Compton and Edrich Stands, Lord's Cricket Ground

Specification
LCAES-WEA-XX-XX-SP-A- Q41
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Table of Contents

Q41 - Barriers/ Guardrails

Q41 BARRIERS/ GUARDRAILS

To be read in conjunction with Section A, other related Sections of the Specification and the Design Drawings.

Q41.1000 TYPE, SYSTEMS, MATERIALS AND PERFORMANCE

Q41.1100 SPECIFICATION AND SCOPE

Q41.1101 Descriptive Work

a) For design and general performance requirements, refer to Section A of the Specification. Specific design and performance requirements are provided in this Section.

b) Undertake the Detailed Design, supply, install and warrant the Works complying with the visual intent indicated on the Design Drawings and criteria stated in the Specification.

c) Where no material, product or supplier is indicated in the Specification, propose suitable materials and systems prior to Contract award which comply with the visual intent and performance criteria stated and remain fully responsible for the Detailed Design of the Works.

d) Where a material, product or supplier is indicated in the Specification, such material, product or supplier shall be deemed indicative representing the Contractor's design intent only. The Subcontractor may complete the installation using that product, or such other confirmed as acceptable by the Contractor in writing, but shall remain fully responsible for the Detailed Design and performance of the Works.

e) Interfaces:

   i) Co-ordinate with the work of others including interfacing as required.

   ii) Maintain performance at interface conditions.

   iii) Undertake the Detailed Design of interfaces with adjoining trades prior to commencement of the Works.

Q41.1200 SYSTEM DESCRIPTIONS

Architectural and Functional Requirements

Q41.1201 General

a) Design and execute the Works in accordance with BS 6180 and Approved Document K of the Building Regulations. Metal pedestrian restraint systems shall be in accordance with BS 7818.

b) Configure the Works to accommodate the architectural and functional features indicated on the Design Drawings and to achieve the performance requirements.

c) The Works shall be covered by a single source warranty.

d) Barriers shall be designed and installed as complete integrated systems, including necessary support structure, bracketry, fixings, packers, shims, other components/ accessories necessary to complete the Works.

Q41.1202 Fixings

a) Fixings shall be concealed unless accepted otherwise by the Contractor.

b) Visible fixings shall be satin finished stainless steel round headed bolts/ Allen bolts, unless otherwise indicated or required by the Contractor.

c) Indicate the type, size and positioning of mechanical fixing devices on the Working Drawings.

d) Where necessary, fixing devices shall be capable of three-dimensional adjustment to accommodate building structure and fabrication/ installation tolerances.

Q41.1203 Fixing to Structure

a) Systems shall include necessary mechanical fixing devices including, but not limited to, anchor bolts, fixings, sockets and other components.

b) The Works shall include necessary preparation such as drilling, plugging, screwing, bolting, cutting, casting-in/ grouting-in and making good.

c) Co-ordinate fixing with the superstructure design.

d) Conceal fixing devices, unless otherwise indicated on the Design Drawings or accepted by the Contractor.

Q41.1204 Secondary Support

a) Systems shall include a structural steel support system, as necessary.

b) Where the Subcontractor deems that visible secondary support is required in addition to that indicated in the Structural Engineer's documentation and on the Design Drawings, the Subcontractor shall inform the Contractor at tender return.

c) Systems shall include necessary sub-constructions/ assemblies including, but not limited to, framing, brackets, cleats, angles and other components.

Q41.1205 Framing

a) Framing profiles and other visible components shall be consistent and matching in appearance throughout the Works.

b) Framing profiles shall be of the minimum cross sections necessary to achieve the performance requirements, while complying with the design intent indicated on the Design Drawings.

c) Align joints/ framing with interfacing systems. Gaps within joints shall be uniform.

d) Movement joints shall accommodate movements while maintaining the overall system performance. Movement joints shall appear as similar to the standard system joint as possible.

Q41.1206 Barriers Generally

a) The principal framing/ bracketry components shall be galvanised and paint finished to the acceptance of the Contractor.

b) Corners shall be radiused or mitred, as indicated on the Design Drawings.

c) Joints and ends shall be welded and ground smooth with no crude machine cuts visible. Protective coatings and finish on joints shall be to the same standard as the main assemblies.

