

Design & Access Statement PSDS Blackley Crematorium Manchester City Council

December 2024

Blackley Cemetery Crematorium & Chapels
Victoria Avenue
Blackley
Manchester
M9 0NG

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1.0 Introduction

This Design & Access Statement has been prepared by Drees & Sommer UK Ltd on behalf of Manchester City Council, to support the planning and listed building consent application submissions for works associated with decarbonisation comprising the following:

- i. Replacement of the existing gas boilers with Air Source Heat Pumps (ASHP)*
- ii. Upgrade existing heating infrastructure and BMS*
- iii. Installation of Solar PV*

The information provided in this report is specific to Blackley Crematorium in order to clearly demonstrate the work content and any impact on the Grade II Listed areas of the building.

The potential impact of the proposed works on the Grade II Listed Building is discussed in further detail in the accompanying Heritage Statement.

This document has been prepared in accordance with the requirements of DCLG Circular 01/2006 and the CABE Publication Guidance “Design and Access Statements”.

The report considers:

- Scope of Works
- Methods of Construction
- Impact on Building Structure, Fabric and Finishes
- Outline Specifications

Instructions

Client

Manchester City Council
Town Hall
182 Sefton Street
Manchester M60 2LA

Property Discussed in this Report

Blackley Cemetery Crematorium & Chapels
Victoria Avenue
Blackley
Manchester M9 0NG

Lead Consultant/Designer

Drees & Sommer UK Ltd
1.06 South Harrington Building
182 Sefton Street
Liverpool L3 4BQ

2.0 Background

2.1 Project Need

Manchester City Council (MCC) is committed to becoming a more sustainable organisation, with a key component to achieving this being the decarbonisation of their corporate estate. The council has targeted Net Zero Carbon status by 2038.

Surveys have been undertaken of the building stock, a number of potential decarbonisation measures were reviewed which prioritised the use of the energy hierarchy model to initially look to reduce energy demand and improve efficiency, followed by installing low or zero carbon solutions including renewable energy before finally looking to offset remaining emissions.

Various mechanical and electrical upgrades have been proposed for MCC buildings which include installation of roof mounted solar PV, replacing gas boilers with Air Source Heat Pumps, replacement LED lighting etc. in conjunction with Building Fabric Improvements comprising upgrading roof coverings, installation of cavity wall insulation and replacement windows and doors.

2.2 Existing Site

Blackley Crematorium was constructed in 1959 and is a Grade II listed building. The building consists of 3 chapels which are of double height construction. The Centre Chapel is located at the front of the building and has a large single-glazed stained glass facade. The East and West chapels are located either side of the Centre Chapel and also have large stained glass windows. The rear of the building is single storey and houses the cremator rooms, staff rooms and plantroom. The roof is predominantly flat and is of varying levels.

The Crematorium and Chapels currently utilise 1,141,020 kWh of natural gas and 33,351 kWh of electricity per annum. All of the natural gas usage on site is used for space heating, hot water generation and the cremators, with an estimated 80% of gas consumption used by the Cremators alone.

There have been several upgrades to the building since its original construction including recovering flat roofs with rigid insulation in 2015, and replacing many of the original single-glazed windows with aluminium framed double-glazed windows in 2013.

This report provides a route to Net Zero for Blackley Crematorium with harm minimised and avoided where possible.

3.0 The Development

3.1 Outline Scope of Works

The proposed development will provide a positive contribution to decarbonising the existing buildings which includes the following works:

1. Installation of 34No. roof mounted Solar PV panels to the Centre Chapel (Roof Area 2) and 16No. panels to the East Chapel (Roof Area 1), refer to Image 01. PV array is to be laid at 10° pitch to reduce visual impact as detailed on drawing ref: 3384-CWC-XX-EX-DR-E-6100-T3.



Image 01: Crematorium Solar PV Roof Reference Plan

2. Removal of existing gas boilers and installation of high temperature Air Source Heat Pump (ASHP) to the north of the rear yard (refer to image 02), with associated pipework connections as indicated on drawing ref: 3384-CWC-XX-00-DR-N-4000-T1.
3. Formation of ASHP compound enclosure up to 2.9m in height, comprising living green wall with gated access including formation of concrete base and foundation support as indicated on drawing ref: P24598.106.



Image 02: Crematorium Proposed ASHP Location

4. Associated works would be necessary for accessing and maintaining the Solar PV, including mansafe system to Roof Areas 1 and 2, and fixed ladders to various external walls areas (refer to image 03) all as detailed on drawing ref: P24598.104 and P24598.105.

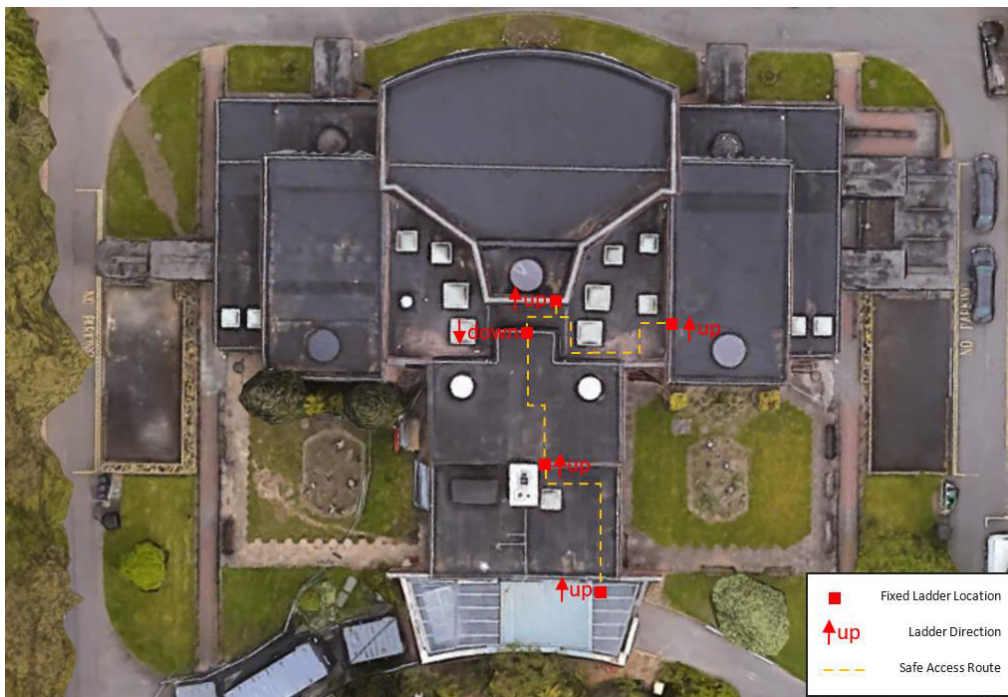


Image 03: Crematorium Access Ladder Location

3.2 Method Statement for Solar PV

The solar PV array is to be secured to supporting galvanised steel tilted framework mounted on rubber Big Foot system feet providing soft contact with the roof, held in place with Ballast to the designed load. No fixtures are required; refer to The Solar Edge Design Report provided in Appendix 'E'.

Cables trays are also to be supported on rubber Big Foot system feet mounted at low level on roofs and over parapets layouts as detailed on drawing ref: 3384-CWC-XX-EX-DR-E-6100-T3. The cable tray and cables will exit the rear wall of the Plant Room at ground level and heights indicated to locations as detailed on drawing ref: 3384-CWC-XX-00-DR-N-4000-T1. Please also refer to the photos in Appendix 'B' providing reference to the wall locations.

3.3 Method Statement for ASHP's

ASHP's are to be installed externally to a discrete location and area of existing hardstanding to the north of the rear yard. The location is a sloping site to be excavated and ground supported concrete slab constructed to provide a level base to support the ASHP's, refer to drawing ref: P24598.006 and 24127-FMA-B1-EX-DR-S-0002-S4-P02.

