



**KERRY COUNTY COUNCIL
BALLYSEEDY AMENITY TRAIL
PHASE 3**

**PROPOSED AMENITY TRAIL & BRIDGE
AT CAMP, TRALEE, CO. KERRY**

**WORKS REQUIREMENTS
SPECIFICATION**



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MRG Consulting Engineers

Civil Structural Architectural Environmental

Revision Control Table

For & On Behalf of MRG Consulting Engineers Limited				
Rev.	Status	Prepared By	Checked By	Date
T1	Issued for Tender	M. Concannon	C. Sheehy	26 th June 2026

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D20

Excavating and filling

Clauses

Read in conjunction with Preliminaries and general conditions

Generally/the site

112 Site investigation report

1. Irish Drilling Limited Site Investigation Report 26KY101.

145 Variations in ground water level

1. **Give notice:** If levels encountered are significantly different from levels in the site investigation report or previously measured.

Clearance/excavating

168 Site clearance

1. **Timing:** Before topsoil stripping, if any.
2. **General:** Clear site of rubbish, debris and vegetation. Do not compact topsoil.
3. **Treatment:** Removal

170 Removing small trees, shrubs, hedges and roots

1. **Identification:** Clearly mark trees to be removed.
2. **Small trees, shrubs and hedges:** Cut down.
3. **Roots:** Grub up and dispose of without undue disturbance of soil and adjacent areas.
4. **Safety:** Comply with Forest Industry Safety Accord safety leaflets.

220 Stripping topsoil

1. **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.
2. **Depth**
 - 2.1. Remove to an average depth of 300 mm.
 - 2.2. Give notice where the depth of topsoil is difficult to determine.
3. **Handling:** Handle topsoil for reuse or sale in accordance with clause 225.
4. **Around trees:** Do not remove topsoil from below the spread of trees to be retained.
5. **Site storage:** Keep separate from excavated sub-soil

225 Handling topsoil

1. **Standard:** To BS 3882.
2. **Aggressive weeds**
 - 2.1. **Species:** Notify the presence of species included in the Weeds Act, section 2, or the appropriate Wildlife and Countryside Act for the relevant jurisdiction.
 - 2.2. **Give notice:** Obtain instructions before moving topsoil.
3. **Contamination:** Do not mix topsoil with:
 - 3.1. Subsoil, stone, hardcore, rubbish or material from demolition work.

- 3.2. Other soil or material containing aggressive weeds, sharps, plastics and non soil forming materials and notifiable animal or plant diseases.
- 3.3. Oil, fuel, cement or other substances harmful to plant growth.
- 3.4. Other classifications of topsoil.
4. Multiple handling: Keep to a minimum. Use topsoil immediately after stripping.

240 Adjacent excavations

1. 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.
2. Angle of line below horizontal: 45°
3. Backfill material: Compacted general filling as clause 248

248 Backfill to excavations lower than foundation formation level

1. Critical level
 - 1.1. Distance between near faces of foundation and lower excavation less than 1 m: 150 mm above foundation formation level.
 - 1.2. Otherwise: 150 mm above level at which line defined in clause 240 cuts near face of lower excavation.
2. Backfill material
 - 2.1. Below critical level: Lean mix concrete
 - 2.2. Above critical level: With compacted granular fill complying with TII 'Specification for Road Works' Clause 608 & 610, i.e. Class 6N granular fill.

250 Permissible deviations from formation levels

1. Beneath mass concrete foundations: ± 25 mm.
2. Beneath ground bearing slabs and r.c. foundations: ± 15 mm.
3. Embankments and cuttings: ± 50 mm.
4. Ground abutting external walls: ± 50 mm, but such as to ensure that finished level is not less than 150 mm below dpc.

260 Inspecting formations

1. Give notice: Make advance arrangements for inspection of formations for foundations and filling formations and roads and pavings.
 - 1.1. Notice (minimum): 48 hours.
2. Preparation: Just before inspection remove the last 150 mm of excavation. Trim to required profiles and levels.
 - 2.1. Loose material: Remove
3. Seal: Within 4 hours of inspection, seal formations with minimum 50 mm blinding concrete for all structures and minimum 50mm sand for roads and pavements.

270 Foundations generally

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

310 Unstable ground

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

330 Unrecorded features

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

360 Excess excavation

1. **Excavation taken wider than required**
 - 1.1. **Backfill:** With compacted granular fill complying with TII 'Specification for Road Works' Clause 608 & 610, i.e. Class 6N granular fill.
2. **Excavation taken deeper than required**
 - 2.1. **Backfill:** Compacted granular fill complying with TII 'Specification for Road Works' Clause 608 & 610, i.e. Class 6N granular fill. Concrete fill required under foundations.

Disposal of materials

441 Surplus subsoil

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

450 Water

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

454 Ground water level, springs or running water

1. **Give notice:** If it is considered that the excavations are below the water table.
2. **Springs/ Running water:** Give notice immediately if encountered.

457 Pumping

1. **General:** Do not disturb excavated faces or stability of adjacent ground or structures.
2. **Pumped water:** Discharge without flooding the site or adjoining property.
3. **Sumps:** Construct clear of excavations. Fill on completion.
 - 3.1. **Locations:** Contractor's choice.

460 Permanent drainage system

1. Disposal of water from the excavations through system: Select from list Not permitted

Filling

500A Proposed fill materials for pipe bedding, haunching and surrounding material

1. **Details:** Submit full details of proposed fill materials to demonstrate compliance with TII 'Specification for Road Works' Clause 503, including:
 - 1.1. Type and source of imported fill.
 - 1.2. Proposals for processing and reuse of material excavated on site.
 - 1.3. Test reports as required elsewhere.
2. **Timing:** At least 21 days before starting filling

500B Proposed fill materials for backfilling of filter drains

1. **Details:** Submit full details of proposed fill materials to demonstrate compliance with TII 'Specification for Road Works' Clause 505, including:
 - 1.1. Type and source of imported fill.
 - 1.2. Proposals for processing and reuse of material excavated on site.
 - 1.3. Test reports as required elsewhere.
2. **Timing:** At least 21 days before starting filling

500C Proposed fill materials for general fill material

1. **Details:** Submit full details of proposed fill materials to demonstrate compliance with TII 'Specification for Road Works' Clause 608, 610, 613 (Class 6N & 6F), including:
 - 1.1. Type and source of imported fill.
 - 1.2. Proposals for processing and reuse of material excavated on site.
 - 1.3. Test reports as required elsewhere.
2. **Timing:** At least 21 days before starting filling

500D Proposed fill materials for gabions

1. **Details:** Submit full details of proposed fill materials to demonstrate compliance with TII 'Specification for Road Works' Clause 626 (Class 6G), including:
 - 1.1. Type and source of imported fill.
 - 1.2. Proposals for processing and reuse of material excavated on site.
 - 1.3. Test reports as required elsewhere.
2. **Timing:** At least 21 days before starting filling

500E Proposed fill materials for rock armour base and back of wall filling

1. **Details:** Submit full details of proposed fill materials to demonstrate compliance with TII 'Specification for Road Works' Clause 608 (Class 6A), including:
 - 1.1. Type and source of imported fill.
 - 1.2. Proposals for processing and reuse of material excavated on site.
 - 1.3. Test reports as required elsewhere.
2. **Timing:** At least 21 days before starting filling

510 Hazardous, aggressive or unstable materials

1. **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:
 - 1.1. Frozen or containing ice.
 - 1.2. Organic.
 - 1.3. Contaminated or noxious.
 - 1.4. Susceptible to spontaneous combustion.
 - 1.5. Likely to erode or decay and cause voids.
 - 1.6. With excessive moisture content, slurry, mud or from marshes or bogs.
 - 1.7. Clay of liquid limit exceeding 80 and/or plasticity index exceeding 55.
 - 1.8. Unacceptable, class U2 as defined in the 'Specification for highway works', clause 601.

520 Frost susceptibility

1. **General:** Except as allowed below, fill must be non frost-susceptible as defined in TII 'Specification for Road Works', clause 801.8.
2. **Test reports:** If the following fill materials are proposed, submit a laboratory report confirming they are non frost- susceptible:
 - 2.1. Fine grained soil with a plasticity index less than 20%.
 - 2.2. Coarse grained soil or crushed granite with more than 10% retained on a 0.063 mm sieve.
 - 2.3. Crushed chalk.
 - 2.4. Crushed limestone fill with average saturation moisture content in excess of 3%.
 - 2.5. Burnt colliery shale.
3. **Frost-susceptible fill:** May only be used:
 - 3.1. At depths below the finished ground surface greater than: 450 mm
 - 3.2. Within the external walls of buildings below spaces that will be heated. Protect from frost during construction.
 - 3.3. Where frost heave will not affect structural elements.

530 Placing fill

1. **Surfaces of excavations and areas to be filled:** Free from loose soil, topsoil, organic material, rubbish and standing water.
2. **Freezing conditions:** Do not place fill on frozen surfaces. Remove material affected by frost. Replace and recompact if not damaged after thawing.
3. **Adjacent structures, membranes and buried services**
 - 3.1. Do not overload, destabilise or damage.
 - 3.2. Submit proposals for temporary support necessary to ensure stability during filling.
 - 3.3. Allow 14 days (minimum) before backfilling against in situ concrete structures.
4. **Layers:** Place so that only one type of material occurs in each layer.
5. **Depth:** Maximum 225 mm compacted thickness shall be spread in one layer so that after compaction the total thickness is as specified. Material of compacted thickness greater than 225 mm shall be laid in two or more layers and the minimum compacted thickness of any such layer shall be 110 mm. Where the layers of unbound mixtures are of unequal thickness, the lowest layer shall be the thickest layer.
6. **Earthmoving equipment:** Vary route to avoid rutting.

535 Compaction generally

1. **General:** Compaction shall be completed as soon as possible after the mixture has been spread and in accordance with the requirements for the individual mixtures.
2. **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.
3. **Defective areas:** Remove and recompact to full thickness of layer using new material.

540 Benching in fill

1. **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.
2. **New filling:** Spread and compact to ensure maximum continuity with previous filling.

550 Geotextile sheet

1. **Manufacturer:** Submit proposals
 - 1.1. **Product reference:** Submit proposals
2. **Type:** Nonwoven
3. **Polymer type:** Polypropylene
4. **Recycled content:** Submit proposals
5. **Jointing:** 300 mm overlap
6. **Preparation of subgrade:** Before laying sheet, remove humps and sharp projections. Fill hollows
7. **Protect from**
 - 7.1. Exposure to light.
 - 7.2. Contaminants.
 - 7.3. Materials listed as potentially deleterious by geotextile manufacturer.
 - 7.4. Wind uplift.

610 Compacted filling for landscape areas

1. **Fill:** Material capable of compaction by light earthmoving plant.
2. **Filling:** Layers not more than 200 mm thick. Lightly compact each layer to produce a stable soil structure.

615 Loose tip filling for landscape areas

1. **Filling:** Do not firm, consolidate or compact when laying. Tip and grade to approximate levels in one operation with minimum of trafficking by plant.

618 Type 2 unbound mixture

1. **Fill:** To TII 'Specification for Road Works', clauses 801 and 804:
 - 1.1. Crushed rock (other than argillaceous rock).
 - 1.2. Coarse crushed concrete aggregate.
 - 1.3. Recycled aggregates.
 - 1.4. Crushed non-expansive slag to clause 801.2.
 - 1.5. Well-burned non-plastic colliery shale.
 - 1.6. Natural gravel.
 - 1.7. Natural sand.
2. **Filling:** To TII 'Specification for Road Works', clause 802.

