

A black and white architectural rendering of a modern, multi-story office building. The building features a grid-like facade with numerous rectangular windows. A prominent glass-enclosed rooftop structure is visible on the upper part of the building. To the left, a smaller section of the building has a rooftop garden with plants. The foreground shows a paved plaza with several people walking, including a group of three women in the lower left. Trees and a street lamp are also visible in the scene. The sky is overcast.

# KING'S CROSS CENTRAL BUILDING R1

Plot R1 King's Cross

Discharge of Planning Conditions 10 and 11

Brown Roof

Bird/ Bat Boxes

**Allies and Morrison**

January 2018



## INTRODUCTION

This report relates to the discharge of Conditions 10 and 11 attached to the Building R1, Development Zone R, King's Cross Central, Planning Permission (ref: 2015/2886/P).

As both of these conditions relate to the details of roof areas of the R1 building, they have been combined into one submission.

Condition 10 'BROWN ROOF' states: "Details of the construction, planting and maintenance of the brown roof shall be submitted to and approved in writing by the local planning authority prior to commencement on the relevant part of the development. The building shall not be occupied until the relevant approved details have been implemented. These works shall be permanently retained and maintained thereafter."  
(...)

Condition 11 ' BIRD/ BAT BOXES' states:  
"Prior to commencement on the relevant part of the development hereby approved details of bird and bat box locations and types, and an indication of species to be accommodated, shall be submitted to and approved in writing by the local planning authority prior to commencement on the relevant part of the development. The building shall not be occupied until the relevant approved details have been implemented. The works shall be permanently retained and maintained thereafter." (...)

An Ecological Report for the site was produced by a qualified ecologist in October 2015 to satisfy BREEAM requirements. Recommendations from the report have informed aspects of this submission, such as the selection of seeding for the brown roof and type and number of bird boxes.

If considered relevant, a copy of this report can be forwarded for LBC information.



## CONDITION 10

### BROWN ROOF

#### BROWN ROOF

The roof areas provided achieve the overall area outlined in the original planning application documents and as described in the DAS, some areas of brown roof are situated beneath PV cells.

A wildflower mix as recommended by the ecologist is proposed to encourage diversity of invertebrates and other species.

#### LOCATIONS

The brown roof areas are on L10 and are shown in Appendix 1.1 and 1.2.

#### DETAILS

Refer to Appendix 1.3 for details and 1.4 for detail information on the roof build ups.

#### MAINTENANCE OF THE ROOF

Please refer to Appendix 1.5 for guidance on the maintenance for the green roof.



## CONDITION 11

### BIRD/ BAT BOXES

#### BIRD BOXES

The ecology report recommended the inclusion of two bird boxes which cater for different bird species such as the house sparrow and black restarts.

Two triple bird boxes to the specification approved by the ecologist have been included based on this advice.

#### LOCATIONS

The bird boxes are to be located in the Cooling Tower area on Level 09.

Refer to Appendix 2.1 for location drawings and 2.2 for images.

#### PRODUCT

The product literature for the Schwegler Sparrow Terrace bird box states, *"Made from long-lasting, breathable woodcrete. No maintenance required."*

#### DETAILS

The boxes are to be hung from the insulated panels separating the Cooling Tower from the L9 corridor. As per product literature they are to be hung 2 metres or above the finished floor level in the Cooling Tower area.

External Dimensions:

24.5cm high x 43cm wide x 20cm deep

Also refer to Appendix 2.2 for images.

#### SPECIES

Product literature states, *"The Sparrow Terrace has been designed to help redress the balance of falling house sparrow numbers..... It may also occasionally attract tits, redstarts and spotted flycatchers."*

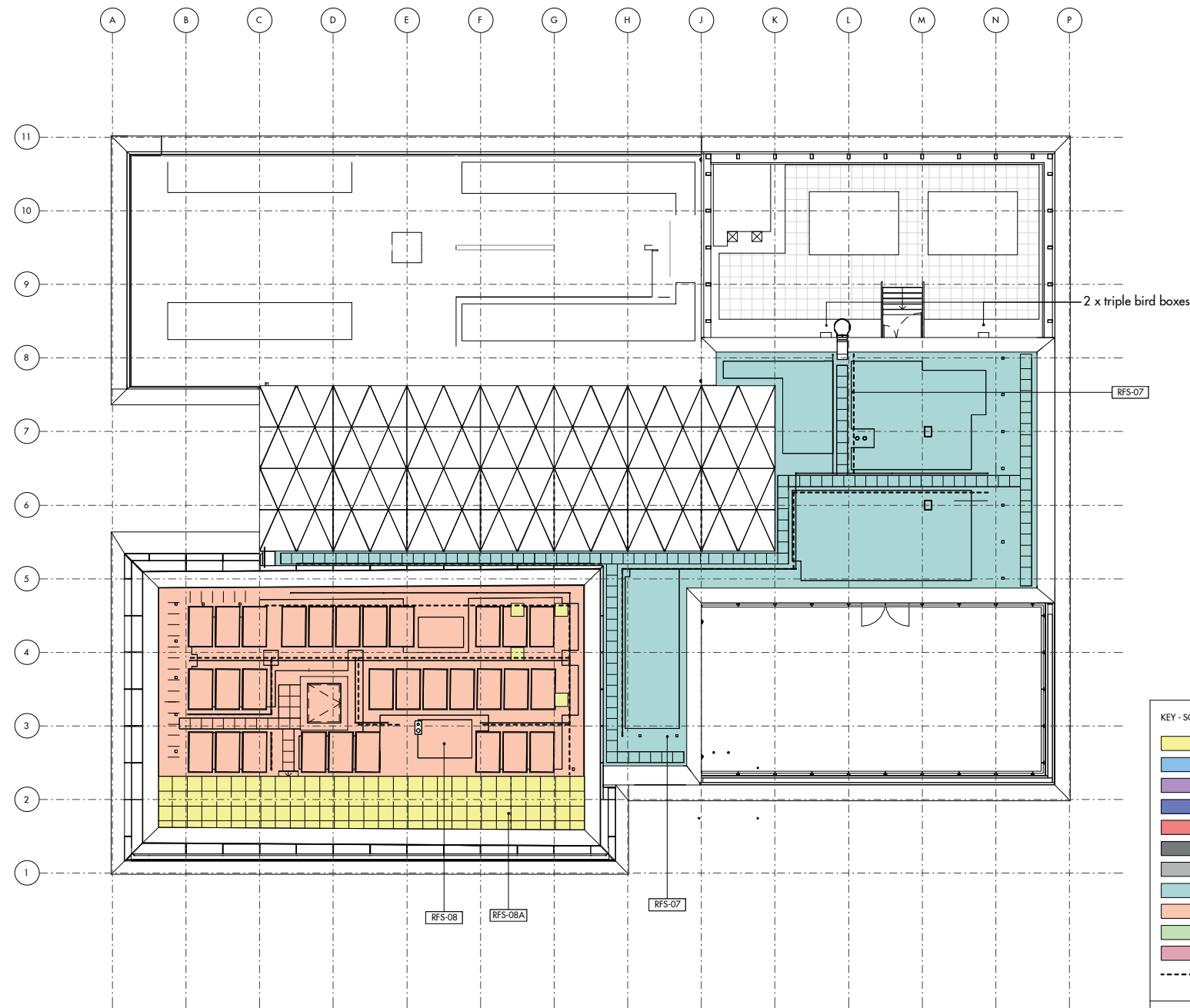




## **APPENDIX 1 - BROWN ROOF**

- 1.1 – Roof Plan
- 1.2 - Bay Study Roof Plans
- 1.3 - Roof Details
- 1.4 – Roof System Information
- 1.5 - Suggested Maintenance Schedule





