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Scoil Mhuire, Brierhill - Enclosure and Upgrade of External Link Corridor / Walkway

Civil and Structural Specification

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1.0 General

The Structural Works shall be executed in accordance with the Engineer's drawings and Specification. Unless specifically stated all materials and workmanship shall comply with the latest edition of the relevant Eurocode (see appendix A), Irish and British Standard. The Contractors shall examine all construction drawings and report any discrepancies, dimensional anomalies or any other technical questions in good time before the execution of the works. All works shall be carried out in accordance with the requirements of the Health and Safety Authority.

The following materials shall not be used:

- Sea dredged aggregates
- High alumina cement
- Calcium chloride
- Woodwool permanent formers
- Asbestos

2.0 Temporary Works

The Contractor shall have sole responsibility for the design and installation of all temporary works. Detailed proposals for temporary works, together with a method statement, shall be submitted to the Engineer, prior to commencement. Comments made by the Engineer (if any) shall not relieve the Contractor from his sole responsibility for temporary works. The Contractor's attention is drawn to the need to support elements of the existing structure prior to the installation of new load bearing elements. It must be anticipated that vertical temporary supports will be required, together with suitable lateral stays or cross-bracing in two directions, at right angles on plan at each floor level. Temporary supports shall be wedged in place to avoid settlement on load transfer.

Where existing walls are to be supported in a temporary condition the following criteria shall apply: -

Wind Loading	-	IS EN 1991-1-4:2005
plus Lateral Loading	-	5% of dead load
plus Eccentricity Loading		
Max. Deflection	-	H/600 overall or in any storey height, unless otherwise agreed by the Engineer.

All faces of excavations shall be fully strutted during the works, and all excavations shall be dewatered as necessary. All fine material shall be retained in position by use of sheeting and a filter membrane.

3.0 Inspection of Works

The Engineer shall be informed 24 hours prior to existing structures and new foundations being exposed, to permit inspections to be carried out. A similar period shall apply to all reinforced concrete, prior to placing of the concrete and new steelwork prior to placing of the fire protection. On completion the Contractor shall notify the Engineer who will carry out a final inspection prior to the

issue of the Certificate of Practical Completion by the Supervising Officer. A further inspection shall be carried out at the expiry of the defects liability period.

4.0 Cost Control

The works shall be carried out in accordance with the drawings and specifications and shall be valued in accordance with the terms of the contract. If in the Contractor's opinion, the nature or the scope of the structural works is likely to attract additional costs, the variation must be sanctioned by the Engineer or Supervising Officer prior to execution of the works concerned. If any additional quantities of material are used, the physical measurements must be agreed on site prior to the works being covered up. The Engineer's agreement to additional quantities does not necessarily imply an agreement to additional payment, since all works must be valued in accordance with the contract.

5.0 Health & Safety

The Contractor shall comply with all enactments, regulations, and working rules relating to the safety, health and welfare of workpeople and other persons authorised to be on the site. The site shall be kept tidy and clean at all times and safety helmets shall be provided for the use of all visitors.

The Contractor shall ensure that no damage beyond fair wear and tear is caused to public or private roads and footpaths by site traffic and that they shall be kept clean.

6.0 Tolerances

Unless otherwise stated the constructional tolerances shall be no greater than listed below.

a) Position on Plan

± 10mm for superstructure and ground beams, relative to building grid lines.

± 35mm for foundations, relative to building grid lines.

b) Verticality

Plumbness in height of:

Up to and including 1.5m	:	± 5mm
1.5m to 4.0m	:	± 15mm
Over 4.0m	:	± 20mm

c) **Level**

Deviation from the specified level of the upper or lower surface of any element, from the nearest T.B.M. $\pm 10\text{mm}$.

d) **Cross Section of Site Constructed Members**

Dimensions of beams, slabs, columns, piers and walls:

Up to and including 500mm $+ 5\text{mm}$ over 500mm $+ 1\%$.

Please note that tolerances cannot be cumulative for the purpose of this specification. The above tolerances are to be regarded as the maximum permitted by the Structural Engineer for general purposes. However, the Contractor must allow for closer tolerances if required for the purposes of items specified by the Architect, Service Engineer, or for any building component.

7.0 Demolition

The extent of demolition is to be as defined by the information shown on the Architect's and Engineer's drawings.

Demolition work should only be undertaken by persons competent and experienced in such work and should be carried out in accordance with IS EN 1991:1:6:2005.

Access to the site and facilities for loading and unloading are to be agreed with the Local Authority. The Contractor is to take proper precautions for the prevention of nuisance arising from dust or excessive noise.

Prior to the commencement of the structural demolition, it is the responsibility of the Contractor to ascertain that all services have been terminated.

