

The Portico Library Manchester

Structural and Civil Specification

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D20

Excavating and filling

SUMMARY

REVISION HISTORY

Date	No.	Title	Status	Revision	Note
07/07/2025	P01	Structural and Civic Specification	Stage 3	P01	Stage 3

TO BE READ WITH PRELIMINARIES/GENERAL CONDITIONS

NOTE :

- New clauses that have been added to the standard NBS are identified with the suffix N. Clauses where an editorial change has been made are identified with the suffix X.

GENERALLY/THE SITE

112X SITE INVESTIGATION REPORT

- Due to relatively low level of intervention into below ground structures, a full site investigation was not deemed necessary. However, 2no trial pits were carried out next to proposed lift to determine the foundation depth and build-up. Additional ground investigation s will be carried out after stage 3 completion in the basement to determine the ground bearing slab build-up and interfaces.

115N GROUND CONDITIONS - ASSUMED

- **Soils and strata:** The British Geologic Survey (BGS) map for the site indicates that the superficial deposits are found to be Till, Devensian-Diamicton. Sedimentary superficial deposits formed between 116 and 11.8 thousand years during the Quaternary period.

The BGS map also indicates the Bedrock geology as Chester Formation – Sandstone. Sedimentary bedrock formed between 250 and 247.1 million years ago during the Triassic period.

122N SITE VISIT

- The Contractor is expected to visit the site and note the visible conditions.

123N SITE GENERALLY

- In planning the works the Contractor should take account of the nature of the site and should allow for maintaining the ground at the required levels and in a suitable condition to receive the final works, including any landscaping.
- Any parts of the site that are allowed to deteriorate through heavy traffic will be consolidated or brought up to level as necessary at the Contractor's expense.

124N EXCAVATION PRICING

- Prices for excavation must include for excavation in whatever type of soil is encountered or in hardcore, rubble, etc. and for removing small roots, disused drains and small isolated obstructions.

143N GROUND WATER LEVEL

- The water table level is unknown but at the time of investigation was below the 1m depth. Typically, the water table in Manchester City Centre is located very low, in the sandstone layers. However, there is a small risk of some perched water that could be encountered during excavation works.
- Make all necessary additional enquiries concerning ground water level and allow for variations from this level when working on any part of the site.

- No claim for cost associated with measures to control groundwater will be allowed.

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.

151N EXISTING SERVICES

- The Contractor is entirely responsible for locating the positions of all services, including mains, cables, pipes, sewers and drains.
- Allow for carrying out excavation in roads, and elsewhere where services are present, by hand digging so as to ensure that no damage is caused to services.
- The Contractor is to make good, at their own expense, any damage whatsoever to existing services to the complete satisfaction of and in accordance with the instructions of the Statutory Authority concerned, and is to keep the employer indemnified at all times from claims in connection with the damage.
- All services which are encountered in the course of excavation are to be adequately supported and protected from damage to the satisfaction of the Statutory Authority or person in whom they may be vested.
- Allowance must be made in the excavation rates for the cost of providing such support and protection.
- No drain or pipe of any description is to be disturbed until it has been inspected by the CA.

161N TEMPORARY WORKS: DESIGNATED INDIVIDUAL AND DESIGNER / CO-ORDINATOR

- Confirm details of the Designated Individual responsible for temporary works at Tender; and the project Temporary Works Co-ordinator at least fifteen working days before starting any temporary works on site.
- Where any temporary works design is required the temporary works co-ordinator must ensure that a competent person does this, and that an appropriate design check is carried out, if required. The temporary works design must be coordinated with the permanent works.
- Full design details (drawings and calculations) are required for comment by the CA for all temporary support systems.
- Provide one electronic copy or two paper copies of the information for comment. 10 working days are to be allowed for preparation of comments by the CA.

CLEARANCE/EXCAVATING

168 SITE CLEARANCE

- **Timing:** Before topsoil stripping, if any.
- **General:** Clear site of rubbish, debris and vegetation. Do not compact topsoil.

- **Treatment:** Apply a suitable residual herbicide to areas to receive gravel surfacing

210N MATERIALS ARISING

- **Ownership:** Excavated materials, including topsoil, surplus to requirements for filling remain the property of the Employer unless the Contractor:
 - Is instructed to remove them from the site, or
 - Purchases them at a price to be agreed.

220 STRIPPING TOPSOIL

- **General:** Before beginning general excavation or filling, strip topsoil from areas where there will be regrading, buildings, pavings/ roads and other areas shown on drawings.
- **Depth**
 - Remove to an average depth of 200 mm.
 - Give notice where the depth of topsoil is difficult to determine.
- **Handling:** Handle topsoil for reuse or sale in accordance with clause 225.
- **Around trees:** Do not remove topsoil from below the spread of trees to be retained.
- **Site storage:** Should be used wherever possible, agree location with CA

221 TREATING TOPSOIL

- **Treatment:** Apply a suitable translocated nonresidual herbicide.
- **Timing:** Not less than two weeks before excavating topsoil.

225 HANDLING TOPSOIL

- **Standard:** To BS 3882.
- **Aggressive weeds**
 - **Species:** Notify the presence of species included in the Weeds Act, section 2, or the appropriate Wildlife and Countryside Act for the relevant jurisdiction.
 - **Give notice:** Obtain instructions before moving topsoil.
- **Contamination:** Do not mix topsoil with:
 - Subsoil, stone, hardcore, rubbish or material from demolition work.
 - Other soil or material containing aggressive weeds, sharps, plastics and non soil forming materials and notifiable animal or plant diseases.
 - Oil, fuel, cement or other substances harmful to plant growth.
 - Other classifications of topsoil.
- **Multiple handling:** Keep to a minimum. Use topsoil immediately after stripping.

230N BENCHING

- **Surfaces of excavations with a gradient greater than 1:5 (20%) and which are to receive filling:** Provide horizontal benches cut to match the depths of compacted layers of filling.

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:** 30° unless agreed otherwise with CA
- **Backfill material:** Hardcore filling as Clause 710

243N EXCAVATIONS ADJACENT TO EXISTING FOUNDATIONS

- No excavation within 3m of an existing foundation is to be taken below the level of the existing foundation unless a method statement has been agreed in writing with the CA.

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: .
 - 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: 5 working days
- **Backfill material to new excavation:** With top soil

250 PERMISSIBLE DEVIATIONS FROM FORMATION LEVELS

- **Beneath mass concrete foundations:** ±25 mm.
- **Beneath ground bearing slabs and r.c. 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:** ± 25 mm

260 INSPECTING FORMATIONS

- **Give notice:** Make advance arrangements for inspection of formations for All foundations and sub-bases.
 - **Notice (minimum):** 3 days
- **Preparation:** Just before inspection remove the last 150 mm of excavation. Trim to required profiles and levels.
 - **Loose material:** In sands and gravels, lightly mechanically compact formation.
In shrinkable soils, remove loose materials.

- **Seal:** Within 4 hours of inspection, seal formations with first layer of concrete or hardcore fill, pipe bedding material or blinding as appropriate and as the details shown on drawings.

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.

280 TRENCH FILL FOUNDATIONS

- **Excavation:** Form trench down to formation in one operation.
- **Safety:** Prepare formation from ground level.
- **Inspection of formations:** Give notice before commencing excavation.
 - **Period of notice:** Three working days
- **Shoring:** Where inspection of formation is required, provide localised shoring to suit ground conditions.
- **Concrete fill:** Place concrete immediately after inspection and no more than four hours after exposing the formation.

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.

300N EARTHWORK SUPPORT

- Use as necessary to support the sides of excavations and remove on completion unless otherwise instructed.
- Take measurements of any supports that are left in position and inform the CA.

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.:** Break out and seal drain ends
- **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:** Old foundations/ walls where they cross any of the new foundations/ walls:
 - Length of breaking out: Width of the new foundation/ wall plus 50 mm on either side of new foundation.
 - **Depth of breaking out:** As necessary to permit the construction of the new foundation to its design cross section with 50mm clearance
- **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 300mm into undisturbed ground on either side.
- **Step up:** The formation for the new foundation as necessary on either side of the old foundation/ wall until the formation is at its design level.
 - **Size of steps:** Minimum distance between steps 600mm and maximum height of step 200mm.
- **Backfilling beneath design formation level:** Fill with concrete as foundation is cast.

337 OLD FOUNDATIONS OR WALLS BENEATH NEW GROUND SUPPORTED SLAB

- **Break out:** The old foundation/ wall to a depth below the slab formation level of at least 300 mm.
 - Excavate: Soil that has softened on either side of the old wall/ foundation.
- **Backfill:** Obtain instructions if depth of fill will be greater than 600 mm, otherwise backfill with compacted hardcore as clause 710.

360 EXCESS EXCAVATION

- **Excavation taken wider than required**
 - **Backfill:** With hardcore as clause 710
- **Excavation taken deeper than required**
 - **Backfill:** With well graded granular material or lean mix concrete.
 - **Under pad and strip foundations:** Concrete grade GEN1
 - **Under pilecaps, landscaping or paved areas::** Hardcore as clause 710

365N FROST PROTECTION

- The ground to be excavated must be protected with insulating material to prevent freezing.
- Excavations are to be protected from freezing.

370 UNDERGROUND STRUCTURES IN LANDSCAPE AREAS

- **Generally:** Remove walls, roads, foundations, disused services, drains, manholes and the like to minimum depth.
- **Minimum depth below finished levels**
 - Grass, ground cover and perennial planting: 500mm
 - Shrub planting: 750 mm.
 - Within 2 m of tree planting: 1000 mm.

- **Walls and slabs remaining:** In every 10 m² of wall or slab, make a drainage hole at least 600 mm diameter.

DISPOSAL OF MATERIALS

410 EXCAVATED TOPSOIL STORAGE

- **Storage:** Stockpile in temporary storage heaps on site .

415 EXCAVATED TOPSOIL REMOVAL

- **General:** Remove from site.

420 TOPSOIL STORAGE HEAPS

- **Location:**
- **Standard:** To BS 3882.
- **Height (maximum):** 1m
- **Protection**
 - Do not place any other material on top of storage heaps.
 - Do not allow construction plant to pass over storage heaps.
 - Prevent compaction and contamination.

421 TOPSOIL STORAGE HEAP TREATMENT

- **Treatment:** Sow with perennial ryegrass, sowing rate 20g/m²

441 SURPLUS SUBSOIL

- **Excavated material:** Stockpile in temporary storage heaps.
- **Retained material:** Spread and level surplus subsoil on site.
 - **Locations:**
 - **Protected areas:** Do not raise soil level within root spread of trees that are to be retained.
- **Remaining material:** Remove from site.

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.

452N WATER

- Notify the CA as soon as water percolation or waterlogging becomes apparent and obtain the written permission of the CA before carrying out any continuous pumping or other method of removal of water.
- The position of any sumps, other than shown on drawings, which the Contractor may wish to construct to remove water are to be approved by the CA.
- Should it be found that pumping appears to result in disturbance or “boiling of the ground” notify the Engineer. Implement instructions without delay.

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:** permitted subject to contractor obtaining consent from all relevant authorities. Make good any drainage or disturbance caused to drainage systems by discharging water.

FILLING

500 PROPOSED FILL MATERIALS

- **Details:** Submit full details of proposed fill materials to CA, 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:** At least 20 working days before starting filling

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 'Specification for highway works', clause 601.

512X SOLUBLE SULFATE CONTENT

- Soluble sulfate content (SO₃) of materials for filling under concrete slabs or within 1 m of substructures when tested to BS 1377-3, clause 5 using a 2:1 water-soil extract (maximum): 1g/litre.

520 FROST SUSCEPTIBILITY

- **General:** Except as allowed below, fill must be non frost-susceptible as defined in the '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.
- **Frost-susceptible fill:** May only be used:
 - At depths below the finished ground surface greater than: 500 mm 450 mm
 - Within the external walls of buildings below spaces that will be heated. Protect from frost during construction.
 - Where frost heave will not affect structural elements.

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.

538N FILL PLACED AGAINST STRUCTURES

- **Permissible plant:** Use only the following types of compaction plant for fill within 2 m of a structure:
 - Vibratory roller, mass per metre width of roll not exceeding 1300 kg and total mass not exceeding 1000 kg.
 - Vibrating plate compactor, mass not exceeding 1000 kg.
 - Vibro-tamper, mass not exceeding 75 kg.

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 TYPE 1 UNBOUND MIXTURE

- **Fill:** To 'Specification for highway works', clauses 801 and 803:
 - Crushed rock (other than argillaceous rock).
 - Coarse crushed concrete aggregate.
 - Recycled aggregates.
 - Crushed non-expansive slag to clause 801.2.
 - Well-burned non-plastic colliery shale.
- **Amendments to requirements in the 'Specification for highway works':** None
- **Filling:** To 'Specification for highway works', clause 802.

630N COMPACTED SUBSOIL FILLING

- Materials arising from the excavations (or, where instructed, imported) complying with Group 1 or Group 2 as defined below.
- If both suitable and unsuitable material is excavated, select and keep separate sufficient suitable material. If there is insufficient suitable excavated material provide CA with details and obtain instructions regarding the importation of material.
- **Group 1:** Cohesive materials:
 - Clays and marls containing up to 20% of gravel and having a moisture content not less than the value of the plastic limit minus 4 (determined in accordance with BS 1377: Part 2, clause 5).
 - Chalk having a saturation moisture content of 20% or greater.
- **Group 2:** Well graded granular and dry cohesive materials:
 - Clays and marls containing more than 20% of gravel and/or having a moisture content less than the value of the plastic limit minus 4 (determined in accordance with BS 1377: Part 2, clause 5).

- Chalk having a saturation moisture content within the range 15-20%.
- Well graded sands and gravels with a uniformity coefficient of more than 10.
- Crushed hard rock or quarry waste (other than chalk).
- Crushed concrete, crushed brick or tile, free from plaster, wood, organic material and rubbish.
- Sound blastfurnace slag (other than from steelmaking foundries).
- Well burnt nonplastic shale.
- Lay and compact in layers using suitable plant. Use the maximum depth of compacted layers and minimum number of passes as listed in the Specification for Highway works, Series 600, table 6/4. Use Method 1 for group 1 materials listed above. Use Method 2 for group 2 materials listed above.
Suitable plant:
 - Smooth wheeled roller; Vibrating roller; Vibrating plate compactor; Vibro-tamper; Power rammer.

640 STARTER LAYER OF COMPACTED FILLING

- **Fill:** Suitable hard granular material. Compact thoroughly.
- **Thickness:** 200 mm

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 as clause 710.
- **Under grassed or soil areas:** Material excavated from the trench, laid and compacted in 300 mm maximum layers.