1 ROOF SCOPING - ROOF PLAN  
1 : 100

	Do not scale from this drawing. Use figured dimensions only. Figured dimensions are in millimetres. All levels are in metres. All dimensions and levels shall be verified on site before proceeding with works. Detailed site survey to be carried out to verify positions and level relationships with site features and ordnance survey. The Architect must be notified of any discrepancy.	REV	11.08.15	ISSUED	AM
		REV	14.10.15	ISSUED FOR DESIGN INTENT	AM
		REV	18.12.15	ISSUED	AM
		REV	13.01.16	ISSUED FOR ROOF PACKAGE UPDATE	AM
	Where building components are described in the specification as Descriptive Specification - (Constructive Design) elements shown on this drawing pertaining to those components are to be read as "Issued for Design Intent" only.				
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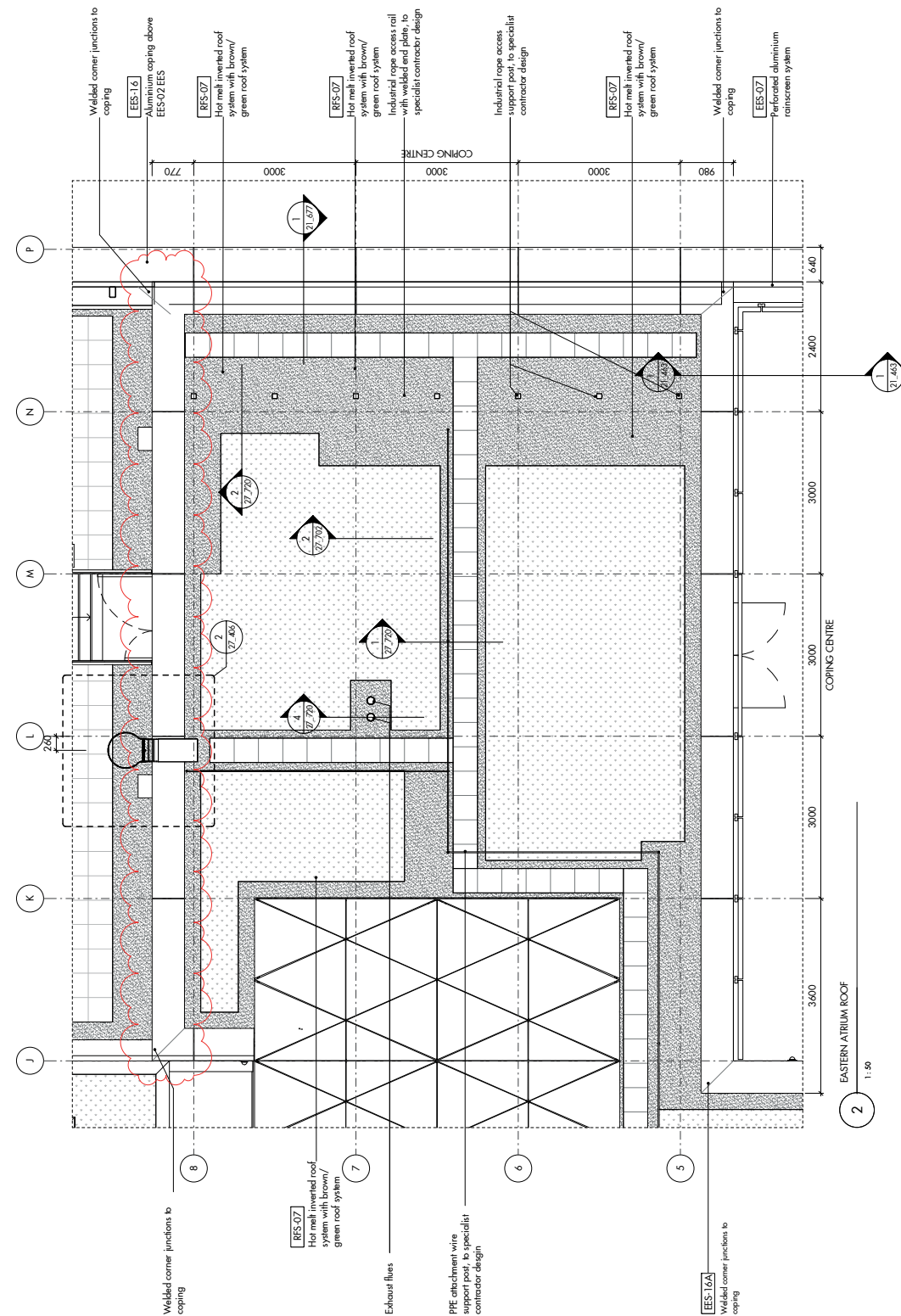
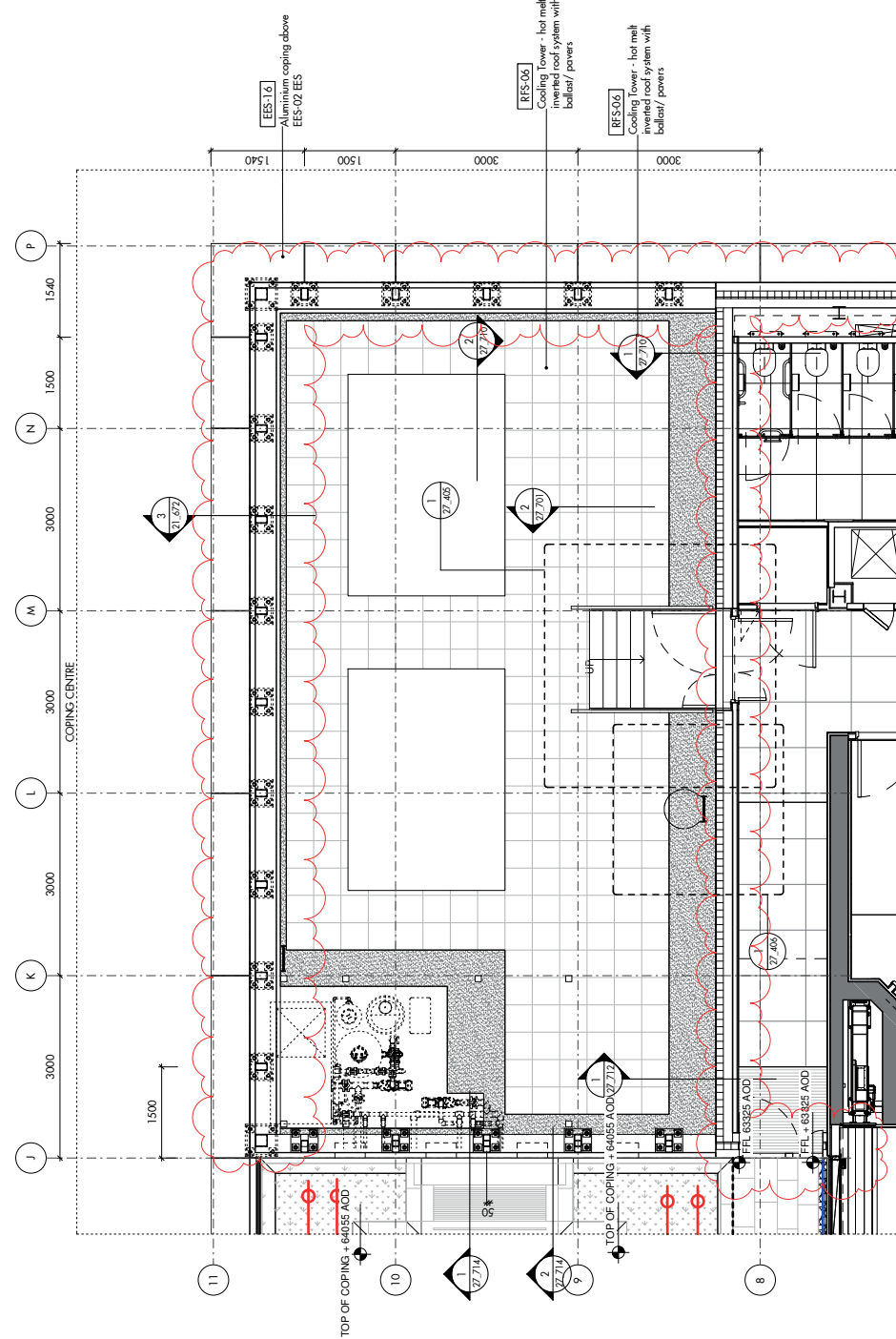
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AGA KHAN DEVELOPMENT NETWORK :  
ROOF SCOPING - ROOF PLAN  
ROOFS  
280\_15\_27\_104  
SCALE 1 : 100 @A1

A&M JOB NO: 280\_15

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## 1.1 - ROOF PLAN



KEY - ROOF DRAWING	
	Green/Brown roof
	Bed-lift margin to parapet and roof penetrations
	Powers, refer to drawings 27_700, 701 & 702 and roof specification

Do not scale from this drawing. Use figured dimensions only. Figured dimensions are in millimeters. All levels are in meters. All dimensions and levels shall be verified on site before proceeding with works. Detailed site survey to be carried out to verify positions and level relationships with site features and ordinance survey. The Architect must be notified of any discrepancies.

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AGA KHAN DEVELOPMENT NETWORK :  
BAY STUDY - COOLING TOWER/ EASTERN ATRIUM ROOF  
ROOFS  
280\_15\_27\_402

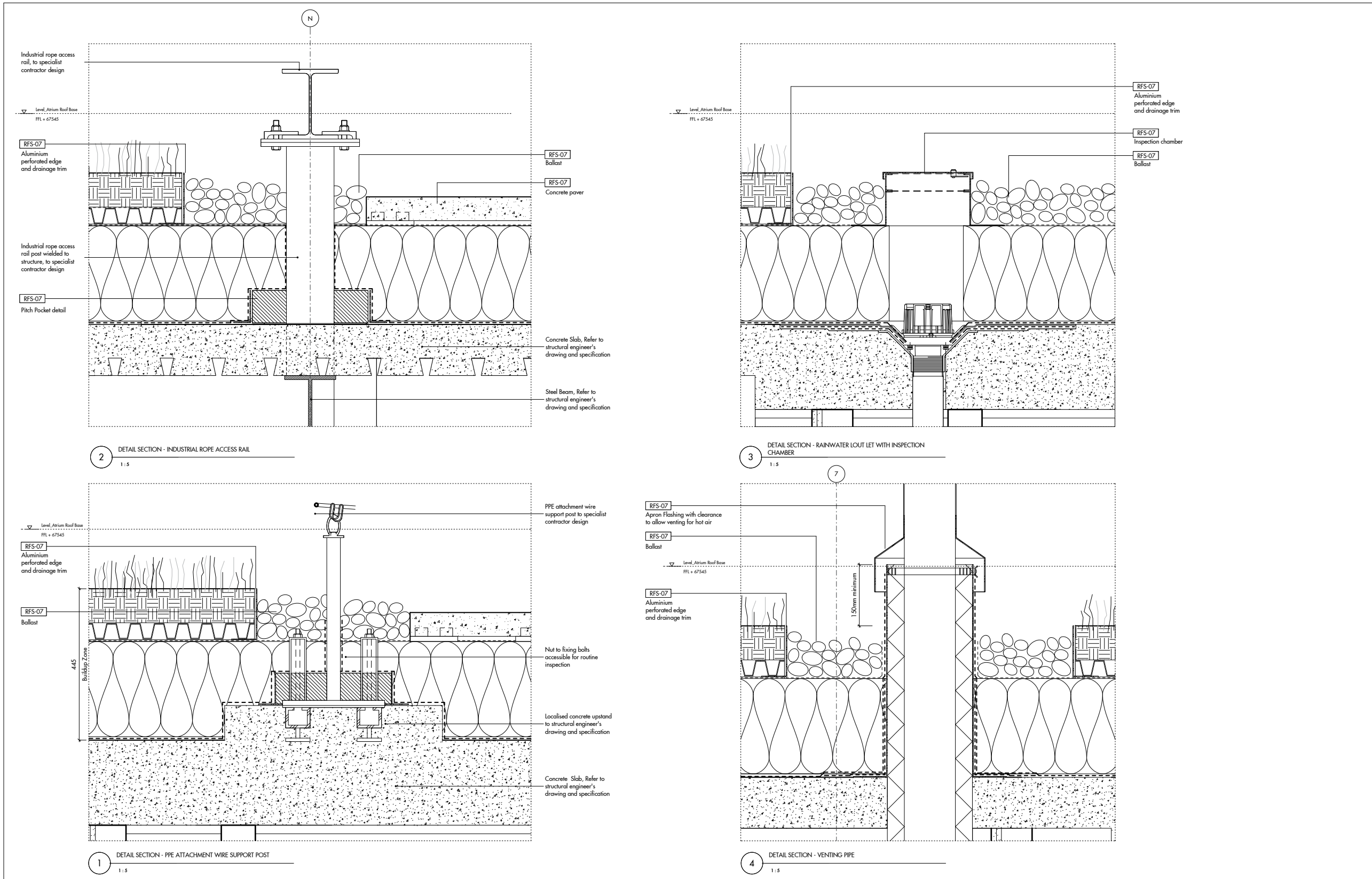
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## 1.2 - BAY STUDY ROOF PLANS



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	1	18.12.13	ISSUED	
	2			
	3			
	4			

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ROOFS  
280\_15\_27\_720

SCALE 1:5 @A1

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FOO

1.3 - ROOF DETAILS





# Proposed Specification

Alumasc Roofing System for Kings Cross R1, London



Ref: SP77033-S4

Date: 09 June 2016

## 1.4 - ROOF SYSTEM INFORMATION

Project No: SP77033-S4  
**Level 10 Roof**

Project: Kings Cross R1, London

Submitted by: Alumasc Exterior Building Products Ltd  
White House Works, Bold Road, Sutton, St Helens, Merseyside, WA9 4JG

Author: Brian Cottington

Contact Email: [cottingtonb@alumasc-exteriors.co.uk](mailto:cottingtonb@alumasc-exteriors.co.uk)

Date: 09 June 2016

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All clauses with the suffix 'A' are either NBS Plus non-standard clauses and/or amended by Alumasc.

### **J31 LIQUID APPLIED WATERPROOF ROOF COATINGS**

To be read in conjunction with related Architectural Sections, Preliminaries and Contract Conditions.

#### **TYPES OF COVERING**

##### **102-A BUILD-UP OVERVIEW**

- Alumasc Bitumen Primer.
- Hydrotech 6125 hot-applied rubberised bitumen waterproofing system.
- Hydrogard 40 Protection Sheet.
- 205mm Alumasc Extruded Polystyrene Insulation.
- 56mm Alumasc Extruded Polystyrene Upstand Board.
- Alumasc Polypropylene Separator Sheet.
- Alumasc/Blackdown Green Roof, refer to Q37 'Green Roofs' NBS specification.

