

Specification

for

Proposed repair and refurbishment of
two pedestrian bridges and associated works

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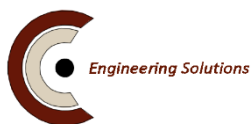
Glenveagh National Park,
Churchill, Leitir Ceannain,
Co. Dún na nGall

for

National Parks & Wildlife Service



An Roinn Tithíochta,
Rialtais Áitiúil agus Oidhreachta
Department of Housing,
Local Government and Heritage



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Civil o Structural o Materials o Fire Engineering

Document Approval

Project	Proposed repair and refurbishment of two pedestrian bridges and associated works	
Client & Job No.	Department of Housing Local Government and Heritage	CC26-5032
Document Title	Civil Engineering Specification	

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Table of Contents

1.0	General Conditions and Preliminaries
2.0	Demolitions
3.0	Excavation and Filling
4.0	Concrete Work
5.0	Structural Steelwork
6.0	Timber Work
7.0	Recycled Plastic and GRP

1.0 DESCRIPTION OF WORKS AND PRELIMINARIES

1.1 DESCRIPTION OF WORKS

Repair and refurbishment of two pedestrian bridges along the visitor path to Glenveagh castle.

EMPLOYER:

Glenveagh N. P. - Department of Housing Local Government and Heritage

1.1.1 LOCATION OF SITE

Glenveagh N. P., Churchill, Letterkenny, Co. Donegal

1.1.2 DESCRIPTION OF THE SITE

Two existing bridges located on the visitor path from the Visitor Centre to Glenveagh Castle.

1.1.3 OUTLINE SCOPE OF WORKS (Main items)

The proposed works are summarized as follows:

- Signage and supervised traffic management at the existing arch bridge over the Owencarrow river on the proposed pedestrian detour around bridge no. B-1. Requirements for traffic management are provided in the drawings and specification.
- The provision of a temporary scaffolded bridge over the stream at Bridge no. B-2.
- Carefully dismantle/demolish existing timber deck and hand railing and dispose off site in accordance with waste management regulations.
- Complete structural works to bridge deck including erection of new galvanized structural steelwork and GRP decking.
- Carryout civil works to bridge abutments and regarding of gravel path.

1.1.4 CONTRACTORS VISIT

Contractor must make a site visit and will be deemed to have made a thorough examination of the site and other things affecting the proposed works, to ascertain the nature and extent of same, and the conditions under which the works will have to be executed.

1.1.5 PROGRAMME FOR THE WORKS

Works must be practically completed by 23rd November 2026.

1.1.6 QUALITY ASSURANCE

The Contractor shall establish and implement quality assurance procedures for the following:

- Contractor to provide CE Marks and DoP's for all materials and products used.

1.1.7 STARTING DATE

The Starting Date shall be no more than 5 working days after the Contract Date.

1.1.8 TAX CLEARANCE CERTIFICATE NOTE

The Contractor shall have a current Tax Clearance Certificate.

1.2 PRELIMINARIES

1.2.1 CONDITIONS OF CONTRACT

The Form of Contract and Conditions is the model public contract for Public Works **PW CF6** Short Form of Contract. The Contractor will be deemed to have examined these Conditions and to have priced the items in accordance therewith, and to have included for all of the Conditions in the Contract Documents.

1.2.2 INSURANCE

Public Liability,	€6.5 million
Employers Liability,	€13 million

Contractor shall provide evidence of up-to-date insurance cover with minimum limits as noted above.

1.2.3 WORK NOT DESCRIBED

Should there appear on the Drawings any work not described in the Specification, or if described therein, is not shown on the Drawings, such work shall be taken as if both shown and described and executed part of the work contracted for. In case of any discrepancy between the Drawings and Specification, the Employers Representative shall determine which shall be followed.

1.2.4 DESCRIPTIONS BINDING ON THE CONTRACTOR

The description of written particulars on the Drawings shall be binding as if contained in the Specification, and everything is to be done that is usual or necessary in completion of same on what may be reasonably implied from the Drawings and Specification. The Employers Representative shall describe those which shall be followed.

1.2.5 PROGRESS OF WORK

The Contractor whose tender is accepted will be required to commence work within one (1) week of being given possession of the Site, to proceed continually and to complete works within the time agreed upon at the beginning of the Contract. The works shall not be deemed to be complete until certified by the Employers Representative to that effect. When the Employers Representative has certified the works to be complete, the Contractor shall hand over possession of the building to the Employer, and shall forthwith remove all contractors' tools, plant, scaffolding, surplus materials and rubbish from the site.

1.2.6 HEALTH & SAFETY

1.2.7 HEALTH HAZARDS

The contractor shall take adequate precautions to protect site operatives and the general public from any health hazards associated with these works including but not limited to heavy plant/machinery, drowning, fall from a height, dangerous fumes, noise and dust arising during the course of the Works.

1.2.8 HEALTH & SAFETY COMPLIANCE WITH LEGISLATION

To comply with Safety, Health & Welfare at Work (Construction) Acts and Regulations current at the date of tender, contractor should take note of the following:

- (a) Include for complying with the Safety, Health and Welfare at work Acts and Regulations current at the date of tender.
- (b) The contractor shall be appointed by the client under a collateral agreement to the main contract as Project Supervisor for the Construction Stage (PSCS) in respect of the project pursuant to the Safety, Health & Welfare at Work (Construction) Regulations 1995. The contractor shall include all costs for the provision of the services of Project Supervisor for the Construction Stage pursuant to Regulations 6 and 7 of the regulations.
- (c) The PSCS shall gather all relevant information, from all designers, specialist designers, and contractors, including relevant information from the final version of the Safety & Health Plan, and delivery to the PSDP for inclusion in the Safety File.

The following is a non-exhaustive list of the information which the PSCS must provide to Carr Consulting Engineers, in their role as PSDP, for inclusion in the safety file:

1. Method Statements for all aspects of proposed works to include protection of the watercourse from pollution from chemicals, fuel, debris and silt.
2. Disposal certificates for disposal of all waste in accordance with waste management legislation.
3. Documentation and CE marks for all materials and products used.
4. Any further information, requested by the PSDP, which is deemed necessary by the PSDP to allow him to complete his role and to prepare the Safety File.

The PSCS shall coordinate all contractors' arrangements for constructing the works so as to protect the Safety Health and Welfare of all people (including employees and the general public) affected by the construction of the works.

The PSCS shall monitor all these arrangements and shall take appropriate steps, where necessary, to ensure that they are implemented and effective in accordance with S.I. 504 of 2006.

The Main Contractor shall, in respect of all persons' and sites' activities, provide for, and ensure compliance with, all Health, Welfare and Safety Standards and Regulations whatsoever arising in connection with the works.

As between the Client and the Main Contractor, the Main Contractor shall be responsible for the health and safety of all persons employed on the site, whether under his direct control or not.

The Main Contractor shall ensure that safe practices and methods of work are adopted at all times. The Main Contractor in that capacity, or in his capacity as Project Supervisor Construction Stage, shall notify the Employer's Representative in writing, at or prior to the submission of his tender, if he considers that any contractual requirement relating to the time for carrying out the works, or any part of the works, or the design of the works, or specification of materials, renders work methods or procedures hazardous, or in any way prevents the work from being safely carried out. Upon receipt of such notice, the Employer's Representative shall issue such necessary instructions as he shall see fit to the Main Contractor.

The Contractor shall comply with all applicable legislation and regulations.