Where demolition and clearance of structure is adjacent to or integral with areas of structure which are to be retained, this shall be carried out in such a manner as will avoid damage to the structure remaining.

The Contractor shall include for all necessary needling, shoring and strutting to adjacent structures likely to be affected by the operations.

8.0 Underpinning Works

Excavation for underpinning is to be carried out with care and must not damage or disturb the existing footings. Sides of excavations are to be vertical and square with propping and boarding installed to maintain the stability of the adjoining ground. Boarding and propping is to be installed below the existing foundation where necessary to avoid disturbance thereto.

Underpinning is to be executed strictly in accordance with the sequence shown on the drawings, with not less than seven days lapsing between adjacent stages if sulphate resisting cement is used, or three days if rapid hardening sulphate resisting cement is used.

Excavation and construction of underpinning (including dry packing) is to be completed at each numbered stage prior to commencing work on the next section in the sequence.

The width of underpinning is to be no less than that of the existing foundation and is to be cast in bays not exceeding 1200mm in length. The head of each bay of underpinning is to be dry packed using 1:3 sharp sand and cement rammed in not earlier than 24 hours after the concrete has been cast to provide a dense, uniform and unvoided bearing surface.

Backfilling of excavations is to be executed in accordance with Section 11 of this Specification.

The Contractor is to take precautions to control noise.

9.0 Foundation Works

9.1 Excavation

All excavations shall be clean, accurately dug and adequately supported. All excavations shall be cleaned out for inspection and the Contractor shall provide the Engineer every facility to carry out such inspections in a safe manner.

The ground below new formation level must not be disturbed and excavations are to remain open for as short a period as possible. The adequacy of the formation for bearing purposes will be dictated by the Engineer and the Contractor shall await decisions by the Engineer where necessary.

Where temporary props are proposed to be cast in the works, they shall consist of pre-cast concrete, steel or other rot-proof material and shall be subject to the approval of the Engineer.

9.2 Dewatering

The Contractor shall provide, maintain and operate suitable pumping equipment and plant and shall, if necessary, construct such drains and sumps etc., as may be required to remove water from the excavations or prevent entry thereto. Water in the excavations shall be dealt with in such a manner so as to prevent the deterioration of the surface on which foundations or other work will be constructed. Suitable filters shall be provided to ensure that significant quantities of fine material are not removed from the soil.

9.3 Existing Foundations

Excavations shall be taken no deeper than the underside of adjacent existing foundations or new foundations already installed unless specifically instructed in writing by the Engineer. Operations adjacent to the site boundary must be carried out in compliance with all party wall agreements.

Existing foundations shall not be cut into or damaged during the course of the works unless specifically directed by the Engineer.

New foundations cast directly against adjoining foundations shall be separated by compressible filler board.

9.4 Foundation Construction

Foundations shall be constructed in accordance with the requirements of IS EN 1997-1:2005. Unless detailed otherwise, pad and strip foundations shall be founded at 1.0 metres below the proposed external ground level.

On sloping sites, strip foundations shall be on a horizontal bearing, stepped where necessary to maintain adequate depth.

The concrete mix shall be as specified in Section 12 (Reinforced and Plain concrete). Any steelwork below ground level shall be encased in a minimum of 100 mm concrete with a layer of D49 fabric reinforcement 50mm from the face of casing.

10.0 Waterproofing

Waterproofing materials shall be applied and jointed in areas indicated on the drawings strictly in accordance with the manufacturer's recommendations. Once a water bar or membrane has been laid, it shall be protected by the Contractor, and made good if any damage occurs. All surfaces must be thoroughly cleaned prior to the placing of membranes or application of liquid sealants. All concrete shall be placed continuously between the joints, pre-determined and agreed with the Engineer.

The joints are to be constructed so as to achieve full continuity and complete water tightness. Damp proof courses shall be provided in all masonry walls at a level of 150mm above the external ground level.

11.0 Fill Material

All fill material shall be subject to the approval of the Engineer. Generally, fill shall be a granular graded material free from timber, rubbish, plaster and other deleterious matter. The maximum particle size shall pass through a 100mm ring and shall be compacted in layers not exceeding 225mm by suitable mechanical rollers or rammers. The compaction is to be in accordance with clause 612 of the Manual of Contract Documents for Highway Works Volume 1 Specification for Highway Works 1991. The Contractor shall submit material samples and appropriate test certificates to the Engineer for approval prior to placement of the fill, and shall also provide a method statement for compaction. Any sand or gravel arising from excavations cannot be assumed to be suitable for use as fill unless specifically authorised by the Engineer. Where suitable it is to be laid at a moisture content close to its natural moisture content. The use of clay as a fill material will not be permitted.