Sleeved pipework will penetrate an external wall of the Plant Area enclosure at two points, with a maximum clearance opening of 150mmØ, cable tray opening would also be required with largest size 225mm x 150mm. Sleeved pipework will also penetrate the rear external wall of the Plant Room at low level with a maximum clearance opening of 150mmØ, cable tray opening size 225mm x 150mm would be formed to the external rear wall of Circulation Area all as detailed on drawing ref: 3384-CWC-XX-00-DR-N-4000-T1. Please also refer to the photos in Appendix 'B' providing reference to the wall locations.

Existing gas boilers will be removed from the Plant Room. No additional internal upgrades are proposed with existing pipework infrastructure and heat emitters being retained.

3.4 Method Statement for Living Green Wall

A living green wall enclosure is proposed to conceal and secure the ASHP's. The main structure forming the green wall is to be constructed in solid brickwork supported by concrete footings. The living green wall would be constructed independently, and not fixed to the existing Plant Area wall, refer to drawing ref: P24598.006 and 24127-FMA-B1-EX-DR-S-0001-S4-P02.

The brick wall enclosure would receive garden plants on all 3 sides laid in a Biotecture system. A built-in self-watering irrigation system has been designed to be installed ensuring the plants are maintained, refer to Section 5.0 of this report for details and specification.

Water supply pipework will penetrate an external wall of the Plant Area enclosure at low level, having a maximum opening of 45mmØ, corresponding pipework will also penetrate the rear external wall of the Plant Room at low level. Please also refer to the photos in Appendix 'B' providing reference to the wall locations.

Timber gates are to be located on the east facing elevation sized appropriately to provide maintenance access to the compound.

3.5 Method Statement for PV Access

3.5.1 Mansafe System

The Chapel roofs are predominantly flat with varying levels, the Centre Chapel roof is formed on a slight incline. Installation of solar PV panels would require safe method of maintenance and fall protection.

A constant force type mansafe system would need to be installed above the Centre and East Chapel roofs, with posts secured to the roof structure with mechanical steel anchor fixings as detailed in image 04.

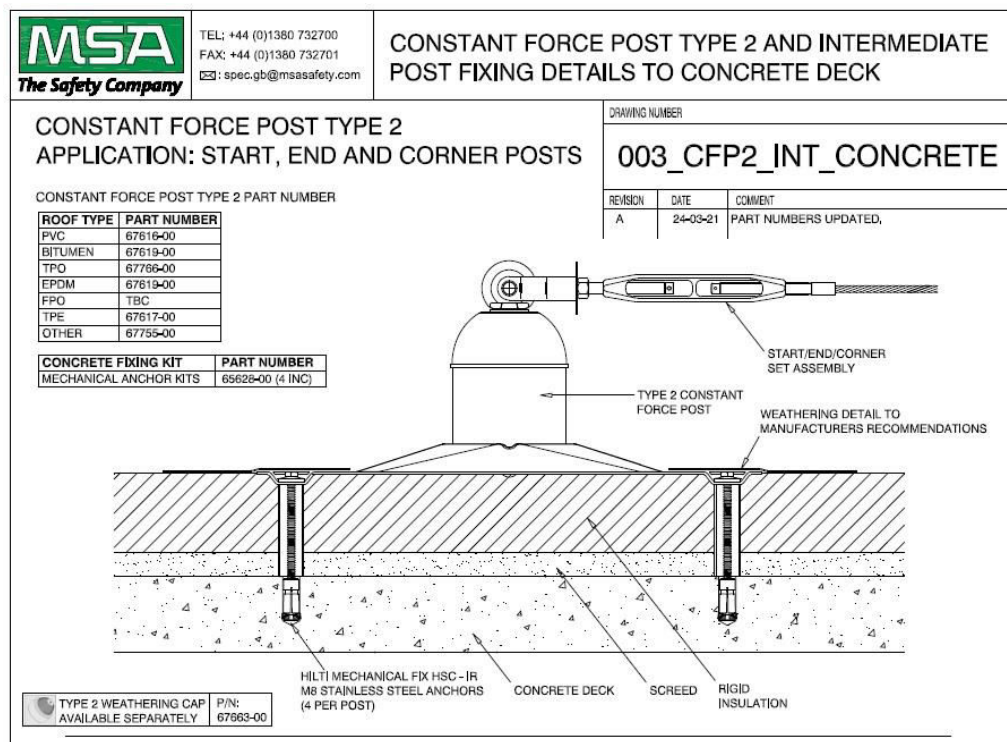


Image 04: Crematorium Mansafe System Fixing Detail

3.5.2 Fixed Ladder Roof Access

To maintain the roof mounted PV panels, permanent roof access would be required; retractable vertical steel ladders are proposed to minimise visual impact when not in use as detailed in image 05.

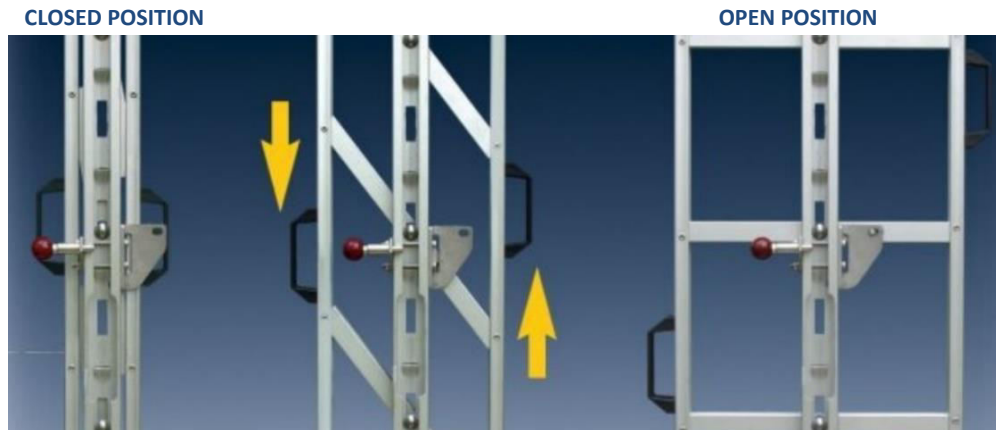


Image 05: Crematorium Retractable Vertical Ladder System

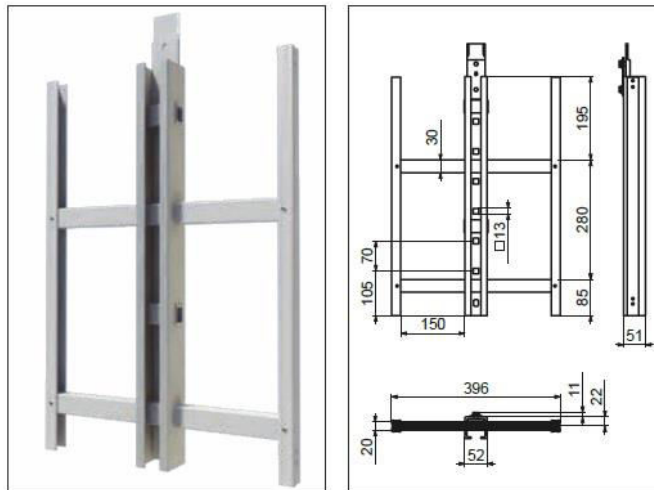
Roof areas with a climb height above 3m require fall protection. To minimise visual impact, a change overrail system is also proposed opposed to a cage, that would be mounted 1m above the roof parapet for the operative to safely harness onto as detailed in Section 5.0 Specification.

