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PARTNERSHIP
CHARTERED ENGINEERS

**Phase 2 Conservation Works to Cahir Market House at Cahir Co.
Tipperary
for Tipperary County Council**

CIVIL / STRUCTURAL SPECIFICATION

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B50

General structural requirements

Clauses

Read in conjunction with Preliminaries and general conditions

Tendering - Not Used

General

110 Eurocodes

1. National Annexes: Reference to a Eurocode, or to an execution or a material standard referenced therein, is deemed to include the appropriate Irish National Annex to the Eurocode or referenced standard. Nationally determined parameters shall apply. Non-contradictory complementary information: applies when referenced in the National Annex.
2. Substitution of alternative design rules for Eurocode Application Rules: Not permitted.

120 Structural work

1. Designated codes of practice: To the Eurocodes appropriate to the nature of the structure.
2. Design working life: 50 years.
3. Completed structure generally: To comply with the requirements of the designated codes of practice and the standards referenced therein. Deflections and other structural movements at serviceability limit state to be compatible with requirements of the building fabric, movement joints and weathertightness.
4. Special requirements: None.

150 Ground investigation report

1. Requirement: Submit proposals for ground investigation, as section C11, to provide data for the design of the proposed work.
2. Datum for borehole logs: Ordnance Datum.
3. Obstructions and voids: None known.

160 Geotechnical design report

1. Standard: To [IS EN 1997-1](#).
2. Requirement: Consider the preliminary report and prepare a full report covering all aspects of the geotechnical work.

Provide report.

- 2.1. Procedures to be adopted to achieve the design requirements: None applicable.
- 2.2. Checking: Keep a copy of the report on site during the execution of the geotechnical work. Consider the ground conditions revealed during execution and the results of monitoring. When necessary, update the geotechnical design report.
- 2.3. Modification of geotechnical design: Before implementing, submit details and reasons.
3. Monitoring
 - 3.1. Assumed ground conditions: Consider adequacy of proposals for identifying differences between actual ground conditions with those assumed in the geotechnical design and submit proposals for extending these proposals to cover contractor's design.
 - 3.2. Performance criteria to justify adequacy of work: Submit proposals for demonstrating the adequacy of the geotechnical work.
 - 3.3. Existing buildings/ below-ground services: Confirm that execution of work will not damage existing structures/ services.

Performance

250 Limits on movement generated by construction

1. Definition of critical values
 - 1.1. Threshold value: The value beyond which further movement will be of significant concern.
 - 1.2. Action value: The value at which execution must cease.
2. Precautions
 - 2.1. Threshold: If movements reach critical values review situation, assess possible causes and submit proposals to ensure that action values are not exceeded.
 - 2.2. Action: If movements reach critical values stop work, report and revise working procedures to prevent further movements.

280 Settlement of existing structures

1. Location: Any part of the structure.
2. Action values: Any part of the structure, 25 mm. Tilt of 1/400.
3. Threshold values: 65% of action values.

310 Damage to existing structures and services

1. Permissible damage criteria
 - 1.1. Structures: No damage permitted.
 - 1.2. Services: No damage permitted.

330 Design loads

1. Description: For piles
2. Source: Clause D/30

Execution

700 Execution generally

1. Standard: Report conflict between specification and the designated codes of practice and the standards referenced therein before ordering affected materials or executing affected work.
2. Inspection levels: To [IS EN 1990](#), Table B5, Level IL2.
 - 2.1. Special requirements: None.
3. Quality control: To [IS EN ISO 9001](#).
4. Tolerances: Notwithstanding tolerances specified elsewhere, do not exceed requirements for compliance with the designated code.

705 Connections and anchorages

1. End and edge distances and spacing (minimum): Unless otherwise specified or detailed, as required by the designated code of practice for fixings/ anchorages carrying maximum load.
2. Special cases: Report locations where type and number of fixings cannot be accommodated.

710 Geotechnical work

1. Geotechnical design report: Keep a copy on site during the execution of the geotechnical work.
2. Requirements for testing and monitoring: As specified.
3. Assumed ground conditions: 2-5m of made ground on limestone

720 Stability during execution

1. Permanent bracing system: Load-bearing masonry structure
 - 1.1. Vertical: Masonry walls.
 - 1.2. Horizontal: Composite action floors.
2. Temporary bracing/ restraints: Provide as necessary until permanent bracing system is complete and sufficiently mature to carry loads and all appropriate connections have been made to the permanent system.
 - 2.1. Special requirements: Submit proposals and calculations for temporary support to external front wall to be dismantled and rebuilt from ground to first floor
3. Design loads: Structure has been designed for the completed state.
 - 3.1. Magnitude: Request details as necessary.
4. Loading stability: Before loading structure take into account reductions in strength due to immaturity of elements and avoid overloading. Also take into account reductions in loadbearing capacity due to partial completion of continuous elements. Avoid exceeding reduced loadbearing capacity.

Completion

900 Geotechnical records

1. Submit: Details and results of monitoring and details and purpose of any changes to the geotechnical work.
2. Timing: Within 28 days of the completion of the foundations.
3. Special requirements: Update geotechnical design report and submit for inclusion in the building manual.

Ω End of Section

C41

Repairing/Conserving Masonry

Generally/ preparation

140 Record of Work

1. General: Record work carried out to masonry clearly and accurately using written descriptions, sketches, drawings and photographs, as necessary.
2. Specific records: Marked up drawings showing: areas of rebuilt facework, rebuilt core-work, areas repointed, sections of wall-top reset.
3. Documentation: Submit on completion of the work in pdf format.

Workmanship generally

150 Power Tools

1. Usage for removal of mortar: Not permitted

160 Protection of Masonry

1. Masonry: Prevent damage, particularly to arrises, projecting features and delicate, friable surfaces. Prevent mortar/grout splashes and other staining and marking on facework. Protect using suitable non-staining slats, boards, tarpaulins, etc. Remove protection on completion of the work.
2. Curing: Protect new lime work from direct sunlight, heavy rain or excessive drying by wind. Protect NHL 5 mortars for 48 hours, NHL 3.5 mortars for 72 hours and NHL 2 mortars for 96 hours.
3. Shrinkage during Curing: Light shrinkage may occur on heavier joints during the first twenty-four hours. If this occurs spray on a light water mist and tap gently with the bristle brush to close the crack. Dampen curing mortar with light water mist spray 3 times a day during warm weather/active drying conditions.
4. Protecting NHL mortars:: Protect from Frost, Heavy Rain, Strong Wind or Direct Sun for minimum of:

NHL	5	48	Hours
NHL	3.5	72	Hours
NHL	2	96	Hours

with damp hessian held 50-75mm off the wall face and plastic sheeting over where necessary to protect against heavy rain.

165 Structural Stability

1. General: Maintain stability of masonry. Report defects, including signs of movement that are exposed or become apparent during the removal of masonry units.

170 Disturbance to Retained Masonry

1. Retained masonry in the vicinity of repair works: Disturb as little as possible.
2. Existing retained masonry: Do not cut or adjust to accommodate new or reused units.
3. Retained loose masonry units and those vulnerable to movement during repair works: Prop or wedge so as to be firmly and correctly positioned.

180 Workmanship

1. Skill and experience of site operatives: Appropriate for types of work on which they are employed.
 - 1.1. Documentary evidence: Submit on request.

185 Adverse Weather

1. General: Do not use frozen materials or lay masonry units on frozen surfaces.
2. Air temperature: Do not bed masonry units or repoint:

- 2.1. In NHL 3.5 or 5 hydraulic lime:sand mortars when ambient air temperature is at or below 5°C and falling or unless it is at least 3°C and rising.
- 2.2. In NHL 2 hydraulic lime:sand mortars when ambient air temperature is at or below 8°C and falling or unless it is at least 5°C and rising.
- 2.3. In nonhydraulic lime:sand mortars in cold weather, unless approval is given.
3. Temperature of the work: Maintain above freezing until mortar has fully set.
4. Rain, snow and dew: Protect masonry by covering during precipitation, and at all times when work is not proceeding.
5. Hot conditions and drying winds: Prevent masonry from drying out rapidly.
6. New mortar damaged by frost: Rake out and replace.

Materials/ production/ accessories

215 Material Samples

1. Representative samples of designated materials: Submit before placing orders.
 - 1.1. Designated materials: sands, grit, lime
2. Retention of samples: Unless instructed otherwise, retain samples on-site for reference. Protect from damage and contamination.

285 Bed Joint Reinforcement to Masonry

1. Description: where specified on drawings
2. Standard: To IS EN 845-3
3. Material: Austenitic stainless steel 2x4.5mm diameter wires flattened with cross wires to form 'ladder'.
4. Width: Approximately 40-50mm less in width than wall or leaf.
5. Laying: On an even bed of mortar in a continuous strip with 225mm laps at joints and full laps at angles. Keep back 20mm from face of external work, 12mm back from face of internal work and finish mortar joint to normal thickness.

Dismantling/ rebuilding

310 Dismantling Masonry for Reuse

1. Masonry units to be reused: Remove carefully and in one piece.
 - 1.1. Treatment: Clean off old mortar, organic growths and dirt, and leave units in a suitable condition for rebuilding.
 - 1.2. Identification: Mark each unit clearly and indelibly on a concealed face, indicating its original position in the construction. Transcribe markings to drawings/photographs.
2. Record: A record of the masonry will be made by the project archaeologist prior to the commencement of dismantling of the masonry. This record will be sufficiently accurate to allow individual stones to be identified and located. The contractor will use this record of the section to be dismantled to mark on enlarged copies of the survey drawings the location of each labelled stone for reinstatement in their original positions.

Record the individual stones on enlarged photo-rectified images from the survey, number, dismantle, and lay the individual stones on the scaffold. Random rubble masonry requires the retention of all pinning stones so that the rhythm and texture of the original may be replicated and where it is built to courses the same attention to coursing is essential.

3. Procedure: Dismantle by hand starting with the removal of coping stones where they exist or dismantling the cap. Rake out the joints and prise the stones out from the middle of the wall. Rake out with hand tools; do not use grinding discs.

320 Rebuilding Facework

1. Replacement materials: Use dismantled or collapsed stone. New stone, as clause 240 if required.

2. Mortar: As section Z21.
 - 2.1. Standard: IS EN 998-2
 - 2.2. Mix: 1:2½ NHL 3.5 hydraulic lime:sand
 - 2.3. Sand source/ type: IS EN 13139
3. Rebuilding: To match previous face and joint lines, joint widths and bonding using the record created prior to dismantling. Adequately bonded to retained work/backing masonry, as appropriate.
4. Joint surfaces: Dampen, as necessary, to control suction.
5. Laying masonry units: On a full bed of mortar; perpend joints filled.
6. Exposed faces: Remove mortar and grout splashes immediately.
7. Joints: To match existing

321 Rebuilding Corework

1. Description: Corework will reinstate lost support to masonry overhead where the original facing masonry is lost. Rebuild in the character of the surviving wall, in similar style and workmanship, taking account of the style and shape of any pinnings, coursing patterns, stone shapes and the like to replicate, as closely as possible, the rhythm of the surrounding masonry.
2. Replacement materials: Use dismantled or collapsed stone. New stone, as Clause 240 if required.
3. Mortar: As section Z21.
 - 3.1. Standard: IS EN 998-2
 - 3.2. Mix: 1:2½ NHL 3.5 hydraulic lime:sand
4. Rebuilding: Build the new masonry surface using a variety of stone sizes, arranged in a rough-racked fashion with recesses of varying dimensions from the plane of the wall face, creating space as though accommodating the absent face masonry.
5. Joint surfaces: Dampen, as necessary, to control suction.
6. Laying masonry units: On a full bed of mortar; joints filled.
7. Exposed faces: Remove mortar and grout splashes immediately.
8. Joints: To match existing

Replacements and insertions

415 Stone Pinnings for Rubble Stonework

1. Material for pinnings: Recover from retained raked-out mortar. Provide additional stone pinnings to match existing as required.
2. Placing: Tamp pinnings firmly into fresh mortar. Ensure mortar is thoroughly compacted into voids and that levelling and load distribution functions of pinnings are retained.