12.0 Reinforced and Plain Concrete

12.1 General

All materials, workmanship and tests (where required) shall comply with the appropriate Eurocode, the Irish and British Standards, and this specification - all in accordance with the Contract. The use of additives or other chemicals is generally not permitted unless specific approval is obtained from the Engineer in writing.

12.2 Cement

Cement shall comply with IS EN 197-1:2011. Cement should be stored in moisture proof conditions. Care should be taken that cement is used rotationally and that no cement is stores too long. The use of high alumina cement or concrete is prohibited.

12.3 Aggregates

Aggregates shall not be used containing materials that are deleteriously reactive with alkalis in cement in an amount sufficient to cause excessive and damaging expansion of mortar or concrete. In particular, aggregates are to comply with the conditions of IS EN 12620:2002 and IS EN 13055-1:2002. Sea dredged aggregates shall not be used.

12.4 Reinforcement

Reinforcement is to be bent, supplied and fixed in accordance with BS 4449:2005+A2:2009, BS 4449:2005+A2:2009, BS 4482:2005, or BS 4483:2005, IS EN 1992-1-1:2005 and I.S. EN ISO 15630-1:2010

12.5 Formwork

All formwork and its supports shall be sufficiently strong and rigid to carry and maintain the concrete for construction traffic, so that the shape of the completed structure is as shown on the drawings. All formwork shall be sufficiently rigid and tight to prevent loss of grout from the concrete.

Props must be placed vertically over other props or onto surfaces sufficiently strong to carry the load without causing unacceptable deflection, damage or ground movement. Minimum striking times are to be in accordance with IS EN 1992-1-1:2005.

12.6 Mixing Concrete

Concrete shall comply with IS EN 1992-1-1:2005.

The concrete shall be mixed in machines for at least two minutes, but not less than that recommended by the manufacturer of the mixer.

The quantities of cement and aggregates shall be measured by weight and every mixing machine shall be equipped with an accurate measuring device for water. Water is not to be added after the concrete has left the mixer.

Where ready mixed concrete is proposed, details of the supplier must be submitted to the Engineer and approval obtained prior to commencing concrete work on site.

Concrete mix design sheets are to be submitted by the Contractor prior to commencing work and the slump of each mix is to be detailed. In the case of pre-packed dry mixes, the supplier's name is to be stated.

Minimum cement contents are to be in accordance with the following table:

Note: The maximum cement content of 550 kg/m³ must not be exceeded.

Mix Ref.	Grade	Normal Maximum Size of Aggregate	Concrete not Exposed to Sulphates	Concrete Exposed to Sulphates		Maximum Free Water Cement Ratio	Location
				Min. Cement Content (kg/m ³)	Cement (kg/m ³)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
A	C35	20		300	*PC 42.5N	0.55	Piles, pile caps, basement slabs, retaining walls and concrete in contact with the ground for Class 1 or Class 2 sulphates.
B	C35	20	300		PC 42.5N	0.60	Superstructure concrete.
C	C35	20		280	SRPC 42.5N	0.55	Piles, pile caps, basement slabs, retaining walls and concrete in contact with the ground for Class 1 or Class 2 sulphates.
D	C40	20	325		PC 42.5N	0.55	Superstructure concrete.
E	C40	20	320		**PC 42.5N	0.45	Car park ramps and pavements for unloading areas.
F	C50	20	400		PC 42.5N	0.45	Columns and walls.
G	C30	14	280		* PC 42.5N	0.65	Lightweight concrete for metal deck slabs, max density 1850 kg/m ² .

H	C30	20	275		PC 42.5N	0.60	Mass concrete.
J	C15	20	270		PC 42.5N		Standard Mix ST3 to BS 5328: Pt 2 for blinding
K	C45	20	340		* PC 42.5N	0.50	Substructure concrete for Class 3 sulphates.
L	C40	20	320		SRPC 42.5N	0.50	Substructure concrete for Class 3 sulphates.

PC = Portland Cement to IS EN 197-1:2011 SRPC = Sulphate Resisting Portland Cement to IS EN 197-1:2011

No mix must be used on site unless the mix concerned has been tested and thereafter sanctioned by the Engineer.

12.7 Quality Control and Testing

All tests shall be carried out by an independent laboratory approved by the Engineer and appointed by the Contractor. The Contractor shall submit test reports to the Engineer direct.

Cubes shall be made and cured in accordance with IS EN 12390-2:2009. A minimum of 4 cubes are to be taken per pour. 2 are to be crushed at 7 days plus 2 are to be crushed at 28 days.