A Preliminary Safety and Health Plan has been prepared for this Contract. All Tenderers are required to familiarise themselves with each item detailed in the Plan and to make any necessary amendment to their proposed Programmes of Work to reflect such.

1.2.9 INFORMATION FROM CONTRACTOR FOR SAFETY FILE

The contractor shall provide as a minimum to Carr Consulting Engineers in their role as PSDP, the following information in a timely fashion to allow coordination and handover of the safety File to the client

- (i) CE Marking and/or material Certificate/specifications sheets for all materials and products used on the project.
- (ii) Future maintenance requirements
- (iii) Marked-up drawings indicating the extent of the works.

Plus, all necessary information as requested by the Project Supervisor for the Design Process to enable the preparation and completion of the Safety File.

1.2.10 WASTE MANAGEMENT PLAN

The contractor is required to provide a current, valid Waste Collection Permit prior to removal/disposal of waste materials. The contractor shall prepare a comprehensive Waste Management Plan for these works. This plan should specify the waste materials designated for off-site disposal, include estimated quantities, and clearly indicate the intended disposal locations for each type of waste. The waste Management Plan shall be submitted to the Employers Representative at least one week prior to commencing works.

Before or at Practical Completion, the contractor must provide the Employer's Representative with certificates confirming that all site waste has been disposed of according to waste management legislation.

1.2.11 NOTICES

Contractor to provide all notices required to authorities, statutory bodies, or any other person. Make all necessary application and pay all fees legally required by them

1.2.12 ARTIFICIAL LIGHTING

The contractor is responsible for the supply of artificial lighting for works.

1.2.13 TRAFFIC MANAGEMENT

Contractor shall prepare a specific traffic management plan for the management of visitors, Glenveagh staff and buses. Contractor shall refer to the preliminary TMP provided in the drawings. TMP shall be presented to Employers Representative for approval a minimum of 1 week prior to commencing any works.

- **Detour Signage**

Erect directional signage and barriers to visitor path for both bridges as required in the traffic management plan.

- **Traffic Management at bridge near Bridge Cottage**

Install traffic light control to road over the road bridge at Bridge Cottage in accordance with the Traffic Management Plan. The traffic light control shall have a call button for pedestrians (visitors) on both sides of the bridge to stop vehicular traffic and all safe passage of pedestrians over the bridge.

During busy periods the contractor shall provide personnel (2 operatives) on site to manage the traffic light or implement a stop/go system. Busy periods are dependent on the weather but are likely to be at weekends. Contractor shall liaise with NPWS staff at the start of each week during the works to agree when this is required.

1.2.14 TAX CLEARANCE CERTIFICATE NOTE

The Contractor shall have a current Tax Clearance Certificate.

1.2.15 WORKING HOURS

Monday – Saturday: 7:00-19:00.

1.2.16 SITE CONDITION AT COMPLETION

The contractor shall:

- (a) The contractor shall take all steps necessary to keep the surrounding roads and paths free of all debris. The contractor shall delegate personnel to clean surrounding roads during working hours should this be necessary. Any accidents arising from failure to keep roads and footpaths clear always shall be the total responsibility of the contractor.
- (b) Clear away all rubbish, debris and surplus materials and leave the whole site clean and in a tidy condition.
- (c) Do not sweep or flush debris into rivers or rainwater system.
- (d) Removal of water - provide temporary drains, sumps and pumping as necessary. Do not pollute water courses with silt laden water.
- (e) Make good all damage consequent upon the work.

2.0 DEMOLITIONS

2.1 GENERAL REQUIREMENTS

2.1.1 CONDITION SURVEY [PHOTOGRAPHIC SURVEY]

Before starting demolition work, examine all available information available from existing Safety File. If deemed necessary the Contractor shall carry out a record survey of the structures to be retained and all other adjacent properties, the site and surrounding area. Submit a copy of any such condition survey report including a full photographic record to the Engineer upon completion.

2.1.2 METHOD STATEMENTS

Before starting demolition work, the contractor shall examine all available information and produce Method Statements covering:

- Dismantling and demolition methods of the timber bridge deck and balustrades with appropriate scaffolding temporary decking and under tarpaulin to collect debris and protect Owencarrow river.
- Include for sequence of works and traffic management plus arrangements for protection of personnel and public including exclus

2.1.3 VARIATIONS TO METHODS

- Do not vary methods on site from the agreed method statement without prior approval.
- Give 14 days' notice of any proposed variation to the method statement. Minor variations may from time to time be agreed as appropriate.
- Should the work on site expose any item which either requires or makes appropriate a variation from the agreed method, notify the Engineer/Aurivo Representative at once. Accept responsibility for any further work in such an area before approval.
- The submission to, and scrutiny by, the Engineer of any programme or details of methods and any checking by the Engineer of the stability and safety of the structures in all stages of demolition shall not relieve the Contractor of his obligations under the Contract and his sole responsibility for the temporary works and the safety of the structure in all stages of demolition.

2.1.4 EXTENT OF DEMOLITION

Subject to the retention of features, facades, structures, retaining walls etc. specified elsewhere, demolish the existing timber super-structure down to sound structural steelwork or timber beams.

2.1.5 GROUNDWORKS:

2.2 SERVICES AFFECTED BY DEMOLITION

2.2.1 SERVICES REGULATIONS

Any work carried out to, or which affects new or existing services must be in accordance with the byelaws or regulations of the relevant Statutory Authority.

2.2.2 LOCATION OF SERVICES

2.2.3 Locate and mark the positions of all services affected by the work. Arrange with the Employers Representative for the location and marking of the positions of adjacent services.

2.2.4 DISCONNECTION OF DRAINS

Locate and disconnect all disused drain connections. Seal within the site to approval.

2.2.5 DRAINS IN USE

2.2.6 Protect, drains, manholes, gullies, still in use and ensure that they are kept free of debris at all times. Make good any damage arising from demolition work. Leave clean and in working order at completion.

2.2.7 BYPASS CONNECTIONS

Provide as necessary to maintain continuity of services to other areas of the same property. Give a minimum 72 hours' notice to occupiers if shutdown is necessary during the changeover.

2.3 DEMOLITION WORK

2.3.1 WORKMANSHIP GENERALLY

- Demolish structures in accordance with BS 6187.
- Operatives must be appropriately skilled and experienced for the type of work and hold or be training to obtain relevant Certificates of Competence.
- Site staff responsible for supervision and control of the work are to be experienced in the assessment of the risks involved and in the methods of demolition to be used.

2.3.2 TEMPORARY WORKS

• **Temporary Bridge (Design)**

Contractor shall prepare a temporary works design for a scaffold bridge structure adjacent to the existing bridge no. B-2. This bridge shall be a minimum of 1.5m wide, structurally designed to span the stream from temporary abutments, with secure balustrades and hand railing and a non-slip deck in accordance with TII standards. The proposed **Temporary Works** design for this bridge shall be by a chartered engineer, who shall provide a **Temporary Design Works Certificate (TWDC)** to the Employers Representative upon completion for review and approval. Temporary scaffold bridge to bridge no. B-2 and other temporary scaffolding works to bridge no. B-1

Design and be responsible for all temporary works at all times and at all stages including subsequent dismantling where relevant. All calculations and details in connection with the temporary works shall be submitted for comment. Allow 14 days from the date of receipt by the Engineer for this.