Tooling/ dressing stone in situ - Not Used

Mortar repairs - Not Used

Crack repairs/ ties/ reinforcement

630 Ties / Crack Stitching

1. Description: FOR CRACK STITCHING IN NHL MORTAR
2. Tie system
 - 2.1. Standard: To IS EN 1090-1
3. Type/ Diameter: 8mm Grade 304 Stainless Steel helical bar
4. Length: 1m
5. Adjacent masonry: Do not damage during drilling. Keep cavities behind facings free from debris.

6. Installation::
 1. Rake out crack and remove loose mortar.
 2. Pack and fully fill the crack tightly with new mortar and pinning stones. If necessary to consolidate the masonry around the crack, locally grout either side of the crack as described below.
 3. Drill 12mm diameter holes for diagonal stitches or rake out bed joint for horizontal stitch.
 4. Set helical bar in NHL3.5 mortar across the crack at 200-400mm vertical centres over the height of the crack. Recess the bars 50mm from the face of the wall.
7. Exposed masonry faces: Clean and free from grout/mortar stains.

675 Joint Reinforcement

1. Description: FOR STITCHING ACROSS CRACKS
2. Existing construction: Solid random rubble
3. Joint width: 10 - 20mm
4. Reinforcement system
 - 4.1. Standard: To IS EN 1090-1
 - 4.2. Manufacturer: Submit proposals
 - 4.3. Type: Stainless steel helical bar set in thixotropic resin.
5. Installation: Remove existing mortar without damaging adjacent masonry or widening joints. Form recess to depth recommended by reinforcement manufacturer. Remove dust and debris. Install reinforcement using methods recommended by manufacturer.
6. Joints: Repoint, as Clause 820.

690 Making Good to Injection and Insertion Holes

1. Preparation: Clean out holes thoroughly.
2. Repair mortar: To match existing masonry units/joints in colour and texture. Fill holes and finish mortar neatly and flush with surrounding masonry.

Grouting rubble filled cores

710 Preparation for Grouting

1. Grouting holes: Drill in joints at horizontal and vertical centres to suit coursing and to achieve an effective distribution of grout so that, on completion, all voids in masonry are filled.
2. Maximum height of each grout pour: Regulate to prevent disruption to masonry.
3. Open joints in masonry: Seal with an approved temporary material to prevent leaking of grout. Leave weep holes every two or three courses to assist in flushing out dust and debris, and to prove effectiveness of grouting. Locate temporary seal back from facework to allow for specified repointing. Seek instructions if repointing precedes grouting.

712 Flushing Out

1. Timing: Before grouting.
2. Requirement: Flush out core of masonry walls using clean water delivered under moderate pressure through grouting holes.

730 Gravity Injection or Hand Pump Grouting

1. Description: TO RUBBLE WALLING
2. Grout mix: 1 no. 25kg bag NHL 3.5 + 50 litres of sharp medium sand + 50 litres of water (max.) NHL may be substituted by Vicat Prompt Natural Cement binder to max. 10% with prior approval of Employer's Representative where specified.
3. Delivery pressure: 50-75 kPa

4. Consistency: The maximum amount of water includes the water contained in the sand. Water should be added to obtain a paste of the required fluidity, to a maximum as set out above. If casein, to a maximum of 1% by weight, is added, water may be reduced by between 25% and 50%.

740 Application of Grouting

1. Grouting: Continuous operation during each lift. Allow grout to set before commencing subsequent lifts.
2. Method: Fit grout tubes at 1m horizontal and vertical centres. Commence at lowest level of grout tubes. Pump grout until grout appears at next grout tube vertically. Temporarily plug both tubes and proceed to next tube along wall. Repeat. Tubes may need to be topped up more than once as grout settles within the wall. Remove tubes when grout has hardened.
3. Monitoring: Monitor grouting carefully and continuously at each delivery point (flow and delivery pressure), and at adjacent/opposite wall faces, to ensure that there is an effective distribution of grout with no leaking, staining, or disruption to the masonry.
4. Temporary seals: Remove on completion of grouting and leave joints in a suitable condition for repointing.

Pointing/ repointing

810 Preparation for Repointing

1. Existing mortar: Working from top of wall downwards, remove mortar carefully, without damaging adjacent masonry or widening joints, to a minimum depth of 2.5 times the joint thickness or 25mm from the face of the innermost facing stone, or to sound mortar whichever is greater.
 - 1.1. Loose or friable mortar: Seek instructions when mortar beyond specified recess depth is loose or friable and/or if cavities are found.
2. Procedure: Clean the stonework and rake out the joints by hand using a variety of tools as they are needed to remove all loose and organic matter. Lay a strip of plastic sheet at the base of the wall face being raked out. Recover, for re-use in the re-pointing mortar, pinning stones and coarse aggregate dis-lodged from the joints during raking out. Brush down the wall on completion of raking out to remove excess mortar.
3. Raked joints: Remove dust and debris.

820 Pointing

1. Description: STONWORK GENERALLY
2. Preparation of joints: Rake out existing loose mortar
3. Mortar: As section Z21.
 - 3.1. Standard: IS EN 998-2
 - 3.2. Mix: 1:2½ NHL 2 hydraulic lime:sand. Adjust mix to match lime volume to void ratio of aggregate.
 - 3.3. Sand source/ type: Sharp medium sand. Colour to match existing mortar. Coarse aggregate to be added to match the grading and appearance of the existing mortar.
 - 3.4. Appearance: To maintain the character of the monument, the new mortar used should match the original mortar as closely as possible.
4. Joint profile/ finish: Finished joints shall be struck level with the masonry surface. On achieving the initial set, hammer the joint with a stiff bristle brush to ensure the tightness of the joint and to expose the coarse aggregate.
Incorporate pinning stones recovered from the raked-out material, supplemented as necessary with similar stones, into the repointed joints to keep joint depth less than 20mm. Fit pinnings horizontally wherever possible.
5. Other requirements: Grout deep voids, as Clause 720

840 Pointing with Tools/Irons

1. General: Press mortar well into joints using pointing tools/irons that fit into the joints, so that they are fully filled.
2. Face of masonry: Keep clear of mortar. Use suitable temporary adhesive tape on each side of joints where necessary. Finish joints neatly.

860 Beaten Back Finish to Joints

1. Timing: After initial mortar set has taken place remove laitance and excess fines by hitting the mortar at right angles to the surface with a stiff bristle brush, to expose the coarse aggregate, give a coarse texture and to tighten the joint.

Ω End of Section

D30

Piling

Clauses

Read in conjunction with Preliminaries and general conditions

General

110 Piling specification

1. Standard: Comply with the current edition of 'Specification for piling and embedded retaining walls' (SPERW).
2. Recognised standard for SPERW requirements:: IS EN 14199
3. References to Engineer in SPERW: For the purpose of this contract, interpret such references as being to the person named in section A10 as administering the Contract on behalf of the Employer.

130 Piles

1. Standard: To SPERW, sections B2-B9, as appropriate to the pile type.
2. Permitted types: Concrete Micropile
3. Project specification: Submit proposals to cover the SPERW requirements in clause B1.2 and listed under this heading for the chosen pile type.

175 Concrete micropiles

1. Standard: To SPERW, section B6.
2. Type: Self-drilling hollow bar
3. Diameter: 150mm
4. Pile casing: Permanent pile casings to [SPERW](#), clause B6.4.2 and [SPERW](#), section B18.
 - 4.1. Section: Contractor's choice
 - 4.2. Joints: Socket push fit
5. Filling: Cementitious grout
6. Reinforcement: Carbon steel ribbed bar reinforcement

System performance

210 Contractor design

1. Structural requirements
 - 1.1. Generally: As section B50.
 - 1.2. Modifications: None
2. Design responsibility
 - 2.1. Piles: Complete design of piles in accordance with SPERW, clause B1.4, option 2
 - 2.2. Other: None
3. Pile layout: As drawing 401
4. Pile design criteria: As clauses 130 and 280
5. Submission of information: As required by SPERW, table B1.1 and elsewhere, as appropriate for the pile type, materials and tests specified.
 - 5.1. Amendments to requirements specified in SPERW for information required
 - 5.1.1. Prior to commencing design: Proposals for working close to existing facades

260 Specified working loads for piles

1. Pile group designation: all micropiles
 - 1.1. Load magnitude: Axial load of 150 kN

290 Basis for setting out

1. Site datum: Ordnance Datum
2. Site grid: Ordnance Survey

300 Commencing surface

1. Level: Existing ground level

Products

440 Permanent casing

1. Reasons for use: Provide barrier to contaminated or aggressive groundwater and ground support
2. Casing
 - 2.1. Material: Steel tube to IS EN 10210-1, grade S275J2H
 - 2.2. Diameter: 150mm
 - 2.3. Thickness: 5mm
 - 2.4. Length: To extend 3 m from underside of pile cap
 - 2.5. Coating: Not required
 - 2.6. Joints: Socket push fit
3. Method of installation: Installed in predrilled hole
4. Backfilling of annulus
 - 4.1. Between casing and ground: Sand-cement grout
 - 4.2. Between casing and pile: Not applicable

470 Concrete generally

1. Standards: To BS 8500-2 and SPERW, section B21.
2. Project compressive strength testing of concrete: Required as SPERW, clause B21.8. Grout testing shall conform to Section B21.10.5 of ICE SPERW
3. Exchange of information: Provide concrete producer with information required by BS 8500-1, clauses 4 and 5.

510 Cement grout

1. Standard: To SPERW, section B21. Grout shall conform to I.S. EN 14199:2015 and a 50 year design life in accordance with I.S. EN 206:2013+A2:2021
2. Compressive strength: 40 N/mm² at 28 days
3. Cement: CEM1
4. Limiting values for composition
 - 4.1. Water:cement ratio (maximum): 0.45
5. Admixtures: Contractor's choice
6. Properties of fresh grout: As SPERW, clause B21.10
7. Temperature at grouting: As for concrete
8. Other requirements: None

Execution

610 Method statement

1. Requirement: Submit proposed method of installation to achieve the design parameters, including:
 - 1.1. Details of equipment.
 - 1.2. Programme showing sequence and resources.
 - 1.3. Confirmation that performance requirements for load and settlement will be achieved.

615 Records and submission of information during the works

1. Generally: As required in SPERW, tables B1.1, B1.6 and elsewhere, as appropriate for the pile types, materials and tests specified.

650 Performance of working piles

1. Substandard performance: Give notice if the performance of any pile is likely to be less than that specified

655 Testing excavated material

1. Contamination tests: Undertake at following rates:
 - 1.1. Made up ground: One test per 10 m³ excavated material
 - 1.2. Other soil types: One test per 10 m³ excavated material

685 Excavated material

1. Disposal: Contractor's responsibility

745 Testing mortar and cement grout

1. Standard: IS EN 445 and Section B21.10.5 of SPERW
 - 1.1. Exceptions: Strength test using 100 mm cubes.
2. Preliminary tests: Not required.
3. Frequency of compliance testing: As IS EN 446, clause 8.4

770 Dynamic/ rapid testing of piles

1. Type of test: Dynamic testing
2. Pile group designation: All
 - 2.1. Number of piles to be tested: two of working piles
 - 2.2. Locations: Submit proposals
 - 2.3. Pile construction: As working pile
 - 2.4. Test procedure/ standards: High Strain Dynamic Testing with Case Pile wave Analysis (CAPWAP)
3. Programme: on completion of piling
4. Results
 - 4.1. Submission of analysis: CAPWAP required for tested piles
5. Other requirements: Actions on completion of a test as SPERW, clause B16.10.2

Completion

910 Health and safety file

1. Piling completion report: Collate and submit a full set of pile records for inclusion in the health and safety file.
2. Content and date for submission: As SPERW, clause B1.12.2.
 - 2.1. Record plan: Give the number of each pile and its final location relative to nearest grid line.