12.8 Placing, Compacting, Finishing and Curing

All plant, formwork, equipment and excavations shall be clean so as to avoid contamination of the concrete. Work is to be carried out in accordance with IS EN 1992-1-1:2005. Particular reference must be made to curing IS EN 1992-1-1:2005, preparation of joints IS EN 1992-1-1:2005 and concreting in cold weather IS EN 1992-1-1:2005.

13.0 Structural Steel

13.1 General

The Specification for Structural Steelwork has incorporated the National Structural Steelwork Specification for Building Construction (5th Ed CE Marking Version), published by the British Constructional Steelwork Association Ltd, in association with The Steel Construction Institute, hereafter referred to as “The NSSSBC”.

This NSSSBC is incorporated into the contract along with the additions and/or modifications required by this Project Specification.

If there is a conflict in specified requirements, the Project Specification takes precedence over other documents.

The full text of IS EN 1090-1 and IS EN 1090-2 takes precedence over the NSSSBC.

The materials provided must be fully in accordance with the relevant parts of BS 4360 : 1972 'Weldable Structural Steels' and IS EN 1993-1-1:2005.

13.2 Fabrication Drawings

The Steelwork Contractor shall prepare accurate and clear shop details and arrangement drawings for fabrication and erection purposes, copies of which must be submitted to the Engineer for comment at least two weeks before any work is put in hand. Such comments shall in no way relieve the steelworker of his responsibility for preparing correct and accurate work.

The Steelwork Contractor shall be required to submit calculations indicating proof that the connections shown on his drawings are capable of resisting the forces and moments given by the Engineer. The Steelwork Contractor shall supply 6 copies of agreed shop drawings to the Design Team free of charge.

13.3 Dimensions

The Steelwork Contractor shall take all necessary dimensions and levels from site to execute and complete his work to suit the Engineer's requirements and those of other trades in such order and sequence as may be directed in accordance with the programme and contract documentation. Particular care must be taken to obtain sufficient site dimensions, including the plumbing of any existing internal and external walls, to ensure the steelwork fits the site throughout.

The permissible dimensional deviations are listed in section 6 of this specification.

13.4 Fabrication, Welding and Non-Destructive Testing

Copies of any mills & other test certificates shall be made freely available to the Engineer for inspection.

Holes are to be drilled unless otherwise authorised by the Engineer. All notches shall be kept as small as practicable. To avoid overcutting, the internal angle of the notch shall be curved wherever possible by drilling an 18mm to 25mm diameter hole before the notch is formed.

Welding shall comply with the provision of IS EN 1011-2:2001. In IS EN 1011-2:2001, Quality Category 'B' for acceptable levels shall generally apply. Welders are to have certificates of competence from an Independent Authority less than 6 months old and related to the type of welds to be made.

Site welding shall not be permitted unless specifically authorised by the Engineer. All site welds must be inspected and tested by an Independent Authority and are to be undertaken free of charge.

13.5 Preparation and Painting

The protective treatment is to be undertaken in accordance with IS EN ISO 12944:1998 and this specification. The treatment for interiors of buildings normally dry as defined in IS EN ISO 14713-1:2009 shall be: -

- (a) Thoroughly clean by shot blasting to IS EN ISO 8501-1:2007
- (b) Prime with 2-pack zinc epoxy primer to IS EN ISO 12944:1998 and KP1B to nominal dry film thickness 25 microns by airless spray to blasted steel.
- (c) Apply 2- pack epoxy organic zinc rich primer to IS EN ISO 12944:1998; DF and KP1B to nominal dry film thickness 75 microns airless blasted steel.
- (d) Site repair with similar and compatible epoxy organic zinc rich type coatings as above DFT 75 microns.

Should the steelworker wish to propose an alternative paint specification this must be submitted to the Engineer for consideration at the time of tender.

13.6 Erection and Site Work

The assembly and erection of the structural steelwork shall be carried out by experienced steelwork erectors.

Where alterations are required to the delivered steelwork, the revised details are to be submitted to the Engineer for comment prior to proceeding with the alterations.

All holding down bolts for fixing steelwork to concrete bases shall be supplied by the steelworker to suit the General Contractor's programme.

The bases of steel stanchions shall be temporarily set to the correct level and positioned using narrow steel packs, steel wedges and holding down bolts prior to grouting up by the General Contractor using a cement grout or cement mortar 1:1 mix in accordance with IS EN 1993-1-1:2005.

14.0 Structural Timber

The structural timber is to be strictly in accordance with the current edition of IS EN 1995-1-1:2005 and the National Building Regulations.

Timber sizes indicated on the drawings are nominal sizes based on timber which has been square-sawn and the minimum size shall not be less than that specified.

