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STRUCTURAL ENGINEER'S SPECIFICATION
March 2023
P2 – Preliminary

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CONTENTS

## B50 GENERAL STRUCTURAL REQUIREMENTS

To be read with Preliminaries/ General conditions/ work sections.

**GENERAL**

110 EUROCODES
- National Annexes: Reference to a Eurocode, or to an execution or a material standard referenced therein, is deemed to include the appropriate United Kingdom National Annex, to the Eurocode or referenced standard. Nationally determined parameters shall apply. Non-contradictory complementary information: Applies when referenced in the National Annex.
- Substitution of alternative design rules for Eurocode Application Rules: Permitted

120 STRUCTURAL WORK
- Designated codes of practice: Generally, to Eurocodes appropriate to the nature of the structure, but ETAG001 for fixings to concrete.
- Design working life: Category 4 to BS EN 1990
- 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.
- Special requirements: None

130 CONTRACTOR'S DESIGN
- Engineer responsible for overall stability of structure: Contractor's Engineer
- Design supervision/ checking levels: To BS EN 1990, table B4, level DSL2
- Design requirements: None additional
- Design quality control: Submit proposals if not certified as compliant with BS EN ISO 9001
- Maintenance: Make provision for and submit details of requirements to ensure the safety and serviceability of the structure, including:
  - Critical parts that should be regularly inspected, with recommendations for the frequency of inspection.
  - Elements susceptible to corrosion, mechanical wear or fatigue that may need to be reconstructed or replaced during the design working life of the structure.
  - Means of safe access for maintenance and repair.

131 ADDITIONAL CONTRACTOR'S DESIGN

The Contractor is responsible for the detail design and detailing of:
- All Temporary works, including temporary bases and fixings to main structures.
- All piling and embedded pile retaining walls, including plunge piles and tension piles.
- All scaffolds and their fixings, including their bases.
- All steelwork connections including connections between steelwork to steelwork and between steelwork and concrete.
- All staircases, their balustrades and their supports to main structure.
- All M&E plant bases and fixings.
- All non-load bearing walls and their head restraints.
- All cladding systems and all associated connections to structure, hardware, including all cat-in items which are required for the cladding design and head restraints, together with joints and wind posts.
- All fire protection including fire stopping to builder's work holes.
- All fixings required to attach miscellaneous items to the structure.
- All water stopping at construction joints.
- All repair works to existing masonry and to any cut or damage surfaces.
- All corrosion protection of steel bars and members.
- All others structural elements as may be identified on site.

The Contractor will be responsible for obtaining all necessary building regulation and approvals for the above structural design.

140 CONTRACTOR'S DESIGN - ADDITIONAL REQUIREMENTS FOR GEOTECHNICAL WORK
- General requirements for design and supervision: Category 2 to BS EN 1997-1
- Existing subsoil conditions:
  - Soil strength and density: As ground Investigation
  - Ground water conditions: As ground Investigation

150 GROUND INVESTIGATION REPORT
- Requirement: Consider adequacy of data provided and submit proposals if additional investigation will be necessary to justify design
- Datum for borehole logs: Ordnance (Newlyn) datum
- Obstructions and voids: As described in Ground Investigation Report

160 GEOTECHNICAL DESIGN REPORT
- Standard: To BS EN 1997-1.
- Requirement: Consider the information provided and submit calculation and information necessary to extend the geotechnical report to cover Contractor's geotechnical design.
  - Procedures to be adopted to achieve the design requirements: Earth retaining structures: Requirements for adequate compacting the fill behind the structure without causing excessive earth pressure and limits on construction surcharge loadings.
  - 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.
  - Modification of geotechnical design: Before implementing, submit details and reasons.
- Monitoring:
  - Assumed ground conditions: Consider adequacy of proposals for identifying differences between actual ground conditions with assumed in the geotechnical design and submit proposals for extending these to cover Contractor's design.
  - Performance criteria to justify adequacy of work: As section D20
  - Existing buildings/ below ground services: Confirm that execution of work will not damage existing structure/services.

**PERFORMANCE**

210 CONSEQUENCE FOR LOCALIZED FAILURE FROM AN UNSPECIFIED CAUSE
- Standard: to BS EN 1991-1-7, Annex A
  - Consequence class: 2a
  - Building Class: 1a
- Design requirements: None additional

230 PERFORMANCE CRITERIA FOR STRUCTURE TO BE SUPPORTED ON FOUNDATIONS
- Permitted settlement at serviceability limit state (maximum): As detail by MBP

240 PERFORMANCE CRITERIA FOR RETAINING STRUCTURES
- Limits on movements:
  - Settlement (maximum): As detailed on drawings and specification.
  - Forward movement (maximum): From combined slip and deflection: As detailed on drawings and specification.

250 LIMITS ON MOVEMENT GENERATED BY CONSTRUCTION
- Definition of critical values:
  - Threshold value: The value beyond which further movement will be of significant concern.
  - Action value: The value at which execution must cease.
- Precautions: Take as follows if movements reach critical values:
  - Threshold: Review situation, assess possible causes and submit proposals to ensure that action values are not exceeded.
  - Action: Stop work, report and revise working procedures to prevent further movements.

310 DAMAGE TO EXISTING STRUCTURES AND SERVICES
- Permissible damage criteria:
  - Structures: No damage permitted
  - Services: No damage permitted

320 LOADS/ ACTIONS
- Generally: Specified loads/ actions are characteristic values unless otherwise described.

390 IMPOSED LOADS ON PARAPETS AND BARRIERS TO PEDESTRIAN AREAS.
- Standard: To BS EN 1991-1-1.
- Horizontal loading: Category (vi)
  - Height of application: 1.2 above Finish Floor Level.
- Vertical loading: None applicable
- Location of posts: As per Architect's drawings. Fabricator to submit design and details of the balustrade and their fixings to Architect and Structural Engineer.

**EXECUTION**

700 EXECUTION GENERALLY
- Standard: Report conflict between specification and the designated codes of practice and the standards referenced therein before ordering affected materials or executing affected work.
- Inspection levels: To BS EN 1990
  - Special requirements: None
- Quality control: Submit proposals if not certified as compliant with BS EN ISO 9001
- Tolerances: Notwithstanding tolerances specified elsewhere, do not exceed requirements for compliance with the designated code.

705 CONNECTIONS AND ANCHORAGES
- 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.
- Report locations where:
  - Type and number of fixings cannot be accommodated.
  - Size or position of members prevents correct positioning.

720 STABILITY DURING EXECUTION
- Permanent bracing system: Floors and walls
  - Vertical: Below ground - new reinforced concrete lining walls and columns.
  - Horizontal: Below ground - New reinforced concrete floors.
- Temporary bracing/ restraints: Provide as necessary until permanent bracing system is complete and sufficiently mature to carry loads and all connections have been made to the permanent system.
  - Special requirements: None
- Design loads: Structure has been designed for the completed state.
  - Magnitude: As per MBP design
- Before loading structure: Take into account:
  - Reduction in strength due to immaturity of elements.
  - Reduction in loadbearing capacity due to partial completion of continuous elements.

730 RESTRICTIONS ON USE OF GROUND SURFACE BEHIND EARTH RETAINING STRUCTURES
- Surcharge loading (maximum): Restrict loading on upper ground surface behind structure 10 kN/$m^2$
  - Extent of restriction: For the distance of the retained structure.

740 CONDITION SURVEY OF EXISTING BUILDINGS AND STRUCTURES
- Application: All neighbouring structures.
- Before starting work: Survey structure. Record and take photographs of damaged or defective areas.
  - Items to be recorded: Location, extent and magnitude of cracks, spalling, indications of movement, previous repairs, modifications and other irregularities of the fabric.
  - Additional investigations: Trial pits along existing boundary walls and front and back elevation.
- Information supplied: as per Architect's details
- Report: Submit for comment.
  - Include recommendations: For monitoring of cracks width.

780 CRACK MONITORING OF EXISTING BUILDINGS/ STRUCTURES
- Application: All neighbouring buildings.
- Survey points: Agree number and location of survey points, record initial readings and mark and date extent of cracks.
- Method of measuring crack widths: Submit proposals.
- New or extending cracks: Mark extent and record date. Report and make proposals for additional monitoring points.

**COMPLETION**

900 GEOTECHNICAL RECORDS
- Submit:
  - Details and results of monitoring.
  - Details and purpose of any changes to the geotechnical work.
- Timing: within 7 days of the completion of each stage of geotechnical works.
- Special requirements: Update geotechnical design report and submit for inclusion in the Building Manual.

## C20 DEMOLITION

To be read with Preliminaries/ General conditions.

### GENERAL REQUIREMENTS

110 DESK STUDY/ SURVEY
- Scope: Before starting deconstruction/ demolition work, examine available information, and carry out a survey of:
  - the structure or structures to be deconstructed/ demolished,
  - the site on which the structure or structures stand, and
  - the surrounding area.
- Report and method statements: Submit, describing:
  - Form, condition and details of the structure or structures, the site, and the surrounding area.
  - Type, location and condition of adjoining or surrounding premises that might be adversely affected by removal of the structure or structures, or by noise, vibration and/ or dust generated during deconstruction/ demolition.
  - Identity and location of services above and below ground, including those required for the Contractor's use, and arrangements for their disconnection and removal.
  - Form and location of flammable, toxic or hazardous materials, including lead-based paint, and proposed methods for their removal and disposal.
  - Form and location of materials identified for reuse or recycling, and proposed methods for removal and temporary storage.
  - Proposed programme of work, including sequence and methods of deconstruction/ demolition.
  - Details of specific pre-weakening required.
  - Arrangements for protection of personnel and the general public, including exclusion of unauthorized persons.
  - Arrangements for control of site transport and traffic.
  - Special requirements: None.
- Format of report: 1No paper copy and 1No electronic copy.

120 EXTENT OF DECONSTRUCTION/ DEMOLITION
- General: Subject to retention requirements specified, refer to Architect’s drawings.

130 GROUNDWORKS
- Old foundations, slabs and the like: Break out in locations and to the extents stated.
- Contaminated material: Remove and carry out remediation required by the Enforcing Authority.

140 BENCHMARKS
- Unrecorded benchmarks and other survey information: Give notice when found. Do not remove marks or destroy the fabric on which they are found.