620 Subgrade improvement layer (capping)

1. **Fill:** To TII 'Specification for Road Works', Table 6/1, Class 6F1 or 6F2.
2. **Filling:** Place and compact to TII 'Specification for Road Works', Table 6/1, clause 612 and clause 613.3, 613.9 and 613.10.

650 Protection of compacted filling

1. **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.
2. **Removal:** Remove temporary protective filling from site before permanent construction.

Ω End of Section

D41

Crib walls, gabions and other gravity retaining walls

Clauses

Read in conjunction with Preliminaries and general conditions

210 Gabions

1. Manufacturer: Submit proposals
 - 1.1. Product reference: Submit Proposals
2. Configuration:
 - 2.1. Sizes: 2000 x 1000 x 1000 mm
 - 2.2. Mesh: 0.5 mm PVC-coated galvanized 2.7 mm hexagonal woven mesh
 - 2.3. Diaphragm: Hexagonal woven to [BS 1052](#)
3. Fill to units
 - 3.1. Material: Type 6G to TII Publication CC-SPW-00600 Clause 626 and Table 6/1
 - 3.2. Size/ grading: Contractor's choice to suit requirements of retaining structure manufacturer
4. Substrate: Granular bed cut to required batter
5. Batter of wall face: Vertical
6. Geotextile: As clause 240
7. Other requirements: None

240 Geotextile

1. Manufacturer: Submit proposals
 - 1.1. Product reference: Submit proposals
2. Permeability: 20 L/m²/s
3. Recycled content: Submit proposals
4. Jointing
 - 4.1. End and side laps: Minimum 300 mm
5. Timing: Do not lay more textile than will be covered in the same day

250 Assembling and installing

1. Description: Gabions
2. Fixings: Galvanised lacing wire
 - 2.1. Individual ties of lacing wire: Do not use.
3. Assembly
 - 3.1. Starting from top corner join edges of adjacent panels together in a continuous operation.
 - 3.2. Join to adjacent units, above, below and on all sides.
 - 3.3. Internal bracing: As per manufactures recommendations. Submit details.
4. Installation
 - 4.1. Vertical joints: Staggered in adjacent courses.
 - 4.2. Stepped constructions: Align bottom edge wire of upper baskets with a longitudinal wire of mesh of lower baskets. Provide continuous lacing along all horizontal joints at front and rear of wall.
5. Filling
 - 5.1. Maintain shape of basket during filling.

- 5.2. Fill to full height in sequence recommended by manufacturer.
- 5.3. Top mesh: To bear upon fill.
- 5.4. Lid: Fix securely.
- 6. Backfill: Place and compact at each course as work proceeds.

Ω End of Section

E05

In situ concrete construction generally

To be read with preliminaries/ general conditions.

220 Structural design provided

1. Standards:
 - 1.1. Design: To IS EN 1992-1-1
 - 1.2. Drawings: To IS EN ISO 4157-1
 - 1.3. Reinforcement Schedules: To BS 8666
2. Eurocodes:
 - 2.1. Irish National Annexes: Deemed to be included. Nationally determined parameters shall apply.
 - 2.2. Substitution of alternative design rules for Application Rules: Submit Proposals.
3. Finished Product: To comply with requirements of design standard.
4. Production/ execution records: In accordance with the designated code of practice.

223 Structural drawings and schedules

1. Standards
 - 1.1. Drawings: To IS EN ISO 3766 and 'Standard method of detailing structural concrete' published by the Institution of Structural Engineers.
 - 1.2. Reinforcement schedules: To BS 8666.

225 Temperature records

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

235 Openings, inserts and fixings

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

290 Accuracy of construction

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

310 Surface regularity of concrete walls - general

1. Standard: To BS 8204-1 or -2.

2. **Measurement:** From underside of a 2 m straightedge (between points of contact) placed anywhere on surface and using a slip gauge.
3. **Abrupt changes:** 2 mm maximum.

410 In situ concrete construction - supervision/ checking

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

430 Surface cracking

1. **Description:** Throughout.
2. **Method of measurement:** Graduated Magnifying Device.
3. **Maximum crack width:** 0.3 mm
4. **Action:** Should cracks occur that are wider than the maximum crack width:
 - 4.1. **Survey:** Frequency and extent of such cracks and investigate cause.
 - 4.2. **Report:** Findings together with recommendations for rectification.

Ω End of Section

E10

Mixing/casting/curing in situ concrete

Concrete

101 Specification

1. **Concrete generally:** In accordance with IS EN 206 and IS EN 206-NA_National Annex to EN 206.
2. **Cement:** To IS EN 197
3. **GGBS:** To IS EN 15167-1
4. **Exchange of information:** Provide concrete producer with information required by IS EN 206-NA_National Annex to EN 206.

105 Designated concrete

1. **Description:** The Contractor shall be responsible for the final mix design and exposure class for each mix. Prior to commencement of concreting operations, the Contractor shall submit to the Engineer for approval: details of ready-mix supplier, samples of all materials, information on material sources, together with the calculations for each mix design and the proposed weights of materials to be incorporated in the mix. Do not place concrete until the mix design has been approved by the Engineer.
2. **Designation:** Application of designed concretes (unless noted otherwise on drawings or by TII Standard Construction Details (SCD)):
 - 2.1. **Blinding, Lean-Mix Filling:** C12/15-20 X0
 - 2.2. **Substructure, Foundations (unreinforced):** C25/30-20 X0
 - 2.3. **Substructure, Foundations (reinforced):** C30/37-20 XA1, XC2 (50% GGBS)
 - 2.4. **Superstructure, Abutment & Wing Wall:** C35/45-20 XA1, XC4, XS1, XF1 (30% GGBS)
 - 2.5. **Superstructure, Apron:** C40/50-20 XA1, XC4, XS1, XF3 (30% GGBS)
3. **Aggregates**
 - 3.1. **Maximum size:** 20 mm.
 - 3.2. **Coarse recycled aggregates:** Not permitted.
 - 3.3. **Special requirements:** None.
4. **Consistence class:** Contractor's choice.
5. **Special requirements for cement/ combinations:** SR cements and combinations not permitted.
6. **Chloride class:** Cl 0,40.
7. **Admixtures:** Concrete producer's choice. Submit details.
8. **Minimum air content:** None.
9. **Additional mix requirements:** None.
10. **Fibres:** Not required.

160 Standardized prescribed concrete

1. **Description:** Bedding, benching, sign foundations.
2. **Designation:** ST4.
3. **Aggregates**
 - 3.1. **Maximum size:** 14 mm.
 - 3.2. **Additional aggregate requirements:** None.
4. **Special requirements for cement/ combinations:** None
5. **Consistence class:** Contractor's choice.
6. **Site mixing:** Not permitted.

Materials, batching and mixing

215 Ready-mixed concrete

1. **Production plant:** Currently certified by a body accredited for product conformity certification of ready-mixed concrete.
2. **Source of ready-mixed concrete:** Obtain from one source if possible. Otherwise, submit proposals.
 - 2.1. **Name and address of depot:** Submit before any concrete is delivered.
 - 2.2. **Delivery notes:** Retain for inspection.
3. **Declarations of nonconformity from concrete producer:** Notify contracts administrator and/ or specifier immediately.

225 Site additions or changes to specification

1. **Site alterations of fresh concrete (outside concrete producer's responsibility):** Prohibited.
 - 1.1. **Addition of water on site:** Any water added on site should be noted on the concrete delivery ticket. Ticket to be marked as non-conforming in line with IS EN 206, unless the producer takes responsibility for the addition.
2. **Actions:** Following non-conformity, perform identity test for each load on each affected batch in accordance with IS EN 206, Annex B.

230 Interruption of supply during concreting

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

315 Aggregates for exposed visual concrete

1. **Limitations on contaminants:** Free from absorbent particles which may cause 'popouts', and other particles such as coal and iron sulfide which may be unsightly or cause unacceptable staining.
2. **Colour:** Consistent.
3. **Supply:** From a single source and maintained throughout the contract.
4. **Samples:** Submit on request.

325 Materials for exposed visual concrete

1. **Alterations to sources, types and proportions:** Submit proposals.

415 Admixtures

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

490 Properties of fresh concrete

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

Project testing/ certification

505 Project testing of concrete - general

1. **Testing:** To IS EN 206 & IS EN 12350.

- 1.1. **Non-conformity:** Any tests that result in a non-conformity should be reported to the contracts administrator and/ or specifier as soon as results are available.
2. **Recording:** Maintain complete correlated records including:
 - 2.1. Record concrete designation.
 - 2.2. Record sampling, site tests, and identification numbers of specimens tested in the laboratory.
 - 2.3. Record location of the parts of the structure represented by each sample.
 - 2.4. Record location in the structure of the batch from which each sample is taken.

508 Regular project testing of concrete

1. **Description:** For all concrete.
2. **Tests:** Consistence and Early age compressive strength testing.
3. **Testing:** Cubes from samples below to be tested at 7 Days (one cube), 28 days (2 cubes) and one cube retained in reserve for later testing if required.
4. **Sampling**
 - 4.1. **Point:** At point of discharge from delivery truck.
 - 4.2. **Rate:** One set of four cubes per 25 cu.m. or fraction thereof, or for each 100 sq.m of surface area placed, with a minimum of one set per day for each class of concrete placed.
5. **Other requirements:** Cubes for early age strength testing to be stored under the same conditions as the concrete component they are intended for.

520 Testing laboratory

1. **Laboratory:** An independent laboratory accredited by Irish National Accreditation Board (INAB), or an equivalent accreditation body, as conforming to [IS EN ISO/IEC 17021-1](#) and [IS EN ISO/IEC 17025](#)
 - 1.1. **Name and INAB/ UKAS reference number:** Submit well in advance of making trial mixes or concrete for use in the works.

530 Tests results

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

550 Broken cubes from failed strength tests

1. **Record:** Record all test data including cube ID, batch number, mix details, curing conditions, and test results. Keep separately the pieces of each cube which fail to meet the conformity requirements for individual results.
 - 1.1. **Evidence:** Photograph the broken cubes for visual records and further analysis.
2. **Period for keeping cubes:** Obtain instructions.

Placing/ compacting/ curing and protecting

620 Temperature of concrete

1. **Application:** All concrete elements.
2. **Objective:** Limit maximum temperature to 70 °C and restrict temperature gradients to a maximum of 20 °C during curing of concrete to minimize early age thermal damage.

3. **High ambient temperatures:** Where the ambient temperature forecast during placing and curing is greater than 30 °C, concreting should be delayed until ambient temperatures fall below this threshold.
 - 3.1. **Rapid changes in temperature:** Prevent during the specified curing period.
4. **Method of temperature control:** Contractor to submit proposals.

630 Premature water loss

1. **Requirement:** Prevent water loss from concrete laid on absorbent substrates.
 - 1.1. **Underlay:** Select from:
 - 1.1.1. **Polyethylene sheet:** 250 micrometres thick.
 - 1.1.2. **Building paper:** To BS 1521, grade B1F.
 - 1.2. **Installation:** End and side laps minimum 150 mm.

640 Construction joints

1. **Description:**
2. **Location of joints:** Pours to be continuous between movement joints where possible. Contractor to propose the location of construction joints to suit pour sequence and liaise with the engineer for agreement of layout well in advance of any construction. Submit proposals when not shown on drawings.
3. **Preparation of joint surfaces:** Prepare the formed face of the joint by brushing the concrete while green to remove the laitance and gently spray the surface with water to remove the loose dirt and debris, and to expose the tips of the coarse aggregate.