The moisture content of the timber at erection and in service shall not exceed the requirements of IS EN 1995-1-1:2005.

Unless otherwise noted on the drawings, all structural timber shall comply with strength class SC3 graded to IS EN 14081-1:2006.

Dowelled joints will not be permitted.

At any junction of two or more timber members, and where not specifically described on the drawings, any groups of nails, screws, bolts, connectors and the like shall be placed symmetrically about the centre line of the members in the joint. All bolted joints to have toothed plate connectors at the interface of members unless otherwise specified on the drawings.

Care shall be exercised in ensuring that the limitations regarding edge and end distances and spacing of fixings as required by IS EN 1995-1-1:2005 are strictly observed.

Where joists, rafters, purlins, binders and the like are supported in joist hangers or anchor plates, the ends shall be fixed in the plate or hanger through the pre-drilled holes by wood screws not less than No. 8 SWG size.

Notches and holes through timber members will not be permitted unless specifically authorised by the Engineer. Generally, notches will not be permitted to exceed 0.125 of the depth of a joist and will be located between 0.07 and 0.25 of the span from the support. Generally, holes will not be permitted unless drilled at the neutral axis with diameters not exceeding 0.25 of the depth of a joist and not less than three diameters (centre to centre) apart are located between 0.25 and 0.4 of the span from the support.

All timber shall be impregnated against rot, fungus, decay and infestation conforming to IS EN 1995-1-1:2005. All cut edges shall be treated separately with an approved preservative.

No timber is to be embedded or concealed within the thickness of an external wall or in contact with the ground.

Timber treated with a water-borne preservative should be dried before being used in construction.

Where painting of timber is specified, all timber is to be protected with a priming paint to BS 2521 or BS 2522 and one undercoat before leaving the workshop. Auxiliary steel components to be suitably protected against rust.

Timber stored on site shall be protected against all conditions which are likely to have an adverse effect on its properties.

Glue laminated timber shall be in accordance with EN386 & EN390, IS EN 1995-1-1:2005. Adhesives shall be gap filling synthetic resin adhesives in accordance with IS EN 301:2013.

15.0 Brickwork and Blockwork

Note: Concrete blocks are to be tested for pyrite. The Pyrite testing regime of block work must consist of chemical analysis testing and X-Ray Diffraction. The chemical analysis testing should provide results for total Sulphur, acid soluble Sulphates, water soluble Sulphates, Calcium Carbonate content and pH value in accordance with TRL 447 and IS EN 13242.

For one pyrite test regime, the sample will be taken from the total debris of a minimum no. 5 compressed concrete blocks (the characteristic compression results must be provided for each concrete block). A minimum number of two independent pyrite tests are to be provided to Coughlan Consulting Engineering. If the sources of the concrete block work are from two or more sources, the pyrite testing regime must be carried out one per source.

15.1 General

Materials, components and workmanship used in the construction of brick and block walls shall comply with the recommendations of IS EN 771-1:2011 - IS EN 771-6:2011.

15.2 Materials

1. Clay bricks shall comply with IS EN 772-3:1999, IS EN 772-7:1999, and IS EN 771-1:2011. Bricks shall be classified in accordance with IS EN 772-7:1999 or IS EN 771-2:2011.
2. Precast concrete blocks shall comply with IS EN 771-3:2011 and IS EN 772-2:1999.
3. Sand shall be free from deleterious substances and shall comply with the requirements for grading of sand for mortar given in IS 5: 1974.
 - i. Cement used in the mortars shall be in accordance with IS 405 : 1987.
 - ii. Lime shall be non-hydraulic (calcium), semi-hydraulic (calcium) or magnesium lime in accordance with IS EN 459-1:2015.
4. Water shall be potable.
5. No admixtures shall be used without the prior written consent of the Engineer. Mortar plasticisers shall meet the requirements of IS EN 934-3:2009 and IS 406:1987.
6. Pigments shall conform to the requirements of IS EN 12878:2014.
7. Calcium chloride shall not be used as an additive.

15.3 Mortar

15.3.1 Preparation

The mortar mixes are to be in accordance with the recommendations given in IS EN 1996-1-1:2005, IS EN 1996-1-2:2005, IS EN 1996-2:2006, and IS EN 1996-3:2006. The proportions of the materials required are as follows:

Cement:Lime:Sand	1:1:5-6
Cement:Sand with Plasticiser	1:5-6

Note: The proportions are by volume. Where a larger sand content is given (e.g. 5-6), the larger quantity should be used for well-graded sands, and the smaller for sands that are uniformly coarse or uniformly fine. Due to bulking, the volume of damp sand may need to be increased.