- Design temporary works in accordance with relevant Standards and Codes of Practice, particularly IS EN 12811-1 'Temporary works equipment. Part 1: Scaffolds. Performance requirements and general design' and in accordance with good practice. The design shall include foundations or other appropriate support. Accept responsibility for any inspection or opening-up required to enable the design of the temporary works to be carried out.
- Give the Engineer reasonable opportunity to view such inspection or opening-up.
- **Temporary Bridge (Construction)**
Contractor shall supply and construct the approved temporary bridge structure on prepared temporary abutments and maintain this bridge in a safe and serviceable condition for the full duration of the works.
- **Removal of Temporary Bridge**
Contractor shall remove the temporary bridge and all associated fixings and materials from the site.

2.3.3 GAS OR VAPOUR RISKS

Take adequate precautions to prevent fire or explosion caused by gas or vapour.

2.3.4 FLAME CUTTING

Where flame cutting of existing metal is required, take all necessary precautions to prevent the outbreak of fire(s) or causing explosion of noxious gases from any adjacent combustible or ignitable materials such as timber, paper, paint, or flammable liquids. in pipes, tanks, contaminated ground etc.

2.3.5 DUST

Allow for any measures for the control of dust such as periodically spraying works with water.

2.3.6 HEALTH HAZARDS

Proposed repair and refurbishment of two pedestrian bridges at Glenveagh N. P.

Take adequate precautions to protect site operatives and the general public from health hazards associated with dangerous fumes and dust arising during the course of the Works.

2.3.7 ADJOINING STRUCTURES

Safeguard any existing structures such as gabions, headwalls etc during demolitions

2.3.8 STRUCTURE(S) TO BE RETAINED

Adequately protect parts of existing structures that are to be kept in place.

2.3.9 PARTLY DEMOLISHED STRUCTURES

Leave in a stable condition with adequate temporary support at each stage to prevent risk of uncontrolled collapse. Keep safe outside working hours. Prevent debris from overloading the structure, scaffold platforms or other temporary works. Prevent access of unauthorised persons.

2.3.10 DANGEROUS OPENINGS

- Illuminate and protect as necessary.
- Keep safe outside working hours.

2.3.12 ASBESTOS-BASED MATERIALS

N/A

2.3.13 UNFORESEEN HAZARDS

Notify any unrecorded tanks, chemicals etc. discovered during demolition work. Submit details of methods for safe removal, filling etc. Any work to unforeseen hazards shall not be at additional cost to the Contract.

2.3.14 SITE CONDITION AT COMPLETION

Clear away all rubbish, debris and surplus materials and leave the whole site clean and in a tidy condition.

2.3.15 SITE SURFACE AT COMPLETION

Grade the site area to follow the levels of adjacent areas as show in the drawings.
Infill voids with suitable compacted material to achieve the grade specified.

2.4 MATERIALS ARISING

2.4.1 CONTRACTOR'S PROPERTY

Except for assets identified to be retained by Client, or to be removed by Client, components and materials arising from the demolition work are the property of the Contractor. Remove from site as work proceeds.

2.4.2 EMPLOYER'S PROPERTY

Components and materials to remain the property of the Employer:

Assets to be removed by Client. (TBC)

Assets to be retained by Client (TBC)

Protect until removed by the Employer, reused in the Works or at the end of the Contract.

3.0 EXCAVATIONS AND FILLING

3.1 GENERAL

Excavation shall be carried out in accordance with BS 6031 "Code of Practice for Earthworks". The Contractor shall excavate to the extent shown on the drawings. Should there be any excavation more than that required for the Works; contractor shall make good the ground as directed and according to circumstances: note that reinstatement with lean-mix concrete may be ordered.

3.2 WARNING SIGNS

The Contractor shall wherever necessary erect warning signs of size and colour and with lettering to the approval of the Engineer indicating that there is a constructional hazard. He shall erect appropriate signs for the benefit of construction traffic to alert of dangers and for the benefit of the road users to alert them of the danger of construction traffic from the site. Such signs shall be arranged with the Employer's Representative.

3.3 SETTING OUT

Set out the excavations as shown on the drawings and to allow for a minimum roadway width of 3m. The contractor shall excavate to the required depths and profiles to provide the proposed trench drains with stable side slopes. The Contractor shall be entirely responsible for accurately setting out all the work, regardless of whether the Engineer has checked the setting out or not. He shall at his own expense make good any defect arising from errors in lines or levels.

3.4 ENVIRONMENTAL & POLLUTION CONTROL

Contractors should have regard to the following best practice guidelines to ensure that water bodies are adequately protected from construction work and undertake all earthworks operations with regard for the specific guidelines:

- ***Construction Industry Research and Information Association CIRIA C649: Control of water pollution from linear construction projects: Technical guidance (Murnane et al. 2006)***
- ***CIRIA C649: Control of water pollution from linear construction projects: Site guide (Murnane et al. 2006)***
- ***DMRB HD33/06: Surface and sub-surface drainage systems for highways. Design Manual for Roads and Bridges. Volume 4: 2, (2006).***

The Contractor shall be adequately equipped and adopt methods to prevent sediment or pollutants from entering streams or lakes, including:

- The location and size of stockpile areas for soils at a location not vulnerable to erosion
- Management of suspended solids to prevent contamination of water bodies.
- Bunded areas will be created for the storage or use of any fuels, oils, greases, cement, etc;
- Prior to the commence details will be provided for locations and safe-guards for refuelling of machinery, machine servicing, concrete-mixing, etc;
- Emergency spill kits will be kept close to works.

3.3 EXCAVATION FOR DRAINAGE TRENCHES

Procedures for normal service trench excavations shall include the following:

- a) The trench is opened by a machine that produces a clean sided trench of the correct trench width.
- b) The trench is unsupported; the bottom is scraped clean level by machine.
- c) Grade back trench side slope so that slope is stable. As a guide the maximum acceptable slope inclines shall be as follows:

Rock: 50 degrees

Granular soil: 35 degrees

Cohesive soil: 25 degrees

d) Give adequate notice of when the work is to be undertaken in order that inspections can be made.

3.4 SAFETY OF THE EXCAVATIONS

Contractor shall adopt the following procedures during excavations:

1. Take whatever precautions necessary to eliminate any risk of collapse of the sides of the any excavations. This is a Contractor's risk and if any damage occurs he shall undertake any repair work as necessary or as directed.
2. Protect structures, utilities, footpaths and other structures from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations.
3. Keep raised soil well back from edges of excavations.
4. Barricade open excavations occurring as part of this work and post with warning lights where members of the public may encounter such excavations. Prevent vehicles, plant, spoil or anything approaching the area adjacent to the edges of excavations; being a recommended distance of not less than the depth of the excavation instable soil.

3.5 EXCAVATIONS IN HARD MATERIAL

The contractor is responsible for provision of suitable rock breaking hammers and equipment to ensure timely and efficient removal of hard material such as existing concrete foundations or rock as indicated in the drawings. The contractor shall review the site and site investigation report and shall carry any other tests deemed necessary to ascertain the type of soil and materials likely to be encountered during excavation works.

3.6 DISPOSAL OF EXCAVATED MATERIALS

Vegetation shall be reused as sod turves to reinstate excavated embankments. Scrub and small trees shall be disposed off on-site as agreed with NPWS.

Topsoil and peaty materials deemed unsuitable for road surface shall be used to coat embankment slopes to reinstate vegetation to match existing.

No materials shall be removed off site.