2.2. Additional requirements: None

920 Piling guarantee

1. Type: Insurance backed. Administered by an independent insurance protection company.
 - 1.1. Guarantee period (minimum): 12 years from completion
 - 1.2. Documentation: Provide certificates/ guarantees at completion of piling works.

Ω End of Section

D50

Underpinning

Clauses

Read in conjunction with Preliminaries and general conditions

Tendering

10 Information to be provided with tender

1. Submit: A full description of underpinning proposals including:
 - 1.1. Drawings: As necessary for understanding the proposals.
 - 1.2. Method statement.
 - 1.3. Additional information: Programme showing sequence and resources

General

115 Underpinning – design and construction

1. Purpose: To found the building below the level of future ground movements
2. Extent: As drawing 401
3. Standards used for design: Mass concrete underpinning to IS EN 1997-1 and BS 8004
4. Load factor: To IS EN 1997-1 and BS 8004
5. Assumed bearing strata: As drawing 401
6. Design proposals: Confirm as adequate for the particular ground conditions revealed in the works or submit alternatives.

165 Exploratory holes

1. Requirement
 - 1.1. Excavate holes to determine: The depth and profile of adjacent existing foundations
2. Timing: Before commencing excavation for underpinning.
3. Findings: Submit details.
4. Backfill
 - 4.1. Below foundation level: Lean mix concrete
 - 4.2. Above foundation level but below ground supported slabs: Compacted T.1 Structural material to SR 21 Annex E: 2016
 - 4.3. Elsewhere: Compacted T.1 Structural material to SR 21 Annex E: 2016

170 Disconnection of services in working areas

1. Disconnections required: Water supply
 - 1.1. Timing: Before commencing underpinning works within the building.
2. Reconnection: Ensure that services cannot be reinstated by site operatives without consent.

Types of underpinning

210 Continuous mass concrete underpinning

1. Underpinning blocks
 - 1.1. Depth: As drawing 401
 - 1.2. Length (maximum): 1.2 m

- 1.3. Width on either side of wall centre line (minimum): As drawing 401
- 1.4. Depth of hard pack: 50-75 mm
2. Materials
 - 2.1. Concrete: Designated as section E10
 - 2.2. Hard packing: 1:3 cement:sharp sand mortar
 - 2.2.1. Water content: Sufficient only to ensure that packing binds together.
3. Sequence: To approval, but maximum 25% of length of foundation to be unsupported at one time
4. Curing periods (minimum)
 - 4.1. Between casting underpinning block and pinning up: 24 hours
 - 4.2. Between completion of pinning up and commencement of excavation for the next sequence of underpinning: 48 hours
 - 4.2.1. Extend curing periods to allow for inclement weather.
5. Shear connection between underpinning blocks: steel dowels as drawing 424
6. Features: Backfill remainder of working space with lean mix concrete

Types of piling - Not Used

Accessories for underpinning - Not Used

Execution

610 Repair of masonry

1. Specification: As section C41.
2. Timing: At least seven days before commencement of underpinning operations

615 Construction of mass concrete underpinning

1. Block and working space: Excavate together.
2. Formation
 - 2.1. Preparation: Remove or compact loose material.
 - 2.2. Protection: Cover with 50 mm thickness of concrete if there will be a delay of more than four hours between completion of excavation and casting of concrete underpinning.
3. Split sleeves: Provide around drain/ service passing through underpinning. Closely fit a rigid sheet to each side of opening to prevent ingress of fill or vermin.
4. Clearance around drain/ service (minimum): 50 mm
5. Dowels/ Shear key/ Front shutter: Provide where required.
6. Casting underpinning: In one lift, leaving a gap for packing up beneath existing foundation.
7. Packing: On completion of concrete curing period, hard pack gap between underpinning block and existing foundation. Allow packing to cure before commencing excavation for the next sequence of underpinning.

Testing - Not Used

Completion

910 Health and safety file–mass concrete underpinning

1. Requirement: Collate and submit a full set of records for inclusion in the health and safety file.
 - 1.1. Number of copies: Two
2. Content: For each underpinning block record:
 - 2.1. Date of casting.
 - 2.2. Depth of base below datum.

- 2.3. Length.
- 2.4. Width either side of wall.
- 2.5. Details of drains and services built into block and diameter of sleeving.
- 3. Latest date for submission: Within 14 days of completion

Ω End of Section

E05

In situ concrete construction generally

To be read with preliminaries/ general conditions.

223 Structural drawings and schedules

1. Standards
 - 1.1. Drawings: To 'Standard method of detailing structural concrete' published by the Institution of Structural Engineers.
 - 1.2. Reinforcement schedules: To BS 8666.

225 Temperature records

1. Requirement: Throughout period of concrete construction record:
 - 1.1. Daily: Maximum and minimum atmospheric shade temperatures
 - 1.2. Under adverse temperature conditions: Temperature at commencement and end of placing.
2. Equipment: Contractor's choice
 - 2.1. Location: In the shade, close to the structure.

235 Openings, inserts and fixings

1. Requirement: Collate all information.
2. Submit: Details where openings, inserts and fixings can only be accommodated by adjustments to reinforcement.
3. Locate reinforcement: To ensure specified minimum cover at openings and inserts and to be clear of fixing positions.

290 Accuracy of construction

1. Setting out: To BS 5964-1.
2. Geometrical tolerances: To IS EN 13670, Tolerance Class 1
 - 2.1. Conflicts: Notwithstanding tolerances specified elsewhere, do not exceed requirements for compliance with the designated code of practice.
 - 2.2. Substitution of alternative requirements: None

300 Levels of structural concrete floors

1. Tolerances (maximum)
 - 1.1. Level of floor: ± 10 mm as measured from nearest temporary bench mark
 - 1.2. Steps in floor level: Not applicable

310 Surface regularity of concrete floors to BS 8204 - general

1. Standard: To BS 8204-1 or -2.
2. Measurement: From underside of a 2 m straightedge (between points of contact) placed anywhere on surface and using a slip gauge.

315 Surface regularity of concrete floors to BS 8204 - tolerance class

1. Description: SR2
2. Location: As drawing 401
3. Abrupt changes: Not permitted

410 In situ concrete construction - supervision/ checking

1. Standard: To BS EN 13670, Execution Class 1

430 Surface cracking

1. Description: OF CONCRETE FLOOR SLABS
2. Method of measurement: graduated magnifying device
3. Maximum crack width: 0.3 mm
4. Action: Should cracks occur that are wider than the maximum crack width:
 - 4.1. Survey: Frequency and extent of such cracks and investigate cause.
 - 4.2. Report: Findings together with recommendations for rectification.

450 Inspection of water excluding structures

1. Notification: Give not less than seven days warning before inspection.
2. First inspection
 - 2.1. Purpose: To identify any defects which may lead to water penetration or damp patches.
 - 2.2. Timing: As soon as possible after completion of the work and before backfilling.
3. Final inspection
 - 3.1. Purpose: To identify any points of water penetration or damp patches.
 - 3.2. Timing: After backfilling, when the ground water table has returned to normal level.
4. Requirement: Exposed faces of the structure must show no signs of leakage and remain apparently dry

Ω End of Section

E10

Mixing/casting/curing in situ concrete

Concrete

*Must contain a minimum 30% GGBS, CEM1 not permitted & Environmental Declaration must be provided upon request

101 Specification

1. Concrete generally: In accordance with IS EN 206 and [BS 8500-2](#).
2. Exchange of information: Provide concrete producer with information required by [BS 8500-1](#), clauses 4 and 5.

105 Designated concrete

1. Description: for foundations, pile caps and reinforced ground-bearing slabs
2. Designation: RC28/35
3. Aggregates
 - 3.1. Maximum size: 10 mm.
 - 3.2. Coarse recycled aggregates: Not permitted.
 - 3.3. Special requirements: Limestone coarse aggregate.
4. Consistence class: Contractor's choice.
5. Special requirements for cement/ combinations: Cement or combinations to contain a minimum of 30% of ggbs by mass of cement.
6. Chloride class: Cl 0,40.
7. Admixtures: Concrete producer's choice.
8. Minimum air content: None.
9. Colour: None.
10. Additional mix requirements: None.
11. Fibres: Not required.

110 Basic designated concrete

1. Description: for mass concrete underpinning
2. Designation: RC20/25.
3. Coarse recycled aggregates: Not permitted.
4. Consistence class: Contractor's choice.
5. Additional requirements: Submit proposals.

125 Substitution of standardized prescribed concrete for designated concrete

1. General: Conforming to [BS 8500-2](#), clause 9.
2. Substitution: In accordance with [BS 8500-1](#), Table A.14.
 - 2.1. Proposals: Submit for each substitution, stating reasons.
3. Site mixing: Not permitted.
 - 3.1. Restrictions: maximum pour size of one cubic metre.

Materials, batching and mixing

215 Ready-mixed concrete

1. Production plant: Currently certified by a third-party body accredited by IAB/NSAI and in accordance with IS EN ISO/IEC 17065 for product conformity certification of ready-mixed concrete.
2. Source of ready-mixed concrete: Obtain from one source if possible . Otherwise, submit proposals.

- 2.1. Name and address of depot: Submit before any concrete is delivered.
- 2.2. Delivery notes: Retain for inspection.
3. Declarations of nonconformity from concrete producer: Notify contracts administrator and/ or specifier immediately.

221 Information about proposed concretes

1. Submit when requested: Details listed in [BS 8500-1](#), clause 5.2.
 - 1.1. Additional information: None.

225 Site additions or changes to specification

1. Site alterations of fresh concrete (outside concrete producer's responsibility): Prohibited.
 - 1.1. Addition of water on site: Prohibited.

230 Interruption of supply during concreting

1. Elements without joints: Where elements are detailed to be cast in a single pour without joints, make prior arrangements for a back-up supply of concrete.
2. Elsewhere
 - 2.1. Preparation: Manage pour to have a full face, and have materials available to form an emergency construction joint while concrete can still be worked.
 - 2.2. Before pour is completed: Submit location and details of joint, make proposals for joint preparation.

415 Admixtures

1. Calcium chloride and admixtures containing calcium chloride: Do not use.

490 Properties of fresh concrete

1. Adjustments to suit construction process: Determine with concrete producer. Maintain conformity to the specification.

Project testing/ certification

505 Project testing of concrete - general

1. Testing: Identity testing in accordance with IS EN 206 Annex B.
 - 1.1. Non-conformity: Any tests that result in a non-conformity should be reported to the contracts administrator and/ or specifier as soon as results are available.
2. Recording: Record location of the parts of the structure represented by each sample.

508 Regular project testing of concrete

1. Description: Compressive strength testing for pile caps and foundations
2. Tests: Compressive strength tests conforming to [BS EN 206](#), Annex B and in accordance with [BS EN 12390-3](#).
3. Sampling
 - 3.1. Point: At point of placing.
 - 3.2. Rate: One sample per 60 m³ for compressive strength testing.
4. Other requirements: Cubes for early age strength testing to be stored under the same conditions as the concrete component they are intended for.