Ready mixed lime:sand for mortar should comply with the requirements of IS EN 998-1:2010 & IS EN 998-2:2010. The appropriate addition of cement should be gauged on site.

Wet ready-mixed retarded cement:lime:sand mixes will not be permitted without the prior written approval of the Engineer.

15.3.2 Strength of Mortar

i) Preliminary Tests

The average compressive strengths to be achieved from tests on mortars carried out before laying brickwork or blockwork on site shall be not less than 2.4 N/mm² at 7 days and 3.6 N/mm² at 28 days. Six 100mm cubes of each mortar shall be made, stored under water and tested in accordance with IS EN 1015:1999.

ii) Site Control Tests

Four 100mm mortar cubes shall be prepared on site from mortar taken from the mixer for every 200 sq. m. of wall or for every storey of the building, whichever is the more frequent. Specimens shall be made, stored and tested in accordance with IS EN 1015:1999. When the average strength of the site samples tested at 7 days exceeds 1.7 N/mm², work may proceed while awaiting the results of the 28 days tests. When the 7 day results fail to meet the required strength, the Contractor may elect to continue work but only at his own risk. The minimum 28 day strength required shall be 2.5 N/mm² for acceptance.

15.4 Ancillary Components

i) Wall Ties

Wall ties shall be stainless steel and shall conform to IS EN 845-1:2013 (vertical-twist type or plan type where no cavity exists) unless indicated otherwise on the drawings. The ties shall be of sufficient length to ensure a minimum embedment of 50mm in each leaf.

ii) Damp-Proof Courses

Damp-proof courses shall comply with IS 57. They shall be capable of resisting all vertical and horizontal loads to which they may be subjected.

15.5 Workmanship

15.5.1 Storage of Materials

Bricks and blocks shall be carefully handled so as to avoid damage and shall be protected from rain, snow and frost.

Cement and hydrated lime shall be stored off the ground in a dry location.

Sand shall be stored on a hard surface where it will not become contaminated.

Lime:sand mixture shall be stored separately, according to type, on a hard surface where it will not become contaminated, and shall be protected from drying out.

15.5.2 Accuracy of Construction

All brickwork and blockwork shall be built to the tolerances given in section 6.

15.5.3 Bricklaying

Clay bricks or blocks shall be wetted strictly in accordance with the manufacturer's recommendations. Excessive wetting will not be permitted.

During construction no one section of wall shall rise more than 1 metre above the level of adjacent work. The height of walling built in one day shall not exceed 1.5 metres without prior permission of the Engineer.

The profile of the mortar joints shall be as specified by the Architect. Joints shall not be raked out for keying without the Engineer's written consent.

Cavity walls shall be formed of two leaves of brickwork or blockwork united by staggered wall ties uniformly spaced at 450mm vertically and 900mm horizontally. Additional ties shall be provided within 150mm of the edge of openings, one for each 300mm of height. As the wall is built one leaf shall not rise higher than 450mm above the other.

Block bonding of walls with other walls or partitions shall not be permitted without the written consent of the Engineer.

15.5.4 Protection against Weather

i) Frost

The Contractor shall be responsible for avoiding the harmful effects of frost. No laying shall be carried out when the temperature is at or below 3°C unless precautions are taken to ensure a minimum temperature of 4°C in the work when laid and thereafter to maintain a temperature above freezing point until the mortar has hardened.

ii) Rain

Brickwork or blockwork shall be protected to prevent rain falling directly on its top surface, or water being channelled onto it until the work has its finally intended protection.

16.0 Fire Protection

Fire protection of structural steelwork shall be undertaken with care and shall not damage any corrosion protection previously applied. Fire protection products must be applied strictly in accordance with the manufacturer's recommendations.

Members to receive fire protection shall be noted as such on the Architects drawings. The type and fire resistance period shall be as specified by the Architect. Fire protection shall be achieved by one of the following methods:

- (a) Sprays
- (b) Boards
- (c) Pre-formed casings
- (d) Intumescent coatings
- (e) Concrete and brick or block

The use of particular fire protective products shall be subject to the approval of the Engineer and the Architect.

Sprayed fire protection shall be applied in such a manner so as to avoid damage or contamination to other elements of the building. All other surfaces shall be masked and any excess sprayed protection shall be removed so as to leave surfaces clean.

17.0 Concrete Repairs

17.1 General

Areas of damaged or spalled concrete or where reinforcement corrosion is evident shall be repaired in accordance with this specification. The extent of repairs shall be scheduled by the Contractor and agreed with the Engineer prior to commencement of the work.

