be insulated such that the heat loss does not exceed the value given by the formula $1.6 \times (0.2 + 0.051V^{2/3})$ kWh per 24 hours, where V is the nominal cylinder capacity in litres

Hot water branches to sink and wash hand basin (whb) to be 15mm x 18 gauge copper and 22mm x 18 gauge main supply to bath.

Supply and fit a single element 3kW immersion water heater in upper half of cylinder with an adjustable thermostatic control and two on/off switches; one located beside the hot press, the other located in the kitchen, immersion water heater switches to have timer/boost function.

ALL HOT AND COLD PIPEWORK TO BE LAGGED WITH INSULATION

Heating:

Radiators shall be oversized to work efficiently with a high efficiency condensing boiler to reduce the average boiler operating temperature to ensure condensing occurs at average operating temperature for the entire system. Radiators to comply with B.S. 3528. Install adequately sized **low surface temperature** double panel “Runtal Zehnder” or other approved equivalent low surface temperature heating radiators with plinths to cover pipes and valves in suitable positions. Radiator

covers to be hinged and lockable. Install a minimum of one radiator per room (including every separate habitable space such as living rooms, kitchen, bedrooms, utility room, hall, w.c. and bathroom). The design and installation of the heating system shall comply with B.S. 5499 Part 1. Materials and workmanship clauses that are specified separately shall have precedence over similar items included in the Code of Practice.

For oil or gas fired central heating thermostatic controls will be fitted in the living room, main bedroom and cylinder and Thermostatic Radiator Valves on the radiators in the other rooms (except on heat sink radiators) with connection to a central processor to control the heating system in compliance with Technical Guidance Document L of the Building Regulations and BS5449. Where solid fuel, oil or gas fired central heating and/or solar water heating are provided the Contractor shall ensure that the system is as simple as possible and shall provide clear operating instructions. In the case of any defect valves shall fail in a safe position and in the case of an interruption to power supply valves shall open automatically. One radiator in the hall and one radiator in the bathroom may act as heat sink radiators and should be fitted with valves that cannot be closed by hand. The heat sink radiators shall be connected to both the solid fuel and oil or gas fired central heating. The solid fuel boiler shall have a separate connection to the hot water cylinder separate from the oil or gas boiler or solar panel.

Flow and return pipes and an electrical duct will be fitted, installed and terminated outside the rear wall of the house to allow for the connection of an external central heating boiler.

ALL SUPPLY AND RETURN PIPEWORK TO BE LAGGED WITH INSULATION.

Automatic boiler bypass valve

This controls water flow according to the differential pressure of the water across it. It is used to maintain a minimum flow rate through the boiler and to limit the circulation pressure when alternative water paths are closed. A bypass circuit must be installed if the boiler manufacturer requires one, or specifies that a minimum flow rate has to be maintained while the boiler is firing. The installed bypass circuit must then include an automatic bypass valve, not a manual (fixed position) valve.

The use of an automatic bypass is essential as the system includes a large number of TRVs. When most of these are open, the automatic bypass remains closed, allowing the full water flow to circulate around the heating system. As the TRVs start to close, the automatic bypass starts to open, maintaining the appropriate water flow through the boiler. It also helps to reduce noise in the system caused by excess water velocity.

Plume

In condensing boilers a plume is present most of the time that the boiler operates. Flue terminal position must be above eaves level and located in a position where it will not cause nuisance to occupiers, neighbours or affect the dwelling or any other property in any way. Flue and insect proof terminal guard must resist the corrosive effect of the flue gases.

Boiler interlock

This is the required wiring arrangement to prevent the boiler firing when there is no demand for heat. The boiler is interlocked when it is switched on and off by the thermostats containing

electrical switches. All thermostats in the heating system must be wired in this way. This includes room thermostats, programmable room thermostats, cylinder thermostats. The interlock is also applied to the operation of the pump, although any requirements for pump overrun stipulated by the boiler manufacturer must be observed.

Frost thermostat

A simple override control used to prevent frost damage to the dwelling and boiler system. The frost air thermostat should be fitted in a suitable place within the dwelling to ensure a minimum temperature is always maintained. If the boiler is located outside the dwelling then an additional pipe thermostat is also required to protect the boiler.

Condensate

Condensate from condensing boilers must be drained via a condensate trap to a waste water sewer (not surface water drain) and must be connected to a sewer internally to avoid freezing in cold weather. Drain must 32mm diameter and be resistant to corrosive condensate (not copper or steel).

Cylinder thermostat

To be strapped onto the cylinder about one third of the way up from the base. The strap needs to be tight to ensure good thermal contact and be adjusted to 60°C. If set too high, it may result in scalding, but if too low it can increase the risk of legionella bacteria which could result in serious health problems. The type of cylinder thermostat provided must be childproof.

Instruction

Installers must provide clear instructions on how to set and use the controls properly and effectively. In particular, the operation of programmers can be difficult to understand. The manufacturer's instructions must also be provided and it will be necessary to demonstrate: How to set the programmer clock and adjust for time (change for summer to winter time etc). The use of the time control override function.
How to set summer hot water only.
How to separate space heating and domestic hot water time settings.
How to set room and cylinder thermostats.
How to set TRVs.

14.4 Insulation**Pipe Lagging:**

All pipework shall be lagged with "Armflex" insulation or approved equivalent.

Tank Insulation:

All water tanks in attic shall be insulated with 100mm thick polyurethane insulation sandwiched between fitted 19mm W.B.P. plywood covers to protect insulation all to Engineer's approval.

Insulation to be extended to cover entire platform on which tank sits and to be extended further down to ceiling level.

14.5 Sanitary Fittings

Low Level W.C. Suite:

Low level suite shall be white vitreous china conforming to B.S. 1213 with “P” trap, 14 litre cistern to B.S. 1125 with supporting brackets, 12mm ball valve to B.S. 1212 with a silencing pipe, 115mm float, inlet screwed for female iron and 22mm overflow connection with union for P.V.C 50mm white plastic flush bend with special rubber ring and coupling nut for jointing to pan, black plastic hinged seat to B.S. 1254 with chromium hinging device.

Sink:

Stainless steel sink and single drainer to I.S. 132 with built in overflow, size 1,067mm x 525mm complete with 38mm P.V.C. two piece swivel “P” trap with cleaning eye, 75mm water seal and neoprene core and washers, plug and strong C.P. chain and two 22mm taps marked hot and cold to B.S. 1010.

Bath:

To B.S. 1/89 as manufactured by Irish Foundries Ltd., Bailieboro, Co. Cavan or approved equivalent and to be cast iron 1,676mm long white porcelain enamelled inside and painted outside with 75mm roll, adjustable feet, earthing lug with brass screw, 30mm C.P. overflow, 50mm C.P. outlet, grating, 38mm P.V.C. trap with neoprene core, washers and P.V.C. overflow, plug and C.P. chain and Westco Avanti bath/shower mixing tap c/w chrome hose and shower head or similar approved.

Wash Hand Basin:

550mm x 404mm vitreous china with pedestal having; C.P. grating outlet and union, 32mm P.V.C. trap with cleaning eye and 75mm water seal, plug and C.P. chain, two C.P. tapes to B.S. 1010. Basin to be set with front rim at a level of 813mm over floor. Provide a 550 x 750mm mirror with anti-corrosion backing and bevelled edge, fixed with 4 no. chrome mirror dome headed fixing screws with rubber washers and cups set 225mm above wash hand basin.

Towel Rail:

600 mm long chrome towel rail with chrome ball-end brackets to be provided in each bath or toilet room.

14.6 Pipework

Overflows:

From W.C. cistern and storage tanks take 22mm diameter P.V.C. overflow pipes through nearest external wall and finish with neat splay cut to discharge 50mm clear of wall face. From overflow of bath provide 28mm P.V.C. pipe and joint to trap.