520 Testing laboratory

1. Laboratory: An independent laboratory accredited by IAB / NSAI an equivalent accreditation body, as conforming to [IS EN ISO/IEC 17021-1](#) and [IS EN ISO/IEC 17025](#)

- 1.1. Name and UKAS reference number: Submit well in advance of making trial mixes or concrete for use in the works.

530 Tests results

1. Submission of reports: Within one day of completion of each test.
 - 1.1. Number of copies: Three copies.
 - 1.2. Method of copies: Digital format (PDF).
2. Reports on site: A complete set, available for inspection.

550 Broken cubes from failed strength tests

1. Record: Record all test data including cube ID, batch number, mix details, curing conditions, and test results.
 - 1.1. Evidence: Photograph the broken cubes for visual records and further analysis.
2. Period for keeping cubes: Obtain instructions.

Placing/ compacting/ curing and protecting

645 Spacing of movement joints

1. Description: ground-bearing slabs
2. Requirements: As [section E40](#).
 - 2.1. Distance between joints (maximum): Refer to drawing 401
 - 2.2. Area of pour (maximum): Refer to drawing 401

648 Adverse temperature conditions

1. Requirement: Submit proposals for protecting concrete when predicted ambient temperatures indicate risk of concrete freezing or overheating.

650 Surfaces to receive concrete

1. Cleanliness of surfaces immediately before placing concrete: Clean and damp with no debris, tie wire clippings, fastenings, free-standing water, oil, grease or chemicals.

660 Inspection of surfaces

1. Notice: Give notice to allow inspections of reinforcement and surfaces before each pour of concrete.
 - 1.1. Period of notice: Obtain instructions.
2. Timing of inspections: When reinforcement and formwork are ready for concreting.

670 Transporting

1. General: Avoid contamination, segregation, loss of ingredients, excessive evaporation and loss of workability. Protect from heavy rain.
2. Entrained air: Anticipate effects of transport and placing methods in order to achieve specified air content.

680 Placing

1. Records: Maintain for time, date and location of all pours.
2. Timing: Place as soon as practicable after mixing and while sufficiently plastic for full compaction.
3. Temperature limitations: as below
 - 3.1. Air temperature: Do not place concrete in air temperatures above 30°C (maximum) or below 5°C (minimum), unless agreed in advance with the producer any changes to the cement, admixtures or concrete temperature. Do not place against frozen (below 0°C) or frost covered surfaces.
 - 3.2. Concrete temperature: Concrete temperature at point of discharge should be less than 35 °C.

4. Continuity of pours: Place in final position in one continuous operation up to construction joints. Avoid formation of cold joints.
5. Discharging concrete: Prevent uneven dispersal, segregation or loss of ingredients or any adverse effect on the formwork or formed finishes.
6. Thickness of layers: To suit methods of compaction and achieve efficient amalgamation during compaction.
7. Poker vibrators: Do not use to make concrete flow horizontally into position, except where necessary to achieve full compaction under void formers and cast-in accessories and at vertical joints.

690 Compacting

1. General: Compact the concrete to full depth and around reinforcement and corners to remove entrapped air. Continue until air bubbles cease to appear on the top surface.
 - 1.1. Timing: Begin compaction immediately or as soon as practicable after placing.
 - 1.2. Areas for particular attention: Around reinforcement, under void formers, cast-in accessories, into corners of formwork and at joints.
2. Consecutive batches of concrete: Amalgamate without damaging adjacent partly hardened concrete.
3. Methods of compaction: Poker or beam vibration.

720 Vibrators

1. General: Maintain sufficient numbers and types of vibrator to suit pouring rate, consistency and location of concrete.
2. External vibrators: Obtain approval for use .

730 Plastic settlement

1. Settlement cracking: Inspect fresh concrete closely and continuously wherever cracking is likely to occur, including the top of deep sections and at significant changes in the depth of concrete sections.
 - 1.1. Timing: During the first few hours after placing and whilst concrete is still capable of being fluidized by the vibrator.
2. Removal of cracks: In hardened concrete, repair cracks according to [section C42](#). In pre-hardened concrete, re-vibrate before initial set while the concrete is still plastic enough to liquefy under vibration.

810 Curing generally

1. Requirement: Keep surface layers of concrete moist throughout curing period, including perimeters and abutments, by either restricting evaporation or continuously wetting surfaces of concrete.
 - 1.1. Timing: Curing and protection should start immediately after compaction.
 - 1.2. Surfaces covered by formwork: Retain formwork in position and, where necessary to satisfy curing period, cover surfaces immediately after striking.
 - 1.3. Surfaces not covered by formwork: Cover immediately after placing and compacting. If covering is removed for finishing operations, replace it immediately afterwards.
2. Surface temperature: Maintain above 5 °C throughout the specified curing period.
3. Records: Maintain details of location and timing of casting of individual batches, removal of formwork and removal of coverings. Keep records on site, available for inspection.

811 Coverings for curing

1. Sheet coverings: Suitable impervious material.
2. Curing compounds: Not permitted.
 - 2.1. Curing efficiency: Not less than 75% or for surfaces exposed to abrasion 90%.
 - 2.2. Colouring: Fugitive dye.
 - 2.3. Application to concrete exposed in the finished work: Readily removable without disfiguring the surface.

- 2.4. Application to concrete to receive bonded construction/ finish: No impediment to subsequent bonding.
3. Interim covering to top surfaces of concrete: Until surfaces are in a suitable state to receive coverings in direct contact, cover with impervious sheeting held clear of the surface and sealed against draughts at perimeters and junctions.

812 Preventing early age thermal cracking

1. Deep lifts or large volume pours: Contractor to submit proposals for curing to prevent early age thermal cracking.
 - 1.1. Limitations: Limit excessive restraint.

817 Curing class

1. Curing class: Curing class 2 to [ISEN 13670](#).

818 Curing periods generally

1. Minimum period: When not otherwise indicated, to [IS EN 13670](#), Annex F.8.5.

820 Curing periods

1. Description: for internal concrete
2. General: Curing periods are in days (minimum) .
 - 2.1. Definition of 't': The average surface temperature of concrete in degrees Celsius during the curing period.
3. Curing periods for concrete made using CEM1 strength class 42.5 or 52.5, or SRPC class 42.5
 - 3.1. Drying winds or dry, sunny weather (relative humidity < 50%): 6 days when surface temperature is between 5°C and 10°C $80/(t+10)$ when surface temperature is between 10°C and 25°C
 - 3.2. Intermediate conditions (relative humidity between 50 and 80%): 4 days when surface temperature is between 5°C and 10°C $60/(t+10)$ when surface temperature is between 10°C and 25°C
 - 3.3. Damp weather, protected from sun and wind (relative humidity > 80%): $100/(t+10)$
4. Curing periods for concrete made using cements listed in BS8500-1, Table A.6 except for those listed above and for supersulfated cement
 - 4.1. Drying winds or dry, sunny weather (relative humidity < 50%): 10 days when surface temperature is between 5°C and 10°C . $140/(t+10)$ when surface temperature is between 10°C and 25°C
 - 4.2. Intermediate conditions (relative humidity between 50 and 80%): 6 days when surface temperature is between 5°C and 10°C. $80/(t+10)$ when surface temperature is between 10°C and 25°C
 - 4.3. Damp weather, protected from sun and wind (relative humidity > 80%): $100/(t+10)$
5. Curing periods: For concretes using admixtures or other types of cements/ combinations: Submit proposals.
6. Other requirements: Increase curing period by any time during which surface temperature of concrete is less than 5°C

840 Protection

1. Prevent damage to concrete, including
 - 1.1. Surfaces generally: From rain, indentation and other physical damage.
 - 1.2. Surfaces to exposed visual concrete: From dirt, staining, rust marks and other disfiguration.
 - 1.3. Immature concrete: From thermal shock, physical shock, overloading, movement and vibration.
 - 1.4. In cold weather: From entrapment and freezing expansion of water in pockets, etc.

Ω End of Section

F10

Brick/ block walling

Clauses

Read in conjunction with Preliminaries and general conditions

100 Alterations

1. Description: Front elevation to be dismantled and rebuilt between ground and first floor levels

Types of walling

230 Reclaimed brick facing brickwork

1. Description: To reinstated arches and surrounding masonry at front elevation.
2. Reclaimed bricks: To match existing
 - 2.1. Condition: Sound, free from mortar and deleterious matter.
 - 2.2. Supplier/ Source: Contractor's choice
 - 2.3. Format: To match existing
3. Mortar: As section Z21.
 - 3.1. Standard: Not applicable
 - 3.2. Mix: NHL 3.5 Mortar
 - 3.2.1. Site-made hydraulic lime mortars: 1:2.5 NHL 3.5 hydraulic lime:sharp, well-graded sand
 - 3.3. Additional requirements: Submit samples of sand for approval
4. Bond: To match existing
5. Joints: Flush
6. Features: Brick arches, as detailed

315 Clay common brickwork

1. Description: For general above ground use in rendered walls
2. Bricks: To [IS EN 771-1](#)
 - 2.1. Size: 215 x 102 x 65 mm
 - 2.2. Mean compressive strength (minimum): 7.5 N/mm²
 - 2.3. Durability designation: F1 S2
 - 2.4. Density
 - 2.4.1. Gross dry: 1470 kg/m³
 - 2.4.2. Net dry: 2160 kg/m³
 - 2.5. Water absorption: Less than 12% by weight
 - 2.6. Configuration: Solid HD Unit Group 2 Structural
3. Mortar: As section Z21.
 - 3.1. Mix: Site-batched and mixed mortar: Select from:
 - 3.1.1. Site-made hydraulic lime mortars: 1:2.5 NHL 3.5 hydraulic lime:sharp, well-graded sand

355 Concrete common blockwork

1. Description: Concrete blockwork generally
2. Blocks: To [IS EN 771-3](#)
 - 2.1. Configuration: Group 1
 - 2.2. Compressive strength

- 2.2.1. Mean value: 13.0 N/mm² below ground level and 7.5N/mm² above ground level
- 2.2.2. Category: I
- 2.3. Freeze/ thaw resistance: Frost-resistant
- 2.4. Recycled content: None permitted
- 2.5. Work sizes (length x width x height): 440 x 100 x 215 mm
 - 2.5.1. Tolerance category: D1
- 2.6. Additional requirements: None
- 3. Mortar: As section Z21
 - 3.1. Standard: To [IS EN 998-2](#)
 - 3.2. Mix: 1:2:9 cement:lime:sand 2 N/mm² (class M2)
 - 3.2.1. Mortar to BS EN 998-2: 1:2:9 cement:lime:sand 2 N/mm² (class M2)
 - 3.3. Additional requirements: None
- 4. Bond: Half-lap stretcher

Testing - Not Used

Workmanship generally

430 Conditioning of clay bricks and blocks

- 1. Bricks and blocks delivered warm from manufacturing process: Do not use until cold.
- 2. Absorbent bricks in warm weather: Wet to reduce suction. Do not soak.

440 Conditioning of concrete bricks/ blocks

- 1. Autoclaved concrete bricks/ blocks delivered warm from manufacturing process: Do not use.
- 2. Age of nonautoclaved concrete bricks/ blocks: Do not use until at least four weeks old.
- 3. Avoidance of suction in concrete bricks/ blocks: Do not wet.
 - 3.1. Use of water retaining mortar admixture: Submit details.