Barriers

Q41.1207 Type BAL-371 Timber Picket Fence

Timber picket fence.

a) Supplier: Procter ~~Fence~~Fencing Systems or acceptable equivalent.

b) ~~Dimensions~~Timber posts: ~~As indicated on the Design Drawings.~~

i) Dimensions: 175mm x 100mm posts at 2000mm centres.

ii) Type: Hardwood with a minimum grade of D24 Class 3 Service Class Base to be top fixed to in situ concrete upstands (by others).

c) Timber boards shall be fixed with gaps as indicated on the Design Drawings.

i) Timber board species: To be agreed with the Contractor.

d) Timber shall receive pressure preservative treatment prior to application of colour stain, refer to Section Z12 of the Specification.

e) Timber shall be painted to white colour.

f) Timber gates to match fence.

Q41.1300 MATERIALS

Metalwork and Finishes

Q41.1301 Metalwork

Refer to Section Z11.

Q41.1302 Finishes

Refer to Section Z30 for general finishes to metalwork.

Fixings

Q41.1303 General

a) Refer to Section Z20.

b) Fixing components shall comply with statutory requirements as to strength and type.

c) Fixings shall be inherently corrosion resistant or fully protected to prevent corrosion.

~~***Concrete***~~

Timber

~~Q41.1304~~ ~~Foundation Concrete for Posts~~

Q41.1305 General

~~a) Concrete shall be in accordance with BS 8500: Parts 1 and 2 and BS EN 206.~~

Refer to Section Z10.

~~b) Designated mix shall be not less than GEN 4 or Standard mix not less than ST5.~~

Q41.1306 Timber for Joinery

~~a) Admixtures shall not be used.~~

b) Comply with the requirements for strength grading, where required.

c) The use of sapwood, for exposed joinery, shall be subject to acceptance by the Contractor.

d) Splay/ elongated knots, for exposed joinery, shall be subject to acceptance by the Contractor.

e) No discoloured materials shall be used for exposed joinery.

Preservative/ Fire Retardant Treatments

Q41.1307 General

a) Refer to Section Z12.

b) Comply with the recommendations of TRADA.

c) Methods shall be suitable for the service conditions, carried out by a processor licensed by the treatment solution manufacturer for the specific treatment. For each batch of timber a certificate of compliance shall be issued.

d) Where timber materials/ components are visible, the preservative/ fire retardant treatment shall not alter the visual characteristics of the timber or finish.

Q41.1400 PERFORMANCE REQUIREMENTS

Q41.1401 General

Comply with the general performance requirements of Section A of the Specification and the following specific performance requirements.

Structural Performance

Q41.1402 General

a) The Works shall be capable of accommodating loads imposed upon the system by movements of its supporting structure and/ or other adjacent elements.

b) Installation of the Works shall transfer loads to the building structure in a statically determined manner. For work requiring mechanical fixing, the failure of any fixing shall not lead to progressive failure of others.

Q41.1403 Deflections

a) The Works shall not deflect under loading in any way that is detrimental to any element of the Works or adjacent structural or building elements.

b) Components, supports and fixings shall be capable of accommodating the above deflection without permanent distortion, deformation or failure.

c) The Works shall accommodate differential structural movements in backing structures as relevant. Refer to the Structural Engineer's documentation.

d) The magnitude of the allowable deflections shall be reduced if they are detrimental to any part of the Works, their support structure or internal finishes.

e) Refer to the Project Common Tolerance and Movement Document for the anticipated movement of the building structure and relevant elements. The precise characteristics of the adjacent structure and any provision for structural support in the Works shall be ascertained.

Q41.1404 Design Loads

a) Systems shall be designed to withstand loads specified and shall be in accordance with prevailing relevant British Standards as appropriate, including, but not necessarily limited to BS 6180 and BS EN 1991: Part 1-1. System must achieve the following loading requirements when tested in accordance with BS 6180:

   i) Horizontal uniformly distributed line load: 1.5 kN/m.

   ii) Uniformly distributed load applied to the infill: 1.5 kN/m².

   iii) A point load applied to part of the infill: 1.5 kN.

b) When calculating design loads the worst combination shall be considered, taking account of the fact that the pressure coefficients at various locations may determine more than one design criterion.

c) The Works shall be capable of accommodating the self-weight gravity loads of the system including its framing and supporting system.

Q41.1405 Imposed Gravity Loads

a) The Works shall be capable of accommodating loads imposed by adjacent and/ or attached elements that bear onto, are suspended from or are fixed to the system.

b) Refer to the Design Drawings for information on such elements and/ or required load capacities.

c) Elements from other trades shall not be fixed to and/ or supported by the system, unless specified, indicated on the Design Drawings and/ or agreed with the Contractor.

