

**Specification for**  
**Intensive Green Roof/Planting over structure**

**Phase 1BN Landscape**  
Excluding Brent Riverside Park (refer to 1065-03-SP-07)

**1065-15-SP-03**

**Issued for Phase 1BN RMA**

<b>Revision</b>	<b>Description</b>	<b>Issued By</b>	<b>Date</b>
-	Issued for RMA	RH	06.03.17
A	Issued for RMA	IM	19.04.17

Macgregor Smith Ltd  
Christopher House  
11 –12 High Street  
Bath BA1 5AQ

Tel: 01225 464690

[hello@macgregorsmith.co.uk](mailto:hello@macgregorsmith.co.uk)

**Project Details**

**Project Name:**

Phase 1BN Landscape (Excluding BRP)  
Brent Cross Shopping Centre,  
Hendon,  
London,  
NW4 3FP

**Client:**

Hammersons  
  
Standard Life Investments

**Landscape Consultant:**

Macgregor Smith  
Christopher House  
11-12 High Street  
Bath  
BA15AQ

**Scope of Works:**

The scope of works covered by this ‘Specification for Intensive Green Roof’ includes the operations indicated below. The principle areas covered by this specification are as follows:

- **Living Bridge Approach North**
- **Tempelhof Circus terrace adjacent to M&S facade**
- **Any other works over structure**

Refer to Base Landscape and Soft Landscape specification for all requirements relating to plant procurement and planting operations

Landscape Contractors should defer to the Main Contractor for confirmation of responsibility for specialist roofing elements.

**Operations:**

Installation of structure Water Proofing System	Refer to Architect’s/Engineer’s Specification
Installation of Root Barrier	Refer to Architect’s/Engineer’s Specification
Installation of Automatic Irrigation System	To Irrigation specialist’s design
Installation of Manual Irrigation System	To Irrigation specialist’s design
Roof drainage and filter layers	✓
Free draining topsoil	✓
Free draining topsoil amelioration	✓
Filling of planting areas	✓
Maintenance	✓

**Drawings:**

This Specification should be read in conjunction with the latest revisions of all of the drawings. Refer to Drawing & Document Issue Sheets for further information.



**Responsibilities of the Contractor:**

- Installation of materials and irrigation associated with Intensive Green Roof
- Plant Procurement and Preparation
- Horticultural and planting operations
- Pre & Post Practical Completion Maintenance

**Documents:**

This Specification should be read in conjunction with the Base and Soft Landscape Specification and Irrigation Consultants Specification. Where schedules and drawings conflict, the **drawings** will take precedence.

**Items requiring approval by the Landscape Architect :**

The following materials / works require approval from the Landscape Architect :

- Free draining topsoil (full analysis should be provided in line with Section 3 of 'Base Landscape Specification')
- Bark Mulch (in line with clause 3.4.6 of 'Soft Landscape Specification')
- Plant Procurement (to be inspected by the Landscape Architect at the supplying nurseries, as detailed in clause 3.2 & 3.3 of the 'Soft Landscape Specification')
- Green Roof System
- Detailed Irrigation Proposals

**Construction (Design and Management) Regulations:**

The Main Contractor will ensure compliance with the Construction (Design and Management) Regulations 2015 (CDM) and is required to act as Principal Contractor for the Works. For the purposes of the CDM Regulations, the Planning Supervisor shall be the person, firm or company defined in the contract documents.

The Landscape Contractor is to ensure that he and his staff co-operate fully with the Principal Contractor.

**Intended Programme:**

Refer to contract preliminaries.



**Plant Suppliers –  
Special Requirements:**

The plant suppliers for this project are defined within the Soft Landscape Specification. All stock for the project will only be sourced from the suppliers as directed.

**Suppliers:**

Alumasc Exterior Building Products/Geosynthetics

**Maintenance and Defects:**

All soft landscape works are to be maintained until Practical Completion.

All shrub planting areas, artificial turf areas and hedging material are to be maintained for a period of **12 months**, and semi-mature trees for **24 months** from either the overall date of Practical Completion, or the final date of the completion of the soft landscape works - whichever is the later, unless otherwise agreed in writing.