The ladders and overrail system would need to be secured to external walls and parapets with mechanical steel anchor fixings as detailed in image 06. Please also refer to the photos in Appendix 'B' providing reference to the wall locations.

Twin ladder

- With side rails
- Profile 5 x 51 mm
- With connector
- Mounting distance: recommended 1,400 mm - max. 2,240 mm
- The bracket is mounted to the ladder through the rectangular cut-outs in the back of the guide rail or through the guide rail catch bar
- Max. section length 4,480 mm
- Rung distance 80 mm
- Step width per side 150 mm

Material: Anodised aluminium
Weight: 3.5 kg/m
Part no. ZAL-<ladder length in mm>



Set of connectors

- To connect twin ladders
- Complete with all mounting elements
- Included in the delivery of each twin ladder
- Must be used when an existing twin ladder is cut and reconnected

Material: Anodised aluminium
Weight: 0.25 kg/each
Part no. 21876

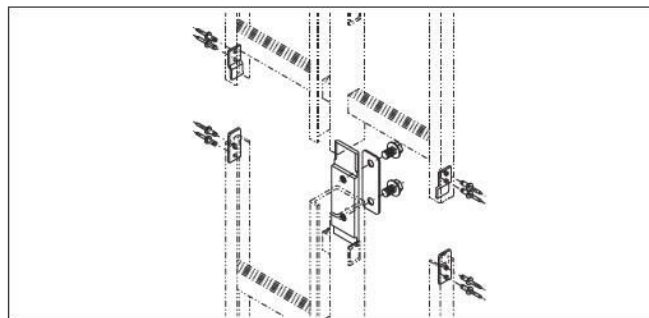


Image 06: Crematorium Vertical Ladder Fixing Detail

4.0 Building Fabric /Finishes and Structural Considerations

4.1 Roof Structure and Coverings

BMI Icopal were appointed to undertake intrusive inspection of the flat roof coverings to determine condition and material build-up, that would assist with the appraisal of roof structure in determining the feasibility of installing surface mounted PV panels above the Centre and East Chapels.

Existing bituminous membrane roof coverings were confirmed to be in good condition and sufficiently insulated as indicated within Icopal Roof Condition Report dated 15.10.24 provided within Appendix 'C'.

Structural Engineers Frederick G Markland Associates were also instructed to undertake inspection and appraisal of the roof structure and supporting framework to determine additional load associated with installation of surface mounted PV panels would not compromise the weathertightness and structural integrity of the existing building.

FG Markland's assessment and appraisal report ref: Y24127.01 and Addendum report ref: Y24127.01.1 concluded the construction of the concrete roof decks would have sufficient capacity to support the additional weight imposed by the PV panel systems, refer to Appendix 'D'.

4.2 PV Solar Panel Support & Fixings

The solar PV system framework and cable trays would be mounted on rubber Big Foot feet and would not require any fixings to penetrate the roof covering or structure.

The additional weight of the proposed PV system will continue to be assessed by the Structural Engineer as the design progresses to ensure that the additional weight imposed causes no detriment to the existing structure or roof coverings.

4.3 Mansafe System & Fixings

Mansafe system is proposed to be installed above the Centre and East Chapel roofs, with posts secured to the concrete roof structure with mechanical steel anchor fixings. Pull-out testing would need to be undertaken prior to installation to ensure the roof structure is suitable for the required resistance loadings.

The additional weight of the proposed mansafe system will continue to be assessed by the Structural Engineer as the design progresses to ensure that the additional weight imposed causes no detriment to the existing structure or roof coverings.

4.4 Access Ladder & Fixings

Vertical fixed ladders are proposed to be installed at various locations to provide unrestricted access to the Centre and East Chapel roofs for maintaining the Solar PV. The ladders and overrail would be secured to external walls and parapets with mechanical steel anchor fixings. Pull-out testing would need to be undertaken prior to installation to ensure wall structures are suitable for the required resistance loadings.

The additional weight of the fixed ladders will continue to be assessed by the Structural Engineer as the design progresses to ensure that the additional weight imposed causes no detriment to the existing wall structures.

The means of fixing ladders to the existing structure will also be checked by a specialist to ensure that a sufficient quantity of fixings are installed to allow the weight of operatives using the ladder to be adequately supported and not damage the building fabric.

4.5 Heating Infrastructure

The forming of holes to allow distribution routes through external walls and pipework /cable duct entry points will first be assessed by a Structural Engineer to ensure there is no structural impact to the existing building wall structures.

The means of fixing to the existing structure will also be checked by a specialist to ensure that sufficient quantity of fixings are installed to support the weight of new pipework and cabling.

ASHP pipework and cable duct protrusions through walls will be sealed with a suitable weatherproof sealing compound.

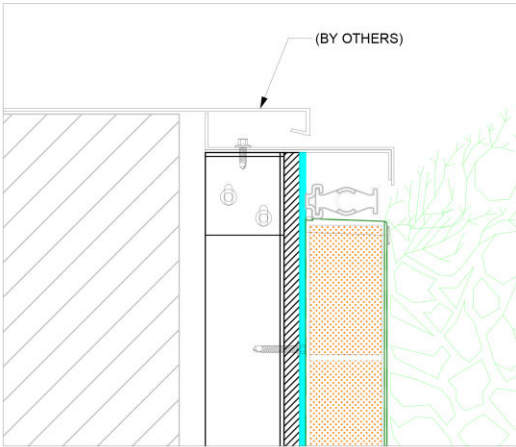
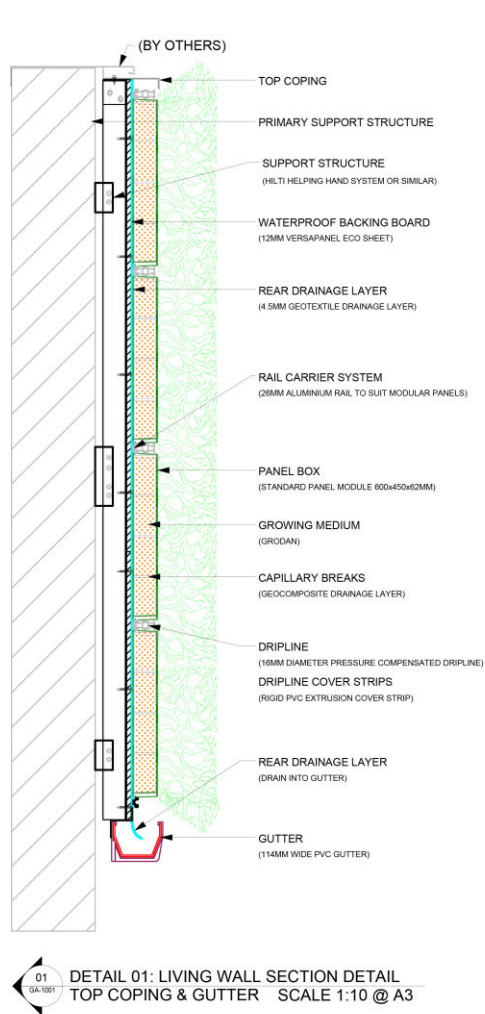
4.6 Living Green Wall Structure

The proposed living green wall structure is to be built independently and not reliant on support from any existing walls and footings which would not be undermined. Site Investigation report has been commissioned to confirm suitability of ground conditions and design is appropriate.