150 FEATURES TO BE RETAINED
- General: Keep in place and protect as per Architects and Engineer’s drawings.

### SERVICES AFFECTED BY DECONSTRUCTION/ DEMOLITION

210 SERVICES REGULATIONS
- Work carried out to or affecting new and/ or existing services: Carry out in accordance with the byelaws and/ or regulations of the relevant Statutory Authority.

220 LOCATION OF SERVICES
- Services affected by deconstruction/ demolition work: Locate and mark positions.
- Mains services marking: Arrange with the appropriate authorities for services to be located and marked.
  - Marking standard: In accordance with National Joint Utilities Group 'Guidelines on the positioning and colour coding of underground utilities 'apparatus'.

230 SERVICES DISCONNECTION ARRANGED BY CONTRACTOR
- General: Arrange with the appropriate authorities for disconnection of services and removal of fittings and equipment owned by those authorities prior to starting deconstruction/ demolition.

240 DISCONNECTION OF DRAINS
- General: Locate, disconnect and seal disused foul and surface water drains.
- Sealing: Permanent, and within the site.

250 LIVE FOUL AND SURFACE WATER DRAINS
- Drains and associated manholes, inspection chambers, gullies, vent pipes and fittings:
  - Protect; maintain normal flow during deconstruction/ demolition.
  - Make good any damage arising from deconstruction/ demolition work.
  - Leave clean and in working order at completion of deconstruction/ demolition work.
- Other requirements: None.

260 SERVICE BYPASS CONNECTIONS
- General: Provide as necessary to maintain continuity of services to occupied areas of the site on which the deconstruction/ demolition is taking place and to adjoining sites/ properties.
- Minimum notice to adjoining owners and all affected occupiers: 72 hours if shutdown is necessary during changeover.

270 SERVICES TO BE RETAINED
- Damage to services: Give notice and notify relevant service authorities and/ or owner/ occupier regarding damage arising from deconstruction/ demolition.
- Repairs to services: Complete as directed, and to the satisfaction of the service authority or owner.

**DECONSTRUCTION/ DEMOLITION WORK**

310 WORKMANSHIP
- Standard: Demolish structures in accordance with BS 6187.
- Operatives:
  - Appropriately skilled and experienced for the type of work.
  - Holding, or in training to obtain, relevant CITB Certificates of Competence.
- Site staff responsible for supervision and control of work: Experienced in the assessment of risks involved and methods of deconstruction/ demolition to be used.

320 GAS OR VAPOUR RISKS
- Precautions: Prevent fire and/ or explosion caused by gas and/ or vapour from tanks, pipes, etc.

330 DUST CONTROL
- General: Reduce airborne dust by periodically spraying deconstruction/ demolition works with an appropriate wetting agent. Keep public roadways and footpaths clear of mud and debris.
- Lead dust: Submit method statement for control, containment and clean-up regimes.

340 HEALTH HAZARDS
- Precautions: Protect site operatives and general public from hazards associated with vibration, dangerous fumes and dust arising during the course of the Works.

350 ADJOINING PROPERTIES
- Temporary support and protection: Provide. Maintain and alter, as necessary, as work proceeds. Do not leave unnecessary or unstable projections.
- Defects: Report immediately on discovery.
- Damage: Minimize. Repair promptly to ensure safety, stability, weather protection and security.
- Support to foundations: Do not disturb.

360 STRUCTURES TO BE RETAINED
- Extent: As per Architects and Engineer's drawings
- Parts which are to be kept in place: Protect.
- Interface between retained structures and deconstruction/ demolition: Cut away and strip out with care to minimize making good.

370 PARTLY DEMOLISHED STRUCTURES
- General: Leave in a stable condition, with adequate temporary support at each stage to prevent risk of uncontrolled collapse. Make secure outside working hours.
- Temporary works: Prevent overloading due to debris.
- Access: Prevent access by unauthorized persons.

380 DANGEROUS OPENINGS
- General: Provide guarding at all times, including outside of working hours. Illuminate during hours of darkness.
- Access: Prevent access by unauthorized persons.

390 ASBESTOS-CONTAINING MATERIALS - KNOWN OCCURRENCES
- General: Locations with materials containing asbestos to be confirmed subject to receipt of asbestos survey.
- Removal: By contractor licensed by the Health and Safety Executive, and prior to other works starting in these locations.

391 ASBESTOS-CONTAINING MATERIALS - UNKNOWN OCCURRENCES
- Discovery: Give notice immediately of suspected asbestos-containing materials when discovered during deconstruction/ demolition work. Avoid disturbing such materials.
- Removal: Submit statutory risk assessments and details of proposed methods for safe removal.

410 UNFORESEEN HAZARDS
- Discovery: Give notice immediately when hazards such as unrecorded voids, tanks, chemicals, are discovered during deconstruction/ demolition.
- Removal: Submit details of proposed methods for filling, removal, etc.

420 OPEN BASEMENTS, ETC
- Temporary support: Leave adequate buttress walls or provide temporary support to basement retaining walls up to ground level.
- Safety: Make remaining sections of retaining and buttress walls safe and secure.
- Water movement: Make holes in basement floors to allow water drainage or penetration (depending on water table). Provide a hole for every 10 m², not less than 600 mm in diameter.

442 SITE SURFACE AT COMPLETION
- Levels: Grade the site to follow the levels of adjacent areas.
- Temporary surface: Cover the site with imported material suitable for piling mat.

450 SITE CONDITION AT COMPLETION
- Debris: Clear away and leave the site in a tidy condition.
- Other requirements: None.

**MATERIALS ARISING**

510 CONTRACTOR'S PROPERTY
- Components and materials arising from the deconstruction/ demolition work: Property of the Contractor except where otherwise provided.
- Action: Remove from site as work proceeds where not to be reused or recycled for site use.

520 RECYCLED MATERIALS
- Materials arising from deconstruction/ demolition work: Can be recycled or reused elsewhere in the project, subject to compliance with the appropriate specification and in accordance with any site waste management plan.
- Evidence of compliance: Submit full details and supporting documentation.
  - Verification: Allow adequate time in programme for verification of compliance.

## D20 EXCAVATING AND FILLING

To be read with Preliminaries/ General conditions.

### GENERALLY/ THE SITE

112 SITE INVESTIGATION REPORT
- Ground investigation report by GEA dated February 2022 is provided.

145 VARIATIONS IN GROUND WATER LEVEL
- Give notice: If levels encountered are significantly different from levels in the site investigation report or previously measured.

150 EXISTING SERVICES, FEATURES AND STRUCTURES
- Services: See section A12 for locations.
- Site features to be retained: See section A12 for details.
- Structures: See section A34 for details of protection.

### CLEARANCE/ EXCAVATING

240 ADJACENT EXCAVATIONS
- Requirement: Where an excavation encroaches below a line drawn at an angle from the nearest formation level of another higher excavation, the lower excavation, all work within it and backfilling thereto, must be completed before the higher excavation is made.
- Angle of line below horizontal: 45°.
- Backfill material: as Clause 248.

242 EXCAVATIONS ADJACENT TO EXISTING BACKFILLED TRENCHES
- Proximity: When width of undisturbed ground between the two excavations will be less than 2m.
- Action: Assume that the ground between the trenches is unstable and provide side support accordingly.

244 EXCAVATIONS ADJACENT TO EXISTING FOUNDATIONS
- Prior to commencing excavation:
  - Excavate trial pits adjacent to existing foundations to determine extent and formation levels.
  - Allow for inspection of trial pits.
  - Allow time for amendment of details if required.
    Time period: Two working days.
- Backfill material to new excavation: Imported, graded Fill.

248 BACKFILL TO EXCAVATIONS LOWER THAN FOUNDATION FORMATION LEVEL
  - Backfill material: Lean mix concrete

250 PERMISSIBLE DEVIATIONS FROM FORMATION LEVELS
- Beneath mass concrete foundations: ± 25 mm.
- Beneath ground bearing slabs and RC foundations: ± 15 mm.
- Embankments and cuttings: ± 50 mm.
- Ground abutting external walls: ± 50 mm, but such as to ensure that finished level is not less than 150 mm below dpc.

255 ACCURACY - LINEAR DIMENSIONS
- Permissible deviations from linear dimensions generally: Refer to CIRIA C709 Publication.

260 INSPECTING FORMATIONS
- Give notice: Make advance arrangements for inspection of formations for all foundations.
  - Notice (minimum): Two working days.
- Preparation: Just before inspection remove the last 150 mm of excavation.
- Trim to required profiles and levels.
  - Loose material: Minor Compaction permitted.
- Seal: Within 4 hours of inspection, seal formations with concrete.

265 INSPECTING FORMATIONS IN SAND AND GRAVEL
- Notice for inspection (minimum): Two working days.
- Preparation: Just before inspection remove the last 150 mm of excavation. Trim to required profiles and levels and mechanically compact formation.
- Seal: Within 4 hours of inspection, seal formations with Concrete.

267 INSPECTION OF FORMATIONS IN SHRINKABLE SOILS
- Inspect formation: For signs of conducting and fine moisture absorbing roots.

- Give notice: If significant quantities of roots are visible in the formation or in the bottom 75 mm of the walls of the excavation.

270 FOUNDATIONS GENERALLY
- Give notice if:
  - A natural bearing formation of undisturbed subsoil is not obtained at the depth shown on the drawings.
  - The formation contains soft or hard spots or highly variable material.

283 FORMATIONS FOR PILE SUPPORTED STRUCTURES
- Excavate: To the design formation level.
- Compact: As necessary to ensure formation will support weight of concrete without settlement.
- Blinding to formation: 50mm GEN 1 Blinding.

290 FOUNDATIONS IN MADE UP GROUND
- Depth: Excavate down to a natural formation of undisturbed subsoil.
- Discrepancy: Give notice if this is greater or less than depth given.

310 UNSTABLE GROUND
- Generally: Ensure that the excavation remains stable at all times.
- Give notice: Without delay if any newly excavated faces are too unstable to allow earthwork support to be inserted.
- Take action: If instability is likely to affect adjacent structures or roadways, take appropriate emergency action.