460 Mortar designations

- 1. Mix proportions: For a specified designation select a mix from the following:
 - 1.1. Designation (i) (BS EN 998-2 M12 equivalent)
 - 1.1.1. 1:0-¼:3 (Portland cement:lime:sand with or without air entraining additive).
 - 1.1.2. 1:3 (Portland cement:sand and air entraining additive).
 - 1.2. Designation (ii) (BS EN 998-2 class M6 equivalent)
 - 1.2.1. 1:½:4-5 (Portland cement:lime:sand with or without air entraining additive).
 - 1.2.2. 1:3 (masonry cement:sand containing Portland cement and lime in approximate ratio 1:1, and an air entraining additive).
 - 1.2.3. 1:2½-3½ (masonry cement:sand containing Portland cement and inorganic materials other than lime and air entraining additive).
 - 1.2.4. 1:3-4 (Portland cement:sand and air entraining additive).
 - 1.3. Designation (iii) (BS EN 998-2 class M4 equivalent)
 - 1.3.1. 1:1:5-6 (Portland cement:lime:sand with or without air entraining additive).
 - 1.3.2. 1:3½-4 (masonry cement:sand containing Portland cement and lime in approximate ratio 1:1, and an air entraining additive).
 - 1.3.3. 1:4-5 (masonry cement:sand containing Portland cement and inorganic materials other than lime and air entraining additive).
 - 1.3.4. 1:5-6 (Portland cement:sand and air entraining additive).

- 1.4. Designation (iv) (BS EN 998-2 class M2 equivalent)
 - 1.4.1. 1:2:8-9 (Portland cement:lime:sand with or without air entraining additive).
 - 1.4.2. 1:4½ (masonry cement:sand containing Portland cement and lime in approximate ratio 1:1, and an air entraining additive).
 - 1.4.3. 1:5½-6½ (masonry cement:sand containing Portland cement and inorganic materials other than lime and air entraining additive).
 - 1.4.4. 1:7-8 (Portland cement:sand and air entraining additive).
2. Batching: Mix proportions by volume.
3. Mortar type: Continuous throughout any one type of masonry work.

500 Laying generally

1. Mortar joints: Fill vertical joints. Lay bricks, solid and cellular blocks on a full bed.
2. AAC block thin mortar adhesive and gypsum block adhesive joints: Fill vertical joints. Lay blocks on a full bed.
3. Clay block joints
 - 3.1. Thin-layer mortar: Lay blocks on a full bed.
 - 3.2. Interlocking perpend: Butted.
4. Bond where not specified: Half-lap stretcher.
5. Vertical joints in brick and concrete block facework: Even widths. Plumb at every fifth cross joint.

520 Accuracy

1. Courses: Level and true to line.
2. Faces, angles and features: Plumb.
3. Permissible deviations
 - 3.1. Position in plan of any point in relation to the specified building reference line and/ or point at the same level: ± 10 mm.
 - 3.2. Straightness in any 5 m length: ± 5 mm.
 - 3.3. Verticality up to 3 m height: ± 10 mm.
 - 3.4. Verticality up to 7 m height: ± 14 mm.
 - 3.5. Overall thickness of walls: ± 10 mm.
 - 3.6. Level of bed joints up to 5 m (brick masonry): ± 11 mm.
 - 3.7. Level of bed joints up to 5 m (block masonry): ± 13 mm.

535 Height of lifts in walling using cement-gauged or hydraulic lime mortar

1. Quoins and advance work: Rack back.
2. Lift height (maximum): 1.2 m above any other part of work at any time.
3. Daily lift height (maximum): 1.5 m for any one leaf.

561 Coursing brickwork with existing

1. Gauge: Line up with existing brick courses.

580 Laying frogged bricks

1. Single frogged bricks: Frog uppermost.
2. Double frogged bricks: Larger frog uppermost.
3. Frog cavity: Fill with mortar.

595 Lintels

1. Bearing: Ensure full length masonry units occur immediately under lintel ends.

610 Support of existing work

1. Joint above inserted lintel or masonry: Fully consolidated with semidry mortar to support existing structure.

620 Block bonding new walls to existing

1. Pocket requirements: Formed as follows:
 - 1.1. Width: Full thickness of new wall.
 - 1.2. Depth (minimum): 100 mm.
 - 1.3. Vertical spacing
 - 1.3.1. Brick to brick: 4 courses high at 8 course centres.
 - 1.3.2. Block to block: Every other course.
2. Pocket joints: Fully filled with mortar.

635 Jointing

1. Profile: Consistent in appearance.

645 Accessible joints not exposed to view

1. Jointing: Struck flush as work proceeds.

671 Fire-stopping

1. Avoidance of fire and smoke penetration: Fit tightly between cavity barriers and masonry. Leave no gaps.

690 Adverse weather

1. General: Do not use frozen materials or lay on frozen surfaces.
2. Air temperature requirements: Do not lay bricks/ blocks:
 - 2.1. In cement-gauged mortars when at or below 3°C and falling or unless it is at least 1°C and rising.
 - 2.2. In hydraulic lime:sand mortars when at or below 5°C and falling or below 3°C and rising, or as manufacturer's/ supplier's recommendations.
 - 2.3. In thin-layer mortars when outside the limits set by the mortar manufacturer.
3. Temperature of walling during curing: Above freezing until hardened.
4. Newly erected walling: Protect at all times from:
 - 4.1. Rain and snow.
 - 4.2. Drying out too rapidly in hot conditions and in drying winds.

Additional requirements for facework

710 The term facework

1. Definition: Applicable in this specification to brick/ block walling finished fair.
 - 1.1. Painted facework: The only requirement to be waived is that relating to colour.

730 Brick/ Concrete block samples

1. General: Before placing orders with suppliers submit for approval of appearance labelled samples of the following: Bricks as in clause F10/230 315 Blocks as in clause F10/355
2. Selection of samples: Representative of the range in variation of appearance.

750 Colour consistency of masonry units

1. Colour range: Submit proposals of methods taken to ensure that units are of consistent and even appearance within deliveries.
2. Conformity: Check each delivery for consistency of appearance with previous deliveries and with approved reference panels; do not use if variation is excessive.
3. Facing bricks should be blended on site from a minimum of three packs to ensure an even distribution of colour and texture variation.
4. Finished work: Free from patches, horizontal stripes and racking back marks.

760 Appearance

1. Brick/ block selection: Do not use units with damaged faces or arrises.
2. Cut masonry units: Where cut faces or edges are exposed cut with table masonry saw.
3. Quality control: Lay masonry units to match relevant reference panels.
 - 3.1. Setting out: To produce satisfactory junctions and joints with built-in features and components.
 - 3.2. Coursing: Evenly spaced using gauge rods.
4. Lifts: Complete in one operation.
5. Methods of protecting facework: Submit proposals.

780 Ground level

1. Commencement of facework: Not less than 150 mm below finished level of adjoining ground or external works level.

800 Toothed bond

1. New and existing facework in same plane: Bond together at every course to achieve continuity.

830 Cleanliness

1. Facework: Keep clean.
2. Mortar on facework: Allow to dry before removing with stiff bristled brush.
3. Removal of marks and stains: Rubbing not permitted.

Ω End of Section

F30

Accessories/Sundry Items for Brick/Block/Stone Walling

Cavities - Not Used

Reinforcing/ fixing accessories

241 Wall Starters/Connectors

1. Standard: To IS EN 845-1
2. Manufacturer: Contractor's choice
 - 2.1. Product reference: Contractor's choice
3. Material/ finish: Austenitic stainless steel - BS EN 845-1 material/ coating reference 1
4. End type: Asymmetrical deformed plate and fishtail for mortar bedding

Flexible damp-proof courses/ cavity trays - Not Used

Installation of dpcs/ cavity trays - Not Used

Joints - Not Used

Proprietary sills/ lintels/ copings/ dressings

735 Precast Concrete Lintels

1. Standard: To IS EN 845-2.
2. Manufacturer: Submit proposals
3. Types: Single
4. Sizes: As existing openings typically approx 200mm deep. 100/215mm wide x 215mm deep
5. Placement: Bed on mortar used for adjacent work.
 - 5.1. Bearing length (minimum): 150 mm or existing slot

755 Prefabricated Steel Lintels (newer)

1. Standard: To [IS EN 845-2](#).
2. Manufacturer: Contractor's choice
3. Types: Single
4. Material/ finish: Austenitic stainless steel – material/ coating reference L1
5. Sizes: As shown on drawings
6. Placement: Bed on mortar used for adjacent work.
 - 6.1. Bearing length (minimum): 150 mm

Miscellaneous items - Not Used

Ω End of Section

G12

Isolated structural metal members

Products

320 Steel members

1. Description: Generally
2. Standard: To IS EN 10025-2.
3. Steel: To IS EN 10025-2.
 - 3.1. Grade: S355 JR
 - 3.2. Section properties and dimensions: To [IS EN 10055](#) To [IS EN 10365](#)
 - 3.3. Surface condition: Free from heavy pitting and rust, burrs, sharp edges and flame-cutting dross.
4. Fire performance: Steelwork to be protected to maintain minimum EI 60 fire resistance to be in accordance with IS EN 13051-2.
5. Verification: CE Marking is mandatory for structural steel. Steel Sub-contractors SHALL demonstrate their right to CE Mark their products, in accordance with the Execution Class(es) specified for the works.
 - 5.1. Submittals: For fire performance verification, see the 'Fire performance' clause. Submit:
 1. A Factory Production Control (FPC) Certificate – issued by a notified body
 2. A Welding Certificate – issued by a notified body
 3. A Declaration of Performance (DoP) – issued by the steelwork Sub-contractor.Where a Steel Sub-Contractor is appointed, they SHALL sign one of the CIF Ancillary Certificates as the party assigned “to construct, supervise and certify the Sub-Contract Works”, Cs (CIF-01) or Css (CIF-02), clarifying, under “Description of the Sub-Contractor / Specialist Contractor buildings or works”, whether they supplied only or supplied and erected the steelwork, and also fill in the Annex* setting out the associated design work undertaken by them, e.g. connection design.
 - 5.2. Timing: Four weeks before commencing manufacture.

340 Bolt assemblies

1. Description: Generally
2. Standard: CE Marking is mandatory for structural steel. Steel Sub-contractors SHALL demonstrate their right to CE Mark their products, in accordance with the Execution Class(es) specified for the works.
3. Designation: Hexagon head bolts to IS EN ISO 4014, Grade A.
4. Property class: To IS EN ISO 898-1, Class 8.8.
5. Size: M16 and M20
6. Nuts and washers: Material grade and finish to suit bolts.
7. Coating applied by manufacturer: Sherardized.
8. Other requirements: Diameter of washers in contact with timber faces to be minimum three times bolt diameter, with a thickness not less than 0.25 times bolt diameter
9. Fire performance: Steelwork to be protected to maintain minimum EI 60 fire resistance to be in accordance with IS EN 13051-2.

Fabrication

510 Fabrication of steel members

1. Cuts and holes: Accurate and neat.
2. Welding: Metal arc method to [IS EN 1011-2](#).
 - 2.1. Welded joints: Fully fused, with mechanical properties not less than those of the parent metal.

- 2.2. Site welding: Not permitted
- 3. Joints: Location and layout of fastenings to suit fabrication drawing package.

Execution

610 Installation

- 1. Accuracy: Members positioned true to line and level using, if necessary, steel packs of sufficient area to allow full transfer of loads to bearing surfaces.
- 2. Fixing: Use washers under bolt heads and nuts.
 - 2.1. Tapered washers: Provide under bolt heads and nuts bearing on sloping surfaces. Match taper to slope angle and align correctly.

640 Preparation and priming

- 1. Sequence of working: Fabricate, prepare, prime.
- 2. Surfaces inaccessible after assembly: Apply full treatment and coating system, including, if necessary, local application of site coatings.
- 3. Galvanized/ sherardized fasteners: After steelwork erection and before applying site coatings, thoroughly degrease and clean. Etch prime.

