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ORIGINATOR **Scott Tallon Walker Architects**

DOCUMENT TITLE **STAGE 4- External Works**

	Name	Signature	Date
Designed by	STW		08.11.2018
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PROJECT	ISSUER	AREA	LEVEL	TYPE	TRADE	SEQUENCE	REV
P4PBT	**STW**	**ALL**	**SL**	**REP**	**A31**	**101094**	**H**

Revision Log

REVISION	COMMENTS	PRODUCED BY	REVISED BY	DATE	CHECKED	APPROVED
A	**1ST ISSUE**	STW	N/A	28.08.2016	SC	KB
B		STW	KK	05.09.2016	SC	KB
C	**100% Stage E External Works report Issued For Acceptance Relevant specification clauses included. Response to BDP 90% comments included**	STW	KK	15.11.2016	KK	KB
D	**Stage 4a Early release**	STW	STW	05.03.2018	KK	KB
E	**Stage 4**	STW	STW	07.08.2018	CR	KB
F	**Stage 4 – S4**	STW	STW	17.08.2018	CR	KB
G	**Stage 4 – S4**	STW	STW	04.10.2018	ID	KB
H	**Issued for Pla Con close out**	STW	STW	08.11.2018	ID	KB

Stage 4A External Works Presentation to Client Team
Proton Beam Therapy Centre
UCLH
Scott Tallon Walker Architects

Introduction

The following drawings and specification are an update from the 100% Stage E Final Issue and the Stage 4A (Early release) Issue and address ongoing design development, supplier and contractor input and Client comments on the Stage E Package. This report is also the result of extensive co-ordination with London Borough of Camden.

Client comments have been recorded and responded to on a separate tracker document *P4PBT-STW-All-SL-SCH-A31-106177-Stage E comments tracker - External Works Rev. B.*

Stage 4A:

STW produced a Stage 4A early release report and drawings on the 5th March 2018. This report was to pick up changes to the reinforced concrete structure at ground floor level to facilitate the construction programme.

This report and drawings now supersedes that issue.

Updates from Stage E

There has been widespread revision to levels, falls, dimensions and roofing build-ups across the entire ground floor. These have come about mainly due to coordination with the approved contractors and engagement with LBC and allowing for their West End Project.

As a result, we have not clouded every single detail change but would list the key updates as below. Any significant design or technical changes have been clouded.

Summary of updates:

1. **Revised reinforced concrete levels to accommodate falls at all sections.**
2. **Revised finished floor levels to suit selected contractor roof build ups and revised levels to tie in with LBC.**
3. **Revised paving slab thickness, further to LBC requirements.**
4. **Revised waterproofing system build up to align with final approved contractor proposals.**
5. **Clarification on extent of work by LBC.**
6. **Additional detail drawings for the Bin Store section over Spearmint Rhino slab (see further note).**
7. **Indication of extent of below slab insulation – if required.**
8. **Drawings 143714 & 143715 added.**

Spearmint Rhino slab

There has been ongoing discussion with the Trust over the agreed level of support that can be taken on the Spearmint Rhino slab and this is part of a separate process. An alternative design is being reviewed and is tabled in separate documents as Plan B.

For now, The Trust has clarified that Plan A, which is the attached design, is the preferred option and the one that should be progress.

Plan assumes that the Trust has a right of support on to the Spearmint Rhino basement columns. This document should be read with that assumption.

Waterproofing concept:

The waterproofing concept to the ground floor slab is a double protection system in line with Architectural Specification reference J31:1206.

'Waterproofing membranes with protective layer of mastic asphalt - Two layers of (Bituminous) waterproofing membranes compatible with insulation and void former system. Requires protective layer of mastic asphalt and separating layer below'

The system proposed by the contractor is a GuaraTEC System as attached in Appendix A. This is a built-up system that is compatible with load bearing insulation/ void former.

U-Values:

Target Roof and Ground floor deck u-value is 0.18W/m².K.

Final FFLs and finishes build-up dictate the allowable thickness of insulation and it is acknowledged that some local ground floor areas indicate an above slab thicknesses of insulation that is below the typical U-value target requirement. To mitigate this, additional insulation has been shown below the slab. This mitigation measure will be tested with a re-run of the Building Energy/ TAS model to determine if this additional insulation is actually required to meet the overall energy requirements and if required to what extent.

The re-run of the TAS model is not yet complete but will happen over the coming weeks.

Traffic barrier to Drop off Area.

The Trust has requested that the option of a raised kerb/ traffic barrier be accommodated at the entrance and exit to the drop off area. This is indicated on the attached set of drawings and a performance specification has also been included – Section Q10.1205,

To date this item has not been formally instructed by the Trust and so it is indicative only.

Confirmation of Vehicle loading:

Deliver Bay

An extensive review of BOC loading and access to the delivery yard has been addressed in STW Report - *P4PBT-STW-ALL-SL-REP-A31-101069-BOC vehicle tracking analysis REV. F.*

This report concluded that with the removal of the Core 4 lobby, the space could accommodate the BOC's smaller 3 axle BOC vehicle and the larger 4 axle BOC vehicle.

The weights of these trucks were confirmed by BOC as

Rigid (4 axle) – 32 tonnes
Rigid (3 axle) – 26 tonnes

The insulation type and thickness indicated on the attached details has been approved by the supplier as being adequate to meet these loads, however the entire road build up is required to be approved by the Civil & Structural Engineer.

Drop off Area:

The drop off area has been designed to accommodate standard car traffic and light Patient Transport Vehicles.

BYUK require the Trust to confirm the type and weight of Patient Transport Vehicle that they currently use and that they expect to use in this area.

Universal Access.

The current design has been reviewed against Part M Requirements.

The External works design provides public, patients and staff with access to the building that meets their needs. Existing road levels are maintained and maximum kerb heights are an improvement on pre-existing conditions. Sections of the public pathways and roads beyond the boundary line and affected by the works, will be reinstated to match or improve existing conditions.

Designed falls on exposed sections of the pathways will match pre-existing conditions or will not exceed 1 in 40 falls and 1 in 20 in areas covered with canopies or building structure. (For example entrance drop off zone or Delivery services yard).
Pavement falls in area of main entrance to the building (corner of Grafton Way and Huntley Street) will not exceed and significantly improve pre-existing conditions.
Paving joints will be reviewed with the chosen sub-contractor to ensure that drop off zone access to core no. 4 will allow bed, trolley and wheelchair movement with ease.