##### **130-A INVERTED ROOF COATING**

- Substrate: Concrete to structural engineer's/architect's specification.
- Density: Minimum 1850 kg/m<sup>3</sup>.
- Finish: Wood float, with a wood -trowelled finish. Steel trowelled or power floated are not suitable.
- Hydration (cure): Recommended minimum 28 days, subject to concrete type, ambient temperature etc.
- Falls: 0°.
- Preparation:
  - Surface is to be dry, clean, and free from all contaminants including oils, grease, laitance, dirt and debris.
  - Advance bond tests must be carried out (and recorded for future reference) on all areas, as clause 710-A.
- Waterproof coating: Hydrotech 6125 Structural Waterproofing System.
  - Manufacturer: Alumasc Exterior Building Products Ltd  
White House Works, Bold Road  
Sutton, St Helens, WA9 4JG  
Telephone: 01744 648400  
Email: roofing@alumasc-exteriors.co.uk
  - Primer: Alumasc Bitumen Primer.  
Application: As clause 720-A.
  - Coating: Hydrotech Monolithic Membrane 6125.  
Application: At a rate of 6.5kg/m<sup>2</sup> to a nominal 6mm (3+3mm) thick coat of Hydrotech 6125 combined with integral reinforcement/s, as clause 760-A.
  - Reinforcement/s: Flex-Flash F / Flex-Flash UN, where appropriate.  
Application: Laid into the first coat of Hydrotech 6125, as clause 760-A / 770-A.
  - Protection sheet: Hydrogard 40.  
Colour: Charcoal mineral.  
Application: Laid into the second coat of Hydrotech 6125, as clause 760-A.
- Insulation to field area: 205mm Alumasc Extruded Polystyrene Insulation.
  - Attachment: Loose laid, as clause 830.
  - Detailing: 56mm Alumasc Extruded Polystyrene Upstand Board, where appropriate.  
Attachment: Loose laid, restrained by main field insulation at foot of detail, as clause 831-A.
- Filter layer: Alumasc Polypropylene Separator Sheet.  
Attachment: Loose laid, as clause 832-A.
- Surface: Alumasc/Blackdown Green Roof, refer to Q37 'Green Roofs' NBS specification.
- Accessories:
  - Alumasc Harmer outlet/s, see clause 392-A.
  - Alumasc Standard Termination bar, see clause 393-A.
  - Alumasc Derbitech Sealstick HD, see clause 394-A.

## PERFORMANCE

### 210 ROOF PERFORMANCE

- General: Secure, free draining and weathertight.

### 225 AVOIDANCE OF INTERSTITIAL CONDENSATION: WARM AND INVERTED ROOFS

- Determine: Interstitial condensation risk of roof construction as recommended in BS 5250.
- Vapour control layer: If necessary, provide a suitable membrane so that damage and nuisance from interstitial condensation do not occur.

### 230-A INSULATION

- Requirement: Determine type and thickness of insulation and integral or separate overlay to satisfy the following criteria:  
Thermal transmittance of roof (maximum): 0.15 W/m<sup>2</sup> k.
  - Compressive strength of insulation (minimum) at 10% compression: 300 kN/m<sup>2</sup>.
  - Finished surface: Suitably even, stable and robust to receive the covering.
  - Insulation compliance: To relevant British Standard, or Agrément certified.

### 280-A GENERAL DESIGN REQUIREMENTS

- All works must comply with all current relevant standards, codes of practice, and the Building Regulations to provide a secure, free draining and completely weathertight roof, including but not limited to:
  - BS 6229 - Flat roofs with continuously supported coverings. Code of practice.
  - BS 5250 - Code of practice for control of condensation in buildings.
  - BS EN 1991-1-4 Eurocode 1 - Actions on structures. General actions. Wind actions.
  - BS EN 12056-3 - Gravity drainage systems inside buildings. Roof drainage, layout and calculation.
  - BS EN ISO 6946 - Building components and building elements. Thermal resistance and thermal transmittance. Calculation method.
  - The Building Regulations Approved Document Part L1 or Part L2. Conservation of fuel and power.
- The design must take account of all structural factors to ensure that the waterproof covering is able to accommodate the effect of movement in order to avoid stress or deformation under these conditions.
- The waterproofing components' resistance to dead and imposed loading must be assessed to avoid failure of the component/and or reduction in performance. Where resistance is deemed to be inadequate, suitable measures to mitigate load intensity will need to be considered.
- Insulation must be incorporated to avoid cold bridges as determined by building control and/or appointed design professional.
- The design must ensure that the continuity of the waterproof covering is maintained for a vertical height of at least 150mm above the finished roof level at all abutments, parapets etc.
- The building owner or their appointed design professional must have satisfied themselves that the roof structure and deck are suitable to receive the dead load of the proposed specification.
- It is strictly the responsibility of the client and/or their design professional to ensure compliance of the proposed specification with all relevant Building Regulations by consultation with Building Control. In the event of any doubt about the interpretation or application of the Building Regulations in relation to any particular new build or refurbishment works, clarification must be sought directly from Building Control.

## PRODUCTS

### 340-A INVERTED ROOF INSULATION

- Type: Extruded Polystyrene (XPS) board.
- Standard: Manufactured to BS EN 13164.
- Manufacturer: Alumasc Exterior Building Products Ltd.
  - Product reference: Alumasc Extruded Polystyrene Insulation.
- Grade: 300 kPa.
- Edges: Lap jointed / Square edge, subject to thickness.
- Board size: 1250mm x 600mm.
- Thickness: 205mm.

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- Environmental status: BRE Green Guide Rating A.  
Blowing agent: CO<sub>2</sub>, CFC and HCFC free.  
Ozone depletion potential: Zero, Global warming potential: <5.
  - Certification: BBA certified, manufactured under ISO 9001 and ISO 14001.
- 341-A INVERTED ROOF UPSTAND BOARD
- Type: Extruded Polystyrene (XPS) board.
  - Standard: Manufactured to BS EN 13164.
  - Manufacturer: Alumasc Exterior Building Products Ltd.
    - Product reference: Alumasc Extruded Polystyrene Upstand Board.
  - Edges: Square.
  - Board size: 2400mm x 1200mm.
  - Thickness: 56mm.
  - Facing: 6mm weather resistant cement particle board.
  - Environmental status: BRE Green Guide Rating A.  
Blowing agent: CO<sub>2</sub>, CFC and HCFC free.  
Ozone depletion potential: Zero, Global warming potential: <5.
  - Certification: Manufactured under ISO 9001 and ISO 14001.
- 351-A FILTER LAYER
- Type: Non-woven polypropylene geotextile membrane, vapour permeable.
  - Manufacturer: Alumasc Exterior Building Products Ltd.
    - Product reference: Alumasc Polypropylene Separator Sheet.
  - Roll size: Width 1.5m x 100m Length, Thickness <1mm.
- 353-A WATERPROOF COATING
- Type: Hot melt liquid applied formulation combined with integral reinforcements, and protection sheet.
  - Manufacturer: Alumasc Exterior Building Products Ltd.
    - System reference: Hydrotech 6125 Structural Waterproofing.
  - Certification:
    - BBA Certificate No. 90/2431.
    - European Technical Approval ETA-05/0152 (CE marked).
    - FM Approval Class 1.
    - CGSB 37-GP-50-M89 International hot melt quality standard.
    - FRA Hot Melt Rubberised Bitumen - Code of practice.
    - Historical data: Continuously used worldwide and manufactured to original formulation since 1963.
- 353-01 PRIMER
- Type: Solvent based low viscosity bitumen primer, black in colour.
  - Manufacturer: Alumasc Exterior Building Products Ltd.
    - Product reference: Alumasc Bitumen Primer.
  - Density: 0.89 kg/litre +/- 0.02.
  - Packaging: 25 litre drums.
- 353-05 COATING
- Type: Hot melt rubberised bitumen comprising 100% solids and containing modified bitumens, synthetic rubbers, inert clay filler and anti-oxidants for chemical resistance (e.g. acid rain, building washes, fertiliser).
    - The compound must not contain calcium carbonate or other inferior substitute fillers in lieu of inert clay.
  - Manufacturer: Alumasc Exterior Building Products Ltd.
    - Product reference: Hydrotech Monolithic Membrane 6125.
  - Working temperature range 180-190°C (Do not heat above 205°C).
  - Density: 1230 kg/m<sup>3</sup>.
  - Recycled content: 8%.
  - Packaging: Polyethylene wrapped 18kg (nominal) cakes, individually packed in 250x200x460mm cardboard boxes. Note: All packaging must bear specific production batch data for traceability.

- Approx. coverage: 6.5 kg/m<sup>2</sup>, subject to the nature of the surface.

353-06 REINFORCEMENT

- Type: Spunbonded polyester fabric.
- Product reference: Flex-Flash F.
- Roll size: Width 1.02m x 200m Length, Thickness 0.5mm.

REINFORCEMENT

- Type: Thermoset uncured Neoprene rubber.
- Product reference: Flex-Flash UN.
- Roll size: Width 150 / 300 / 450 / 600mm x 30.5m Length, Thickness 1.5mm.

353-09 PROTECTION SHEET

- Type: Glass/polyester reinforced APP modified anti-root bitumen membrane with mineral surface.
- Product reference: Hydrogard 40.
- Colour: Charcoal mineral.
- Roll size: Width 1m x 7.5m Length, Thickness 4mm.

392-A ROOF OUTLETS

- Type: Aluminium.
- Manufacturer: Alumasc Exterior Building Products Ltd.
- Product reference: Harmer \_\_\_\_\_.
- Size: 50mm / 75mm / 100mm / 150mm.
- Accessories: N/A / Screw Thread Adaptor / Flat Grate / Terrace Grate / Extension Piece.
- Product reference: N/A / 2ADP (50mm) / 3ADP (75mm) / 4ADP (100mm) / 6ADP (150mm).

393-A TERMINATION BAR

- Type: Aluminium.
- Manufacturer: Alumasc Exterior Building Products Ltd.
- Product reference: Termination bar.
- Size: 1500 lm.

394-A SEALANT

- Type: HD Polymer eco-friendly fast curing flexible UV resistant adhesive.
- Manufacturer: Alumasc Exterior Building Products Ltd.
- Product reference: Alumasc Derbitech Sealstick HD.
- Application: To seal the connection between roofing membranes to all common building materials.
- Packaging: 290ml cartridge.
- Colour: Black .

**EXECUTION GENERALLY**

410 ADVERSE WEATHER

- Do not apply coatings:
  - In wet conditions or at temperatures below 5°C, unless otherwise permitted by coating manufacturer.
  - In high winds (speeds >7 m/s), unless adequate temporary windbreaks are erected adjacent to working area.
- Unfinished areas of roof: Keep dry.

420-A SUITABILITY OF SUBSTRATES

- Suitability of base: Ensure that the tolerances of the structure to which the works are being installed are within permissible deviation of a level surface and satisfactory to receive the proposed specification. The substrate is to be even and free from any irregularities that may compromise the works/and or performance. It is the responsibility of the appointed contractor to verify and report any deficiencies so that they can be corrected prior to commencing with the application.

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- Screed: Structural screed is susceptible to absorbing moisture which may compromise the integrity of the bond caused by the installation of Hydrotech 6125 at high temperature, and is to be avoided. Further guidance should be sought from Alumasc technical services, if applicable.
- Substrates generally: Secure, clean, dry, smooth, free from frost, contaminants, voids, and protrusions.
- Preliminary work: Complete including:
  - Formation of upstands, kerbs, box gutters, sumps, grooves, chases, and expansion joints.
  - Fixing of battens, anchoring plugs/strips.
- Moisture content and stability of substrate: Must not impair roof integrity.
- Acceptable methods of drying of roof areas, where required, must be agreed with the client prior to the commencement of works.

#### 453-A APPLYING COATING

- Cut excess wrapping from block, with a sharp knife or scissors.
- Heat in purpose made oil or air jacketed melter in accordance with operating instructions and manufacturers' guidelines.
- Temperature of compound: Operating range 180°C to 190°C. Do not heat above 205°C.
- Application: Full over whole surface by squeegee.