Q41.1406 Imposed Loads

The Works shall be capable of accommodating the following imposed loads without any reduction in performance:

a) Loads resulting from movements of the building structure and support structure of the Works.

b) Applied loads acting on the surface of the Works arising from maintenance and cleaning operations. The Works shall sustain, without reduction in performance and without permanent deformation to any component, a minimum static 500N load applied horizontally through a square of 100mm sides.

c) Loads applied to the Works in accordance with BS EN 1991: Part 1-1.

d) Loads associated with normal maintenance access traffic and in addition any accidental loads imposed by persons falling against or onto the elements.

e) Increased weight due to water absorption, snow and ice. Snow loads shall be in accordance with BS EN 1991: Part 1-3.

f) The loads created by rainwater.

g) Known impact loads, or transferred impact loads, that occur during the service life, without deterioration in performance and without sustaining non-repairable damage.

h) Horizontal and vertical loads of similar magnitude to those that are imposed upon adjacent or attached elements. Refer to the Design Drawings for information on such elements and/ or required load capacities.

Q41.1407 Wind Loads

a) Refer to the requirements under Section A.5000.

b) Design/ Select the method(s) of attachment of the systems to withstand, without permanent deformation, the positive and negative effects of wind loads.

c) Systems shall be designed to eliminate vibration, noise and fatigue caused by wind action.

Q41.1408 Thermal Movement

a) The Works shall accommodate local thermal movements exerted due to climatic conditions.

b) The Works shall accommodate effects due to the orientation of the building towards the sun and presence of any shading.

c) Thermal movements shall not result in unacceptable levels of audible noise.

Q41.1409 Inertial Loads

The Works shall be capable of accommodating inertial loads arising due to the acceleration/ deceleration of moving sections including opening lights, doors and vents of the building or enclosure. Obtain confirmation regarding the motion requirements for such elements.

Q41.1410 Moisture Movement

The Works shall withstand movement without permanent deformation or any reduction in the performance:

a) Due to changes in the moisture content of components, resulting from variations in the moisture content of the air.

b) Due to the expansion of absorbed or retained moisture caused by freezing.

Fire and Smoke

Q41.1411 Generally

a) The Works shall as a minimum achieve the requirements of the Building Regulations.

b) Comply with the performance requirements indicated in the Fire Strategy Report.

c) Unless otherwise stated in the Fire Strategy Report, compliance with the Building Regulations shall be achieved by the application of the principles laid out in Approved Document B of the Building Regulations, BS 7974 and BS 9999.

d) The Works shall be in accordance with any recommendations or conditions from Statutory Authorities, Fire Services and the Building Insurers.

e) Submit test certificates, calculations and reports to demonstrate that materials/ systems achieve the fire performance requirements.

Durability

Q41.1412 General

a) The performance requirements shall be achieved for the full service life of the Works.

b) The Works shall perform throughout the service life without failure resulting from defects in design, materials or workmanship. Failure shall be defined as breakage, disengagement of components, deflection beyond stated values, reduction in performance or unacceptable change in appearance.

c) There shall be no electrochemical corrosion or staining resulting from exposure to moisture or from water running from one material to another.

Q41.1413 Abrasion Resistance

The Works shall resist abrasion from agreed cleaning methods and maintenance systems without any noticeable change in surface appearance.

Q41.2000 SUBMITTALS AND TESTING

Q41.2100 SUBMITTALS

Tender Submittals

Q41.2101 Tender Response

a) Provide tender submittals in accordance with the requirements of Section A of the Specification.

b) Submit a design response with the tender proposal, to include profiles of typical conditions, with dimensions.

c) The tender design response shall include:

i) Samples where specified.

ii) List of Tests included.

iii) QA/ QC programme.

iv) List of proposed Working Drawings.

v) Summary of deviations from the Design Drawings and the Specification.

vi) Outline technical specifications reflecting proposed materials/ systems.

vii) A list of proposed suppliers and subcontractors to be used.

Samples, Mock-ups, Prototypes and Quality Benchmarks

Q41.2102 Pre-contract Samples

Not required.

Q41.2103 Post Contract Award Samples

In accordance with Section A.4000, submit post contract award samples of the following:

a) Technical details and appropriate certification.

b) Samples of visible materials.

Q41.2104 Mock-up Requirements

Not required.

Q41.2105 Prototype Requirements

Not required.

Q41.2106 Quality Benchmark Requirements

Submit quality benchmarks, in location(s) to be agreed with the Contractor, in accordance with Section A.4000:

a) The first fully installed item of each type.