Engagement with London Borough of Camden (LBC)

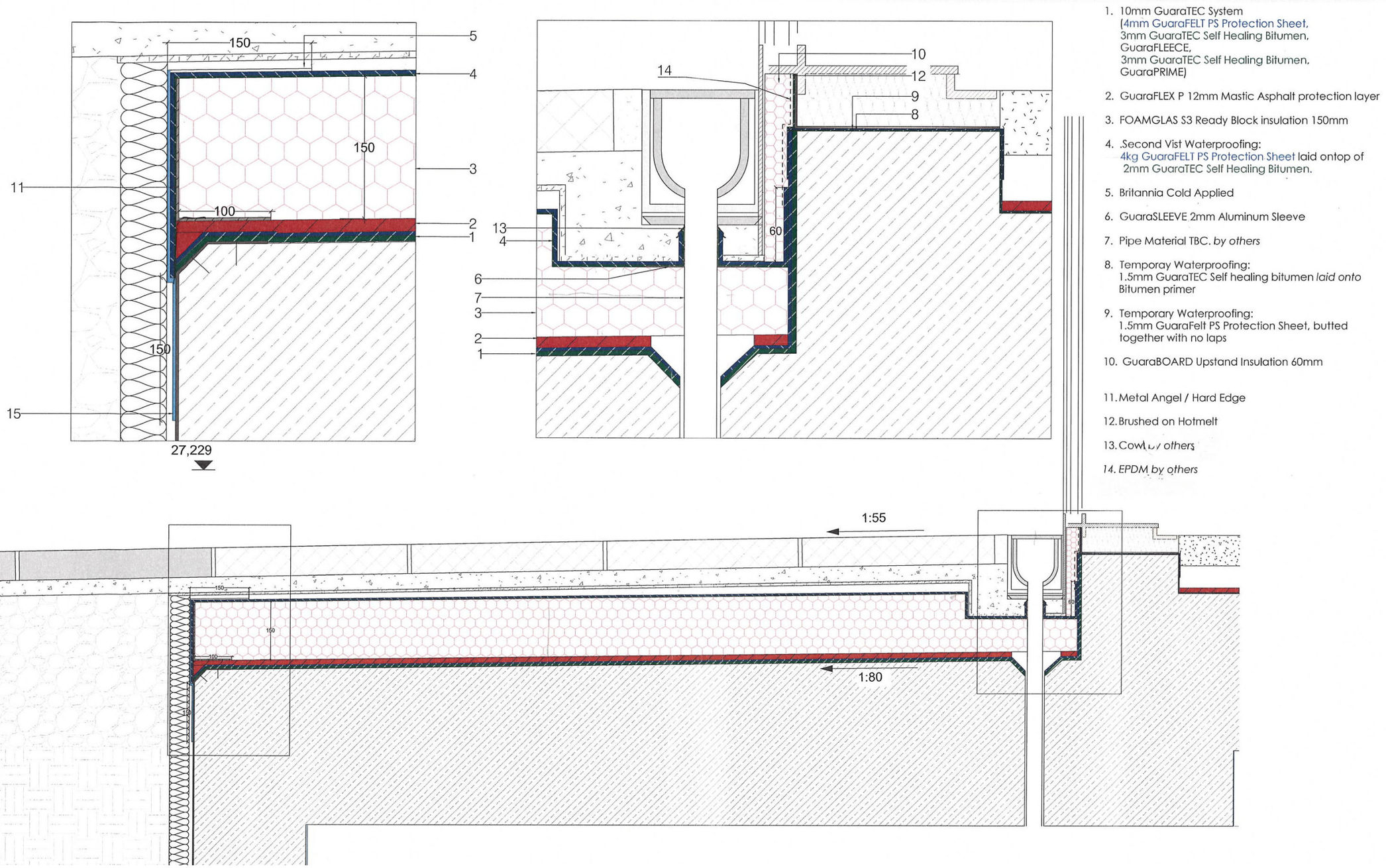
A series of workshops were held with LBC to clarify their scope of works and the final design of the public way around the building. LBC are responsible for all paving and bedding up to the boundary line of the building at ground floor. Apart from the drop off area and the delivery yard, this essentially equates to the façade line. LBC will coordinate this work with BYUK's ground works contractor.

The design of the external works takes into account LBC's future plans for the upgrade of the public roads and paving to Huntly Street and Grafton Way (West End Project - https://consultations.wearecamden.org/culture-environment/wep). This project proposes new road levels to Huntley street, with a view to making this street a pedestrian/ level street zone. It also proposes revised levels and setting out along Grafton way.

LBC has confirmed that their intention is to provide granite paving to the majority of this area, which is an upgrade from the previous yorkstone. All paving levels, cross falls and kerb heights etc have been reviewed and agreed with LBC.

Other than where indicated (slot drains to drop off and delivery yard entrances, all rainfall will run to the public drain system.

Appendix A – GuaraTEC System build up for Phase 4/ PBT Project



1. 10mm GuaraTEC System
   (4mm GuaraFELT PS Protection Sheet,
   3mm GuaraTEC Self Healing Bitumen,
   GuaraFLEECE,
   3mm GuaraTEC Self Healing Bitumen,
   GuaraPRIME)
2. GuaraFLEX P 12mm Mastic Asphalt protection layer
3. FOAMGLAS S3 Ready Block insulation 150mm
4. .Second Vist Waterproofing:
   4kg GuaraFELT PS Protection Sheet laid ontop of
   2mm GuaraTEC Self Healing Bitumen.
5. Britannia Cold Applied
6. GuaraSLEEVE 2mm Aluminum Sleeve
7. Pipe Material TBC. *by others*
8. Temporay Waterproofing:
   1.5mm GuaraTEC Self healing bitumen *laid onto*
   Bitumen primer
9. Temporary Waterproofing:
   1.5mm GuaraFelt PS Protection Sheet, butted
   together with no laps
10. GuaraBOARD Upstand Insulation 60mm
11. Metal Angel / Hard Edge
12. Brushed on Hotmelt
13. Cowl *by others*
14. *EPDM by others*