Waste Pipes:

Provide white P.V.C. pipes to sink and baths 38mm and w.h. basin 32mm. Carry through walls as necessary executing neat bends and neat finish where pipes discharge. Secure wastes with clips as directed and lay to constant falls.

ALL WASTE PIPES TO HAVE SEPARATE BOSS CONNECTIONS TO SOIL VENT PIPE.

Soil and Vent Pipes and Stacks:

Soil and vent pipes to be provided to every house as shown on site plan in each block in 100mm diameter P.V.C. pipes. Stacks to be secured to walls with heavy screwed holder brackets to stand 38mm clear of blockwork and to have an approved type swan neck bend at eaves and to finish with 300mm length of pipe and P.V.C. cowl.

Hoppers:

Obtain Engineers approval of hopper type securely fixed to wall where required and make connections.

Testing Etc:

Before handing over, test all fittings, joints, circulation's, etc. to Engineers satisfaction and leave all wastes, traps, etc. clear and all fittings clean inside and out.

14.7 Heating Appliances

Heating Appliances

Install A STANLEY "OISIN" multi fuel range complete with splash bank enamelled flues, bonnet and all necessary accessories also include heat reduction fire bricks to reduce heat to water boiler. All associate pipework, pumps, thermostats etc. are to be installed in accordance with manufacturer's instructions. Stove to be room sealed and to take air supply from outside.

Install a GRANT VORTEX 50/90 oil fired condensing boiler, 95% efficient or equivalent approved, and all ancillary fittings to manufacture instructions. External boiler to be provided where shown on the drawings.

Install a 1350 litre PVC oil storage tank and 50 gallons of home heating oil per house will be supplied by the contractor for testing of the oil fired boiler, thermostats, valves and timer etc.

14.8 Mechanical Services Installation

Ventilation

Whole house heat recovery ventilation systems shall be installed in all houses. Where such a system is to be used the Vent Axia extract fans specified may be omitted and replaced by a similar feature incorporated into the whole house heat recovery ventilation system capable of providing a similar and quantifiably equal performance compliant with the Building Regulations and enhancing the Building Energy Rating of the dwelling.

Mechanical Ventilation Heat Recovery Fan Units

The whole house heat recovery ventilation system (MVHR) shall provide continuous airflow of 100 – 350m³/h between normal automatic mode and high speed combined with 95% heat recovery efficiency through a counterflow sonic welded polystyrol heat exchanger. Maximum airflow of 350m³/h @ 225Pa. MVHR unit to be fitted with EU F7 filters on supply air and waste air. Unit fitted with brushless DC EC motors complete with integrated thermostats. System controlled by internal intelligent biorhythmic control and automatic 100% bypass and automatic efficient defrost cycle.

Unit to be fitted with water condensation drain piped to a sewage outlet. Unit to be capable of connection to internet for remote monitoring and diagnosis.

The MVHR Unit shall be SAP Appendix Q registered and shall have a specific fan power of no more than 0.67 W/l/s. The MVHR Unit shall be MTD-Solutions ERV-350, or equal and approved.

Controls

Ventilation control shall be capable of providing variable speed control and operation on humidity sensitivity. The controls shall have a boost feature for kitchen extract and shall be integrated into bathroom PIRs for bathroom boost. Controller shall be mounted at 1500mm height.

Ductwork

Ductwork system to be installed using the Eco-Air semi flexible 5 core aluminium polyester composite thermally insulated ducting on the waste air and Eco-Air acoustic and thermally insulated duct on the supply air. Eco Air ducting is certified and fire tested to EN 13502-1 B-s1,d0 and tested for air tightness to EN 13180 standard:

Ventilation in Buildings – Air Ducts – Measurements and mechanical requirements for flexible ducts. Primary ducts to be Eco-Air 150mm diameter inner core with thermally insulated outer core. All mechanical fixing of ductwork system to be stainless steel, aluminium or galvanised steel. Where ductwork must be dropped in stud partitions, flat pack with a minimum height of 54mm may be used. Final connections may be flexible to a maximum length of 300mm. Ductwork connections shall be 100mm diameter, with 150mm diameter to main runs. Cross talk between rooms shall be minimised by allowing individual duct runs for all rooms. Installation shall be carried out in accordance with the MVHR unit manufacturer's installation guide.

Supply & Extract Air Devices

All supply and extract air devices shall be ceiling mountable capable of flowrates of 12-70m³/hr @100Pa.

Supply and Extract air devices shall be installed at a minimum separation distance of 1m from any smoke detectors.

External Wall Louver, Ridge Terminal & Roof Cowl Devices

All external wall louver, ridge terminal, and roof cowl devices shall be supplied complete with bird and insect mesh and be capable of a flowrate of 210m³/hr @10Pa.

14.9 Solar Water Heating Equipment

A solar water heating system shall be provided for all house types including hot water cylinders with 300 litres storage capacity and pre-insulated with 50mm thick factory applied polyurethane or equivalent insulation.

The cylinders shall be suitable for 3 Bar operation and have dual heating coils (i.e., supplied by both solar panels and boiler).

The hot water cylinders shall be 'slimline' models capable of fitting in the hotpress cupboards or as detailed on the architect's drawings. Solar water heating panels shall be supplied and installed to each housing unit on a South or West facing roof at a pitch of between 30 and 45 degrees. Allow for increased size of solar panels due to poor orientation of roofs.

The solar panels shall have the following specification:

- Compound Parabolic Collector (CPC) type
- 4mm thick low iron solar safety glass
- the absorber shall be constructed from copper with nickel oxide coating.
- 1.5mm leak proof welded aluminium collector tank without vent holes.
- cylindrical, high-gloss rolled galvanically anodised pure aluminium reflector.
- anodized aluminium frame.
- c/w negative pressure relief valve for pressure compensation.
- Diffusion factor (Kdif) of 0.87
- Heat capacity of 8513 J/m² K
- Flowrate of 20 - 70 l/m² h.

The solar panel circuits feeding hot water cylinders shall be 22mm diameter and be complete with circulating pumps, pressurisation units, automatic air vents (installed at highest point of circuit) and non-return valves. The system shall include 3-way valve linking to heating system in order to enable the system to dissipate heat through radiators when demand is not required to the hot water cylinder.

The solar panels shall be SolarFocus or equal and approved.

Electrical

15.1 General Conditions

The Electrical Installation:

Must be carried out to the entire satisfaction of the Engineer and R.E.C.I. Inspector (or equivalent) and must comply with the current guidelines of the Electro-technical Council of Ireland. The electrical installation is to form part of the general building Contract and the responsibility for carrying out work to a satisfactory conclusion is to be borne by the Building Contractor, who shall, however, sub-let the work to an experienced Electrical Contractor. The Electrical Contractor shall supply all materials and labour necessary for the complete electrical installation as herein specified and indicated on the relevant drawings. Electrical installations shall comply with part M of the Irish Building Regulations, switches and sockets to be easily accessible for the wheelchair bound.

Only Electrical Contractors of good standing will be permitted to undertake the electrical installation. Before the installation is commenced it will be necessary to obtain the Engineer's approval of the electrical sub-contractor. The Engineer may also wish to know the arrangements and work schedule for completion of the work.

Standards:

All electrical work must comply with the latest edition of the I.E.E. Regulations and the latest requirements of the E.T.C.I., E.S.B., and must be R.E.C.I. certified or equivalent.

Electrical Mains:

The Electricity supply mains will be erected by the E.S.B. and do not form part of this Contract but any necessary ducting required to connect and/or divert the supply will be included.

Mains and Wiring:

Routes are to be ascertained by the Contractor at an early stage so that ways are to be left to receive wire and ducts to save unnecessary cutting away.

