REF No: B153121 **PROJECT NAME: THYBALDS ESTATE**

NBS SECTION Q37 - DESCRIPTION OF WORKS

Section Q37 deals with the design and installation of the Bauder Green Roof landscaping system, including the various related elements i.e. separation, protection, and drainage layers, substrates, Bauder supplied planting and accessories such as inspection chambers, trims etc. It invokes clauses from related sections for waterproofing, insulation, landscaping and maintenance as necessary for a complete system.

It is intended for use on projects where the detailed design is completed by the specifier (architect or landscape architect) with technical assistance from the manufacturer as required and should be read in conjunction with any project specific drawings provided.

SCOPE OF WORKS

This section includes:

- Bauder Extensive green roof system components/ landscaping
- Related Bauder system accessories

This section does not include:

- Construction of the structural deck
- Bauder waterproofing system – refer NBS Section J41-110 & 130
- Irrigation– refer NBS section S--

Q37 GREEN ROOFS
To be read with Preliminaries / General Conditions.

GENERAL

130A EXTENSIVE GREEN ROOF: All Vegetative Roofs
Landscaping finish: Pre-cultivated Sedum vegetation blanket

- **Substrate:** Plywood Deck & concrete
- **Slope:** 1°
- **Waterproofing system:** BAUDER TOTAL GREEN ROOF SYSTEM – as per J41-110 & 130A
- **Slip Layer:** Bauder PE Foil (loose laid) rolled out in single layer. Installation as clause 745.
- **Protection layer:** Bauder Eco-Mat - 6mm thick protection fleece. Installation as clause 750A.
- **Drainage layer:** Bauder DSE40 - drainage / water storage panel. Installation as clause 770E.
- **Filter membrane:** Bauder Filter Fleece. Installation as clause 780A.
- **Growing Medium:** Bauder Extensive Substrate, depth 80mm above the filter fleece. Installation as clause 790A.
- **Landscaping depth:** TBC
- **Vegetation:** Bauder Xero Flor XF300 sedum blanket, applied in standard length rolls 2m x 1 m over the growing medium. Installation as clause 800B.
- **Accessories: -**
  - Bauder AL80/100 drainage and retention trim, fitted to all open perimeters to contain a pebble vegetation barrier. Installation as clause 820E.
  - Project specific drip line irrigation system (designed and supplied by others), as clause 463C. Installation of irrigation pipe work to the waterproofing as clause 825A.
  - Bauder ALU 250 Inspection chamber, to be installed over all internal rainwater outlets within soft landscaping areas. The lid of the chamber must be level with, or higher than

the surrounding landscaping. For landscaping exceeding 100mm, additional height adapter units (available in 50mm or 100mm depths) must be used to achieve the required chamber depth, with the chamber lid being at least level with the surrounding landscaping or higher. Installation as clause 830.

- 20 - 40mm round washed pebble vegetation barrier provided around all protrusions and in conjunction with AL80/100, where used at perimeters, as clause 460. Installation as clause 840
- Bauder Organic Fertiliser (slow release), applied as clause 850A.

- **Additional requirements:** As clauses 210, 710, 715A, 720, 910, 915B, 916, 920, 930.

PERFORMANCE

210 GENERAL DESIGN

- **Green roof and associated features:** Complete the detailed design.
- **Proposals:** Submit drawings, technical information, calculations and manufacturers literature.

PRODUCTS

460 PEBBLE BALLAST

- **Type:** Washed, round pebbles.
- **Size:** Graded 20-40mm and free from fines and sharps.