UCLH PHASE 4 AND PROTON BEAM THERAPY BUILDING PROJECT

Architectural Specification

Section Q10 – Kerbs

Revision: E –STAGE 4A

Revision	Date	Clauses Updated	Notes
Contract Issue	28/07/2014	-	-
Rev. A – STAGE E ISSUE	14.11.2016	Q10.1102 Q10.1202 k) Q10.1203 Q10.1204	- "External Granite kerbs" added - "or proposed" added - (in areas with Yorkstone paving slabs and granite setts) - Existing Stone Kerbs specification added
Rev B	05.03.2018	None	Early release Stage 4a issued for BYUK final comment and Sub-Contractor award
Rev C	07.08.2018	None	Issued as part of report no. P4PBT-STW-ALL-SL-REP-A31-101094 Rev. E S3 – Issued for Review and Comment
Rev D	17.08.2018	Q10.1205 Added	Issued as part of report no. P4PBT-STW-ALL-SL-REP-A31-101094 Rev. F S4 – Issued for Byuk Approval
Rev E	04.10.2018	Q10.1205 Added	Issued as part of report no. P4PBT-STW-ALL-SL-REP-A31-101094 Rev. G S4 – Issued for Stage Approval
General notes: ~~Omissions to specifcation shown in blue and struck through.~~ Additions to specification shown in red. Updates from Contract Specification to be agreed by ByUK and UCLH where relevant.			

Scott Tallon Walker Architects

Q10 KERBS/ EDGINGS/ CHANNELS/ PAVING ACCESSORIES

To be read in conjunction with Section A91 and other related sections of the Specification, Preliminaries and Contract Conditions.

Q10.1000 SCOPE, SUBMITTALS, TESTING AND PERFORMANCE

Q10.1100 SPECIFICATION AND SCOPE

Q10.1101 General

a) Works covered in this section are specified by performance and therefore designated as works with specialist sub-contractor Design (SCD). Refer to Section A91.

b) Complete the Detailed Design, manufacture, supply, install and warrant the works whilst complying with the visual intent indicated on the Design Drawings and criteria stated in the Specification.

c) For design and general performance requirements, refer to Section A91 of the Specification. Specific design and performance requirements are as defined in the particular trade sections.

d) 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.

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

Q10.1102 Scope of Works

This section of the Specification, when read in conjunction with the Design Drawings, provides particular requirements with respect to:

a) External drainage channels.

b) External Granite kerbs

Q10.1103 Particular Interfaces

a) Complete the Detailed Design of all interfaces with adjoining trades prior to commencement of manufacture.

b) Ensure that all interfaces are fully co-ordinated prior to commencement.

Q10.1200 SYSTEM TYPES

Drainage Channel

Q10.1202 Type EXT-002 Drainage Channel

a) Standard: To BS EN 1340.

b) Manufacturer: Aco or an approved equivalent.

c) Product reference: Aco stainless steel Slot Drain or an acceptable equivalent to suit.

d) Recycled content: 20% (minimum) to BS EN ISO 14021.

e) Designations: Slot drain.

f) Size (width x height x length): Refer to the Design Drawings – slim line required in some cases

g) Special shapes: Cut at 45º where required. Refer to the Design Drawings.

h) Bedding: Cement mortar.

i) Joints generally: Narrow mortar.

j) Sealant movement joints: At 4.5m or 9m centers.

k) Connect drain to existing or proposed drainage system as required.

l) Accessories: Haunching as required. Refer to the Design Drawings.

Q10.1203 Type EXT-013 Stone Kerb (in areas with ~~Yorkstone paving slabs and~~ granite setts)

a) Standard: To BS EN 1343.

b) Granite kerb units.

c) Refer to the Design and Access statement.

d) Designations: 'Splayed' kerb unit (75mm splay).

e) Size (width x height x length): Refer to the Design Drawings.

f) Special shapes: 45 degree splayed corner.

g) Finish: To be confirmed.

h) Colour: To be confirmed.

i) Bedding: Cement mortar.

j) Joints generally: Narrow mortar.

k) Sealant movement joints: At 6m centres.

l) Accessories: Haunching as required. Refer to the Design Drawings

Q10.1204 Existing Stone Kerb

a) Damage or misplaced granite kerbs to be made good and reinstated to mach pre-existing conditions.

b) Size (width x height x length): to mach preexisting conditions.

c) Finish: to mach pre-existing conditions.

d) Colour: To be confirmed.

e) Bedding: to mach pre-existing conditions.

f) Joints generally: to mach pre-existing conditions.

g) Accessories: Haunching as required. to mach pre-existing conditions.

Q10.1205 Traffic barrier – awaiting instruction by the Client

a) Manufacturer: Frontier Pitts Ltd or similar and approved

b) Product reference: Parking Height Rising Kerb

c) Lift Height: 300mm

d) Colour: To be confirmed.

e) Dimensions: Length- 3m/ Depth 300 app.

f) Accessories: To be confirmed.

g) Signal box by supplier: Stainless Steel circular post type design.

Q10.1300 SUBMITTALS

Tender Submittals

Q10.1301 Tender Response

a) Provide tender submittals in accordance with the requirements of Section A91.4000 of the Specification.

b) Submit a design response with the Tender proposal, to include all 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 Specification.

vi) Outline technical specifications reflecting proposed materials/ systems.

vii) A list of proposed suppliers and sub-contractors intended to be used.

Samples, Mock-ups, Prototypes and Quality Benchmarks

Q10.1302 Pre-contract Samples

Relevant trade literature and technical specifications shall be provided in accordance with Section A91.4000.

Q10.1303 Post Contract Award Samples

In accordance with Section A91.4000, post contract award samples of the following shall be provided:

a) 1 No. samples of channel type.

Q10.1304 Mock-ups

Not required.

Q10.1305 Prototypes

Not required.

Q10.1306 Quality Benchmark Requirements

The following quality benchmarks shall be provided, in locations to be agreed with the Architect, in accordance with Section A91.4000:

a) Following agreement of samples, a length of channel 2m.

Testing

Q10.1307 Testing of Drainage

a) Test in accordance with the Services Engineer's requirements.

Q10.1400 PERFORMANCE REQUIREMENTS

Comply with the general performance of Section A91.5000 and the following specific performance requirements.

Structural

Q10.1401 General

Refer to Section A91, clause series 5300.