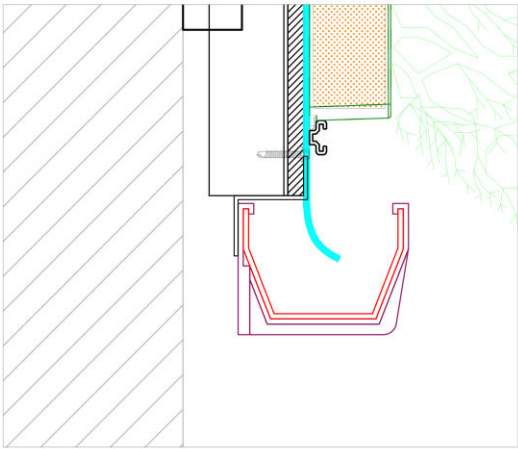
5.0 Specifications

5.1 Living Green Wall

The living green wall forming ASHP compound is proposed to be constructed with supporting brick masonry and overlaid with a Biotecture system as detailed below.



DETAIL 02: TOP COPING DETAIL
SCALE 1:3 @ A3



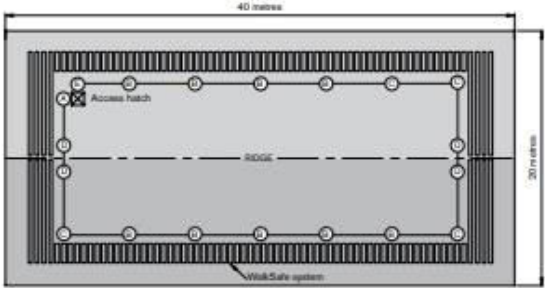
5.2 Mansafe System

A constant force type mansafe system would need to be installed above the Centre and East Chapel roofs to provide safe access for installation and maintenance of the solar PV as detailed below.

Latchways Fall Protection

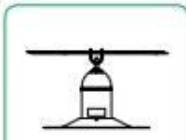
Constant Force post: System design

A typical roof layout for a perimeter system is illustrated identifying the different system components. Posts must not be spaced more than 10 m apart. Designers should try to ensure that access to all areas is achieved without the requirement for PPE (Personal Protective Equipment) adjustment. MSA provides a bespoke Latchways system design service for your project requirements.
Email: spec@latchways.com for more information.

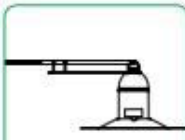




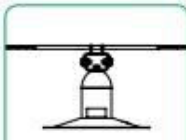
A. End Anchor



B. Intermediate Anchor



C. Corner Anchor



D. Variable Anchor



E. End Anchor

System components

The following components complete the system allowing hands-free operation. Latchways components are manufactured in marine-grade stainless steel and are individually numbered to allow complete traceability. Inspection and maintenance are required annually.

Transfasteners

The user, wearing a full body harness and energy-absorbing lanyard, is continuously attached to the system with a Transfastener™, which rotates allowing it to pass through the intermediate cable supports. For systems on inclines over 15° a Climblatch device is required instead of the Transfastener.





Turnbuckle assembly
The turnbuckle assembly provides a cable termination and method of tensioning the system. The integral indicator disc will spin when the correct tension is reached.



Swage & Clevis
The swage and clevis unit provides the method of terminating the cable at the opposite end of the system to the turnbuckle assembly.



90° Corner bracket
This one-piece corner bracket attached to an intermediate post provides an angle change of 90° within the system.



Variable bracket
This bracket attaches to an intermediate post and provides an angle change of between 0 and 80° both in the horizontal and the vertical plane.



D Ring & Hanger
The D ring and hanger form an intermediate cable support. The cable is threaded through the hanger allowing the Transfastener to travel the length of the system without disconnecting.



5.3 Fixed Ladders

Vertical fixed ladders would need to be installed at various locations to provide unrestricted access to maintain Solar PV on the Centre and East Chapel roofs as detailed below.

Söll PivotLoc foldable ladder system

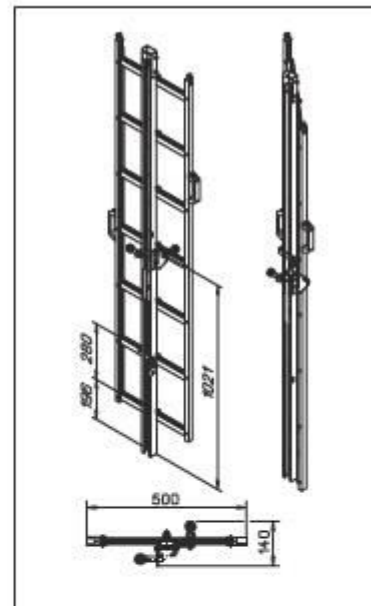
Design principle:

The ladders can be opened or folded closed. When the ladder is closed, it has a slim and unobtrusive profile. When open, the result is a high-quality ladder with Miller® fall protection. The foldable ladder system prevents unauthorised use of the system.

Söll PivotLoc, 1st ladder section:

- Profile 5 x 33 mm
- With arresting device, end-stop, recess, connector and side handles
- Mounting distance: Recommended 1,400 mm – max. 1,680 mm
- The brackets must be fixed on the pivot points of the rungs
- Max. section length 4,480 mm
- Rung distance 80 mm
- The system also includes a stainless steel clamp that is used to insert a padlock

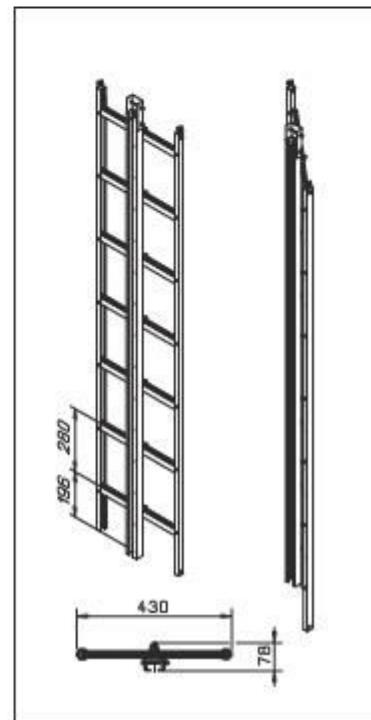
Material: Anodised aluminium
Weight: Approx. 4.0 kg/m
Part no. **ZALKLAPP- $\langle$ ladder length in mm $\rangle$ -A**



Söll PivotLoc, extension section:

- Profile 5 x 33 mm
- With connector
- Recommended mounting distance: 1,400 mm – max. 1,680 mm
- The brackets must be fixed on the pivot points of the rungs
- Manufacturing length max. 4,480 mm
- Rung distance 80 mm

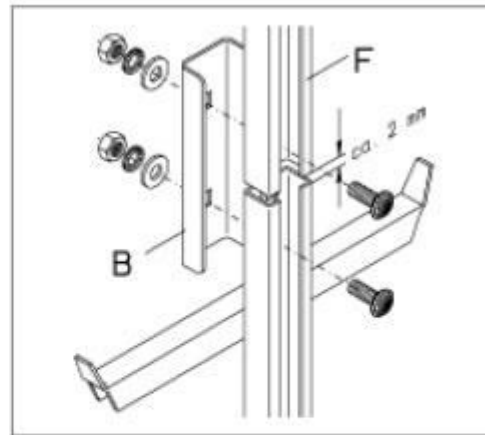
Material: Anodised aluminium
Weight: 4.0 kg/m
Part no. **ZALKLAPP- $\langle$ ladder length in mm $\rangle$**



4.9 Assembling the twisted change-over rail

When assembling from new, assemble the ascent route in accordance with the relevant assembly instructions. The free ladder projection at the upper end must not exceed 380 mm. If it is greater, an additional retaining bracket must be fitted.

- Fit the connecting piece (B) on the uppermost ladder element.
- Bolt the twisted change-over rail (F) to the connecting piece. Set the guide rail joint to about 2 mm. (Fig. 2)
- Use the attachment cross (F1) to mount the twisted change-over rail (F) at a sufficiently dimensioned fixing point (e.g. support foot, order no. 17509) at the free end. When doing so, make sure that all fixing holes of the attachment cross (F1) are used (2x fixing on change-over rail, 2x fixing on structure). (Fig. 3)



Attention!