710 HARDCORE FILL/ GRANULAR FILL MATERIAL

- **Fill:** Granular material of a known suitability for use in sub-bases, where possible sourced from site including demolition waste. Material to be free from excessive dust, well graded and all pieces less than 75 mm in any direction:
 - If both suitable and unsuitable material is excavated, select and keep separate sufficient suitable material.
 - **Test requirements**
 - A resistance to fragmentation of LA50 for the Los Angeles test to BS EN 1097-2, or a minimum 10% fines value of 50 kN when tested in a soaked condition to BS 812-111. Impact value testing to BS EN 1097-2 is not required.
- **Material**
 - **Permitted materials in any one layer**
 - 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.
- 715 VENTING HARDCORE LAYER
- **Fill:** Clean granular material, well graded, passing a 75 mm BS sieve but retained on a 20 mm BS sieve. In each layer only one of the following:
 - Crushed hard rock.
 - Crushed concrete, crushed brick or tile, free from plaster, timber and metal.
 - Gravel.
 - **Filling:** Spread and level in 150 mm maximum layers. Thoroughly compact each layer whilst maintaining enough voids to allow efficient venting.
- 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, 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 (CP to table B.1 of BS EN 12620) or 0/2 (MP to table B.1 of BS EN 12620).
 - Permissible deviations on surface level: +0 / -25 mm

BIOREMEDIATION - NOT USED

'SPECIFICATION FOR HIGHWAY WORKS: EARTHWORKS SPECIFICATION' APPENDICES - NOT USED

D50

Underpinning

SUMMARY

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GENERALLY

100N CONTRACTOR'S RESPONSIBILITIES

- The Contractor is:
 - To check for any services that could be damaged by the underpinning work, before starting work. Inform the CA or Engineer and arrange for any disconnection and reinstatement needed.
 - Responsible for ensuring that their operations do not in any way impair the safety or condition of the building both before and during the execution of the work. The Contractor must immediately inform the Structural Engineer if they consider that more stringent procedures than those specified are necessary.
 - To submit proposals for method of forming back shutters, where these are required.
 - To provide the Structural Engineer and the Building Inspector with 24 hours' notice of when underpinning will be ready for inspection.
 - To keep excavated material intended for backfilling protected from drying out or wetting.
 - To keep a record of the sequence and dimensions of the underpinning as actually carried out, including details of excavation, casting concrete and pinning up for each section.

120N UNDERPINNING GENERALLY

- Underpinning is to be carried out in short sections of about 1 metre in length.
- Sequence of underpinning to be as shown on drawings which is generally a 1,4,2,5,3 sequence.
- The Contractor may adjust the sequence but must comply with the timing requirements in clauses 140N, 150N and 160N.

130N INSPECTION

- The formation level shall be inspected and approved by the Structural Engineer and the Building Inspector before concrete is poured.
- The underpinning is to be carried out to the satisfaction of the Engineer and the Building Inspector.

140N CONCRETE

- The body of the underpinning is to be constructed in: a 1:2:4 mix mass concrete, or better
- Pins are to be cast to the widths shown unless otherwise directed by the Structural Engineer.
- Excavation and concreting of any section of underpinning are to be carried out on the same day.

150N DRY PACKING

- The concrete is to be stopped off 75mm below the underside of the existing footing.

- Projecting portions of the existing footings are to be carefully cut off where directed and the underside of the footings are to be cleaned and hacked free of dirt, soil or loose materials before dry packing.
- The final pinning up over the whole of the footing is to be carried out with 1:3 mix cement to sharp sand dry pack mortar well rammed in, 24 hours after the concrete has been poured.

160N TIMING OF ADJACENT PINS

- Excavation to any section of underpinning, adjacent to a completed section, shall not be started until at least 48 hours after completion of the adjacent sections.

170N PREPARATION OF ADJACENT PINS

- The sides of the previous underpinning bays are to be roughened or keyed to the satisfaction of the Engineer and Building Inspector.

180N BACKFILLING

- Excavated material used as backfilling is to be placed in maximum 150mm layers, carefully compacted with a pneumatic or electric percussion tool with compacting plate.

E05

In situ concrete construction generally

SUMMARY

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110X ARRANGEMENT OF INFORMATION

- The different parts of insitu concrete construction are specified in separate sections as follows:
 - E10 Mixing/casting/curing in situ concrete
 - E20 Formwork
 - E30 Reinforcement
 - E40 Designed Joints
 - E41 Worked Finishes
 - E60 Precast/Composite concrete floors/roof decks
- Clauses dealing with particular aspects of certain types of construction may thus be dispersed over several sections.

115N TEMPORARY WORKS: DESIGNATED INDIVIDUAL AND DESIGNER / CO-ORDINATOR

- Confirm details of the Designated Individual responsible for temporary works at Tender; and the project Temporary Works Co-ordinator at least fifteen working days before starting any temporary works on site.
- Where any temporary works design is required the temporary works co-ordinator must ensure that a competent person does this, and that an appropriate design check is carried out, if required. The temporary works design must be coordinated with the permanent works.
- Full design details (drawings and calculations) are required for comment by the CA for all temporary support systems.
- Provide one electronic copy or two paper copies of the information for comment. 10 working days are to be allowed for preparation of comments by the CA.

200N SETTING OUT AND TOLERANCES

- Comply with the tolerances given in NSCS Fourth Edition Part 1 Section 10
- The contractor is to carry out a survey of completed work at each level and report to the CA any deviations from the datum level and the horizontal reference grid.
- Angles including right angles to be set out correct within 1 minute of arc.

201N SETTING OUT AND TOLERANCES

- Comply with the tolerances given in NSCS Third Edition Part 1 Section 7.
- The contractor is to carry out a survey of completed work at each level and report to the CA any deviations from the datum level and the horizontal reference grid.
- Angles including right angles to be set out correct within 1 minute of arc.

202N SETTING OUT AND TOLERANCES

- The contractor is to carry out a survey of completed work at each level and report to the CA any deviations from the datum level and the horizontal reference grid.
- Angles including right angles to be set out correct within 1 minute of arc.
- Members are to be set out from the references and constructed or erected so that the dimension between any point as built and any reference agrees with the required dimension, whether shown on or calculable from the drawings, within the degree of accuracy indicated in the following Table:
- Deviations apply +/- except in case 2
- PERMISSIBLE DEVIATIONS
- Distance up to 0.5m
 - In situ concrete and as built: 3 mm
 - Foundations: 10 mm
- Distance 0.5m to 3.0m
 - In situ concrete and as built: 6 mm
 - Foundations: 15 mm
- Distance 3.0m to 10.0m
 - In situ concrete and as built: 10 mm
 - Foundations: 20 mm
- Distance 10.0m to 20.0m
 - In situ concrete and as built: 15 mm
 - Foundations: 25 mm
- Distance > 20.0m
 - In situ concrete and as built: 0.075%
 - Foundations: 0.125%
- LEVELS
- With respect to the nearest datum:
 - Slab tops to be within +/- 6mm of correct level before de-propping.
 - Tops of other in situ members, including any bearing or bedding surfaces or foundations to be at correct level within +/- 6mm.
 - Soffit level of beams and slabs to be within +/- 6mm of correct level or specified camber before de-propping.
- STRAIGHTNESS
- Deviation from straight line or plane related to the length of the member. Lesser tolerances apply within any part of the length of a longer member.
 - 0 to 0.5m: 1mm
 - 0.5 to 1.0m: 1mm varying to 2mm linearly
 - 1.0 to 3.0m: 2mm varying to 4mm linearly

- 215 **CONTRACTOR'S STRUCTURAL DETAILING OF REINFORCEMENT**
- **Responsibility:** Prepare reinforcement drawings and schedules of reinforcement for basement
 - **Requirement:** Complete the detailing/ scheduling of reinforcement in accordance with the designated code of practice.
- 220X **STRUCTURAL DESIGN PROVIDED**
- **Description:** As Summary of Design Principles
 - **Requirements**
 - **Generally:** As section B50.
 - **Additional requirements:** None
 - **Production/ execution records:** As defined in Contractor's quality plan and agreed with the CA
 - **Finished product:** To comply with the requirements of the design standard.
 - The design has been carried out in accordance with BS8110 / BSEN 1992 and the reinforcement schedules have been prepared in accordance with BS8666.
- 225X **TEMPERATURE RECORDS**
- Throughout the period of concrete construction the contractor is to maintain adequate records of the temperature to ensure concrete is placed in accordance with the specification. These records shall be available for inspection on site.
- 235X **OPENINGS, INSERTS AND FIXINGS**
- The Contractor is to collate all information on inserts and fixings to be cast into the concrete.
 - The Contractor is to prepare fully dimensioned builderswork drawings showing all holes, inserts, fixings etc. The Contractor is to ensure that drawings are submitted for comment in time so that the approval period complies with the programme. A period of 10 working days, after receipt of drawings, must be allowed for preparation of comments by the CA.
 - The Contractor is to give the CA 24 hours notice before any concrete pour where there is a clash between openings, inserts and fixings and agree any alterations to the fixing and any adjustments needed to reinforcement.
 - **Locate reinforcement:** To ensure specified minimum cover at openings and inserts and to be clear of fixing positions.
- 310 **SURFACE REGULARITY OF CONCRETE FLOORS TO BS 8204 - GENERAL**
- **Standard:** To BS 8204-1 or -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**
- **Description:** SR3
 - **Location:** All floors
 - **Abrupt changes:** 2 mm maximum

318 SURFACE REGULARITY OF CONCRETE FLOORS TO TR 34 - GENERAL AND TOLERANCE

- Measurement of surface regularity: To Concrete Society Technical Report 34 (TR 34), section 3.
- Surface regularity class: Comply with permissible limits for floor classifications/ locations: FM1.

410 IN SITU CONCRETE CONSTRUCTION - SUPERVISION/ CHECKING

- Standard: To BS EN 13670, Execution Class 2

412N WATER RESISTANT CONCRETE CONSTRUCTION

- The following clauses in other sections relate specifically to water resistant concrete construction:
 - Concrete: E10/:
 - Timing of placing:
 - Curing periods: E10/:
 - Temperature during curing: E10/830
 - Formwork ties: E20/:
 - Construction joints: E40/:
 - Flexible waterstops: E40/310
 - Ties and dowels: E40/:
 - Sealant: E40/:

420 LIQUID RETAINING AND CONTAINMENT CONCRETE CONSTRUCTION

- Description: To achieve a basement grade of ??? in accordance with BS 8102
- Form of construction: To BS 8102, Type ??? To BS 8102, Type B
- Requirement: Work is to be water resistant when tested to clause E05/ 460.

430 SURFACE CRACKING

- Description: Generally
- Method of measurement: Graduated magnifying device, template or feeler gauge
- Maximum crack width: 0.3 mm
- Action: Should cracks occur that are wider than the maximum crack width:
 - Survey: Frequency and extent of such cracks and investigate cause.
 - Report: Findings together with recommendations for rectification.

440N PRESSURE GROUTING, IF REQUIRED

- To be carried out by an approved specialist firm.
- Drill grouting holes in carefully selected locations. If drill hits reinforcement, stop drilling immediately and relocate hole.
- On completion make good to holes with a damp 1:3 cement: sharp sand mix thoroughly rammed in and finished neat and flush.

450 INSPECTION OF WATER EXCLUDING STRUCTURES

- Inspection:: To be carried out jointly by the contractor and the CA.
- Notification: Give not less than seven days warning before inspection.
- First inspection
 - Purpose: To identify any defects which may lead to water penetration or damp patches.
 - Timing: As soon as possible after completion of the work and before backfilling.
- Final inspection
 - Purpose: To identify any points of water penetration or damp patches.
 - Timing: After backfilling when the ground water table has returned to normal level.
- Requirement: Exposed faces of the structure must show no signs of leakage and remain apparently dry

460 TESTING OF WATER RETAINING STRUCTURES

- Timing: To be agreed with CA.
- Recording: Maintain accurate test records at all stages.
- Preparation for testing
 - Fill completed and clean structure to capacity with water at a uniform rate not exceeding 2 m depth in 24 hours.
 - Maintain level by adding more water for an agreed stabilizing period.
- Filled level: Accurately mark and record.
- Permissible drop in level after allowing for evaporation and rainfall (maximum): 10 mm
 - Test period: 7 days.
 - Intervals for recording drop in level: 24 hours.

470 TESTING OF ELEVATED WATER RETAINING STRUCTURES

- Requirements in addition to clause 460: During the test period, the exposed faces of the structure must show no signs of leakage and must remain apparently dry.

510N EXPOSED CONCRETE CONSTRUCTION

- The following clauses in other sections relate specifically to exposed concrete:
 - Concrete: E10/:
 - Curing periods: E10/:
 - Protection: E10/840
 - Formwork ties:
 - Plain finish: E20/620
 - Special finish: E20/630
 - Ribbed finish: E20/650
 - Proprietary form lining finish: E20/660
 - Finish for abrasive blasting: E20/700

- Finish for tooling: E20/710
- Cover spacers: E30/491
- Rust staining: E30/510
- Checking cover: E30/520
- Construction joints: E40/:
- Sealant E40/:
- Abrasive blasted finish: E41/420
- Tooled finish: E41/430

610 SPECIALLY CONSTRUCTED SAMPLE

- Location: To approval.
- Description: As drawing number:
- Placing, compaction and curing of the concrete is identical to that proposed for the element or part of the building.
- Inspection of samples: Give not less than seven days' notice before inspection.
- Commencement of related parts of the Works: Do not proceed until instructed.

615N ALTERATIONS TO CAST CONCRETE

- No alterations to cast concrete, cutting holes or chases etc. is permitted without the consent of the CA.
- The contractor is to give at least five working days' notice of any proposed cutting.

E20

Formwork for in situ concrete

SUMMARY

REVISION HISTORY

Date	No.	Title	Status	Revision	Note
07/07/2025	P01	Structural and Civic Specification	Stage 3	P01	Stage 3

TO BE READ WITH PRELIMINARIES/ GENERAL CONDITIONS.

NOTE :

- New clauses that have been added to the standard NBS are identified with the suffix N. Clauses where an editorial change has been made are identified with the suffix X.

GENERALLY/ PREPARATION

105N TEMPORARY WORKS: DESIGNATED INDIVIDUAL AND DESIGNER / CO-ORDINATOR

- Confirm details of the Designated Individual responsible for temporary works at Tender; and the project Temporary Works Co-ordinator at least fifteen working days before starting any temporary works on site.
- Where any temporary works design is required the temporary works co-ordinator must ensure that a competent person does this, and that an appropriate design check is carried out, if required. The temporary works design must be coordinated with the permanent works.
- Full design details (drawings and calculations) are required for comment by the CA for all temporary support systems.
- Provide one electronic copy or two paper copies of the information for comment. 10 working days are to be allowed for preparation of comments by the CA.