Q10.1402 Specific Movements

a) The works shall be detailed, manufactured and installed to accommodate all movements of the substrates without damage or any reduction in the performance.

b) 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.

Q10.1403 Specific Dead Loads

a) The works' own dead load shall be accommodated locally and without causing deflections or movements that affect abutting elements.

b) The dead loads derived from permanent fixtures or services attached to the surfaces of the works shall be accommodated without any reduction in performance.

Q10.1404 Specific Live Loads

The works shall be capable of accommodating the following live loads without any reduction in performance:

a) Movements of the concrete slabs and loads imposed upon them.

b) All loads resulting from movements of the structure as a whole.

c) Loads from a 2½ tonne cherry picker type access machine.

d) Working loads up to 11.5-ton axle load shared between two wheels with assumed 300mm x300mm area of tyres producing an ultimate load of 1.8N/ mm².

Environmental

Q10.1405 Thermal Movement

It shall be ensured that the works are capable of withstanding differential surface temperatures without any reduction in the specified performance. Any movement joints, as necessary to cater for any thermal movement, shall be provided.

Q10.1406 Moisture Movement

The works shall withstand the following movement without permanent deformation or any reduction in the specified performance:

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

b) Due to drying shrinkage of building components, both short term and long term.

Q10.2000 MATERIALS AND FABRICATION

Q10.2100 GENERAL

Q10.2101 Concrete For Foundations, Races And Haunching

a) Standard: To BS 8500-2.

b) Designated mix: Not less than GEN0 or Standard mix ST1.

c) Workability: Very low.

Q10.2102 Bedding/ Backing Of Units On Fresh Concrete Races

a) Standard: To BS 7533-6.

Q10.2200 MATERIALS

General

Q10.2201 Cement Mortar Bedding

a) General: To section Z21.

b) Mix (Portland cement:sand): 1:3.

c) Portland cement: Class CEM I 42.5 to BS EN 197-1.

d) Sand: to BS EN 12620, grade 0/4 or 0/2 (MP).

e) Bed thickness: 12-40 mm.

Q10.2203 Damage

Materials that are chipped, scratched, damaged or have any other physical imperfections shall not be used in the works.

Q10.3000 SITE INSTALLATION

Q10.3100 WORKMANSHIP

Q10.3101 Channels

a) Installation: To an even gradient, without ponding or backfall.

b) Lowest points of channels: 6 mm above drainage outlets.

Q10.3102 Drainage Channel System

a) Installation: To an even gradient, without ponding or backfall. Commence laying from outlets.

b) Silt and debris: Removed from entire system immediately before handover.

c) Washing and detritus: Safely disposed without discharging into sewers or watercourses.

Q10.3103 Accuracy

a) Deviations (maximum):

i) Level: ± 6 mm but ± 1 mm at adjacent finishes. Alignments shall not result in trip hazzards.

ii) Horizontal and vertical alignment: 3 mm in 3 m.

Q10.3104 Tooled Mortar Joints

a) Jointing: Ends of units buttered with bedding mortar as laying proceeds. Joints completely filled and tooled to a neat flush profile.

b) Joint width: 6 mm.

Q10.3105 Drainage Channel Systems with Built-in fall

a) Installation: Top of channels level, installed in correct sequence to form an even gradient without ponding or backfall. Commence laying from outlets.

b) Silt and debris: Removed from entire system immediately before handover.

c) Washings and detritus: Safely disposed without discharging into sewers or watercourses.

Q10.3106 Inclement Weather

a) Channels shall not be laid if the temperature is below 3°C on a falling thermometer or below 1°C on a rising thermometer.

b) Frozen materials or bedding shall not be used on frozen or frost covered bases.

Q10.3113 Protection from Traffic

a) Paving bedded on mortar shall be kept free from pedestrian traffic as recommended by the manufacturer.

b) Access to paved areas shall be restricted as necessary to prevent damage from Site traffic and plant.

c) Site traffic and plant access to areas with geotextile shall be avoided until the upper granular sub-base has been fully laid with the prior acceptance of the Architect.

End of Section

UCLH PHASE 4 AND PROTON BEAM THERAPY BUILDING PROJECT

Architectural Specification

Section Q25 – Slab Paving

Revision: G – Stage 4

Revision	Date	Clauses updated	Notes
Contract Issue	28/07/2014	-	-
Rev. A – STAGE E – DRAFT ISSUE	14/11/2016	Q25.1201 f) Q25.1201 i) Q25.1202 e) Q25.1203 Q25.1203 Q25.1204 Q25.1205	- "to mach existing" added - Loading requirements added - Colour patterns as per Architects' - Drawings - Section Q25.1203 added - Section Q25.1204 added - Section Q25.1205 added
Rev B1	05.03.2018	Q25.1202 Q25. 2204 Q25.2205 Q25.3103	Stage 4a issued for BYUK final comment and Sub-Contractor award
Rev B2	26.03.2018	Q25:1202	- Updated Issued for Stage 4
Rev **B**	21.05.2018		No further changes Issued as part of report no. P4PBT-STW-ALL-SL-REP-A31-101091 Rev. E Suitability Code: S3 – Issued for Review and Comment
Rev C	04.06.2018		No further changes Issued as part of report no. P4PBT-STW-ALL-SL-REP-A31-101091 Rev. F Suitability Code: S4 – Issued for Stage Approval
Rev D	**25.06.2018**		No further changes Issued as part of report no. P4PBT-STW-ALL-SL-REP-A31-101091 Rev. G Suitability Code: S4 – Issued for Stage Approval
Rev E	**07.08.2018**	~~**Q25.1201**~~ **Q25.1202** ~~**Q25.1204**~~ **Q25.3100**	Yorkstone paving and road surface removed. Issued as part of report no. P4PBT-STW-ALL-SL-REP-A31-101094 Rev. E S3 – Issued for Review and Comment
Rev F	**17.08.2018**	**Q25.1202**	Issued as part of report no. P4PBT-STW-ALL-SL-REP-A31-101094 Rev. F S4 – Issued for Stage Approval
Rev G	**17.08.2018**	**Q25.1202** **Q25;1203**	Issued as part of report no. P4PBT-STW-ALL-SL-REP-A31-101094 Rev. F S4 – Issued for Stage Approval
General notes: ~~Omissions to specifcation shown in blue and struck through.~~ Additions to specification shown in red. Updates from Contract Specification to be agreed by ByUK and UCLH where relevant.			