Notice to Electricity Supply Board:

The main Contractor and the electrical sub-contractor shall consult at an early stage with the District Manager of the E.S.B. to arrange for service and meter position. Provision, during the construction of the house, of an entry duct and "hockey stick connection" through the wall to the meter position for service cables should be allowed.

Inspection of Work:

All material to be used in this Contract shall be of first class quality and be available for examination by the Engineer or his specified representative at any time during the progress of the Contract. If requested, samples of materials must be forwarded to the Engineer before commencing

work. Any departure from the Specification or the approved samples without written confirmation from the Engineer may also cause certification of the installation to be refused.

Examination on Completion of Work:

The Engineer shall be notified when the electrical installation has been completed. No house will be taken over unless the electrical installation has been approved by the Engineer or his authorised representative. The electrical contractor shall carry out loop impedance and polarity tests on all houses - R.E.C.I. completion certs or equivalent should then be issued to the Engineer or his representative.

15.2 Cables and Fixtures**Cables General:**

All cables shall be I.S. 201 and I.S. 202 and shall be of the following sizes:-

Cable Lighting Circuits: 1.5mm² P.V.C./P.V.C. cable with earth continuity conductor.

Cables socket outlets/immersion Group circuit - 2.5mm² twin core flat P.V.C./P.V.C. cable with earth continuity conductor.

Cables Cooker Circuits:

6mm² twin core flat P.V.C. /P.V.C. cable with earth continuity conductor.15.25 Flexible Cables:

The minimum size is 0.5mm (High temperature type). Tails to E.S.B. meter and service fuse 16mm P.V.C./P.V.C.

Pumped Electric Shower

All bathrooms to be wired with a suitable cable and fittings for a 10kW pumped electric shower even where showers are not shown, blank to be fitted at end of cable in bathroom wall and appropriate m.c.b. /r.c.d. to be fitted in consumer unit and labelled. Showers only to be fitted where shown on plans or specified in tender documents, where a shower is shown Mira 9.8 pumped electric shower to be fitted.

Junctions:

Junctions in wiring shall only be made in suitable ceiling roses, switches, slack cables shall be left at the back of ceiling roses; switches and fuseboards to facilitate inspection, testing and maintenance. Sufficient slack cable should be left behind the fuseboards to permit any circuit to be transferred to another fuse.

Wiring:

The wiring of each final sub-circuit shall be electrically separate from that of every other final sub-circuit. The wiring for the lighting and socket outlets will be effected in cable concealed under the floor or in the attic, WIRING TO BE CLIPPED TO THE RAFTERS IN CABLE TRAYS ABOVE THE 300mm THICK INSULATION AND RUNNING IN NEAT RUNS PARALLEL OR PERPENDICULAR TO THE TRUSSES. Joists may not be grooved; any holes required must be bored through the centre of the joists. In solid walls all switch and socket outlet drops shall be

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enclosed in plastic conduit and recessed in walls. Cables to be fixed with buckle clips spaced 225mm apart horizontally or 375mm vertically. The electrical sub-contractor shall provide all chases for conduit and recesses for switch boxes and socket outlet boxes. All socket outlets to be wired on a Ring-Main system.

Conduit:

Conduits shall be oval plastic type sunk in the wall for each switch drop and socket outlet. Conduits shall only be run horizontally and vertically.

Fuseboards:

A distribution board shall be located in a place agreed, usually in front entrance hall or utility, and should comply with E.T.C.I. Requirements. Unit to have integrated door and casing. All M.C.B.s and R.C.D.s etc. to be clearly labelled with typed labels.

Fuses / M.C.B.'s:

Fuses / M.C.B.'s ratings shall be as follows:-

Lighting Circuits - 6 amps. Socket outlet circuits - 20 amps. Cooker circuits - 30 amps.

Water heating circuit - 20 amps.

Lighting Switches:

Lighting switches shall be with Bakelite flush type 5 amp switch to B.S. 3676. They are to be installed between 900mm and 1200mm above floor level; brass or other non-corroding fixed screws must be used.

Lampholders:

Lampholders shall be cord grip type with solid plungers and flange holders. They should be Bakelite type. In bathrooms, toilets and kitchens, lampholders should have a shield of insulating material. Additional outdoor light with PIR detector to be installed at back door of each house and recessed outdoor light to be installed above front door also. One kitchen light to be 1.2m long double fluorescent tube light with diffuser. Recessed lampholder to be installed in WC under stairs.

Ceiling Roses:

Ceiling roses shall be white bakelite type. They should be mounted on a suitable ground attached to the structure behind the plaster.

Flexible Cable:

All flexible cables are to be B.S. 6004 and 6500. The minimum size shall be 1.5mm² and the lighting pendants shall be circular white P.V.C. insulated type.

Lamps:

All lights to be fitted with General Electric extra mini 20w BC/B22d COMPACT FLUORESCENT LAMPS (Low Energy Light Bulbs) electrician to supply and fit bulbs and check that each bulb is working.

Socket Outlets:

All socket outlets are to be 3-pin 13 amp type to B.S. 1363 earthed with on/off switches to be located on the outside of the unit for ease of use. Socket outlets to be between 900mm to 1200mm above floor level and 500mm from any internal corner, brass or other non-corroding fixing screws are to be used. Allowance must be made for remotely switching appliances such as washing machines etc. which are located under worktops. A suitable switch and terminal must be used. The number of sockets required shall be in compliance with Quality Housing for Sustainable Communities published by the Department of the Environment or the number shown on the electrical layout drawing, whichever is the greater.

Switch and Socket Outlet Boxes:

Switch and socket outlet boxes are to be galvanised metal conforming to B.S. 4662. They shall finish flush with the finishing wall surface and shall be firmly secured in position with sand and cement mix.

Bathrooms:

No electrical equipment shall be installed in a bathroom other than the following -

- a) Lighting fittings complying with E.T.C.I. 5.113.2.1.
- b) Water heaters and associated wiring complying with E.T.C.I. 5.113.2.2.
- c) Shower units complying with E.T.C.I. 5.113.2.3.
- d) Heating appliances and fans complying with E.T.C.I. 5.113.2.4.
- e) Safety extra-low voltage equipment complying with E.T.C.I. 1.4.4.2.

NOTE: Shaver units will be installed and shall have an isolating transformer and shall comply with B.S. 3052 or equivalent standard. This unit shall not be located directly over the bath.

Shower:

All bathrooms to be wired with a suitable cable and fittings for a 10kW pumped electric shower even where showers are not shown, blank to be fitted at end of cable in bathroom wall and appropriate m.c.b./r.c.d. to be fitted in consumer unit and labelled. Showers only to be fitted where shown on plans or specified in tender documents, where a shower is shown Mira 9.8 pumped electric shower to be fitted.

Water Heaters and Associated Wiring:

A water heater where shown or specified, may be instantaneous or non-instantaneous and shall be permanently fixed and wired. Its associated wiring shall be mechanically protected against damage. A flexible cable which is firmly clamped at each end and which does not exceed 300mm in length need not have additional mechanical protection. A cable shall be installed in such a way that it cannot be grasped by persons using the bath.

Heating Appliances and Fans:

Heating appliances if shown or noted to Class II (double insulated) type and heating appliances having enclosed or sheeted heating elements shall be permanently fixed and wired and situated at

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least 1m from the edge of the bath measured horizontally. Such heating appliances shall not have switches fitted as part of the appliance.

Appliances in Bathroom:

The following heating appliances and fans, (if shown), shall be permanently fixed and wired and situated outside a zone bounded by a horizontal distance of 1m from the edge of the bath and a height of 2.1m from the floor.

Fan-assisted heater. Infra-red heater with sheeted elements. Extractor fan to be Safety Extra Low Voltage. Ultra-violet lamp. Combined heat and light unit. Switches on such appliances shall be controlled by means of a non-conducting cord or rod. Separate switches operated by means of a non-conducting pull-cord shall be mounted at least 2.1m from the floor.