3.7 SURFACE & GROUND WATER MANAGEMENT

Keep the roadway generally free from runoff water that could cause erosion during the works arising from any cause: adopt the following procedures and precautions:

- a) Use methods that cause no harm or nuisance. Manage
- b) Install the cross-drain culverts under the road sections initially in order to provide discharge for storm water to lower side of the road.
- c) Ensure drains are excavated to a discharge point after every days work.

3.8 RISK ASSESSMENTS & METHOD STATEMENTS

Before starting excavation works, examine all available information for the proposed works including but not limited to the drawings and the preliminary health & safety plan. The contractor shall carryout risk assessments of all work elements and these should be forwarded to the PSCS. The contractor shall develop suitable Method Statements to describe how the works may be completed in an efficient manner in compliance with Safety and Health requirements. Method Statements shall generally include:

- Description of proposed excavation, rock breaking demolition and filling methods
- arrangements for control of site transport and traffic.

3.9 UNEXPECTED SITUATIONS

Record any circumstances not anticipated by the drawings or otherwise; seek instructions if the Works are affected in any way.

Obstructions in the ground: Break up and remove surface beds and pavings, old foundations, disused drains and manholes and all other obstructions in the ground.

Voids in the ground: Report any voids, tanks or other potential hazards encountered and seek instructions. Backfill any voids caused by removing obstructions with hard-core/..... thoroughly compacted.

Toxic substances: Refer to Engineer.

Disused drains: Plug any pipes cut off at the perimeter of excavations with foundation grade concrete rammed in to refusal (but not less than 300 mm).

Existing live services: Report as soon as encountered and protect pending instructions: notify all authorities concerned. If work proceeds adjacent to live pipes and cables etc., excavate by hand and provide all necessary temporary support and protection. Backfill and compact with equal care.

Excavating for drains and services: See Drainage section.

3.14 REGRADING OF THE ROADWAY AND GENERAL FILLING

General filling to make up levels:

General filling to provide a capping layer or a structural subbase under load bearing structures shall consist of material complying with 6F1, 6F2 or 6F3 in accordance with the TII Specification for Roadworks unless otherwise noted on the drawings or Bill of Quantities.

Imported Blinding Material

Imported blinding stone shall consist of brown well graded natural gravel or crushed stone from an approved source with a grading corresponding with a UGMB stone. A gradation and other tests for the proposed material shall be provided to the Employers Representative one week prior to commencing the works for final approval.

Procedure for compacted fill

Spread selected fill material horizontally in 200mm loose lifts.

Compact all fill layers thoroughly using an appropriate in accordance with Section 612 Compaction of Fills in Series 600 in the Specification of Roadworks generally as follows:

- a) Undertake all compaction using mechanical plant appropriate to the class of fill and the site conditions. Generally, for Method specification follow the appropriate plant and passes noted in table 6/4 of Series 600 in the Specification of Roadworks.
- b) Compaction shall be either method or end-product as required for the class of fill as noted in Table 6/1 of Series 600 of the Specification for Roadworks.
- c) Compact around structures with an unsupported side (e.g. retaining walls) in thin layers and with care: otherwise fill and compact both sides together.
- d) Continue compaction until there is no surface movement ahead of the roller, all surface voids are filled and the surface is smooth and level or graded as required.
- d) Undertake initial compaction over drains and ducts, etc. with care to avoid fractures.

Inspection

For filling which is to support load bearing structures such as concrete slabs or foundations the compaction of each of the first few layers should be inspected and approved to confirm suitability of compaction process.

Contractor shall not backfill around foundations, etc. until inspected and approved by the Engineer.

Frozen material or ground

Do not undertake any filling when this situation occurs.

4.0 CONCRETE WORK

4.1 Concrete

Concrete shall consist of dense concrete of the specified strength made with natural aggregates and complying with the harmonised standard I.S. EN 206-1. The aggregates used in the manufacture of this concrete shall comply with the harmonised standard IS EN 12620 and the guidance for their use in Ireland provided in S.R. 16.

4.1.1 Compressive Strength

The Contractor must satisfy the Engineer that all concrete mixes have the required minimum compressive strength. The strength class of the concrete to be used in the various sections of the work shall be as stated herein and on the drawings.

4.2 Certificates

Prior to commencing any work the contractor shall supply the following documentation from the concrete producer:

- (a) Mix design certificate confirming the constituents of the proposed concrete mix for each concrete strength class. The concrete mix design shall state the relevant properties of fresh and hardened concrete together with the constituents and their proportions. Concrete mixes shall be certified by a third party or shall have a documented track record indicating compliance with the strength class specified.
- (b) Certification that the concrete and **all** of the constituent aggregates used to make this concrete complies with the appropriate harmonised standards.

4.3 Verification & Testing

The contractor shall supply a certificate with each delivery stating the concrete mix type or number. The contractor shall sample and test the concrete for fresh and hardened properties in accordance with the requirements of clause 4.7 below.

4.4 Constituent Materials

4.4.1 Cement

The cement shall be Ordinary Portland Cement certified as complying with IS EN 197-1 (Cement type CEM I, CEM II or CEM III). Manufacturer's certificate of compliance with the standard shall be provided when requested by the engineer.

4.4.2 General

All aggregates shall comply with the requirements of the latest version of Series 800 of the Specification for Roadworks published by Transport Infrastructure Ireland (TII).

4.4.2.1 Fine Aggregates / Sand

Sand and fine aggregate are to be clean and sharp and from an approved pit and shall comply with the requirements of IS EN 12620.

4.4.2.2 Coarse Aggregates / Gravel

Coarse Aggregates shall consist of natural pit gravel or crushed stone. They shall be hard, strong and durable and shall be clean and free from clay films and other adherent coatings and shall be washed if so directed. The coarse aggregate is to have a nominal maximum size of 20mm unless shown otherwise. Coarse aggregates shall conform to IS EN 12620.

4.4.2.3 Certificates & CE Marking

The contractor shall furnish the CE Mark including the Declaration of Performance for all aggregates to be used in the concrete.

4.4.4 Water

Clean fresh water shall be used and shall be free from deleterious material.

4.4.5 Admixtures

Admixtures may be used in the concrete at the contractor's discretion in accordance with the manufacturer's instructions and best practice and shall comply with the requirements of or latest applicable BS EN 934-2

4.5 Concrete Mixes

The concrete mixes in the various sections of the works shall be designed mixes in accordance with BS 8500 and IS EN 206:

Mix Designation	Mix "A"	Mix "B"
Concrete Class (Cube Strength)	17/20 (20N/mm ²) Lean Mix	40/50 (50 N/mm ²) Ecocem or GGBS Blend
Exposure class	n/a	XS1/XF4/XC4
Cement Type & Strength Class	CEM I or II 42.5 N/mm ²	CEM II/A-L 42.5N Ecocem or GGBS Blends
Nominal Maximum Aggregate size	20	20
Minimum Cement Content (kg/m ³)	180	340-360
Maximum free water /cement ratio (by mass)	0.75	0.40
Consistence Class (contractor to confirm)	S4	S3
Admixture	Please advise	3.5% Air Entrainment
Placement Method (contractor to confirm)	Usually Direct	As requested

Table 3.2

Mix Classes and proposed uses

- Mix "A" Class 17/20** (Cube strength 20N/mm² at 28 days),
Proposed Use: *In-fill lean mix concrete.*
- Mix "B" Class C28/35** (Cube strength 35 N/mm² at 28 days)
Proposed Use: *Abutment walls.*

Notes:

- If mix uses vary from that stated above the contractor shall request updated mix parameters from the Engineer.
- Depending on the selected method of placement maximum aggregate size and consistency may be varied provided that the concrete strength class is maintained as approved by the Engineer during submission of mixes, refer to clause 4.5.1 below.