Scott Tallon Walker Architects

Q25 SLAB PAVING

To be read in conjunction with Section A91 and other related sections of the Specification, Preliminaries and Contract Conditions.

Q25.1000 SCOPE, SUBMITTALS, TESTING AND PERFORMANCE

Q25.1100 SPECIFICATION AND SCOPE

Q25.1101 General

a) Works covered in this section are specified by performance and therefore designated as works with specialist sub-contractor Design (SCD). Refer to Section A91.

b) Complete the Detailed Design, manufacture, supply, install and warrant the works whilst complying with the visual intent indicated on the Design Drawings and criteria stated in the Specification.

c) For design and general performance requirements, refer to Section A91 of the Specification. Specific design and performance requirements are as defined in the particular trade sections.

d) 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.

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

Q25.1102 Scope of Works

This section of the Specification, when read in conjunction with the Design Drawings, provides particular requirements with respect to paving.

Q25.1103 Particular Interfaces

a) Complete the Detailed Design of all interfaces with adjoining trades prior to commencement of manufacture.

b) Ensure that all interfaces are fully co-ordinated prior to commencement.

Q25.1200 SYSTEM TYPES

Paving

~~Q25.1201 Type EXT-001 Slab Paving~~

~~a) Natural Yorkstone slab external paving to match the existing pavement.~~

~~b) Thickness and bedding to match the existing paving and to achieve the required performance criteria stated in the Specification.~~

~~c) Natural stone slabs:~~

~~i) Nominal size: 600mm x random lengths x 75mm thick.~~

~~ii) Finish: Honed to an accepted control sample.~~

~~iii) Colour: To match accepted control sample.~~

~~d) Sub-base: As required.~~

~~e) Bedding: Sand/ cement mortar minimum 40mm thick, with reinforcement.~~

~~f) Joints: 3mm mortar joints nominal. To match existing~~

~~g) Pattern: As indicated on the Design Drawings.~~

~~h) Other requirements: Interface with the building and the slot drain where required.~~

~~i) Other requirements: Bedding and installation to suit heavy duty vehicles passing over or pedestrian traffic. Insulation of minimum comprehensive strength (EN 826-A) as per architects drawings.~~

Q25.1202 Type EXT-012 Granite Setts

a) Natural stone slab external paving on minimum 25mm high performance mortar bedding with grouted joints. 'Steintec' mortar bedding system or similar. All to be approved by roofing contractor as suitable for supporting granite sets.

b) Natural stone slabs: Granite setts for vehicular paving.

c) Nominal sizes: 100mm x 200mm and 200mm x 300mm. Nominal thicknesses of 150mm for heavy trafficked areas, 75mm thick for low trafficked but heavy vehicle areas and nominal 65mm for light/ pedestrian trafficked areas. Refer to the Design Drawings. Contractor to confirm sizes of granite setts are suitable for their use.

d) Finish: Sand blasted to achieve the required slip resistance and to an accepted/ agreed control sample.

e) Colour: To match accepted control sample. Colour patterns as per architects' drawings.

f) Sub-base: Concrete slab as Structural Engineer's specification.

g) Bedding: Min 25mm 'Steintec' or similar Tufbed 2 pack permeable bedding mortar with a Tufbond bonding layer applied to the back of the paving slabs.

h) Joints: 3mm nominal 'Steintec' Tuftop permeable mortar. To be revised with supplier to achieve a level surface for beds trolleys wheelchairs etc.

i) Pattern: As indicated on the Design Drawings.

j) Other requirements: Bedding and installation to suit heavy duty vehicles passing over or pedestrian traffic. Insulation of minimum comprehensive strength (EN 826-A) as per architects drawings.

Delivery Bay – To accommodate rigid 3 axle (26 tonnes) and 4 axle (32 tonnes) trucks by BOC

Drop off area – To accommodate standard vehicular traffic and light transport patient vehicles – Client to confirm type and weight of current PTV's used by the Hospital

Q25.1203 Reinforced in-situ concrete slab

a) Reinforced in-situ concrete slab.

b) In situ concrete finish equivalent to Special Class quality and Type B finish.

c) Thickness 150mm as per architects' drawings - over existing Paramout Court basement structure all screeds should be lightweight sand and cement screeds with mesh reinforcing only and to a max depth of 65mm

d) Bedding to achieve the required performance criteria stated in the Specification. As per architects drawings

e) Sub-base: As required.

f) Joints: 3mm mortar joints nominal.

g) Other requirements: Interface with the building and the slot drain where required. Bedding and installation to suit heavy duty vehicles passing over or pedestrian traffic. Insulation of minimum comprehensive strength (EN 826-A) as per architects drawings.

~~Q25.1204 Existing road surface to be reinstated~~

~~a) Existing road surface to be reinstated to match the existing .~~

~~b) Thickness and bedding to match the existing and to achieve the existing required performance criteria.~~

Q25.1300 SUBMITTALS

Tender Submittals

Q25.1301 Tender Response

a) Provide tender submittals in accordance with the requirements of Section A91.4000 of the Specification.

b) Submit a design response with the Tender proposal, to include all 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 Specification.

vi) Outline technical specifications reflecting proposed materials/ systems.

vii) A list of proposed suppliers and sub-contractors intended to be used.

Samples, Mock-ups, Prototypes and Quality Benchmarks

Q25.1302 Pre-contract Samples

Relevant trade literature and technical specifications shall be provided in accordance with Section A91.4000.

Q25.1303 Post Contract Award Samples

In accordance with Section A91.4000, post contract award samples of the following shall be provided:

a) 3 No. samples of each type of paving slab type full size.

b) Jointing sand sample.

Q25.1304 Mock-ups

Not required.

Q25.1305 Prototypes

Not required.

Q25.1306 Quality Benchmark Requirements

The following quality benchmarks shall be provided, in locations to be agreed with the Architect, in accordance with Section A91.4000:

a) Following agreement of samples, an area of 15m² of each type of paving.