463C IRRIGATION

- **Supplier:** Access Irrigation Ltd. Crick, Northampton NN6 7XS
  Tel: 01788 823811, Fax: 01788 824256, E-mail: sales@access-irrigation.co.uk
- **Product reference:** Permadrip Pro - drip line irrigation system with anti-syphon design to resist clogging and pressure regulation.
- **Material:** Perforated UV resistant plastic - Colour: Dark Brown
- **Height:** 10mm
- **Operating range:** 0.8 -4.3bar.
- **Wall thickness:** 1.2mm
- **Nozzle output:** 1.6L/h
- **Spacing:** 150mm.
- **Pipe connection:** For Bauder Extensive Green Roofs, all irrigation systems using Permadrip Pro must use PoziLock compression fittings for both the drip line and water feed pipework. Barbed connectors are not permitted.
- **Location:** Irrigation system to be installed flush with the surface of the growing medium and tested to ensure that it is fully operational prior to installation of the vegetation blanket.
- **Design:** The design, water pressure, positioning and spacing of the drip line is critical to the performance and effectiveness of the system. Therefore, the irrigation scheme for each project should be designed accordingly to ensure it is fit for purpose. Irrigation is a specialist subjects and Access Irrigation Ltd provide a design service and can assist with information pertaining to any individual project upon request.

EXECUTION

710 INSTALLATION GENERALLY

- **Preparation:** Clear all surfaces of debris.
- **Timing:** After certification of waterproof membrane integrity.
- **Surface condition:** Visually inspect waterproof membrane, report any damage.
- **Faults in waterproof membrane:** Report.

- **Contamination**: Do not use materials detrimental to healthy plant growth.
- **Storage:** Do not overload.
- **Point loads:** Avoid.
- **Outlets:** Do not block.
- **Outlet grilles:** Installed (these can be omitted where Bauder inspection chambers are used, if the grille cap height obstructs the closing of the chamber lid).

715A GREEN ROOF RELATED REQUIREMENTS

- **The following are vital to the accurate pricing, correct installation, and ultimately the long-term life of a green roof, and must, therefore, be included within the specification and tender documents: -**
- **Loadings:** It is assumed that the architect or his advisors have satisfied themselves that the roof structure and deck are suitable to receive the dead load of the proposed green roof system and landscape both during construction and on completion of the works.
- **Additional protection:** A planned or contractual delay between the installation of the waterproofing and landscape will almost certainly necessitate additional/increased protection to the waterproofing. This protection may be temporary or permanent. The responsibility and cost of this possible extra protection should be clearly included within the tender documents.
- **Detailed drawings:** Correct detailing design and construction is essential to the long-term life of the green roof. It is essential, therefore, that detail drawings illustrating for the construction are included with the tender documents, in order to enable the contractor to tender accurately.
- **Minimum upstand height requirements**: The waterproofing should be taken up all abutment upstands, pipes, detailing protrusions etc. a minimum of 150mm above finished landscape surface level to comply with British Standards and current code of practice BS8217:2005.
- **Provision for living products in hot weather conditions:** During hot weather conditions, living products such as plants, turf, sedum blankets etc. must be laid on the day of delivery to site. With regard to sedum blankets or turf, any rolls not installed should be laid out and kept watered prior to final installation.
- **Watering / Irrigation:** Adequate provision for watering the installed any form of planting must be in place on site before the product is installed. Irrigation systems if fitted should be operational. Initial watering should be by surface sprinklers to water in the fertiliser, where this is specified. All watering should be carried out in strict accordance with the Bauder watering requirements and guidance document.
- **Final Inspection:** No landscaping work should be installed until Bauder have carried out a final inspection to the waterproofing and have passed this as suitable for guarantee. It is the responsibility of the roofing contractor to advise and organise this inspection with Bauder. We cannot guarantee any waterproofing that has been landscaped without this inspection having been carried out and passed as acceptable.
- **Damage risk form other trades:** No landscaping should be installed while the roof area is subject to other site traffic. Bauder will carry out an inspection of the completed roof 4-6 weeks following installation and any site related damage by others will be reported to the client. Bauder accept no responsibility whatsoever for damage to the product or the installation caused by site work carried out by others after the landscaping has been installed.
- **First year maintenance:** The contractor must price into his tender the cost of post installation maintenance for a minimum period of 1 year to ensure the handover of a flourishing green roof.