320 RECORDED FEATURES
- Recorded foundations, beds, drains, manholes, etc: Notify Contract Administrator.
- Contaminated earth: Remove and disinfect as required by local authority.

330 UNRECORDED FEATURES
- Give notice: If unrecorded foundations, beds, voids, basements, filling, tanks, pipes, cables, drains, manholes, watercourses, ditches, etc. not shown on the drawings are encountered.

335 NEW FOUNDATIONS CROSSING OLD FOUNDATIONS OR WALLS
- Break out: The old foundation/ wall where it crosses the new foundation/ wall:
  - Length of breaking out: Width of the new foundation/ wall plus 250mm
  - Depth of breaking out: Full depth of existing wall.
- Disturbed/ softened soil: When the formation for the old foundation/ wall is deeper than the formation of the new foundation.
  - Excavate: Soil that has been disturbed and/ or softened on either side of the old wall/ foundation, and for 100-150mm into undisturbed ground on either side
- Backfilling beneath design formation level: Lean mix concrete.

350 EXISTING WATERCOURSES
- Diverted watercourses which are to be filled: Before filling, remove vegetable growths and soft deposits.

360 EXCESS EXCAVATION
- Excavation taken wider than required:
  - Backfill: Lean mix concrete.
- Excavation taken deeper than required:
  - Backfill: Lean mix concrete.

**DISPOSAL OF MATERIALS**

450 WATER
- Generally: Keep all excavations free from water until:
  - Formations are covered.
  - Below ground constructions are completed.
  - Basement structures and retaining walls are able to resist leakage, water pressure and flotation.
- Drainage: Form surfaces of excavations and fill to provide adequate falls.
- Removal of water: Provide temporary drains, sumps and pumping as necessary. Do not pollute watercourses with silt laden water.

454 GROUND WATER LEVEL, SPRINGS OR RUNNING WATER
- Give notice: If it is considered that the excavations are below the water table.
- Springs/ Running water: Give notice immediately if encountered.

457 PUMPING
- General: Do not disturb excavated faces or stability of adjacent ground or structures.
- Pumped water: Discharge without flooding the site or adjoining property.
- Sumps: Construct clear of excavations. Fill on completion.
  - Locations: Submit proposals.

460 PERMANENT DRAINAGE SYSTEM
- Disposal of water from the excavations through system: Not permitted.

**FILLING**

500 PROPOSED FILL MATERIALS
- Details: Submit full details of proposed fill materials to demonstrate compliance with specification, including:
  - Type and source of imported fill.
  - Proposals for processing and reuse of material excavated on site.
  - Test reports as required elsewhere.
- Timing: 10 days before placement.

510 HAZARDOUS, AGGRESSIVE OR UNSTABLE MATERIALS
- General: Do not use fill materials which would, either in themselves or in combination with other materials or ground water, give rise to a health hazard, damage to building structures or instability in the filling, including material that is:
  - Frozen or containing ice.
  - Organic.
  - Contaminated or noxious.
  - Susceptible to spontaneous combustion.
  - Likely to erode or decay and cause voids.
  - With excessive moisture content, slurry, mud or from marshes or bogs.
  - Clay of liquid limit exceeding 80 and/or plasticity index exceeding 55.
  - Unacceptable, class U2 as defined in the Highways Agency 'Specification for highway works', clause 601.

512 LIMITATION OF SULFATE CONTENT IN FILL MATERIALS
- Test specification: To BS 1377-3.
- Sulphate content: Expressed as $SO_3$.
  - Water soluble sulphate (maximum): 1500mg/l in 2:1.
  - Total potential sulphate (maximum): 0.6%.
  - Oxidizable sulphate (maximum): 0.3% of Total Potential Sulphate.
- Certificates of test result: Submit.

520 FROST SUSCEPTIBILITY
- General: Except as allowed below, fill must be non-frost-susceptible as defined in Highways Agency 'Specification for highway works', clause 801.8.
- Test reports: If the following fill materials are proposed, submit a laboratory report confirming they are non-frost-susceptible:
  - Fine grained soil with a plasticity index less than 20%.
  - Coarse grained soil or crushed granite with more than 10% retained on a 0.063 mm sieve.
  - Crushed chalk.
  - Crushed limestone fill with average saturation moisture content in excess of 3%.
  - Burnt colliery shale.

530 PLACING FILL
- Surfaces of excavations and areas to be filled: Free from loose soil, topsoil, organic material, rubbish and standing water.
- Freezing conditions: Do not place fill on frozen surfaces. Remove material affected by frost. Replace and recompact if not damaged after thawing.
- Adjacent structures, membranes and buried services:
  - Do not overload, destabilise or damage.
  - Submit proposals for temporary support necessary to ensure stability during filling.
  - Allow 14 days (minimum) before backfilling against in situ concrete structures.
- Layers: Place so that only one type of material occurs in each layer.
- Earthmoving equipment: Vary route to avoid rutting.

535 COMPACTION GENERALLY
- General: Compact fill not specified to be left loose as soon as possible after placing.
- After compaction: Surface of each layer must be well closed, showing no movement under compaction plant, and without cracks, holes, ridges, loose material and the like.
- Defective areas: Remove and recompact to full thickness of layer using new material.

540 BENCHING IN FILL
- Adjacent areas: If, during filling the difference in level between adjacent areas of filling exceeds 600 mm, cut into edge of higher filling to form benches 600 mm minimum width and height equivalent to depth of a layer of compacted filling.
- New filling: Spread and compact to ensure maximum continuity with previous filling.

617 HIGHWAYS AGENCY TYPE 1 UNBOUND MIXTURE
- Fill: To Highways Agency 'Specification for highway works', clauses 801 and 803:
  - Crushed rock (other than argillaceous rock).
  - Crushed concrete.
  - Recycled aggregates.
  - Crushed non-expansive slag.
  - Well-burned non-plastic colliery shale.
- Amendments to requirements in Highways Agency 'Specification for highway works': None.
- Filling: To Highways Agency 'Specification for highway works', clause 802.

618 HIGHWAYS AGENCY TYPE 2 UNBOUND MIXTURE
- Fill: To Highways Agency 'Specification for highway works', clauses 801 and 804:
  - Crushed rock (other than argillaceous rock).
  - Crushed concrete.
  - Crushed non-expansive slag.
  - Well-burned non-plastic colliery shale.
  - Natural gravel.
  - Natural sand.
- Amendments to requirements in Highways Agency 'Specification for highway works': None.
- Filling: To Highways Agency 'Specification for highway works', clause 802.

620 SUBGRADE IMPROVEMENT LAYER (CAPPING)
- Fill: To Highways Agency 'Specification for highway works', Table 6/1, Class 6F1 or 6F2.
- Filling: Place and compact to Highways Agency 'Specification for highway works', Table 6/1, clause 612 and clause 613.3, 613.9 and 613.10.

626 COMPACTED GENERAL FILL
- Suitable material: Imported granular graded material.
- Excavated material: Select suitable material and keep separate.
- Filling: Spread and level material in layers. As soon as possible thoroughly compact each layer.
- Required compaction: 95% of test density determined to BS 1377-9.
- Proposals: Well in advance of starting work submit details of proposed:
  - Materials to be used, including quantities of each type.
  - Type of plant.
  - Maximum depth of each compacted layer.
  - Minimum number of passes per layer.

640 STARTER LAYER OF COMPACTED FILLING
- Fill: Suitable hard granular material. Compact thoroughly.
- Thickness: 150mm.

650 PROTECTION OF COMPACTED FILLING
- Temporary protective filling: Before allowing construction traffic, raise level of compacted cohesive soil filling at least 150 mm above formation level using properly compacted temporary filling.
- Removal: Remove temporary protective filling from site before permanent construction.

700 BACKFILLING AROUND FOUNDATIONS
- Under oversite concrete and pavings: Hardcore.
- Under grassed or soil areas: Material excavated from the trench, laid and compacted in 300 mm maximum layers.

710 HARDCORE FILLING
- Fill: Granular material, free from excessive dust, well graded, all pieces less than 75 mm in any direction, minimum 10% fines value of 50 kN when tested in a soaked condition to BS 812-111, and in any one layer only one of the following:
  - Crushed rock (other than argillaceous rock) or quarry waste with not more binding material than is required to help hold the stone together.
  - Crushed concrete, crushed brick or tile, free from plaster, timber and metal.
  - Crushed non-expansive slag.
  - Gravel or hoggin with not more clay content than is required to bind the material together, and with no large lumps of clay.
  - Well-burned non-plastic colliery shale.

- Natural gravel.
- Natural sand.

- Filling: Spread and level in 150 mm maximum layers. Thoroughly compact each layer.

730 BLINDING

- Surfaces to receive sheet overlays or concrete:
- Blind with:
  - Concrete where shown on drawings; or
  - Sand, fine gravel, or other approved fine material applied to fill interstices. Moisten as necessary before final rolling to provide a flat, closed, smooth surface.
- Sand for blinding: To BS EN 12620, grade 0/4 or 0/2 (MP).
- Permissible deviations on surface level: +0 -25 mm.

## D50 UNDERPINNING

To be read with Preliminaries/ General conditions.

### TENDERING

010 INFORMATION TO BE PROVIDED WITH TENDER
- Submit: A full description of underpinning proposals including:
  - Drawings: As necessary for understanding the proposals.
  - Method statement.
  - Additional information: None.

### GENERAL

117 EUROCODES
- National Annexes: Reference to a Eurocode shall be deemed to include the appropriate United Kingdom National Annex, and nationally determined parameters shall apply.
- Substitution of alternative design rules for Application Rules: Permitted when it can be demonstrated that the alternative rule is in accordance with the relevant principles and that structural safety, serviceability and durability of the resulting structure will be at least that required by the Eurocode.

155 GROUND INVESTIGATION
- Report: Ground Investigation Report by GEA dated February 2022
  - Datum for borehole logs: As per the Report

170 DISCONNECTION OF SERVICES IN WORKING AREAS
- Disconnections required: TBA.
  - Timing: Before commencing underpinning works within the building.
- Reconnection: Ensure that services cannot be reinstated by site operatives without consent.