**The defects liability period will run concurrently with the maintenance programme.**



**Q37 INTENSIVE GREEN ROOF**

**GENERAL**

**110A INTENSIVE GREEN ROOF**

- Roof type: Refer to Engineers Specification
  - Substrate: Refer to Engineers Specification
  - Slope: Refer to Engineers Specification
- Waterproofing: Refer to Engineers specification
- Thermal insulation: Refer to Architects specification. Insulation may be required at perimeter of slab to address cold bridging.
- Root Barrier Layer: Root Barrier: WSF40.
- Drainage Layer: Zinco FD 60 or similar equal.
- Filter Sheet: Zinco FS Filter Sheet or similar equal.
- Growing medium: Free drainage topsoil as specified or similar equal.
  - Depth: Refer to drawings depth varies from 600mm to 1000mm + 30% settlement.
- Vegetation: As per the instructions of the client's appointed landscape consultant
- Accessories: Harmer Modulock Adjustable Access Cover Product Code: GR400/AC, Access Chamber Extension Piece Product Code: GR400G/AC , Access Chambers Product Code: GR400. Components to be selected to achieve depth from finished surface to the top of the structural slab over the outlet.

**PERFORMANCE**

**255A GREEN ROOF LOADS**

- The proposed structure at Tempelhof and on the Living Bridge Approach North have dead load parameters which have been taken into account in the designed scheme. The Contractor is to review the loading constraints set out by the Structural Engineer and ensure loading restrictions both during construction and on completion of the works are compiled with. Care must be taken during the construction process to avoid excess point loading of the structural slabs in line with parameters set out by the Structural Engineers.

**PRODUCTS**

**320 ROOT BARRIER**

Root barrier to be laid on top of the water proofing layer across the whole roof area unless the structure contains an integrated root barrier. Hydrogard 40 root barrier or similar equal to be installed to manufacturers latest recommendations.

**350 DRAINAGE LAYER – BELOW PLANTED AREAS**

- Manufacturer:  
The Alumasc Group plc  
Burton Latimer  
Kettering  
Northamptonshire  
NN15 5JP  
Tel: +44 (0) 1536 383844  
Fax: +44 (0) 1536 725069  
Email: info@alumasc.co.uk  
Product: Zinco FD 60 with a filter sheet  
Size: 1m x 2m sheets and 1m x 15m rolls  
Weight 1.7kg / m<sup>2</sup> empty, 4.7kg / m<sup>2</sup> full  
Product Reference: FD 25-E  
Colour: Black



Material: Recycled polypropylene (100%)

- Installation: Laid Loose to manufacturers latest recommendations

**360 FILTER MEMBRANE**

- Manufacturer:  
Alumasc Water Management Solutions  
Station Road  
Burton Latimer  
Kettering  
Northamptonshire  
NN15 5JP  
Tel: +44 (0) 1536 383810  
Fax: +44 (0) 1744 648401  
Email: [info@alumascwms.co.uk](mailto:info@alumascwms.co.uk)  
Web: [www.alumascwms.co.uk](http://www.alumascwms.co.uk)  
Product: Filter Sheet SF or similar equal and approved.

- Installation: Laid Loose to manufacturers latest recommendations

**350 DRAINAGE LAYER – BELOW HARD AREAS**

- Manufacturer:  
Geosynthetics Limited  
Fleming Road  
Harrowbrook Industrial Estate  
Hinckley  
Leicestershire  
LE10 3DU  
Telephone: 01455 617139  
Fax: 01433 617140  
Product: RoofCell
- Installation: Laid Loose to manufacturers latest recommendations

**380 FREE DRAINING GROWING MEDIUM**

The following intensive soil can be considered for the project.



**390 FREE DRAINING GROWING MEDIUM**

Physical Parameters required for the Top Soil

	<u>Value</u>
i. Total porosity (%)	38 – 45
ii. Air Filled porosity (%)	15 – 20
iii. Water filled porosity (%)	15 – 20
iv. Bulk density (g/cm <sup>3</sup> )	1.60 – 1.80
v. Dry density (g/cm <sup>3</sup> )	1.50 – 1.60
vi. Triaxil permeability (m/sec)	10-5 – 10-6
vii Particle size (%)	
Sand	75 – 95
Silt	5 – 10
Clay	5 – 10
Sand Fraction (%)	
Very Fine	0 – 5
Fine Sand	10 – 20
Medium Sand	30 – 60
Coarse Sand	10 – 20
V. Coarse Sand	0 – 5
Texture	Sandy Loam