#### 462-A GENERAL NOTES / REQUIREMENTS

- Prior to installation, the Alumasc project specification, associated drawings, and manufacturer's installation instructions for all materials should have been studied and understood, and must be followed.
- These proposals relate to the roof waterproofing area only. They do not include associated work to be carried out by other trades, which may be required to complete a satisfactory refurbishment.
- All preliminary work including alterations to detailing, where applicable, is complete and satisfactory.
- The installing contractor must attend a pre-start meeting in conjunction with Alumasc and the main contractor at which the scope and programme of the roofing works project will be determined. Any relevant issues and details must be discussed and the methodology for dealing with any such matters agreed. Confirmation of the availability of trained operatives and contract management must be established.
- All installers must be Alumasc Registered Operatives, who must be able to produce their individual card upon demand, whilst installing the system for which they are approved. A minimum of two operatives out of every three must be fully trained operatives.
- The works must be overseen by the contractor's Hydrotech Trained Contract Manager.
- 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, and it also their responsibility to acquire all relevant tender documentation to enable accurate estimation.
- It is the sole responsibility of the contractor to ensure that all roofing works shall be installed in accordance with the appropriate sections of all current relevant codes of practice, Building Regulations, and manufacturer's installation instructions for product supplied by the company.
- Outlet/s shall be set at a level to compensate for the thickness of the outlet flange and avoid any check against the flow of water. All outlets are to include a clamping ring to secure the waterproof covering.
- Outlets and apertures must be protected from ingress of debris to prevent blockage of downpipe/s; protection should be removed during non-operating periods.
- Where applicable, all roof services and plant, access walkways, platforms, pipes etc. must be mounted on appropriate support systems providing at least 500mm clearance above the roof membrane, in order to facilitate access for future inspection/maintenance or repair.
- The contractor must ensure that satisfactory aesthetic appearance of the completed works is achieved.

#### 463-A SITE INSPECTIONS

- Site inspections will be made by Alumasc during the works to ensure that the installation is executed in accordance with the Alumasc warranty requirements and current codes of practice. A site visit report form, incorporating supporting photographs will be issued to the client/contractor following each inspection. The reports will identify and monitor the works observed during the inspections and will, where applicable, make recommendations for appropriate rectification which the contractor is to undertake in order to satisfy the warranty requirements.



**464-A HEALTH & SAFETY**

- 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 reference: 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.
- Sure-Foot Guardrail System or other suitable temporary or permanent fall arrest or fall protection measures will be necessary for the inspection and maintenance of the warranted Alumasc Roofing System throughout its life cycle.
- Product data and MSDS documents are available for all relevant products supplied by Alumasc; available for download from <http://www.alumascroofing.co.uk>.

**466-A STORING OF MATERIALS**

- Materials must be stored carefully on a clean dry surface, under cover and raised clear of the ground.
  - Insulation should be stored inside wherever possible. If outside storage is unavoidable, the insulation packaging alone is not under any circumstances sufficient to provide protection.
- Roll materials must be stored on end.
- The load-bearing capacity of the structure must be checked if material is to be stored at roof level.
- Only sufficient material for the day's schedule should be taken out of store, or uncovered, and placed close to the area being worked. Insulation should only be unwrapped immediately prior to use.

**ROOF COATING SYSTEM**

**710-A ADHESION TESTS**

- Requirement: Carry out advance bond tests to determine system suitability.
- Execution of test: Apply a small amount of membrane by squeegee onto the test area and allowing it to cool completely. Cut a triangular shaped incision through the membrane in the centre of the test area. If this triangular area of membrane can be peeled from the substrate easily, then the substrate is not ready. If it is not possible to pull the membrane away without distorting it, then the bond is deemed to be satisfactory. Temporarily apply a piece of protection sheet over the test area to keep dust off, removing it only when the main material application takes place. The test material will reactivate and blend in with the subsequent application.
- Test results: Proceed with membrane installation if satisfactory.

**720-A APPLYING PRIMERS/CONDITIONERS**

- Coverage per coat (minimum):
  - Concrete (Wood float, or similar) 8-16 m<sup>2</sup>/litre - diluted 50/50 with white spirit.
  - Timber 6-8 m<sup>2</sup>/litre.
  - Metal surfaces 6-12 m<sup>2</sup>/litre.
- Surface coverage: Even and full.
- Application: Apply by brush, roller or spray and allow to dry completely. Surfaces must be clean and free from all oil, grease, dirt, dust and loose debris. On metal surfaces all loose rust should be removed using a wire bristled brush, and where advanced signs of corrosion are evident, these areas should initially be treated with a rust inhibitor.

**760-A APPLICATION OF ROOF COATINGS**

- Apply product to suitably prepared substrate by squeegee, at a rate of 6.5kg/m<sup>2</sup> in two layers of total (nominal) thickness of 6mm (not including protection sheet), reinforced with Flex-Flash F (or Flex-Flash UN, where appropriate).
  - Flex-Flash F reinforcement is to be fully bonded into the first 3mm coat of membrane and brushed in with a soft broom or brush. Side and end laps 75mm (also sealed with Hydrotech).
  - Apply Hydrogard protection sheet immediately into second 3mm coat of membrane, with 100mm side and 150mm end laps sealed by gas torch (laps must be kept free of Hydrotech).
- Reinforcement/s: Ensure reinforcement is firmly embedded before the second coat of membrane is applied to ensure positive adhesion and free of trapped air pockets.

- Thickness: Monitor by taking regular thickness tests using a depth gauge, to ensure consistent and correct thickness and coverage of membrane. Seal pinhole after removal of gauge by applying direct pressure.
- Continuity: Maintain full thickness of coatings around angles, junctions and features.
- Rainwater outlets: Form with watertight joints.
- Drainage systems: Do not allow liquid coatings to enter piped rainwater or foul systems.

#### 770-A SKIRTINGS AND UPSTANDS / GENERAL DETAILING

- Preparation: Prepare the substrate to provide an acceptable base for waterproofing.
  - Prime substrate with the specified primer, as clause 530-A.
- Reinforcement strip: Where minor movement or changes in level, direction or dissimilar materials occur, the reinforcement is to be Flex Flash UN uncured neoprene, overlap to Flex Flash F, 75mm.
  - Bedding: Bonded into the first 3mm coat of membrane and gently smoothed in by gloved hand.
  - Side and end laps: 75mm (also sealed with Hydrotech).
- Flashings and detail work:
  - The design should ensure that the continuity of the waterproof covering is maintained for a vertical height of 150mm above the finished roof level at all abutments, parapets etc. Alumasc cannot take responsibility in the event of water ingress over and above the termination of our waterproofing.
  - Additional fixing of membranes: Where applicable, mechanically fix termination bar at 300mm (max.) centres placed at the top edge of the flashing detail, sealed with Alumasc Derbitech Sealstick HD.
- Install 75mm deep metal framework around groups of pipes and/or other penetrations as necessary, and fill with Hydrotech Monolithic Membrane 6125 to form a permanent waterproof pitch pocket. Apply protection sheet to pitch pocket upon completion.
- In any situation where a structural expansion detail is to be incorporated into the Hydrotech waterproofing and the percentage movement is less than 50%, the contractor is to install the detail as per the relevant nominal width of joint as shown in the Hydrotech Installation manual. Should any expansion joint detail require a degree of movement in excess of 50%, consult with the coating manufacturer for guidance.
- Leadwork: Where applicable, code 4 or 5 lead is required for flashing of details. Maximum lengths and girth should be established and carried out in accordance with the Lead Sheet Association recommendations.
- Seal the connection between roofing membranes to all common building materials: Apply Alumasc Derbitech Sealstick HD polymer sealant to all exposed edges, termination bars, flashings, connections with roof penetrations etc. Surfaces must be dry, clean and free from contaminants.
- Additional requirements: The contractor is to install all details in a manner to comply with current quality assessment recommendations for the installation of the specified system. Should any detail arise where it is not clear how this can be achieved, the contractor is to seek advice and approval for all proposals from Alumasc before completing the works.

#### SURFACING

#### 830 LAYING INVERTED ROOF INSULATION

- Condition of substrate: Clean.
- Setting out:
  - Loose lay with staggered joints.
  - Cutting: Minimize.
  - Small cut pieces: Avoid at perimeters and penetrations.
  - Joints: Butt together.
- Projections, upstands, rainwater outlets, etc: Cut insulation cleanly and fit closely around.
- Completion:
  - Boards must be in good condition, well fitting and stable.
  - Cover as soon as practicable to prevent wind uplift and/or flotation.

#### 831-A LAYING INVERTED ROOF UPSTAND BOARD

- Condition of substrate: Clean.
- Setting out:
  - Restrained by main field insulation and subsequent surfacing at foot of the detail. Use dabs of an Alumasc pre-approved mastic on the reverse side if necessary.

- Cutting: Minimize.
- Joints: Butt together.
- Completion:
  - Boards must be in good condition, well fitting and stable.
  - Cover as soon as practicable with proprietary metal flashing at the head of the detail.

**832-A LAYING FILTER LAYER**

- Condition of substrate: Clean.
- Direction of laying: Loose lay over the insulation at right angles to the roof slope, with 300mm overlaps.
  - Do not overlap against the flow of water.
  - Extend sheet at edges and penetrations up the adjacent surface approx. 50mm.

**COMPLETION**

**910-A INTERIM/FINAL INSPECTION**

- Interim and final roof inspections: Strictly in accordance with Alumasc's requirements to satisfy the warranty requirements.
- The contractor is to submit reports to Alumasc clearly recording all depth test and bond test data.
- Rainwater goods must be tested by the contractor upon completion of the works prior to handover.
- The contractor must contact Alumasc to arrange a final inspection upon completion of each stage of the works. It is strictly the responsibility of the contractor to notify Alumasc that a final inspection is required, and also to ensure that the inspection takes place prior to the application of any surfacing above the waterproof covering. Failure on either or both counts will jeopardise approval and/or warranty release.
- Once the final inspection has been carried out, the warranty will be issued via the roofing contractor upon acceptable rectification of any snags as identified by Alumasc, or without undue delay should all be satisfactory.
  - The contractor must apply to Alumasc for the warranty within three months of completion.

**920-A ELECTRONIC ROOF INTEGRITY TEST**

- Test Authority: The contractor must arrange final documented leak testing for each waterproofed area who must be a member company of WITA - Waterproofing Integrity Test Association Tel: 020 7448 3857.
- Timing of Tests:
  - Primary test must take place within seven days of completion of each roof area.
  - Final test must take place within 24 hours prior to applying finishes to the waterproofing.
- Condition of roof covering prior to testing: Complete to stage where integrity can be tested.
- Surface: Clean and free of site debris.
- Breaches detected: Re-test immediately following repair and confirm watertight.
- Test Results: Submit on completion, to include annotated plan of area tested.
- Waterproofing Integrity Certificate: Submit on completion of a single test or series of tests to the nominated roof or section thereof.
- The issue of the warranty is conditional upon the provision of satisfactory leak test certification covering all areas.

**912-A PROTECTION**

- As soon as an area of waterproofing has been completed, it should be inspected and tested upon notification of completion by the contractor. Completed areas should not be used as a building platform or as an access route by other trades. If unavoidable, appropriate protection must be provided for the duration of the construction period. Care should be taken not to mark or dent the works while laying any additional protection. Inspection and/or leak testing must always take place after removal of such protection.
- Roofs accessed for regular maintenance of plant, or parts of the building, should be given consideration in providing a predetermined route to and from the entry point to minimise potential hazards.

**940 COMPLETION**

- Roof areas: Clean.

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- Outlets: Clear.
- Work necessary to provide a weathertight finish: Complete.
- Storage of materials on finished surface: Not permitted.
- Completed membrane: Do not damage. Protect from chemicals, traffic and adjacent or high level working.