4.5.1 Submission of Mixes by Contractor

Contractor shall supply the name of ready-mix concrete supplier and mix proportions for each mix proposed for use on the project, to the structural engineer a minimum of one week prior to commencing work.

4.6 Sampling and Testing of concrete

1. The Sampling, Curing and Testing of concrete fresh or hardened shall be carried out by the contractor in accordance with IS EN 12350-1 to 6 and IS EN 12390-1 to 7.

The rate of sampling for testing shall be as follows:

Recommended minimum rate of sampling of concrete	
One Sample of concrete per	
10 cu.m	Columns and cantilevers
30 cu.m	Walls, Beams and Slabs
50 cu.m	Foundations & large slab areas

Table 4.6

2. From each sample a consistency test shall be carried out initially, air content and density tests shall also be completed as agreed with the Engineer. In addition, at least three test specimens (cubes) shall be prepared in accordance with IS EN 12350 and laboratory cured under water maintained at 20°C until tested. Test one specimen at seven (7) days in compression as a guide to strength gain of concrete. Test two (2) specimens at 28 days in compression and the average of the two tests shall be taken as the test result.

3. Testing to be performed by a qualified independent testing laboratory utilizing up to date calibrated equipment. A copy of the calibration certificate shall be forwarded to the Engineer upon request. Copies of all test reports shall be sent directly to Architect/Engineer.

4.6.1 Compliance with the Characteristic Strength, f_c

Compliance with the Characteristic strength shall be assumed if the strength determined from any test result is not less than the specified $f_c - 4 \text{ N/mm}^2$ with a minimum mean strength of $f_c + 1$ or 2 N/mm^2 of in accordance with the requirements of IS EN 206-1 unless agreed otherwise by Engineer prior to commencing work.

4.6.2 Tests on Fresh Concrete IS EN 12350

Consistence of Concrete

The consistence of concrete shall be as stated in the mix design parameters given above. The contractor shall verify that the consistency of the concrete is verified by testing of the fresh concrete on-site using one or more of the appropriate test methods presented in IS EN 12350.

Air Content of Air Entrained Concrete

The air content of air entrained concrete shall be as specified herein and in accordance with IS EN 206-1. Air entrained fresh concrete shall be tested for compliance with the specification by using one or more of the appropriate test methods presented in IS EN 12350.

Wet Density of Normal Concrete Mixes

The density of the fully compacted normally concrete shall not be less than 2350 kg/cu.m, unless otherwise stated in this specification. Wet density of the concrete shall be verified by the contractor in accordance with IS EN 12350. Wet density for other mixes such as air entrained concrete mixes shall be agreed with the supplier during mix submissions.

4.7 Joints in concrete

4.7.1 Construction Joints

Floor slabs and wall panels shall be laid in continuous pours between extremities and construction joints shall be incorporated as shown in the drawings. The surface of concrete against which new concrete is to be cast shall be free from laitance and shall be roughened to the extent that the large aggregate is exposed but not disturbed. The joint surface shall be cleaned immediately before fresh concrete is placed against it. Where practicable such preparation of horizontal and vertical joint faces shall be carried out when the concrete has set but not hardened. Dowels shall be used as shown in the drawings.

4.7.2 Contraction Joints

Contraction joints shall be formed or cut in all sections of floor slab or wall greater than 6m in length as approved by the Engineer. Typical contraction joint details are shown in the drawings.

- (i) Partial contraction joints (PCJ) - 50% of the main reinforcing steel shall pass through the joint.
- (ii) Total Contraction Joint (TCJ) – 0% of main reinforcing steel shall pass through the joint. However Sleeved dowels are generally used across the joint for continuity.

4.7.3 Expansion Joints

Expansion joints are provided to allow for expansion movements of continuous members generally in excess of 50m in length. Typical expansion joint details are shown in the drawings.

4.7.4 Isolation Joints

Isolation joints are generally formed between certain members to prevent bonding of concrete to other surfaces and provide for relative movements. Typical isolation joint details are shown in the drawings.

4.8 Formwork

The formwork shall be of sufficient rigidity to support the concrete without deflection and shall be securely wedged and supported. Care must be taken in striking to avoid injury to the surface.

The Contractor shall be responsible for supplying, erecting, maintaining, striking and clearing away all formwork and for forming all moulds for precast work and for ensuring that it is of adequate strength and without deflection or movement when bearing load. All formwork shall receive an application of mould oil before concrete is poured.

4.9 Concrete finish

4.9.1 Formed Finish

Formed surfaces to members shall be finished as follows:

Member	Class Finish
Foundations	F1
Walls and Piers	F2
Soffits to slabs and beams	F3

Table 4.6.1

4.9.2 Unformed Finish

Unformed surfaces in floor slabs shall be finished in accordance with the requirements of EN 13670 as follows:

Ordinary Finish

The concrete shall be levelled, screeded to produce a level plain surface and then shall be floated under light pressure to eliminate surface irregularities to produce a level uniform surface.

Plain Finish

The concrete shall be levelled and screeded to produce a level plain surface and then shall be floated under light pressure to eliminate surface irregularities. When the moisture film has disappeared and the concrete has hardened sufficiently, the surface shall be hard trowelled under firm pressure to produce a dense, smooth surface free from travel marks.

Special Finish - Brush Texture

Finish is achieved by pulling a brush over the surface of the wet concrete after the surface has been levelled and screeded.

Unformed concrete surfaces shall be finished as follows:

Member	Class Finish to EN 13670
Pier Cap	Standard plain trowelled finish.

Table 4.6.2

4.9.3 Other Specialist finishes to concrete surfaces:

N/A

4.9.4 Edges and sharp arises

Sharp arises are to be avoided in the exposed surfaces of the exposed columns, beams and walls. A 25mm chamfer shall be constructed on the exposed corners of all columns, beams and walls.

4.10 Placing

Concrete shall be placed from the truck by an approved method and carefully deposited into the formwork, levelled and consolidated by tamping, ramming, or mechanical vibration. The concrete shall be placed in such a way to minimize segregation of the mix and shall not be dropped nor poured from a height nor made flow in the formwork. Concrete shall be placed within 60 minutes of the truck arriving at the site or 90 minutes of water being added to mix.

Concrete shall not be placed in any part of the structure until formwork, reinforcement, inserts and water bars, means of mixing, transporting, placing and compaction have all been inspected and approved by the Employers Representative. Such approval shall be obtained 24 hours prior to concreting and sufficient time shall be allowed for the Employer's Representative to make such an inspection and order any alterations that should be made.

Unless otherwise approved by the Employers Representative, concrete shall be discharged, placed and compacted in its final position, in one operation, under the direct supervision of a competent member of the Contractor's Personnel.

The concrete shall be placed in the positions as indicated on the Drawings, in the Specification or as directed by the Employers Representative. It shall be placed in such a manner as to avoid segregation of concrete, or displacement of formwork, reinforcement, inserts or water bars. Concrete shall not be allowed to fall freely more than 1.5m unless otherwise approved by the Employer's Representative. A suitable tremie pipe shall be used in all concrete pour lifts greater than 1.5m, to deposit the concrete as close as possible to its final location. Concrete placement and compaction shall proceed continuously between approved construction joints. Concrete which has partially hardened, has been adversely affected by delay or by weather, has become contaminated or segregated, or has fallen outside the section of formwork being filled shall not be used.