648 Adverse temperature conditions

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

650 Surfaces to receive concrete

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

660 Inspection of surfaces

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

670 Transporting

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

680 Placing

1. **Records:** Maintain for time, date and location of all pours.
2. **Timing:** Place as soon as practicable after mixing and while sufficiently plastic for full compaction.
3. **Temperature limitations:** for concrete:
 - 3.1. **Air temperature:** Do not place concrete in air temperatures above 30°C (maximum) or below 5°C (minimum), unless agreed in advance with the producer any changes to the

cement, admixtures or concrete temperature. Do not place against frozen (below 0°C) or frost covered surfaces.

- 3.2. **Concrete temperature:** Concrete temperature at point of discharge should be less than 35 °C.
4. **Continuity of pours:** Place in final position in one continuous operation up to construction joints. Avoid formation of cold joints.
5. **Discharging concrete:** Prevent uneven dispersal, segregation or loss of ingredients or any adverse effect on the formwork or formed finishes.
6. **Thickness of layers:** To suit methods of compaction and achieve efficient amalgamation during compaction.
7. **Poker vibrators:** Do not use to make concrete flow horizontally into position, except where necessary to achieve full compaction under void formers and cast-in accessories and at vertical joints.

690 Compacting

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

720 Vibrators

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

730 Plastic settlement

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

810 Curing generally

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

811 Coverings for curing

1. Sheet coverings: Suitable impervious material.
2. Curing compounds: Permitted.
 - 2.1. Curing efficiency: Not less than 75% or for surfaces exposed to abrasion 90%.
 - 2.2. Colouring: Fugitive dye.
 - 2.3. Application to concrete exposed in the finished work: Readily removable without disfiguring the surface.
 - 2.4. Application to concrete to receive bonded construction/ finish: No impediment to subsequent bonding.
3. Interim covering to top surfaces of concrete: Until surfaces are in a suitable state to receive coverings in direct contact, cover with impervious sheeting held clear of the surface and sealed against draughts at perimeters and junctions.

812 Preventing early age thermal cracking

1. Deep lifts or large volume pours: Contractor to submit proposals for curing to prevent early age thermal cracking, taking account of:
 - 1.1. Temperature differentials across sections.
 - 1.2. Coefficient of thermal expansion of the concrete.
 - 1.3. Strain capacity of the concrete mix (aggregate dependent).
 - 1.4. Restraint.
 - 1.5. Limitations: Limit maximum temperature to 70 °C and restrict temperature gradients to a maximum of 20 °C during curing of concrete to minimize early age thermal damage.

815 Additional curing requirement - water curing

1. Commencement of water curing: As soon as practicable after placing and compacting concrete.
 - 1.1. Surfaces covered by formwork: Expose to water curing as soon as practicable following striking.
 - 1.2. Surfaces not covered by formwork: Cover immediately with impermeable sheeting to prevent evaporation before commencement of water curing.
2. Water curing: Wet surfaces continuously throughout curing period.
 - 2.1. Method: Contractor to choose from mist spraying or wet hessian covered with impermeable sheeting.

818 Curing periods generally

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

820 Curing periods

1. Description: All concrete
2. General: Curing periods are in days (minimum) .
 - 2.1. Definition of 't': The average surface temperature of concrete in degrees Celsius during the curing period.
3. Curing periods for concrete made using CEM1 strength class 42.5 or 52.5, or SRPC class 42.5
 - 3.1. Drying winds or dry, sunny weather (relative humidity < 50%): $140/(t+10)$
 - 3.2. Intermediate conditions (relative humidity between 50 and 80%): $100/(t+10)$
 - 3.3. Damp weather, protected from sun and wind (relative humidity > 80%): $100/(t+10)$
4. Curing periods for concrete made using cements listed in BS8500-1, Table A.6 except for those listed above and for supersulfated cement
 - 4.1. Drying winds or dry, sunny weather (relative humidity < 50%): $180/(t+10)$

- 4.2. Intermediate conditions (relative humidity between 50 and 80%): $140/(t+10)$
- 4.3. Damp weather, protected from sun and wind (relative humidity > 80%): $100/(t+10)$
- 5. Curing periods: For concretes using admixtures or other types of cements/ combinations: Submit proposals.
- 6. Other requirements: Increase curing period by any time during which surface temperature of concrete is less than 5°C

840 Protection

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

Ω End of Section

E20

Formwork for in situ concrete

Generally/ preparation

110 Loadings

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

115 Design

1. **Standard:** Either BS 5975 or IS EN 12812.
2. **Other requirements:** None.

120 Formwork details

1. **Provide the following:**
 - 1.1. **Construction joints:** Positions and types.
 - 1.2. **Panel joints:** Layout where exposed to view.
 - 1.3. **Tie holes:** Layout where exposed to view.
 - 1.4. **Sealing methods:** At panel joints, form tie holes and construction joints.
 - 1.5. **Surface of forms:** Form liners and other means of obtaining specified finish.
2. It is noted that the submission of the above details for review and comment does not place any obligation on the Contractor to adopt any amendments considered desirable by the Engineer, nor does it affect the Contractor's responsibility for producing the specified quality of finished concrete work and the associated responsibility for the means of producing that quality.

132 Propping

1. **General:** Prevent deflection and damage to the structure. Carry down props to bearings strong enough to provide adequate support throughout concreting operations.
2. **Method statement:** Submit proposals for prop bearings and sequence of propping/ repropping and backpropping.
 - 2.1. **Timing of submission:** To be agreed between the permanent works designer and the temporary works coordinator.

145 Permanent formwork

1. **Location and materials:** Submit proposals.
2. **Standard:** Design profiled steel shuttering as permanent formwork in accordance with BS EN 1993-1-3.

170 Work below ground

1. **Description:** Foundation
2. **Casting vertical faces against faces of excavation:** Not permitted
 - 2.1. **Requirements:** Increase nominal cover to reinforcement to 75 mm. Prevent contamination of concrete by loose soil.

Construction

310 Accuracy

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

315 Substructure formwork and underslab insulation

1. **Cutting:** Neat and accurate to edges, and around penetrations and downstands.
2. **Laying:** Tightly butted and fully supported on firm, even substrate.
3. **Vertical faces:** Stiffen as necessary to act as shutter.
4. **Formwork/ insulation surfaces:** Protect from indentation by spacers and other items.
5. **Joints in formwork/ insulation and with edge structure and penetrations:** Seal to prevent penetration of concrete.
6. **Concrete placement:** Restrain formwork/ insulation against movement.

320 Joints in forms

1. **Requirements including joints in form linings and between forms and completed work**
 - 1.1. Prevent loss of grout, using seals where necessary.
 - 1.2. Prevent formation of steps. Secure formwork tight against adjacent concrete.

330 Inserts, holes and chases

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

340 Kickers

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

350 Form ties

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

470 Release agents

1. **Use:** All formwork
2. **General:** Achieve a clean release of forms without disfiguring the concrete surface.
3. **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.
4. **Protection:** Prevent contact with reinforcement, hardened concrete, other materials not part of the form face, and permanent forms.

480 Surface retarders

1. Use: Obtain approval.
2. Reinforcement: Prevent contact with retarder.

Striking

510 Striking formwork

1. Timing: Prevent any disturbance, damage or overloading of the permanent structure.

521 Minimum period for retaining formwork/ temporary supports in position

1. Concrete strength at time of formwork removal (minimum): To BS EN 13670, clause 5.7 and 8.5, and Annex F
2. Assumptions: Maturity of permanent supports and adjacent elements of structure is at least equal to element under consideration
 - 2.1. Before removing formwork: Submit proposals if assumptions will not be realised.
3. Method to be used in assessing early age strength of concrete: To IS EN 13670, Annex F

Formed finishes

605 Control samples (part of the finished work)

1. Quality of finish: Special finish E20/630
2. Location: Obtain instructions.
3. Area (minimum): 3m x 3m.
4. Features to be included: None.
5. Viewing distance (maximum): 3m.
6. Approval of appearance: Obtain before proceeding with remainder of the work.

610 Basic finish

1. Location: Faces below ground level
2. Finish: Faces fully compacted and cover to reinforcement provided.

613 Ordinary finish

1. Location: Buried face of abutment/ wing walls.
2. Finish: Faces fully compacted. Formed surfaces free from major blemishes and honeycombing. Steps at joints to be less than 5 mm.

615 Finish to receive asphalt tanking

1. Finish: Even and suitable to receive asphalt.
2. Permissible deviation of surfaces
 - 2.1. Sudden irregularities (maximum): 3 mm.
 - 2.2. Gradual irregularities (maximum): 3 mm, when measured from underside of a 1 m straightedge, placed anywhere on surface.
3. Surface blemishes
 - 3.1. Permitted: Blowholes less than 10 mm in diameter.
 - 3.2. Not permitted: Voids, honeycombing, segregation and other large defects.
4. Projecting fins: Remove.
5. Formwork tie holes: Filled with mortar.

620 Plain finish

1. **Location:** Surfaces not included in Clause 630
2. **Finish:** Even and dense. Arrange formwork panels in a regular pattern as a feature of the surface.
3. **Permissible deviation of surfaces**
 - 3.1. **Sudden irregularities (maximum):** 3 mm.
 - 3.2. **Gradual irregularities (maximum):** 3 mm, when measured from the underside of a 1 m straightedge, placed anywhere on surface.
4. **Variations in colour**
 - 4.1. **Permitted:** Those caused by impermeable formwork linings.
 - 4.2. **Not permitted:** Those caused by contamination or grout leakage.
5. **Surface blemishes**
 - 5.1. **Permitted:** Blowholes less than 10 mm in diameter and at an agreed frequency.
 - 5.2. **Not permitted:** Voids, honeycombing, segregation and other large defects.
6. **Formwork tie holes:** In a regular pattern and filled with matching mortar.

630 Special finish

1. **Location:** Exposed face of abutment/ wing walls.
2. **Finish:** Smooth and even. Formwork panels as large as practicable. Arrange in a regular pattern as a feature of the surface.
 - 2.1. **Special requirements:** None
3. **Permissible deviation of surfaces**
 - 3.1. **Sudden irregularities (maximum):** 3 mm.
 - 3.2. **Gradual irregularities (maximum):** 3 mm when measured from the underside of a 1 m straightedge, placed anywhere on surface.
4. **Variations in colour**
 - 4.1. **Permitted:** Those caused by impermeable formwork linings.
 - 4.2. **Not permitted:** Those caused by contamination, grout leakage and replacement of formwork panels.
5. **Cover spacers:** Submit proposals
6. **Surface blemishes**
 - 6.1. **Permitted:** Blowholes less than 5 mm in diameter and at an agreed frequency.
 - 6.2. **Not permitted:** Voids, honeycombing, segregation and other defects.
7. **Formwork tie holes:** In a regular pattern and filled with matching mortar

Ω End of Section

E30

Reinforcement for in situ concrete

Reinforcement

110 Quality assurance of reinforcement

1. Standards
 - 1.1. Reinforcement: To BS 4449 & IS EN 10080.
 - 1.2. Cutting and bending: To BS 8666.
2. Source of reinforcement: Companies holding valid certificates of approval for product conformity issued by the UK Certification Authority for Reinforcing Steels (CARES).