**941-A MANUFACTURER'S WARRANTY**

- The works shall be installed by an Alumasc Registered Contractor, and, as agreed in the contract, the Hydrotech System Warranty shall be issued to the Building Owner from the date of final completion.
  - The warranty offered is subject to the ruling terms and conditions.
- The warranty is conditional upon the full system being purchased from Alumasc and installed in accordance with the specification outlined. Substitution of any products, or installation by means other than those described, will invalidate the warranty offered.

**942-A MAINTENANCE**

- It is recommended that all flat roofs be inspected at a minimum frequency of twice a year. Ideally, inspections should be carried out in spring and autumn accounting for the effects of annual extremes of weather to be checked. Inspection should also be carried out following works on the roof by other trades, or following installation of new roof equipment.
- All inspections/and or maintenance actions carried out at roof level must be in full compliance with the appropriate health and safety regulations, and particularly those specifically dealing with working at height.

**Q37 GREEN ROOFS**

To be read in conjunction with related Architectural Sections, Preliminaries, and Contract Conditions.

**GENERAL**

**130-A EXTENSIVE BIODIVERSE GREEN ROOF**

- Roof type: Blackdown Biodiverse Plant Roof.
  - Manufacturer: Blackdown Horticultural Consultants Ltd  
Street Ash Nursery, Combe Street Nicholas  
Somerset, TA20 3HZ  
Telephone: 01460 234582
  - Falls: 0°
- Waterproofing: Hydrotech waterproofing system, refer to J31 NBS specification.
  - Manufacturer: Alumasc Exterior Building Products Ltd  
White House Works, Bold Road  
Sutton, St Helens, WA9 4JG  
Telephone: 01744 648400  
Email: roofing@alumasc-exteriors.co.uk
  - Root barrier: Hydrogard 40 protection sheet, refer to J31 NBS specification.
- Moisture control layers:
  - Blackdown 20+FS Drainage Layer (composite drainage layer + filter sheet).
- Growing medium: Blackdown Biodiverse Substrate.
  - Depth: Varying between 50 to 200mm (100mm average settled depth).
  - Settlement factor: +20%.
- Vegetation: Blackdown Wildflower Seed Mix.
  - Vegetation coverage: 0% on installation, approx. 50-90% after 12-15 months.
- Irrigation: Optional if seed is sown in the spring or autumn.
- Ecological Enhancements: Constructed with areas of lying organic matter, timber logs, and locally sourced shelter stones etc. appropriate to native bird and invertebrate species all in accordance with the appointed landscape consultant's instructions.
- Accessories: Harmer GR400/AC Inspection Chamber, as clause 430.  
Blackdown Washed Pebble Ballast 20/40, as clause 440.

## PERFORMANCE

### 210-A GENERAL DESIGN

- Green roof and associated features: Complete the detailed design.
- Proposals: Submit drawings, technical information, calculations, and manufacturer's literature.
- Performance criteria: Instant green coverage.
- The design must ensure that the continuity of the waterproof covering is maintained for a vertical height of at least 150mm above the finished roof level at all abutments, parapets etc.
- The building owner or their appointed design professional must have satisfied themselves that the roof structure and deck are suitable to receive the dead load of the proposed specification.
- It is strictly the responsibility of the client and/or their design professional to ensure compliance of the proposed specification with all relevant Building Regulations by consultation with Building Control. In the event of any doubt about the interpretation or application of the Building Regulations in relation to any particular new build or refurbishment works, clarification must be sought directly from Building Control.

## PRODUCTS

### 350 DRAINAGE LAYER

- Manufacturer: Blackdown Horticultural Consultants Ltd.
  - Product reference: Blackdown 20+FS Drainage Layer with geotextiles thermally bonded.
- Material: Perforated cusped HPDE (High Density Polyethylene) core.
  - Upper face: Non-woven needle punched and heat treated long staple fibre polypropylene.
- Properties:
  - Depth: 20mm
  - Retention volume: 4.3 l/m<sup>2</sup>
  - Mass/unit area (saturated): 5.97 kg/m<sup>2</sup>
  - Compressive strength: 240 kN/m<sup>2</sup>
- Size: 0.92 x 50m

### 390 EXTENSIVE GROWING MEDIUM

- Manufacturer: Blackdown Horticultural Consultants Ltd.
  - Product reference: Blackdown Biodiverse Substrate.
- Material: Aggregate, recycled build materials, mineral, organic and inorganic components. Materials
- Depth: Varying between 50 to 200mm (100mm average settled depth).
  - Settlement factor: +20% post installation.
- Parameters: pH Value: 7 - 8.
  - Approx. density: 1100kg/m<sup>3</sup> (dry); 1375kg/m<sup>3</sup> (saturated)
- Supply: 1m<sup>3</sup> bulk bag.

### 400 VEGETATION

- Manufacturer: Blackdown Horticultural Consultants Ltd.
  - Product reference: Blackdown Wildflower Seed Mix.
- Planting mixes: 22 wildflower (100%) seed species are native or naturalised to the UK  
22 wildflower (20%) and 7 grasses (80%) seed species are native or naturalised to the UK.
- Vegetation coverage: 0% on installation, approx. 50-90% after 12-15 months.
- Supply: 100g bag.

### 430 INSPECTION CHAMBERS

- Manufacturer: Alumasc Exterior Building Products Ltd.
  - Product reference: Harmer GR400/AC Inspection Chamber.
- Material: Moulded PU access frame.
- Size: 400 x 400mm
  - Depth: 100-130mm (adjustable)
- Access covers: 9 x 32mm galvanised mild steel grating.
- Accessories: GR400/EP access frame extension with height adjustment of 50 to 80mm.

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440 VEGETATION BARRIER

- Manufacturer: Blackdown Horticultural Consultants Ltd.
  - Product reference: Blackdown Washed Pebble Ballast 20/40.
- Depth: 70mm
- Width: 300mm to external perimeter edge / 500mm to internal junctions and penetrations etc.

**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: Loose lay, closely butt-joint boards.
- Upstands: Fit closely around penetrations and outlets, using a heavy-duty knife or small toothed saw.

790 GROWING MEDIUM INSTALLATION

- Handling: Minimize handling. Deliver to roof in bulk bags or pump.
  - Conditions: Handle in the driest condition possible. Do not handle or install when wet or frozen.
- Layers:
  - Depth: 50 to 200mm (100mm average settled depth).
  - Settlement factor: +20% post installation.
  - Substrate mounded so that contours flow evenly into surrounding planting pattern.
  - Sequence: Gently firm each layer before spreading the next. Grading bars are recommended to achieve the correct depth. Gently firm each layer before spreading the next. Apply pre-formulated nutrient regime according to planting plan and rake in.

800 VEGETATION INSTALLATION

- Handling Seed.
  - Extent: Continuous over area to be planted.
  - Timing: Optimal period for sowing is during the Spring or Autumn months.
  - Storage: Stored in a sealed container in a cool shaded area in dry conditions until required.
  - Growing medium condition: Thoroughly watered.
- Application: 1 to 4g per/m<sup>2</sup>.
  - Application: Seeds dispersed evenly into a suitable carrier and spread by hand or mechanically onto the surface of the growing medium at the specified coverage rate.
- Watering:
  - Gently water following installation.
  - Keep growing medium moist until plants are established (typically a minimum of 6 to 8 weeks following installation), optional.
  - Account for climatic variation and seasonality.

830 INSPECTION CHAMBER INSTALLATION

- Location: Install centrally over drain outlet.
  - Orientation: Align parallel with adjacent features.
- Bedding: Position onto inverted roof insulation/separator sheet.
- Surround: 300mm diameter circle / square of 20-40mm pebble ballast.

**COMPLETION**

910 INSPECTION

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

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:
  - Growing medium declaration of analysis.
  - Manufacturers' guarantees and warranties.
  - Procedures for maintenance of the green roof.
  - Record drawings showing the location of planting and associated features.

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Alumasc standard NBS specifications are offered on the condition that the customer is responsible for ensuring that each specification is appropriate for its intended purpose and that conditions for its use are suitable.



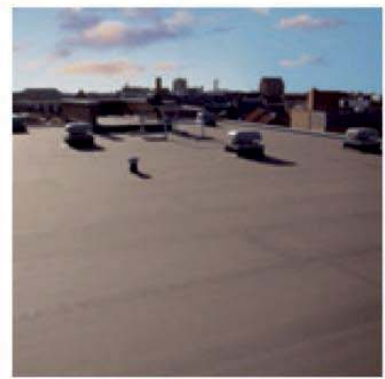
## Alumasc Roofing

The market leader in innovative roofing and structural waterproofing systems in the new and refurbishment sectors. High performance roofing membranes, hot-melt monolithic membranes, cold-applied liquid membranes and a comprehensive range of accessories embrace new production and installation technologies, and provide engineered solutions to rainwater management, thermal insulation and daylighting.

Green roof systems deliver a wide range of environmental benefits and make practical use of urban spaces otherwise lost to development.

An unparalleled track record reflects a wealth of technical expertise and support, along with fully warranted, BBA certified systems, ensuring long-term waterproof integrity, energy efficiency and environmental sustainability for all building types.

- High Performance Roofing Systems
- Structural Waterproofing
- Green Roofs
- Blue Roofs
- Rooflights
- Plant Support
- Edge Protection





# Proposed Specification

Alumasc Roofing System for Kings Cross R1, London



Ref: SP77033-S5

Date: 09 June 2016

Project No: SP77033-S5  
**Green Roof (Composite Deck to Falls)**

Project: Kings Cross R1, London

Submitted by: Alumasc Exterior Building Products Ltd  
White House Works, Bold Road, Sutton, St Helens, Merseyside, WA9 4JG

Author: Brian Cottington

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Date: 09 June 2016



All clauses with the suffix 'A' are either NBS Plus non-standard clauses and/or amended by Alumasc.

### **J31 LIQUID APPLIED WATERPROOF ROOF COATINGS**

To be read in conjunction with related Architectural Sections, Preliminaries and Contract Conditions.

#### **TYPES OF COVERING**

##### **102-A BUILD-UP OVERVIEW**

- Alumasc Bitumen Primer.
- Hydrotech 6125 hot-applied rubberised bitumen waterproofing system.
- Hydrogard 40 Protection Sheet.
- Alumasc/Blackdown Green Roof, refer to Q37 'Green Roofs' NBS specification.

##### **130-A COLD ROOF COATING**

- Substrate: Composite Deck to falls.
  - Falls: 1:80.
- Preparation:
  - Surface is to be dry, clean, and free from all contaminants including oils, grease, laitance, dirt and debris.
  - Advance bond tests must be carried out (and recorded for future reference) on all areas, as clause 710-A.
- Waterproof coating: Hydrotech 6125 Structural Waterproofing System.
  - Manufacturer: Alumasc Exterior Building Products Ltd  
White House Works, Bold Road  
Sutton, St Helens, WA9 4JG  
Telephone: 01744 648400  
Email: [roofing@alumasc-exteriors.co.uk](mailto:roofing@alumasc-exteriors.co.uk)
- Primer: Alumasc Bitumen Primer.
  - Application: As clause 720-A.
- Coating: Hydrotech Monolithic Membrane 6125.
  - Application: At a rate of 6.5kg/m<sup>2</sup> to a nominal 6mm (3+3mm) thick coat of Hydrotech 6125 combined with integral reinforcement/s, as clause 760-A.
- Reinforcement/s: Flex-Flash F / Flex-Flash UN, where appropriate.
  - Application: Laid into the first coat of Hydrotech 6125, as clause 760-A / 770-A.
- Protection sheet: Hydrogard 40.
  - Colour: Charcoal mineral.
  - Application: Laid into the second coat of Hydrotech 6125, as clause 760-A.
- Surface: Alumasc/Blackdown Green Roof, refer to Q37 'Green Roofs' NBS specification.
- Accessories:
  - Alumasc Harmer outlet/s, see clause 392-A.
  - Alumasc Standard Termination bar, see clause 393-A.
  - Alumasc Derbitech Sealstick HD, see clause 394-A.