Testing

Q25.1307 Testing of Paving

a) All sampling and testing of the natural stone slabs shall be carried out in accordance with BS EN 1341.

b) All sampling and testing of the concrete slabs shall be carried out in accordance with BS EN 1339.

c) All sampling and testing of the natural stone setts shall be carried out in accordance with BS EN 1342.

d) Additional testing and sampling shall be performed if the works do not comply with the Specification.

e) Acceptance shall only be given to complying paving. Inform the Architect of test results for paving not originally complying. The official certification of test results shall be given

after acceptance and before manufacture of the paving.

f) As soon as the sources of the units have been accepted, instruct the testing authority to carry out the following tests:

i) Compressive strength.

ii) Absorption percentage.

iii) Soluble salt content.

iv) Drying shrinkage or moisture expansion.

v) Mechanical test on completion, 5% of slabs shall be tested to prove adequate bedding adhesion.

Q25.1308 Mortar Testing

a) All tests on wet or hardened mortar samples shall be carried out in accordance with BS 5628: Part 1, BS EN 1052: Part 1, BS 4551 and BS EN 1015, or to equal standards acceptable to the Architect.

b) Samples shall be taken at the point of mixing or use. The frequency of sampling shall not be less than that specified in BS 5628: Part 1.

c) Additional tests and sampling shall be performed if the mortar does not comply with the Specification.

d) Subject to the test results, the specified nominal mix proportions shall be adjusted and tested.

e) Unless acceptance is obtained to the contrary, the consistency of fresh mixed mortar shall comply with the standard recommended in BS EN 1015: Part 4.

f) Any paving containing mortar that does not comply with the requirements of the Specification shall be demolished and removed.

Q25.1309 Testing Apparatus

On Site the following apparatus shall be maintained in good repair:

a) Maximum and minimum thermometers as and where required.

b) Soil thermometers as required for measuring the mortar and ground temperatures.

c) Apparatus for carrying out the test described in BS EN 932: Parts 1 and 6.

d) Syphon can, Gammon Morgan or Speedy apparatus for measuring the moisture content of aggregate.

e) Apparatus for carrying out the test described in BS EN 1015: Part 4.

f) Apparatus for making mortar cubes or prisms in accordance with BS 4551.

g) Apparatus for measuring the air content of the mortar in accordance with BS EN 1015: Part 7.

Q25.1310 Slip Resistance Testing

a) Testing for slip resistance shall comply with the following documents:

i) 'Assessing the slip resistance of flooring' by The Health and Safety Executive (latest published version).

ii) 'The assessment of floor slip resistance, the UK Slip Resistance Group guidelines' by The UK Slip Resistance Group (latest published version).

b) Testing shall be performed at an independent UKAS accredited laboratory accredited to perform the specified test methods.

c) Pendulum Test: External paving shall be evaluated in both dry and wet conditions using the TRL Pendulum Tester in accordance with BS 7976 (BS EN 1341 for external natural stone slabs and BS EN 1342 for external natural stone setts) and the recommendations of the UK Slip Resistance Group to obtain the pendulum test value (PTV) specified.

d) Roughness Test: External paving shall be evaluated using a surface roughness meter, in accordance with the recommendations of the UK Slip Resistance Group, to obtain the surface roughness (Rz) value specified.

e) Samples shall be tested at the following stages of the project:

i) Approval.

ii) Production.

iii) Post-installation (in situ).

f) Submit test results to the Architect for acceptance in due time, prior to each of the project stages or as agreed with the Architect.

g) Test samples must include any surface sealer or treatment to be applied to the finished external paving.

Q25.1400 PERFORMANCE REQUIREMENTS

Comply with the general performance of Section A91.5000 and the following specific performance requirements.

Structural

Q25.1401 General

Refer to Section A91, clause series 5300.

Q25.1402 Specific Movements

a) The works shall be detailed, manufactured and installed to accommodate all movements of the substrates without damage or any reduction in the performance.

b) Provide all necessary movement joints to accommodate the movements to which the paving is expected to be subjected, whether indicated on the Design Drawings or not.

c) Show all movement joints on the Working Drawings, which shall be subject to acceptance by the Architect.

d) The Contractor shall be responsible for ensuring that movement joint thicknesses are adequate.

e) A method statement for the installation of all the works shall be provided, taking into account movements of the structural slab including:

i) Dimensional setting out and joints alignment.

ii) Floor services.

iii) Construction tolerances.

iv) Movement joints, bay joints and relief joints.

v) Full adhesion.

vi) Full bed without hollows.

vii) Cracking to grouted joints, which will not be acceptable.

viii) Resilient and insulation layer.

f) Refer to and take account of the Structural Movements and Tolerances Report.

g) A full understanding of the behaviour of the building structure, its movements and its effects upon the works is required.

h) 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.

Q25.1403 Specific Dead Loads

a) The works' own dead load shall be accommodated locally and without causing deflections or movements that affect abutting elements.

b) The dead loads derived from permanent fixtures or services attached to the surfaces of the works shall be accommodated without any reduction in performance.

Q25.1404 Specific Live Loads

The works shall be capable of accommodating the following live loads without any reduction in performance:

a) Movements of the concrete slabs and loads imposed upon them.

b) All loads resulting from movements of the structure as a whole.

c) Loads from a 2½ tonne cherry picker type access machine.

d) Working loads up to 11.5-ton axle load shared between two wheels with assumed 300mm x300mm area of tyres producing an ultimate load of 1.8N/ mm².

Environmental

Q25.1405 Thermal Movement

It shall be ensured that the works are capable of withstanding differential surface temperatures without any reduction in the specified performance. Any movement joints, as necessary to cater for any thermal movement, shall be provided.

Q25.1406 Moisture Movement

The works shall withstand the following movement without permanent deformation or any reduction in the specified performance:

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

b) Due to drying shrinkage of building components, both short term and long term.

Slip Resistance

Q25.1407 Slip Resistance

a) When tested using the TRL Pendulum Tester, external paving, inclusive of surface treatment, shall achieve the following pendulum test value (PTV):

i) Dry: Not less than 55 PTV.

ii) Wet: Not less than 40 PTV.

b) When tested using the surface roughness meter, external paving shall achieve a surface roughness (Rz) value of not less than 20 µm Rz.