140 Plain bar reinforcement

1. Standard: To BS 4449 & IS EN 10080.
 - 1.1. Strength grade: 250

150 Ribbed bar reinforcement

1. Standard: To BS 4449 & IS EN 10080.
 - 1.1. Strength grade: Generally B500B, but B500C where detailed

210 Standard fabric reinforcement

1. Standard: To BS 4483.
2. Strength grade: Generally B500A but wrapping fabric plain wire grade 250.

Workmanship

310 Cutting and bending reinforcement

1. General: To schedules and to BS 8666.
2. Bending on site, including minor adjustments: Obtain instructions

320 Protection of reinforcement

1. Dropping from height, mechanical damage and shock loading: Prevent.
2. 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

1. Details not shown on drawings: Obtain instructions.

425 Laps not detailed on drawings

1. Laps in bar reinforcement (minimum): Generally 50 x bar diameter. However, refer to lap length table on reinforcement drawings.
2. Laps in fabric reinforcement (minimum): Minimum 400 mm.
 - 2.1. Laps at corners: Avoid four layer build-up. Maintain minimum cover.

427 Laps in fabric reinforcement

1. Terms: As defined in BCA publication 97.321.
2. Lap type

- 2.1. **Long edge of fabric:** Nested in plane lap with bars in centre layer bundled and bars in outer layers spaced apart to ensure full encapsulation in concrete
- 2.2. **Short edge of fabric:** Nested in plane lap with bars in centre layer bundled and bars in outer layers spaced apart to ensure full encapsulation in concrete
3. **Other requirements:** Locate laps away from cut joints in ground slabs

451 Fixing reinforcement

1. **Standard:** To BS 7973-1 and -2.
2. **Installation:** In addition to any spacers and chairs shown on drawings or schedules, provide adequate support, tie securely and maintain the specified cover.
3. **Tying**
 - 3.1. **Wire type:** 16 gauge black annealed. Use stainless steel wire for stainless steel reinforcement.
4. **Ends of tying wire:** Prevent intrusion into the concrete cover. Remove loose ends.
5. **Compatibility of metals:** Prevent contact between ordinary carbon steel and stainless or galvanized reinforcement.

470 Tolerances on cover

1. **Tolerance (maximum):** +/- 5 mm.
2. **Checking specified cover dimensions:** Before concreting check that cover dimensions will be achieved.

480 Nominal cover to reinforcement

1. **Nominal cover:** Refer to drawings.

510 Rust staining

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

520 Cover meter survey

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

Ω End of Section

E40

Designed joints in in situ concrete

To be read with preliminaries/ general conditions.

120 Construction/ movement joints generally

1. **Location:** Contractor to propose the location of construction joints to suit pour sequence and liaise with the engineer for agreement of layout well in advance of any construction. Refer to design drawings for movement joint locations.
2. **Accuracy:** Position and form joints accurately, straight and well-aligned as per the design. Joints to be truly vertical, horizontal or parallel with setting-out lines of the building.
3. **Modifications to joint design or location:** Prohibited unless modification is agreed with the engineer.
4. **Placing concrete:** Maintain effectiveness of movement joints by preventing concrete entering joint void, penetrating or impregnating compressible joint fillers. Do not place concrete simultaneously on both sides of movement joints. It is important to ensure thorough compaction of the concrete on both sides of all joints.

210 Formed joints

1. **Formwork type:** Timber formwork and stop ends.
2. **Waterstops:** Not required.
3. **Forms/ stop ends generally:** Formwork/ stop ends to be rigid to ensure joint straightness, easily strikable and grout-tight to ensure no grout loss, using seals where necessary.
4. **Forms/ stop ends for projecting continuity reinforcement:** To accommodate bars or fabric without temporary bending or displacement, and without any grout loss through holes.
5. **Modifications:** Formed joint type and location as per the design. Any on-site modifications to the type or location of the joints should be agreed with the engineer prior to construction.

230 Preparation of construction joints

1. **Surface preparation:** Prepare the formed face of the joint by brushing the concrete while green to remove the laitance, and gently spray the surface with water to remove the loose dirt and debris, and to expose the tips of the coarse aggregate.
 - 1.1. **Other methods:** Submit proposals.
2. **Condition of joint surfaces immediately before placing fresh concrete:** Clean and damp.

260 Sawn crack-inducing grooves

1. **Groove dimensions**
 - 1.1. **Depth:** Refer to drawings for joint detail.
 - 1.2. **Width:** Refer to drawings for joint detail.
2. **Sawing:** Saw-cut grooves as soon as practicable before drying shrinkage cracks form. Typically between 6 and 12 hours after placing. Ensure that the concrete is hard enough to prevent damage to the arrises.
3. **Groove:**
 - 3.1. **Preparation:** Groove should be cleaned to remove dirt, debris and oils.
 - 3.2. **Filling:** Joint to be filled with flexible joint sealant.

437 Debonding compound

1. **Manufacturer:** Submit proposals
 - 1.1. **Product reference:** Submit proposals.

521 Extruded polyethylene (PE) foam joint fillers

1. **Description:** Isolation Joint Filler
2. **Manufacturer:** Submit proposals
 - 2.1. **Product reference:** Submit proposals.
3. **Duty:** Heavy duty.
4. **Weathering test:** To DTP Clause 1015, No disintegration.
5. **Density:** Medium density.
6. **Recovery:** To ASTM D3575, 98% after 50%.
7. **Size**
 - 7.1. **Thickness:** 12 mm.
 - 7.2. **Depth:** Full depth of slab.
8. **Compressive Strength:** 0.15 N/mm².
9. **Water absorption:** <0.05% by volume.
10. **Composition:** Cellular polyethylene.
11. **Certification:** Provide European Technical Assessment (ETA) with CE Mark Declaration of Performance or a third-party certification by a [European co-operation for Accreditation \(EA\)](#) member-accredited third-party testing organization.
12. **Joints finished with sealant:** Where the joint is to be sealed by a proprietary sealant, ensure that the bond breaker has been correctly installed and that there is sufficient space for the sealant by using temporary formers or other means.

531 Polysulfide construction joint sealants

1. **Description:** Concrete slab joint sealing.
2. **Manufacturer:** Submit proposals
 - 2.1. **Product reference:** Submit proposals.
3. **Standard:** To BS EN 14188-2, BS 5212, SS S 200:E, ASTM C920.
4. **Sealant type:** Polysulfide.
5. **Class:** To BS EN 14188-2, Class B, C, D.
6. **Colour:** Grey.
7. **Certification:** Sealant to have UKCA/ UKNI/ CE marking and a Declaration of Performance (DoP) in compliance with [BS EN 15651-1](#).
8. **Special performance requirements:** UV-resistant. Abrasion-resistant.
9. **Guarantee:** Required.
 - 9.1. **Period:** Ten years.
10. **Inspection and maintenance:** Joints to remain accessible during construction works to allow for regular inspection of sealants and repair or replacement if required.

590 Inspection of tied and partially tied joints

1. **Purpose:** Inspect joints and concrete to ensure that movement and cracking is controlled as intended, and that there are no signs of deterioration, arris damage or debonded sealant.
2. **Timing:** At regular intervals following casting of slab, and for the duration of works. For inspection after the construction period, refer to the maintenance schedule.
3. **Joints that have opened significantly more than the average:** Submit proposals for grouting.

Ω End of Section

E41

Worked finishes to in situ concrete

To be read with preliminaries/ general conditions.

150 Finishing

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

210 Tamped finish

1. Surface on completion: Even array of parallel ribs

230 Brushed finish

1. Surface on completion: Light even texture.

240 Wood floated finish

1. Surface on completion: Slightly coarse, even texture with no ridges or steps.

310 Smooth floated finish

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

320 Trowelled finish

1. 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

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

Ω End of Section

G10

Structural steel framing

General requirements/ information

110 Contractor's design of joints

1. **Description:** All steel-to-steel connections not fully detailed on the Engineers drawings.
2. **Design concept:** All joints to be comply with IS EN 1993-1-8, the latest edition of National Structural Steelwork Specification (NSSS). Joints in simple construction shall also comply with the BCSA/ SCI Publication 'JOINTS IN STEEL CONSTRUCTION - GREEN BOOK'.
3. **Design responsibility:** Design connections and detail steelwork and connections.
 - 3.1. **Other responsibilities:** Provide Professional Indemnity Insurance Cover of €0.5m in respect of design of joints.
4. **Structural requirements**
 - 4.1. **Generally:** As indicated on the design drawings or as described in paragraph 4.3 of this clause.
 - 4.1.1. **Modifications:** For bolted sections the reduced section areas are to be calculated and the section strengthened if so required.
 - 4.2. **Design:** Complete in accordance with the designated code of practice to satisfy specified performance criteria.
 - 4.3. **Connections:**
 - a) All moment connections and connections of members subject to vibration shall be made with HSFG bolts unless otherwise approved in writing by the Engineer.
 - b) No connections shall be designed for a shear force less than 100 kN for beams and other flexural members and 100 kN for bracing and other axially loaded members.
 - c) Loading assumed to be reversible.
 - d) Bolted beam connections of non-composite construction shall develop a minimum of 55% of the UDL bending capacity of the beam, assuming simple span and full restraint to the compression flange, UNO on drawings.
 - e) Tie forces for beam to column/ wall connections in accordance with the requirements of Annex A of IS EN 1991-1-7: 2006 or as specified on the drawings.
 - 4.4. **Fixings to foundations and walls:** As detailed on drawings.
 - 4.5. **Additional requirements:**
 - a) Submit proposal, including details of qualifications and experience of the Engineer responsible for the Contractor's design of joints.
 - b) Calculations for Contractor's design of joints shall be submitted for approval with the fabrication drawings.
5. **Design and production information:** Refer to Clause 120 below.

115 Design constraints – general

1. **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.
2. **Bolts**
 - 2.1. **Diameter (minimum):** 20 mm (UNO)
 - 2.2. **Number per connection (minimum):** Two, unless otherwise indicated.
 - 2.3. **Other requirements:** Choose bolt dimensions to ensure that threads do not occur in shear plane of joint
3. **Punching of bolt holes:** Not permitted

4. **Welds:** 6 mm fillet (UNO)
5. **Other constraints:** None

116 Design constraints – steelwork to be galvanized

1. **Steel grades:** Do not use steel downgraded from a higher specification.
2. **Detail design:** Avoid details that will increase the risk of initiating liquid metal assisted cracking (LMAC).
 - 2.1. **Particular restrictions:**
 - a) Seal vent and drainage holes in hollow sections using non-ferrous plugs.
 - b) Vent and drainage holes to be positioned out of sight, normally to underside of members.
 - c) Crop the corners of all stiffeners to facilitate H.D.G. process in accordance with Galvanizer's recommendations.
 - d) Shop drawings to be approved by Galvanizer prior to commencing fabrication.
 - e) Balance primary welds on either side of section access.
 - f) Round corners of rectangular web openings.
3. **Other requirements:**
 - a) Seal vent and drainage holes in hollow sections using non-ferrous plugs.
 - b) Provide washers under nut and bolt head.

120 Drawings and calculations

1. **Information required:** The aesthetic appearance of all steel members and associated joints/connections is important, should generally be in line with details included on the Tender Drawings and the Steel Contractor will be required to submit details and calculations for all connections for consideration by the Engineer prior to fabrication.
2. **Requirement:** Before preparing detailed fabrication drawings, submit:
 - 2.1. 2D & 3D general arrangement drawings for the assembled structure.
 - 2.2. 3D digital model.
 - 2.3. General arrangement drawings with individual steel members clearly identified.
 - 2.4. Calculations and details for all connections.
 - 2.5. Detailed Specification for proposed Shop Applied Protective Coating Systems.
 - 2.6. All vent and drain holes to be indicated on fabrication drawings.