#### **PERFORMANCE**

##### **210 ROOF PERFORMANCE**

- General: Secure, free draining and weathertight.

##### **280-A GENERAL DESIGN REQUIREMENTS**

- All works must comply with all current relevant standards, codes of practice, and the Building Regulations to provide a secure, free draining and completely weathertight roof, including but not limited to:
  - BS 6229 - Flat roofs with continuously supported coverings. Code of practice.
  - BS 5250 - Code of practice for control of condensation in buildings.
  - BS EN 1991-1-4 Eurocode 1 - Actions on structures. General actions. Wind actions.
  - BS EN 12056-3 - Gravity drainage systems inside buildings. Roof drainage, layout and calculation.

- BS EN ISO 6946 - Building components and building elements. Thermal resistance and thermal transmittance. Calculation method.
- The Building Regulations Approved Document Part L1 or Part L2. Conservation of fuel and power.
- The design must take account of all structural factors to ensure that the waterproof covering is able to accommodate the effect of movement in order to avoid stress or deformation under these conditions.
- The waterproofing components' resistance to dead and imposed loading must be assessed to avoid failure of the component/and or reduction in performance. Where resistance is deemed to be inadequate, suitable measures to mitigate load intensity will need to be considered.
- Insulation must be incorporated to avoid cold bridges as determined by building control and/or appointed design professional.
- The design must ensure that the continuity of the waterproof covering is maintained for a vertical height of at least 150mm above the finished roof level at all abutments, parapets etc.
- The building owner or their appointed design professional must have satisfied themselves that the roof structure and deck are suitable to receive the dead load of the proposed specification.
- It is strictly the responsibility of the client and/or their design professional to ensure compliance of the proposed specification with all relevant Building Regulations by consultation with Building Control. In the event of any doubt about the interpretation or application of the Building Regulations in relation to any particular new build or refurbishment works, clarification must be sought directly from Building Control.

## PRODUCTS

### 351-A FILTER LAYER

- Type: Non-woven polypropylene geotextile membrane, vapour permeable.
- Manufacturer: Alumasc Exterior Building Products Ltd.
- Product reference: Alumasc Polypropylene Separator Sheet.
- Roll size: Width 1.5m x 100m Length, Thickness <1mm.

### 353-A WATERPROOF COATING

- Type: Hot melt liquid applied formulation combined with integral reinforcements, and protection sheet.
- Manufacturer: Alumasc Exterior Building Products Ltd.
- System reference: Hydrotech 6125 Structural Waterproofing.
- Certification:
  - BBA Certificate No. 90/2431.
  - European Technical Approval ETA-05/0152 (CE marked).
  - FM Approval Class 1.
  - CGSB 37-GP-50-M89 International hot melt quality standard.
  - FRA Hot Melt Rubberised Bitumen - Code of practice.
  - Historical data: Continuously used worldwide and manufactured to original formulation since 1963.

### 353-01 PRIMER

- Type: Solvent based low viscosity bitumen primer, black in colour.
- Manufacturer: Alumasc Exterior Building Products Ltd.
- Product reference: Alumasc Bitumen Primer.
- Density: 0.89 kg/litre +/- 0.02.
- Packaging: 25 litre drums.

### 353-05 COATING

- Type: Hot melt rubberised bitumen comprising 100% solids and containing modified bitumens, synthetic rubbers, inert clay filler and anti-oxidants for chemical resistance (e.g. acid rain, building washes, fertiliser).
  - The compound must not contain calcium carbonate or other inferior substitute fillers in lieu of inert clay.
- Manufacturer: Alumasc Exterior Building Products Ltd.
- Product reference: Hydrotech Monolithic Membrane 6125.
- Working temperature range 180-190°C (Do not heat above 205°C).
- Density: 1230 kg/m³.
- Recycled content: 8%.

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- Packaging: Polyethylene wrapped 18kg (nominal) cakes, individually packed in 250x200x460mm cardboard boxes. Note: All packaging must bear specific production batch data for traceability.
- Approx. coverage: 6.5 kg/m<sup>2</sup>, subject to the nature of the surface.

353-06 REINFORCEMENT

- Type: Spunbonded polyester fabric.
  - Product reference: Flex-Flash F.
- Roll size: Width 1.02m x 200m Length, Thickness 0.5mm.

REINFORCEMENT

- Type: Thermoset uncured Neoprene rubber.
  - Product reference: Flex-Flash UN.
- Roll size: Width 150 / 300 / 450 / 600mm x 30.5m Length, Thickness 1.5mm.

353-09 PROTECTION SHEET

- Type: Glass/polyester reinforced APP modified anti-root bitumen membrane with mineral surface.
  - Product reference: Hydrogard 40.
  - Colour: Charcoal mineral.
- Roll size: Width 1m x 7.5m Length, Thickness 4mm.

392-A ROOF OUTLETS

- Type: Aluminium.
- Manufacturer: Alumasc Exterior Building Products Ltd.
  - Product reference: Harmer \_\_\_\_\_.
- Size: 50mm / 75mm / 100mm / 150mm.
- Accessories: N/A / Screw Thread Adaptor / Flat Grate / Terrace Grate / Extension Piece.
  - Product reference: N/A / 2ADP (50mm) / 3ADP (75mm) / 4ADP (100mm) / 6ADP (150mm).

393-A TERMINATION BAR

- Type: Aluminium.
- Manufacturer: Alumasc Exterior Building Products Ltd.
  - Product reference: Termination bar.
- Size: 1500 lm.

394-A SEALANT

- Type: HD Polymer eco-friendly fast curing flexible UV resistant adhesive.
- Manufacturer: Alumasc Exterior Building Products Ltd.
  - Product reference: Alumasc Derbitech Sealstick HD.
- Application: To seal the connection between roofing membranes to all common building materials.
- Packaging: 290ml cartridge.
- Colour: Black .

**EXECUTION GENERALLY**

410 ADVERSE WEATHER

- Do not apply coatings:
  - In wet conditions or at temperatures below 5°C, unless otherwise permitted by coating manufacturer.
  - In high winds (speeds >7 m/s), unless adequate temporary windbreaks are erected adjacent to working area.
- Unfinished areas of roof: Keep dry.

420-A SUITABILITY OF SUBSTRATES

- Suitability of base: Ensure that the tolerances of the structure to which the works are being installed are within permissible deviation of a level surface and satisfactory to receive the proposed specification. The substrate is to be even and free from any irregularities that may compromise the works/and or

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performance. It is the responsibility of the appointed contractor to verify and report any deficiencies so that they can be corrected prior to commencing with the application.

- Screed: Structural screed is susceptible to absorbing moisture which may compromise the integrity of the bond caused by the installation of Hydrotech 6125 at high temperature, and is to be avoided. Further guidance should be sought from Alumasc technical services, if applicable.
- Substrates generally: Secure, clean, dry, smooth, free from frost, contaminants, voids, and protrusions.
- Preliminary work: Complete including:
  - Formation of upstands, kerbs, box gutters, sumps, grooves, chases, and expansion joints.
  - Fixing of battens, anchoring plugs/strips.
- Moisture content and stability of substrate: Must not impair roof integrity.
- Acceptable methods of drying of roof areas, where required, must be agreed with the client prior to the commencement of works.

#### 453-A APPLYING COATING

- Cut excess wrapping from block, with a sharp knife or scissors.
- Heat in purpose made oil or air jacketed melter in accordance with operating instructions and manufacturers' guidelines.
- Temperature of compound: Operating range 180°C to 190°C. Do not heat above 205°C.
- Application: Full over whole surface by squeegee.

#### 462-A GENERAL NOTES / REQUIREMENTS

- Prior to installation, the Alumasc project specification, associated drawings, and manufacturer's installation instructions for all materials should have been studied and understood, and must be followed.
- These proposals relate to the roof waterproofing area only. They do not include associated work to be carried out by other trades, which may be required to complete a satisfactory refurbishment.
- All preliminary work including alterations to detailing, where applicable, is complete and satisfactory.
- The installing contractor must attend a pre-start meeting in conjunction with Alumasc and the main contractor at which the scope and programme of the roofing works project will be determined. Any relevant issues and details must be discussed and the methodology for dealing with any such matters agreed. Confirmation of the availability of trained operatives and contract management must be established.
- All installers must be Alumasc Registered Operatives, who must be able to produce their individual card upon demand, whilst installing the system for which they are approved. A minimum of two operatives out of every three must be fully trained operatives.
- The works must be overseen by the contractor's Hydrotech Trained Contract Manager.
- 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, and it also their responsibility to acquire all relevant tender documentation to enable accurate estimation.
- It is the sole responsibility of the contractor to ensure that all roofing works shall be installed in accordance with the appropriate sections of all current relevant codes of practice, Building Regulations, and manufacturer's installation instructions for product supplied by the company.
- Outlet/s shall be set at a level to compensate for the thickness of the outlet flange and avoid any check against the flow of water. All outlets are to include a clamping ring to secure the waterproof covering.
- Outlets and apertures must be protected from ingress of debris to prevent blockage of downpipe/s; protection should be removed during non-operating periods.
- Where applicable, all roof services and plant, access walkways, platforms, pipes etc. must be mounted on appropriate support systems providing at least 500mm clearance above the roof membrane, in order to facilitate access for future inspection/maintenance or repair.
- The contractor must ensure that satisfactory aesthetic appearance of the completed works is achieved.

#### 463-A SITE INSPECTIONS

- Site inspections will be made by Alumasc during the works to ensure that the installation is executed in accordance with the Alumasc warranty requirements and current codes of practice. A site visit report form, incorporating supporting photographs will be issued to the client/contractor following each inspection. The reports will identify and monitor the works observed during the inspections and will, where applicable,

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make recommendations for appropriate rectification which the contractor is to undertake in order to satisfy the warranty requirements.

**464-A HEALTH & SAFETY**

- 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 reference: 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.
- Sure-Foot Guardrail System or other suitable temporary or permanent fall arrest or fall protection measures will be necessary for the inspection and maintenance of the warranted Alumasc Roofing System throughout its life cycle.
- Product data and MSDS documents are available for all relevant products supplied by Alumasc; available for download from <http://www.alumascroofing.co.uk>.

**466-A STORING OF MATERIALS**

- Materials must be stored carefully on a clean dry surface, under cover and raised clear of the ground.
  - Insulation should be stored inside wherever possible. If outside storage is unavoidable, the insulation packaging alone is not under any circumstances sufficient to provide protection.
- Roll materials must be stored on end.
- The load-bearing capacity of the structure must be checked if material is to be stored at roof level.
- Only sufficient material for the day's schedule should be taken out of store, or uncovered, and placed close to the area being worked. Insulation should only be unwrapped immediately prior to use.

**ROOF COATING SYSTEM**

**710-A ADHESION TESTS**

- Requirement: Carry out advance bond tests to determine system suitability.
- Execution of test: Apply a small amount of membrane by squeegee onto the test area and allowing it to cool completely. Cut a triangular shaped incision through the membrane in the centre of the test area. If this triangular area of membrane can be peeled from the substrate easily, then the substrate is not ready. If it is not possible to pull the membrane away without distorting it, then the bond is deemed to be satisfactory. Temporarily apply a piece of protection sheet over the test area to keep dust off, removing it only when the main material application takes place. The test material will reactivate and blend in with the subsequent application.
- Test results: Proceed with membrane installation if satisfactory.