Socket outlets other than those forming part of a shaver unit complying with 5.113.2.3 shall not be installed in a bathroom.

Kitchen and Utility Rooms:

In kitchens and utility rooms extraneous conductive parts as metal sinks, splash-backs and water pipes shall be metallically interconnected to form one local equipotential system. The equipotential system shall be connected locally to a protective conductor in compliance with Electro-technical Council of Ireland guidelines.

Labelling:

All fuses / M.C.B.'s shall be suitably labelled as to the manner and position of points on each circuit.

Meter Boxes:

Meter boxes are to be E.S.B. type or other approved equivalent set in walls to regulation height.

Extractor Fans (to be installed whether shown on drawings or not, see Building Regulations)

A Safety Extra Low Voltage (S.E.L.V.) Vent-Axia extractor fan, or similar approved, will be installed in the ceiling of the bathroom above the bath or shower with a capacity to extract a minimum of 30 litres per second or the capacity specified in the current Irish Building Regulations, whichever is the greater. The duct from the fan will pass through the roof space and be fixed securely to a grilled hit and miss vent in the soffit. The duct will be fitted with a condensation trap that will be piped to the outside underside of the soffit. The bathroom light switch will operate the extractor fan and the fan will have an adjustable 15-minute over-run. A white splash-proof fused spur isolator will be installed downstream of the bathroom light in such a way that the fan can be completely isolated to allow an electrician to work in complete safety on the fan with the light switched on. The transformer for the S.E.L.V. fan will be securely fixed to a truss above the insulation above the ceiling of the bathroom at 1.5m from the external wall for ease of accessibility, length and type of cable required to be checked for compliance with manufacturer's recommendations. A small gap of approximately 10mm will be allowed for under the bathroom door to allow air infiltration.

A cooker hood with extract fan incorporated will be installed above the cooker in the kitchen with a capacity to extract a minimum of 60 litres per second or the capacity specified in the current Irish Building Regulations, whichever is the greater (samples to be supplied and type to be agreed with the Engineer / Clerk Of Works). The cooker hood extract fan will not re-circulate the extracted air. The duct for extracting air through the kitchen wall will be formed in a single piece of clay pipe where it passes through the wall.

A Vent-Axia VA150A extractor fan, or similar approved, will be installed in the rear wall of the utility room and the downstairs toilet (where shown) with a capacity to extract a minimum of 60 litres per second or the capacity specified in the current Irish Building Regulations, whichever is the greater.

ALL fans will be controlled by both a simple wall mounted switch or pull cord switch and a Vent-Axia humidity controller or equivalent to ensure fully automatic condensation control. The switching system will allow the fan to be switched on manually but it will also be switched on automatically by the “humidistat” humidity control switch if the humidity increases beyond an acceptable level and will run until the humidity has dropped below the set level. All fans to be fully commissioned and tested in operation by the electrician.

Television Booster:

Additional double socket outlet to be installed in roof space to accommodate television booster and lamp or other appliance, supply to be taken from socket ring main. Conduit for TV aerial cable from top of roof to outlet in Living room to be of sufficient size for two 1.27mm² cables, one 1.27mm² cable to be installed in conduit with 6 metres of slack.

15.4 Earthing

Earth Electrodes:

The earth electrode shall consist of one of the following:

A bare copper or hot-dip galvanised iron pipe or rod of at least 12mm diameter, driven vertically into the soil for a length not less than 1,200mm ; or a straight length of at least 4,500mm of the same bare copper or galvanised iron rod, or a straight length of at least 4,500mm of bare copper or galvanised steel wire of at least 25mm cross-sectional area, buried in the soil at least 500mm deep; or with the agreement of the E.S.B. the metal sheath of an E.S.B. underground supply cable; or in installations with a main fuse rating not exceeding 150A, a copper clad high tensile steel rod of at least 9mm diameter driven vertically into the soil for a length of not less than 1,200mm.

Fit aluminium horse shoe type cover in paving over and surround with dry chamber.

15.5 The Earthing Lead

The Earthing Lead:

Shall connect the earth electrode to the main earthing terminal of the installation. The earthing lead shall consist of an uninsulated copper conductor having a cross-sectional area not less than 10mm

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(or greater if required by Electricity Supply Board or Electro-Technical Council of Ireland); otherwise the earthing lead shall comply with the requirements for protective conductors and it shall be mechanically protected.

The insulation shall be coloured green/yellow.

The connection at the earth electrode shall be accessible for inspection and shall be protected against corrosion by a suitable waterproof tape.

15.6 Main Earthing Terminal

The Main Earthing Terminal (or “neutralising block”):

Shall be at the distribution board position. Where the meter is located in a separate compartment, the neutralising connection is made in that compartment.

The Neutralising Lead from the Main Earthing Terminal to the Meter Compartment:

Shall consist of insulated copper conductor having a minimum cross-sectional area of 10mm or greater if required by Electricity Supply Board or Electro Technical Council of Ireland. This conductor may form part of a multicore cable, or it may be a separate conductor insulated for system voltage.

15.7 Fire Alarms:

Provide at least FOUR self-contained, interconnected fire alarms including: one ionising smoke detector alarm (on landing or in hall near bedrooms), two optical smoke detector alarms (one in living room and one in hall near kitchen) and one heat detector with alarm (in kitchen), located so that no door to a habitable room is more than 7.5m from the nearest smoke alarm (check drawings to verify whether or not four alarms will be sufficient and price for additional alarms where required). All smoke and fire alarms to be hard wired to consumer unit m.c.b. with continuous charge LITHIUM battery back-up and shall comply with I.S. 3218:1989 or subsequent standard if superseded.

Radon Barriers & Sumps

Blockwork:

All internal blockwork and the outer leaf of the external wall must be kept down 225mm from the D.P.C. level.

Door openings must be left out in the inner leaf of the external wall.

Hardcore:

Hardcore must be permeable to allow gases to pass freely towards the radon sump.

Hardcore should have 50mm of sand binding, and be kept down 200mm below the rising wall blockwork.

Sump:

A Sump should be laid centrally in the hardcore fill with its top tight against the Monarflex RMB 300 (or similar) Barrier or concrete slab; (1 sump to every 200m²). Openings should be left in blockwork foundations to allow soil gases to pass freely towards the sump (i.e. vertical mortar joint to be cleaned out every third block).

Sump Installation:

The sump has 4 No. 100mm diameter spigots, which are sited, at the bottom of the sump: If only one outlet pipe is required, you should cut off one end of cap and fit a standard straight connector. Then fit a 100mm diameter pipe from this connector to terminate either to external wall/footpath or through a service area to a vent tile at roof level.

Note: all pipework laid in hardcore fill should be laid as standard drainage details (i.e. 1-40 fall/towards sump).

Labelling:

All pipework above floor level should be 100mm diameter and solvent sealed with Radon indicator stickers at 1 metre centres.

Number of Sumps:

Sumps can be connected to each other in larger buildings but it is recommended that no more than 5 sumps should be fitted to one exhaust pipe.

Sand Blinding:

Radon Barriers must be laid on sand blinding in a continuous sheet over the complete floor area, and it must pass up over the inner leaf blockwork and out over the cavity as in standard cavity tray details and services passing through the barrier must be sealed.

Protection:

Blockwork can then be completed to D.P.C. level and care should be taken to prevent damage to the barrier during this procedure.

Barriers should then be protected immediately by laying the floor insulation directly on the barrier and place loose blocks to prevent insulation moving.

Remember - the performance of the Radon Barrier will only be effective if the membrane is effectively gas tight. Inadequate seams and poorly sealed service entries will allow radon gas into the completed building.

Suspended Concrete Floors:

In the case of suspended concrete floors the radon barrier, insulation and concrete screed shall be completed before the construction of any blockwork above DPC level, the integrity and state of the radon barrier and concrete screed shall be maintained in good condition throughout the entire construction process.