Q41.2200 TESTING

Q41.2201 General

a) Refer to Section A, clause series A.6000 for the general requirements for testing and the approach to off-Site and on-Site testing.

b) Submit independently certified tests and Agrément certificates that demonstrate that the proposed systems achieve the performance requirements of the Specification.

c) Where data from previous independently certified tests and Agrément certificates demonstrate that the proposed systems achieve the performance requirements of the Specification, off-Site independent testing need not be undertaken.

d) Undertake on-Site testing specified herein, which shall be carried out by an independent testing body accredited by the United Kingdom Accreditation Service (UKAS).

Off-Site Testing

Q41.2202 General

a) Where previous test data is not available, not applicable to the service conditions or not accepted by the Contractor, agree with the Contractor suitable test methods/ procedures to demonstrate that the proposed systems can achieve the performance requirements of the Specification.

b) Testing shall be carried out by an independent laboratory acceptable to the Contractor.

c) Submit details of the testing procedures to the Contractor for review and comment.

On-Site Testing

Q41.2203 Testing of Fixings

Structural fixings shall be proof load tested as required and witnessed by the Contractor.

Q41.3000 EXECUTION

Q41.3100 WORKMANSHIP

Fabrication

Q41.3101 General

a) Fabrication of materials/ components shall, as a minimum, be in accordance with current regulations and standards.

b) Where preceding work is complete before fabrication, the Subcontractor shall take Site measurements. If these measurements indicate that the dimensions indicated on the Design Drawings are unachievable, the Subcontractor shall seek instruction from the Contractor before proceeding.

c) Where applicable and practical, fabrication and assembly of materials/ components shall take place in properly equipped workshops with site work restricted to fixing.

d) Form sections true to shape, accurate in size, square, free from distortions, irregularities and defects to profiles indicated on the Design Drawings.

e) Do not use materials/ components that are damaged or have any other physical imperfections in the Works.

f) Fabricate joints so that the assembly shall be tight and close fitting to produce rigid materials/ components free from distortion.

Q41.3102 Metalwork

Refer to Section Z11.

Workmanship

Q41.3103 General

a) Where applicable, carry out the Works in accordance with the manufacturer's recommendations.

b) Operatives shall be trained, experienced and appropriately skilled in the installation of the Works and, where applicable, be recommended by the system/ product manufacturer.

c) Sides and ends of sheets shall be lapped in accordance with the manufacturer's recommendations.

Inspection/ Preparation

Q41.3104 Inspection

a) Before commencing installation, survey the structure. Check dimensions, line, level and fixing points. Report immediately to the Contractor if the structure is unsuitable to receive the Works.

b) If the structure/ substrate is unsuitable, propose remedial action to make the structure suitable.

Q41.3105 Suitability of Base/ Backing

a) Bases/ backgrounds shall be rigid, dry, sound, smooth, clean, free from dust, dirt, grease and other contaminants before systems/ products are installed.

b) Cutting, chasing, plugging, making good and other necessary procedures required to the substrate or to adjacent work, that cannot/ should not be undertaken after the installation of the Works, shall be completed.

c) Tolerances of the structure/ substrate shall be suitable to permit the required configuration and specified tolerances of the finished systems/ products.

d) Surfaces to be covered shall be firmly fixed, dry, smooth, without depressions, voids or protrusions, clean and free from frost, unacceptable curing compounds, release agents and other surface contaminants.

e) Preliminary work shall be complete and satisfactory.

f) Sweep the substrate thoroughly prior to application of the Works.

Installation

Q41.3106 General

a) Make allowance for future moisture and temperature movement.

b) The Works shall be set out and installed square, true to line, level and plane, free from undulations, with lines and joints aligned, straight and parallel unless specified otherwise, within stated tolerances and in the correct relationship with the building structure.

c) Cutting of materials/ components:

i) Where required, cut materials/ components in accordance with the manufacturer's recommendations.

ii) There shall be no damage to the finished face of the materials/ components or any damage that would adversely affect the performance.

iii) Keep cut edges to a minimum.

d) Materials/ components to be installed in 'running lengths' shall be subject to the following:

i) Straight runs between angles or ends of runs shall be formed in single unjointed lengths wherever possible. Where running joints are unavoidable, obtain acceptance for location and method of jointing from the Contractor.

ii) Joints at angles shall be mitred or as otherwise accepted by the Contractor.

e) Inspect each material/ component of the Works immediately before installation. The Works shall be installed using materials/ components being properly sized, free from marks, defects, flaws, steps, waves, or damage of any nature.

f) Do not alter materials/ components with prefinished surfaces unless accepted by the Contractor.

g) Materials/ components from the same production batch shall be used in the same area to prevent banding, patchiness or other visual variations.

h) Do not cut, drill or otherwise alter interfacing work to accommodate the system installation unless accepted by the Contractor.

i) Make provision for movements/ expansion/ contraction in accordance with the system/ product manufacturer's recommendations.