720 ADVERSE WEATHER

- **Unfinished work:** Secure from damage and wind uplift.
- **Conditions:** Do not install or work with frozen materials.

LANDSCAPING INSTALLATION

745 SLIP LAYER INSTALLATION

- **Installation:** to be rolled out loose over the root resistant layer as specified (one layer for Extensive landscaping and two layers for Intensive landscaping).
- This product is only required for roofs with a fall between 0-3º (A slip layer is not necessary or advisable for slopes above 3º).
- **Joints:** Minimize.
- **Overlaps (minimum):** All laps to be 150mm with care being taken to ensure that roll sides join between layers.
- **Upstands:** Extend to top of growing medium. Sufficient foil must be allowed for to enable it to be taken up all upstand and edge details prior to installation of the protection layer.

750A PROTECTION LAYER INSTALLATION

- **Installation:** 6mm thick Protection Fleece, rolled out and laid loose.
- **Joints:** Minimize.
- **Overlaps (minimum):** Laps to be 150mm.
- **Upstands:** Sufficient protection fleece must be allowed for so that it may be installed to all abutment upstands and edge details, in accordance with the manufacturer's instructions. Extend to full height of the upstand and secure in place by using a lead or fabricated metal counter-flashing.
- **Openings in landscape restraint kerbs:** Where these kerbs are present (roof slopes above 5º), the protection layer should be cut away from the openings/ gaps to avoid impeding drainage.

770E DRAINAGE / WATER STORAGE LAYER INSTALLATION

- **Extent:** Continuous over entire designated roof area.
- **Fitting:** Loose laid over the protection layer. Boards to overlap and interlock by one cup profile at sides and ends and each row be laid staggered. The 'X' stamped impression on the highpoint of the cup moulding indicates where boards overlap.
- **Upstands:** Carefully cut to fit closely around penetrations and outlets.
- **Construction of planter walls:** The drainage/water storage board provides a suitable base surface for building concrete or brick kerbs/walls. The specified infill haunching should be installed over the board to required depth of cover, poured directly into the cells of board. These should be constructed to provide an adequate support for the raised masonry planters
  For the specification of the type of infill and all kerb/wall construction elements – please refer to the structural engineer's plans and the specification. An internal surface of the planter wall may be primed using bituminous primer and then lined with single layer of torch applied root resistant Bauder Plant-E. The bright green slate finish may be considered undesirable, but the slate is necessary for long-term UV protection of the bitumen. To disguise and blacken the slate colour, paint exposed areas above anticipated soil level with a light coat of bituminous primer.

780A FILTER MEMBRANE INSTALLATION

- **Joints:** Minimize.
- **Overlaps (minimum):** 150mm
- **Fitting:** Loose laid over drainage layer in accordance with manufacturer's recommendation.
- **Upstands (soft landscaping):** Extend up, between vegetation barrier and growing medium and trim flush with finished surface level.
- **Upstands (Hard landscaping):** Extend to top of perimeter abutments and trim flush just below finished surface level.

790A GROWING MEDIUM INSTALLATION

- **Handling:** Minimize.

- **Conditions:** Handle in the driest condition possible. Do not handle or install when wet or frozen.
- **Layers:** Start by applying two equal layers, building up to required maximum depth.
- **Sequence:** Gently firm each layer before spreading the next. Allowance should be made for any settlement that may occur. It is recommended that measuring stick markers of the required depth be used around the roof area to ensure that a minimum acceptable thickness of growing medium is achieved.
- **Supply:** Depending on size and access of the project the 'substrate' can be supplied by various methods i.e. Tipper, Silo lorry (pumping directly onto the roof area), Big bags, or sacks. Prior to costing this element of the installation the 'Approved Contractor' must contact Bauder Ltd so that they may advise on the best solution on any specific contract.
- ***Important note regarding alternative substrates:*** If alternative substrates are required (e.g. topsoil…etc.), Bauder does not take any responsibility for the performance of such substrates supplied from an alternative source. We recommend that alternative substrates should be covered by a technical data sheet and certified in writing as suitable to support the system and plants specified. Saturated weight loadings must be provided directly from the supplier of the substrate and should be the subject to a structural engineer's approval.