Exhaust pipes:

Exhaust pipes from radon sumps shall be located to the rear of dwellings in inconspicuous positions where they do not interfere with any other pipe or service or window or door opening. Radon exhaust pipes shall be continued from ground level up to a discharge point above eaves level and away from any opening and shall be terminated with a suitable insect, vermin and water proof cap.

Airtight Membrane

17.1 Airtight membrane

Airtight membranes complete with all necessary tapes fixings and seals to be installed strictly to manufacturer's instructions. The level of air tightness to be achieved is $4\text{m}^3/(\text{h.m}^2)$ at 50 Pa.

17.2 Services penetrations through floors

Contractor to note requirement for air tightness collars to be fitted to all pipes and services including soil vent pipes, sink wastes, pipes for radiators, incoming Eircom duct, incoming electricity supply, incoming gas supply etc. where they pass through the floor; that they are to be properly sealed at the junction between the pipe and concrete screed.

Contractor is to note that the buildings are to be airtight and the use of blower-door tests will be required on all houses to ensure same. At least 2no. air tightness tests will be required to be carried out for each house.

17.3 Blower Door Tests

Contractor is to note that the buildings are to be 'airtight' and as such the use of at least two number blower-door tests will be required on all houses to ensure same.

Blower door test no.1 is to be carried out for each house when the air-tightness membranes to roof, windows, door edges etc. are in place and when all first fix works are in place but not covered up. If the test result does not comply with the specification then the Contractor must carry out all work required to improve seals, membranes etc until compliance is achieved. An additional test will be required to show compliance before work proceeds further. All additional tests required to show compliance shall be at the Contractor's expense.

Another blower door test will be carried out on completion of all the works including snagging. The Contractor will be required to note the details of the air-tightness tests when each test is carried out. The Contractor shall have to remove the finishes, make good the damaged areas and carry out further air-tightness tests should the other air-tightness tests fail. In the event that any dwelling fails an air-tightness test all further tests and work required to remedy the cause of failure shall be at the expense of the Contractor.

All costs for tests are to be included in the contract amount, any costs not included will be at the Contractor's expense and will not be accepted as additional work and will not be recoverable under the contract.

Appendices

APPENDIX I

WATER SERVICES – TECHNICAL REQUIREMENTS

WATER SUPPLY

A formal application for a watermain connection to be submitted to Irish Water for approval; and a road opening licence to be submitted to Cavan County Council for approval. No work to commence on this proposed development until consent has been obtained in writing from Cavan County Council. Connection fees will be paid prior to commencement of any works on this development. The connection to the public watermain will be carried out by Irish Water/Cavan Co. Co. staff.

The developer is responsible for all aspects of design of the water supply system for the proposed development.

To ensure compliance with Irish Water's technical specifications and requirements, it is essential that the developer consult the technical staff of that department.

All watermains shall be a minimum of 100mm internal diameter and 12.5 Bar pressure rating, either MDPE or HDPE. Watermains to be laid with a minimum of 150mm pea gravel bedding surround material. In roads and footpaths where depth of crown is less than **1 meter**, suitable concrete surround is to be provided.

An approved marker tape containing a tracer wire should be laid in the backfill material approximately 300mm above the crown of the watermain.

All watermains, valves, stopcocks and fire hydrants to be located where possible in the public footpath or roadway with marker posts and plates included. Where watermains, valves etc. are not located in the public footpath or road, approval must be granted in writing from Cavan County Council.

Each house/unit shall be provided with an individual water connection incorporating meter and stopcock from the supply mains. The meters and stopcock are to be located such that the local authority has easy access to same at all times. It may be possible to locate some/all of the connections in a manifold type system located in a chamber box or in a special compartment within the external wall of the building with access being provided to Local Authority Staff to same.

The water service pipe for each house shall be *adopted* as far as the meter. The meter/stopcock is to be located immediately outside the boundary of each individual house. A separate additional stopcock shut off valve shall be fitted within each individual house.

Service connections to be UPVC self tapping saddles with PVC push fit, fusion or compression fittings.

All water service connections shall incorporate a watertight Meter Box system capable of supporting a 5 ton wheel load. The Meter Box system shall be located in the footpath, in so far as possible and shall include a shut off device and the facility to meet the requirements for automatic meter reading installation. **Minimum cover to service line to be 600mm at all points.** Sluice valves should be provided such that houses can be isolated in groups of not more than 40 houses and should comply with the requirements of BS 5163. The depth of the sluice valve spindle cap below finished ground level should not exceed 300mm. Sluice and scour valves shall be anti-clockwise – closing.

Hydrants should be provided such that no house is more than 40 meters from a hydrant. Hydrants should be of a Screw Down type fitting in compliance with the requirements of BS 750. Hydrant outlets should comply with the Chief Fire Officers requirements. The depth of the hydrant outlet below finished ground level should not exceed 200mm. Hydrants are to be clockwise closing.

Air valves to be in compliance with the requirements of BS 5159 and to be installed at all high points within the watermain network. Double air valves are required to be installed on all watermains by Cavan County Council. Size of valves are to be as follows:

4” main – 63mm air valve

6” main – 100mm air valve

An approved bulk-recording meter with associated kiosk to be provided. The meter shall be installed in a chamber on the supply pipeline to the scheme. The chamber will be located in a non traffic area in the vicinity of the entrance to the site from public road. Sluice valves will be provided by the applicant prior to work commencing on the connection to be placed upstream and downstream of the meter.

The location of hydrants, air valves, sluice valves and changes of direction should be indicated by marker plates positioned to the approval of Irish Water. Marker plates to be in compliance with BS 3251. Marker plates shall show valve type, pipe size and distance of marker post to pipe.

Interconnection and looping of mains be provided to eliminate any occurrence of dead ends.

Design, installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages to be carried out in strict compliance with BS 6700.

All new watermains to be tested to the satisfaction of Irish Water. Applicant to give written notice to Irish Water prior to the test being carried out.

Sterilisation of mains: On completion of the final test, pipelines should be thoroughly flush-out. The system should be sterilised in sections, by allowing water containing at least 10 parts per million,

residual chlorine to stand in the mains and service pipes, for at least two hours. The system should again be thoroughly flushed-out, on completion of sterilisation. Care should be exercised in flushing out the sterilised water mains, that the draining liquid does not cause environmental damage.

Detailed accurate “As Constructed” drawings to an approved scale indicating location, type and size of all water mains, hydrants, sluice valves and private house connections to be prepared in auto-cad format or map-info. Drawings to be completed within 3 months of substantial completion of the works and certified copies shall be retained by the developer / applicant for inspection by Cavan County Council on request. These “as constructed” drawings will be required by the Local Authority in the event of “taking in charge” by the Local Authority of services associated with this development in the future.

All works to be carried out in strict compliance with the “Recommendations for Site Development Works for Housing Areas, November 1998”.

If directional drilling is to be used as method of construction for laying water mains pipe specification is to be PE 100 HDPE

FOUL SEWERAGE

A formal application for a foul sewer connection to be submitted to Irish Water for approval; and a road opening licence to be submitted to Cavan County Council for approval. No work to commence on this proposed development until consent has been obtained in writing from Irish Water.

The developer is responsible for all aspects of the design of the sewerage system.

To ensure compliance with the Irish Water technical specifications and requirements, it is essential that the developer consult the technical staff of Irish Water.

The developer shall provide separate foul and surface water sewerage collection and discharge systems.

Domestic Foul and waste drainage from culinary and sanitary appliances only to be connected to public sewer.

All discharge of surface water from roads, yards or roofs to be collected into a separate surface water collection system.

All new foul sewers to be laid using PVC-U, GRP, Vitrified Clay or S&S concrete, pipes and fittings, in accordance with the requirements of IS 424. Should the contractor / developer wish to use pipe materials other than those described above he/she must first obtain the approval of Cavan County Council.