17.2 Materials

i) Bonding Coat

A copolymer emulsion and cement shall be prepared and mixed in accordance with the manufacturer's recommendations.

ii) Repair Render

A polymer modified sand/cement mortar mix shall be prepared, mixed and applied in accordance with the manufacturer's recommendations.

The details and name of manufacturer of each product must be submitted to the Engineer for approval prior to its use on site.

17.3 Workmanship

The area of repair must be structurally sound and free from dust, loose material and other contamination. Corroded reinforcement or steelwork must be exposed and wire brushed to remove all traces of rust. The surface to be treated shall be roughened and shall be cut back so as to allow a minimum repair thickness of 12mm or as directed by the manufacturer, whichever is the greater.

The prepared surface shall be primed with two coverings of bonding coat strictly in accordance with the manufacturer's instructions.

The repair render shall be applied whilst the bonding coat is still wet and, where necessary, in layers so as to avoid sagging.

Work shall not be undertaken at temperatures below 5°C and shall be cured using a curing membrane for at least three days.

The top surface of the repair shall be finished smooth and flush with the existing surface.

Appendix A

Eurocodes

Eurocode Part	Publication as an adopted Irish standard (I.S. EN)
Eurocode 0 – Basis of structural design	
Basis of structural design	I.S. EN 1990: 2002
Basis of structural design	I.S. EN 1990: 2002 Amendment
Eurocode 1 – Actions on structures	
Part 1-1: General actions - Densities, self-weight and imposed loads	I.S. EN 1991-1-1: 2002
Part 1-2: General actions - Actions on structures exposed to fire	I.S. EN 1991-1-2: 2002
Part 1-3: General actions - Snow loads	I.S. EN 1991-1-3: 2003
Part 1-4: General actions - Wind actions	I.S. EN 1991-1-4: 2005
Part 1-5: General actions - Thermal actions	I.S. EN 1991-1-5: 2003
Part 1-6: General actions - Actions during execution	I.S. EN 1991-1-6: 2005
Part 1-7: General actions - Accidental actions	I.S. EN 1991-1-7: 2006
Part 2: Traffic loads on bridges	I.S. EN 1991-2: 2003
Part 3: Actions induced by cranes and machinery	I.S. EN 1991-3: 2006
Part 4: Silos and tanks	I.S. EN 1991-4: 2006
Eurocode 2 – Design of concrete structures	
Part 1-1: General rules and rules for buildings	I.S. EN 1992-1-1: 2005
Part 1-2: General rules - Structural fire design	I.S. EN 1992-1-2: 2005
Part 2: Concrete bridges - Design and detailing rules	I.S. EN 1992-2: 2005
Part 3: Liquid retaining and containment structures	I.S. EN 1992-3: 2006
Eurocode 3 – Design of steel structures	
Part 1-1: General rules and rules for buildings	I.S. EN 1993-1-1: 2005
Part 1-2: GR - Structural fire design	I.S. EN 1993-1-2: 2005
Part 1-3: GR - Supplementary rules for cold-formed thin gauge members and sheeting	I.S. EN 1993-1-3: 2006
Part 1-4: GR - Supplementary rules for stainless steels	I.S. EN 1993-1-4: 2006
Part 1-5: Plated structural elements	I.S. EN 1993-1-5: 2006
Part 1-6: General - Strength and stability of shell structures	I.S. EN 1993-1-6: 2007
Part 1-7: General - Strength of planar plated structures loaded transversely	I.S. EN 1993-1-7: 2007
Part 1-8: Design of joints	I.S. EN 1993-1-8: 2005
Part 1-9: Fatigue strength of steel structures (will replace ENV 1993-1-1:1992)	I.S. EN 1993-1-9: 2005
Part 1-10: Material toughness and through-thickness properties	I.S. EN 1993-1-10: 2005

Part 1-11: Design of structures with prefabricated tension components	I.S. EN 1993-1-11: 2006
Part 1-12: Additional rules for the extension of EN 1993 up to grades S700	I.S. EN 1993-1-12: 2007
Part 2: Steel Bridges	I.S. EN 1993-2: 2006
Part 3-1: Towers, masts and chimneys - Towers and masts	I.S. EN 1993-3-1:2006

Part 4-1: Silos, tanks and pipelines - Silos	I.S. EN 1993-4-1: 2007
Part 4-2: Silos, tanks and pipelines - Tanks	I.S. EN 1993-4-2: 2007
Part 4-3: Silos, tanks and pipelines - Pipelines	
Part 5: Piling	I.S. EN 1993-5: 2007
Part 6: Crane supporting structures	I.S. EN 1993-6: 2007

Eurocode 4 – Design of composite steel and concrete structures

Part 1-1: General rules and rules for buildings	I.S. EN 1994-1-1: 2005
Part 1-2: General rules - Structural fire design	I.S. EN 1994-1-2: 2005
Part 2: Bridges	I.S. EN 1994-2: 2005