The depth of lifts and size of sections to be concreted shall be determined by the Contractor and shall be subject to approval by the Employers Representative. In any case, pour sizes will be limited to a maximum of 15 metres in any direction. Pour depths will be limited to a maximum of 900mm in depth.

Concrete shall be thoroughly compacted by vibration, or other means approved by the Employers Representative, or thoroughly worked around reinforcement, inserts, water bars and corners of formwork to ensure a solid mass free of voids throughout and to achieve the required surface finish. Where vibrators are used for compaction, vibration shall be applied continuously during concrete placement and until the expulsion of air has practically ceased and in a manner which avoids segregation. All concrete shall be compacted to its final position within 30 minutes of discharge from the mixer, unless otherwise directed by the Employer's Representative. When in situ concrete has been in place for four hours, no further concrete shall be placed against it for a further twenty hours.

The contractor shall add no water in addition to that provided for in the approved concrete mix design without the agreement of the Employers Representative. In exceptional cases where it is agreed that water may be added to the concrete mix, approval if given, shall in no way remove responsibility for the concrete strength from the Contractor. In such cases the concrete to which water has been added shall be sampled and tested as noted above to verify compliance with concrete strength class requirements.

4.11 General Curing of concrete

After being placed, concrete shall not be jarred, walked on or otherwise disturbed during setting. Curing is the process of preventing loss of moisture from the concrete in its early life while maintaining a satisfactory temperature regime.

As such concrete shall be maintained damp after its initial set for a minimum period of seven days. The concrete can be maintained damp by using any of the following techniques:

- (i) Ponding or spraying water on the surface of the concrete.
- (ii) Prevention of evaporation of water from the surface of the concrete by covering with polythene or leaving formwork in-place.
- (iii) Apply an approved spray-on curing membrane. All concrete slabs and wall surfaces shall be sprayed with an approved curing membrane (90% efficiency) after final set or removal of formwork.

Regarding temperature, concrete shall not be placed when its temperature is below 5°C or if its temperature exceeds 30°C. Refer to cold and hot weather concreting below for further information.

Precast concrete shall be protected similarly and cured for a period of seven days and then stacked in the open air to cure for a further period of fourteen days before being built into position.

Cold Weather Concreting

Concrete shall be protected from inclement weather, and no concreting to be proceeded with when the temperature drops below 2°C. If the air temperature is below 2°C, or if less than 5 °C on a falling thermometer, no concrete shall be placed. Where temperature is expected to fall overnight recently placed concrete shall be protected from freezing; insulating blankets and heaters shall be supplied by the contractor. Striking of supporting concrete structures shall be delayed during cold weather to account for slow strength gain of concrete due to low temperatures.

Hot Weather Concreting

In hot weather and during high winds, freshly placed concrete must be kept watered and protected by wet hessian and polythene or other approved method for at least seven days after placing.

4.12 Reinforcement

Steel bars used for reinforcement shall comply with BS EN 10138 as applicable to high yield steel designation H and B with $f_y = 500\text{N/mm}^2$. In general bars designated H shall be used in RC structures not subjected to cyclic load from process equipment, while bars designated B shall be used for RC structures subjected to cyclic loading from process equipment.

Condition

Bars shall be free from all loose rust, scale, grease or oil.

Fixing

Reinforcing steel bars shall be securely tied in position as shown in the drawings so as not to deflect due concrete placement. On no account shall bars be welded.

Nominal Cover

Nominal concrete cover to reinforcing steel shall be as follows :

foundations :	60 mm top and bottom and sides
slabs	40 mm top and bottom
walls	50 mm inside face and outside face

Unless noted otherwise on the drawings.

5.0 STEELWORK SPECIFICATION

5.1 DESCRIPTION OF THE STRUCTURAL STEELWORKS

Provide and erect a galvanized steel sub-structure over the existing sub-structure structure to support new bridge deck for pedestrian bridge no. B-1

5.2 FABRICATION

5.2.1 Structural Steelwork:

The contractor shall fabricate, and erect steelwork as shown on the drawings and in accordance with approved fabrication drawings. The Structural steelwork sub-contractor must have a CE Marking in conformance with BS EN 1090-1 and BS EN 1090-2. Fabricated steelwork shall comply with the National Structural Steelwork Specification (NSSS) for Building Construction 5th Edition CE Marking version. The contractor shall provide a **CE mark, declaration of performance, welding certificate and factory production control certificate** for the steelwork upon erection.

Execution Class in accordance with BS EN 1090-2 for fabrication of the structural steelwork for this project is **EXC2**

5.2.2 Connections: Contractor to design all connections and submit details for approval of the Engineer.

5.2.3 Drawings: Submit a full set of assembly drawings for review and approval by the Engineer.

5.3 MATERIALS & TOLERANCES

5.3.1 Hot Rolled Sections - Dimensions and Tolerances

Plates and Bars	to	BS EN 10025/ IS EN10111
Hot Rolled Sections	to	BS EN10025/ BS 4-1
Angles	to	BS EN10025/ BS EN10056
Hollow Sections	to	BS EN10210-1
Cold Rolled Sections	to	BS EN 10130
Cold Formed Hollow sections	to	BS EN10219-1
Pre-Galvanised steel sheet	to	BS EN10147

Fabricated Structural steelwork must have a CE Marking in conformance with the above referenced standards. Steelwork contractor to provide confirmation of CE mark and Execution Class accreditation to the Engineer.

5.3.2 Steel Grade

All hot rolled steel to be grade EN 10025-2 S275JR, unless otherwise noted on the drawings.

6.3.3 Condition of steel

All surfaces to be coated and should be clean dry and free from contamination. Prior to paint application all surfaces should be assessed and treated in accordance with ISO 8504:2000. Steel for fabrication is not to be more heavily pitted or rusted than Grade C of Swedish Standard 05 59 00.

6.3.3 Surface Preparation

Abrasive blast cleaning

Abrasive blast clean to Sa2½ (ISO 8501-1:2007) or SSPC-SP6. If oxidation has occurred between blasting and application of primer, the surface should be reblasted.

5.3.4 Corrosion Protection Systems (as indicated on the drawings)

Galvanized steel

Structural Steel to be hot dip galvanized to BS EN ISO 1460 : 2009. Unless otherwise agreed with the ER an average coating thickness of 85µm with a local minimum thickness of 70µm shall be provided.

5.3.5 Structural Fasteners

Bolts, Nuts and Washers shall comply with the requirements of BS EN 15048-1, Grade 8.8 unless otherwise noted. All bolts nuts and washers shall be protected with a sherardising coating. Fabricated Structural steelwork must have a CE Marking to confirm compliance with the above standards.

5.3.6 Surface Finish

Bolt assemblies are to be galvanized in accordance with BS 729.

5.3.7 Fire Protection**5.3.7 Welding**

Welding consumables are to comply with BS 5135.

Mechanical properties: Welding consumables and procedures are to give mechanical properties of for the deposited weld metal, fusion line and heat affected zone not less than the minima specified for the parent metal.

5.3.8 Identification, storage and handling

Mark and document all materials to ensure that they are used as specified.

Holding areas: lay out steelwork in holding areas and keep clean.

Support: steelwork to be adequately supported clear of the ground with individual piece markings are visible.