800B VEGETATION BLANKET INSTALLATION

Handling blankets:

- **Timing:** Lay within 36 hours of lifting from growing position.
- **Method:** laid manually – two-man operation
- **Excessive stacking:** Not permitted.
- **Material loss (maximum):** 3% of total surface area.

Growing medium condition: Thoroughly watered

Laying blankets:

Dry, damaged, frosty or waterlogged blankets: Do not lay.

- **Orientation:** Diagonal or perpendicular to slope of roof.
- **Joints:** Stagger. Butt together or slightly overlap to prevent gaps. Do not stretch blankets. All excess vegetation should be removed from the overlap and the opposite leading edge of the blanket to ensure that the joints butt together tightly (as per the Bauder installation guideline).
- **Edges:** Finish with whole blankets.
- **Consolidation:** N/A
- **Dressing:** Bauder Xero Flor substrate.
- **Application:** Brush in to fill joints.
- **Watering:** Thorough, immediately after laying and dressing.
- **Roll size:** 2m x 1m

820E EDGE RETAINING PROFILE INSTALLATION

- **Cutting:** Neat, accurate and without spalling.
- **Junctions:** Cut with a hack saw to form 90º corners – mitre cut fixing arm.
- **Position:** True to line and level. Smooth continuous lines.
- **Fixing:** The AL80/100 trim is to be secured in place by separate pieces of torch applied Bauder Plant-E capping sheet cut into strips 1000mm x 200mm, these bituminous flashings should be torched to the surface of the trim and set at intervals of 400mm between each one metre long flashing piece, bonding onto the main capping sheet by a minimum 100mm. Bauder AL80/100 can be installed either to form an 80mm or 100mm perforated retention upstand, depending on which way the fixing arm is secured.
- **Location:** AL80/100 must always be used in conjunction with the pebble vegetation barrier.
- **Precautionary note:** when cutting metal, please ensure that appropriate tools and personal protection equipment are used.

825A INSTALLATION OF IRRIGATION PIPEWORK

- Pipe work should be installed and connected in accordance with the irrigation supplier's installation guidelines and set as per the plan provided. Pipework should be secured at intervals to the substrate as required using plastic pegs (available from irrigation supplier), but these must not exceed the depth of the substrate itself. Pegs are best installed off-set at an angle if they are over long or otherwise trimmed down to ensure that later foot traffic during maintenance does not push the peg beyond the substrate depth into the underlying drainage board. Once the vegetation blanket is installed, the pipes will become retained in position.

830 INSPECTION CHAMBER INSTALLATION

- **Location:** Install centrally over rainwater outlets.
- **Orientation:** Align parallel with adjacent features.
- **Surround:** Using 20/40mm grade washed pebbles; the inspection chamber must be surrounded by a 500mm vegetation barrier surround to prevent unwanted growth obstructing the drainage system.
- **Positioning:** Never place directly on the waterproofing membrane – see options below-
  Intensive / extensive soft landscaping: Placed directly on to the drainage / water storage layer.
  Inverted roof with pebble ballast: Placed directly on the vapour permeable membrane or filter layer.
  Decorative aggregate finishes: Placed directly on the protection layer or vapour permeable membrane / filter layer
  Important Note: Ensure that a suitably sized hole has been cut out of the underlying drainage board / protection layer to allow water to flow freely into the outlet.
- **Chamber Height:** The contractor should also allow for the installation of additional Bauder height adapter units as required, in order to bring the inspection chamber up to at least the height of the surrounding landscaping. These are available in either 50mm or 100mm units.
- **Box gutters and gullies:** Where a box gutter is to be constructed, provision should be made to accommodate the 250mm diameter of the inspection chamber. The front support leg of the chamber will need to be removed (see installation guide) for the unit to fit inside a box gutter /gully. We recommend that all box gutters are constructed to a minimum finished width of 500mm to ensure that the support feet of the inspection chamber sufficiently clears the angle fillets within the gutter sole and leaves space to dress the pebble vegetation barrier around the main body of the chamber.
- **Precautionary note:** When cutting metal, please ensure that appropriate tools and personal protection equipment are used.