**720-A APPLYING PRIMERS/CONDITIONERS**

- Coverage per coat (minimum):
  - Concrete (Wood float, or similar) 8-16 m<sup>2</sup>/litre - diluted 50/50 with white spirit.
  - Timber 6-8 m<sup>2</sup>/litre.
  - Metal surfaces 6-12 m<sup>2</sup>/litre.
- Surface coverage: Even and full.
- Application: Apply by brush, roller or spray and allow to dry completely. Surfaces must be clean and free from all oil, grease, dirt, dust and loose debris. On metal surfaces all loose rust should be removed using a wire bristled brush, and where advanced signs of corrosion are evident, these areas should initially be treated with a rust inhibitor.

**760-A APPLICATION OF ROOF COATINGS**

- Apply product to suitably prepared substrate by squeegee, at a rate of 6.5kg/m<sup>2</sup> in two layers of total (nominal) thickness of 6mm (not including protection sheet), reinforced with Flex-Flash F (or Flex-Flash UN, where appropriate).
  - Flex-Flash F reinforcement is to be fully bonded into the first 3mm coat of membrane and brushed in with a soft broom or brush. Side and end laps 75mm (also sealed with Hydrotech).
  - Apply Hydrogard protection sheet immediately into second 3mm coat of membrane, with 100mm side and



- 150mm end laps sealed by gas torch (laps must be kept free of Hydrotech).
- Reinforcement/s: Ensure reinforcement is firmly embedded before the second coat of membrane is applied to ensure positive adhesion and free of trapped air pockets.
- Thickness: Monitor by taking regular thickness tests using a depth gauge, to ensure consistent and correct thickness and coverage of membrane. Seal pinhole after removal of gauge by applying direct pressure.
- Continuity: Maintain full thickness of coatings around angles, junctions and features.
- Rainwater outlets: Form with watertight joints.
- Drainage systems: Do not allow liquid coatings to enter piped rainwater or foul systems.

#### 770-A SKIRTINGS AND UPSTANDS / GENERAL DETAILING

- Preparation: Prepare the substrate to provide an acceptable base for waterproofing.
  - Prime substrate with the specified primer, as clause 530-A.
- Reinforcement strip: Where minor movement or changes in level, direction or dissimilar materials occur, the reinforcement is to be Flex Flash UN uncured neoprene, overlap to Flex Flash F, 75mm.
  - Bedding: Bonded into the first 3mm coat of membrane and gently smoothed in by gloved hand.
  - Side and end laps: 75mm (also sealed with Hydrotech).
- Flashings and detail work:
  - The design should ensure that the continuity of the waterproof covering is maintained for a vertical height of 150mm above the finished roof level at all abutments, parapets etc. Alumasc cannot take responsibility in the event of water ingress over and above the termination of our waterproofing.
  - Additional fixing of membranes: Where applicable, mechanically fix termination bar at 300mm (max.) centres placed at the top edge of the flashing detail, sealed with Alumasc Derbitech Sealstick HD.
- Install 75mm deep metal framework around groups of pipes and/or other penetrations as necessary, and fill with Hydrotech Monolithic Membrane 6125 to form a permanent waterproof pitch pocket. Apply protection sheet to pitch pocket upon completion.
- In any situation where a structural expansion detail is to be incorporated into the Hydrotech waterproofing and the percentage movement is less than 50%, the contractor is to install the detail as per the relevant nominal width of joint as shown in the Hydrotech Installation manual. Should any expansion joint detail require a degree of movement in excess of 50%, consult with the coating manufacturer for guidance.
- Leadwork: Where applicable, code 4 or 5 lead is required for flashing of details. Maximum lengths and girth should be established and carried out in accordance with the Lead Sheet Association recommendations.
- Seal the connection between roofing membranes to all common building materials: Apply Alumasc Derbitech Sealstick HD polymer sealant to all exposed edges, termination bars, flashings, connections with roof penetrations etc. Surfaces must be dry, clean and free from contaminants.
- Additional requirements: The contractor is to install all details in a manner to comply with current quality assessment recommendations for the installation of the specified system. Should any detail arise where it is not clear how this can be achieved, the contractor is to seek advice and approval for all proposals from Alumasc before completing the works.

#### SURFACING

#### 830 LAYING INVERTED ROOF INSULATION

- Condition of substrate: Clean.
- Setting out:
  - Loose lay with staggered joints.
  - Cutting: Minimize.
  - Small cut pieces: Avoid at perimeters and penetrations.
  - Joints: Butt together.
- Projections, upstands, rainwater outlets, etc: Cut insulation cleanly and fit closely around.
- Completion:
  - Boards must be in good condition, well fitting and stable.
  - Cover as soon as practicable to prevent wind uplift and/or flotation.

**831-A LAYING INVERTED ROOF UPSTAND BOARD**

- Condition of substrate: Clean.
- Setting out:
  - Restrained by main field insulation and subsequent surfacing at foot of the detail. Use dabs of an Alumasc pre-approved mastic on the reverse side if necessary.
  - Cutting: Minimize.
  - Joints: Butt together.
- Completion:
  - Boards must be in good condition, well fitting and stable.
  - Cover as soon as practicable with proprietary metal flashing at the head of the detail.

**832-A LAYING FILTER LAYER**

- Condition of substrate: Clean.
- Direction of laying: Loose lay over the insulation at right angles to the roof slope, with 300mm overlaps.
  - Do not overlap against the flow of water.
  - Extend sheet at edges and penetrations up the adjacent surface approx. 50mm.

**COMPLETION**

**910-A INTERIM/FINAL INSPECTION**

- Interim and final roof inspections: Strictly in accordance with Alumasc's requirements to satisfy the warranty requirements.
- The contractor is to submit reports to Alumasc clearly recording all depth test and bond test data.
- Rainwater goods must be tested by the contractor upon completion of the works prior to handover.
- The contractor must contact Alumasc to arrange a final inspection upon completion of each stage of the works. It is strictly the responsibility of the contractor to notify Alumasc that a final inspection is required, and also to ensure that the inspection takes place prior to the application of any surfacing above the waterproof covering. Failure on either or both counts will jeopardise approval and/or warranty release.
- Once the final inspection has been carried out, the warranty will be issued via the roofing contractor upon acceptable rectification of any snags as identified by Alumasc, or without undue delay should all be satisfactory.
  - The contractor must apply to Alumasc for the warranty within three months of completion.

**920-A ELECTRONIC ROOF INTEGRITY TEST**

- Test Authority: The contractor must arrange final documented leak testing for each waterproofed area who must be a member company of WITA - Waterproofing Integrity Test Association Tel: 020 7448 3857.
- Timing of Tests:
  - Primary test must take place within seven days of completion of each roof area.
  - Final test must take place within 24 hours prior to applying finishes to the waterproofing.
- Condition of roof covering prior to testing: Complete to stage where integrity can be tested.
- Surface: Clean and free of site debris.
- Breaches detected: Re-test immediately following repair and confirm watertight.
- Test Results: Submit on completion, to include annotated plan of area tested.
- Waterproofing Integrity Certificate: Submit on completion of a single test or series of tests to the nominated roof or section thereof.
- The issue of the warranty is conditional upon the provision of satisfactory leak test certification covering all areas.

**912-A PROTECTION**

- As soon as an area of waterproofing has been completed, it should be inspected and tested upon notification of completion by the contractor. Completed areas should not be used as a building platform or as an access route by other trades. If unavoidable, appropriate protection must be provided for the duration of the construction period. Care should be taken not to mark or dent the works while laying any additional protection. Inspection and/or leak testing must always take place after removal of such protection.

- Roofs accessed for regular maintenance of plant, or parts of the building, should be given consideration in providing a predetermined route to and from the entry point to minimise potential hazards.

**940 COMPLETION**

- Roof areas: Clean.
- Outlets: Clear.
- Work necessary to provide a weathertight finish: Complete.
- Storage of materials on finished surface: Not permitted.
- Completed membrane: Do not damage. Protect from chemicals, traffic and adjacent or high level working.

**941-A MANUFACTURER'S WARRANTY**

- The works shall be installed by an Alumasc Registered Contractor, and, as agreed in the contract, the Hydrotech System Warranty shall be issued to the Building Owner from the date of final completion.
  - The warranty offered is subject to the ruling terms and conditions.
- The warranty is conditional upon the full system being purchased from Alumasc and installed in accordance with the specification outlined. Substitution of any products, or installation by means other than those described, will invalidate the warranty offered.

**942-A MAINTENANCE**

- It is recommended that all flat roofs be inspected at a minimum frequency of twice a year. Ideally, inspections should be carried out in spring and autumn accounting for the effects of annual extremes of weather to be checked. Inspection should also be carried out following works on the roof by other trades, or following installation of new roof equipment.
- All inspections/and or maintenance actions carried out at roof level must be in full compliance with the appropriate health and safety regulations, and particularly those specifically dealing with working at height.

**Q37 GREEN ROOFS**

To be read in conjunction with related Architectural Sections, Preliminaries, and Contract Conditions.

**GENERAL**

**130-A EXTENSIVE GREEN ROOF**

- Roof type: Blackdown Sedum NatureMat Plant Roof.
  - Manufacturer: Blackdown Horticultural Consultants Ltd  
Street Ash Nursery, Combe Street Nicholas  
Somerset, TA20 3HZ  
Telephone: 01460 234582
  - Falls: Roof falls are to be designed to achieve a minimum finished fall of 1:80.
- Waterproofing: Hydrotech waterproofing system, refer to J31 NBS specification.
  - Manufacturer: Alumasc Exterior Building Products Ltd  
White House Works, Bold Road  
Sutton, St Helens, WA9 4JG  
Telephone: 01744 648400  
Email: roofing@alumasc-exteriors.co.uk
  - Root barrier: Hydrogard 40 protection sheet, refer to J31 NBS specification.
- Moisture control layers:
  - Blackdown 20+FS Drainage Layer (composite drainage layer + filter sheet).
- Growing medium: Blackdown Sedum Substrate.
  - Depth: 50mm
  - Settlement factor: +20%
- Vegetation: Blackdown NatureMat, 20mm thick pre-grown sedum blanket.
  - Vegetation coverage: 90-95% minimum on installation.
- Irrigation: Mats are to be thoroughly watered in and the substrate kept moist for a minimum of 6 to 8 weeks following installation, or longer if necessary, to allow the plants to become established.
- Accessories: Blackdown Nutrient, as clause 390.



Blackdown Aluminium Containment Angle (Optional), as clause 420.  
Harmer GR400/AC Inspection Chamber, as clause 430.  
Blackdown Washed Pebble Ballast 20/40, as clause 440.

## PERFORMANCE

### 210-A GENERAL DESIGN

- Green roof and associated features: Complete the detailed design.
- Proposals: Submit drawings, technical information, calculations, and manufacturer's literature.
- Performance criteria: Instant green coverage.
- The design must ensure that the continuity of the waterproof covering is maintained for a vertical height of at least 150mm above the finished roof level at all abutments, parapets etc.
- The building owner or their appointed design professional must have satisfied themselves that the roof structure and deck are suitable to receive the dead load of the proposed specification.
- It is strictly the responsibility of the client and/or their design professional to ensure compliance of the proposed specification with all relevant Building Regulations by consultation with Building Control. In the event of any doubt about the interpretation or application of the Building Regulations in relation to any particular new build or refurbishment works, clarification must be sought directly from Building Control.