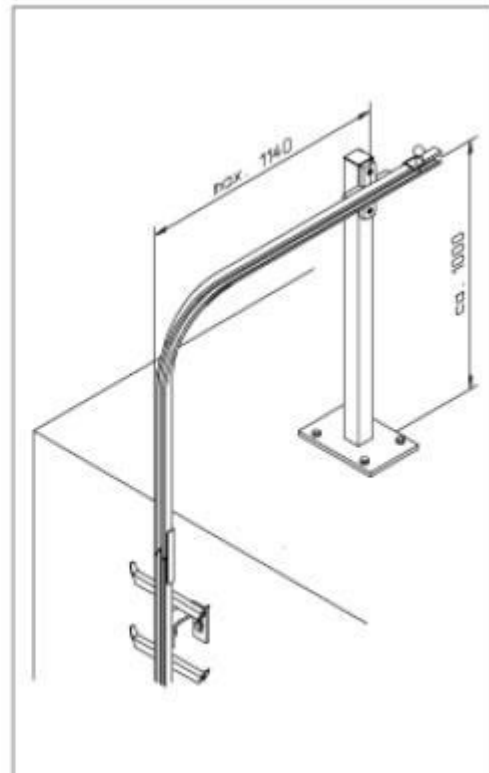
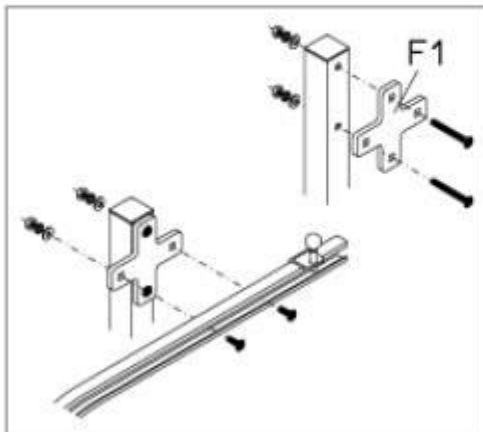
The distance between the front edge of the twisted change-over rail and the fixing point must not exceed 1,140 mm! (Fig. 4)

Note:

The catch noses of the twisted change-over rail must always point upwards when vertical.

Attention!

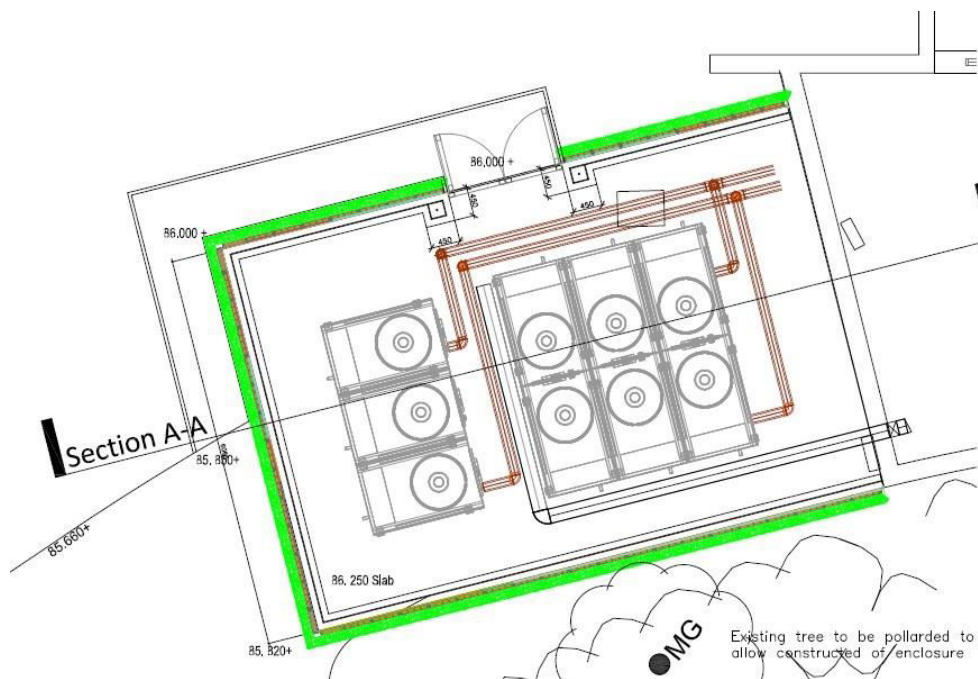
The twisted change-over rail must be securely mounted on at least 2 fixing points before being used.



6.0 Accessibility

6.1 Air Source Heat Pumps

Access to the ASHP's for maintenance purposes has been fully considered by installing double gates to the living wall compound having 1800mm clear opening. There would be maximum 150mm step down into the compound from external paving level, it has been considered that no heavy plant would be hand lifted through the opening.



6.2 Solar PV Modules

To ensure safe access is provided to roof areas for maintaining the Solar PV on a 6 month cycle, vertical fixed ladders are proposed with built-in fall protection. On accessing roof areas mansafe systems would be available to safely access the working areas.



7.0 Conditions of Use of this Report

This report is to be regarded as confidential to and for the sole use of the recipient. Consequently, no responsibility is accepted to any third party in respect of its contents in whole or in part.

APPENDIX A

Drawing Schedule

DRAWING REGISTER

Drawing Owner	Status	Drawing No.	Title	Rev No.
Drees & Sommer	Planning	24598-001	Elevations as Existing	-
	Planning	24598-002	Roof Plan Existing	-
	Planning	24598-003	Reflective Ceiling Plan	-
	Planning	24598-004	Elevations & Ladder Access Proposed	-
	Planning	24598-005	Roof Plan & Ladder Access Proposed	-
	Planning	24598-006	ASHP Enclosure as Proposed	-
	Planning	24598-007	External Services	-
	Planning	24598-008	IPS System Proposed	-
	Planning	24598-009	Wall Penetration Details	-
FG Markland	Planning	24127-FMA-B1-FN-DR-S-0001-S4-P02	ASHP Compound Slab Details	-
	Planning	24127-FMA-B1-FN-DR-S-0002-S4-P02	ASHP Compound Wall and Foundation Details	-
Crookes & Walker	Planning	3384-CWC-ZZ-EX-DR-ME-9001	Site Boundary Plan	-
	Planning	3384-CWC-ZZ-EX-DR-ME-9002	Site Location Plan	-
	Planning	3384-CWC-XX-00-DR-M-5001	Proposed Plant Room & Stripout Layout	T1
	Planning	3384-CWC-XX-00-DR-M-5002	Proposed Water Services	T1
	Planning	3384-CWC-XX-00-DR-M-5601	Proposed Heating Layout	P1
	Planning	3384-CWC-XX-00-DR-N-2801	Builders Work	T1
	Planning	3384-CWC-XX-00-DR-N-4000	ASHP External Compound MEP Spacials	T1
	Planning	3384-CWC-XX-EX-DR-E-6100	External Electrical Services Proposed	T1
	Planning	3384-CWC-XX-EX-DR-E-6100	Solar PV as Proposed	T3
	Planning	3384-CWC-XX-EX-DR-E-6900	Lightning Protection	T1

APPENDIX B

Photographic Schedule



Image 01 – Ladder Access Location Nr.1



Image 02 – Ladder Access Location Nr.1



Image 03 – Outer wall to receive low level pipework and cable tray protrusions



Image 04 – Outer wall to receive low level pipework and cable tray protrusions

APPENDIX C

Roof Covering Inspection Report

Roof Condition Report



Project Name:	Blackley Cemetery Crematorium
Address:	Victoria Avenue, Manchester M9 8PJ

Client:	Drees & Sommer
Address:	1.06 South Harrington Building, 182 Sefton Street, Liverpool, L3 4BQ
Tel/Fax/Email:	
Contact:	Alexander Hodkin

Weather during inspection	Dry & Overcast (10°C)
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Inspected by	Paul Seel	Position	Technical Specification Manager	Date	15.10.24
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Project Description & Observations

Reason for survey

Manchester City Council are proposing the installation of PV panels to be installed to certain flat roof areas and need to determine the existing build up and current condition of the roofs to help calculate feasibility of the PV installation and also to understand any required remedial works that may be required prior, to ensure the roof is in suitable condition.