### TYPES OF UNDERPINNING

215 MASS CONCRETE UNDERPINNING
- Underpinning blocks:
  - Depth: Refer to drawings
  - Length (maximum): 1000mm
  - Width on either side of wall centre line (minimum): To Suit Wall
  - Depth of hard pack: 75mm
- Materials:
  - Concrete: Designated concrete as in E10
  - Hard packing: 1:3 cement: sharp sand mortar.
    Water content: Sufficient only to ensure that packing binds together.
- Sequence: Refer to drawing MBP-8204-099
  - Curing periods (minimum): 48 hours
  - Between casting underpinning block and pinning up: 24 hours
  - Between completion of pinning up and commencement of excavation for the next sequence of underpinning: 24 hours
    Extend curing periods to allow for inclement weather.
- Drains/ Services: Locate underpinning blocks to avoid.
- Features: Joggle joints incorporated between underpins

### EXECUTION

610 REPAIRS OF MASONRY
- Records of masonry to be repaired: Before starting work, use measurements and photographs as appropriate to record bonding patterns, joint widths, special features
- Exposed faces keep to agreed lines.
- Faces, angles and features: Align accurately. Set out carefully to ensure satisfactory junctions with existing masonry and maintain existing joint widths.
- Joint surfaces: Dampen to control suction as necessary.
- Laying units: On a full bed of mortar, all joints filled.
- Exposed faces: Keep clear of mortar and grout.

615 CONSTRUCTION OF RC CONCRETE UNDERPINNING

- Block and working space: Excavate together.
- Formation:
  - Preparation: Remove or compact loose material.
  - 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.
- 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.
  - Clearance around drain/ service (minimum): 50mm.
- Dowels/ Shear key/ Front shutter: Provide where required.
- Casting underpinning: In one lift, leaving a gap for packing up beneath existing foundation.
- 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.

**COMPLETION**

910 HEALTH AND SAFETY FILE - MASS CONCRETE UNDERPINNING

- Requirement: Collate and submit a full set of records for inclusion in the health and safety file.
  - Number of copies: Two.
- Content: For each underpinning block record:
  - Date of casting.
  - Depth of base below datum.
  - Length.
  - Width either side of wall.
  - Details of drains and services built into block and diameter of sleeving.
- Latest date for submission: Refer to contract documents.

## E05 IN SITU CONCRETE CONSTRUCTION GENERALLY

To be read with Preliminaries/ General conditions.

220 DESIGN OF STRUCTURAL CONCRETE
- Standards:
  - Design: To BS 8110: Part 1.
  - Drawings: To BS EN ISO 4157-1 4157-2 3766.
  - Reinforcement schedules: To BS 8666.
- Finished product: To comply with the requirements of design standard.

225 TEMPERATURE RECORDS
- Requirement: Throughout period of concrete construction record:
  - Daily: Maximum and Minimum atmospheric Shade Temperatures.
  - Under adverse temperature conditions: Temperature at commencement and end of placing.
- Equipment: Calibrated Thermometer.
  - Location: In the shade, close to the structure.

235 OPENINGS, INSERTS AND FIXINGS
- Requirement: Collate all information.
- Submit: Details where openings, inserts and fixings can only be accommodated by adjustments to reinforcement.
- Locate reinforcement: To ensure specified minimum cover at openings and inserts and to be clear of fixing positions.

290 ACCURACY OF CONSTRUCTION
- Setting out: To BS 5964-1.
- Geometrical tolerances: To National Structural Specification for Building Construction.
  - Conflicts: Notwithstanding tolerances specified elsewhere, do not exceed requirements for compliance with the designated code of practice.
  - Substitution of alternative requirements: Submit proposals.

300 LEVELS OF STRUCTURAL CONCRETE FLOORS
- Tolerances (maximum):
  - Level of floor: ±10mm
  - Steps in floor level: ±5mm.

310 SURFACE REGULARITY OF CONCRETE FLOORS TO BS 8204 - GENERAL
- Standard: To BS 8204-1 or -2.
- Measurement: From underside of a 2m 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 – TOLERANCE CLASS SR2.
- Location: All Slabs above basement level
- Abrupt changes: 5mm

316 SURFACE REGULARITY OF CONCRETE FLOORS TO BS 8204 - TOLERANCE CLASS – TOLERANCE CLASS SR3.
- Location: Basement Slabs
- Abrupt changes: 10mm

430 SURFACE CRACKING
- Method of measurement: To be proposed by contractor.
- Critical crack width: 0.3 mm.
- Action: Should cracks occur that are wider than the critical crack width:
  - Survey: Frequency and extent of such cracks and investigate cause.
  - Report: Findings together with recommendations for rectification.

## E10 MIXING/ CASTING/ CURING IN SITU CONCRETE

To be read with Preliminaries/ General conditions.

**CONCRETE**

101 SPECIFICATION
- Concrete generally: To BS 8500-2.
- Exchange of information: Provide concrete producer with information required by BS 8500-1, clauses 4 and 5.

105 BASIC DESIGNATED CONCRETE
- Designation: RC32/40.
- Coarse recycled aggregates: Permitted.
- Consistence class: S3.
- Additional requirements: Submit proposals.

106 DESIGNATED CONCRETE FOR ALL RC STRUCTURES
- Designated concrete: RC 32/40.
- Reinforcement/ embedded metal: Yes.
- Aggregates:
  - Size (maximum): 20 mm.
- Other requirements for admixtures: An accelerator or retarder may be used. All concrete in contact with soil to be designed to Class DS-2 in accordance with the Site Investigation Report.

110 DESIGNED MIX FOR ALL WATER-RESISTING CONCRETE UNDERPINNING
Embedded metal: As specified
- Compressive strength class (cylinder/ cube minimum): C32/40.
- Target density (oven-dry): Normal.
- Fibres: Not required.
- Aggregates:
  - Size (maximum): 20mm.
  - Type/ Density: normal weight.
  - Coarse recycled aggregates: RCA permitted subject to acceptance by the waterproof admixture manufacture.
  - Additional aggregate requirements: absorption not greater than 3%.
- Design chemical class: n/a.
- Limiting values for composition:
  - Water/cement ratio (maximum): 0.40.
  - Cement/ combination content (minimum): 350kg/m3.
  - Cement combinations: Submit proposals
  - Air content in situ (minimum): No requirement.
- Consistence class: S3.
- Chloride class: Cl 0.40.
- Admixtures: Pudlo CWP admixture or similar approved.

111 BASIC DESIGNATED CONCRETE ALL MASS CONCRETE (MASS CONCRETE UNDERPINNING, PAD & STRIP FOOTINGS, PAD STONES, DRAINAGE TRENCH BACKFILL ETC)
- Designation: GEN 3.
- Coarse recycled aggregates: No special requirements.
- Consistence class: Contractor's choice.
- Chloride class: Cl 0.40.
- Additional requirements: Submit proposals.

115 DESIGNATED CONCRETE FOR ALL RC ELEMENTS ABOVE & BELOW GROUND LEVEL NOT REQUIRED TO BE WATER RESISTING
- Designation: RC32/40.
- Fibres: Not required.
- Aggregates:
  - Size (maximum): 20mm.
  - Coarse recycled aggregates: Permitted.
  - Additional aggregate requirements: None.
- Special requirements for cement/ combinations:
- Consistence class: S3.
- Chloride class: CL 0.40.
- Admixtures: Permitted but if desired, advice structural engineer.
- Additional mix requirements: None.

125 SUBSTITUTION OF STANDARDIZED PRESCRIBED CONCRETE FOR DESIGNATED CONCRETE
- General: Conform to BS 8500-2, clause 9.
- Substitution: In accordance with BS 8500-1, table A. 13.
  - Proposals: Submit for each substitution, stating reasons.
- Site mixing: Permitted.

**MATERIALS, BATCHING AND MIXING**

215 READY-MIXED CONCRETE
- Production plant: Currently certified by a body accredited by UKAS to BS EN 45011 for product conformity certification of ready-mixed concrete.
- Source of ready-mixed concrete: Obtain from one source if possible. Otherwise, submit proposals.
  - Name and address of depot: Submit before any concrete is delivered.
  - Delivery notes: Retain for inspection.
- Declarations of nonconformity from concrete producer: Notify immediately.

218 SITE MIXED CONCRETE
- Batching by mass:
  - Restrictions: Maximum Pour Size = $1m^3$.
  - Accuracy of measuring devices: To BS EN 206-1, clause 9.6.2.2.
    Tolerances for quantity of constituent material: To BS EN 206-1, table 21.
- Batching by volume:
  - Restrictions: Maximum Volume = $1m^3$.
- Mixing: To BS 8000-2.1, subsections 2, 3 and 4.

221 INFORMATION ABOUT PROPOSED CONCRETES
- Submit when requested:
  - Details listed in BS 8500-1, clause 5.2.
  - Additional information: None.

225 CHANGES TO SPECIFICATION
- Changes to specification of fresh concrete (outside concrete producer's responsibility): Permitted.

230 INTERRUPTION OF SUPPLY DURING CONCRETING
- 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.
- Elsewhere:
  - Preparation: Manage pour to have a full face and have materials available to form an emergency construction joint while concrete can still be worked.
  - Before pour is completed: Submit location and details of joint, make proposals for joint preparation.

310 RECYCLED AGGREGATE
- Standard: To BS 8500-2, clause 4.3 and BS EN 12620.

415 ADMIXTURES
- Calcium chloride and admixtures containing calcium chloride: Do not use.

490 PROPERTIES OF FRESH CONCRETE
- Adjustments to suit construction process: Determine with concrete producer. Maintain conformity to the specification.

**PROJECT TESTING/ CERTIFICATION**

505 PROJECT TESTING OF CONCRETE – GENERAL
- Testing: To BS 8500-1.
  - Nonconformity: Obtain instructions immediately.
- Recording: Maintain complete correlated records including:
  - Concrete designation.
  - Sampling, site tests, and identification numbers of specimens tested in the laboratory.
  - Location of the parts of the structure represented by each sample.
  - Location in the structure of the batch from which each sample is taken.

520 TESTING LABORATORY
- Laboratory: Accredited by UKAS or other national equivalent.
  - Name and UKAS reference number: Submit well in advance of making trial mixes or concrete for use in the works.

530 TESTS RESULTS
- Submission of reports: Within one day of completion of each test.
  - Number of copies: Two copies.
- Reports on site: A complete set, available for inspection.