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.

120X FORMWORK DETAILS

- All timber used in formwork shall have a valid Forest Stewardship Council (FSC) 'Chain of Custody Certificate' or other documentary evidence (which has been or can be independently verified) of its source and supply chain as agreed with the CA.
- **Provide the following:** Void formers
Surface of forms
Form liners and other means of obtaining specified finish
Sealing methods - at panel joints, form tie holes and construction joints
Access doors
Construction joints - positions and types Tie holes - layout where exposed to view

124N FALSEWORK

- Falsework shall comply with the requirements of BS 5975 Code of practice for temporary works procedures and the permissible stress design of falsework and HSE Construction Information Sheet No 56: Safe erection, use and dismantling of falsework.

132X PROPPING

- **General:** Prevent deflection and damage to the structure. Carry down props to bearings strong enough to provide adequate support throughout concreting operations.
- The design of all falsework and propping should be carried out by the contractors' Temporary Works Co-ordinator.

140N PROPPING OF PROFILED STEEL SHEETS

- Provide continuous support along the centre of each span until the concrete has reached an adequate strength as agreed with the CA.

150N BEARINGS

- Prop through other decks if construction load on a particular deck exceeds:
 - the design loading, or
 - where less than 28 days have elapsed from casting, a reduced loading agreed with CA.
- Submit details of proposed prop bearings and through propping to CA. Accept responsibility for cost of checking effects on structure.

170X WORK BELOW GROUND

- Vertical faces of strip footings, bases and slabs may be cast against faces of excavation, provided:
 - Prior approval is obtained.
 - The faces are sufficiently accurate and stable.
 - Supports to faces are withdrawn progressively as concrete is placed.
- Adequate measures are taken to prevent contamination of concrete.
- Faces of walls must be cast against formwork.

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.

340X KICKERS

- Unless shown otherwise form horizontal construction joints at base of walls and columns without kickers, using one of the methods described in BCA Publication 47.023 'Kickerless construction'. The Contractor must satisfy themselves as to the suitability of the chosen method.
- If kickers are proposed ensure concrete in the kicker is of the same quality as used in the wall or column. Kicker height to be 75mm minimum.

350 FORM TIES

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

361 FORM TIES FOR WATER-RESISTANT CONCRETE

- General: Maintain water resistance of construction.
- Tie type and sealing system: Submit proposals.

362N FORM TIES FOR WATER RESISTANT CONCRETE

- Through bolts which are entirely withdrawn on stripping the formwork.
- Seal holes with corks coated with adhesive or other approved material well rammed in from the concealed face, and plug the other side with semi-dry 1:3 cement: sand mortar, well rammed in.

470X RELEASE AGENTS

- 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.
- Apply evenly to form faces, from top downwards, and to horizontal surfaces last.
- Use the minimum amount necessary to obtain a clean release and prevent excessive local collection.
- 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

510X STRIKING FORMWORK

- Strike formwork without disturbing, damaging or overloading structure, and without disturbing props. Notwithstanding other clauses in this specification and any checking or approvals by the CA, the responsibility for safe removal of any part of the formwork and any supports without damaging the structure rests with the Contractor.

520N MINIMUM PERIODS

- The following periods (in days) for retaining formwork in position before striking apply to concrete made with CEMI or sulphate resistant Portland cement with no cement replacement materials or admixtures.
: Temperatures listed are for the average mean of daily minimum and maximum air temperatures during the period.
- Vertical formwork to columns, walls and beams:
 - 16°C: 0.5
 - 7°C: 0.75
 - 3°C: 1
- Soffit forms to slabs:
 - 16°C: 4
 - 7°C: 6
 - 3°C: 8
- Props to slabs and soffit forms to beams:
 - 16°C: 10
 - 7°C: 15
 - 3°C: 20
- Props to beams:
 - 16°C: 14
 - 7°C: 21
 - 3°C: 28
- Submit details of proposed periods for mixes using admixtures or other types of cement.

521X MINIMUM PERIODS

- Alternative methods of determining minimum periods for retaining formwork in position may be submitted for approval. Accept responsibility for cost of checking of proposals by CA and for any testing.

FORMED FINISHES

610X BASIC FINISH

- **Finish:** No particular requirements, except those for tolerances and full compaction.

613 ORDINARY FINISH

- **Location:**
- **Finish:** Faces fully compacted. Formed surfaces free from major blemishes and honeycombing. Steps at joints to be less than 5 mm.

620 PLAIN FINISH

- **Location:**
- **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.

E30

Reinforcement for in situ concrete

SUMMARY

REVISION HISTORY

Date	No.	Title	Status	Revision	Note
07/07/2025	P01	Structural and Civic Specification	Stage 3	P01	Stage 3

TO BE READ WITH PRELIMINARIES/ GENERAL CONDITIONS.

NOTE :

- New clauses that have been added to the standard NBS are identified with the suffix N. Clauses where an editorial change has been made are identified with the suffix X.

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).

115N DESIGN - REINFORCEMENT

- **Design:** Complete the detailing and scheduling of the reinforcement. Based on the following information: We should confirm the extent of the contractor detailing – e.g. all RC work; and list here the information that will be provided to allow contractor detailing – the drawings with notes on reinforcement required or calculations showing requirements, limits on the choice of reinforcement spacing for any alternative details, confirmation of the nominal cover and concrete details to go on the RC drawings etc.
- Should any conflicts occur in the design information seek clarification from the CA.
- Details shall be prepared in accordance with the Institution of Structural Engineers “Standard Method of Detailing Structural Concrete”; and comply with standard rules on size and spacing to control cracking.
- Co-ordinate the reinforcement detailed with cast in elements shown on the drawings.

140X PLAIN BAR REINFORCEMENT

- Bars up to 12mm diameter
- **Standard:** To BS 4482
 - **Strength grade:** 250

150 RIBBED BAR REINFORCEMENT

- **Standard:** To BS 4449.
 - **Strength grade:** 500. Reinforcement in accordance with BS4449 scheduled as class H shall be ductility class A for bars up to and including 12mm diameter and ductility class B for larger bars.

160 GALVANIZED STEEL REINFORCEMENT

- **Galvanizing:** To BS EN ISO 1461 after cutting but before bending.

210 STANDARD FABRIC REINFORCEMENT

- **Standard:** To BS 4483.
- **Strength grade:** 500. Fabric made from ribbed bar reinforcement in accordance with BS4449 and scheduled as class H shall be ductility class A for bars up to and including 12mm diameter and ductility class B for larger bars.

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.

WORKMANSHIP

305N REINFORCEMENT DRAWINGS & BAR BENDING SCHEDULES

- Reinforcement bending schedules will be provided a maximum of 3 weeks before the programmed date for casting each part of the work on the contractors written request.
- Before the bars are cut to length, the Contractor must check that each schedule includes the correct quantity of reinforcement of the correct grade and to the correct size length and shape as shown on the drawings to which it relates.
- The CA is to be notified of any errors disclosed by these checks.

310X CUTTING AND BENDING REINFORCEMENT

- **General:** To schedules and to BS 8666.
- Tag bundles of reinforcement with labels to BS 8666.
- Restrictions on bending steel:
 - **Rebending including minor adjustments:** Obtain instructions.
 - **Temperatures below 5°C:** Prohibited.
 - **Temperatures greater than 100°C:** Prohibited.

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 mill scale, 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 of smallest bar in lap
- **Laps in fabric reinforcement (minimum):** 40 x bar diameter of smallest bar in lap
 - **Laps at corners:** Avoid four layer build-up.

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.

470X TOLERANCES ON COVER

- The cover noted on drawings is nominal cover. The allowable tolerances are
- Not less than the nominal cover minus 10 mm.
- Not more than the nominal cover plus
 - 10 mm in sections less than 150 mm thick
 - 15 mm in sections 400 mm thick
 - 25 mm in sections over 2500 mm thick
 - with linear interpolation for intermediate values.
- For foundations and members in foundations, permitted plus-deviations may be increased by 15 mm. Minus deviations are 15 mm cast against blinding or prepared earth and 50mm when cast directly against earth faces.
- Before concreting check thoroughly that the specified cover dimensions have been obtained.

481N GROUND BEARING SLABS

- Where these are reinforced with a single layer of fabric in the upper part of the slab, either:
 - Lay fabric on top of the first compacted layer of concrete, followed by the top layer of concrete, placed within two hours of the first layer, or;
 - Fully support the fabric on suitable proprietary supports/chairs.

491N SPACERS TO FORMED CONCRETE FINISHES

- If permitted (see section E20) to be approved type(s).

500N DAMAGE

- Prevent damage to and disfigurement of forms, form linings and adjacent work.

510 RUST STAINING

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

E40

Designed joints in in situ concrete

SUMMARY

REVISION HISTORY

Date	No.	Title	Status	Revision	Note
07/07/2025	P01	Structural and Civic Specification	Stage 3	P01	Stage 3

TO BE READ WITH PRELIMINARIES/GENERAL CONDITIONS.

0 NOTE :

- New clauses that have been added to the standard NBS are identified with the suffix N. Clauses where an editorial change has been made are identified with the suffix X.

120 CONSTRUCTION/ MOVEMENT JOINTS GENERALLY

- **Accuracy:** Position and form joints accurately, straight, well-aligned and truly vertical, horizontal or parallel with setting out lines of the building.
- **Modifications to joint design or location:** Submit proposals.
- **Placing concrete to form movement joints**
 - Maintain effectiveness of joints. Prevent concrete entering joints, penetrating or impregnating compressible joint fillers.
 - Do not place concrete simultaneously on both sides of movement joints.

132X ADDITIONAL CONSTRUCTION JOINTS

- **Joints additional to those required by designer:** Not permitted in concrete exposed to view
- **Approval of additional joints:** Submit proposals.

210 FORMED JOINTS

- **Forms/ stop ends generally:** Rigid and grout-tight.
- **Forms/ stop ends for projecting continuity reinforcement:** To accommodate bars or fabric without temporary bending or displacement.

211 FORMED JOINTS IN CONCRETE WEARING SURFACES

- **Temporary forms:** Square edged with a steel top surface.
- **Placing concrete:** Compact thoroughly at edges to give level, closely abutted joints with no lipping.

219N PRODUCT CERTIFICATION

- Provide product certification when the use of an alternative product to that specified is proposed, or where noted in product clauses.
- Appropriate certification is as follows:
- For products specified to meet a harmonised European standard, or for which a European Technical Assessment exists: Provide certification of CE marking and Declaration of Performance.
- For products outside this scope: Provide third party certification from a United Kingdom Accreditation Service (UKAS) approved independent laboratory, where this is available.

220 PRECAST CONCRETE PERMANENT SIDE FORMS

- **Manufacturer:**
 - Product reference:
- **Certification:** As clause 219N

- Depth:
 - Installation: To accurate line and level with concrete thoroughly compacted at edges and with no lipping.
- 225 PREFABRICATED STEEL PERMANENT JOINT FORMERS
- Manufacturer:
 - Product reference:
 - Certification: As clause 219N
 - Depth:
 - Installation: To accurate line and level with concrete thoroughly compacted at edges and with no lipping.
- 230 PREPARATION OF CONSTRUCTION JOINTS
- Roughening of joint surfaces: Select from:
 - Brushing and spraying: Remove surface laitance and expose aggregate finish while concrete is still green.
 - Other methods: Submit proposals - mechanical methods (e.g. scabbling) will not be accepted..
 - Condition of joint surfaces immediately before placing fresh concrete: Clean and damp.
- 240 BOTTOM OF SLAB CRACK INDUCERS
- Certification: As clause 219N
 - Type:
 - Plastics, triangular section
 - Depth:
 - Fixing to sub-base: Secure to prevent movement during casting and compacting of concrete.
- 250 INSERTED STRIP CRACK INDUCERS
- Certification: As clause 219N
 - Type:
 - Depth:
 - Installation: To accurate line and level with concrete thoroughly compacted at edges and with no lipping.
- 260 SAWN CRACK INDUCING GROOVES
- Groove dimensions
 - Depth:
 - Width: As narrow as practicable.
 - Sawing: Sufficiently early to prevent random cracking (within 24 hours of casting slab) and to produce strong, well defined arrises.
 - Groove filling:
- 310 FLEXIBLE WATERSTOPS
- Manufacturer:

- Product reference:
- Certification: As clause 219N
- Junctions and angles: Use factory formed junction pieces.
- Placing concrete: Fully compact concrete around waterstops with no voids or porous areas.

320 HYDROPHILIC WATERSTOPS

- Manufacturer:
 - Product reference:
- Certification: As clause 219N
- Location:
- Material:
- Method of fixing:
- Condition of concrete surface at time of fixing: Clean and free from ponded or running water.
- Protection: Prevent wetting of exposed sections of waterstop.

330N BENTONITIC WATERSTOPS

- Manufacturer: Cetco Europe Limited.
- Reference: WATERSTOP RX101 with Revo-fix.
- Install using Revo-Fix unless noted otherwise.
- Install to form a continuous length with no breaks.
- Install strictly in accordance with manufacturer's recommendations.

410 CARBON STEEL TIE BARS

- Standard: To BS 4482.
 - Product form: Plain
 - Strength grade: 250
- Certification: As clause 219N
- Cleanliness: Free from corrosive pitting, loose millscale, loose rust and contaminants which may adversely affect the tie bars, reinforcement, concrete, or bond between the two.
- Position: Centred on joint.
- Other requirements: None

420 FABRIC TIE STRIPS

- Standard: To BS 4483.
- Certification: As clause 219N
- Cleanliness: Free from corrosive pitting, loose millscale, loose rust and contaminants which may adversely affect the fabric, concrete, or bond between the two.
- Position: Width of the mesh strip centred on the joint at the level shown on the drawings.