Weather conditions at time of Visit

At the time of inspection the weather was dry and overcast.

Roof Description: Overview

Roof Area Reference	2no Flat Roofs
Building Use	Religious Building
Roof height	Double Storey
Roof Access	Multi Section Ladder
Existing roof pitch	Approximately 1° & 4° Respectively
Existing drainage	Internal and Chute Outlets Respectively
Warm/Cold Roof	Warm
Type of waterproofing	Bituminous Built Up System
Abutments (type)	Check Kerbs, Upstands and Parapets
Flashings	Dressed into chase
Rooflights	Oversailed Rooflight above Glazed Panel Rooflights
Penetrations	

Roof Map



Roof Condition: Flat Roofs

Both of the roof areas are currently waterproofed with a bituminous built up system installed to the existing concrete deck.

Both roof areas have 130mm insulation which we assume will achieve the required 0.18 U value for this type of building, as long as they were installed as part of a remedial works plan.

The falls on the roof appear adequate for the drainage of the roof. Continuous maintenance of the roofs, especially around the outlets, need to be organised as the existing internal outlets on Roof 1 were completely blocked with dirt. Also on Roof 2 some build up of moss was evident, which could provide a substrate for root growing vegetation.

The core samples showed that the existing system is working with no signs of water ingress and no moisture content within the existing insulation or layers of the system.

Some areas of mineral loss were present on Roof 1 which could lead to UV degradation, so consideration should be made to install some rolls of mineral faced bitumen, or some form of coating to these areas for added protection and prolong the life of the system.

Pointing between some of the parapet copings on Roof 2 could be allowing water to penetrate into the structure and so repointing these should be considered.

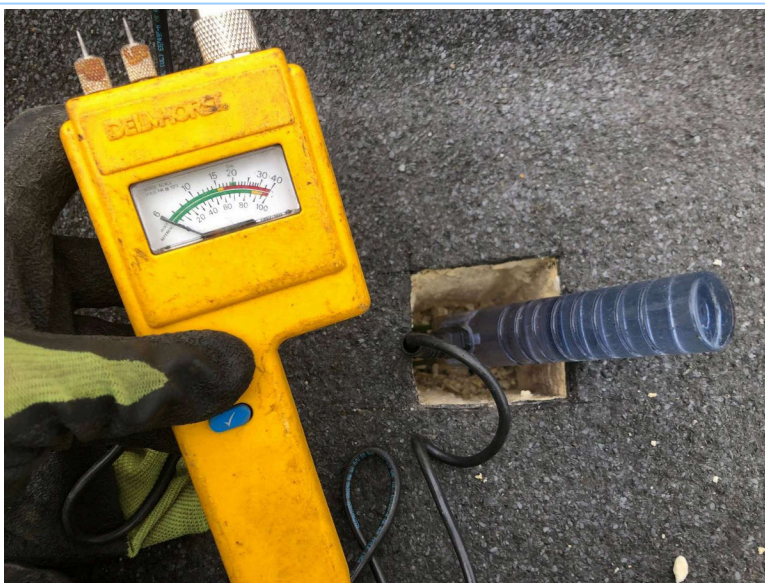
Photographs : Roof 1



Photograph 1:Overview Image Roof 1

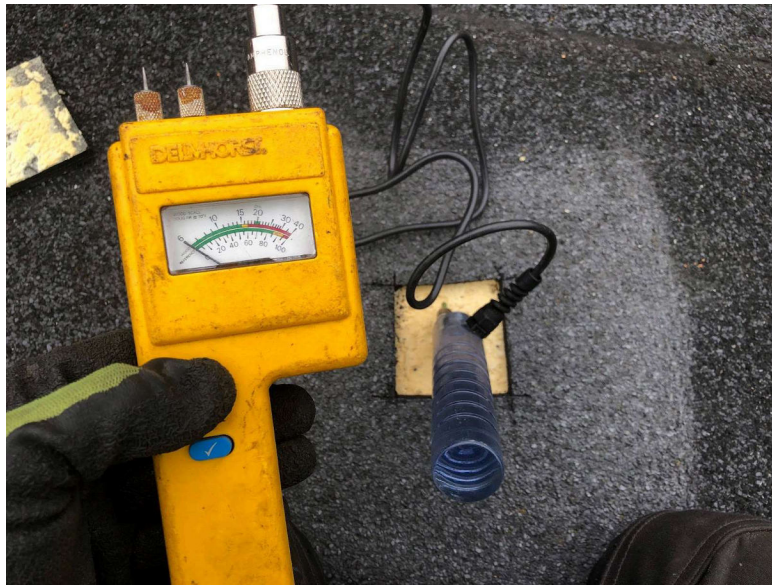


Photograph 2: Overview Image Roof 2



Photograph 3: Roof 1 Core Sample - Build up consists of Concrete Deck, Bituminous VCL, 130mm PUR/PIR Insulation, Bituminous Built Up System with Mineral Finish.

Moisture Reading - 0%



Photograph 4: Roof 2 Core Sample
- Build up consists of Concrete Deck, Bituminous VCL, 130mm PUR/PIR Insulation, Bituminous Built Up System with Mineral Finish.

Moisture Reading - 0%



Photograph 5: Image of mineral loss on section of Roof 1.



Photograph 6: Image of blocked outlet on Roof 1.



Photograph 7: Image of deteriorated pointing between copings.



Photograph 8: Moss build up on Roof 2

Recommendations

The roofs in general appear to be in decent condition with very little remedial works required from a waterproofing point of view.

Maintenance to be organised for clearance of debris, moss and unblocking of outlets.

Protective covering for area of mineral loss on Roof 1.

Re-point parapet coping stones.

APPENDIX D

Structural Report



Corby House
38A Chorley New Road
Bolton
BL1 4AP
Tel: 01204 531 208
Fax: 01204 380 474
Email: info@fgmarkland.co.uk
Web: www.fgmarkland.co.uk

Structural Report

Manchester City Council Decarbonisation.

Blackley Cemetery Crematorium and Chapels – Roof Appraisal

Prepared by

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Blackley Cemetery Crematorium and Chapels – Roof Appraisal

Brief

Frederick G Markland Associates have been instructed to undertake a site inspection to determine the existing roof structure and prepare an appraisal relating to the feasibility of the proposed PV panel installation.

Site Address

Blackley Cemetery Crematorium and Chapels
Victoria Avenue
Manchester
M9 8PJ

Inspection Date

The inspection was carried out on 5th August 2024.

Observations

The Blackley Cemetery Crematorium consists of a number of single storey buildings of various heights housing the chapel areas towards the front elevation, and the crematorium facilities towards the rear.

Due to the height of the roof deck within the chapel buildings, close inspection from within the internal areas was not possible during the inspection. A member of staff at the Crematorium informed us that the roof deck to all chapel areas consisted of a concrete deck.

This appeared to be corroborated with our observations within the Centre Chapel, where formwork joints appeared to be visible to the soffit of the roof deck. The front elevation to the Centre Chapel forms an arc on plan, with a number of beam elements spanning front to back in a fanned arrangement. The roof beams generally span from the front elevation to an assumed line of support above the dais, with internal columns providing intermediate support offset from the front elevation. A false decorative ceiling obscures the roof deck soffit above the dais, so it was not possible to determine the support to the fanned roof beams in this location.