650 Shop priming

- 1. Description: to steel beams generally
- 2. Preparation: To [IS EN ISO 12944-4](#). Remove fins, burrs, sharp edges and weld spatter, and clean out crevices.
 - 2.1. Surface finish: Blast-cleaned to [IS EN ISO 8501-1](#), Grade Sa 2½
 - 2.2. Prepared surfaces: Keep in a dry atmosphere and apply first coating without delay.
- 3. Priming
 - 3.1. Primer: High-build zinc phosphate epoxy
 - 3.1.1. Number of coats: Two
 - 3.1.2. Dry film thickness (minimum): First coat 20 micrometres, second coat 60 micrometres.
 - 3.2. Application: To [IS EN ISO 12944-7](#).
- 4. Other requirements: Overcoat ends of beams built into solid external walls with high-build bituminous paint. Extend coating from face of wall onto exposed steelwork.
- 5. Verification: System samples
 - 5.1. Submittals: Submit product data sheets
 - 5.2. Timing: Four weeks prior to priming

Completion

910 Steel-to-timber joints

- 1. General: Inspect accessible bolted and coach-screwed joints and tighten fasteners if necessary.
 - 1.1. Timing: Immediately prior to installation of finishes, on completion, and at end of the defects rectification or liability period.
 - 1.2. Confirmation: Give notice when inspections and adjustments have been made.

Ω End of Section

G20

Carpentry/ timber-framing/ first fixing

General

160 Grading and marking of structural timber

1. Standard: Timber strength graded by approved grading body to [IS EN 14081-1](#).
2. Marking: Timber to be individually marked in accordance with Irish National Annex to [IS EN 14081-1](#), and be CE marked.
3. Submittals : Manufacturer to provide Declaration of Performance (DoP) certificate and CE marking documentation.
4. Timber dry-graded for use in Service Class 1 and 2: Graded at an average moisture content not exceeding 20% with no reading being in excess of 24% and clearly marked as 'DG' (dry-graded).
5. Timber wet-graded for use in Service Class 3: Graded at an average moisture content above 20%.
6. Structural timber members cut from graded sections: Regraded to approval and marked accordingly.

Products

210 Structural softwood (graded direct to strength class)

1. Description: for structural use generally
2. Strength grading: Strength-graded and marked in accordance with [IS EN 14081-1](#).
3. Performance
 - 3.1. Structure: Refer to [section B50](#).
 - 3.1.1. Service class: Service Class 2.
 - 3.2. Fire: Refer to [section B05](#).
 - 3.2.1. Protection: passive protection by wall and ceiling linings
4. Product characteristics
 - 4.1. Strength class: C24.
 - 4.2. Target size: As shown on drawings.
 - 4.2.1. Tolerance class: T1.
 - 4.3. Preservative treatment: Timber must be treated in compliance with [BS 8417](#).
 - 4.3.1. Use class: Intermediate floor joists to UC1. Sole plates to UC2. External roof timbers to UC3.
 - 4.3.2. Desired service life: 60 years.
 - 4.3.3. Preservative type: Supplier's choice.
 - 4.3.4. Wood species: Supplier's choice.
 - 4.4. Flame-retardant treatment: None required.
 - 4.4.1. Service environment: Type INT 2.
 - 4.5. Surface finish: None required.

360 Joist gloves (fitted to decayed existing joist bearing ends)

1. Manufacturer: Contractor's choice
 - 1.1. Product reference: 10mm thk galvanised steel plate / angle
2. Dimensions: 600mm long
 - 2.1. Depth: 200mm
 - 2.2. Width: 100mm
3. Masonry depth: 140 mm.

Workmanship generally

401 Cross section dimensions of structural softwood and hardwood

1. Dimensions: Dimensions in this specification and shown on drawings are target sizes as defined in [IS EN 336](#).
2. Tolerance class: Tolerance Class 1 (T1) for sawn surfaces and Tolerance Class 2 (T2) for further processed surfaces. Maximum permitted deviations are as stated in [BS EN 336](#), clause 4.3.

420 Warping of timber

1. Bow, spring, twist and cup: Maximum warp for structural timber shall be no greater than permitted values given in Table A.2 in [IS EN 14081-1](#).

430 Selection and use of timber

1. Timber members damaged, crushed or split beyond the limits permitted by their grading: Do not use.

435 Notches, holes and joints in timber

1. Notches and holes
 - 1.1. General: Avoid if possible and consult structural engineer before any cutting, notching or significant drilling of structural timber.
 - 1.2. Sizes: Minimum needed to accommodate services.
 - 1.3. Position: Do not locate near knots or other defects.
 - 1.4. In same joist: Minimum of 100 mm apart horizontally.
 - 1.5. Notches in joists
 - 1.5.1. Position: Locate at top. Form by sawing down to a drilled hole.
 - 1.5.2. Depth (maximum): 0.15 x joist depth.
 - 1.5.3. Distance from supports: Between 0.1 and 0.2 x span.
 - 1.6. Holes in joists
 - 1.6.1. Position: Locate on neutral axis.
 - 1.6.2. Diameter (maximum): 0.25 x joist depth.
 - 1.6.3. Centres (minimum): Three x diameter of largest hole.
 - 1.6.4. Distance from supports: Between 0.25 and 0.4 of span.
 - 1.7. Notches in roof rafters, struts and truss members: Not permitted.
 - 1.8. Holes in struts and columns: Locate on neutral axis.
 - 1.8.1. Diameter (maximum): 0.25 x minimum width of member.
 - 1.8.2. Centres (minimum): Three x diameter of largest hole.
 - 1.8.3. Distance from ends: Between 0.25 and 0.4 of span.
2. Scarf joints, finger joints and splice plates: Do not use without approval.

440 Processing treated timber

1. Cutting and machining: Carry out as much as possible before treatment.
2. Extensively processed timber: Retreat timber sawn lengthways, thickened, planed, ploughed, etc.
3. Surfaces exposed by minor cutting/ drilling: Treat with two flood coats of a solution recommended by main treatment solution manufacturer.

450 Moisture content

1. Moisture content of wood and wood-based products at time of installation: Should not be more than 20% for service class 1 environments. Should not be more than 20% for service class 2 environments.

451 Moisture content testing

1. Procedure: When instructed, test timber sections with an approved electrical moisture meter.
2. Test sample: Test 5%, but not less than ten lengths of each cross section in the centre of the length.
3. Test results: 90% of values obtained to be within the specified range. Provide records of all tests.

460 Prototypes

1. Components: Prepare one of each of the following and arrange for inspection before starting repetitive fabrication: joist gloves.

520 Exposed end grain protection

1. Components: Seal exposed end grain of the following before delivery to site: All structural timber..
2. Sealer: An extra coat of primer.

Jointing timber

570 Jointing/ fixing generally

1. Generally: Where not specified precisely, select methods of jointing and fixing and types, sizes and spacings of fasteners in compliance with [section Z20](#).

580 Framing anchors

1. Manufacturer: Contractor's choice
2. Material/ finish: Galvanized low-carbon steel.
3. Fasteners: Galvanized or sherardized square twist nails.
 - 3.1. Size: Not less than size recommended by anchor manufacturer.
4. Fixing: Secure using not less than the number of nails recommended by anchor manufacturer.

615 Bolt/ screw assemblies

1. Description: Generally
2. Designation: Black bolts to [BS EN ISO 898-1](#), Grade 8.8.
3. Size: M16.
4. Coating applied by manufacturer: Sherardized coating to BS 7371-8
5. Nuts and washers: Material grade and finish to suit bolts.
6. Washer dimensions: Diameter/ side length of washers in contact with timber faces to be a minimum of three times bolt diameter, with a thickness of not less than 0.3 times bolt diameter.

630 Bolted joints

1. Bolt spacings (minimum): To [IS EN 1995-1-1](#), section 8.5.
2. Holes for bolts: Located accurately and drilled to diameters as close as practical to the nominal bolt diameter, and not more than 2 mm larger.
3. Washers: Placed under bolt heads and nuts that would otherwise bear directly on timber. Use spring washers in locations which will be hidden or inaccessible in the completed building.
4. Bolt tightening: So that washers just bite the surface of the timber. Ensure that at least one complete thread protrudes from the nut.
 - 4.1. Checking: At agreed regular intervals up to completion. Tighten as necessary.

660 Purpose-made metal components

1. Type of component: Rafter repair bracket
2. Drawing references: 405

3. Material: Stainless Steel plate, Grade S 275
4. Quality of materials and workmanship: As section Z11.

Erection and installation

710 Proposals for erecting structural timber

1. Proposals: Submit details of method and sequence of erection; types of craneage; and temporary guys and bracing proposed for use during erection.
2. Latest date for submission: Ten days before erection starts.

750 Modifications/ Repairs

1. Defects due to detailing or fabrication errors: Report without delay.
2. Methods of rectification: Obtain approval of proposals before starting modification or remedial work.
3. Defective/damaged components: Timber members/ components may be rejected if the nature and/or number of defects is deemed likely to result in an excessive amount of site repair.

760 Temporary bracing

1. Provision: As necessary to maintain structural timber components in position and to ensure complete stability during construction.

775 Bearings

1. Timber surfaces which are to transmit loads: Finished to ensure close contact over the whole of the designed bearing area.
2. Packings: Where provided, to cover the whole of the designed bearing area.
 - 2.1. Crushing strength: Not less than timber being supported.
 - 2.2. In external or inaccessible locations: Rot and corrosion proof.

780 Wall plates

1. Position and alignment: To give the correct span and level for trusses, joists, etc.
2. Bedding: Fully in fresh mortar.
3. Joints: At corners and elsewhere where joints are unavoidable use nailed half-lap joints. Do not use short lengths of timber.

784 Joists generally

1. Centres: Equal, and not exceeding designed spacing.
2. Bowed joists: Installed with positive camber.
3. End joists: Positioned approximately 50 mm from masonry walls.

786 Joists on hangers

1. Hangers: Bedded directly on and hard against supporting construction. Do not use packs or bed on mortar.
2. Joists: Cut to leave not more than 5 mm gap between ends of joists and back of hanger. Rebated to lie flush with underside of hangers.
3. Fixing to hangers: A nail in every hole.

795 Trimming openings

1. Trimmers and trimming joists: When not specified otherwise, not less than 25 mm wider than general joists.

820 Vertical restraint straps

1. Description: Roofs generally
2. Type: Bent
3. Manufacturer: Contractor's choice
4. Standard: CE marked in accordance with [IS EN 845-1](#).
5. Material/ finish: Galvanized steel.
6. Size
 - 6.1. Cross section: Not less than 30 x 5 mm.
 - 6.2. Length: Overall length 1500 mm: end of strap 900 mm below underside of wall plate; twisted immediately beneath joist/ trussed rafter; bent over top of joist/ trussed rafter and extending 100 mm down far side.
7. Centres: Not more than 1.2 m.
8. Fixing: To timber members with not less than two 30 x 3.5 mm galvanized square twist nails. To masonry with not less than five 48 mm x 70 mm masonry screws evenly spaced, with at least one screw located within 150 mm of the bottom end of each strap.

840 Strutting to floor joists

1. Type: Solid strutting - at least 38 mm thick softwood and at least three quarters of joist depth.
2. Fixing: For joist spans over 4.5m install two rows equally spaced at third-points.
3. Outer joists: Blocked solidly to perimeter walls.

850 Inspection generally

1. Structural timber-work: Give reasonable notice before covering up.

860 Bolted joint inspection

1. Timing: Inspect all accessible bolts at the end of the defects liability period and tighten if necessary.

Ω End of Section

J40

Flexible sheet waterproofing/ damp-proofing

To be read with preliminaries/ general conditions.