125 Specification standard

1. **Standard:** Comply with latest edition of National Structural Steelwork Specification (NSSS).
 - 1.1. **Additional requirements:** The Steelwork Contractor is to be certified for minimum execution class 2 (EXC 2) in accordance with IS EN 1090.
 - 1.2. **Document availability:** For the duration of the work, at fabrication shop and on site.
2. **References to Engineer in NSSS:** For the purpose of this contract, interpret such references as being to the person named in section A10 as Consulting Structural Engineer.
 - 2.1. **Exceptions:** None

130 General hot rolled steel sections - External steelwork

1. **Description:** External Steelwork.
2. **Certification:** Provide European Technical Assessment (ETA) with CE marking and a Declaration of Performance (DoP)
3. **Standard:** To IS EN 10025

4. **Grade:** S355JR
 - 4.1. **Options:** None
5. **Source:** Obtain steel from a source accredited to a national or internationally accepted quality standard.
6. **Other requirements:** None

131 General hot rolled steel plates - External steelwork

1. **Description:** External Steelwork.
2. **Certification:** Provide European Technical Assessment (ETA) with CE marking and a Declaration of Performance (DoP)
3. **Standard:** To IS EN 10025
4. **Grade:** S355JR S275J0
 - 4.1. **Options:** None
5. **Source:** Obtain steel from a source accredited to a national or internationally accepted quality standard.
6. **Other requirements:** None

135 Hollow steel sections

1. **Description:** All structural hollow sections (cold finished).
2. **Certification:** Provide European Technical Assessment (ETA) with CE marking and a Declaration of Performance (DoP)
3. **Standard:** To IS EN 10210
4. **Grade:** S355J2H
 - 4.1. **Options:** None
5. **Source:** Obtain steel from a source accredited to a national or internationally accepted quality standard.
6. **Other requirements:** None

Frame systems - Not Used

Cold-formed materials - Not Used

Fabrication

180 Notification of commencement

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

190 Marking

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

195 Hard stamping

1. **Usage:** Not permitted except as indicated on drawings.

200 Faying surfaces for preloaded joints

1. Location: As required.
2. Steel 25 mm thick or over: Check faying surfaces for deformities that may reduce slip factor to below design limit.
 - 2.1. Remedial measures: Submit proposals.
3. Preparation/ treatment: As required for friction surface class A to IS EN 1993-1-8

215 Hollow sections

1. Insides of sections: Debris and moisture removed before sealing ends and openings.

220 Access/ Ventilation holes in base plates

1. 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

1. Cutting, drilling and shop welding: Complete before galvanizing.
2. Vent and drain holes: Provide as necessary.
 - 2.1. Locations: Submit proposals.
 - 2.2. Sealing: Seal vent and drain holes using non-ferrous plugs. Submit proposals.

235 Shop inspection

1. Give notice: Before fabricating give notice to the Design Engineer and Client.
 - 1.1. Period of notice (minimum): Five working days

240 Trial shop assembly

1. Component: A trial shop assembly of the completed structure should be made available for inspection prior to being sent for galvanising. No alterations to steelwork to take place after galvanising.
2. Give notice: Before commencing trial assembly.
 - 2.1. Period of notice (minimum): Five working days'

Welding

250 Welding procedures

1. Quality management systems: To IS EN ISO 3834-3.
2. Certification of welders: Welders to work on steelwork and type of welding only for which they are suitably qualified.
 - 2.1. Third party certification: Welding inspectors' certification shall be those issued by an approved independent testing agency to IS EN ISO 9606-1.
 - 2.2. Verification of welding procedures: Submit.
 - 2.3. Welding procedure qualification records: IS EN 1011-1 & IS EN 1011-2.
 - 2.4. Requirement: Submit procedure.

255 Site welding

1. Usage: Permitted only where indicated on drawings.
2. Working conditions: Suitable and safe. Do not weld when surfaces are wet or when ambient temperature is below 0°C.

270 Additional welds

1. Welds (including tack welds) not indicated on drawings: Not permitted without approval.

Bolt assemblies

302A Non-preloaded bolt assemblies - Structures generally

1. **Certification:** Provide European Technical Assessment (ETA) with CE marking and a Declaration of Performance (DoP).
2. **Designation:** Hexagon head bolts to IS EN ISO 4014, grade 8.8.
 - 2.1. **Threading:** Part length.
3. **Nuts and washers:** To suit grade of bolt, as NSSS CE Marking version, clause 2.4.3.
4. **Coating applied by manufacturer:** Galvanised.
5. **Other requirements:**
 - a) Minimum size M20 unless shown otherwise on drawings.
 - b) Bolted connection shall have a minimum of two bolts in line.
 - c) Holes for bolts shall be drilled only.
 - d) Minimum 2 mm clearance holes to be provided to all bolt sizes unless noted on specific detail.
 - e) All bolts shall be provided with washers under the nuts such that no threading occurs within the parts gripped. Choose bolt dimensions to ensure that threads do not occur in shear plane of joint.
 - f) For bolts connecting metal coated steel, provide washers under the nut and head.
 - g) For sections less than 4 mm thick, provide washers under both head and nut.

302B Non-preloaded bolt assemblies - Bridge structure holding down bolts

1. **Certification:** Provide European Technical Assessment (ETA) with CE marking and a Declaration of Performance (DoP).
2. **Designation:** Hexagon head bolts to IS EN ISO 4014, grade 8.8.
 - 2.1. **Threading:** Full length.
3. **Nuts and washers:** To suit grade of bolt, as NSSS CE Marking version, clause 2.4.3.
4. **Coating applied by manufacturer:** Galvanised.
5. **Other requirements:**
 - a) Minimum size M30 unless shown otherwise on drawings.
 - b) Holes for bolts shall be drilled only.
 - c) Provide double washers under all nuts.
 - d) Two nuts shall be fitted to all anchor/ holding down bolts.

302C Non-preloaded bolt assemblies - Structures holding down bolts general

1. **Certification:** Provide European Technical Assessment (ETA) with CE marking and a Declaration of Performance (DoP).
2. **Designation:** Hexagon head bolts to IS EN ISO 4014, grade 8.8.
 - 2.1. **Threading:** Full length.
3. **Nuts and washers:** To suit grade of bolt, as NSSS CE Marking version, clause 2.4.3.
4. **Coating applied by manufacturer:** Galvanised.

5. **Other requirements:** a) Minimum size M20 unless shown otherwise on drawings.
b) Holes for bolts shall be drilled only.
c) Provide double washers under all nuts.
d) Two nuts shall be fitted to all anchor/ holding down bolts.

302D Non-preloaded bolt assemblies - Structures countersunk bolts (A)

1. **Certification:** Provide European Technical Assessment (ETA) with CE marking and a Declaration of Performance (DoP).
2. **Designation:** Hexagon socket countersunk bolts to IS EN ISO 4014, grade 8.8.
 - 2.1. **Threading:** Part length.
3. **Nuts and washers:** To suit grade of bolt, as NSSS CE Marking version, clause 2.4.3.
4. **Coating applied by manufacturer:** Galvanised.
5. **Other requirements:** a) Minimum size M16 unless shown otherwise on drawings.
b) Holes for bolts shall be drilled only.

305 Proprietary anchors

1. **Description:** Bridge holding down bolts.
2. **Manufacturer:** Hilti
 - 2.1. **Product reference:** Hit-HY 200 Injection Mortar
3. **Certification:** Provide European Technical Assessment (ETA) with CE marking and a Declaration of Performance (DoP).
4. **Anchor type:** Bonded anchor.
5. **Material:** Galvanised carbon steel grade 8.8.

370 Galvanized coating to bolt assemblies

1. **Standard:** To BS 7371-6.
2. **Galvanizing:** Applied by fastener manufacturer. Passivated and lubricated if no additional coatings are specified. Nuts tapped after galvanizing.
3. **Use/location:** All shop and site connections in shop painted steelwork.

390 Sealed hollow sections

1. **Holes:** Sealed to prevent access of moisture.
 - 1.1. **Method of sealing:** Minimum 5.0 mm thk plate welded to open ends.

Erection

405 Outline method of erection

1. **Documentation:** Steelwork Contractor to liaise with the Employer (Kerry County Council), the Design Team and the Civil Works Contractor regarding programme and access to facilitate the works. Detailed Method Statement, including a craneage plan, to be submitted for inspection. Provide Erection method statement in accordance with NSSS. Note that the design intent is that the bridge, excluding handrails, be installed as a single piece.

410 Pre-erection checks

1. **Scope:** At least 7 days before proposed erection start date, check the following:

- 1.1. Foundations and other structures to which steelwork will be attached: Accuracy of setting out.
- 1.2. Holding down bolts: Position, protruding length, slackness and condition.
2. Inaccuracies and defects: Report without delay.
3. Permission to commence erection: Obtain.

420 Setting out

1. Permissible deviations: In addition to the requirements of the NSSS, add permissible deviations for different types of dimension and locations, as necessary.

425 Modifications

1. Steelwork: Do not modify without approval.
2. Temporary fabrication/ erection attachments: Remove

440 Bridge beam/ column bases

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

441 Mortar filling/ bedding of column bases

1. Mortar
 - 1.1. Cement: Portland cement BS EN 197-1 - CEM I 42.5 or 52.5.
 - 1.1.1. Certification: Provide European Technical Assessment (ETA) with CE marking and a Declaration of Performance (DoP)
 - 1.2. Fine aggregate: To BS EN 12620, grade 0/4 or 0/2 (MP).
 - 1.3. Additives: None.
2. Bedding thickness range: 20 - 50 mm
3. Bolt pockets: Completely filled with neat cement slurry.
4. Spaces beneath base plates: Completely filled as follows:
 - 4.1. Spaces 0-25 mm deep: High strength, non-shrink flowable grout.
 - 4.2. Spaces 25-50 mm deep: 1:1 cement:fine aggregate mortar, just fluid enough to pour. Tamped well as filling proceeds.
 - 4.3. Spaces 50 mm and above: 1:2 cement:fine aggregate mortar, just damp, tamped well against properly fixed supports as filling proceeds.

447 Bonded anchors

1. Holes: Clean and free from dust at time of installing anchor.
2. Permeable sleeves: Use in conditions where otherwise the loss of bonding agent would be unacceptably high.
3. Other requirements: Strictly follow all manufactures instructions.

Testing

475 Products

1. Steel: Submit test certificates.

Protective coatings

535 Inspection of coating work

1. **Work in progress:** Permit coating manufacturer to inspect and take samples of products.
2. **Notice:** Give notice of dates for:
 - 2.1. Start of surface preparation and coating.
 - 2.2. Coated members or components leaving the works.
 - 2.3. Period of notice (minimum): 5 working days.

550 Post-galvanizing inspection

1. **Inspector:** Submit, on request, evidence of training and competence in visual inspection for liquid metal assisted cracking.
2. **Components for which visual inspection is not required (procedure PGI-0):** Not applicable
3. **Components requiring additional inspection**
 - 3.1. Procedure PGI-2A: None
 - 3.2. Procedure PGI-2B: None
4. **Timing:** Before erection of steelwork or application of other coatings.
5. **Action in event of non-compliance**
 - 5.1. **Submit:** Full records of all post-galvanizing inspections, drawing attention to any erected components that are required to be quarantined.
 - 5.2. **Procedure PGI-3:** Carry out on all quarantined components, and submit report.
 - 5.3. **Sites of suspected defects:** Remove zinc coating by grinding back to bright metal for a distance of not less than 50 mm around each defect and from a similar area on opposite face of member and inspect.
 - 5.4. **Remedial actions:** Submit proposals.

Protective coating systems

620 Galvanizing to blast cleaned steel

1. **Use/ location:** All steel not included in clause 630 & 631.
2. **Preparation:** Blast cleaning to BS EN ISO 8501-1, preparation grade Sa2½ using chilled angular iron grit grade G24 to give a coarse surface profile, followed by chemical cleaning.
3. **Galvanizing:** To BS EN ISO 1461.
 - 3.1. **Minimum mean coating thickness:** 85 micrometres.