The roof beams were noted to be approximately 180mm wide, with a varied depth of approximately 270mm at the front elevation, tapering to an approximate depth of 550mm at the internal column position, then tapering back to an approximate depth of 270mm adjacent to the assumed line of support above the dais.

The internal columns were noted to be approximately 180mm wide x 430mm deep, with a total height of approximately 6.1m. The columns appeared to be of concrete construction, though considering the slenderness of the columns in conjunction with construction technologies available at the time of construction (circa 1960), it would be a reasonable assumption that the columns consist of steel stanchions encased in concrete.

The centres of the roof beams within the Centre Chapel were noted to be approximately 2m adjacent to the front elevation, diminishing to approximately 1m centres towards the assumed line of support above the dais.

Decorative false ceilings were noted to the East and West Chapels, so the roof structural layout could not be confirmed during the survey. Given the spans and the confirmation from a member of

staff that the roof consists of a concrete deck, it is a reasonable assumption that the roof deck spans front to back between steel beams spanning onto load-bearing masonry walls. This would need to be confirmed subject to further investigation.

A large circular rooflight was noted within each Chapel, generally located above the dais.

The roof covering to the East Chapel appears to consist of a felt roof with a slight fall from the front elevation towards an inset gutter in front of the existing rooflight.

The roof covering to the Centre Chapel appears to consist of a single-ply system, with a reasonably significant fall from the front elevation towards the existing rooflight at the rear of the roof. It was not deemed possible to gain access onto the Centre Chapel roof during the survey, but from observing the approximate depth of parapet to the roof covering, the roof appears to fall approximately 1m from the front elevation to the rear.

Proposals

A number of potential decarbonisation measures have been identified on behalf of the client to attain the client's target of achieving Net Zero Carbon status by 2038.

One of the measures identified across a number of properties within the client's corporate estate include the installation of an array of photovoltaic (PV) panels. At the Crematorium and Chapels, the proposals entail the installation of a PV panel array on the Centre Chapel roof & East Chapel roof.

Due to limited information regarding the existing build up of the roofs to both the Centre Chapel & East Chapel, a detailed assessment is not possible at this stage. A provisional assessment will be undertaken, with any areas of further investigation required identified.

Discussion

Considering the robustness of a concrete deck construction for the roofs to the Centre and East chapels, it is considered likely that the PV panel installations are feasible.

With regards to the Centre Chapel, the plan arrangement of the roof beams is considered likely to be more for aesthetic purposes rather than structural requirements, so it is anticipated that there may be some redundancy in the existing structure that will enable the additional weight of a PV panel system to be accommodated. One aspect of the build-up to the Centre Chapel roof that bears further questioning is the roof fall. From the internal area, the roof soffit appears to be reasonable flat, so it is considered prudent to confirm how the fall has been achieved on the external roof surface. Falls can often be achieved via tapered PIR or EPS insulation boards as part of over-roofing works on an historic flat roof, however given the depth of fall that appears to be evident on the Centre Chapel roof, this methodology is considered unlikely. Alternate methods can entail the installation of a thin gauge steel rail mounting system, which can create requisite falls while supporting some form of built-up cladding. If this is the case, the cladding build up and mounting system would need to be appraised to determine the suitability of supporting the proposed PV panel system and suitably transfer the loads into the original concrete roof deck.

Further investigation is recommended to confirm the roof build up to the Centre Chapel. Additionally, it is recommended that high-level access is provided internally to enable further investigation of the support arrangement of the roof beams over the dais. Further investigation within the East Chapel is also recommended to confirm the roof build up and the structural deck arrangement. It is recommended that high-level access is provided internally to inspect the structural deck soffit obscured by the existing decorative false ceiling.

Conclusions

In summary, the initial inspection would indicate that due to the concrete roof deck construction of the roofs to the Centre and East chapels, it is considered likely that there will be sufficient capacity to support the proposed PV panel systems.

However, further investigation is required to confirm this. We would recommend the below investigation works are undertaken.

- Determine existing build up to both Centre and East Chapel roofs. This could be achieved via reviewing historic as-built drawings from previous over-roofing works, or alternatively via sample coring.
- Confirm structural arrangement of roof deck to Centre and East Chapel roofs. Provide high-level access to inspect the soffit of the existing roof deck currently obscured by the decorative false ceiling. These works may also entail locally removing portions of the decorative ceiling.

Report Prepared by:



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Structural Report - Addendum

Manchester City Council Decarbonisation.

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Blackley Cemetery Crematorium and Chapels – Roof Appraisal

Brief

Frederick G Markland Associates have been instructed to undertake a site inspection to determine the existing roof structure and prepare an appraisal relating to the feasibility of the proposed PV panel installation. This report relates to the additional site visit undertaken to obtain further information regarding the structural arrangement of the roofs to the Main and East Chapels.

Site Address

Blackley Cemetery Crematorium and Chapels
Victoria Avenue
Manchester
M9 8PJ

Inspection Date

The second inspection was carried out on 7th November 2024.

Observations

A scissor lift was utilised to enable high level access to the underside of the roof soffit to both the Main Chapel and the East Chapel.

The East Chapel roof deck appears to consist of a concrete slab spanning between downstand beams at approximately 2.8m centres. The roof beams span across the width of the East Chapel, bearing onto the masonry walls on either side. The roof beams appear to consist of steel members encased in concrete.

The Main Chapel roof deck appears to consist of a pitched concrete slab spanning between downstand beams in a fanned arrangement. The area above the dais obscured by a false ceiling was surveyed via the scissor lift. The roof deck in this area was noted to be locally thickened by approximately 200mm to match the depth of the roof beams running into it.

Local roof core sampling undertaken by BMI indicates that the build-up to both roofs consist of a bituminous VCL laid on the concrete deck, with 130mm PIR insulation overlaid with a Bituminous built up system with mineral finish.

Proposals

A number of potential decarbonisation measures have been identified on behalf of the client to attain the client's target of achieving Net Zero Carbon status by 2038.

One of the measures identified across a number of properties within the client's corporate estate include the installation of an array of photovoltaic (PV) panels. At the Crematorium and Chapels, the proposals entail the installation of a PV panel array on the Centre Chapel roof & East Chapel roof.

Discussion

Considering the robustness of a concrete deck construction for the roofs to the Centre and East chapels, it is considered likely that the PV panel installations are feasible.

The initial PV panel design proposals indicated on Van Der Valk's project report (document No. SEG_CWC MCC Blackley Crematorium_RPT_5.00kWp) outline an anticipated area loading of 0.19kN/m^2 for the ballasted PV panel array system.

On the basis of the building being constructed circa 1959, the relevant design code describing dead and variable loadings was CP3: Chapter V: Part 1.

Section 6.3 of the above document states that for a roof slope of 30° or less, the following imposed loads (including snow) should be allowed for:

- Roof variable load **0.75 kN/m^2**

Current British Standards (UK NA to BS EN 1991-1-1:2002) indicate that for a roof not accessible except for normal maintenance and repair, imposed loads on roofs should be taken as follows:

- Roof with slope less than 30° **0.60 kN/m^2**

The permanent loading due to the PV panel arrays will increase the net permanent loading by 0.19 kN/m^2 . The variable design loading applicable at the time of construction would have been 0.75 kN/m^2 . In line with current codes of practice, this variable loadcase can be reduced to 0.6 kN/m^2 . In addition, the variable loading attributed to access for maintenance can be omitted within the footprint of the PV panel array, as due to the fragility of the PV panels the owner should ensure that the PV panel array should not be trafficked. Therefore, even when considering the area within the footprint of the PV panel array being trafficked, the net increase in loading is 0.04kN/m^2 . This increase is considered negligible and can reasonably be expected to be accommodated by the robust concrete roof deck structure.