430X CARBON STEEL DOWEL BARS

- Standard: To BS 4482
 - Product form: Plain.
 - Strength grade: 250
 - Properties: Perfectly straight, with sawn (not sheared) ends.
- Certification: As clause 219N
- Debonding: Achieve effective debonding of each bar
 - Material: Suitable proprietary debonding compound or suitable plastics sleeve
 - Extent: Half length of bar
- Position: It is essential to fix bars securely at the required depth, perfectly level and at right angles to and centred on joint.
- Other requirements: Fit debonded ends of bars in expansion joints with an approved type of cap incorporating not less than 20 mm of compressible material

435X STAINLESS STEEL DOWEL BARS

- Standard:
 - Designation:
 - Product form: Plain.
 - Strength grade: 200.
 - Properties: Perfectly straight, with sawn (not sheared) ends.
- Certification: As clause 219N
- Debonding: Achieve effective debonding of each bar.
 - Material: Suitable proprietary debonding compound or suitable plastics sleeve
 - Extent: Half length of bar
- Position: It is essential to fix bars securely at the required depth, perfectly level and at right angles to and centred on joint.
- Other requirements: Fit debonded ends of bars in expansion joints with an approved type of cap incorporating not less than 20 mm of compressible material

437 DEBONDING COMPOUND

- Manufacturer:
 - Product reference:

438 LOOP CONNECTORS

- Manufacturer:
 - Product reference:
- Loop length:

440 LOAD TRANSFER SYSTEMS

- Manufacturer:
 - Product reference:

445 INSULATING LOAD TRANSFER SYSTEMS

- Manufacturer:
 - Product reference:
- Certification: As clause 219N
- Slab depth:
- Fire resistance:
- Thermal conductivity:
- Special requirements:

448 THERMAL BREAK CONNECTION PLATES

- Manufacturer:
 - Product reference:
- Certification: As clause 219N
- Material:
- Dimensions:
 - Length:
 - Width:
 - Thickness (maximum):
 - Thickness (minimum):
- Holes:
- Thermal conductivity:
- Maximum permitted compressive stress:
- Operating temperature
 - Maximum:
 - Minimum:

510 SHEET MEMBRANE FOR SLIDING JOINTS

- Manufacturer:
 - Product reference:
- Certification: As clause 219N
- Fixing: Bond to first cast concrete surface, or otherwise hold in position during concreting.

520 SHEET JOINT FILLER

- Description:

- Manufacturer:
 - Product reference:
- Certification: As clause 219N
- Joints finished with sealant: Leave sufficient space for sealant by using temporary formers.

530 SEALANT

- Description:
- Manufacturer:
 - Product reference:
 - Colour of surfaces exposed to view:
- Certification: As clause 219N
- Preparation and application: As section Z22.
- Guarantee:
 - Period:
 - Requirements:

545 COMPRESSIBLE SEALING STRIP SYSTEM

- Description:
- Manufacturer:
 - Product reference:
 - Colour:
- Certification: As clause 219N

590 INSPECTION OF TIED AND PARTIALLY TIED JOINTS

- Purpose: To determine whether shrinkage is concentrated at occasional joints.
- Timing: At intervals from one month after casting of slab for duration of works.
- Joints that have opened significantly more than the average: Submit proposals for grouting.

E41

Worked finishes to in situ concrete

SUMMARY

REVISION HISTORY

Date	No.	Title	Status	Revision	Note
07/07/2025	P01	Structural and Civic Specification	Stage 3	P01	Stage 3

TO BE READ WITH PRELIMINARIES/ GENERAL CONDITIONS.

0 NOTE :

- New clauses that have been added to the standard NBS are identified with the suffix N. Clauses where an editorial change has been made are identified with the suffix X.

110 MONOLITHIC CONCRETE WEARING SCREED

- Description:
- Thickness
 - Minimum: 10 mm.
 - Maximum: 20 mm.
- Abrasion resistance class to BS 8204-2: AR1/WS
- Mix
 - Cements/ Combinations: To BS EN 197-1 and BS 8500-2.
 - Fine aggregate: To BS EN 12620.
 - Grading limit: To BS EN 12620.
 - Coarse aggregate: To BS EN 12620.
 - Grading limit: 10 mm single size
 - Proportions: 1:1:2
- Construction
 - Lay and compact within three hours of laying base (less in hot weather).
 - Bleed water on base surface: None.
- Tolerances
 - Surface regularity: As clause E05/???
 - Level: Permissible deviation of wearing surface from datum (maximum): ± 10 mm.
- Finish:
 - Additional surface treatment:
 - Slip resistance (minimum):
- Curing: As section E10.

120 DIRECTLY FINISHED CONCRETE WEARING SURFACES

- Description:
- Abrasion resistance class to BS 8204-2: AR1/DF
- Tolerances
 - Surface regularity: As clause E05/???
 - Level: Permissible deviation of wearing surface from datum (maximum): ± 10 mm.
- Finish:
 - Additional surface treatment:

- Slip resistance (minimum):
- Curing: As section E10.
- 140 SAMPLES AVAILABLE FOR INSPECTION
- Type:
- Location:
- 145 CONTROL SAMPLES
- Sample areas that are part of finished work:
- Location:
- Approval of appearance: Obtain before proceeding with remainder of the work.
- 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.
- 210 TAMPED FINISH
- Surface on completion: Even array of parallel ribs
- 215N LIGHT TAMPED FINISH TO RECEIVE RAISED FLOOR PEDESTALS
- Lightly tamp surface mechanically with suitable beam to give a sufficient even texture suitable for adhering raised floor pedestals.
- Surface to be generally flat and smooth with no steps or significant ridges.
- Raised floor manufacturer to confirm suitability of finish on an agreed area of actual work which will be designated as a sample panel.
- 220 SCORED FINISH
- Surface on completion: Roughened, to agreed pattern
 - Scoring tool: Metal comb
- 230X BRUSHED FINISH
- Surface on completion: Light even texture.
 - Timing: While concrete is sufficiently green.
 - Direction: At right angles to longitudinal direction of the slab.
 - Texture depth: Approximately 1 mm with finished surface having an overall even texture.
- 240 WOOD FLOATED FINISH
- Surface on completion: Slightly coarse, even texture with no ridges or steps.

310 SMOOTH FLOATED FINISH

- Surface on completion: Even with no ridges or steps.

320 TROWELLED FINISH

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

330 TROWELLED FINISH FOR WEARING SURFACES

- Surface on completion: Uniform and smooth, free from trowel marks and blemishes.

335 DRY SHAKE TROWELLED FINISH FOR WEARING SURFACES

- Dry shake manufacturer:
 - Product reference:
 - Mix:
 - Colour:
 - Application: Sprinkle evenly at appropriate stages during floating and before trowelling.
 - Application rate:
- Curing agent/ Sealer:
- Protection: Prevent marking of adjacent surfaces.
- Surface on completion: Uniform and smooth, free from trowel marks and blemishes.

340 DEWATERED TROWELLED FINISH FOR WEARING SURFACES

- Dewatering
 - Timing: Immediately after compacting concrete.
 - Removing water: Use vacuum process.
- Surface on completion: Uniform and smooth, free from trowel marks and blemishes.

410 POWER GROUND FINISH FOR WEARING SURFACES

- Grinding: Remove 1-2 mm from surface.
 - Timing: When concrete is sufficiently hard for fine aggregate surface particles not to be dislodged.
- Cleaning: Remove dust and wash down.
- Surface on completion: Even glass-paper texture, free from blemishes and trowel marks.

420 ABRASIVE BLASTED FINISH

- Type:
 - Depth of aggregate exposure:
- Margins: Unblasted, straight and regular.
 - Width:
- Cleaning: Remove loose particles and dust.

430 TOOLED FINISH

- Type:
 - Texture/ Maximum depth of indentations:
 - Timing: Tool surface minimum 21 days after casting.
- Margins: Untooled, straight and regular.
 - Width:
- Cleaning: Remove loose particles and dust.

510 SURFACE HARDENER

- Manufacturer:
 - Product reference:
- Condition of substrate prior to application: Cured, clean and free from surface contaminants.
- Application: Evenly to dry surfaces. After absorption, wash surface immediately with clean water.
 - Additional applications:
- Solutions and wash water: Do not discharge to drains. Store and dispose of safely.

520 SURFACE SEALER

- Manufacturer:
 - Product reference:
- Substrate
 - Moisture content: As recommended by sealer manufacturer. Test relative humidity to BS 8203, Annex A where required to verify suitability.
 - Condition prior to application: Cured, clean and free from contaminants.
- Primer:
- Application: Evenly to dry surfaces to form an effective seal but without a glossy finish.

530 SLIP RESISTANCE TESTING OF WEARING SURFACES

- Test: To BS 7976-2 using a Transport Research Laboratory (TRL) Pendulum.
 - Timing: Give adequate notice.
 - Test results: Submit, inclusive of slip resistance values (pendulum test value [PTV]), in the wet and dry states.

F10

Brick/ block walling

SUMMARY

REVISION HISTORY

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07/07/2025	P01	Structural and Civic Specification	Stage 3	P01	Stage 3

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TYPES OF WALLING

110 CLAY FACING BRICKWORK

- Description: General
- Bricks: To BS EN 771-1.
 - Manufacturer: **Submit proposals**
 - Product reference: Submit proposals
 - Recycled content: Submit proposals
 - Special shapes: None
- Mortar: As section Z21.
 - Standard: To BS EN 998-2
 - Mix: Insert Requirements e.g 1:1:6 cement:lime:sand, 4N/mm² (mortar class M4)
 - Additional requirements: None
- Bond: To match existing

255 CONCRETE FACING BLOCKWORK

- Description: General
- Blocks: To BS EN 771-3.
 - Manufacturer: **Submit proposals**
 - Product reference: Submit proposals
 - Configuration: Group 1
 - Compressive strength
 - Mean value: 10.4 N/mm²
 - Characteristic value: 10.4 N/mm²
 - Category: I
 - Freeze/ thaw resistance: Suitable for exposed external use below dpc
 - Recycled content: Submit proposals
- Mortar: As section Z21.
 - Standard: To BS EN 998-2
 - Mix: 1:¼:3 cement:lime:sand

315 CLAY COMMON BRICKWORK

- Description: General
- Bricks: To BS EN 771-1.
 - Manufacturer: **Submit proposals**
 - Product reference: Submit proposals
 - Size: 215 x 102 x 65 mm.
 - Mean compressive strength (minimum): 20 N/mm²
 - Durability designation: F2
 - Water absorption: Between 15% and 19%
 - Recycled content: Submit proposals
- Mortar: As section Z21.
 - Standard: To BS EN 998-2
 - Mix: 1:1:6 cement:lime:sand 4 N/mm² (class M4)

355 CONCRETE COMMON BLOCKWORK

- Description: General
- Blocks: To BS EN 771-3.
 - Manufacturer: **Submit proposals**
 - Product reference: Submit proposals
 - Configuration: Group 1
 - Compressive strength
 - Mean value: 10.4 N/mm²
 - Characteristic value: 10.4 N/mm²
 - Category: I
 - Freeze/ thaw resistance: Suitable for exposed external use below dpc
 - Recycled content: Submit proposals
- Mortar: As section Z21.
 - Standard: To BS EN 998-2
 - Mix: 1:1:6 cement:lime:sand 4 N/mm² (class M4)

TESTING

399A PRICE & MYERS GUIDANCE

- Testing is needed either if we need to ensure a mortar is not too strong for use in a restoration project or if we want to make use of a partial safety factor based on special quality construction control in our design. Other than that it need not be specified. Omit this section if not required.

410 COMPRESSIVE STRENGTH OF MORTAR FOR EACH WALLING TYPE

- Testing authority: A UKAS-accredited laboratory
- Test method: To BS EN 1015-11.
- Preliminary tests procedure: As follows:
 - Specimens
 - Number of specimens: Six.
 - Type: 40 x 40 x 160 mm prism.
 - Preparation: At least six weeks before walling commences.
 - Specimen testing: Half of specimens at seven days. Remainder at 28 days.
 - Retarded mixes: Extend curing periods to include retardation period.
 - Response to result: If mean compressive strength at 28 days is not within the range given below repeat tests with more suitable sand or next higher Mortar class.
- Site tests procedure: As follows.
 - Number of specimens: Six per 150m² of walling or per storey whichever the more frequent.
 - Specimen types: As preliminary test, but prepared during construction.
 - Specimen testing: Half of specimens at seven days. Remainder at 28 days.
 - Retarded mixes: Extend curing periods to include retardation period.
- Required test mean compressive strength at 28 days (N/mm²): To be within the following range:
- Results: Submit.

415 FRESH MORTAR CEMENT CONTENT

- Test method: BREMORTEST in accordance with Building Research Establishment Information Paper 8/89
- Results: Submit.

WORKMANSHIP GENERALLY

430 CONDITIONING OF CLAY BRICKS AND BLOCKS

- Bricks and blocks delivered warm from manufacturing process: Do not use until cold.
- Absorbent bricks in warm weather: Wet to reduce suction. Do not soak.
- When using lime mortar : Pre-wet masonry units with high porosity in advance of use; do not over wet, especially in cold weather, and ensure all water is absorbed into the masonry units and does not run off of the face.

440 CONDITIONING OF CONCRETE BRICKS/ BLOCKS

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

460 MORTAR DESIGNATIONS

- **Mix proportions:** For a specified designation select a mix from the following:
 - **Designation (i) (BS EN 998-2 M12 equivalent)**
 - 1:0-¼:3 (Portland cement:lime:sand with or without air entraining additive).
 - 1:3 (Portland cement:sand and air entraining additive).
 - **Designation (ii) (BS EN 998-2 class M6 equivalent)**
 - 1:½:4-5 (Portland cement:lime:sand with or without air entraining additive).
 - 1:3 (masonry cement:sand containing Portland cement and lime in approximate ratio 1:1, and an air entraining additive).
 - 1:2½-3½ (masonry cement:sand containing Portland cement and inorganic materials other than lime and air entraining additive).
 - 1:3-4 (Portland cement:sand and air entraining additive).
 - **Designation (iii) (BS EN 998-2 class M4 equivalent)**
 - 1:1:5-6 (Portland cement:lime:sand with or without air entraining additive).
 - 1:3½-4 (masonry cement:sand containing Portland cement and lime in approximate ratio 1:1, and an air entraining additive).
 - 1:4-5 (masonry cement:sand containing Portland cement and inorganic materials other than lime and air entraining additive).
 - 1:5-6 (Portland cement:sand and air entraining additive).
 - **Designation (iv) (BS EN 998-2 class M2 equivalent)**
 - 1:2:8-9 (Portland cement:lime:sand with or without air entraining additive).
 - 1:4½ (masonry cement:sand containing Portland cement and lime in approximate ratio 1:1, and an air entraining additive).
 - 1:5½-6½ (masonry cement:sand containing Portland cement and inorganic materials other than lime and air entraining additive).
 - 1:7-8 (Portland cement:sand and air entraining additive).
- **Batching:** Mix proportions by volume.
- **Mortar type:** Continuous throughout any one type of masonry work.

500 LAYING GENERALLY

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

511N OVERHAND LAYING

- Will only be permitted subject to compliance with this specification and approval of samples and methods of carrying out the work.

520X ACCURACY

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

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

537N HEIGHT OF LIFTS IN WALLING USING PURE NATURAL LIME MORTARS

- Lift height (maximum): 1.2m above any other part of work at any time.
- Daily lift height (maximum): 0.675m for any one leaf.