All foul sewer pipelines and manholes to be located where possible in the public spaces i.e. roadway, footpath or open green areas. Manholes and sewers should be sited with due regard to

public utility services. Sewers should be accessible for maintenance, repair, surveying and inspection. Where foul pipelines and manholes are not located in the public road, footpath or open green areas, approval must be granted in writing from Cavan County Council & Irish Water.

When laid in public roads or areas likely to become public roads the outside of the sewer should be laid in the vehicle carriageway (not footpath) and be at least 1.5m from the kerb line. The outside of manholes should be at least 1.0m from the kerb line.

All new foul sewers to be laid in roads, footpaths, car parks, any traffic area or within 600mm of road edge are to be laid in accordance with B.S. 8005: Part 1, BS 8301 and the *Specification for Roadworks*. All foul sewers to be laid with a minimum of 150mm depth of pea gravel bedding and surround material. Pipeline trench to be backfilled with well-compacted granular material conforming to clause 804 to finished ground level. Where the depth of cover from the surface to the crown of the pipe is less than 1.0m, concrete surround to be provided all to the approval of Cavan County Council. Concrete to be used is “Foam Crete” or similar approved of 3N/mm² compressive strength. If pipelines are to be laid in green areas, suitable backfill material may be used in lieu of Clause 804 to finished ground level. Note: Selected fill material generally shall be made up of broken stone or clay matter. It shall be free from stones larger than 37.5mm, lumps of clay over 75mm, timber, frozen material, vegetable matter, and rubbish or building rubble or any other undesirable material

Rising mains should be laid in straight lines. Where bends are used, they should be preformed and securely anchored with thrust blocks, if above 35°.

The route of a cross-country rising main should be marked at every field boundary and where practicable at every change of direction by approved marker posts. The letters “RM (S)”, the distance from the marker post to the pipe and the depth to the top of the pipe in meters should be marked. Colour of marker post to be red.

For non metal rising mains an approved non-degradable marker tape containing a tracer wire should be laid in the backfill material approximately 300mm above the crown of the rising main. The trace wire should be brought to the surface at every marker post.

The developer shall not build or place any structure, plant, temporary structures, over or within 10 meters (5 meters either side of pipe), measured horizontally from the centreline of any sewer (or such other distance that the Local Authority may deem reasonable) where the depth from ground level to invert is less than 3m. In circumstances of large diameter sewers, greater depth, usual ground conditions profile or material, the distance required by Cavan Co Co/Irish Water may be greater.

Pipe Sizing and Gradients: Pipes carrying foul water should be designed to accommodate six times average foul water flow. Average flow should be taken as 600 litres per dwelling per day. Gradients should be selected so as to maintain self-cleansing velocity under normal discharge conditions.

Twice the average daily flow can be used as the criterion for the self-cleansing velocity. Subject to Table 2.1, all pipework should be laid at gradients that would produce velocities lying in the range of 0.75m/sec to 3m/sec, when flowing half full.

TABLE 2.1 Pipe sizes and Gradients- Foul Water

No. Of Dwellings contributing	Minimum Pipe Diameter (mm)	Minimum Gradient
1	100	1 in 60
2	150	1 in 80
3 or more	150	1 in 150

Subject to the limitations imposed by the foregoing, pipe sizes and gradients should be selected from approved tables for the hydraulic design of pipework.

The width of the trenches shall comply with the following table up to a minimum of 300mm above the top of the pipe barrel. Battering the sides to the trenches shall be permitted only above this level and where approved.

Table 2.2 Trench Width

Nominal Internal Diameter of Pipe mm	Minimum Trench Width mm	Maximum Trench Width mm
100	430	630
150	490	690
225	580	780
300	680	880
375	950	1150
450	1030	1230
525	1120	1320
600	1240	1440
675	1330	1530
750	1400	1600
825	1490	1690
900	1920	2120
1050	2100	2300
1200	2290	2490

Above 1200	Outside Diameter of pipe plus 800 mm	Outside Diameter of pipe plus 1000 mm
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Trench compaction: sidefill of granular material or selected fill, should be placed uniformly on either side of the pipe, in layers not exceeding 100mm, each layer being compacted by hand tamping until the pipe has a minimum of 150mm compacted cover. Care should be taken that the process of compaction does not displace the pipe from its correct line and level. Backfill should be placed in layers not exceeding 300mm, each layer then being well compacted, Mechanical compaction equipment should not be used until there is a minimum of 150mm compacted material above the crown of the pipe.

A manhole is required to provide access to sewers and drains and shall be provided at maximum intervals of 90m and in the following positions

At all changes of direction.

At all changes of gradient.

At the head of all sewer and drain lengths.

At all changes in pipe diameter

At every junction of 2 or more public sewers

At every junction of a public sewer with a private sewer

At the point of connection of a branch drain with a main drain or sewer, or on the branch drain within 12m of such connection.

The connections of drains to trunk sewers should be made in such a manner as to minimise any interruption of the flow, by one of the following methods:

Where there is an adjacent manhole, the connection should be made at the manhole.

Where there is not an adjacent manhole, it may be necessary to construct a new manhole.

When connecting directly to a sewer or a drain, an oblique or curved square junction pipe inserted in the main may be used.

As an alternative to method 3, an oblique type saddle may be used. Saddles should not be used on pipes of 100mm diameter, nor to connect pipes of the same diameter.

In the case of methods 3 and 4, an approved slow bend may be used in the drain, immediately upstream of the connection.

All pipes should have flexible joints formed by a method recommended by the pipe manufacturer. Elastomeric sealing rings, complying with the requirements of BS 2494, type D, should be used

Each house/unit shall be provided with an individual sewerage connection directly to the collection sewer line. The size of the foul sewer service connection from each unit to collection pipelines shall be 100mm diameter. Connection to the collection pipelines shall be made during the laying of the sewer using oblique 45° branches (90° are not to be used). The individual service connection pipes shall not be adopted by Cavan County Council. The developer shall provide sufficient inspection

chambers and rodding locations (AJ or inspection chambers) on the service line prior to connection to the collection sewer line on the service lines

Individual foul sewer connections for each dwelling unit, to the foul sewer collection pipeline shall not be permitted to be laid in part of an adjoining site/private property. Pipeline foul sewer trunk sections are to be extended as appropriate in order to comply with this requirement.

A suitable grease trap shall be installed on the foul drain service pipe and certification shall be provided to the Water Services Department from the Supplier that the unit will provide treatment to the required standard (Ref. E.P.A. Wastewater Treatment and Manual).

The minimum size of gravity sewer that will be adopted is 150mm nominal internal diameter. All manholes shall be constructed generally to details as per attached drawings in appendix 1.

Manholes should be durable, resistant to water penetration, resistant to leakage and should be designed and constructed to minimise the risk of blockage. Concrete surround shall be provided with a minimum of 150mm of “Foam Crete” (or similar other) to manholes within public roads. Manholes shall be constructed using precast concrete units in compliance with the requirements of BS 5911: Part 200. Should the contractor/developer wish to construct manholes in any other type of material he/she must first obtain the approval of Cavan County Council. All precast concrete manholes to be a minimum of 1200mm diameter.

Dimensions of storm and foul sewer manholes shall comply with the specification, details and sizes as indicated in WRC publication “Sewers for Adoption 5th edition” except as to table below and to local authority approval as follows

Table 2.2 Manhole Sizes

Diameter of largest pipe in manhole (mm)	Internal diameter of manhole (mm)
Less than 375	1200
375-450	1350
500-700	1500
750-900	1800
>900	Consult Water Services Department

Step Irons should be provided in manholes of between 1 metre and 4.5 metres in depth. Manhole steps should comply with the requirements of BS 1247: Part 1. (i.e. plastic coated galvanised) Ladders should be used, instead of step irons for manholes in excess of 4.5 metres depth. Access ladders should be fabricated from steel complying with the requirements of IS EN 10113 and (i.e. plastic coated galvanised)

Manhole Covers & Frames: All manhole covers situated in public property, or property likely to become public at a latter date to comply with Standard IS EN 124: 1994 and loading class D400. The minimum opening dimensions should be 675mm x 675mm (rectangular), or 675mm diameter (circular). The appropriate class of cover and frame that should be used in various locations is given in table below.