630 Galvanizing to Structures

1. **Description:** Bridge structure.
2. **Use/ location:** All bridge and abutment wall steelwork and handrails.
3. **Shop preparation:** Blast cleaning to BS EN 8501-1, preparation grade Sa2½ using chilled angular iron grit grade 24 to give a coarse surface profile, followed by chemical cleaning
4. **Galvanizing:** To IS EN ISO 1461.
 - 4.1. **Minimum mean coating thickness:** 140 micrometres.

631 Galvanizing plus polyurethane finish General

1. **Description:** Polyurethane finish to non structural items.
2. **Use/ location:** Entrance sign and chicane gates.
3. **Shop preparation:** Blast cleaning to BS EN 8501-1, preparation grade Sa2½ using chilled angular iron grit grade 24 to give a coarse surface profile, followed by chemical cleaning
4. **Galvanizing:** To IS EN ISO 1461.
 - 4.1. **Minimum mean coating thickness:** 85 micrometres
5. **Paint manufacturer:** Submit proposals
6. **Surface preparation:** The galvanizing to be coated must be free of dust, rust, oil, grease and soluble salts (white rust). The recommended process is to:
 - a) Clean and degrease the surface.
 - b) Steam clean to remove any dirt, grease and zinc salts.
 - c) When dry apply a mordant solution ('T' wash) for the recommended time by the 'T' wash supplier.
7. **Shop top coat**
 - 7.1. **Dry film thickness:** 80 microns.
 - 7.2. **Colour:** To be agreed with the client.
8. **Special requirements:** Stripe intermediate coat to external angles. Apply as recommended by manufacture.

Preparation for painting

710 Offsite preparation and painting

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

725 Manual cleaning of new steelwork

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

736 Treatment of site welded joints in galvanized steelwork

1. **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.
2. **Coating:** Reinstate using one of the methods given in BS EN ISO 1461, clause 6.3.

740 Bolted joints (other than preloaded joints)

1. **Steelwork to be shop painted:** Apply full shop specification to joint faces.

2. **Steelwork to be erected with mill finish then site painted:** Before erection, prepare and prime joint faces and allow to dry.
3. **Bolted joints in externally exposed steelwork**
 - 3.1. Immediately before assembling, apply a further coat of primer and bring surfaces together while still wet.
 - 3.2. After assembling and before applying site coatings, seal crevices to bolts and joint perimeters with a compatible sealant.

760 Galvanized fasteners

1. **Treatment:** After steelwork erection and before applying site coatings, thoroughly degrease and clean. Etch prime.

765 Site preparation of shop painted steelwork

1. **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

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

Painting

810 Environmental conditions

1. **General requirements prior to starting coating work**
 - 1.1. **Surfaces:** Unaffected by moisture or frost.
 - 1.2. **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.
 - 1.3. **Relative humidity:** Below 85%.

815 Coatings

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

820 Film thickness

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

825 Stripe coat

1. External angles, nuts, bolt heads, rough weld seams, and areas difficult to coat: Apply an additional stripe coat of primer.

Ω End of Section

G20

Carpentry/ timber-framing/ first fixing

General

105 Timber procurement

1. Timber and wood-derived products: To originate from an independently verifiable legal and sustainable source, in accordance with the [UK Forestry Standard \(UKFS\)](#).
2. Documentation: Other evidence that suppliers have adopted and are implementing a formal environmental purchasing policy for timber and wood-based products.
3. Chain of custody certification: In accordance with the [UKTPP](#), i.e. the [Forest Stewardship Council \(FSC\)](#), [Grown in Britain \(GiB\)](#) or [Programme for the Endorsement of Forest Certification \(PEFC\)](#).
 - 3.1. Other evidence: None.

160 Grading and marking of structural timber

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

Products

230 Structural softwood (species graded)

1. Description: Bridge deck.
2. Strength grading: Visually graded to [BS 4978](#) in compliance with [BS EN 14081-1](#).
3. Product characteristics
 - 3.1. Species: Redwood
 - 3.2. Grade: GS to [BS 4978](#).
 - 3.3. Strength class: C16 to [BS EN 1912](#).
 - 3.4. Target size: 145 x 45 mm.
 - 3.4.1. Tolerance class: T2.
 - 3.5. Preservative treatment: Timber must be treated in compliance with [BS 8417](#).
 - 3.5.1. Use class: Bridge deck UC4.
 - 3.5.2. Desired service life: 15 years.
 - 3.5.3. Preservative type: Supplier's choice.
 - 3.6. Surface finish: Bauxite aggregate polyurethane resin based inserts to achieve a mean corrected pendulum test value of 45 units.

Workmanship generally

401 Cross section dimensions of structural softwood and hardwood

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

420 Warping of timber

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

430 Selection and use of timber

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

440 Processing treated timber

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

510 Protection

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

Ω End of Section

J30

Liquid-applied tanking/ damp-proofing

Types of tanking/ damp proofing

111 Cold-applied bitumen solutions

1. **Description:** All structural concrete surfaces in contact with the ground shall be waterproofed with a proprietary below ground waterproofing system except where noted otherwise on the drawings. All buried concrete surfaces which are more than 150mm below finished ground level, excluding piles, shall be treated with two coats of a proprietary epoxy resin waterproofing system for below ground concrete.
2. **Substrate:** Concrete.
3. **Primer:** One coat epoxy primer
4. **Membrane system:** Bitumen based liquid waterproofing.
 - 4.1. **Manufacturer:** Submit proposals
 - 4.1.1. **Product reference:** Submit proposals
 - 4.2. **Material:** Bitumen solution.
 - 4.3. **Application temperature:** 5–30°C.
 - 4.4. **Moisture vapour transmission rate:** <2.0 g/m/24 hours.
 - 4.5. **Elongation:** 250%.
 - 4.6. **Adhesion to concrete:** 880 N/m.
 - 4.7. **Coating:** First coat shall be thinned as per manufacturers instructions and shall be red brown in colour. Second coat shall be similarly thinned but shall be black in colour. Application of the second coat must be carried out within 8 to 48 hours after the solvents have evaporated. At lower temperatures, a drying period of 24 hours is required before overcoating. All areas to be painted shall be clean, dry and free from all loose particles, dust, oil and other contaminants. In addition, all blowholes in concrete surfaces shall be cleared out, filled with approved non-shrink cementitious filler and the repair work properly cured before application of coating.
5. **Protection boards:** As clause 330.

Execution

205 Suitability of substrate

1. **Substrates generally:** Smooth, even textured, clean, dry and frost-free.
2. **Moisture content and stability of substrate:** Must not impair integrity of finished tanking/ damp-proofing.
3. **Vertical and horizontal surfaces:** Correctly prepared and free from irregularities.
4. **Curing period for concrete substrates (minimum):** Seven days.

206 Adhesion testing

1. **Tensile bond strength:** Test in accordance with [BS EN ISO 4624](#).
2. **Test results:** Submit.

207 Application of primers

1. **Application:** Uniform, continuous coverage.

210 Coating application

1. **Adjacent surfaces exposed to view in finished work:** Protect.

2. Coatings

- 2.1. Coverage: As coating manufacturer's recommendations.
 - 2.2. Application generally: Uniform, continuous coverage. Do not allow to pool in hollows. Firmly adhered to substrate and free from imperfections.
3. Penetrations: Fully sealed and impervious.
 4. Final covering: Apply as soon as possible after coating has hardened.

220 Application of cold-applied coatings

1. Thinning: As manufacturer instructions.
2. Successive coats: Apply at right angles to previous.

230 Application of bituminous coatings

1. Air and surface temperatures (minimum): 5°C.
2. Weather conditions: Do not apply if there is a risk of rain during application and drying unless effective temporary cover is provided over working area.
 - 2.1. Unavoidable wetting of construction or coatings: Minimize and make good damage.

Completion

310 Inspection

1. Interim and final inspections: Submit reports.

330 Protection boards

1. Manufacturer: Submit proposals
 - 1.1. Product reference: Submit proposals
2. Thickness: 6 mm
3. Coated surface: Clean and free from contaminants.
4. Placement: Bond protection board to coating with double-sided tape.
 - 4.1. Edges: 75 mm minimum overlap and taped.
5. Contact with coating: Secure and continuous.

340 Backfilling to external coatings

1. Timing: Carry out as soon as possible after tanking and protection are complete.

Ω End of Section

Q20

Granular sub-bases to roads/ pavings

To be read with preliminaries/ general conditions.

110 Thicknesses of sub-base/ subgrade improvement layers

1. Thicknesses: See sections: Q22 Coated macadam/asphalt roads/pavings and Q23 Gravel/hoggin/woodchip roads/pavings

140 Excavation of subgrades

1. Final excavation to formation or subformation level: Carry out immediately before compaction of subgrade.
2. Soft spots and voids: Give notice.
3. Old drainage and service trenches: Give notice. Excavate to remove soft or damaged material, then backfill with specified granular sub-base material and compact.
4. Wet conditions: Do not excavate or compact when the subgrade may be damaged or destabilized.

145 Preparation and compaction of subgrades

1. Timing: Immediately before placing sub-base.
2. Soft or damaged areas: Excavate and replace with sub-base material, compacted in layers 150 mm (maximum) thick
3. Compaction: Thoroughly, by roller or other suitable means, adequate to resist subsidence or deformation of the subgrade during construction and of the completed roads/ pavings when in use. Take particular care to compact fully at intrusions, perimeters and where local excavation and backfilling has taken place.

170 Geotextile filter/ separator membrane

1. Description: Terram 1000 geotextile.
2. Manufacturer: Submit proposals
 - 2.1. Product reference: Submit proposals.
3. Jointing: 300 mm overlap
4. Protect from
 - 4.1. Exposure to light, except during laying (maximum five hours).
 - 4.2. Contaminants.
 - 4.3. Materials listed as potentially deleterious by geotextile manufacturer.
 - 4.4. Damage, until fully covered by fill.
 - 4.5. Wind uplift, by laying not more than 15 m before covering with fill.
5. Preparation: Remove humps and sharp projections and fill hollows before laying.

180 Notice

1. Give notice: After preparation and compaction of subgrades
 - 1.1. Period of notice: 5 working days

200 Subgrade improvement layer (capping)

1. Material: To Highways Agency 'Specification for highway works', table 6/1, Class 6F2.
2. Material: To TII 'Specification for highway works', table 6/1, Class 6F2.
3. Standard: Placed and compacted to TII Specification for Road Works, table 6/1, clauses 612 and 613.3, 613.8, 613.9, 613.10 and 613.13.

205 Type 2 unbound mixture for sub-base

1. **Material:** Type 2 unbound mixture to TII Specification for Road Works, clauses 801 and 804.
 - 1.1. **Recycled aggregate:** Permitted
 - 1.2. **CBR (minimum):** 5%

210 Type 1 unbound mixture for sub-base

1. **Material:** Type 1 unbound mixture to TII Specification for Road Works, clauses 801 and 803.
 - 1.1. **Recycled aggregate:** Permitted

211 Granular material

1. **Quality:** Of a known suitability for use in sub-bases, free from excessive dust, well graded, all pieces less than 75 mm in any direction, resistance to fragmentation of LA50 for the Los Angeles test to [BS EN 1097-2](#), and in any one layer only one of the following:
 - 1.1. Crushed rock (other than argillaceous rock) or quarry waste with not more binding material than is required to help hold the stone together.
 - 1.2. Crushed concrete, crushed brick or tile, free from plaster, timber and metal.
 - 1.3. Gravel or hoggin with not more clay content than is required to bind the material together, and with no large lumps of clay.
 - 1.4. Natural gravel.
 - 1.5. Natural sand.
2. **Filling:** Spread and levelled in 150 mm maximum layers, each layer thoroughly compacted.