Physical Parameters required for the Sub Soil

	<u>Value</u>
i. Total porosity (%)	33 – 40
ii. Air Filled porosity (%)	10 – 15
iii. Water filled porosity (%)	10- 15
iv. Bulk density (g/cm <sup>3</sup> )	1.80 – 2..00
v. Dry density (g/cm <sup>3</sup> )	1.70 – 1.90
vi. Triaxil permeability (m/sec)	10-6 – 10-7
vii Particle size (%)	
Sand	70 – 80
Silt	10 – 15
Clay	10 – 15
Sand Fraction (%)	
Very Fine	0 – 5
Fine Sand	10 – 20
Medium Sand	30 – 60
Coarse Sand	10 – 20
V. Coarse Sand	0 – 5
Texture	Sandy Loam



**Chemical Parameters**

The nutrient loadings of the shrub soil or tree and turf soil are dependent on the drainage properties linked with the depth of placement and the demands the plant has for nutrients. i.e. a large tree planted at depth does not require elevated levels of organic matter nor does a quality lawn. The higher the organic content in this situation only encourages the soils to settle and compact, effectively removing the level/even surface achieved after consolidation of the seedbed.

The nutrient loadings normally associated with BS 3882 top soil would be in line with that required for the shrubs and plants which have larger demands. Thus the organic levels are set approximately at 4 – 5% for the shrub soil, which will elevate the total nitrogen contents to approx. 0.2%. A 4% organic content will slow water percolation rates down to  $\times 10^{-6}$  m/sec which is ideal for the application the soil in being selected.

Tree/ turf soil should possess lower levels and these are set approx. 2.5 – 3%, in line with that normally associated for sands selected for golf green construction. This reduced level will increase drainage levels to  $\times 10^{-5/6}$  m/sec and reduce the nutrients levels proportionality to that which is being applied. The data below gives the comparisons:

	<u>Shrub Soil</u>	<u>Tree/turf soil</u>
pH	6.5 – 7.5	6.5 – 7.5
Organic Matter (%)	4.0 – 5.0	2.0 – 3.0
Electrical Conductivity (us/cm)	500 – 800	300 - 500
Total Nitrogen (%)	0.15 - 2.0	0.1 – 0.15
Phosphorus (mg/l)	40 – 60	25 - 40
Potassium (mg/l)	500 – 800	250 - 400
Magnesium (mg/l)	150 – 200	75 - 125

Heavy Metals and Hydrocarbons will be in line with current CLEA model requirements.

The base soils, including the incorporation of green compost, are being considered for the project and are currently being tested for all the properties listed to demonstrate that in the intended application they will drained at the desired rate, maintained structure and thus AFP and WFP values will stay in line with the desired soil environment.

In order to elevate the nutrient status of the sands and give them a reserve of plant nutrients and a moisture holding ability, green compost will be selected and incorporated to create tree soil or shrub soil, the nutrient loading will be in line with presented above.

Green compost is created from composted plant material, which under controlled conditions creates a stable humus material, which possesses the appropriate levels of plant nutrients and organic matter. When applied to soil it creates a nutritional environment in line with BS 3882. Once composted this product is extremely stable and does not mineralise or decompose very easily thus will remain within the soil, effectively it can be compared with the organic matter in a normal soil.

Shrub soil will possess and elevated level of compost when compared to tree soil as this is in line with that found in normal growing conditions.

The key to achieving the growth performance required is to ensure that once the soils are placed, and after a period of consolidation, the sub and top soils physical and chemical properties remain constant and in line with that presented above.





**400 Soil Scientist Selection**

Soil analysis and production of the interpretive report must be undertaken by a Soil Scientist approved by the Landscape Architect, as detailed in the following schedule:

<b>Approved Soil Testing Facilities</b>
Tim O'Hare Associates Tim O'Hare Associates Howbery Park Wallingford Oxfordshire OX10 8BA UK  Tel : 01491 822653 Email: info@toha.co.uk Contact : Tim O'Hare

**410 Interpretive Report**

The results of analysis should be presented in an **interpretive report** to include a Certificate of Analysis, comments on the soil's compliance with the relevant specification and its suitability for the proposed landscape scheme with respect to the parameters determined. A copy of this specification and the proposed planting list / drawings for the landscape scheme shall be provided when the samples are submitted for review by the soil scientist and for reference within the soil analysis report. The report should either confirm that the specified application rates for fertiliser and compost applications are satisfactory, or make recommendations where appropriate.