Table 2.3 Manhole Covers and Frames

*Class	Location
Class D 400 (lockable)	Roadways, hard shoulders, vehicular accesses, footways
Class B 125 (lockable)	Grass verges
Class A 15 (lockable)	Areas inaccessible to motor vehicles

Ref: IS EN 124

Where manholes are to be constructed in open spaces or gardens, covers are to be lockable Class B 125 (medium duty).

Testing of Sewers & Drains: On completion of works all foul sewer pipelines shall be tested by means of an Air Test as follows:

Air should be pumped into the section of sewer or drain under test, until a pressure of 100mm of water is indicated on a U-tube manometer connected to the system. The pipeline should stand for a period of five minutes, to permit air pressure stabilisation, before commencing the test proper. Care should be taken that temperature changes of the air in the pipe during the test, do not distort the test results. The air pressure should not fall to less than 75mm head of water during the test period of five minutes, without further pumping. Failure to pass an air test should not be taken as conclusive. When failure occurs, a water test maybe undertaken. Acceptance or rejection of the line under test could be based on the results of this water test.

Manhole Infiltration: Infiltration tests should be carried out on manholes after backfilling, when the ground water adjacent to the manhole is at its highest level. The maximum infiltration should not exceed one litre per hour, per square metre of internal surface area of the whole of the manhole. Notwithstanding this requirement, any visible leaks should be repaired.

Cleaning of Sewers & Drains: At the time of completion of the development works, the developer should ensure, to the satisfaction of the local authority, that all sewers and drains within the site are clean and free from obstructions. All material to be removed from the most downstream manhole prior to discharge to the public mains sewerage pipeline disposed of in an appropriate manner. The local authorities may require the developer to provide sewer condition surveys, by approved contractors, which include internal inspections using closed circuit television equipment. The results may be recorded on diskette, tape or compact disk.

All sanitary facilities shall be completed in compliance with the 1997 building regulations technical guidance document part H.

All toilets, wash hand basins, culinary and sanitary appliances etc. to be connected to the foul sewerage collection system.

Cavan County Council must be granted right of access at all times to all foul sewer pipelines and manholes within the proposed development.

Detailed accurate “As Constructed” drawings to an approved scale indicating location, type and size of all foul sewerage pipelines, manholes and private house connections to be prepared in auto-cad format. Drawings to be completed within 3 months of substantial completion of the works and certified copies shall be retained by the developer/applicant for inspection by Cavan County Council on request. These “as constructed” drawings will be required by the Local Authority in the event of “taking in charge” by the Local Authority of services associated with this development in the future.

The Applicant / Developer shall carry out a CCTV survey of all foul sewerage pipelines within the development upon substantial completion of the works. The Applicant / Developer to retain the CCTV survey for submission to Cavan County Council on request if the development is to be taken in charge by the Local Authority. The CCTV survey shall confirm to the standards as set out in the WRC Manual on Sewer Condition Classification.

SURFACE WATER SEWERAGE:

A formal application for a storm sewer connection and a road opening licence to be submitted to Cavan County Council for approval. No work to commence on this proposed development until consent has been obtained in writing from Cavan County Council. Connection fees will be paid prior to any commencement of works on the proposed development. The connection to the public storm sewer to be carried out under the strict supervision of Cavan County Council Engineering staff.

The developer is responsible for all aspects of the design of the storm water system.

To ensure compliance with the Water Services Department technical specifications and requirements, it is essential that the developer consult the technical staff of that department. The Water Services Department telephone number is 047 30504

The developer shall provide separate foul and surface water sewerage collection and discharge systems.

Domestic Foul and waste drainage from culinary and sanitary appliances only to be connected to public sewer.

All discharge of surface water from roads, yards or roofs to be collected into a separate surface water collection system.

No discharge of surface water from roads yards or roofs to be allowed to discharge onto the public roadway, footpath or adjacent property. All such possible risk of flooding must be taken into consideration in this development and measures taken to prevent this from occurring.

All new storm sewers to be laid using PVC-U, GRP, Vitrified Clay or S&S concrete, pipes and fittings, in accordance with the requirements of IS 424. Should the contractor / developer wish to use pipe materials other than those described above he/she must first obtain the approval of Cavan County Council.

All storm sewer pipelines and manholes to be located where possible in the public spaces i.e. roadway, footpath or open green areas. Manholes and sewers should be sited with due regard to public utility services. Sewers should be accessible for maintenance, repair, surveying and inspection. Where storm pipelines and manholes are not located in the public road, footpath or open green areas, approval must be granted in writing from Cavan County Council

When laid in public roads or areas likely to become public roads the outside of the sewer should be laid in the vehicle carriageway (not footpath) and be at least 1.5m from the kerb line. The outside of manholes should be at least 1.0m from the kerb line.

All new storm sewers to be laid in roads, footpaths, car parks, any traffic area or within 600mm of road edge are to be laid in accordance with B.S. 8005: Part 1, BS 8301 and the *Specification for Roadworks*. All storm sewers to be laid with a minimum of 150mm depth of pea gravel bedding and surround material. Pipeline trench to be backfilled with well-compacted granular material conforming to clause 804 to finished ground level. Where the depth of cover from the surface to the crown of the pipe is less than 1.0m, concrete surround to be provided all to the approval of Cavan County Council. Concrete to be used is "Foam Crete" or similar approved of 3N/mm² compressive strength. If pipelines are to be laid in green areas, suitable backfill material may be used in lieu of Clause 804 to finished ground level. Note: Selected fill material generally shall be made up of broken stone or clay matter. It shall be free from stones larger than 37.5mm, lumps of clay over 75mm, timber, frozen material, vegetable matter, and rubbish or building rubble or any other undesirable material

The developer shall not build or place any structure, plant, temporary structures, over or within 10 meters (5 meters either side of pipe), measured horizontally from the centreline of any sewer (or such other distance that the Local Authority may deem reasonable) where the depth from ground level to invert is less than 3m. In circumstances of large diameter sewers, greater depth, usual ground conditions profile or material, the distance required by Cavan County Council may be greater.

Pipe Sizing and Gradients: Pipes carrying storm water should be designed in accordance with Modified Rational Method (Wallingford Procedure). (See Appendix 2 for further information). The minimum size of storm water sewer pipe to be laid from an individual dwelling to the collection system is to be 150mm, and within any part of the collection system is 225mm. Gradients should be selected so as to maintain self-cleansing velocity under normal discharge conditions. Subject to Table 2.1, all pipework should be laid at gradients that would produce velocities lying in the range of 0.75m/sec to 3m/sec, when flowing half full.

TABLE 2.1 Pipe sizes and Gradients- Foul Water

No. Of Dwellings contributing	Minimum Pipe Diameter (mm)	Minimum Gradient
1	150	1 in 60
2	225	1 in 80
3 or more	225	1 in 150

Subject to the limitations imposed by the foregoing, pipe sizes and gradients should be selected from approved tables for the hydraulic design of pipework.

The width of the trenches shall comply with the following table up to a minimum of 300mm above the top of the pipe barrel. Battering the sides to the trenches shall be permitted only above this level and where approved.