550 BROKEN CUBES FROM FAILED STRENGTH TESTS
- Nonconformity: Keep separately the pieces of each cube which fail to meet the conformity requirements for individual results.
- Period for keeping cubes: Obtain instructions.

**PLACING/ COMPACTING/ CURING AND PROTECTING**

630 PREMATURE WATER LOSS
- Requirement: Prevent water loss from concrete laid on absorbent substrates.
  - Underlay: Select from:
    Polyethylene sheet: 250 micrometres thick.
    Building paper: To BS 1521, grade B1F.
  - Installation: Lap edges 150 mm.

640 CONSTRUCTION JOINTS
- Location of joints: Submit details.
- Preparation of joint surfaces: Remove surface laitance and expose aggregate by lightly brushing and spraying; concrete surface to be clean and damp before placing fresh concrete. Install waterstop to all joints in basement.

645 SPACING OF CONSTRUCTION JOINTS
- Type of construction: All.
  - Submit proposals.

648 ADVERSE TEMPERATURE CONDITIONS
- Requirement: Submit proposals for protecting concrete when predicted ambient temperatures indicate risk of concrete freezing or overheating.

650 SURFACES TO RECEIVE CONCRETE
- Cleanliness of surfaces immediately before placing concrete: Clean with no debris, tying wire clippings, fastenings or free water.

660 INSPECTION OF SURFACES
- Notice: Give notice to allow inspections of reinforcement and surfaces before each pour of concrete.
  - Period of notice: Two days.

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

680 PLACING
- Records: Maintain for time, date and location of all pours.
- Timing: Place as soon as practicable after mixing and while sufficiently plastic for full compaction.
- Temperature limitations for concrete: 30°C (maximum) and 5°C (minimum), unless otherwise specified. Do not place against frozen or frost covered surfaces.
- Continuity of pours: Place in final position in one continuous operation up to construction joints. Avoid formation of cold joints.
- Discharging concrete: Prevent uneven dispersal, segregation or loss of ingredients or any adverse effect on the formwork or formed finishes.
- Thickness of layers: To suit methods of compaction and achieve efficient amalgamation during compaction.
- 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
- General: Fully compact concrete to full depth to remove entrapped air. Continue until air bubbles cease to appear on the top surface.
  - Areas for particular attention: Around reinforcement, under void formers, cast-in accessories, into corners of formwork and at joints.
- Consecutive batches of concrete: Amalgamate without damaging adjacent partly hardened concrete.
- Methods of compaction: To suit consistence class and use of concrete.

700 LIGHTWEIGHT AGGREGATE CONCRETE
- Placing and compacting: Prevent flotation of coarse aggregate and formation of excessive blowholes.

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

730 PLASTIC SETTLEMENT
- 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.
  - Timing: During the first few hours after placing and whilst concrete is still capable of being fluidized by the vibrator.
- Removal of cracks: Re-vibrate concrete.

810 CURING GENERALLY
- Requirement: Keep surface layers of concrete moist throughout curing period, including perimeters and abutments, by either restricting evaporation or continuously wetting surfaces of concrete.
  - Surfaces covered by formwork: Retain formwork in position and, where necessary to satisfy curing period, cover surfaces immediately after striking.
  - Top surfaces: Cover immediately after placing and compacting. If covering is removed for finishing operations, replace it immediately afterwards.
- Surface temperature: Maintain above 5°C throughout the specified curing period or four days, whichever is longer.
- 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
- Sheet coverings: Suitable impervious material.
- Curing compounds: Selection criteria:
  - Curing efficiency: Not less than 75% or for surfaces exposed to abrasion 90%.
  - Colouring: Fugitive dye.
  - Application to concrete exposed in the finished work: Readily removable without disfiguring the surface.
  - Application to concrete to receive bonded construction/ finish: No impediment to subsequent bonding.
- 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
- Deep lifts or large volume pours: Submit proposals for curing to prevent early age thermal cracking, taking account of:
  - Temperature differentials across sections.
  - Coefficient of thermal expansion of the concrete.
  - Strain capacity of the concrete mix (aggregate dependent).
  - Restraint.

815 ADDITIONAL CURING REQUIREMENT – WATER CURING
- Commencement of water curing: As soon as practicable after placing and compacting concrete.
  - Surfaces covered by formwork: Expose to water curing as soon as practicable.
  - Top surfaces: Cover immediately with impermeable sheeting to prevent evaporation before commencement of water curing.
- Water curing: Wet surfaces continuously throughout curing period.
  - Select methods from:
    Mist spray.
    Wet hessian covered with impermeable sheeting.

818 CURING PERIODS GENERALLY
- Minimum periods: When not otherwise indicated, to BS8110-1.

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

## E20 FORMWORK FOR IN SITU CONCRETE

To be read with Preliminaries/ General conditions.

### GENERALLY/ PREPARATION

110 LOADINGS
- Requirement: Design and construct formwork to withstand the worst combination of the following:
  - Total weight of formwork, reinforcement and concrete.
  - Construction loads including dynamic effects of placing, compacting and construction traffic.
  - Wind and snow loads.

120 FORMWORK DETAILS
- Provide the following:
  - Void formers and permanent formwork.
  - Positions and types of construction joints.

132 PROPPING
- General: Prevent deflection and damage to the structure. Carry down props to bearings strong enough to provide adequate support throughout concreting operations.
- Method statement: Submit proposals for prop bearings and sequence of propping/ repropping and backpropping.
  - Timing of submission: Ten days before installation.

145 PERMANENT FORMWORK
- Location and materials: Submit proposals.

160 CAMBERS
- Application of specified upward cambers: To the concrete immediately before formwork is struck.
  - Formwork: Allow for deflection under weight of fresh concrete.
  - Top surfaces of concrete: Camber to maintain the required structural depths and profiles.
- Checks after striking of formwork and removal of props: Levels to determine extent of any residual camber. Submit results.
- Upward cambers: Construct forms to achieve the following:
  - Floor Slabs – Span/300.

### CONSTRUCTION

310 ACCURACY
- General requirement for formwork: Accurately and robustly constructed to produce finished concrete in the required positions and to the required dimensions.
- Formed surfaces: Free from twist and bow (other than any required cambers).
- Intersections, lines and angles: Square, plumb and true.

315 SUBSTRUCTURE FORMWORK AND UNDERSLAB INSULATION
- Cutting: Neat and accurate to edges, and around penetrations and downstands.
- Laying: Tightly butted and fully supported on firm, even substrate.
- Vertical faces: Stiffen as necessary to act as shutter.
- Formwork/ insulation surfaces: Protect from indentation by spacers and other items.
- Joints in formwork/ insulation and with edge structure and penetrations: Seal to prevent penetration of concrete.
- Concrete placement: Restrain formwork/ insulation against movement.

320 JOINTS IN FORMS
- Requirements including joints in form linings and between forms and completed work:
  - Prevent loss of grout, using seals where necessary.
  - Prevent formation of steps. Secure formwork tight against adjacent concrete.

330 INSERTS, HOLES AND CHASES
- Positions and details:
  - Dimensioned on drawings provided on behalf of the Employer: Do not change without consent.
  - Undimensioned or from other sources: Submit proposals.
- Positioning relative to reinforcement: Give notice of any conflicts well in advance of placing concrete.
- Method of forming: Fix inserts or box out as required. Do not cut hardened concrete without approval.

340 KICKERS
- Method statement: Submit proposals including means of achieving quality of concrete consistent with that specified for the column or wall.
  - Kicker height: 150mm.

350 FORM TIES
- Metal associated with form ties/ devices: Prohibited within cover to reinforcement. Compatible with reinforcement metal.

470 RELEASE AGENTS
- Use: Floor slabs and walls.
- General: Achieve a clean release of forms without disfiguring the concrete surface.
- Product types: Compatible with formwork materials, specified formed finishes and subsequent applied finishes. Use the same product throughout the entire area of any one finish.
- Protection: Prevent contact with reinforcement, hardened concrete, other materials not part of the form face, and permanent forms.

480 SURFACE RETARDERS
- Use: Obtain approval.
- Reinforcement: Prevent contact with retarder.

**STRIKING**

510 STRIKING FORMWORK
- Timing: Prevent any disturbance, damage or overloading of the permanent structure.

521 MINIMUM PERIOD FOR RETAINING FORMWORK/ TEMPORARY SUPPORTS IN POSITION
- Concrete strength at time of formwork removal (minimum): 60%.
- Assumptions: Imposed load will not exceed 0.75KN/$m^2$ until concrete reaches full maturity.
  - Before removing formwork: Submit proposals if assumptions will not be realised.
- Method to be used in assessing early age strength of concrete: Cube tests.

**FORMED FINISHES**

620 PLAIN SMOOTH FINISH
- Location: All elements.
- Finish: Even and dense. Arrange formwork panels in a regular pattern as a feature of the surface.
- Permissible deviation of surfaces:
  - Sudden irregularities (maximum): 3 mm.
  - Gradual irregularities (maximum): 3 mm, when measured from the underside of a 1 m straightedge, placed anywhere on surface.
- Variations in colour:
  - Permitted: Those caused by impermeable formwork linings.
  - Not permitted: Those caused by contamination or grout leakage.
- Surface blemishes:
  - Permitted: Blowholes less than 10 mm in diameter and at an agreed frequency.
  - Not permitted: Voids, honeycombing, segregation and other large defects.
- Formwork tie holes: In a regular pattern and filled with matching mortar.

750 ARRISES, MARGINS AND JUNCTIONS
- Requirements: 12.5mm.

## E30 REINFORCEMENT FOR IN SITU CONCRETE

To be read with Preliminaries/ General conditions.

### REINFORCEMENT

110 QUALITY ASSURANCE OF REINFORCEMENT
- Standards:
  - Reinforcement: To BS 4449, BS 4482, BS 4483, or BS 6744.
  - Cutting and bending: To BS 8666.
- Source of reinforcement: Companies holding valid certificates of approval for product conformity issued by the UK Certification Authority for Reinforcing Steels (CARES).