540 HEIGHT OF LIFTS IN WALLING USING THIN LAYER MORTAR

- Quoins and advance work: Rack back.
- Lift height (maximum): 1.3 m above any other part of work at any time.

545 LEVELLING OF SEPARATE LEAVES

- Locations for equal levelling of cavity wall leaves: As follows:
 - Every course containing vertical twist type ties or other rigid ties.
 - Every third tie course for double triangle/ butterfly ties.
 - Courses in which lintels are to be bedded.

560 COURSING BRICKWORK

- Gauge: Four brick courses including bed joints to 300 mm.

561 COURSING BRICKWORK WITH EXISTING

- Gauge: Line up with existing brick courses.

580 LAYING FROGGED BRICKS

- Single frogged bricks: Frog uppermost.
- Double frogged bricks: Larger frog uppermost.
- Frog cavity: Fill with mortar.

585 LAYING CELLULAR BRICKS

- Orientation: Cavities downward.

595 LINTELS

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

610 SUPPORT OF EXISTING WORK

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

615 BRICKWORK TO RECEIVE ASPHALT DPC

- Substrate: Mortar bed finished flush, smooth and level.

620 BLOCK BONDING NEW WALLS TO EXISTING

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

635 JOINTING

- Profile: Consistent in appearance.

645 ACCESSIBLE JOINTS NOT EXPOSED TO VIEW

- Jointing: Struck flush as work proceeds.

665 POINTING

- Description: General
- Joint preparation: Remove debris. Dampen surface.
- Mortar: As section Z21.
 - Standard: To BS EN 998-2

- Mix: 1:1:6 cement:lime:sand
1:5 masonry cement:sand
 - Profile: Flush
- 671 FIRE STOPPING
- Avoidance of fire and smoke penetration: Fit tightly between cavity barriers and masonry. Leave no gaps.
- 690 ADVERSE WEATHER
- General: Do not use frozen materials or lay on frozen surfaces.
 - Air temperature requirements: Do not lay bricks/ blocks:
 - In cement-gauged mortars when at or below 3°C and falling or unless it is at least 1°C and rising.
 - 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.
 - In thin-layer mortars when outside the limits set by the mortar manufacturer.
 - Temperature of walling during curing: Above freezing until hardened.
 - Newly erected walling: Protect at all times from:
 - Rain and snow.
 - Drying out too rapidly in hot conditions and in drying winds.
- 691N ADVERSE WEATHER AND MASONRY LAID IN LIME MORTARS
- When using lime mortar if snow and frosts are forecast or when the temperature is expected to fall below 8 °C, up to 24 hours after laying, brickwork or blockwork shall be laid in lime/sand mortars only when the method of protection has been agreed with the CA.
 - Protection should be kept in place until the mortar is firm.
 - Protection can be by layering dry hessian sheet or bubble wrap covered with a protective plastic sheet over the top of the work or another method agreed with the CA.
- 693N PROTECTION FOR MASONRY LAID IN LIME MORTARS
- In direct sunlight and high temperatures, and warm drying winds, a damp hessian sheet should be draped over the brickwork. If the hessian sheet shows signs of drying out a mist spray should be used to dampen down the surface.
 - In wet weather plastic sheeting should be draped over the work with special attention being given to the top of the wall to stop water entering through the vertical joints. The protection should remain in place until the surface of the mortar has achieved a set.
 - In drying winds, but in cool conditions, dry hessian sheet should be draped over the completed work to stop evaporation.

ADDITIONAL REQUIREMENTS FOR FACEWORK

710 THE TERM FACEWORK

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

750 COLOUR CONSISTENCY OF MASONRY UNITS

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

760 APPEARANCE

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

780 GROUND LEVEL

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

790 PUTLOG SCAFFOLDING

- **Use:** Not permitted in facework.

800 TOOTHED BOND

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

830 CLEANLINESS

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

860N CRACKED BRICKS

- Cracked bricks in existing facework to be cut out and replaced with matching bricks bedded in: 1:1:6 cement:lime:sand mortar, before repointing adjacent cracked joints as specified.

870N CRACKED JOINTS

- Cracked joints in existing facework, which is not to be repointed: joints with cracks wider than: Joints with cracks wider than ??? mm to be cut out to form a square recess of 15-20 mm depth.
- Remove dust, lightly wet and neatly point in: 1:1:6 cement:lime:sand mortar to match existing work.

880N REPOINTING

- Where specified carefully rake out existing joints by hand to form a square recess of 15-20 mm depth.
- Remove dust, lightly wet and neatly point in: 1:1:6 cement:lime:sand mortar to a profile in a continuous operation.

894N HEALTH AND SAFETY WITH LIME MORTARS

- Lime mortars are a potential health hazard and must only be used in accordance with all the Lime Manufacturer's Health & Safety requirements.

G10

Structural steel framing

SUMMARY

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NOTE : -

- To be read with preliminaries/general conditions and the latest edition of the National Structural Steelwork Specification for building construction (hereinafter call the NSSS).

GENERAL REQUIREMENTS/ INFORMATION

107N SUBMISSIONS

- Calculations for all connections as required by NSSS 3.7.2(ii) shall be submitted to an agreed programme allowing 10 working days for comments by the Engineer.
- Detailing of holding down bolts and production of a foundation plan drawing is to be done by the steel fabricator.
- For temporary works: As clause 108N.

108N TEMPORARY WORKS: DESIGNATED INDIVIDUAL AND DESIGNER / CO-ORDINATOR

- Confirm details of the Designated Individual responsible for temporary works at Tender; and the project Temporary Works Co-ordinator at least fifteen working days before starting any temporary works on site.
- Where any temporary works design is required the temporary works co-ordinator must ensure that a competent person does this, and that an appropriate design check is carried out, if required. The temporary works design must be coordinated with the permanent works.
- Full design details (drawings and calculations) are required for comment by the CA for all temporary support systems.
- Provide one electronic copy or two paper copies of the information for comment. 10 working days are to be allowed for preparation of comments by the CA.

111 CONTRACTOR'S DESIGN OF MEMBERS AND JOINTS

- Description:
- Design concept: ??? insert brief description, e.g. pinned frame, etc. ???
- Design responsibility: Design and detail members and joints to suit the conceptual layout detailed in the contract drawings.
 - Other responsibilities:
- Structural requirements
 - Generally: As section B50.
 - Modifications:

- Design: Complete in accordance with the designated code of practice to satisfy specified performance criteria.
 - Connections:
 - Fixings to foundations and walls:
 - Additional requirements:
 - Design and production information: as drawing ??? OR contractor design
- 111X CONTRACTOR'S DESIGN OF MEMBERS AND JOINTS
- Design concept: ??? insert brief description, e.g. pinned frame, etc. ???
 - Completion of design: Design and detail member sizes and connections to suit the conceptual layout detailed on P&M drawings.
 - Design standard: BS EN 1993-1
 - Loading requirements: As specified on: ??? or otherwise calculable.
 - Other requirements: See P&M Summary of Design Principals document. ??? disproportionate collapse class, execution class???
 - Design parameters assumed:
 - Fixings to foundations/ walls: as drawing ??? OR contractor design
- 112X CONTRACTOR'S DESIGN
- Design concept: ??? insert brief description, e.g. pinned frame, etc. ???
 - Design responsibility: Design and detail the structural steelwork.
 - Design standard: BS EN 1993-1
 - Loading requirements: As specified on: ??? or otherwise calculable
 - Other requirements: See P&M Summary of Design Principals document. ??? disproportionate collapse class, execution class???
 - Design parameters assumed:
- 113N VARIATIONS
- No variation to the specification or drawings may be made without approval.
 - The Contractor is to submit details of and reasons for any proposed variations from:
 - This specification
 - The drawings
 - The CA's written or drawn instructions
- 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): 16 mm

- Number per connection (minimum): Two, unless otherwise indicated.
 - Other requirements: None
 - Punching of bolt holes: Permitted
 - Welds: 6mm fillet unless otherwise shown or appropriate to the location
- 116 DESIGN CONSTRAINTS – STEELWORK TO BE GALVANIZED
- Steel grades: Do not use steel downgraded from a higher specification.
 - Detail design: Avoid details that will increase the risk of initiating liquid metal assisted cracking (LMAC).
 - Particular restrictions:
 - Other requirements:
- 117N DRAWINGS AND MODELS FOR COMMENT
- Drawings shall include:
 - 3D View showing all members marked with their drawing reference
 - GA plans at each level showing all member sizes and their drawing reference
 - Member drawings for all main pieces
 - Where cold formed sections are specified co-ordinated drawings showing all connection details etc.
 - Separate member drawings for plates, packs etc. are not to be provided.
 - As required by the engineer provide detailed extract views from the 3D model showing member connection details including all welds and bolts.
 - Allow for drawing: 12 % of all the connections.
- 120N DRAWINGS AND CALCULATIONS
- Before preparing detailed fabrication drawings, submit two copies of calculations for all major connections for comment by the structural engineer, and general arrangement drawings with individual steel members clearly identified.
 - Submit either an electronic copy or 4 paper copies of drawings (2 copies each for the CA and Structural Engineer).
 - If required by the main contractor, use their chosen document management system for submissions of drawings.
 - Drawing submitted for comment will be received by the CA and assigned one of the categories as NSSS clause 3.7.4.
 - The contractor is to ensure that drawings are submitted for comment in time so that the approval period complies with the programme.
 - A period of 10 working days, after receipt of drawings, must be allowed for preparation of comments by the CA.
 - Approval shall not in any way relieve the Contractor of their responsibility for any errors which their drawings or calculations may contain.

124N DRAWINGS AND DIMENSIONS

- The definition of Design Drawings given in NSSS is revised as follows: General
- Fully dimensioned drawings will not be provided by the Engineer.
- Basic dimensions, levels and setting out, which will be either dimensions from gridlines or relative to other structural elements, will be provided by: The Architect
- Any other dimensions calculable from this information are to be worked out by the contractor as necessary
- All site dimensions are to be measured and checked on site prior to fabrication, or as necessary to progress design and production of fabrication drawings.
- All dimensions between new and existing structure are to be checked and setting out confirmed relative to existing structure (existing structure includes any structure on site whether new or existing which may influence the dimension of a piece of steelwork.)
- Copies of all information to be provided to the CA.
- The cost of this work is to be borne by the contractor.

125 SPECIFICATION STANDARD

- **Standard:** Comply with latest edition of National Structural Steelwork Specification (NSSS).
 - **Additional requirements:** The execution class is to be EXC2 to BS EN 1090.
 - **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 administering the Contract on behalf of the Employer.

126N FABRICATION, DESPATCH

- The Contractor shall give the Engineer 7 working days notice of intended dates of despatch to site of steelwork and accessories in such a way that inspection can take place prior to despatch.

127N PRODUCT CERTIFICATION

- Provide product certification when the use of an alternative product to that specified is proposed, or where noted in product clauses.
- Appropriate certification is as follows:
- For products specified to meet a harmonised European standard, or for which a European Technical Assessment exists: Provide certification of UKCA / CE marking and Declaration of Performance.
- For products outside this scope: Provide third party certification from a United Kingdom Accreditation Service (UKAS) approved independent laboratory, where this is available.

130 GENERAL STEEL SECTIONS AND PLATES

- **Description:** General
- **Certification:** As Clause 127N
- **Standard:** To BS EN 10025-2
- **Grade:** S355JR
 - **Options:** Generally 355JR; steel to be galvanized, S275JR

- **Source:** Obtain steel from a source accredited to a national or internationally accepted quality standard.
- **Other requirements:** Steel to be galvanized to have a carbon equivalent value not exceeding 0.44

135 HOLLOW STEEL SECTIONS

- **Description:** General
- **Certification:** As Clause 127N
- **Standard:** To BS EN 10210-1
- **Grade:** S355J0H
 - **Options:** None
- **Source:** Obtain steel from a source accredited to a national or internationally accepted quality standard.
- **Other requirements:** None

FRAME SYSTEMS - NOT USED

COLD-FORMED MATERIALS

170 COLD-FORMED GALVANIZED STEEL

- **Description:** General
- **Manufacturer:** ISO 9001-certified or equivalent approved by the CA.
 - **Product reference:** Submit proposals
- **Certification:** As Clause 127N
- **Material:** Galvanized steel sheet to BS EN 10346.

FABRICATION

180 NOTIFICATION OF COMMENCEMENT

- **Notice:** Give notice before fabrication is due to start.
 - **Period of notice (minimum):** Ten working days

210 END CONNECTIONS

- **Angle 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.

220 ACCESS/ VENTILATION HOLES IN BASE PLATES

- **Base plates larger than 1 m²:** Make 25 mm diameter holes as necessary for pressure grouting, escape of entrapped air or direct compaction of filling/ bedding material.

225 STEELWORK TO BE GALVANIZED

- Cutting, drilling and shop welding: Complete before galvanizing.
- Vent and drain holes: Provide as necessary.
 - Locations: Submit proposals.
 - Sealing: Required, submit proposals.

WELDING

250 WELDING PROCEDURES

- Quality management systems: To BS EN ISO 3834-3.
- Certification of welders:
 - Third party certification: To BS EN ISO 9606-1.
 - Verification of welding procedures: Submit.
 - Welding procedure qualification records: To BS EN ISO 15614-1.

255X SITE WELDING

- Usage: Permitted only where indicated on drawings.
- Working conditions: Suitable and safe. Do not weld when surfaces are wet or when ambient temperature is below 0°C.
- Procedures for site welding, including details of protection to the working area, shall be agreed with the CA at least 5 working days before site welding starts.
- Where existing steels are to be welded check for the presence of existing lead paint before starting to prepare surfaces for welding. If lead paint is found take all precautions required by the Control of Lead at Work Act

290N FINISHING WELDS

- Dressing: Carefully dress welds to remove slag. Do not deform surface of weld.

BOLT ASSEMBLIES

302 NON-PRELOADED BOLT ASSEMBLIES

- Certification: As Clause 127N
- Designation: Grade 8.8
 - Threading: Full length
- Nuts and washers: To suit property class of bolt, as NSSS, clause 2.4.4.
- Coating applied by manufacturer: As clauses 370-380

303 PRELOADED BOLT ASSEMBLIES

- **Certification:** As Clause 127N
- **Designation:** BS EN 14399-3, property class 8.8, system HR with direct tension indicators to BS EN 14399-9
- **Nuts and washers:** To suit property class of bolt, as NSSS, clause 2.4.5.
- **Coating applied by manufacturer:** Galvanized as clause 370

306N EXPANDING BOLTS

- Where not indicated on drawings, type and manufacturer to be agreed in writing in advance with the Engineer at least 3 working days before intended date of placing order.
- **Stud anchors including the following examples are NOT acceptable:**
 - Hilti HST or HSA
 - Parabolt Through Bolt
 - Rawl Throughbolt
 - Spit Fix

308N SPACING

- Spacing and distance to edge of concrete or masonry for all expanding bolts to comply with fixing manufacturer's recommendations for maximum safe static load.