840 VEGETATION BARRIER / DRAINAGE BARRIER

- A minimum 500mm pebble vegetation barrier must be provided to all perimeters and roof penetrations and protrusions i.e. surrounds to roof light or plant upstand kerbs, rainwater outlets, soil vent pipes, man-safe posts etc. as specified.
- Every 40m, there is a 30mm high barrier constructed of non-flammable materials or a one metre wide strip of solid paving, gravel or pebbles.
- We recommend 20/40mm rounded river washed pebbles. Stones or aggregates with sharp edges must not be used i.e. flint. Other materials may be used, but only after consultation and agreement with Bauder Ltd.
- At all open drainage perimeters AL80/100 drainage trim must be used to contain the vegetation barrier.
- For extensive green roofs where sedum blanket is specified, the vegetation barrier must cover the edges of the blanket by a minimum of 100mm in order to protect the exposed edge of the blanket against wind uplift and substrate erosion.

850A FERTILISER

- Bauder Organic Fertiliser slow release must be applied at a rate of 80g/m² onto the installed

planting.

- This product is to be supplied by Bauder Ltd.
- Care must be taken to distribute the fertiliser evenly, through use of an approved applicator.
- The vegetation / vegetation blankets should then be thoroughly saturated by the use of sprinklers so as to promote rapid establishment. It is the responsibility of the roofing contractor to liaise with the main contractor/ building owner to provide water to ensure that the growing medium/ blanket does not dry out within the first month – refer document 'Watering Requirement Guidelines for Extensive and Bio-diverse green roof installations'.

COMPLETION

910 INSPECTION

- **Timing:** Before handover.
- **Give notice (minimum):** 3 days.

915B ESTABLISHMENT WATERING REQUIREMENTS - XF300 PLANTING

- It is the responsibility of the roofing contractor to liaise with the main contractor/ building owner to provide water and ensure that the planted and fertilised growing medium is thoroughly irrigated immediately after installation.
- An adequate mains water supply of sufficient pressure, must be available and operational prior to the plants being delivered and installed. Initial watering must be by surface mounted sprinklers.
- See the Bauder Watering Guide document for detailed information on watering requirements.
- Bauder Ltd accepts no responsibility whatsoever for the condition of installed planting that is not properly watered or irrigated following landscaping works.

916 POST INSTALLATION MAINTENANCE

- The installing contractor should price into the tender, the cost of carrying out post-installation maintenance for a contract period to be agreed with the client's representative. Following completion of the landscaping installation and handover, the responsibility for future on-going maintenance of the green roof planting becomes the responsibility of the building owner or the Main Contractor, where this element forms part of the contract.
- **Maintenance services:** Bauder Ltd offers a professional maintenance service using experienced green roof technicians and would be pleased to provide an estimate for carrying out on-going maintenance. Please contact our green roof maintenance team on Tel: 01473 257671. Alternatively, the work can be contracted to experienced landscape contractors of your choice.
- **Period of maintenance contract:** *Insert requirement i.e. one year, two years etc.*
- **Scope of maintenance procedure:** as per manufacturer's recommendations.

920 COMPLETION

- **General:** Leave the works in a clean, tidy condition.
- **Surfaces:** Clean immediately before handover.
- **Outlets:** Clean and clear of obstructions.
- **Completed green roof:** Protect from adjacent or high level working.

930 DOCUMENTATION

- **Timing:** Submit at handover.
- **Contents:**
- Manufacturer's guarantees and warranties.
- Procedures for maintenance of the green roof.
- Record drawings showing the location of planting and associated features.

- **Number of copies:** as required by client.