110 Soft blinding to hardcore beds

1. Material: Soft sand
 - 1.1. Thickness (minimum): 25 mm
2. Finish on completion: Smooth, consolidated bed free of sharp projections.

Types of tanking/ damp proofing

290 High-density polyethylene (PE-HD) studded sheets Type A

1. Substrate: Brickwork, Stonework, Blockwork
 - 1.1. Preparation: Primer
2. Manufacturer: [Delta Membrane Systems Ltd](#)
 - 2.1. Product reference: [Delta MS 500 - Waterproofing Membrane](#)
3. Third-party certification: BBA Agrément Certificate number 00/3742.
4. Stud height: 8 mm.
5. Sheet thickness: 0.5 mm.
6. Weight (minimum): Manufacturer's standard.
7. Colour: Clear.
8. Performance characteristics
 - 8.1. Flow rate: 2.25 L/s/m.
 - 8.2. Fire performance: Reaction to fire, to EN 13501-1: Class E.
9. Joint sealant: Delta-Rope to studded joints.
10. Typical compressive strength: >250 kN/m².
11. Service temperature range: -30°C to +80°C.
12. Fixing: Mechanically fix walling sheets
 - 12.1. Fasteners: Manufacturer's sealed polypropylene plugs with 50 mm diameter retaining head
 - 12.1.1. Fixing centres: 400 mm horizontal, 600 mm vertical
 - 12.1.2. Sealing: Taped flush with the membrane
13. Joints: Lapped minimum three studs
 - 13.1. Sealing: Butyl rubber sealant between the last two rows of studs and joints overtaped
14. Drainage components: None

297 Plastics sheets Type A

1. Substrate: Concrete lift pit base and walls
2. Manufacturer: [GCP Applied Technologies](#)
 - 2.1. Product reference: [Preprufe® 300R Plus LT - Pre-Applied Waterproofing Membrane](#)
3. Material: High-density polyethylene (HDPE).
4. Third-party certification: BBA Agrément Certificate.
5. Physical properties
 - 5.1. Dimensions
 - 5.1.1. Width (minimum): 1.17 m.
 - 5.1.2. Roll length (minimum): 31 m.

6. Sealant tape: Preprufe® tape.
7. Adhesion to concrete: 2.88 N/mm.
8. ShearStrength: 14.5 N/mm.
9. Hydrostatic resistance: >70 m.
10. Puncture resistance: 990 N.
11. Standard: To [IS EN 15814](#)
12. Number of layers: One
13. Bonding: Full adhesive bond
14. Joints
 - 14.1. Laps (minimum): 100 mm
 - 14.2. Sealing: Fully adhere; smooth out to exclude air

Workmanship

310 Workmanship generally

1. Condition of substrate
 - 1.1. Clean and even-textured, free from voids and sharp protrusions.
 - 1.2. Moisture content: Compatible with damp-proofing/ tanking materials.
2. Air and surface temperature: Do not apply sheets if below the minimum recommended by the membrane manufacturer.
3. Condition of membrane at completion
 - 3.1. Neat, smooth and fully supported, dressed well into abutments and around intrusions.
 - 3.2. Completely impervious and continuous.
 - 3.3. Undamaged. Prevent puncturing during following work.
4. Permanent overlying construction: Cover the membrane as soon as possible.

320 Inspection

1. Give notice: Before covering any part of the membrane with overlying construction.

335 Primers

1. Manufacturer: Submit proposals
2. Coverage per coat (minimum): As recommended for the purpose by the membrane manufacturer
3. Curing: Allow to dry thoroughly before covering.

380 Bitumen-impregnated softboards Type A

1. Manufacturer: [GCP Applied Technologies](#)
 - 1.1. Product reference: [Protection 03](#)
2. Thickness: 3 mm.
3. Impact resistance: 800 mm @ +35°C.
4. Application: Membrane surface clean and free from contaminants.
 - 4.1. Bonding: Not required
 - 4.2. Board joints: Butted
 - 4.3. Board contact with membrane: Secure and continuous.
5. Backfilling: Carry out when tanking, loading and protection are complete

Ω End of Section

R12

Below ground drainage systems

General

110 Below ground drainage system

1. Description: General
2. Surface water and rainwater drainage sources: Rainwater downpipes (nonsiphonic), as section R10 and composite gullies
3. Foul drainage sources: Discharge stack and branch pipes, as section R11
4. Land drainage sources: Below ground pipelines from land drainage, as section R13
5. Pipes, bends and junctions: Submit proposals PVC-U - solid wall
6. Manholes, inspection chambers, traps, and separators: Inspection chambers - brickwork, as section F10
Manholes and inspection chambers - concrete Manholes and inspection chambers - brick, as section F10 Oil and petrol separator units - plastics
 - 6.1. Accessories: Manhole channels and branches - conventional Sealing for concrete manholes - bituminous strips Vortex flow control units
7. Disposal: to outfalls and sewers

116 Groundwater pressure relief drainage system – filter drains

1. Description: High level of perimeter drain to external walls
2. Pipes, bends and junctions: Plastics -structured wall perforated, as section R16
3. Pipe beddings and surrounds: Class X, as section R16
 - 3.1. Capping: Geotextile membrane, as section R16
4. Disposal: To below ground drainage system
5. Accessories: None

System performance - Not Used

Products

329 Pipes, bends and junctions – supply

1. Pipes and fittings: From same manufacturer for each pipeline.

344 Pipes, bends and junctions - plastics - structured wall

1. Description: - SURFACE WATER DRAINAGE
2. Standard: Type B, to IS EN 13476-1 and -3, Kitemark or Agrément certified
 - 2.1. Supplementary requirements: Puncture resistance, jetting resistance and longitudinal bending to requirements of WIS 4-35-01, issue 2.
3. Material: PVC-U
4. Manufacturer: submit proposals
 - 4.1. Product reference: submit proposals
5. Sizes: 150 mm
6. Jointing type: Spigot and socket

346 Pipes, bends and junctions – pvc-u – solid wall

1. Description: - FOUL DRAINAGE
2. Standard: IS EN 1401-1 with flexible joints.

- 2.1. Class: SN8
- 3. Manufacturer: submit proposals
 - 3.1. Product reference: submit proposals
- 4. Sizes: 100mm, 150mm, 225mm, 375mm
- 5. Application area code: UD.

357 Connectors – saddle

- 1. Description: storm drains only
- 2. Standards
 - 2.1. Cast iron: To BS 437 and Kitemark certified, or Agrément certified.
 - 2.2. Clay: To BS EN 295-1 and Kitemark certified, or Agrément certified.
 - 2.3. Concrete: To BS 5911-6 and Kitemark certified, or Agrément certified.
 - 2.4. Plastics: To BS 4660 and Kitemark certified, BS EN 13598-1 or Agrément certified.
- 3. Material: Plastics
- 4. Manufacturer: Submit proposals
 - 4.1. Product reference: Submit proposals
- 5. Sizes: 150mm, 225mm

379 Warning marker tapes

- 1. Description: - FOUL DRAINAGE - SURFACE WATER DRAINAGE
- 2. Type: Heavy gauge polyethylene.
- 3. Manufacturer: Contractor's choice
 - 3.1. Product reference: Contractor's choice
- 4. Colour: submit proposals
- 5. Widths: 200 mm
- 6. Message: FOUL SEWER BELOW SURFACE WATER DRAIN BELOW
- 7. Wire detection aid: Required

401 Inspection chambers – plastics

- 1. Description: General
- 2. Standard: To IS EN 13598-1, IS EN 13598-2 or Agrément certified.
- 3. Diameter: 400 mm
- 4. Manufacturer: submit proposals
- 5. Bases
 - 5.1. Product reference: submit proposals
- 6. Access covers and frames
 - 6.1. Product reference: Contractor's choice
 - 6.2. Loading grades to BS EN 124: B125 C250

407 Manholes and inspection chambers – concrete

- 1. Description: Manholes
- 2. Standards
 - 2.1. To BS 5911-4 and BS EN 1917.
- 3. Manufacturer: submit proposals
- 4. Shape: Circular
- 5. Sizes: DN 1500 DN 1200 DN 1800

6. Cement type and content: To BS 5911-1 and IS EN 1916
7. Chamber sections
 - 7.1. Jointing type: Bituminous strips
8. Cover slabs
 - 8.1. Product reference: Submit proposals
 - 8.2. Thickness: 175 mm
 - 8.3. Loading grades to BS EN 124: D400
 - 8.4. Openings: To suit access covers.
9. Steps: Required in chambers over 900 mm deep
10. Vortex flow control unit: Required As drawing

439 Manhole steps

1. Description: General
2. Standard: To BS EN 13101.
3. Type: D
4. Manufacturer: Contractor's choice
 - 4.1. Product reference: Contractor's choice
5. Material: Plastics coated steel

496 Granular material – natural

1. Description: GENERAL
2. Standards: To Water Industry Specification WIS 4-08-02 (as amended by WIS 4-08-02A, 2008).
3. Supplier : Contractor's choice
4. Size: Dependent on location – see Execution clauses in this section, and in sections R16, R17 and R18, if used.

Fabrication - Not Used

Execution

613 Excavated material

1. Turf, topsoil, hardcore, etc: Set aside for use in reinstatement.

616 Selected fill for backfilling

1. Selected fill: As-dug material, free from vegetable matter, rubbish, frozen soil and material retained on a 40 mm sieve.
 - 1.1. Compaction: By hand in 100 mm layers.

623 Lower part of trench – general

1. Trench up to 300 mm above crown of pipe: Vertical sides, width as small as practicable.
 - 1.1. Width (minimum): External diameter of pipe plus 300 mm.

625 Lower part of trench – transition depth

1. Trench widths up to 300 mm above crown of pipe (maximum)
 - 1.1. DN 100 pipelines more than 6.0 m deep: 600 mm.
 - 1.2. DN 150 pipelines more than 5.4 m deep: 700 mm.
 - 1.3. DN 225 pipelines more than 4.0 m deep: 800 mm.
 - 1.4. DN 300 pipelines more than 2.9 m deep: 900 mm.

631 Type of subsoil

1. General: Where type of subsoil at level of crown of pipe differs from that stated for the type of bedding, surround or support, give notice.

635 Formation for beddings

1. Timing: Excavate to formation immediately before laying beddings or pipes.
2. Mud, rock projections, boulders and hard spots: Remove. Replace with consolidated bedding material.
3. Local soft spots: Harden by tamping in bedding material.
4. Inspection of excavated formations: Give notice.

641 Pipes at different levels in common trench

1. Subtrench: Permissible provided soil of step is stable and unlikely to break away.
 - 1.1. Subtrench not permissible: Trench depth as required for lower pipe. Increase thickness of bedding to upper pipe as necessary.
2. Lower pipe: Backfill with compacted granular material to at least half way up higher pipe.
3. Clear horizontal distance between pipes (minimum)
 - 3.1. Pipes up to DN 700: 350 mm.
 - 3.2. Pipes exceeding DN 700: 500 mm.

663 Class P support

1. Description: Foul sewer, surface water
2. Type of subsoil: Clay, sandy clay - firm
3. Granular material: Contractor's choice
 - 3.1. Sizes: To Water Industry Specification WIS 4-08-02 (as amended by WIS 4-08-02A, 2008).
4. Bedding
 - 4.1. Material: Granular, compacted over full width of trench.
 - 4.2. Thickness (minimum): 100 mm.
5. Pipes: Dig slightly into bedding, rest uniformly on barrels and adjust to line and gradient.
6. Initial testing before placing support: Required
7. Support
 - 7.1. Material: Granular.
 - 7.2. Depth: To slightly above crown of pipe.
 - 7.3. Compaction: By hand.
8. Backfilling
 - 8.1. Material and depth
 - 8.1.1. Protective cushion of selected fill to 300 mm above crown of pipe; or
 - 8.1.2. Additional granular material, to 100 mm above crown of pipe.
 - 8.2. Compaction: By hand in 100 mm layers.