Eurocode 5 – Design of timber structures

Part 1-1: General - Common rules and rules for buildings	I.S. EN 1995-1-1: 2005
Part 1-2: General - Structural fire design	I.S. EN 1995-1-2: 2005
Part 2: Bridges	I.S. EN 1995-2: 2005

Eurocode 6 – Design of masonry structures

Part 1-1: Common rules for reinforced and unreinforced masonry structures	I.S. EN 1996-1-1: 2005
Part 1-2: General rules - Structural fire design	I.S. EN 1996-1-2: 2005
Part 2: Design, Selection of materials and execution of masonry	I.S. EN 1996-2: 2006
Part 3: Simplified calculation methods and simple rules	I.S. EN 1996-3: 2006

Eurocode 7 – Geotechnical design

Part 1: General rules	I.S. EN 1997-1: 2005
Part 2 Ground investigation and testing	I.S. EN 1997-2: 2007

Eurocode 8 – Design of structures for earthquake resistance

Part 1: General rules, seismic actions and rules for buildings	I.S. EN 1998-1: 2005
Part 2: Bridges	I.S. EN 1998-2: 2006
Part 3: Strengthening and repair of buildings	I.S. EN 1998-3: 2005
Part 4: Silos, tanks and pipelines	I.S. EN 1998-4: 2006
Part 5: Foundations, retaining structures and geotechnical aspects	I.S. EN 1998-5: 2005
Part 6: Towers, masts and chimneys	I.S. EN 1998-6: 2005

Eurocode 9 – Design of aluminium structures

Part 1-1: General rules	I.S. EN 1999-1-1: 2007
Part 1-2: General - Structural fire design	I.S. EN 1999-1-2: 2007
Part 1-3: Additional rules for structures susceptible to fatigue	I.S. EN 1999-1-3: 2007
Part 1-4: Supplementary rules for trapezoidal sheeting	I.S. EN 1999-1-4: 2007
Part 1-5: Supplementary rules for shell structures	I.S. EN 1999-1-5: 2007

APPENDIX B

Schedule of required Ancillary Certificates to be issued by the relevant Ancillary Certifiers appointed by the building owner, design team and by the builder.

NOTE: As a minimum - Ancillary certificates are to be issued by the Architect, Civil & Structural Engineers, Mechanical & Electrical Engineers and the Builder.

Appendix: List of Requirements under Building Regulations

Ref.	Description	Apply	Does not apply	Partially applies	Comment
Part A - Structure					
A1	Loading				
A2	Ground movement				
A3	Disproportionate Collapse				
Part B – Fire Safety					
B1	Means of Escape				
B2	Internal Fire Spread - Structure				
B3	Internal Fire Spread - Linings				
B4	External Fire Spread				
B5	Access and Facilities for the Fire Service				
Part C – Site Preparation & Resistance to Moisture					
C1	Preparation of Site				
C2	Subsoil Drainage				
C3	Dangerous Substances				
Part D – Materials and Workmanship					
D1	Materials and Workmanship				

* Extracts have been taken from the Building Control Regulations Code of practice, published by the Environment, community and Local Government in February 2014.

Ref.	Description	Apply	Does not apply	Partially applies	Comment
Part E - Sound					
E1	Airborne Sound (walls)				
E2	Airborne Sound (floors)				
E3	Impact Sound (floors)				
Part F - Ventilation					
F1	Means of Ventilation				
F2	Condensation in Roofs				
Part G - Hygiene					
G1	Bathrooms and Kitchens				
G2	Sanitary Conveniences and Washing Facilities				
Part H – Drainage and Waste Disposal					
H1	Drainage System				
H2	Septic Tanks				
Part J – Heat Producing Appliances					
J1	Air Supply				
J2	Discharge of products of Combustion				
J3	Protection of Building				
J4	Oil Storage Tank				

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Code of Practice

Ref.	Description	Apply	Does not apply	Partially applies	Comment
Part K – Stairways, Ladders, Ramps and Guards					
K1	Stairways, Ladders and Ramps				
K2	Protection from Falling				
K3	Vehicle Ramps				
Part L – Conservation of Fuel and Energy					
L1	Conservation of Fuel and Energy				
L2	Conservation of Fuel and Energy in Existing Dwellings				
L3	Conservation of Fuel and Energy in New Dwellings				
L4	Conservation of Fuel and Energy in Buildings other than Dwellings				
Part M – Access and Use					
M1	Access and Use of Buildings				
M2	Sanitary Conveniences				
M3	Audience or Spectator Facilities				