150 RIBBED BAR REINFORCEMENT
- Standard: To BS 4449.
  - Strength grade: B500B.

210 STANDARD FABRIC REINFORCEMENT
- Standard: To BS 4483.
- Strength grade: B500B.

255 PREFABRICATED CONTINUITY REINFORCEMENT STRIPS
- Source: Obtain from a manufacturer holding a valid Technical Product Approval certificate issued by the UK Certification Authority for Reinforcing Steels (CARES) or equivalent.

260 PROPRIETARY MECHANICAL COUPLERS
- Locations: Refer to drawings.
- Manufacturer: Schoeck.
  - Product reference: Refer to drawings.

### WORKMANSHIP

310 CUTTING AND BENDING REINFORCEMENT
- General: To schedules and to BS 8666.
- Bending on site, including minor adjustments: Permitted.

320 PROTECTION OF REINFORCEMENT
- Dropping from height, mechanical damage and shock loading: Prevent.
- Cleanliness of reinforcement at time of pouring concrete: Free from corrosive pitting, loose millscale, loose rust and contaminants which may adversely affect the reinforcement, concrete, or bond between the two.

410 LAPS OR SPLICES
- Details not shown on drawings: Obtain instructions.

425 LAPS NOT DETAILED ON DRAWINGS
- Laps in bar reinforcement (minimum): 40 x bar diameter.
- Laps in fabric reinforcement (minimum): 40 x bar diameter.
  - Laps at corners: Avoid four layer build-up.

427 LAPS IN FABRIC REINFORCEMENT
- Terms: As defined in BCA publication 97.321.
- Lap type:
  - Long edge of fabric: 40 x bar diameter.
  - Short edge of fabric: 40 x bar diameter.
- Other requirements: Avoid four layer build-up.

430 WELDING REINFORCEMENT
- Site welding: Not permitted.

451 FIXING REINFORCEMENT
- Standard: To BS 7973-1 and -2.
- Installation: In addition to any spacers and chairs shown on drawings or schedules, provide adequate support, tie securely and maintain the specified cover.
- Tying:
  - Wire type: 16 gauge black annealed. Use stainless steel wire for stainless steel reinforcement.
  - Ends of tying wire: Prevent intrusion into the concrete cover. Remove loose ends.

- Compatibility of metals: Prevent contact between ordinary carbon steel and stainless or galvanized reinforcement.

470 TOLERANCES ON COVER
- Tolerance (maximum): 5mm.
- Checking specified cover dimensions: Before concreting check that cover dimensions will be achieved.

480 NOMINAL COVER TO REINFORCEMENT
- Top face: min 25mm unless noted otherwise.
- Formed faces: min 25mm unless noted otherwise.

510 RUST STAINING
- Staining of surfaces of concrete which will be exposed to view in the finished work: Prevent.

520 COVER METER SURVEY
- Purpose of survey: To check positions of reinforcement and that the specified cover has been achieved.
- Type of cover meter: A magnetic induction digital display type selected to suit arrangement and type of reinforcement.
  - Use: In accordance with recommendations of BS 1881-204 and manufacturer as appropriate to yield accurate results.
  - Surveyor: Experienced with cover meter surveys.
  - Calibration: At the outset and thereafter regularly at 45 minute (maximum) intervals.
- Locations for checking: Include columns, beams, cantilevers, slab soffits and all faces exposed to the weather in the finished structure.
- Timing: As soon as practicable after casting.
  - Notification: Give adequate notice.
- Results: Submit. Notify immediately where specified cover has not been achieved.

## E41 WORKED FINISHES TO IN SITU CONCRETE

To be read with Preliminaries/ General conditions.

150 FINISHING
- Timing: Carry out at optimum times in relation to setting and hardening of concrete.
- Prohibited treatments to concrete surfaces:
  - Wetting to assist surface working.
  - Sprinkling cement.

320 TROWELLED FINISH
- Surface on completion: Uniform, smooth but not polished, free from trowel marks and blemishes, and suitable to receive specified flooring material.

## G10 STRUCTURAL STEEL FRAMING

To be read with Preliminaries/ General conditions.

### GENERAL REQUIREMENTS/ INFORMATION

110 CONTRACTOR'S DESIGN OF JOINTS OF ALL STEELWORK
- Design concept: SERIES OF SIMPLE & MOMENT CONNECTIONS.
- Design responsibility: Design connections and detail steelwork and connections.
  - Other responsibilities: None.
- Structural requirements:
  - Generally: As section B50.

  Modifications: None.
  - Design: Complete in accordance with the designated code of practice to satisfy specified performance criteria.
  - Connections: Refer to drawings and mark-ups for forces and moments. In any case, simple connections to be designed against disproportionate collapse for a minimum of 75KN acting either in shear or tension.
  - Fixings to foundations and walls: As drawings and details.
  - Additional requirements: All beams receiving timber joists to have holes to suit M12 bolts at 400c/c. Diaphragm action is provided by timber joists and is essential for the overall stability of the frames.

115 DESIGN CONSTRAINTS – GENERAL
- Members forming bracing systems or girders of lattice construction: Unless detailed or instructed otherwise, position so that their lines of action intersect at a point.
- Bolts:
  - Diameter (minimum): 16mm.
  - Number per connection (minimum): Two, unless otherwise indicated.
  - Other requirements:
- Punching of bolt holes: Not permitted.
- Welds: 6mm Minimum
- Other constraints: None.

120 DRAWINGS AND CALCULATIONS
- Information required: Fabrication Drawings and Connection Calculations.
- Requirement: Before preparing detailed fabrication drawings, submit:
  - General arrangement drawings with individual steel members clearly identified.
  - Calculations/ selected standard joint detail for major connections.

125 SPECIFICATION STANDARD
- Standard: Comply with latest edition of National Structural Steelwork Specification (NSSS).
  - Additional requirements: None.
  - Document availability: For the duration of the work, at fabrication shop and on site.
- References to Engineer in NSSS: For the purpose of this contract, interpret such references as being to the person named in section A10 as Consulting Structural Engineer.
  - Exceptions: None.

### FABRICATION

180 NOTIFICATION OF COMMENCEMENT
- Notice: Give notice before fabrication is due to start.
  - Period of notice (minimum): Seven Days.

190 MARKING
- Identifying and recording materials and components: Submit details of proposed methods.
- Location of marks:
  - Generally: Visible for checking after erection.
  - Weathering steel: On surfaces not exposed to open view in the completed work.
- Steel to be blast cleaned, pickled, metal sprayed or galvanized: Marked so that subsequent treatment cannot obliterate the marking.

195 HARD STAMPING
- Usage: Not permitted except as indicated on drawings.

210 END CONNECTIONS
- Angle web cleats: Project 10 mm beyond ends of simply supported members.

215 HOLLOW SECTIONS
- Insides of sections: Debris and moisture removed before sealing ends and openings.

**WELDING**

255 SITE WELDING
- Usage: Permitted only were indicated on drawings.
- Working conditions: Suitable and safe. Do not weld when surfaces are wet or when ambient temperature is below 0°C.

270 ADDITIONAL WELDS
- Welds (including tack welds) not indicated on drawings: Not permitted without approval.

**BOLT ASSEMBLIES**

302 NON-PRELOADED BOLT ASSEMBLIES
- Designation: Black Bolts to BS 4190, Grade 8.8.
  - Threading: Full Length.
- Nuts and washers: To suit grade of bolt, as NSSS, clause 2.3.
- Coating applied by manufacturer: Galvanised.
- Other requirements: None.

310 ANCHORAGES TO CONCRETE
- Design standard: To ETAG 001, Annex C.
- Anchor type: Indented Bolts
- Material: Carbon Steel.
  - Coating applied by manufacturer: Sheradized.
- Concrete:
  - Grade: RC32/40
  - Condition: Cracked.
- Characteristic resistances of single anchor remote from edge of concrete (minimum):
  - Tension: _As drawings and sketches
  - Shear: As drawings and sketches
- Fixing in concrete: Bonded into predrilled hole using chemical bonding agent or cast-in as per drawings.

335 SPRING WASHERS
- Standard: To BS 4464.

370 GALVANIZED COATING TO BOLT ASSEMBLIES
- Standard: To BS 7371-6.
- Galvanizing: Applied by fastener manufacturer. Passivated and lubricated if no additional coatings are specified. Nuts tapped after galvanizing.
- Use/ location: _All.

**ERECTION**

410 PRE-ERECTION CHECKS
- Scope: At least 7 days before proposed erection start date, check the following:
  - Foundations and other structures to which steelwork will be attached: Accuracy of setting out.
  - Holding down bolts: Position, protruding length, slackness and condition.
- Inaccuracies and defects: Report without delay.
- Permission to commence erection: Obtain.

420 SETTING OUT
- Permissible deviations: To the requirements of the NSSS

425 MODIFICATIONS
- Steelwork: Do not modify without approval.
- Temporary fabrication/ erection attachments: Remove afterwards

432 TEMPORARY SUPPORT
- Permanent bracing system:
  - Vertical: Frame Action.
  - Horizontal: Frame Action.
- Temporary bracing/ restraints: Provide as necessary until permanent bracing system and diaphragm timber roof are complete and sufficiently mature to carry loads and all connections have been made to the permanent system.

440 COLUMN BASES
- Levels: Adjust using steel shims or folding wedges no larger than necessary.
- Location of shims/ wedges: Position symmetrically around perimeter of base plate. Do not use a single central pack.
- Give notice: If space beneath any column base is outside specified limits for bedding thickness.
- Accuracy of erection: Check, and correct errors before filling and bedding beneath bases and carrying out other adjacent work.

443 PROPRIETARY FILLING/ BEDDING OF COLUMN BASES
- Bedding thickness range: 20-50mm.
- Preparation: Concrete surfaces scarified to provide a good mechanical key.
- Bolt pockets and spaces beneath base plates: Completely filled with Non-Shrink Grout.

447 BONDED ANCHORS
- Holes: Clean and free from dust at time of installing anchor.
- Permeable sleeves: Use in conditions where otherwise the loss of bonding agent would be unacceptably high.
- Other requirements: None.

470 SITE TESTING OF ANCHORS TO MASONRY
- Standard: To BS 5080.
- Preliminary tests: 5No. For tensile loading failure evenly spread across existing facade.
- Proof tests: Teat 25% of working fixings to 1.5 times the working load.
- Test results: Report failures and seek instructions.