665 Class Q surround

1. Description: Storm water (partially)
2. Type of subsoil: Clay, sandy clay - firm
3. Granular material: Contractor's choice
 - 3.1. Sizes: To Water Industry Specification WIS 4-08-02 (as amended by WIS 4-08-02A, 2008).
4. Bedding
 - 4.1. Material: Granular, compacted over full width of trench.

- 4.2. Thickness (minimum): 100 mm.
- 5. Pipes: Dig slightly into bedding, rest uniformly on barrels and adjust to line and gradient.
- 6. Initial testing before placing support: Required
- 7. Surround
 - 7.1. Material: Granular.
 - 7.2. Depth (minimum): To 75 mm above crown of pipe.
 - 7.3. Compaction: By hand.
- 8. Protection slabs
 - 8.1. Material: Concrete
 - 8.1.1. Type: Reinforced.
 - 8.2. Thickness: 150 mm
 - 8.3. Reinforcement: A393
 - 8.4. Minimum bearing: 300 mm.
- 9. Backfilling: Soil or topsoil, as appropriate.

683 Laying pipelines

- 1. Laying pipes: To true line and regular gradient on even bed for full length of barrel with sockets (if any) facing up the gradient.
- 2. Ingress of debris: Seal exposed ends during construction.
- 3. Timing: Minimize time between laying and testing.

685 Jointing pipelines

- 1. Connections: Durable, effective and free from leakage.
- 2. Junctions, including to differing pipework systems: With adaptors intended for the purpose.
- 3. Cut ends of pipes: Clean and square. Remove burrs and swarf. Chamfer pipe ends before inserting into ring seal sockets.
- 4. Jointing or mating surfaces: Clean and, where necessary, lubricate immediately before assembly.
- 5. Allowance for movement: Provide and maintain appropriate clearance at ends of spigots as fixing and jointing proceeds.
- 6. Jointing material: Do not allow to project into bore of pipes and fittings.

687 Concrete surround for crossovers

- 1. Class Z surround: Provide where two pipelines (other than plastics pipes) cross with less than 300 mm separation.
 - 1.1. Extent, on both pipes: 1 m centred on the crossing point, and beyond as necessary to come within 150 mm of nearest flexible joints.

689 Pipelines passing through structures

- 1. Pipelines that must be cast in or fixed to structures (including manholes, catchpits and inspection chambers): Provide 600 mm long rocker pipes adjacent to the external face of the structure (or both faces where appropriate, e.g. walls to footings), with flexible joints at both ends.
 - 1.1. Distance to rocker pipe from structure (maximum): 150 mm.
- 2. Provision for movement for pipelines that need not be cast in or fixed to structures (e.g. walls to footings)
 - 2.1. Rocker pipes as specified above; or
 - 2.2. Openings in the structures to give 50 mm minimum clearance around the pipeline. Closely fit a rigid sheet to each side of opening to prevent ingress of fill or vermin.

691 Bends at base of soil stacks

1. Type: Nominal 90° rest bends
 - 1.1. Radius to centreline of pipe (minimum): 200 mm
2. Height of invert of horizontal drain at base of stack below centreline of lowest branch pipe (minimum): 450 mm
3. Bedding: Do not impair flexibility of pipe couplings.
 - 3.1. Material: Concrete.

693 Direct connection of ground floor wcs to drains

1. Drop from crown of WC trap to invert of drain (maximum): 1.3 m
2. Horizontal distance from the drop to a ventilated drain (maximum): 6 m.

695 Backdrop pipes outside manhole walls

1. Excavation beneath backdrop pipe: Backfill.
 - 1.1. Material: Concrete.
2. Pipe encasement:
 - 2.1. Material: Concrete.
 - 2.2. Thickness (minimum): 150 mm.

697 Installing flexible couplings

1. Ends of pipes to be joined: Cut cleanly and square.
2. Outer surfaces of pipes to be joined: Clean and smooth. Where necessary, e.g. on concrete or iron pipes, smooth out mould lines and/ or apply a cement grout over the sealing area.
3. Clamping bands: Tighten carefully to make gastight and watertight seals.

699 Connections to sewers

1. General: Connect new pipework to existing adopted sewers to the requirements of the adopting authority or its agent.

705 Initial testing of pipelines

1. Before testing
 - 1.1. Cement mortar jointing: Leave 24 h.
 - 1.2. Solvent welded pipelines: Leave 1 h.
2. Method: Block open ends of pipelines to be tested and pressurise. Air test short lengths to BS EN 1610.

711 Trench supports

1. Removal of trench supports and other obstacles: Sufficient to permit compacted filling of all spaces.

715 Backfilling to pipelines

1. Backfilling above top of surround or protective cushion: Material excavated from trench, compacted in layers 300 mm (maximum) thick.
2. Heavy compactors: Do not use before there is 600 mm (total) of material over pipes.

720 Backfilling under roads and pavings

1. Backfilling from top of surround or protective cushion up to formation level: Granular sub-base material, laid and compacted in 150 mm layers.

728 Laying warning marker tapes

1. Installation: During backfilling, lay continuously over pipelines.
2. Depth: 300-400 mm.
 - 2.1. Pipelines deeper than 2 m: Lay an additional tape 600 mm above the top of the pipeline.

732 Temporary bridges

1. Trench bridges: As necessary to prevent construction traffic damaging pipes after backfilling.

734 Installing access points and gullies

1. Backfilling
 - 1.1. Material: Granular - natural, size 4/10 to IS EN 13242, to 300 mm above crown of pipes, then selected fill
 - 1.2. Compaction: By hand in 100 mm layers.
2. Setting out relative to adjacent construction features: Square and tightly jointed.
3. Permissible deviation in level of external covers and gratings: +0 to -6 mm.
4. Raising pieces (clay and concrete units): Joint with 1:3 cement:sand mortar.
5. Exposed openings: Fit purpose made temporary caps. Protect from traffic.

743 Installing concrete manholes

1. Bases
 - 1.1. Material: Concrete
 - 1.2. Thickness (minimum): 270mm
2. Surround
 - 2.1. Material: Concrete
 - 2.2. Thickness (minimum): 150 mm
 - 2.3. Height: Full height
3. Backfilling
 - 3.1. Material: Granular - manufactured, size 4/10 to IS EN 13242, to 100 mm above crown of pipes, then selected fill
 - 3.2. Compaction: By hand in 100 mm layers.

776 Exposed openings in inspection chambers, access points, fittings and equipment

1. General: Fit purpose made temporary caps. Protect from site traffic.

Completion

901 Removal of debris and cleaning

1. Preparation: Lift covers to manholes, inspection chambers and access points. Remove mortar droppings, debris and loose wrappings.
 - 1.1. Timing: Before cleaning, final testing, CCTV inspection if specified, and immediately before handover.
2. Cleaning: Thoroughly flush pipelines with water to remove silt and check for blockages. Rod pipelines between access points if there is any indication that they may be obstructed.
3. Washings and detritus: Do not discharge into sewers or watercourses.
4. Covers: Securely replace after cleaning and testing.

903 Temporary measures

1. Water used to stabilize tanks and the like during installation: Drain.

911 Testing and inspection

1. Dates for testing and inspection: Give notice.
 - 1.1. Period of notice: 3 work days

921 Final testing of private gravity drains and sewers up to dn 300

1. Before testing
 - 1.1. Cement mortar jointing: Leave 24 h.
 - 1.2. Solvent welded pipelines: Leave 1 h.
2. Standard: To Building Regulations.
3. Method: Water

941 Water testing of manholes and inspection chambers

1. Timing: Before backfilling.
2. Standard
 - 2.1. Exfiltration: To IS EN 1610.
 - 2.2. Method: Testing with water (method W).
 - 2.3. Infiltration: No identifiable flow of water penetrating the chamber.

971 CCTV inspection of private pipelines

1. General: Carry out and record internal inspection using CCTV equipment.
 - 1.1. Locations to be inspected: Foul and surface water drains
2. Illumination: Of adequate intensity.
3. Recording: Provide continuous position recording, still photographs and stopping of the camera at any point.
 - 3.1. Copy of videotape recording: Submit.

978 Lifting keys

1. Lifting keys: Supply suitable keys for each type of access cover.
 - 1.1. Timing: At completion.

Ω End of Section

R16

Groundwater pressure relief drainage

Products

305 Below-ground drainage systems – products

1. Products generally: As section R12.

335 Pipes, bends and junctions – plastics – structured wall perforated

1. Description: For use in all filter drains
2. Standard: To [IS EN 13476-1](#) and [BS EN 13476-2](#), and Kitemark-certified or Agrément-certified
 - 2.1. Supplementary requirements: Stiffness, SN 8 in accordance with [BS EN 13476-1](#) and [BS EN 13476-3](#)
3. Sizes: DN 110
4. Jointing type: Spigot and socket
5. Integral accessories: Bends

375 Geotextile membrane for groundwater pressure relief drainage

1. Manufacturer: Contractor's choice
 - 1.1. Product reference: Contractor's choice

Execution

605 Below-ground drainage systems – execution

1. Execution generally: As [section R12](#).

630 Laying perforated pipes

1. Pipe types laid with perforations up: Plastics – structured wall
2. Pipe types laid with perforations down: None

640 Granular bedding and surround

1. Bedding
 - 1.1. Granular material: Natural
 - 1.1.1. Size: 4/10 to [IS EN 13242](#)
 - 1.2. Depth: 75 mm
 - 1.3. Width (minimum): 100 mm wider than pipe
2. Surround
 - 2.1. Granular material: Natural
 - 2.1.1. Size: 4/10 to [IS EN 13242](#)
 - 2.2. Depth: Compact by hand to 150 mm above crown of pipe

650 Laying filter drain cappings

1. Geotextile membrane : Lay over completed surround and tuck down trench side by 100 mm minimum before backfilling. Protect from damage during subsequent construction.
2. Jointing: Overlap 300 mm (minimum)

Ω End of Section

Z21

Mortars

Cement gauged mortars - Not Used

Lime:sand mortars

310 Lime:Sand Mortar Mixes

1. Specification: Proportions and additional requirements for mortar materials are specified elsewhere.

320 Sand for Lime:Sand Masonry Mortars

1. Type: Sharp, well graded.
 - 1.1. Quality, sampling and testing: To IS EN 13139.
 - 1.2. Grading/ Source: As specified elsewhere in relevant mortar mix items.

350 Storage of Lime:Sand Mortar Materials

1. Sands and aggregates: Keep different types/ grades in separate stockpiles on hard, clean, free-draining bases.
2. Ready prepared nonhydraulic lime putty: Prevent drying out and protect from frost.
3. Nonhydraulic lime:sand mortar: Store on clean bases or in clean containers that allow free drainage. Prevent drying out or wetting and protect from frost.
4. Bagged hydrated hydraulic lime: Store off the ground in dry conditions.

360 Making Lime:Sand Mortars Generally

1. Batching: By volume. Use clean and accurate gauge boxes or buckets.
2. Mixing: Mix materials thoroughly to uniform consistency, free from lumps.
3. Contamination: Prevent intermixing with other materials, including cement.

400 Making Hydraulic Lime:Sand Mortars

1. Mixing hydrated hydraulic lime:sand: Follow the lime manufacturer's recommendations for each stage of the mix.
 - 1.1. Water quantity: Only sufficient to produce a workable mix.
2. Working time: Within limits recommended by the hydraulic lime manufacturer.

Ω End of Section