Strength and Physical Properties of Stone

Q25.1408 General

a) Stone supplied for use in accordance with the Specification shall comply with the following Standards:

i) Petrographic description: BS EN 12407.

ii) Density: BS EN 1936.

iii) Water absorption: BS EN 13755.

iv) Flexural strength under concentrated load: BS EN 12372 (3-point loading: Modulus of Rupture).

v) Flexural strength under constant moment: BS EN 13161 (4-point loading).

vi) Abrasion resistance: BS EN 1341.

vii) Slip resistance, to recognised procedure.

viii) Staining potential, to recognised procedure.

ix) Coefficient of thermal expansion, to recognised procedure.

x) Cyclic heating and cooling, to recognised procedure.

b) Provide information and values for review by the Architect for the following test criteria:

i) Petrographic description: No deleterious constituents.

ii) Density: 2560kg/ m³ minimum.

iii) Water absorption: 0.40% maximum.

iv) Flexural strength under concentrated load shall be 10.34 Mpa minimum (wet). Note: Tests shall be performed at proposed project thickness.

v) Abrasion resistance: Provide values for assessment.

vi) Slip resistance: Provide values for assessment (dry and wet). Note: Tests shall be performed at proposed project thickness.

c) Surface finish:

i) To be confirmed.

ii) Staining potential: Non-susceptible.

Pattern

Q25.1409 Laying Pattern

Paving pattern shall be in accordance with the Architect's requirements and suitable for any vehicular use after consideration of BS 7533: Part 3.

Q25.2000 MATERIALS AND FABRICATION

Q25.2100 GENERAL

Paving Generally

Q25.2101 Generally

a) Paving slabs to match existing.

b) Comply with the Landscaping Consultant's requirements.

c) Provide blister paving slabs as required.

d) Provide natural stone grooved paving to external entrance areas.

e) Substrate: In situ concrete with applied waterproofing overlaid with loose laid insulation.

Q25.2200 MATERIALS

General

Q25.2201 Slabs

a) Natural stone slabs shall be to BS EN 1341.

b) Precast concrete slabs shall be hydraulically pressed to BS EN 1339.

c) Tactile paving shall be to BS 7997.

Q25.2202 Stone Quality

a) Arrangements shall be made for the Architect, and others as necessary, to inspect samples of stone in the respective quarries which represent the range of variations in appearance. The acceptance of the Architect shall be obtained before confirming orders with suppliers or proceeding with production.

b) Stone shall be free from vents, cracks, fissures, discolouration, or other defects, which may adversely affect strength, durability or appearance. It shall be dressed and worked before delivery to Site in accordance with the Design Drawings.

Q25.2203 Damage

Materials that are chipped, scratched, damaged or have any other physical imperfections shall not be used in the works.

Bedding and Reinforcement

Q25.2204 High performance structural bedding from Steintec or similar for stone paving

a) Steintec 'Tufbed' permeable bedding mortar in 2 layers to min 25mm.

b) Steintec 'Tufbond' bonding layer applied to back of stone paving

c) It shall be free from chlorides or other deleterious salts, contaminants and cement.

d) The moisture content shall be between 3-7%.

e) It shall be obtained from a single source.

Q25.2205 Mortar Bedding

a) Steintec 'Tuftop' permeable mortar

b) Tests on mortar shall be conducted as specified for special construction control, in accordance with BS 5628: Part 1.

c) Portland Cements shall conform to BS EN 197: Part 1. Unless otherwise stated, the cement shall be of Ordinary Portland Cement and delivered in the original sealed bags of the manufacturer or in accepted bulk containers.

d) All cement used in the works shall be obtained from a supplier chosen as being capable of supplying cement complying with the requirements of the Specification.

e) Any mortar plasticiser used shall be agreed with the Architect prior to commencement of any work, and shall be used in the proportions recommended in writing by the manufacturer. Mortar mixes shall be utilised in accordance with the manufacturer's written recommendations. The suitability of the mixture for use in any particular mortar shall be demonstrated.

f) Admixtures shall not be used in mortar unless specified. Calcium chloride, or any admixtures containing calcium chloride, shall not be used. Admixtures, if specified, shall be to BS EN 934: Part 3.

g) Mixing plant, tools and banker boards shall be kept clean at all times.

h) Materials shall be measured accurately by volume using clean gauge boxes. Proportions of mixes are for dry sand; allow for bulking if sand is damp.

i) Ingredients shall be mixed thoroughly to a consistency suitable for the work and free from lumps. Mortars containing air-entraining admixtures shall be mixed by machine, but not overmixed.

j) Mortar shall be used within about two hours of mixing. Retarded mortar shall be used within the time recommended in writing by the manufacturer. Mortar may be retempered to restore workability, but only within these time limits.

k) The required amount of water shall be determined to achieve a workable mix.

l) If pre-mixed mortars are used, the characteristics, product data, and testing criteria shall be submitted to the Architect for review.

m) The mortar shall have a suitable strength to withstand the live load of vehicles.

Q25.2206 Reinforcement

Reinforcement in mortar bedding shall be in accordance with BS 4483 and of the following types:

a) D49.D98 to unbonded bedding only.

b) Determine the final selection/ type of reinforcement subject to acceptance by the Architect.

Accessories/ Joints

Q25.2207 Jointing Material

a) Jointing material shall comply with BS 7533: Part 4.

b) Jointing sand: Clean dried sand, graded as for jointing sand to BS 7533: Part 4 and free from deleterious salts, contaminants and cement.

Q25.2208 Geotextile Membrane

Geotextile membrane to meet the requirements of the Specification.

Q25.2209 Movement Joint Metal Edgings

Movement joint metal edgings shall be provided as follows:

a) Material shall be brushed stainless steel.

b) Fixing shall be bedded in cement and sand/ screwed to plugs at 600mm centres, to exact finished level of floor/ pavings.

Q25.2210 Sealant Movement Joints

a) Sealant movement joints shall be provided where necessary.

b) Preparation and application shall be in accordance with the Specification, Section Z22. Joints shall extend through paving and bedding to substrate.

c) Joints shall coincide with any movement joints left in the substrate.

Q25.2211 Preformed Strip/ Section Movement Joints

Where indicated on the Design Drawings, preformed strip/ section movement joints shall be provided and fixed in accordance with the manufacturer's written recommendations.

Q25.2300 FABRICATION

Q25.2301 Material Tolerances Generally

Width and lengths of varying sizes shall not deviate by more than ±2mm of the described size.

Q25.2302 Manufacturing Tolerances

a) Paving sizes stated in the Specification are nominal and the actual sizes required to meet the joint sizes, etc. shall be determined by the Contractor.

b) Slabs shall be butted/ manufactured with the tolerance of ±0.5mm.