335 SPRING WASHERS

- **Standard:** To BS 4464.

351N VIBRATION

- Whenever there is a risk of fasteners or nuts becoming loose due to vibration or alternation of stresses, they shall be securely locked.
- The method of achieving locking shall be submitted for approval.
- Damaging the thread on the bolt shank to achieve locking will not be permitted.

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:** External steelwork and steelwork in external or cavity walls.

380X ZINC PLATED FINISH TO BOLT ASSEMBLIES DRY INTERNAL STEELWORK

- **Standard:** To BS EN ISO 4042.
- **Minimum 5 microns thickness.**
- **Zinc plating:** Applied by fastener manufacturer. Clear passivated if no additional coatings are specified. Nuts tapped after plating.
- **Use/ location:** Dry Internal steelwork

390 SEALED HOLLOW SECTIONS

- Holes: Sealed to prevent access of moisture.
 - Method of sealing: To be agreed with CA allowing at least 10 working days for comment on proposals by CA

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.

420X SETTING OUT

- In addition to the requirements of the NSSS, comply with the following:
- Permissible deviations: 10mm
 - For all lift and hoist shafts:: 10mm maximum in any direction.

425X MODIFICATIONS

- Steelwork: Do not modify without approval.
- Obtain approval for methods of rectification before starting modification or remedial work.
- Temporary fabrication/ erection attachments: Remove

432X TEMPORARY SUPPORT

- The temporary stability of the building is provided by ??? until the permanent stability provided by the is in place.
- The anticipated erection sequence is ??? , as shown on drawing ???
- Provide temporary bracing or restraints to ensure stability of ??? during erection and until the connection can be made to the ???
- Notwithstanding the requirements of NSSS clause 8.4.1, make an assessment of the forces and moments in these elements without the assistance of the engineer.

441X MORTAR FILLING/ BEDDING OF COLUMN BASES

- Mortar
 - Cement: Portland cement BS EN 197-1 - CEM I 42.5 or 52.5.
 - Certification: As Clause 127N
 - Fine aggregate: To BS EN 12620, grade 0/4 or 0/2 (MP).
 - Additives: Not required

- Bedding thickness range: 25-40mm
- Bolt pockets: Completely filled with neat cement slurry.
- Spaces beneath base plates: Completely filled as follows:
 - Spaces 0-25 mm deep: ??? Obtain instructions OR Neat Portland cement, CEM 1 OR Proprietary filling as clause 443
 - Spaces 25-50 mm deep: 1:1 cement:fine aggregate mortar, just fluid enough to pour. Tamped well as filling proceeds. Provide temporary shuttering as necessary.
 - Spaces 50 mm and above: 1:2 cement:fine aggregate mortar, just damp, tamped well against properly fixed supports as filling proceeds.

TESTING

460N INSPECTION

- Permit the CA, and/or an independent inspection authority appointed by them, to inspect the work at all reasonable times and at all places where it is being carried out.
- Provide all facilities, hand tools, lighting, etc. as necessary to ensure adequate inspection.

462N INSPECTION

- The Examiner or Examining Body used by the steelwork fabricator to carry out checks on the welding and welding procedures shall be UKAS accredited. Details of the UKAS accreditation are to be provided to the CA on request.

468N TESTING AUTHORITY

- All tests to be carried out by a NAMAS accredited Laboratory.

480N DEFECTIVE WORK

- As soon as possible after any part of the work or any materials are known or suspected to be defective, submit proposals to CA for further testing, inspection or replacement and obtain instructions.

PROTECTIVE COATINGS

515N STANDARDS AND SUBMISSIONS

- Comply with all relevant clauses of BS EN 12944.
- Provide with the Tender or when requested by the CA:
 - Proposals for the inspection plan for all coating work, to include the standards used, qualification of inspectors and details of all records to be issued.
 - Proposals for handling and storage all coated steelwork
 - Proposals from the paint manufacturer for maintenance of the specified coatings

522N REPAIR OF DAMAGED COATINGS

- The steel sub-contractor is responsible for making good any coats damaged during transport and erection.

530N STEELWORK TO BE GALVANISED

- Cutting, drilling and shop welding: Complete before galvanizing.
- Vent and drain holes: Provide as necessary.
- Locations: Submit proposals.
- Sealing: Required. Submit proposals.

535X INSPECTION OF COATING WORK

- Work in progress: Permit coating manufacturer to inspect and take samples of products.
- Do not comply with directions or requests given by coating manufacturer unless and until confirmed by CA.
- Notice: Give notice of dates for:
 - Start of surface preparation and coating.
 - Coated members or components leaving the works.
 - Period of notice (minimum): 7 working days.

PROTECTIVE COATING SYSTEMS

610 GALVANIZING TO CHEMICALLY CLEANED STEEL

- Use/ location: General
- Preparation: Chemical cleaning.
- Galvanizing: To BS EN ISO 1461.
 - Minimum mean coating thickness: 85 micrometres.

640A SHOP PAINTING WITH PRIMER FOR INTERNAL CONCEALED STEELWORK

- Corrosivity Category: C1-very low
- Description: Epoxy Zinc Phosphate Primer
- Use/ location: Dry internal steelwork concealed from view
- Paint manufacturer: Sherwin Williams
- Shop preparation
 - Generally: Blast cleaning to BS EN ISO 8501-1, preparation grade Sa 2½.
 - Welds/ edges/ areas with surface imperfections: To BS EN ISO 8501-3, preparation grade P1.
- Shop primer: MACROPOXY 400 Zinc Phosphate Primer/Buildcoat
 - Dry film thickness: 75 µm
 - Colour: Light grey subject to confirmation by the Architect
 - On site: Prepare surface as Clause 765 and touch up in shop coat.

- **Special requirements:** If steel is to be blast cleaned prior to fabrication a compatible Pre-fabrication Primer must be used
- **Durability Range:** High

640B SHOP PAINTING WITH PRIMER FOR.....

- **Corrosivity Category:** C2 - low
- **Description:** Epoxy Zinc Phosphate Primer
- **Use/ location:** Internal steelwork at risk of condensation and external steelwork in low pollution (rural) areas, concealed from view
- **Paint manufacturer:** Sherwin Williams
- **Shop preparation**
 - Generally: Blast cleaning to BS EN ISO 8501-1, preparation grade Sa 2½.
 - Welds/ edges/ areas with surface imperfections: To BS EN ISO 8501-3, preparation grade P1.
- **Shop primer:** MACROPOXY 400 Zinc Phosphate Primer/Buildcoat
 - Dry film thickness: 120 µm
 - Colour: Light grey subject to confirmation by the Architect
 - On site: Prepare surface as Clause 765 and touch up in shop coat.
- **Special requirements:** If steel is to be blast cleaned prior to fabrication a compatible Pre-fabrication Primer must be used
- **Durability Range:** High

640C SHOP PAINTING WITH PRIMER FOR

- **Corrosivity Category:** C3 - medium
- **Description:** Epoxy Zinc Phosphate Primer
- **Use/ location:** Internal steelwork in damp spaces and external steelwork in urban areas, concealed from view
- **Paint manufacturer:** Sherwin Williams
- **Shop preparation**
 - Generally: Blast cleaning to BS EN ISO 8501-1, preparation grade Sa 2½.
 - Welds/ edges/ areas with surface imperfections: To BS EN ISO 8501-3, preparation grade P1.
- **Shop primer:** MACROPOXY 400 Zinc Phosphate Primer/Buildcoat
 - Dry film thickness: 180 µm
 - Colour: Light grey subject to confirmation by the Architect
 - On site: Prepare surface as Clause 765 and touch up in shop coat.
- **Special requirements:** If steel is to be blast cleaned prior to fabrication a compatible Pre-fabrication Primer must be used
- **Durability Range:** High

640D SHOP PAINTING WITH PRIMER FOR CONCEALED STEELWORK IN CAVITIES

- **Corrosivity Category:** C3 - medium,

- **Description:** Epoxy Zinc Phosphate Primer
- **Use/ location:** Internal steelwork in cavity walls, set at least 40mm back from outer leaf.
- **Paint manufacturer:** Sherwin Williams
- **Shop preparation**
 - Generally: Blast cleaning to BS EN ISO 8501-1, preparation grade Sa 2½.
 - Welds/ edges/ areas with surface imperfections: To BS EN ISO 8501-3, preparation grade P1.
- **Shop primer:** MACROPOXY 400 Zinc Phosphate Primer/Buildcoat
 - Dry film thickness: 250 µm
 - Colour: Light grey subject to confirmation by the Architect
 - On site: Prepare surface as Clause 765 and touch up in shop coat.
- **Special requirements:** If steel is to be blast cleaned prior to fabrication a compatible Pre-fabrication Primer must be used
- **Durability Range:** Very High

640E SHOP PAINTING WITH PRIMER FOR.....

- **Corrosivity Category:** C4 - high
- **Description:** Epoxy Zinc Phosphate Primer
- **Use/ location:** Internal steelwork in aggressive environments and for external steelwork in industrial or coastal areas, concealed from view
- **Paint manufacturer:** Sherwin Williams
- **Shop preparation**
 - Generally: Blast cleaning to BS EN ISO 8501-1, preparation grade Sa 2½.
 - Welds/ edges/ areas with surface imperfections: To BS EN ISO 8501-3, preparation grade P1.
- **Shop primer:** MACROPOXY 400 Zinc Phosphate Primer/Buildcoat
 - Dry film thickness: 240 µm
 - Colour: Light grey subject to confirmation by the Architect
 - On site: Prepare surface as Clause 765 and touch up in shop coat.
- **Special requirements:** If steel is to be blast cleaned prior to fabrication a compatible Pre-fabrication Primer must be used
- **Durability Range:** High

640F SHOP PAINTING WITH PRIMER FOR.....

- **Corrosivity Category:** C5-I; very high industrial
- **Description:** Epoxy Zinc Phosphate Primer
- **Use/ location:** Internal steelwork in wet or polluted environments and external steelwork in areas of high humidity, concealed from view
- **Paint manufacturer:** Sherwin Williams
- **Shop preparation**

- Generally: Blast cleaning to BS EN ISO 8501-1, preparation grade Sa 2½.
- Welds/ edges/ areas with surface imperfections: To BS EN ISO 8501-3, preparation grade P1.
- **Shop primer:** MACROPOXY 400 Zinc Phosphate Primer/Buildcoat
 - **Dry film thickness:** 300 µm applied as two 150 µm coats
 - **Colour:** Light grey subject to confirmation by the Architect
 - **On site:** Prepare surface as Clause 765 and touch up in shop coat.
- **Special requirements:** If steel is to be blast cleaned prior to fabrication a compatible Pre-fabrication Primer must be used
- **Durability Range:** High

640G SHOP PAINTING WITH PRIMER FOR.....

- **Corrosivity Category:** C5-M; very high marine
- **Description:** Epoxy Zinc Phosphate Primer
- **Use/ location:** Internal steelwork in wet and polluted environments, and external steelwork in a corrosive environment; concealed from view
- **Paint manufacturer:** Sherwin Williams
- **Shop preparation**
 - Generally: Blast cleaning to BS EN ISO 8501-1, preparation grade Sa 2½.
 - Welds/ edges/ areas with surface imperfections: To BS EN ISO 8501-3, preparation grade P1.
- **Shop primer:** MACROPOXY 400 Zinc Phosphate Primer/Buildcoat
 - **Dry film thickness:** 300 µm applied as two 150 µm coats
 - **Colour:** Light grey subject to confirmation by the Architect
 - **On site:** Prepare surface as Clause 765 and touch up in shop coat.
- **Special requirements:** If steel is to be blast cleaned prior to fabrication a compatible Pre-fabrication Primer must be used
- **Durability Range:** High

660A SHOP PLUS SITE PAINTING WITH PRIMER AND DECORATIVE FINISH FOR INTERNAL EXPOSED STEELWORK

- **Corrosivity Category:** C1; very low and C2; low
- **Description:** Acrylic Urethane over Epoxy Zinc Phosphate Primer
- **Use/ location:** Dry internal, exposed steelwork requiring a decorative finish
Internal steelwork at risk of condensation and external steelwork in low pollution (rural) areas, requiring a decorative finish
- **Paint manufacturer:** Sherwin Williams
- **Shop preparation**
 - Generally: Blast clean to BS EN ISO 8501-1, preparation grade Sa 2½.
 - Welds/ edges/ areas with surface imperfections: To BS EN ISO 8501-3, preparation grade P3.
- **Shop primer:** MACROPOXY 400 Zinc Phosphate Primer/Buildcoat
 - **Dry film thickness:** 70 µm

- Site preparation: Touch up shop coats and prepare surface as clause 765
- Shop or site top coat: Acrolon 7300 gloss or semi-gloss finish
 - Dry film thickness: 50 µm
 - Colour: To Architect's details
- Special requirements: If steel is to be blast cleaned prior to fabrication a compatible Pre-fabrication Primer must be used
- Durability Range: High

660C SHOP PLUS SITE PAINTING WITH PRIMER AND DECORATIVE FINISH FOR ...

- Corrosivity Category: C3; medium
- Description: Acrylic Urethane over Epoxy Zinc Phosphate Primer
- Use/ location: Internal steelwork in damp spaces and external steelwork in urban areas, requiring a decorative finish
- Paint manufacturer: Sherwin Williams
- Shop preparation
 - Generally: Blast clean to BS EN ISO 8501-1, preparation grade Sa 2½.
 - Welds/ edges/ areas with surface imperfections: To BS EN ISO 8501-3, preparation grade P3.
- Shop primer: MACROPOXY 400 Zinc Phosphate Primer/Buildcoat
 - Dry film thickness: 125 µm
- Site preparation: Touch up in shop coats and prepare surface as clause 765.
- Shop or Site top coat: Acrolon 7300 gloss or semi-gloss finish.
 - Dry film thickness: 55 µm.
 - Colour: To Architect's details.
- Special requirements: If steel is to be blast cleaned prior to fabrication a compatible Pre-fabrication Primer must be used
- Durability Range: High.

660E SHOP PLUS SITE PAINTING WITH PRIMER AND DECORATIVE FINISH FOR ...