Transport and Handling: Transport and handle steelwork in a manner designed to prevent damage to the steelwork and any protective coating.

5.3.9 Cutting and Dressing

Process: cut steel by an automatic or semi-automatic process

Hand flame cutting: use only where it is impractical to use machine flame cutting.

Dressing and Grinding: Dress edges of all plate cut by flame to remove slag, scale and irregularities. Remove burrs, sharp arises and ragged edges by grinding.

5.3.10 Stiffeners

Cut and grind bearing stiffeners to ensure a tight bearing along edges in contact with flanges.

5.3.11 Accuracy of fabrication

Accuracy: Fabricate steelwork to an accuracy that will enable erection within the specified limits to take place without inducing excessive stresses, deflection or distortion into the structure.

Length: Members with both ends prepared for contact bearing are not to deviate from the detailed length by more than 2 mm.

Members without ends prepared for contact bearing, which are to be framed to other parts of the structure, are not to deviate from the detailed length by more than 3 mm for members less than 10 m length, and 5 mm for members greater than 10 m in length.

Bow: the deviation of steelwork due to bow distortion is not to exceed the greater of 3 mm or 0.1%.

Camber: The deviation of steelwork due to camber is not to exceed the greater of 12 mm or 0.1% of the length of the member.

5.4 WORKMANSHIP**5.4.1 Bolting**

Holes: drill or punch and ream all holes unless otherwise agreed.

Size : holes not more than 2 mm greater than dia. of bolt up to 20 mm
holes not more than 3 mm greater than dia. of bolt up to 24 mm

Holes in Hollow Sections : seal bolt holes and vent hollow sections to prevent build-up of moisture.

Condition of Bolts : bolt assemblies are to be in such condition immediately before installation that the nut turns freely on the bolt.

Washers : Each bolt assembly is to contain at least one washer placed under the part being rotated.

Limits to Length : the length of bolt is to be such that at least one clear thread shows above the nut after tightening, and at least one thread plus the thread run out is clear between the nut and unthreaded shank of the bolt.

Bolt Tightening : bolts and nut assemblies shall be tightened to BS 5950: part 2.

5.4.2 Welding

Arc Welding : Arc welding of carbon and carbon manganese steels shall comply with BS 5135.

Qualifications: All welding is to be carried out under the direction of a head welder with appropriate qualifications as required by the Engineer.

All welders approval tested to BS 4871 : part 1.

Welding procedures : to BS 4870 : part 1.

Distortion: welding procedures and sequence of fabrication are to be such that distortion is reduced to a minimum.

Consumables: store, handle and use in accordance with manufacturers recommendations.

Tack Welding: to comply with BS 5135

Butt Welds: edges of plates to be butt welded to be prepared in accordance with best practice. Where possible, use run-on and run-off plates in making butt welds to ensure full throat thickness at ends.

Removal of Slag: Remove slag by light hammering, wire brushing or other methods that do not deform the surface of the weld.

6.4.3 Erection

General : Check before erection of any steel work that work abutting the steelwork has been correctly placed in position and level.

Foundation bolts : Steelwork contractor to provide general contractor with bolt base templates or drawings prior to foundation work. Care shall be taken not to damage holding down bolts prior to erection.

Temporary Works : Ensure that the steelwork is adequately braced or restrained to withstand all loadings liable to be encountered during construction without inducing excessive stresses, deflection or distortion in the structure.

Alignment : align each part of the structure as soon as practicable after it has been erected. Do not make permanent connections between members until sufficient of the structure has been aligned, levelled, plumbed and temporarily connected to ensure that members will not be displaced during the subsequent erection or alignment of the remainder of the structure.

Accuracy of construction : shall be as follows:

Cast in foundation bolts	± 5 mm
Base of column	± 12 mm
Level of baseplate	± 12 mm
Space beneath baseplate not less than	20 mm nor more than 50 mm
Plumb in Single Storey	5 mm or H/600
Position on Plan	± 5 mm
Level to Top of Steel	± 10 mm
Level differential	± 5 mm or Span/1000

6.5 QUALITY ASSURANCE

- 6.5.1 Steels** : Provide test certificates to demonstrate that steels used in works conform with this specification.
- 6.5.2 Bolts** : Provide test certificates to demonstrate that bolts used in works conform with this specification.
- 6.5.3 Welds** : All welds may be subject to visual inspection to BS 5289 and individual welds may be selected for Non-destructive examination at the discretion of the Engineer/Architect.
- 6.5.4 Verification** : Test certificates for all steel, and products to be provided to the Engineer upon request for verification by the Engineer or an approved Inspecting Authority.

6.0 TIMBER PEDESTRIAN PARAPET – ACCOYA (50-YEAR DESIGN LIFE)

Contact: McFadden Joinery 074 9139026

6.1 GENERAL

Timber parapet shall be constructed from **Accoya® modified timber**, manufactured and certified in accordance with:

- **EN 14081-1** (structural timber)
- **EN 1912** (strength class allocation)
- **EN 335** (use class)
- **EN 351-1** (treatment requirements)
- **EN 1995-1-1 (Eurocode 5)**
- **EN 1991-2** (pedestrian bridge loading)

Minimum **Use Class 3** (external, above ground) with durability equivalent to **Class 1** per Accoya performance data.

Minimum design life: **50 years**.

Timber shall be straight-grained, free from shakes, excessive knots, resin pockets, or distortion.

Moisture content at installation: $\leq 12\%$.

6.2 TIMBER COMPONENTS

6.2.1 Newel Posts

Section: **100 × 100 mm Accoya**.* It may not be possible to source this section in Accoya in Ireland. These newel posts are to be made-up from two 100mm x 50mm plank glued (refer to together and bolted with 2 no M10, grade A5 stainless steel bolts with 40mm dia over sized washers. Post length shall be adequate to achieve **1200 mm overall parapet height**.

Spacing: **2.3m & 1.9m centres**.

Posts shall be factory-machined and arrissed (2–3 mm).

All cut ends sealed with **Accoya end-grain sealer**.

6.2.2 Rails

4 No. rails, section **100 × 44 mm Accoya**.

Rails fixed to **face of newel posts** using stainless steel fixings.

Rail spacing arranged to achieve **1200 mm overall parapet height**.

6.2.3 Spindles / Balusters

Section: **40 × 40 mm Accoya**.

Fixed to rails using concealed stainless steel screws or proprietary brackets.

Maximum clear gap between spindles: ≤ 100 mm.

6.2.4 Toprail to Parapet

Section: 44mm x 150mm with beveled to surface

Height: **1200 mm** above deck level (EN 1991-2 pedestrian parapet guidance).

Continuous, smooth, splinter-free finish.

6.2.5 Siding

Section: **25 × 150 mm Accoya**.

Fixed to rails using concealed stainless steel screws or proprietary brackets.

Maximum clear gap between spindles: **10 mm**.

6.3 STRUCTURAL FIXINGS & SUPPORT

6.3.1 Glue specification for newel post

Glue shall be suitable for exterior, above-ground exposure, matching Accoya's 50-year design life. Joint shall cure in a covered area for a minimum of 24h prior to machining or use. Adhesive: EPI or PU/PUR structural wood adhesive, tested and approved for Accoya, durability class XT7 to EN 17619, equivalent to Jowacoll 102.50 + Jowat 195.60 or Jowapur 681.xx series. Contractor shall provide CE Mark and DoP for proposed glue product.