Q25.3000 SITE INSTALLATION

Q25.3100 WORKMANSHIP

Q25.3101 Setting Out

a) Works shall be set out in relation to defined grids and datums established by the Contractor and accepted by the Architect.

b) Setting out shall recognise the interface of the works with other areas of works and shall, where not otherwise indicated by the Architect, be set out by the Contractor to minimise cutting and avoid narrow cuts.

c) Setting out grids shall be established parallel to walls with full slabs starting from the building and working out to the pavement, unless otherwise indicated by the Architect.

d) Paving co-ordination with manhole covers, etc shall be agreed with the Architect prior to the commencement of the construction of the manholes where possible and prior to the laying of the slabs.

Q25.3102 Bedding Method

a) Light filling mixed with mortar, added on top of structural slab shall be used to create an even slope.

b) The light filling shall be added in various thicknesses from 0-90mm.

c) The bitumen sheet membrane shall be torched onto the sloping filling according to the manufacturer's specifications. The membrane shall be protected by a rigid plastic protection sheet. If a flexible bitumen sheet membrane is not used, a sliding layer shall be added consisting of two layers of thin plastic (polythene).

d) Semi-dry mortar shall be added and levelled with a trowel. The mortar shall be well compacted to prevent voids beneath the stone slab. The slab shall be cleaned before fixing, no dust or stone laitance shall be allowed. The level of the mortar has to be adjusted by carrying out a test mounting of the slab.

e) The adjustment of the level of the mortar is very important in achieving a good result.

f) The adhesive shall be as the manufacturer's recommendations, in accordance with the requirements of the Specification.

Q25.3103 Joints and Grouting

a) The joints shall be totally cleaned of concrete, dust or similar before the grouting can start.

b) Steintec Paving System or similar to be used. All to be laid in accordance with manufacturers instructions.

c) The bedding and bonding layer shall be in full contact with the stone slabs on both sides (minimum depth 25mm). When the grouted joint has started to dry, excess grout on the surface of the stone slab shall be cleaned away using a clean and wet sponge.

d) When the grouting is finished, the paving shall be covered by plastic and kept humid for 5-7 days to achieve a good setting.

Q25.3104 Laying of Paving

a) Paving units shall be cut neatly and accurately with a masonry saw to give neat junctions with edgings and adjoining finishes, including following the profile of adjacent work where radiused and curved.

b) Paving units shall be suitably bedded so that rocking does not occur or develop.

c) Lines and levels of finished surface shall be smooth and even, with regular falls to prevent ponding.

d) Finished paving shall have an even overall appearance with even joint widths and be free of mortar and sand stains.

e) Where paving is laid in a stack bond pattern, the corners of the paving slabs must meet accurately, unless otherwise agreed with the Architect.

Q25.3105 Cutting Slabs

a) Cut with a masonry saw or disc cutter only.

b) When cutting a notch from the corner of a slab, which exceeds 25% of the slab area, mitre cut the remaining shape from the internal corner of the notch of the opposite external corner.

c) Diagonally cut slabs or portions of slabs to form a mitre at abrupt changes of level at the ends of ramped footpath crossings and the like.

Q25.3106 Inclement Weather

a) Paving shall not be laid if the temperature is below 3°C on a falling thermometer or below 1°C on a rising thermometer.

b) Frozen materials or bedding shall not be used on frozen or frost covered bases.

c) Paving shall be adequately protected with mortar joints and/ or mortar bedding from frost damage. It shall also be protected from rapid drying out or saturation until mortar has hardened.

Q25.3107 Acceptance of Base

Before starting work, the points stated below shall be followed:

a) The base shall be sound, clean and suitably close textured.

b) The levels and falls of the base shall be as detailed, within the specified tolerance of

c) ±12mm.

d) Drainage outlets shall be within +0 to -10mm of the required finished level.

Q25.3108 Levels of Paving

The permissible deviation from the specified levels shall be ±6mm generally. Paving shall be set 6mm above drainage outlets and 2mm above kerbs.

Q25.3109 Regularity

a) Sudden irregularities shall not occur.

b) Where appropriate in relation to the geometry of the surface, the variation in gap under a 3m straightedge (with feet placed anywhere on the surface) shall be not more than 6mm.

c) The difference in level between adjacent paving units shall be not more than 2mm.

Q25.3110 Slab Paving - Mortar Pointed Joints

a) Mortar mix for pointing joints to suit paving of colour to the acceptance of the Architect.

b) Immediately after completing joints, paving shall be covered with polythene sheeting for not less than 5 days.

Q25.3111 Sand Bedding

a) Lay and compact sand to give the specified final thickness using one of the following methods:

i) Either: Lay and compact using a vibrating plate as BS 7533: Part 4and loosen the top 10mm using a rake.

ii) Or, lay and compact as above, then screed out a further 10mm of loose sand.

b) Do not deliver bedding sand to the working area over uncompacted paving. Ensure that there is no disturbance to the bedding course by pedestrian or wheeled traffic. Fill voids left by screed rails.

c) Do not leave areas of bedding exposed; proceed with laying paving immediately.

d) Supply slabs/ flags to laying face over newly laid paving but stack at least 1m back from laying face. Do not allow plant to traverse areas of uncompacted paving.

Q25.3112 Narrow Sand Filled Joints for Sand Bedded Paving

a) Place slabs/ flags squarely with minimum disturbance to bedding, laying away from previously laid slabs/ flags.

b) Lay slabs/ flags with a joint width of 2-5mm. Do not use mechanical force to obtain tight joints.

c) On the same day as laying and before the onset of wet weather, brush clean dry sand over the joints, then bed down the slabs/ flags using a plate vibrator to BS 7533: Part 4. Refill the joints with sand. Repeat the process until the joints are completely filled.

d) Where early trafficking leads to settlement of the jointing sand, refill the joints as specified.

e) Do not use vacuum machines on the completed paving.

Q25.3113 Protection from Traffic

a) Paving bedded on mortar shall be kept free from pedestrian traffic as recommended by the manufacturer.

b) Access to paved areas shall be restricted as necessary to prevent damage from Site traffic and plant.

c) Site traffic and plant access to areas with geotextile shall be avoided until the upper granular sub-base has been fully laid with the prior acceptance of the Architect.

End of Section