Table 2.2 Trench Width

Nominal Internal Diameter of Pipe mm	Minimum Trench Width mm	Maximum Trench Width mm
100	430	630
150	490	690
225	580	780
300	680	880
375	950	1150
450	1030	1230
525	1120	1320
600	1240	1440
675	1330	1530
750	1400	1600
825	1490	1690
900	1920	2120
1050	2100	2300
1200	2290	2490
Above 1200	Outside Diameter of pipe plus 800 mm	Outside Diameter of pipe plus 1000 mm

Trench compaction: sidefill of granular material or selected fill, should be placed uniformly on either side of the pipe, in layers not exceeding 100mm, each layer being compacted by hand tamping until the pipe has a minimum of 150mm compacted cover. Care should be taken that the process of compaction does not displace the pipe from its correct line and level. Backfill should be placed in layers not exceeding 300mm, each layer then being well compacted, Mechanical compaction equipment should not be used until there is a minimum of 150mm compacted material above the crown of the pipe.

A manhole is required to provide access to sewers and drains and shall be provided at maximum intervals of 90m and in the following positions

At all changes of direction.

At all changes of gradient.

At the head of all sewer and drain lengths.

At all changes in pipe diameter

At every junction of 2 or more public sewers

At every junction of a public sewer with a private sewer

At the point of connection of a branch drain with a main drain or sewer, or on the branch drain within 12m of such connection.

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The connections of drains to trunk storm sewers should be made in such a manner as to minimise any interruption of the flow, by one of the following methods:

Where there is an adjacent manhole, the connection should be made at the manhole.

Where there is not an adjacent manhole, it may be necessary to construct a new manhole.

When connecting directly to a sewer or a drain, an oblique or curved square junction pipe inserted in the main may be used.

As an alternative to method 3, an oblique type saddle may be used. Saddles should not be used on pipes of 100mm diameter, nor to connect pipes of the same diameter.

In the case of methods 3 and 4, an approved slow bend may be used in the drain, immediately upstream of the connection.

All pipes should have flexible joints formed by a method recommended by the pipe manufacturer. Elastomeric sealing rings, complying with the requirements of BS 2494, type D, should be used

Each house/unit shall be provided with an individual storm water connection directly to the collection storm sewer line. The size of the storm sewer service connection from each unit to collection pipelines shall be 150mm diameter. Connection to the collection pipelines shall be made during the laying of the sewer using oblique 45° branches (90° are not to be used). The individual service connection pipes shall not be adopted by Cavan County Council. The developer shall provide sufficient inspection chambers and rodding locations (AJ or inspection chambers) on the service line prior to connection to the collection sewer line on the service lines

Individual storm sewer connections for each dwelling unit, to the storm sewer collection pipeline shall not be permitted to be laid in part of an adjoining site/private property. Pipeline storm sewer trunk sections are to be extended as appropriate in order to comply with this requirement.

The minimum size of gravity storm sewer that will be adopted is 225mm nominal internal diameter.

Gullies are required for the collection of surface water from roofs and impervious areas. They should be provided for impervious or paved areas at a minimum rate of one gully per 200m². Gullies for the drainage of roadways and large paved areas should be precast concrete complying with the requirements of BS 5911: Part 230.

All manholes shall be constructed generally to details as per attached drawings in appendix 1.

Manholes should be durable, resistant to water penetration, resistant to leakage and should be designed and constructed to minimise the risk of blockage. Concrete surround shall be provided with a minimum of 150mm of "Foam Crete" (or similar other) to manholes within public roads. Manholes shall be constructed using precast concrete units in compliance with the requirements of BS 5911: Part 200. Should the contractor/developer wish to construct manholes in any other type of

material he/she must first obtain the approval of Cavan County Council. All precast concrete manholes to be a minimum of 1200mm diameter.

Dimensions of storm and foul sewer manholes shall comply with the specification, details and sizes as indicated in WRC publication “Sewers for Adoption 5th edition” except as to table below and to local authority approval as follows

Table 2.2 Manhole Sizes

Diameter of largest pipe in manhole (mm)	Internal diameter of manhole (mm)
Less than 375	1200
375-450	1350
500-700	1500
750-900	1800
>900	Consult Water Services Department

Step Irons should be provided in manholes of between 1 metre and 4.5 metres in depth. Manhole steps should comply with the requirements of BS 1247: Part 1. (i.e. plastic coated galvanised) Ladders should be used, instead of step irons for manholes in excess of 4.5 metres depth. Access ladders should be fabricated from steel complying with the requirements of IS EN 10113 and (i.e. plastic coated galvanised)

Manhole Covers & Frames: All manhole covers situated in public property, or property likely to become public at a latter date to comply with Standard IS EN 124: 1994 and loading class D400. The minimum opening dimensions should be 675mm x 675mm (rectangular), or 675mm diameter (circular). The appropriate class of cover and frame that should be used in various locations is given in table below.

Table 2.3 Manhole Covers and Frames

*Class	Location
Class D 400 (lockable)	Roadways, hard shoulders, vehicular accesses, footways
Class B 125 (lockable)	Grass verges
Class A 15 (lockable)	Areas inaccessible to motor vehicles

*Ref: IS EN 124

Where manholes are to be constructed in open spaces or gardens, covers are to be lockable Class B 125 (medium duty).

Testing of Sewers & Drains: On completion of works all storm sewer pipelines shall be tested by means of an Air Test as follows:

Air should be pumped into the section of sewer or drain under test, until a pressure of 100mm of water is indicated on a U-tube manometer connected to the system. The pipeline should stand for a period of five minutes, to permit air pressure stabilisation, before commencing the test proper. Care should be taken that temperature changes of the air in the pipe during the test, do not distort the test results. The air pressure should not fall to less than 75mm head of water during the test period of five minutes, without further pumping. Failure to pass an air test should not be taken as conclusive. When failure occurs, a water test may be undertaken. Acceptance or rejection of the line under test could be based on the results of this water test.

Manhole Infiltration: Infiltration tests should be carried out on manholes after backfilling, when the ground water adjacent to the manhole is at its highest level. The maximum infiltration should not exceed one litre per hour, per square metre of internal surface area of the whole of the manhole. Notwithstanding this requirement, any visible leaks should be repaired.

Cleaning of Sewers & Drains: At the time of completion of the development works, the developer should ensure, to the satisfaction of the local authority, that all sewers and drains within the site are clean and free from obstructions. All material to be removed from the most downstream manhole prior to discharge to the public mains sewerage pipeline disposed of in an appropriate manner. The local authorities may require the developer to provide sewer condition surveys, by approved contractors, which include internal inspections using closed circuit television equipment. The results may be recorded on diskette, tape or compact disk.

Cavan County Council must be granted right of access at all times to all storm sewer pipelines and manholes within the proposed development.

Detailed accurate “As Constructed” drawings to an approved scale indicating location, type and size of all storm sewerage pipelines, manholes and private house connections to be prepared in auto-cad format. Drawings to be completed within 3 months of substantial completion of the works and certified copies shall be retained by the developer/applicant for inspection by Cavan County Council on request. These “as constructed” drawings will be required by the Local Authority in the event of “taking in charge” by the Local Authority of services associated with this development in the future.

The Applicant / Developer shall carry out a CCTV survey of all foul sewerage pipelines within the development upon substantial completion of the works. The Applicant / Developer to retain the CCTV survey for submission to Cavan County Council on request if the development is to be taken in charge by the Local Authority. The CCTV survey shall confirm to the standards as set out in the WRC Manual on Sewer Condition Classification.

Gullies are required for the collection of surface water from roofs and impervious areas. They should be provided for impervious or paved areas at a minimum rate of two gullies per 200m². Gullies for the drainage of roadways and large paved areas should be precast concrete complying with the requirements of BS 5911: Part 230.

No discharge of surface water from roads yards or roofs to be allowed to discharge onto the public roadway, footpath or adjacent property. All such possible risk of flooding must be taken into consideration in this development and measures taken to prevent this from occurring.