## PRODUCTS

### 350 DRAINAGE LAYER

- Manufacturer: Blackdown Horticultural Consultants Ltd.
  - Product reference: Blackdown 20+FS Drainage Layer with geotextiles thermally bonded.
- Material: Perforated cusped HPDE (High Density Polyethylene) core.
  - Upper face: Non-woven needle punched and heat treated long staple fibre polypropylene.
- Properties:
  - Depth: 20mm
  - Retention volume: 4.3 l/m<sup>2</sup>
  - Mass/unit area (saturated): 5.97 kg/m<sup>2</sup>
  - Compressive strength: 240 kN/m<sup>2</sup>
- Size: 0.92 x 50m

### 390 EXTENSIVE GROWING MEDIUM

- Manufacturer: Blackdown Horticultural Consultants Ltd.
  - Product reference: Blackdown Sedum Substrate.
- Material: Mineral & organic substrate consisting of clean virgin crushed brick, expanded clay, organic matter bark compost & greenwaste.
- Depth: 50mm
  - Settlement factor: +20% post installation.
- Ameliorant/conditioner: Blackdown Osmocote Pro 8-9 months fertiliser.
  - Coverage: 25 gm/m<sup>2</sup>
  - Declaration of analysis: Submit.
- Parameters: pH Value: 6.5 - 7.5  
Approx. density: 950kg/m<sup>3</sup> (dry); 1200kg/m<sup>3</sup> (saturated)
- Supply: 1m<sup>3</sup> bulk bag or 25 litre sack.

### 400 VEGETATION

- Manufacturer: Blackdown Horticultural Consultants Ltd.
  - Product reference: Blackdown NatureMat.
- Planting mix: 6 core & up to 13 random sedum species, up to 5 species are native or naturalised to the UK.
  - Depth: 20mm
- Vegetation coverage: 90-95% minimum on installation.
- Supply: 1.5m<sup>2</sup> roll.

420 EDGE RETAINING PROFILE - OPTIONAL

- Manufacturer: Blackdown Horticultural Consultants Ltd.
  - Product reference: Blackdown Aluminium Containment Angle.
- Material: Aluminium.
- Height: 100mm

430 INSPECTION CHAMBERS

- Manufacturer: Alumasc Exterior Building Products Ltd.
  - Product reference: Harmer GR400/AC Inspection Chamber.
- Material: Moulded PU access frame.
- Size: 400 x 400mm
  - Depth: 100-130mm (adjustable)
- Access covers: 9 x 32mm galvanised mild steel grating.

440 VEGETATION BARRIER

- Manufacturer: Blackdown Horticultural Consultants Ltd.
  - Product reference: Blackdown Washed Pebble Ballast 20/40.
- Depth: 70mm
- Width: 300mm to external perimeter edge / 500mm to internal junctions and penetrations etc.

**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: Loose lay, closely butt-joint boards.
- Upstands: Fit closely around penetrations and outlets, using a heavy-duty knife or small toothed saw.

790 GROWING MEDIUM INSTALLATION

- Handling: Minimize handling. Deliver to roof in small sacks, bulk bag or pump.
  - Conditions: Handle in the driest condition possible. Do not handle or install when wet or frozen.
- Layers:
  - Depth: 50mm
  - Settlement factor: +20% post installation.
  - Sequence: Gently firm each layer before spreading the next. Grading bars are recommended to achieve the correct depth. Gently firm each layer before spreading the next. Apply pre-formulated nutrient regime according to planting plan and rake in.

800 VEGETATION INSTALLATION

- Handling NatureMat:
  - Extent: Continuous over area to be planted.

- Timing: To be installed within 36 hours of delivery.
- Storage: Pallets containing the NatureMat must be stored in a cool and shaded area.
- Excessive stacking: Not permitted.
- 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.
  - Edges: Finish with whole blankets.
  - Consolidation: Firm as laying proceeds to ensure full contact with the growing medium. Do not use rollers.
- Dressing: Sedum vegetative material.
  - Application: Brush in to fill joints.
- Watering:
  - Gently water following installation.
  - Keep growing medium moist until plants are established (typically a minimum of 6 to 8 weeks following installation)
  - Account for climatic variation and seasonality.

#### 820 EDGE RETAINING PROFILE INSTALLATION

- Cutting: Neat, accurate and without spalling.
  - Junctions: vertical, secured using proprietary connectors.
- Position: True to line and level. Smooth continuous lines.
- Fixing: Integrated to roofing system in accordance with manufacturer's recommendations.

#### 830 INSPECTION CHAMBER INSTALLATION

- Location: Install centrally over drain outlet.
  - Orientation: Align parallel with adjacent features.
- Bedding: Position onto waterproofing membrane
- Surround: 300mm diameter circle / square of 20-40mm pebble ballast.

### COMPLETION

#### 910 INSPECTION

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

#### 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:
  - Growing medium declaration of analysis.
  - Manufacturers' guarantees and warranties.
  - Procedures for maintenance of the green roof.
  - Record drawings showing the location of planting and associated features.

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Alumasc standard NBS specifications are offered on the condition that the customer is responsible for ensuring that each specification is appropriate for its intended purpose and that conditions for its use are suitable.

# ALUMASC

## ROOFING SYSTEMS

### Alumasc Roofing

The market leader in innovative roofing and structural waterproofing systems in the new and refurbishment sectors. High performance roofing membranes, hot-melt monolithic membranes, cold-applied liquid membranes and a comprehensive range of accessories embrace new production and installation technologies, and provide engineered solutions to rainwater management, thermal insulation and daylighting.

Green roof systems deliver a wide range of environmental benefits and make practical use of urban spaces otherwise lost to development.

An unparalleled track record reflects a wealth of technical expertise and support, along with fully warranted, BBA certified systems, ensuring long-term waterproof integrity, energy efficiency and environmental sustainability for all building types.

- High Performance Roofing Systems
- Structural Waterproofing
- Green Roofs
- Blue Roofs
- Rooflights
- Plant Support
- Edge Protection



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## Suggested Maintenance Schedule for Extensive Green Roofs

The health and longevity of any green roof will depend on it being given the correct maintenance. Any area of vegetation that is neglected will simply return to nature. Dominant species will take over, self sown species will invade and vulnerable areas of the roof will become overgrown.

### Designing to reduce future maintenance:

- The correct choice of soil will reduce the chances of unwanted wind blown seeds from germinating
- The correct level of moisture retention will help the less dominant species survive
- Correct detailing will reduce the chance of plants damaging vulnerable details on the roof

*Remember, low maintenance does not mean no maintenance!*

### Roof perimeter and outlets

The roof perimeter, upstands and roof penetrations must be kept weed free. This is normally achieved by separating them from the vegetation areas using a 300mm wide barrier of large rounded pebbles, 16mm to 32mm grade, paving slabs, decorative bricks etc.

Outlets must have inspection chambers over them and must be inspected to ensure they are clear of debris.

Consider detailing at lawn edges to make mowing easier.

### Remove unwanted plants

Seeds of unwanted plants can be brought by the wind and birds. Unwanted plants must be removed with roots, complete. Their seedlings are harmful and should be pulled up and not dug or cut as this might damage the waterproofing. The more ground cover is achieved with the desired plants the less chance of alien plants invading.

### Mowing, trimming, pruning

Grass and herb type landscapes have to be cut when the seeds are mature. This helps to avoid moss growth. All mown or trimmed material should be removed in the same way as maintaining a natural garden.

### Additional material

It is possible after initial planting that some plants fail or do not spread as quickly as required. Then additional planting will be necessary. This type of maintenance is usually built into the landscape contractor's contract.

### Irrigation

It is necessary to irrigate after initial planting to establish plant grown. Later in the life of extensive green roofs there should be no need for additional irrigation. Intensive green roofs will need irrigating regularly, the frequency depending on the plant type.

### Fertilising

Extensive green roofs do not require fertilising. However, there may be occasions such as trying to speed up ground cover or, if the plants are showing signs of stress (sedums turning red from green despite good weather) when the addition of fertiliser in the spring will be beneficial.

## 1.5 - SUGGESTED MAINTENANCE SCHEDULE



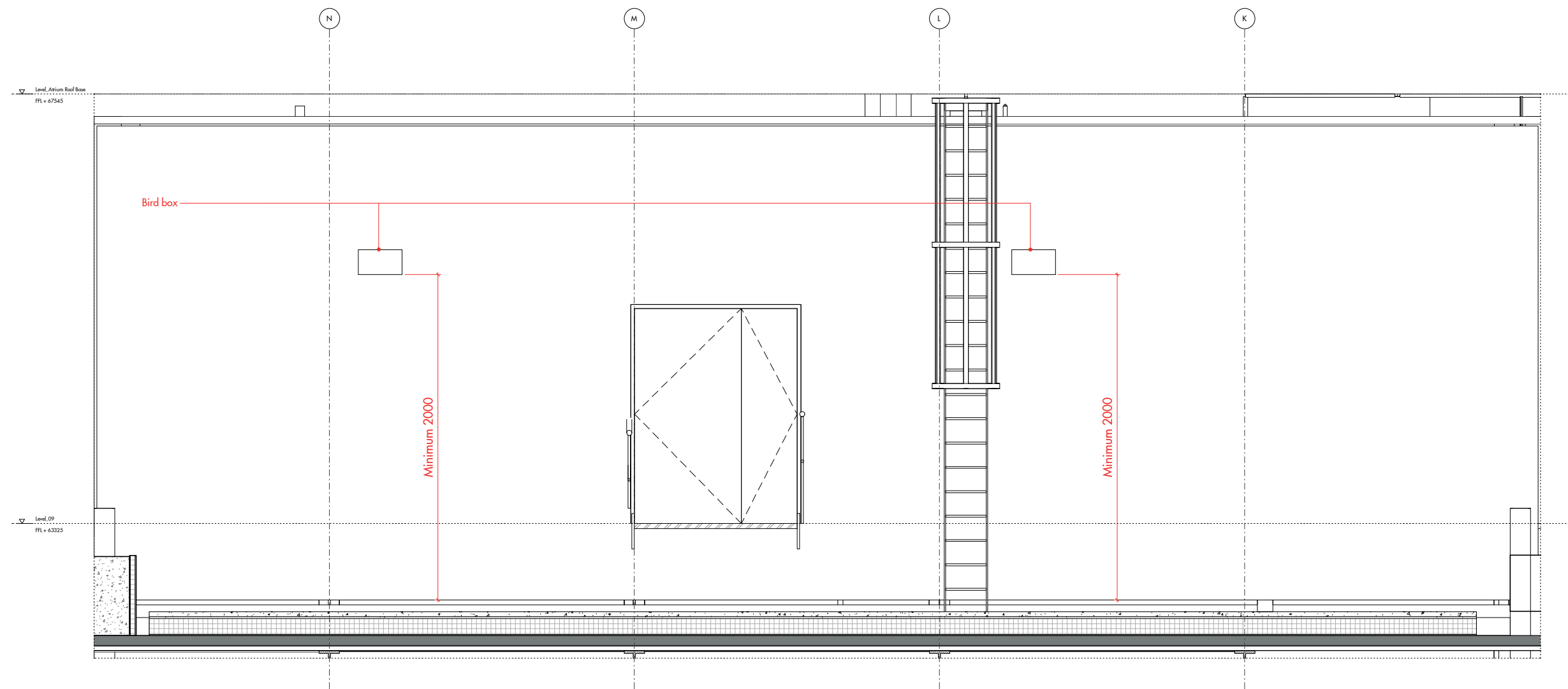
## APPENDIX 2 - BIRD BOXES

2.1 – Bird Boxes Setting Out

2.2 – Images





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A&M JOB NO: 280\_15

AGA KHAN DEVELOPMENT NETWORK :  
BIRD BOXES SETTING OUT  
SKETCH  
280\_15\_SK\_553

SCALE 1 : 20 @A1

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## 2.1 - BIRD BOXES SETTING OUT



## 2.2 - IMAGES