- Corrosivity Category: C4; high
- Description: Acrylic Urethane over Epoxy Zinc Phosphate Primer
- Use/ location: Internal steelwork in aggressive environments and external steelwork in industrial or coastal areas, requiring a decorative finish
- Paint manufacturer: Sherwin Williams
- Shop preparation
 - Generally: Blast clean to BS EN ISO 8501-1, preparation grade Sa 2½.
 - Welds/ edges/ areas with surface imperfections: To BS EN ISO 8501-3, preparation grade P3.
- Shop primer: MACROPOXY 400 Zinc Phosphate Primer/Buildcoat
 - Dry film thickness: 190 µm

- Site preparation: Touch up in shop coats and prepare surface as clause 765.
- Shop or Site top coat: Acrolon 7300 gloss or semi-gloss finish.
 - Dry film thickness: 50 µm.
 - Colour: To Architect's details.
- Special requirements: If steel is to be blast cleaned prior to fabrication a compatible Pre-fabrication Primer must be used
- Durability Range: High.

660F SHOP PLUS SITE PAINTING WITH PRIMER AND DECORATIVE FINISH FOR ...

- Corrosivity Category: C5-I.
- Description: Acrylic Urethane over Epoxy Zinc Phosphate Primer
- Use/ location: Internal steelwork in wet or polluted environments and external steelwork in areas of high humidity, requiring a decorative finish
- Paint manufacturer: Sherwin Williams
- Shop preparation
 - Generally: Blast clean to BS EN ISO 8501-1, preparation grade Sa 2½.
 - Welds/ edges/ areas with surface imperfections: To BS EN ISO 8501-3, preparation grade P3.
- Shop primer: MACROPOXY 400 Zinc Phosphate Primer/Buildcoat
 - Dry film thickness: 250 µm applied as two 125 µm coats
- Site preparation: Touch up in shop coats and prepare surface as clause 765.
- Shop or Site top coat: Acrolon 7300 gloss or semi-gloss finish.
 - Dry film thickness: 50 µm.
 - Colour: To Architect's details.
- Special requirements: If steel is to be blast cleaned prior to fabrication a compatible Pre-fabrication Primer must be used
- Durability Range: High.

660G SHOP PLUS SITE PAINTING WITH PRIMER AND DECORATIVE FINISH FOR ...

- Corrosivity Category: C5-M.
- Description: Acrylic Urethane over Epoxy Zinc Phosphate Primer
- Use/ location: Internal steelwork in wet and polluted environments, and external steelwork in a corrosive environment; requiring a decorative finish
- Paint manufacturer: Sherwin Williams
- Shop preparation
 - Generally: Blast clean to BS EN ISO 8501-1, preparation grade Sa 2½.
 - Welds/ edges/ areas with surface imperfections: To BS EN ISO 8501-3, preparation grade P3.
- Shop primer: MACROPOXY 400 Zinc Phosphate Primer/Buildcoat
 - Dry film thickness: 250 µm applied as two 125 µm coats

- **Site preparation:** Touch up in shop coats and prepare surface as clause 765.
- **Shop or Site top coat:** Acrolon 7300 gloss or semi-gloss finish.
 - Dry film thickness: 50 µm.
 - Colour: To Architect's details.
- **Special requirements:** If steel is to be blast cleaned prior to fabrication a compatible Pre-fabrication Primer must be used
- **Durability Range:** High.

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.

712N REPAINTING EXISTING STEELWORK

- Where existing steels are to be repainted check for the presence of existing lead paint before starting to prepare surfaces for painting or welding.
- If lead paint is found take all precautions required by the Control of Lead at Work Act

715N INACCESSIBLE SURFACES

- The sequence of working must be such as to ensure that surfaces inaccessible after assembly receive the full specified treatment and coating system including, if necessary, local shop 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.

730 PREPARATION FOR SITE WELDING OF SHOP PAINTED STEELWORK

- **Method:** Select from the following:

- Mask weld areas immediately after blast cleaning and before coating steelwork. If paint system comprises more than one coat, step each coat 30 mm back from edge of preceding coat and away from masked areas. Remove masking immediately before welding.
- Prepare and paint steelwork including weld areas. Grind off to bare steel around each weld area immediately before welding.

735 TREATMENT OF SITE WELDED JOINTS IN PAINTED STEELWORK

- **Preparation:** After welding, and without delay, remove scale and weld spatter from weld areas. Remove traces of rust. Wash with clean water and allow to dry. Prime without delay.
- **Protective/ Decorative coatings:** Apply to weld areas to match surrounding painted areas.

736 TREATMENT OF SITE WELDED JOINTS IN GALVANIZED STEELWORK

- **Preparation:** After welding, and without delay, remove scale and weld spatter from weld areas. Remove traces of rust. Wash with clean water and allow to dry.
- **Coating:** Reinstate using one of the methods given in BS EN ISO 1461, clause 6.3.

740 BOLTED JOINTS (OTHER THAN PRELOADED 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 PRELOADED 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 PRELOADED 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.

765 SITE PREPARATION OF SHOP PAINTED STEELWORK

- **Preparation:** Touch in shop coats, as necessary, and allow to dry. Before applying site coats (when specified), abrade surfaces or wash down or both, as recommended by paint manufacturer.

770 SITE PREPARATION OF GALVANIZED SURFACES FOR PAINTING

- **Preparation:** Thoroughly degrease. Remove white corrosion products. Wash off and allow to dry before applying etching wash or primer.

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.

825X STRIPE COAT

- Where specified, brush apply an additional stripe coat to all external angles, nuts and bolt heads, rough weld seams, and areas that are difficult to coat.

850 JUNCTIONS WITH CONCRETE

- Exposed steelwork partially embedded or encased in concrete: Apply two coats of bituminous coating locally to the steel/concrete junction.
- Bituminous coating: Everbuild Black Jack 901 Black Bitumen Paint or similar approved

STRUCTURAL METAL DECKING

900N GENERAL DESCRIPTION OF THE WORKS

- The detailing and installation of profiled metal deck permanent formwork with all fixtures and fittings.
- The contractor must confirm the design and provide supporting calculations confirming compliance with BS5950 Part 4 / BS EN 1994-1-1 in accordance with the following table, which shows the responsibility for each designer on this project and the period for checking where applicable.
- Base GA drawings and specification: Structural designer
- Design of main steel members : Structural designer¹
Steelwork Contractor¹ / 15 working days
- Steel fabrication drawings: Steelwork Contractor / 20 working days
- Detail design of decking : Steel Decking Supplier¹ / 10 working days
Steelwork Contractor¹ / 10 working days
- Steel decking detail drawings : Steel Decking Supplier¹ / 15 working days
Steelwork Contractor¹ / 15 working days
- Concrete specification : Main/ Principal Contractor¹ / 3 working days
Concrete subcontractor^{1,2} / 3 working days
- Erection of steel frame: Steelwork Contractor
- Erection of metal decking : Steelwork Contractor¹
Decking Supplier¹
- Shear Stud Welding : Steelwork Contractor¹
Decking Supplier¹
- Reinforcing and concreting slab : Main / Principal Contractor¹
Concrete subcontractor¹
- Notes

- ¹ For each of these activities the contractor must confirm with the tender who has responsibility for the work described
- ² The base design concrete specification should be produced by the structural designer but the final specification sent to the concrete supplier must contain co-ordinated information from all parties.

905N LOADINGS

- Design and construct formwork to withstand worst combination of:
 - Total weight of formwork, reinforcement and concrete
 - Construction loads including dynamic effects of placing, compacting and construction traffic.
 - Design loadings given on drawings:

910N STANDARDS

- Comply with the requirements of the “BCSA Code of Practice for Metal Decking and Stud Welding”

915N PROFILED STEEL SHEET FOR SHUTTERING/COMPOSITE FLOOR SLABS

- Nature of permanent supports:
- Manufacturer:
 - Product reference:
- Material: Galvanized steel sheet to BS EN ISO 10346.
 - Thickness:
 - Designation: S250GD + Z275 N-A-C.
- Metal accessories: Provided by sheet manufacturer unless otherwise indicated: All necessary edge trims and framing for holes etc.:
 - Finish: As for sheet.
- Seam stitching:
 - Fixings/ centres:
 - Coating applied by manufacturer:

CONSTRUCTION

930N FIXING PROFILED SHEET TO STEELWORK

- Fixings to BS 5950 :Part 4, clauses 4.7 and 4.8.1 and in accordance with BS EN 1994-1-1.
- All edge trims are to be securely fixed to a good line, within 3mm of the specified position.
- All joints between panels of metal decking and between decking, edge trims and steelwork etc are to be grout tight.
- If taping of the joints is necessary this is to be agreed in advance with the Engineer and Architect.

940N ACCURACY

- Construct formwork accurately and robustly with adequate supports to produce finished concrete to the required dimensions.
- Formed surfaces must be free from twist and bow (other than any required cambers), all intersections, lines and angles being square, plumb and true.

945N JOINTS IN FORMS

- Construct formwork, including joints in form linings and between forms and completed work, to prevent loss of grout, using seals when necessary.
- Tape all joints to prevent grout loss using a method acceptable to the Architect in areas where the joint will subsequently be exposed to view.
- Secure formwork tight against adjacent concrete to prevent formation of steps.

950N DECK LAYING

- Lay butt fitted longitudinally. No gaps are permitted between beam and deck where studs are welded.

970N INSERTS, HOLES, CHASES

- Form all holes and chases.
- Fix inserts or box out as required in correct positions before placing concrete.

975N WATERPROOF MEMBRANE

- On floors where waterproof membrane is laid on top, provide pin holes in metal deck at 500mm centres in each direction.

990N REINFORCEMENT

- **For any single span slab provide 1 H: ????? diameter bar per trough with H8 lacers @ 450 centres in addition to top mesh reinforcement specified elsewhere.**

995N CONCRETE THICKNESS

- Concrete is to be placed to a constant thickness relative to the decking/supporting beams.
- Prepare a method statement to be agreed with the Architect and Engineer prior to concreting.

996N SLAB LEVEL

- Construct the slab to level using a staff and laser level.
- Prepare a method statement to be agreed with the Architect and Engineer prior to concreting.

R12

Below ground drainage systems

SUMMARY

REVISION HISTORY

Date	No.	Title	Status	Revision	Note
07/07/2025	P01	Structural and Civic Specification	Stage 3	P01	Stage 3

TO BE READ WITH PRELIMINARIES/ GENERAL CONDITIONS.

NOTE :

- New clauses that have been added to the standard NBS are identified with the suffix N. Clauses where an editorial change has been made are identified with the suffix X.

GENERAL

110 BELOW GROUND DRAINAGE SYSTEM

- **Description:** Foul Water & Surface Water
- **Surface water and rainwater drainage sources:** Rainwater downpipes (nonsiphonic), as section R10
- **Foul drainage sources:** Sanitary appliances, as section N13
- **Land drainage sources:** None
- **Pressure relief drainage sources:** None
- **Pipes, bends and junctions:** Cast iron internally and vitrified clay externally
 - **Accessories:** Oblique "Y" Junctions
Flexible couplings;
Rodding points;
Rodent Barriers;
Gullies.
- **Manholes, inspection chambers, traps, and separators:** Manholes and inspection chambers - concrete;
Inspection chambers - plastics
 - **Accessories:** Manhole channels and branches - conventional
- **Disposal:** To sewers
- **Accessories – general:** Access covers and frames; Access covers and frames - precast concrete seatings;
Concrete Granular material; Granular sub-base material; Concrete

111N REMEDIAL WORKS TO EXISTING SYSTEM

- A CCTV survey of the existing below ground drainage system was carried out by Drainage Consultants Ltd and report dated March 2025 is included with the Tender.
- The contractor is to carry out the remedial works to the parts of the existing system highlighted in the CCTV Report for example the following:
 - High-pressure jetting of existing pipework
 - Relining/patch repairs to fractured pipework
 - Replacement of collapsed pipework
 - CCTV drainage survey to be completed in accordance with P&M CCTV drainage survey tender document.

SYSTEM PERFORMANCE - NOT USED

PRODUCTS

310N ADAPTORS TO CAST IRON DRAINAGE

- Description: From above ground drainage
- Material and standard: Cast iron
- Type: DN 100 discharge stack to DN 100 Cast iron
- Manufacturer: Pam Building
 - Product reference: EF059 Transitional Connector

311 ADAPTORS TO CLAY DRAINAGE

- Description: From above ground drainage
- Material and standard: Polypropylene to BS EN 295-1 and Kitemark certified.
- Type: DN 100 discharge stack to DN 100 Clay
- Manufacturer: Wavin Hepworth
 - Product reference: Pipe Adaptor SA9

317 COMPOSITE GULLIES

- Description: Internal Floor Gullies (Non Corrosive Environment)
- Standards: To BS EN 1253-1, -2, -3, -4 and -5; or
 - Cast iron: To BS 437 and Kitemark certified, or Agrément certified.
- Material: Cast iron
- Manufacturer: Wade G1014
- Covers
 - Product reference: K2103CI - to Architect's specification
 - Material: Cast iron
 - Loading grades to BS EN 124: B125
- Silt buckets: None

329 PIPES, BENDS AND JUNCTIONS – SUPPLY

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

334 PIPES, BENDS AND JUNCTIONS – CAST IRON – GREY

- Description: Internal/below slab drainage
- Standard: To BS EN 877, Kitemark or Agrément certified
- Manufacturer: Saint Gobain or similar approved
 - Product reference: Ensign
- Sizes: As shown on P&M below ground drainage drawings

- Additional corrosion protection: None
 - Jointing type: Push fit spigot and socket
- 336 PIPES, BENDS AND JUNCTIONS – CLAY – FLEXIBLE JOINTS
- Description: External below ground gravity drainage
 - Material and standard: Vitrified clay to BS EN 295-1, Kitemark certified.
 - Manufacturer: Wavin Hepworth
 - Product reference: SuperSleve
 - Sizes: Refer to below ground drainage drawings
 - Crushing strength (minimum): FN 40
 - Jointing type: Plain ended pipes with flexible couplings; for pipes greater than 300mm use spigot and socket joints with sealing ring
- 359 FLEXIBLE COUPLINGS FOR CLAY OR PLASTIC PIPEWORK
- Description: For connecting two pipes
 - Standard: To BS EN 295-4 or WIS 4-41-01 and Kitemark certified, or Agrément certified. .
 - Manufacturer: To match main pipework
 - Product reference: Ensign (cast iron), Hepworth (clay)
- 371 RODDING POINTS
- Description: Rodding access to below ground drainage networks
 - Material: Aluminium
 - Manufacturer: Hepworth
 - Product reference: SRP1/1, SRP1/2
 - Sizes: DN 100, DN150
- 407 A MANHOLES AND INSPECTION CHAMBERS – CONCRETE SEALED MANHOLES
- Description: For Type A and B manholes with diameters 1200, 1500 or 1800mm, and not requiring an in-situ concrete surround. Modular system comprising precast base section with choice of monolithic precast or cast in situ benching, precast rings for the main body with a rubber joint, and precast cover slab also with a rubber joint.
 - Standards
 - To BS 5911-3 and BS EN 1917 and Kitemark certified; or
 - Manufacturer: Marshalls Civil and Drainage
 - Shape: Refer to Access Chamber Schedule
 - Sizes: Refer to Access Chamber Schedule
 - Cement type and content: To BS 5911-1 and BS EN 1916
 - Chamber sections
 - Product reference: Marshalls Sealed Manholes