Any soil offered which is deficient in the nutrient levels described above, but which otherwise conforms to the specification, may be acceptable providing suitable adjustments are made with the addition of organic and inorganic fertilisers to the satisfaction of the Landscape Consultant and at no additional expense to the contract.

The Landscape Consultant retains the right to reject any or all subsoil, which does not comply with the specification and may request the Contractor to use other sources of supply. If, in the opinion of the Landscape Consultant, the subsoil varies in quality over the duration of importation, he may request further assessment of soil quality. If in such subsequent tests the quality of subsoil is found to be below specification then the Contractor will be liable for all costs incurred in sampling and the removal and replacement of defective materials.



**430 INSPECTION CHAMBERS**

- Manufacturer: Alumasc Exterior Building Products Ltd.
    - Product reference:  
Harmer Modulock Adjustable Access Cover Product Code: GR400/AC,  
Access Chamber Extension Piece Product Code: GR400G/AC  
Access Chambers Product Code: GR400.
- Components to be selected to achieve depth from finished surface to the top of the structural slab over the outlet.

**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.

**720 ADVERSE WEATHER**

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

**770 DRAINAGE LAYER INSTALLATION**

- Extent: Continuous over entire roof area.
- Fitting: Butt jointed and stapled together.
- Upstands: Fit closely around penetrations and outlets.

**780 FILTER MEMBRANE INSTALLATION**

- Joints : Minimize.
  - Overlaps (minimum): 200mm.
- Fitting: Unsealed.
- Upstands: Extend to top of growing medium.

**790 GROWING MEDIUM INSTALLATION**

- Handling: Minimize.
  - Conditions: Handle in dry condition possible. Do not handle or install when wet/ frozen.
- Layers:
  - Depth (maximum): Refer to drawings + 30% to the calculated volume to allow for settlement.
  - Sequence: Gently firm each layer before spreading the next.

**805A VEGETATION**

- All hard and soft landscape is to be installed as per the instructions of the client's appointed Landscape Consultant.
- Manual or automatic irrigation is to be provided to the Irrigation Performance Specification installation as directed by the client's appointed Landscape Consultant. The system to be installed as per manufacturer's instructions and commissioned prior to the installation of the planting.



**830 INSPECTION CHAMBER INSTALLATION**

- Location: Install centrally over drain outlet, the filter sheet is to be dressed over the flange and up the body of the inspection chamber.
  - Orientation: Align parallel with adjacent to paving units.

**840 MAINTENANCE**

- The client or their designated representative is to carry out maintenance to the horticultural element of the green roof as directed by the landscape consultant responsible for the initial planting regime.

**PRICING, PLANNING & CONTRACTUAL**

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 :

The installation of the Green Roof will only be carried out by a competent contractor with a track record of roof installations. The workmanship of the Contractor is to be regularly checked during the contract either by Landscape Architect.

Provision should be made to estimate the number of site visits required of the Green Roof contractor to enable them to complete the contract. The number of visits estimated should be entered into the tender documents in order to facilitate accurate pricing.

A planned or contractual delay between the installation of the waterproofing and installation of the 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 will be the responsibility of the Main Contractor.

Intensive Landscape - It is essential to the long-term life of the landscape that some form of irrigation system is provided, preferably on an automatic basis.

Correct detailing design and construction is essential to the long-term life of the green roof. It is essential, therefore, that detail drawings are read in conjunction with the specification.

It is strictly the contractor's responsibility to ensure that all works are executed in accordance with current health and safety legislation (guidance may be taken from HSE publication Ref HSG33, "Health and Safety in Roof Work").

Safety scaffolding, the location of rubbish skips, access ladders etc should be agreed with the client/principal contractor and be in accordance with current Health and Safety regulations.

Approved Contractors are advised to visit site when deemed necessary and make themselves fully acquainted with the extent of the works and the conditions under which they are to be executed.