230 Placing granular material generally

1. **Preparation:** Loose soil, rubbish and standing water removed.
2. **Structures, membranes and buried services:** Ensure stability and avoid damage.

240 Laying granular sub-bases for vehicular areas

1. **General:** Spread and levelled in layers. As soon as possible thereafter compact each layer.
2. **Standard:** To TII Specification for Road Works, clause 802.
3. **At drainage fittings, inspection covers, perimeters and where local excavation and backfilling has taken place:** Take particular care to compact fully.

250 Laying granular sub-bases

1. **Description:** Generally.
2. **General:** Spread and levelled.
3. **Compaction**
 - 3.1. **Timing:** As soon as possible after laying.
 - 3.2. **Method:** By roller or other suitable means, adequate to resist subsidence or deformation of the sub-base during construction and of the completed paving when in use. Take particular care to compact fully at intrusions, perimeters and where local excavation and backfilling has taken place.

310 Accuracy

1. **Permissible deviation from required levels, falls and cambers (maximum)**
 - 1.1. **Subgrades**
 - 1.1.1. **Roads and parking areas:** +20 -30 mm.
 - 1.1.2. **Footways and recreation areas:** $\pm$ 20 mm.

1.2. Sub-bases

1.2.1. Roads and parking areas: +10 -30 mm

1.2.2. Footways and recreation areas: ± 12 mm

330 Cold weather working

1. Frozen materials: Do not use.
2. Freezing conditions: Do not place fill on frozen surfaces. Remove material affected by frost. Replace and recompact if not damaged after thawing.

340 Protection

1. Sub-bases: As soon as practicable, cover with subsequent layers, specified elsewhere.
2. Subgrades and sub-bases: Prevent degradation by construction traffic, construction operations and inclement weather.

Ω End of Section

Q22

Asphalt roads/ pavings

Types of paving

160 Stone mastic asphalt paving Type A

1. Description: Asphalt trail pavement.
2. Granular sub-base: Type 2 unbound mixture, as section Q20.
3. Regulating course: Limestone screenings.
4. Binder course: 50 mm AC20 Dense Bin 70/100.
5. Surface course: 25 mm SMA 10 Surf 70/100.

160 Stone mastic asphalt paving Type B

1. Description: Asphalt access road pavement.
2. Granular sub-base: Type 1 unbound mixture, as section Q20.
3. Regulating course: Limestone screenings.
4. Binder course: 65 mm AC20 Dense Bin 70/100.
5. Surface course: 35 mm SMA 10 Surf 70/100.

Preparatory work/ requirements

220 Bituminous materials generally

1. Suppliers' names: Submit.
 - 1.1. Timing (minimum): Two weeks before starting work.
2. Test certificates: At the time of delivery for each manufacturing batch submit certificate:
 - 2.1. Confirming compliance with this specification and the relevant standard.
 - 2.2. Stating full details of composition of mix.

240 Acceptance of surfaces

1. Surface: Sound, clean and suitably close textured.
2. Level tolerances: To [BS 594987](#).
3. Kerbs and edgings: Complete, adequately bedded and haunched and to the required levels.

250 Abutments

1. Vertical edges of manholes, gullies, kerbs and other abutments: Clean and paint with a thin uniform coating of hot applied 70/100 paving grade bitumen.
2. Finishing: Tamp surface around projections.
 - 2.1. Level: Flush or not more than 3 mm above projections.

Laying

310 Laying generally

1. Preparation: Remove all loose material, rubbish and standing water.
2. Adjacent work: Form neat junctions. Do not damage.
3. Channels, kerbs, inspection covers etc: Keep clean.
4. New paving
 - 4.1. Keep traffic free until it has cooled to prevailing atmospheric temperature.

- 4.2. Do not allow rollers to stand at any time.
- 4.3. Prevent damage.
- 4.4. Lines and levels: With regular falls to prevent ponding.
- 4.5. Overall texture: Smooth, even and free from dragging, tearing or segregation.
- 4.6. State on completion: Clean.

320 Adverse weather

1. Frozen materials: Do not use.
2. Suspend laying
 - 2.1. During freezing conditions
 - 2.2. If the air temperature reaches 0°C, or in calm dry conditions -3°C, on a falling thermometer.
 - 2.3. Hot rolled asphalt: During periods of continuous or heavy rain or if there is standing water on the base.

330 Levels

1. Permissible deviation from the required levels, falls and cambers (maximum): In accordance with [BS 594987](#), clause 5.2.

340 Flatness/ Surface regularity

1. Deviation of surface: Where appropriate in relation to the geometry of the surface, the variation in gap under a 3 m straightedge placed anywhere on the surface to be not more than:
 - 1.1. Base: Machine laid, 25 mm
 - 1.2. Binder course: Machine laid, 13 mm
 - 1.3. Surface course: Machine laid, 7 mm
 - 1.4. Where a straightedge cannot be used the surface must be of a comparable standard of accuracy when judged by eye.

350 Contractor's use of pavements

1. Before use
 - 1.1. Timing: allow newly laid sections to cool before trafficking.
 - 1.2. Open-grained surface: Fill with 0/4 mm size coated grit. Remove surplus.
 - 1.3. Finish: Uncoated chipping and binder surface treatment.
2. Preparation for final surfacing
 - 2.1. Timing: Defer laying until as late as practicable.
 - 2.2. Immediately before laying final surfacing: Clean and make good the base/ binder course. Allow to dry.
 - 2.3. Adhesion: Bond coat
 - 2.3.1. Application rate: As manufacturer's recommendation
 - 2.3.2. Accuracy: Uniform, without puddles.
 - 2.4. Finishing: Allow emulsion to break completely before applying surface.

351 Contractor's use of pavements

1. Preparation for final surfacing
 - 1.1. Timing: Defer laying until as late as practicable.
 - 1.2. Immediately before laying final surfacing: Clean and make good the base/ binder course. Allow to dry.
 - 1.3. Adhesion: Bond coat

- 1.3.1. Application rate: As manufacturer's recommendation
- 1.3.2. Accuracy: Uniform, without puddles.
- 1.4. Finishing: Allow emulsion to break completely before applying surface.

Completion

390 Documentation

- 1. Standard:
 - 1.1. Declaration of conformity: Submit.
- 2. Submission: Two weeks prior to date when Contractor expects work to be complete

Ω End of Section

Q23

Gravel/ hoggin/ woodchip/ resin bound roads/ pavings/ overlays

Types of surfacing

140 Surfacing for gravel amenity trail

1. Description: Gravel trail generally.
2. Subgrade improvement layer: As section Q20.
3. Geotextile: As Section Q20.
4. Granular sub-base: Type 2 unbound mixture, as section Q20.
 - 4.1. Compacted thickness: 250 mm
5. Surface course: Compacted Clause 804.
 - 5.1. Thickness: 100 mm
6. Drainage falls: Lay sub-base with 1:40 crossfall or 1:50 central camber.
7. Completion: Compact to produce a firm, regular surface, stable in use.

Laying

340 Laying generally

1. Channels, gullies, etc: Keep clear.
2. Finished surfaces
 - 2.1. Lines and levels: To prevent ponding.
 - 2.2. Overall texture: Even.
 - 2.3. State at completion: Clean.

350 Cold weather working

1. Frozen materials: Do not use.
2. Freezing conditions: Do not lay pavings.
3. Cold bituminous surface dressings: Do not apply when ambient temperature is below 10°C.
4. Other dressings or overlays: As manufacturers' recommendations.

360 Drainage falls

1. Sealed surfaces
 - 1.1. Falls and cross falls (minimum): 1:40.
 - 1.2. Camber (minimum): 1:50.
2. Unsealed surfaces (minimum): 1:30.

370 Laying granular surfaces in vehicular areas

1. Permissible deviation from required levels, falls and cambers (maximum): ± 20 mm.
2. General: Spread and level in 150 mm maximum layers. As soon as possible compact each layer.
3. Dry weather: Lightly water layers during compaction.

380 Laying granular surfaces in pedestrian areas and cycle tracks

1. Permissible deviation from required levels, falls and cambers (maximum): ± 12 mm.

2. **General:** Spread and level in 100 mm maximum layers. As soon as possible, compact each layer.
3. **Dry weather:** Lightly water layers during compaction.

390 Protection from traffic and plant

1. **Paved areas:** Restrict access to prevent damage.

Ω End of Section

Q28

Topsoil and soil ameliorants

System outline

115 Topsoil system for turfing and seeding

1. Description: Seeded topsoil generally
2. Composition
 - 2.1. Topsoil: Site-sourced topsoil.
 - 2.2. Ameliorants: Fertilizer to be incorporated into topsoil.
 - 2.3. Accessories: None.

Products

300 Preparation materials generally

1. Purity: Free of pests and disease.
2. Foreign matter: On visual inspection, free of fragments and roots of aggressive weeds, sticks, straw, subsoil, pieces of brick, concrete, glass, wire, large lumps of clay or vegetation, and the like.
3. Contamination: Do not use topsoil contaminated with subsoil, rubbish or other materials that are:
 - 3.1. Corrosive, explosive or flammable.
 - 3.2. Hazardous to human or animal life.
 - 3.3. Detrimental to healthy plant growth.
4. Subsoil: In areas to receive topsoil or planting media, do not use subsoil contaminated with the above materials.
5. Objectionable odour: None.
6. Give notice: If any evidence or symptoms of soil contamination are discovered on the site or in topsoil or planting media to be imported.

Execution

605 Site investigation

1. Report: See section A11.

655 Mechanical tools

1. Restrictions: Do not use within 100 mm of tree and plant stems. Do not damage adjacent planting.

660 Grading subsoil for:

1. Description:
2. Standard: In accordance with [BS 8601](#).
3. General: Grade to smooth flowing contours to achieve specified finished levels of topsoil.
4. Areas of thicker topsoil: Excavate locally.
5. Avoid compaction.
6. Excess subsoil: Remove.

665 Subsoil surface preparation for:

1. Description:
2. Standard: In accordance with [BS 3882](#).

3. **General:** Excavate and/ or place fill to required profiles and levels, as section D20.
4. **Loosening**
 - 4.1. When ground conditions are sufficiently dry to allow breaking up of soils, loosen thoroughly to specified depth
 - 4.1.1. Light and non-cohesive subsoils: 150 mm.
 - 4.1.2. Stiff clay and cohesive subsoils: 300 mm.
 - 4.1.3. Rock and chalk subgrades: Lightly scarify to promote free drainage.
 - 4.2. Wet conditions: Do not loosen subsoils.
5. **Stones:** Immediately before spreading topsoil, remove stones larger than 50 mm.
6. **Remove from site:** Arisings, contaminants and debris.

670 Inspecting formations

1. **Give notice:** Before spreading topsoil for grass areas.
2. **Notice period:** Seven days.

680 Surplus topsoil to be retained

1. **Generally:** Spread and level on site:
 - 1.1. **Locations:** Any areas where topsoil is required for new planting
 - 1.2. **Protected areas:** Do not raise soil level within root spread of trees that are to be retained.

690 Topsoil storage heaps

1. **Location:** Submit proposals.
2. **Height (maximum):** 1.5 m.
3. **Width (maximum):** 3.0 m.
 - 3.1. **Formation:** Loose-tip and shape from the side only, without running machinery on the heap at any time.
4. **Protection**
 - 4.1. Do not place any other material on top of storage heaps.
 - 4.2. Do not allow construction plant to pass over storage heaps.
 - 4.3. Prevent compaction and contamination, by fencing and covering as appropriate.