475 PRODUCTS
- Steel: Submit test certificates.

**PROTECTIVE COATINGS**

510 SURFACES NOT TO BE COATED
- Location: None.

521 ALTERNATIVE MANUFACTURERS
- Short list of manufacturers: Obtain coating materials from:
- W.J. Leigh & Co. or submit details of alternative manufacturer for approval.
- Selected manufacturer: Submit details before ordering materials.

**PROTECTIVE COATING SYSTEMS**

638 SHOP PRIMING FOR ALL STEELWORK EMBEDDED WITHIN EXTERNAL MASONRY WALLS
- Paint manufacturer: W J Leigh & Co Ltd.
- Shop preparation: Blast cleaning to BS EN ISO 8501-1, preparation grade Sa21/2.
- Shop primer: Two-pack epoxy zinc phosphate primer, C400V2.
- Dry film thickness: 200 μm in a single coat.
- Special requirements: Steelwork face must be a minimum of 40 mm away from internal face of the external brick leaf.

640 SHOP PAINTING WITH PRIMER ALL OTHER STEELWORK
- Use/ location: all internal steelwork of 1 hour fire protection, to be specified by APPROVED INSPECTOR/ARCHITECT.
- Paint manufacturer: Leighs paints or similar approved.
- Shop preparation: Blast cleaning to BS EN ISO 8501-1, preparation grade Sa 2½.
- Shop primer: to be Epigrip C400V3 Zinc Phosphate Primer/Buildcoat.
- Dry film thickness: 75 micrometres.
- Site intermediate coat: Firetex FX1000 intumescent coating.
- Dry film thickness: to be confirmed by the manufacturer, and APPROVED INSPECTOR/ARCHITECT.
- Site top coat: Firetex M71V2 sheen finish.
- Dry film thickness: 50 micrometres.
- Colour: to architect's spec.
- Special requirements: Resistex C137V2 special finish can also be used at the same film thickness as the top coat.

**PREPARATION FOR PAINTING**

710 OFFSITE PREPARATION AND PAINTING
- Working area: Covered and properly lit, heated and ventilated.
- Sequence of working: Select from the following and submit proposals:
  - Fabricate, blast clean, prime.
  - Blast clean, fabricate, remove flash rust with a light overall sweep blast, prime.
  - Blast clean, apply weldable prefabrication primer, fabricate, prime.
- Prefabrication primer (option 3): Type recommended by manufacturer of post fabrication primer.
  - Thickness of post fabrication primer coat: May be reduced if and as recommended by manufacturer.
- Surfaces inaccessible after assembly: Apply full treatment and coating system including, if necessary, local application of site coatings.

725 MANUAL CLEANING OF NEW STEELWORK
- Preparation: Remove fins, burrs, sharp edges, weld spatter, loose rust and loose scale.
- Surface finish: Clean but unpolished to BS EN ISO 8501-1, grade St 2.
- Finishing: Thoroughly degrease and clean down. Remove any consequent rusting back to grade St 2. Prime without delay.

740 BOLTED JOINTS (OTHER THAN FRICTION GRIP JOINTS)
- Steelwork to be shop painted: Apply full shop specification to joint faces.
- Steelwork to be erected with mill finish then site painted: Before erection, prepare and prime joint faces and allow to dry.
- Bolted joints in externally exposed steelwork:
  - Immediately before assembling, apply a further coat of primer and bring surfaces together while still wet.
  - After assembling and before applying site coatings, seal crevices to bolts and joint perimeters with a compatible sealant.

745 FAYING SURFACES OF FRICTION GRIP JOINTS
- Protection: Immediately after blast cleaning and before coating surrounding areas, mask faying surfaces to protect from contamination and deterioration.
  - Paint systems comprising more than one coat: Step each coat 30 mm back from edge of preceding coat and away from masked areas.
- Removal of protection: Immediately before bolting, remove masking. Check faying surfaces are free from adhesive. Clean with solvent if necessary.

750 FRICTION GRIP JOINTS IN SHOP PAINTED STEELWORK
- Post assembly treatment of bolts and surrounding areas: After final tightening of bolts and inspection of joints:
  - Thoroughly degrease and clean uncoated areas including bolts.
  - Prime without delay.
  - Apply full shop coating specification.
- Direct tension indicators: Seal measuring gap to prevent ingress of moisture.

755 UNCOATED FASTENERS
- Treatment: After steelwork erection and before applying site coatings, thoroughly degrease and clean. Without delay, coat to match adjacent shop painted areas.

760 GALVANIZED FASTENERS
- Treatment: After steelwork erection and before applying site coatings, thoroughly degrease and clean. Etch prime.

**PAINTING**

810 ENVIRONMENTAL CONDITIONS
- General requirements prior to starting coating work:
  - Surfaces: Unaffected by moisture or frost.
  - Steel temperature: At least 3°C above dew point, with conditions stable or improving, and not high enough to cause blistering or wrinkling of the coating.
  - Relative humidity: Below 85%.

815 COATINGS
- Surfaces to be coated: Clean, dust free and suitably dry. Previous coats to be adequately cured.
- Multiple coats of same material: Use different tints to assist checking of complete coverage.
- Penultimate coat: Colour recommended by paint manufacturer to suit top coat colour.
- Finish required: Smooth and even, of uniform thickness and colour, free from defects.

820 FILM THICKNESS

- Wet film thickness: During application, check thickness of each coat with a wheel or comb gauge used in accordance with BS EN ISO 2808.
- Accumulated dry film thickness: After each coat has dried, check total accumulated film thickness.
  - Method: Magnetic or electromagnetic meter.
  - Number and position of measurements: As directed.
  - Validation: Measurements to be independently witnessed.
  - Meter calibration: Check against standard shims and recalibrate regularly against a smooth steel reference plate.
- Average dry film thickness:
  - At least specified thickness over any square metre.
  - No reading to be less than 75% of specified thickness.
- Top coat dry film thickness: Sufficient to give an even, solid, opaque appearance.

825 STRIPE COAT

- External angles, nuts, bolt heads, rough weld seams, and areas difficult to coat: Apply an additional stripe coat of ZINC PHOSPHATE BUILDCOAT.

850 JUNCTIONS WITH CONCRETE

- Exposed steelwork partially embedded or encased in concrete: Apply two coats of bituminous coating locally to the steel/concrete junction.

## G20 CARPENTRY/ TIMBER FRAMING/ FIRST FIXING

To be read with Preliminaries/ General conditions.

### GENERAL

105 TIMBER PROCUREMENT
- Timber (including timber for wood based products): Obtained from well managed forests/ plantations in accordance with:
  - The laws governing forest management in the producer country or countries.
  - International agreements such as the Convention on International Trade in Endangered Species of wild fauna and flora (CITES).
- Documentation: Provide either:
  - Documentary evidence (which has been or can be independently verified) regarding the provenance of all timber supplied, or
  - Evidence that suppliers have adopted and are implementing a formal environmental purchasing policy for timber and wood based products.

150 STRENGTH GRADING OF TIMBER
- Grader: A company currently registered under a third party quality assurance scheme operated by a certification body approved by the UK Timber Grading Committee.

160 GRADING AND MARKING OF SOFTWOOD
- Timber of a target/ finished thickness less than 100 mm and not specified for wet exposure: Graded at an average moisture content not exceeding 20% with no reading being in excess of 24% and clearly marked as 'DRY' or 'KD' (kiln dried).
- Timber graded undried (green) and specified for installation at higher moisture contents: Clearly marked as 'WET' or 'GRN'.
- Structural timber members cut from large graded sections: Regraded to approval and marked accordingly.

### PRODUCTS

210 STRUCTURAL SOFTWOOD (GRADED DIRECT TO STRENGTH CLASS) FOR TIMBER WALLS AND ROOFS
- Grading standard: To BS 4978, BS EN 14081-1, or other national equivalent and so marked.
- Strength class to BS EN 338: C24.
- Treatment: Organic solvent impregnation to NBS section Z12 and Wood Protection Association Commodity Specification C9
  Design life: 50 years
  Fire retardant treatment: Impregnation to NBS section Z12 and Wood Protection Association Commodity Specification FR3.

### WORKMANSHIP GENERALLY

401 CROSS SECTION DIMENSIONS OF STRUCTURAL SOFTWOOD AND HARDWOOD
- Dimensions: Dimensions in this specification and shown on drawings are target sizes as defined in BS EN 336.
- Tolerances: The tolerance indicators (T1) and (T2) specify the maximum permitted deviations from target sizes as stated in BS EN 336, clause 4.3:
  - Tolerance class 1 (T1) for sawn surfaces.
  - Tolerance class 2 (T2) for further processed surfaces.

420 WARPING OF TIMBER
- Bow, spring, twist and cup: Not greater than the limits set down in BS 4978 or BS EN 14081-1 for softwood, or BS 5756 for hardwood.

430 SELECTION AND USE OF TIMBER
- Timber members damaged, crushed or split beyond the limits permitted by their grading: Do not use.
- Notches and holes: Position in relation to knots or other defects such that the strength of members will not be reduced.
- Scarf joints, finger joints and splice plates: Do not use without approval.

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

450 MOISTURE CONTENT
- Moisture content of wood and wood based products at time of installation: Not more than:
  - Covered in generally unheated spaces: 24%.
  - Covered in generally heated spaces: 20%.
  - Internal in continuously heated spaces: 20%.

451 MOISTURE CONTENT TESTING
- Procedure: When instructed, test timber sections with an approved electrical moisture meter.
- Test sample: Test 5% but not less than 10 lengths of each cross-section in the centre of the length.
- Test results: 90% of values obtained to be within the specified range. Provide records of all tests.

510 PROTECTION
- Generally: Keep timber dry and do not overstress, distort or disfigure sections or components during transit, storage, lifting, erection or fixing.
- Timber and components: Store under cover, clear of the ground and with good ventilation. Support on regularly spaced, level bearers on a dry, firm base. Open pile to ensure free movement of air through the stack.
- Trussed rafters: Keep vertical during handling and storage.