6.3.2 Post Base Connection

Newel posts bolted into **galvanized 100 RSA steel shoes** (hot-dip galvanised to **EN ISO 1461**) fixed to steel **UB beams** for bridge no. B-1

Shoe thickness: ≥ 6 mm.

Fixings: **A4 stainless steel bolts**, minimum **M12**, 2-bolt configuration per post.
Shoe-to-UB connection via welded plate or bolted cleats (contractor to confirm).
Posts shall not be in direct contact with steel except via shoes; maintain drainage and ventilation.

Newel posts bolted into **greenheart beams** for bridge no. B-2.

Note: Bolted screw fixings into the Greenheart beams will require a pilot hole as screws will not self thread.

6.3.2 Rail Fixings

Rails fixed to posts using **A4 stainless steel screws**, minimum **5 mm diameter**, pre-drilled.
Minimum **2 fixings per rail per post**.

6.3.3 Spindle Fixings

Stainless steel screws or concealed brackets.
Adhesives not permitted as primary structural fixing.

6.3.4 SURFACE FINISH

All faces planed smooth (PAR) to **P120–P150** finish.
Remove machining dust prior to installation.
All **cut ends** sealed with **Accoya end-grain sealer** to maintain dimensional stability and prevent moisture uptake.
Spindles to be finished on **all faces**, including concealed faces.

6.5 DURABILITY & PROTECTION

Accoya timber provides **Class 1 durability** and **dimensional stability** without additional chemical treatment.

All cut ends and drilled holes sealed with Accoya end-grain sealer.

Surface finish options:

- **Opaque or translucent coating system** compatible with Accoya (Teknos, Sikkens, or equivalent).
- **Uncoated natural finish** permitted; weathering will occur but structural performance unaffected.

All fixings: **A4 stainless steel** (EN 10088).

Avoid moisture traps; ensure free drainage at all connections.

6.5 STRUCTURAL PERFORMANCE

Parapet shall resist the following minimum actions:

- **Horizontal line load:** 1.0 kN/m (EN 1991-1-1).
- **Point load:** 0.5 kN.
- **Deflection limit:** L/200 for parapet elements.

Contractor to verify all dimensions and support conditions prior to fabrication.

6.6 FABRICATION & INSTALLATION

Timber shall be factory-cut to final dimensions.

All edges arrissed to reduce splintering.

Ensure consistent alignment of posts at 1.5 m c/c. Spindles installed plumb; rails level and continuous.
Fixings installed without splitting timber; pre-drill where required.

6.7 QUALITY ASSURANCE

Timber supplied with manufacturer's **CE/UKCA declaration**, grading certificate, and Accoya warranty.

No timber with visible defects, twist, or excessive grain deviation shall be installed.

All fixings and steel shoes inspected prior to timber installation.

6.8 MAINTENANCE

Annual inspection of fixings, shoes, and coating condition.

Replace damaged or split components immediately.

6.9 STAINLESS STEEL HANDRAIL

50 mm Ø brushed 316 stainless-steel handrail with matching 316 fittings and domed/mitred ends.
TIG-welded, brushed finish. A4 stainless fixings. Installed at 1000–1050 mm above deck level. Suitable for external exposure.

7.0 GLASSFIBRE REINFORCED PLASTIC (GRP)

Supplier: Krafton 0031 168 22 75 10 www.krafton.uk

7.1 GENERAL

Bridge deck planks shall be Glass Reinforced Polymer (GRP) manufactured by Krafton, or **approved equivalent** meeting equal or superior performance.

Planks shall be designed and manufactured in accordance with:

- EN 1990, EN 1991, EN 1993-1-1, EN 1993-1-9, EN 13706 (GRP pultruded profiles).
- BS 476 Part 7 or EN 13501-1 for fire performance.
- ISO 9001 certified manufacturing.

7.2 PRODUCT TYPE

Krafton GRP Bridge Deck Plank System, pultruded GRP structural panels.

Profile: Interlocking plank system, tongue-and-groove or proprietary Krafton joint.

Typical depth: 50–80 mm.

Standard width: 300–500 mm per plank.

Supplied in lengths to suit deck geometry; max recommended length 6 m unless otherwise agreed.

7.3 MATERIAL PROPERTIES (MINIMUM)

Glass content: $\geq 65\%$ by weight (E-glass).

Resin: Isophthalic polyester or vinylester (for enhanced durability).

Density: $1.7\text{--}2.0\text{ g/cm}^3$.

Elastic modulus (E): $\geq 23\text{--}26\text{ GPa}$ (longitudinal).

Tensile strength: $\geq 240\text{--}300\text{ MPa}$.

Flexural strength: $\geq 300\text{--}350\text{ MPa}$.

Shear strength: $\geq 25\text{--}30\text{ MPa}$.

UV stability: UV-inhibited resin with surface veil.

7.4 STRUCTURAL PERFORMANCE

Planks shall be capable of resisting the following minimum design actions:

Uniform distributed load (UDL): $\geq 5.0\text{ kN/m}^2$ (pedestrian bridges) or project-specific load per EN 1991-2.

Point load: $\geq 2.0\text{ kN}$ applied over $100\times 100\text{ mm}$.

Deflection limits:

- Serviceability: $L/300$ (pedestrian), $L/250$ (maintenance access).
- Ultimate: No rupture, delamination, or permanent deformation.

Manufacturer shall provide structural verification for the exact span and support conditions.

7.5 SURFACE FINISH

Factory-applied anti-slip grit surface, minimum P5 / R13 slip resistance.

Colour: Grey (standard) or project-specific.

Surface shall be UV-stable and resistant to wear under pedestrian traffic.

7.6 DURABILITY & ENVIRONMENTAL RESISTANCE

Resistant to:

- Corrosion, salt spray, moisture, freeze–thaw, alkalis, acids.
- Biological attack, including mould and fungal growth.

Fire performance: Minimum Class 3 (BS 476-7) or Euroclass E; higher classes available on request.

Design life: ≥ 50 years for pedestrian bridge applications.

7.7 INSTALLATION REQUIREMENTS

Planks shall be installed strictly in accordance with KRAFTON installation manual.

Supports:

- Steel, concrete, or GRP beams with level bearing surfaces.
- Minimum bearing length: 40 mm.

Fixings:

- Stainless steel A4 bolts, clamps, or proprietary KRAFTON concealed fixings.
- Minimum 4 fixings per plank per support (unless manufacturer specifies otherwise).

Joints:

- Interlocking plank edges to be fully engaged.
- Expansion allowance: 3–5 mm per metre of plank length.

7.8 ACCESSORIES

End caps, edge trims, drainage slots, and upstand profiles as required.

GRP handrail or kerb units where specified.

7.9 QUALITY ASSURANCE

All planks shall be factory-tested for:

- Dimensional tolerance (± 2 mm).
- Flexural strength.
- Surface hardness.
- Bond integrity.

Delivery shall include:

- Manufacturer's DoP, CE/UKCA marking, and test certificates.
- Installation guide and maintenance instructions.

7.10 MEASUREMENT & DELIVERY

Planks delivered cut to length where possible.

Site cutting permitted using carbide-tipped blades; edges to be sealed with resin.

7.11 MAINTENANCE

KRAFTON GRP bridge deck planks: low-maintenance composite system.

Annual inspection of grit surface, fixings, joints, and plank integrity.

Clean with water and mild detergent only.

Repair grit using manufacturer's kit. Replace damaged planks as required.

A4 stainless fixings only. Inspect the deck once per year for:

Record findings in maintenance log.