~~Q41.3107~~ ~~***Setting Posts in Concrete***~~

~~a) Holes shall be excavated with vertical sides.~~

~~b) Posts/ struts shall be positioned centrally in the holes.~~

~~c) The holes shall be filled with concrete to not less than the specified depth, well rammed as filling proceeds and consolidated.~~

~~d) Where holes are indicated on the Design Drawings as not completely filled with concrete, the upper part of the hole shall be ***backfilled with well rammed and consolidated excavated material***.~~

Q41.3108 Fixing Requirements

a) Refer to Section Z20.

b) Install and position fixings and fastenings as recommended by the manufacturer. Where visible, positions shall be to the acceptance of the Contractor.

c) The Works shall be fixed securely to prevent pulling away, bowing or other movement during use and without causing stress or distortion. Include additional bracing and stiffening as required.

d) Isolating tape, plastic washers or other suitable means shall be provided to prevent bi-metallic corrosion between dissimilar metals, or between preservative treated timber and metal.

Q41.3109 Packings

a) Provide suitable tight packings to take up tolerances and prevent distortion.

b) Packings shall be of non-compressible, rot-proof and non-corrosive materials/ components that maintain the performance of the systems/ products with which they interface.

Protection and Completion

Q41.3110 Protection

Finished areas shall be adequately protected from damage until Practical Completion.

Q41.3111 Cleaning

a) At Practical Completion of the Works, or when otherwise agreed with the Contractor, clean exposed areas/ surfaces of the Works.

b) Cleaning materials and methods shall be as recommended/ accepted by the system/ product manufacturer, where applicable.

c) Do not use materials or methods that could alter the character of the exposed finishes.

d) Protect adjacent surfaces from damage due to cleaning operations.

Q41.3112 Completion

a) Repair defects without delay to minimise damage and nuisance.

b) Do not use the Works for any purpose, except testing, until Practical Completion.

c) On Practical Completion, check the Works for damage and defects. Replace damaged or defective materials/ components.

Adverse Conditions

Q41.3113 Working in Adverse Conditions

a) If unavoidable wetting of the Works occurs, prompt action shall be taken to minimise and make good any damage.

b) Provide temporary covers as required to keep unfinished areas dry.

c) In severe or continuously wet weather, work shall be suspended unless an effective temporary enclosure is provided over the working areas.

d) Concrete foundations:

i) Do not cast foundations, lay units, place haunching or make joints if the temperature is below 3°C on a falling thermometer or 1°C on a rising thermometer

ii) Foundations, bedding and haunching shall be adequately protected against frost and rapid drying by sun and wind.

Q41.3200 TOLERANCES

Q41.3201 General

Measure tolerances against the relevant Base Reference Datum; Location Reference Point; Location Reference Plane; Location Reference Surface or Reference Element as defined in Section A.6000.

a) The Works shall be set out to the correct position as shown on the Working Drawings, within ±3mm.

b) Vertical elements shall be plumb, within ±2mm or 0.1% of the height, whichever is the lesser.

c) Horizontal elements shall be level, within ±2mm or 0.1% of the length, whichever is the lesser.

d) The maximum variation in gap from a straightedge applied to a flat plane shall be 2mm for a 3000mm straightedge and 1mm for a 1000mm straightedge.

e) The maximum offset in plane, level or section between any two adjacent sections shall be ±1mm.

f) The average width of any panel to panel joint shall be within ±2mm of the designed width. Any variation shall be equally distributed with no sudden changes or steps.

g) The maximum deviation between adjacent panel surfaces either side of a joint shall be 1mm.

h) The bow of any flat surface shall not exceed more than ±2mm from a 2000mm straightedge placed against it in any direction.

i) The straightness of any surface of an edge shall not deviate by more than ±2mm from a 2000mm straightedge placed against it in any direction parallel to the long axis of the element.

j) The centre section of any lineal element shall not bow by more than the lesser of ±2mm or 0.075% of the length of the element measured from a straight line between the ends of the element.

k) The cross-section of any element shall not be twisted by more than 1° from the alignment.

l) Cut-outs for interfacing work shall be within ±1mm the dimensions indicated on the Design Drawings.

m) Account shall be taken of the installation tolerance requirements such that repetitive elements are located, relative to gridlines.

n) Tolerances shall not be cumulative.

o) Where an element/ component is subject to more than one applicable tolerance, the most onerous tolerance shall apply.

END OF SECTION