520 EXPOSED END GRAIN
- Components: Seal exposed end grain of all joists before delivery to site.
- Sealer: Clear End-Grain Sealant

**JOINTING TIMBER**

570 JOINTING/ FIXING GENERALLY
- 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
- Manufacturer: SIMPSON.
  - Product reference: A34.
- Material/ finish: GALVANISED STEEL.
- Fasteners: Galvanized or sherardized square twist nails.
  - Size: Not less than size recommended by anchor manufacturer.
- Fixing: Secure using not less than the number of nails recommended by anchor manufacturer.

630 BOLTED JOINTS
- Bolt spacings (minimum): To BS 5268-2, table 81.
- 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.
- 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.
- Bolt tightening: So that washers just bite the surface of the timber. Ensure that at least one complete thread protrudes from the nut.
  - Checking: At agreed regular intervals up to Completion. Tighten as necessary.

670 ANTICORROSION FINISHES FOR FASTENERS
- Galvanizing: To BS 7371-6, with internal threads tapped and lightly oiled following treatment.
- Sherardizing: To BS 7371-8, Class 1.
- Zinc plating: To BS EN ISO 4042 and passivated.

**ERECTION AND INSTALLATION**

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

760 TEMPORARY BRACING
- Provision: As necessary to maintain structural timber components in position and to ensure complete stability during construction.

770 ADDITIONAL SUPPORTS
- Provision: Position and fix additional studs, noggings and/ or battens to support edges of sheet materials, and wall/ floor/ ceiling mounted appliances, fixtures, etc. shown on drawings.
- Material properties: Additional studs, noggings and battens to be of adequate size and have the same treatment, if any, as adjacent timber supports.

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

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

784 JOISTS GENERALLY
- Centres: Equal, and not exceeding designed spacing.
- Bowed joists: Installed with positive camber.
- End joists: Positioned approximately 50 mm from masonry walls.

786 JOISTS ON HANGERS
- Hangers: Bedded directly on and hard against supporting construction. Do not use packs or bed on mortar.
- Joists: Cut to leave not more than 6 mm gap between ends of joists and back of hanger. Rebated to lie flush with underside of hangers.
- Fixing to hangers: A nail in every hole.

795 TRIMMING OPENINGS
- Trimmers and trimming joists: When not specified otherwise, not less than 25 mm wider than general joists.

820 VERTICAL RESTRAINT STRAPS TO RAFTERS & FLOORS
- Type: L.
- Manufacturer: Simpson.
  - Product reference: L10B10.
- Material/ finish: GALVANISED STEEL.
- Size:
  - Cross section: Not less than 30X5.
  - Length: 1000mm.
- Centres: Not more than 1200mm.
- Fixing:
  - To timber members with not less than STEEL SCREWS OR 4X75 ROUND NAILS.

830 LATERAL RESTRAINT STRAPS
- Manufacturer: SIMPSON.
  - Product reference: H10B10.
- Material/ finish: GALVANISED STEEL.
- Size: Not less than 30X5.
- Fixing: To top of joists/ rafters/ ties at not more than 1.2 m centres and as shown on drawings.
  - Ensure that cranked end is in tight contact with cavity face of wall inner leaf and is not pointing upwards.
- Straps spanning joists/ rafters/ ties running parallel to wall: Fix noggins and packs tightly beneath straps.
  - Size of noggings and packs: Not less than three quarters of joist/ rafter/ tie depth and not less than 38 mm thick.
  - Notching: Notch joists so that straps fit flush with surface. Do not notch rafters/ ties.
- Fasteners: AMMx75MM ROAUND NAILS.

850 INSPECTION GENERALLY
- Structural timber-work: Give reasonable notice before covering up.

860 BOLTED JOINT INSPECTION
- Timing: Inspect all accessible bolts at the end of the Defects Liability Period and tighten if necessary.

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Report Approved by:

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Date 28.03.2023

## APPENDIX A

## MBP PERFORMANCE SPECIFICATIONS FOR RC DETAILING

**PERFORMANCE SPECIFICATION FOR DETAILING AND SCHEDULING OF REINFORCED CONCRETE ELEMENTS**

To be read with Preliminaries/ General conditions and in conjunction with the specifications and Planning Design Statement by MBP.

Definitions: For the Structural Engineer read CA as necessary in the context.

1.0 GENERALLY

The contractor is required to carry out the detailing of reinforcement bars and the production of bar bending schedules for the works.

2.0 DESIGN

The Structural Engineer has carried out and is responsible for the design of all reinforced concrete elements, except for proprietary items, contractor-designed elements, or as otherwise provided for in the project specification.

3.0 INFORMATION PROVIDED BY THE ENGINEER

The Structural Engineer, or the relevant specialist sub-contractor for contractor-designed elements, will provide the following information:

- The design reinforcement requirements in the form of summary calculations and/or marked-up drawings.
- At the Structural Engineer's discretion, detailed sketches and/or drawings of specific areas where the reinforcement is deemed to be particularly critical.
- Where the Structural Engineer has special curtailment requirements they will be stated and/or shown on marked up drawings.

4.0 DRAWINGS

All drawings are to be A1size and generally to the following scales:

- Slabs & walls 1:50
- Beams 1:20
- Details to suit & ensure clarity.

Drawings are to be produced using CAD.

Contractor detailed reinforcement drawings are required for the following areas (refer also to drawings):

- In situ reinforced concrete capping beams, beams, columns, walls and all slabs.
- Reinforced structural toppings to profiled metal decks.
- Sundry in situ reinforced concrete items;

5.0 DETAILING

Detailing shall be carried out in accordance with all relevant British Standards and the recommendations given in "Standard method of detailing structural concrete", published by the Institution of Structural Engineers, unless instructed to the contrary by the Structural Engineer. The simplified curtailment rules given in BS8110 shall apply unless otherwise stated.
Starter bars are to be shown on the drawings referring to elements that are cast first, e.g. retaining wall starters are to be shown on the retaining wall base reinforcement drawing.

The contractor shall be free to detail the reinforcement to suit his proposed method of construction, however he should note the requirements in other parts of the Project Specification for seeking approval of his proposals in this respect.

6.0 PROGRAMME:

Prepare a programme for drawing production.
Submit programme to CA for agreement.

7.0 CHECKING AND APPROVALS:

A detailed check – by the contractor – for each drawing/schedule will be required by a person other than the originator. The checked drawing/schedule ("greened/redded" off) must be available for inspection by the Structural Engineer.
Submit reinforcement drawings to the Structural Engineer for a design check. Allow not less than 2 weeks for acceptance.

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## APPENDIX B

## MBP PERFORMANCE SPECIFICATIONS FOR PILINGS AND ASSOCIATED WORKS

## PERFORMANCE SPECIFICATION FOR PILING AND ASSOCIATED WORKS

### INTRODUCTION

To be read with Preliminaries/ General conditions and in conjunction with the specifications and Design Statement by MBP.

1.0 SERVICES REQUIRED

The services required in relation to the substructure work covered by this specification and the piling section of the workmanship and materials specification includes:

- Interpretation of site investigation information, determination of all necessary parameters and analysis of ground induced loading and deformation.
- Selection of appropriate construction methods, plant and materials to effect support to the vertical loadings specified and the derived lateral loads within the physical constraints of the site, the deformation limits specified and to allow safe construction of the required basement.
- Design of piles for the various purposes described and/or identified.
- Design of associated geotechnical processes
- Obtaining approval of the engineer and Building Control department for the scheme and detailed design
- Assisting the engineer in negotiation with any other affected body or person, including public drainage undertaker and appointed party wall surveyors of neighbouring properties including any necessary provision of additional information on noise, vibration, ground movements etc.
- Complying with Clause 13 of the Construction (Design and Management) Regulations, preparing risk assessments and suitable documentation for inclusion in the contract specification and pre-contract Health and Safety Plan.
- Derivation of propping loads for permanent and temporary works cases taking into account reasonable range of prop stiffnesses and load transfer procedures
- Assisting the engineer in developing performance specifications for the temporary and permanent lateral support to the piled retaining walls to ensure performance of the walls in accordance with this specification and the design.
- Provision of all materials, plant, labour and supervision for the installation of the piles as specified and designed
- Installation of the piles as designed and specified to an agreed sequence and programme.
- Integrity and load testing of installed piles as specified or otherwise required to demonstrate the adequacy of the installation.
- Design and execution of any remedial works necessitated by failure to meet the requirements of this specification or full collaboration with others charged with such remedial works design and execution.
- Any other service reasonably required to complete the installation of the substructure and enable its effective incorporation into the permanent works construction.

The Construction Manager must ensure that they understand the purpose, performance requirements and constraints relating to the works and that these have been fully allowed for in their proposals and pricing. Specifically, they shall be deemed to have visited the site and made any necessary enquiries of the engineer or any other party necessary to establish and clarify any matter relating to the performance of the services described.

## 2.0 DESCRIPTION OF CONTRACT WORKS

The general layout and relationship of the required piled structures and other geotechnical processes is shown on MBP's General Arrangement drawings and details. These drawings indicate zones of installations based on preliminary assessment of options and discussions with specialist sub-contractors.

The Construction Manager may propose alternative techniques which address the specified purpose and performance of the installations and the constraints of the site and its environs. Similarly, any particular technique may be applied to more than one of the separately identified types of structure.

For convenience the following sections outline some of the reasons for proposing the illustrated form of construction. This information in no way reduces the Construction Manager's responsibility for selecting methods and plant which take into account all factors and requirements.

## 3.0 PERFORMANCE REQUIREMENTS FOR STRUCTURES

These secant walls are to be constructed from within the site boundary. Constraints identified are those of access, manoeuvrability and proximity to and effects on the nearby main house and garden walls (party fence walls). The indicated solution is of 350 diameter piles arranged in a hard/soft secant wall.

The structure is required to provide effective lateral support to the ground such as to control vertical and horizontal deformation with the aid of temporary propping during excavation and permanent support from the structural floors of the completed building at the sub-basement level and garden slab level. The wall will also carry vertical load from the permanent structure.

Deformation criteria are related to the need to protect the adjacent main house and garden walls from unacceptable deformation and damage.

Temporary propping is to be designed by the Construction Manager and is to be indicated on their drawings. This temporary works design shall take into account constraints on level, plan layout and reaction arising from considerations of excavation process and the permanent works.

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