- Jointing type: Proprietary rubber joint
- Cover slabs
 - Product reference: Marshalls Cover Slab 1200, 1500 diameter
 - Thickness: 150, 175
 - Loading grades to BS EN 124: D400
 - Openings: To suit access covers.
- Steps: Required where shown on the Access Chamber Schedule
- Vortex flow control unit: Refer to below ground drainage drawing

433 MANHOLE CHANNELS AND BRANCHES – CONVENTIONAL

- Description: To be read in conjunction with clause 757
- Material: Clay
- Manufacturer: Hepworth
 - Product reference: SuperSleve

435 MANHOLE CHANNELS AND BRANCHES – PREFORMED PLASTICS

- Description: To be read in conjunction with clause 759
- Manufacturer:
 - Product reference:

439 MANHOLE STEPS

- Description: To manholes less than 3.0m deep
- Standard: To BS EN 13101.
- Type: C
- Manufacturer: Contractor's choice
 - Product reference: Submit proposals
- Material: Plastics coated steel

448 SEALING FOR CONCRETE MANHOLES – SEALANT

- Description: Bitumen and butyl rubber based seal for manhole ring sections
- Manufacturer: Marshalls Civils & Drainage
 - Product reference: Refer to Manufacturer's guidance

471 A ACCESS COVERS AND FRAMES INTERNAL RECESSED COVERS

- Description: MH C1
- Standard: To BS EN 124.
- Types: Double seals and grease and recessed
- Manufacturer: Fabweld Steel Products
 - Product reference: Fab Tray S20

- Material: Steel
- Finishes: Stainless Steel
- Sizes: Refer to manhole schedule
- Loading grades to BS EN 124: Refer to manhole schedule
- Edging trims: Stainless steel
- Accessories: Chains to restrain covers

471 C ACCESS COVERS AND FRAMES EXTERNAL MANHOLES

- Description: For manhole S1
- Standard: To BS EN 124.
- Types: Single seal
- Manufacturer: Pam Saint-Gobain
 - Product reference: Ult-Emax
- Material: Ductile cast iron
- Sizes: Refer to manhole schedule
- Loading grades to BS EN 124: D400
- Edging trims: Not required

483 CONCRETE

- Description: General
- Standard: To BS 8500-2
- Concrete: Designated, GEN1, as section E10

485N CONCRETE

- Description: Structural, where indicated on drawings
- Standard: To BS 8500-2
- Concrete: Designated, GEN 3, as section E10

492 GEOTEXTILE MEMBRANES – FILTER

- Description: For type S pipe trench surround (if required)
- Manufacturer: Terram
 - Product reference: T1500

496 X GRANULAR MATERIAL

- Description: For pipe beddings and surrounds.
- Standards: To Highways Agency Volume 1, 'Specification for Highway Works', Type 1 Unbound mixtures for sub-base
- Recycled content: Submit proposals, recycled content to be inspected and approved by Civil Engineer before use None permitted

498 GRANULAR SUB-BASE MATERIAL

- **Description:** For surrounds to plastic inspection chambers where shown on drawings
- **Standard:** To Highways Agency Volume 1, 'Specification for Highway Works', Type 1 Unbound mixtures for sub-base.
- **Recycled content:** Submit proposals None permitted

FABRICATION - NOT USED

EXECUTION

610 STRIPPING OUT

- **Extent of stripping out:** Redundant pipework should be removed and replaced with clean material

611 EXISTING DRAINS

- **Setting out:** Before starting work, check invert levels and positions of existing drains, sewers, inspection chambers and manholes against drawings. Report discrepancies.
- **Protection:** Protect existing drains to be retained and maintain normal operation if in use.

613 EXCAVATED MATERIAL

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

616 SELECTED FILL FOR BACKFILLING

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

623 LOWER PART OF TRENCH – GENERAL

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

625 LOWER PART OF TRENCH – TRANSITION DEPTH

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

631 TYPE OF SUBSOIL

- **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

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

641 PIPES AT DIFFERENT LEVELS IN COMMON TRENCH

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

673 CLASS W SURROUND

- **Description:** Granular surround - for pipes under buildings with more than 300 cover to pipe crown
- **Timing:** Excavate trench after hardcore has been laid and compacted.
- **Granular material:** Single size or graded coarse aggregate, as R12/496X
 - **Sizes:** As clause R12/496 X
- **Bedding**
 - **Material:** Granular, as described above, compacted over full width of trench.
 - **Thickness (minimum):** 100 mm.
- **Pipes:** Dig slightly into bedding, rest uniformly on barrels and adjust to line and gradient.
- **Surround**
 - **Material:** Granular, as described above.
 - **Depth:** To 100 mm above crown of pipe.
 - **Compaction:** By hand.
- **Backfilling**
 - **Material:** Hardcore as section D20, or granular.
 - **Depth:** Up to slab formation.
 - **Compaction:** In 300 mm (maximum) thick layers.

680 CONCRETE SURROUND FOR PIPE RUNS NEAR FOUNDATIONS

- **Class Z surround:** Provide in locations where bottom of trench is lower than bottom of foundation and as follows (horizontal clear distance between nearest edges of foundations and pipe trenches):
 - **Trenches less than 1 m from foundations:** Top of concrete surround not lower than bottom of foundation.
 - **Trenches more than 1 m from foundations:** Top of concrete surround not lower than D mm below bottom of foundation, where D mm is horizontal distance of trench from foundation, less 150 mm.

683 LAYING PIPELINES

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

685 JOINTING PIPELINES

- **Connections:** Durable, effective and free from leakage.
- **Junctions, including to differing pipework systems:** With adaptors intended for the purpose. See also R12/ 697 for flexible couplings
- **Cut ends of pipes:** Clean and square. Remove burrs and swarf. Chamfer pipe ends before inserting into ring seal sockets.
- **Jointing or mating surfaces:** Clean and, where necessary, lubricate immediately before assembly.
- **Allowance for movement:** Provide and maintain appropriate clearance at ends of spigots as fixing and jointing proceeds.
- **Jointing material:** Do not allow to project into bore of pipes and fittings.

687 CONCRETE SURROUND FOR CROSSOVERS

- **Class Z surround:** Provide where two pipelines (other than plastics pipes) cross with less than 300 mm separation.
 - **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

- **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.
 - **Distance to rocker pipe from structure (maximum):** 150 mm.
- **Provision for movement for pipelines - where pipelines need not be cast in or fixed to structures**
 - Rocker pipes as specified above; or
 - 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

- **Type:** Single dwellings up to 3 storeys: One nominal 90 degree rest bend
Multi-storey buildings: Two nominal 45 degree bends
 - **Radius to centreline of pipe (minimum):** 200 mm
- **Height of invert of horizontal drain at base of stack below centreline of lowest branch pipe (minimum):** Single dwellings up to 3 storeys: 450mm
Multi-storey buildings (up to 5 floors): 750mm
- **Bedding:** Do not impair flexibility of pipe couplings.
 - **Material:** Concrete.

693 DIRECT CONNECTION OF GROUND FLOOR WCS TO DRAINS

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

695 BACKDROP PIPES OUTSIDE MANHOLE WALLS

- **Excavation beneath backdrop pipe:** Backfill.
 - **Material:** GEN 3 concrete as Clause 485N
- **Pipe encasement:.**
 - **Material:** GEN 3 concrete as Clause 485N
 - **Thickness (minimum):** 150 mm.

697 INSTALLING FLEXIBLE COUPLINGS

- **Ends of pipes to be joined:** Cut cleanly and square.
- **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.
- **Clamping bands:** Tighten carefully to make gastight and watertight seals.

699 CONNECTIONS TO SEWERS

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

705 INITIAL TESTING OF PIPELINES

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

711 TRENCH SUPPORTS

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

715 BACKFILLING TO PIPELINES

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

718 BACKFILLING OVER CONCRETE

- Minimum times from placing concrete
 - Backfilling generally: 24 h.
 - Heavy compactors and traffic loads: 72 h.

720 BACKFILLING UNDER ROADS AND PAVINGS

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

722 PUBLIC ROADS AND PAVINGS – ENG, WALES, SCOT

- Excavating and backfilling of trenches: To Department for Transport 'Specification for the reinstatement of openings in highways'.

728 LAYING WARNING MARKER TAPES

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

732 TEMPORARY BRIDGES

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

734 INSTALLING ACCESS POINTS AND GULLIES

- Bedding
 - Material: GEN 3 concrete as Clause 485N
 - Thickness (minimum): 150 mm
- Surround
 - Material: GEN 3 concrete as Clause 485N
 - Thickness (minimum): 100 mm
 - Height: Full height
- Backfilling
 - Material: Not required
 - Compaction: By hand in 100 mm layers.
- Setting out relative to adjacent construction features: Square and tightly jointed.
- Permissible deviation in level of external covers and gratings: +0 to -6 mm.
- Raising pieces (clay and concrete units): Joint with 1:3 cement:sand mortar.

- Exposed openings: Fit purpose made temporary caps. Protect from traffic.

736 INSTALLING RODDING POINTS

- Bedding and surround
 - Material: GEN 1 concrete as Clause 483
 - Thickness (minimum): 100 mm
- Permissible deviation in level of external covers and gratings: +0 to -6 mm.

743 INSTALLING CONCRETE MANHOLES

- Bases
 - Material: Concrete (structural)
 - Thickness (minimum): 225 mm for circular, 150mm for rectangular.
- Surround
 - Material: Concrete
 - Thickness (minimum): 150 mm
 - Height: Full height
- Backfilling
 - Material: Selected fill
 - Compaction: By hand in 100 mm layers.

753 FIXING MANHOLE STEPS

- Fixing: Bed in joints
- Positioning: 300 mm vertical centres staggered 300 mm horizontally, with lowest step 300 mm (maximum) above benching and top step 450 mm (maximum) below top of cover.

755 JOINTING CONCRETE MANHOLE CHAMBER SECTIONS

- Jointing and sealing: Mortar
- Inner joint surface: Trim surplus jointing material extruded into chamber and point neatly.

757 LAYING CONVENTIONAL CHANNELS, BRANCHES AND BENCHING

- Main channel: Bed solid in 1:3 cement:sand mortar.
 - Branches: Connect to main channel at or slightly above invert level, but not higher than half channel level, so that discharge flows smoothly in direction of main flow.
 - Branches greater than nominal size 150 mm: Connect the branch soffit level with the main drain soffit.
 - Connecting angles more than 45° to direction of flow: Use three-quarter section channel bends.
- Benching
 - Material: Concrete.
 - Profile: Rise vertically from top of main channel to a level not lower than soffit of outlet pipe, then slope upwards at 10% to walls.

- Topping
 - Material: 1:3 Cement:sand mortar
- Application: Before benching concrete has set, and with dense smooth uniform finish.

759 LAYING PREFORMED PLASTICS CHANNELS, BRANCHES AND BENCHING

- Main channel: Bed solid in 1:3 cement:sand mortar.
 - Branches: Connect to main channel at or slightly above invert level, but not higher than half channel level, so that discharge flows smoothly in direction of main flow.
 - Connecting angles more than 45° to direction of flow: Use three-quarter section channel bends.
- Bedding: 1:3 cement:sand mortar. Use clips or ensure adequate mechanical key.
- Benching
 - Material: Concrete.
 - Profile: Rise vertically from top of main channel to a level not lower than soffit of outlet pipe, then slope upwards at 10% to walls.
 - Topping
 - Material: 1:3 Cement:sand mortar
 - Application: Before benching concrete has set, and with dense smooth uniform finish.

773 INSTALLING ACCESS COVERS AND FRAMES

- Seating: Precast concrete or Brickwork as per P&M Drawing
- Bedding and haunching of frames: Continuously.
 - Material: 1:3 cement:sand mortar
 - Top of haunching: 30 mm below surrounding surfaces.
- Horizontal positioning of frames
 - Centred over openings.
 - Square with joints in surrounding paving.
- Vertical positioning of frames
 - Level; or
 - Marry in with levels of surrounding paving.
- Permissible deviation in level of external covers and frames: +0 to -6 mm.

776 EXPOSED OPENINGS IN INSPECTION CHAMBERS, ACCESS POINTS, FITTINGS AND EQUIPMENT

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

COMPLETION

901 REMOVAL OF DEBRIS AND CLEANING

- **Preparation:** Lift covers to manholes, inspection chambers and access points. Remove mortar droppings, debris and loose wrappings.
 - **Timing:** Before cleaning, final testing, CCTV inspection if specified, and immediately before handover.
- **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.
- **Washings and detritus:** Do not discharge into sewers or watercourses.
- **Covers:** Securely replace after cleaning and testing.

903 TEMPORARY MEASURES

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

911X TESTING AND INSPECTION

- **Dates for testing and inspection:** Give notice.
 - **Period of notice:** 48 hours. Testing to be carried out before pipelines become inaccessible
 - **Test Results:** Submit to CA within 3 days of completing test.

921 FINAL TESTING OF PRIVATE GRAVITY DRAINS AND SEWERS UP TO DN 300

- **Before testing**
 - **Cement mortar jointing:** Leave 24 h.
 - **Solvent welded pipelines:** Leave 1 h.
- **Standard:** To Building Regulations.
- **Method:** Air

931 FINAL TESTING OF ADOPTABLE AND LARGE PRIVATE SEWERS

- **Standard (sewers up to and including size DN 750)**
 - **England, Wales and Northern Ireland:** To Water UK 'Sewer Sector Guidance Appendix C: Design and Construction Guidance'.
 - **Scotland:** To Scottish Water 'Sewers for Scotland'.
- **Method:** Air

941 WATER TESTING OF MANHOLES AND INSPECTION CHAMBERS

- **Timing:** Before backfilling.
- **Standard**
 - **Exfiltration:** To BS EN 1610.
 - **Method:** Testing with water (method W).
 - **Infiltration:** No identifiable flow of water penetrating the chamber.

971 CCTV INSPECTION OF PRIVATE PIPELINES

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

978 LIFTING KEYS

- **Lifting keys:** Supply suitable keys for each type of access cover to end user.
 - **Timing:** At completion.

980 INSTRUCTIONS

- **Manufacturer's user instructions:** Submit for grease traps, converters and oil and petrol separator units



Specification created using NBS Chorus