700 Grading of topsoil

1. **Topsoil condition:** Reasonably dry and workable.
2. **Contours:** Smooth and flowing, with falls for adequate drainage.
 - 2.1. **Hollows and ridges:** Not permitted.
3. **Give notice:** If required levels cannot be achieved by movement of existing soil.

705 Handling topsoil

1. **Standard:** In accordance with [BS 3882](#).
2. **Aggressive weeds:** Give notice and obtain instructions before moving topsoil.
3. **Plant:** Select and use plant to minimize disturbance, trafficking and compaction.
4. **Contamination:** Do not mix topsoil with:
 - 4.1. Subsoil, stone, hardcore, rubbish or material from demolition work.
 - 4.2. Other grades of topsoil.
5. **Multiple handling:** Keep to a minimum. Use or stockpile topsoil immediately after stripping.

6. **Wet conditions:** Handle topsoil in the driest condition possible. Do not handle during or after heavy rainfall, or when the moisture content is greater than the plastic limit.

710 Spreading topsoil on:

1. **Description:**
2. **Standard:** In accordance with [BS 3882](#).
3. **Temporary roads/ surfacing:** Remove before spreading topsoil.
4. **Layers**
 - 4.1. **Depth (maximum):** 150 mm.
 - 4.2. **Gently firm** each layer before spreading the next.
5. **Depth after firming and settlement:** 150 mm.
6. **Crumb structure:** Do not compact topsoil. Preserve a friable texture of separate visible crumbs wherever possible.

715 Loose-tipping of topsoil

1. **Standard:** In accordance with [BS 3882](#).
2. **General:** Do not firm, consolidate or compact topsoil when laying. Tip and grade to approximate levels in one operation with minimum of trafficking by plant.

720 Finished levels of topsoil after settlement

1. **In relation to adjoining paving, kerbs or hard surfaces:** Flush.
2. **In relation to adjacent grass areas:** 25 mm above.
3. **Seeded areas:** Extend cultivation into existing adjacent grassed areas sufficient to ensure full marrying in of levels.
4. **Within root spread of existing trees and shrubs to be retained:** Do not dig or cultivate.
5. **Adjoining soil areas:** Marry in.
6. **Thickness of turf or mulch:** Included.

825 Applying fertilizer to proposed grass areas

1. **Description:**
2. **Application:** Before final cultivation and three to five days before seeding/ turfing.
3. **Coverage:** Spread evenly over whole area.
4. **Spread evenly, in transverse directions.**
 - 4.1. **Rate:** As recommended

Ω End of Section

Q30

Seeding/ turfing

General information/requirements

115 Seeded and turfed areas

1. **Growth and development:** Healthy, vigorous grass sward, free from the visible effects of pests, weeds and disease.
2. **Appearance:** A closely knit, continuous ground cover of even density, height and colour.

120 Climatic conditions

1. **General:** Carry out the work while soil and weather conditions are suitable.

145 Watering

1. **Quantity:** Wet full depth of topsoil.
2. **Application:** Even and without displacing seed, seedlings or soil.
3. **Frequency:** As necessary to ensure the establishment and continued thriving of all seeding/ turfing.

150 Water restrictions

1. **Timing:** If water supply is or is likely to be restricted by emergency legislation do not carry out seeding/turfing until instructed. If seeding/turfing has been carried out, obtain instructions on watering.

Preparation

250 Soil requirements

1. **Type**
 - 1.1. **Seeded areas:** Soil for grass swards, as section Q28

Seeding

310 Grass seed

1. **Description:**
2. **Mixture:** 35% chewings fescue, 35% slender red fescue, 20% smooth-stalked meadow grass, 10% brown top bent
3. **Application rate:** 34–50 g/m²

312 Wildflower seed mixture

1. **Description:**
2. **Supplier:** Submit proposals
 - 2.1. **Mixture reference:** Submit proposals
3. **Origin of each species:** Irish Native
4. **Application rate:** 18–25 g/m²

319 Quality of seed

1. **Description:**
2. **Freshness:** Produced for the current growing season.

3. **Certification:** Blue label-certified varieties.
 - 3.1. **Standard:** EC purity and germination regulations.
 - 3.2. **Official Seed Testing Station certificate of germination, purity and composition:** Submit when requested.
4. **Samples of mixtures:** Submit when requested.

330 Sowing

1. **General:** Establish good seed contact with the root zone.
2. **Method:** To suit soil type, proposed usage, location and weather conditions during and after sowing
 - 2.1. **Distribution:** Two equal sowings at right angles to each other

335 Grass sowing season

1. **Grass seed generally:** April to June or August to October

336 Wildflower sowing season

1. **Wildflower seed generally:** March to May or August to October

352 Edges to seeded areas

1. **Description:**
2. **Timing:** After seeded areas are well established.
3. **Edges:** Clean, straight lines or smooth curves.
 - 3.1. **Mulch and soil:** Draw back to permit edging.
4. **Arisings:** Remove.
5. **Completion:** Respread soil and mulch.

Protecting/cutting

530 First cut of grassed areas

1. **Timing:** When grass is reasonably dry.
 - 1.1. **Height of initial growth:** 50 mm
2. **Preparation**
 - 2.1. **Debris and litter:** Remove.
 - 2.2. **Stones and earth clods larger than 25 mm in any dimension:** Remove
3. **Height of first cut:** 40 mm
4. **Mower type:** Contractor's choice
5. **Arisings:** Remove from the site

590 Cleanliness

1. **Soil and arisings:** Remove from hard surfaces.
2. **General:** Leave the works in a clean, tidy condition at Completion and after any maintenance operations.

Maintenance

610 Failures of seeding/ turfing

1. **Duration:** carry out the following operations from completion of seeding/ turfing until: The end of the rectification period.

2. Defective materials or workmanship: Areas that have failed to thrive.
 - 2.1. Exclusions: Theft or malicious damage.
3. Method of making good: Recultivation and reseeding/ returfing.
4. Timing of making good: The next suitable planting season

Ω End of Section

R13

Land drainage

Generally

100 Existing drains and watercourses

1. **Pre-commencement checking:** Before starting work, check invert levels and positions of existing drainage against drawings. Report any discrepancies
2. **Drains to be retained:** Protect. Maintain normal operation. Show location on drawings

106 In situ concrete (general)

1. **Standard:** To [BS EN 206](#) and in accordance with [BS 8500-1](#) and [BS 8500-2](#) .
 - 1.1. **Concrete:** Standardized prescribed, ST2, as section E10

Drains

350 Laying pipes

1. **Weather conditions:** Lay pipes in good weather using methods suitable for the site conditions
 - 1.1. **Plastics pipes:** Do not lay or backfill at temperatures lower than 5°C
 - 1.2. **Trafficking:** Do not compact, smear, cause top ponding, rutting or damage to the soil structure
2. **General:** Scoop out locally at couplings and sockets. Lay pipes digging slightly into bed and resting uniformly on their barrels. Lay to line and gradient without backfalls
3. **Proximity to plants:** Use unperforated pipes with positively sealed joints and as-dug backfill in areas closer than 6 m to trees and hedges
4. **Junctions between branches and mains:** Purpose made components
5. **Upper ends of drain runs:** Plug to prevent ingress of soil or animals
6. **Backfilling:** Do not damage, distort or displace pipes

Culverts

401 Culvert

1. **Excavation:** To profile and gradient necessary for pipe.
2. **Pipe bedding:** Granular material to [BS EN 13242](#), size 4/10
 - 2.1. **Recycled content of granular material:** None permitted
3. **Pipes:** Plastics to [BS 4962](#), Kitemark-certified,
 - 3.1. **Manufacturer:** Submit proposals
 - 3.1.1. **Product reference:** Corripipe
 - 3.2. **Sizes:** Diameter 900 mm.
 - 3.3. **Recycled content of plastics pipes:** Contractor's choice
 - 3.4. **Perforations:** None
4. **Pipe surround and backfill**
 - 4.1. **Material :** Granular surround and backfill – surface water drains.
 - 4.2. **Recycled content of granular material:** None permitted

405 Precast concrete pipe

1. **Drawing reference:** 126001-502

2. Pipe bedding: Granular material to [BS EN 13242](#), size 4/10
 - 2.1. Recycled content of granular material: None permitted
3. Pipe culverts
 - 3.1. Standard: To [BS 5911-1](#) and [BS EN 1916](#), Kitemark-certified.
 - 3.2. Manufacturer: Submit proposals
 - 3.2.1. Product reference: Concrete pipe
 - 3.3. Sizes: DN 750
 - 3.4. Shapes: Round
 - 3.5. Jointing type: Socket
 - 3.6. Cement type and content: To above standards
4. Pipe surround and backfill
 - 4.1. Material: Granular material to [BS EN 13242](#), size 4/10
 - 4.2. Recycled content of granular material: None permitted
5. Backfilling: Carefully pack material up to finished ground level in layers not exceeding 300 mm thick. Do not heap material in the trench before spreading and do not overload culvert when compacting. Compact thoroughly by non-mechanical means and compact each layer before placing the next. Do not use heavy compactors before there is 600 mm (total) of material over any pipes that are within the granular layers.

Excavating/ beddings/ surrounds/ backfill

505 Excavation

1. Pipe gradients: Between 1 in 200 and 1 in 80
2. Subsoil:
 - 2.1. Treatment: Remove from site or to approved locations at end of each day and before pipe laying. Do not disperse on topsoiled areas

515 Existing live land drains

1. Drains exposed by excavation: Mark positions
2. Cutting out: Carefully break back piped drains to an undisturbed section
3. Reconnection: Connect exposed drain to new work
4. Record drawing: Show position of exposed system and new connections. Submit copy

520 Formation for beds or pipes

1. Timing: Excavate to formation immediately before laying beds or pipes
2. Hard spots: Remove rock projections, boulders, etc. Replace with consolidated bedding material
3. Soft spots: Tamp in bedding material
4. Inspection:
 - 4.1. Requirement: Give notice of completed excavated formation for each section of the work
 - 4.2. Period of notice (minimum): Two working days

525 Granular beds

1. Compacted thickness (minimum): 250 mm
2. Laying pipes: Scoop out locally at couplings and sockets and lay pipes digging slightly into bed and resting uniformly on their barrels. Lay to line and gradient without backfalls

540 Granular surround and backfill – surface water drains

1. **Material:** Granular material to BS EN 13242, size 4/10

Ancillary constructions and work

700 Precast Concrete headwalls

1. **Description:** Precast concrete headwalls to contractor's design
2. **Drawing reference:** 126001-
3. **Base:** ST2 concrete blinding
 - 3.1. **Thickness:** 75 mm
4. **Flap valve:** Proprietary plastic flap valve.
 - 4.1. **Manufacture:** Submit proposals
 - 4.2. **Product reference:** Submit proposals

800 Cleaning

1. **General:** Thoroughly flush out the whole of the installation with clean water to remove silt and debris immediately before handover
2. **Preparation:** Lift covers to any access points which form part of the system. Remove mortar droppings, debris and loose wrappings
3. **Timing:** Before cleaning, final testing, CCTV inspection (if specified), and immediately before handover
4. **Cleaning:** Thoroughly flush any pipes with water to remove silt and check for blockages. Where appropriate, rod pipes between access points if there is any indication that they may be obstructed
5. **Washings and detritus:** Dispose of safely. Do not discharge into sewers or watercourses
6. **Covers:** Securely replace after cleaning and testing

Ω End of Section