The net loading increase due to PV panel self-weight is considered negligible against the self-weight of the building construction, therefore it is reasonable to assume that the existing foundations will have sufficient capacity to accommodate the increase in loading.

Conclusions

In summary, it is considered that the existing structure has sufficient capacity to accommodate the proposed PV panel installation, with no requirement for any strengthening works.

Report Prepared by:



Ben Griffin
BSc (Hons)
Structural Engineer

APPENDIX E

The Solar Edge Design Report

ValkPVplanner

Project report



System Electrial Ltd

United Kingdom of Great Britain
and Northern Ireland

Project name	: CWC MCC Blackley Crematoriu
Date (modified)	: 10-10-2024
Time (modified)	: 09:49
Company	: System Electrial Ltd
User	: Mark Gracey
Version ValkPVplanner	: 2.16.73

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• Strength calculations Building 1 - Area 1 - Default Subarea 1	07
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► Location information

Project	: CWC MCC Blackley Crematoriu
Project location	: Victoria Ave, Manchester M9 8PJ, UK
Terrain category	: Country
High neighbouring	: No
Wind area	: 23 m/s
Snow zone	: 0.5 kN/m ²
Altitude above sea	: 75 m
Distance to shore line	: 52 km
Peak wind pressure	: 724,78 N/m ²
Calculated load on panel due to wind and snow	: 544,48 Pa

► Project overview

Building	No. of PV-panels	Power [kWp]	System type	Weight of mounting system [kg]	No. of FULL tiles*	No. of HALF tiles**	Weight of ballast [kg]
Building 1	34	17,00		404	76	0	684
Building 1 - Area 1 - Default Subarea 1	34	17,00	ValkPro+	404	76	0	684
Building 2	16	8,00		201	40	0	360
Building 2 - Area 1 - Default Subarea 1	16	8,00	ValkPro+	201	40	0	360
Total project	50	25,00		604	116	0	1.044

Tiles are included for all flat roof systems selected in this project.

Notes: The results in this project report can be based on default values. Please check if all values are correct.

Bill of Materials - Total project

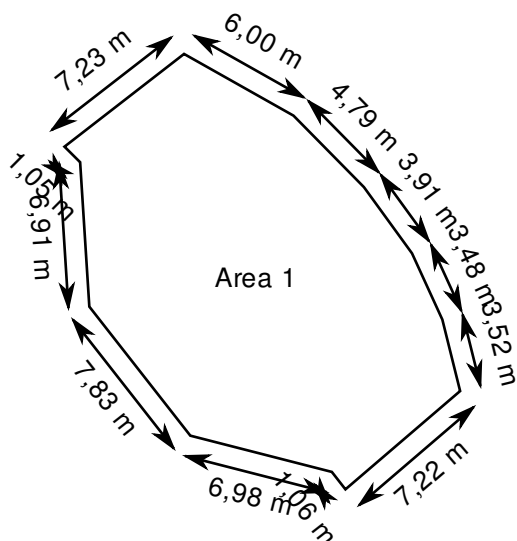
Article no.	Description	Package Qty.	Building 1	Building 2	Total
729622	Rubber tile carrier - click - ValkPro+	30	54	30	84
741801500	Galv roof carrier L=1500x1,5mm	100	44	20	64
7506301545G	Tile 30 x 15 x 4,5cm - 4,5kg - UK	104	0	0	0
7506303045G	Tile 30 x 30 x 4,5cm - 9kg - UK	52	76	40	116
774221	Ss hammerhead bolt M8x20mm + lock nut	100	39	15	54
724650	Alu rear foot ValkPro+ L10° middle	25	24	12	36
724651	Alu rear foot ValkPro+ L10° side	25	20	8	28
724660	Alu front foot ValkPro+ P/L10° middle	25	24	12	36
724661	Alu front foot ValkPro+ P/L10° side	25	20	8	28
742515	Galv back plate ValkPro+ L10° L=2180mm	100	34	16	50
742555	Galv mass carrier ValkPro+ L=2179mm	100	42	24	66
773320	Ss thread-forming bolt M6x20mm - T30	100	104	44	148
742540	Galv side plate ValkPro+ L10° universal	100	20	8	28

The bill of materials shown on this page, refer to the materials needed for the total project.

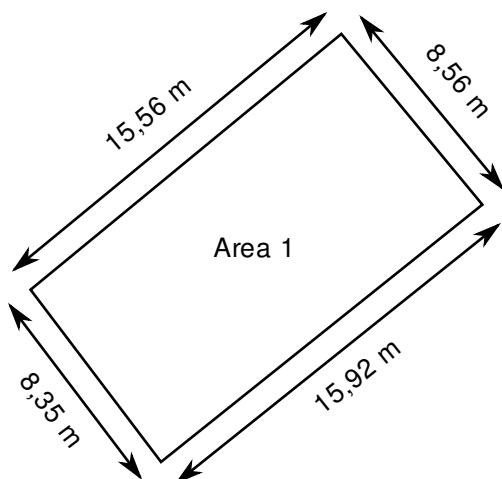
The Bill of Materials per individual roof area can be found in the dedicated chapters of this user manual.

This drawing shows all the buildings of the total project including the different roof areas.

► Building 1



► Building 2

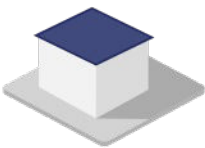


► Building information

Building name	: Building 1
Ridge height	: 6,00 m

► Roof information

Roof type	: Flat
Roof material	: Bitumen
Gravel present	: No
Roof friction coefficient	: 0.6

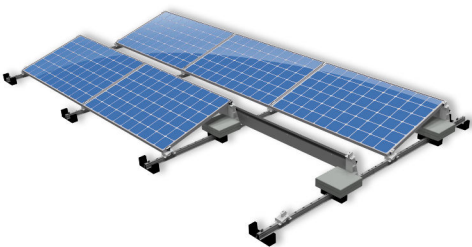


► System information

No. of panels south wall	: 34
Module	: JA SOLAR 500w 2.094 x 1.134 x 0.030
Panel weight	: 25,00 Kg
Module orientation	: Landscape
Edge zone calculated	: 1,20 m
Edge zone adjusted	: 1,20 m
System choice	: ValkPro+
System colour	: Aluminium
Panel inclination	: 10
Azimuth	: 143
Foundation type	: Tile carrier
Include side plate	: Yes

► System type

ValkPro+



► Weight information

Weight of panels	:	850,00 kg
Weight of mounting system	:	403,42 kg
Weight of ballast	:	684,00 kg
Total weight	:	1.937,42 kg

► System dimensions

Subarea dimensions	:	174,90 m ²
System dimensions	:	107,36 m ²

► Roof loadings

Roof load based on subarea dimension	:	11,08 kg/m ² (108,67 N/m ²)
Roof load based on system dimension	:	18,05 kg/m ² (177,04 N/m ²)
Point load max. (max. ballasted points)	:	31 kPa (0,031 N/mm ²)
Point load min. (min. ballasted points)	:	22 kPa (0,022 N/mm ²)

► Option to reduce point load of max ballasted point

For projects where it is required to keep the point load to a minimum, there is the option to add load distributors for additional support of the ballasted points. The following reduction of point load can be achieved:

Point load reduction of the ValkPro+ system per ballast point		
Number of rubber load distributors per ballast point	Reduction of point load for ValkPro+ South	Reduction of point load for ValkPro+ East-West
0	0%	0%
1	71%	55%
2	73%	71%
3	88%	78%

The load distributors can be ordered using the following codes:

729630 for standard roofs

729631 for PVC roof membrane

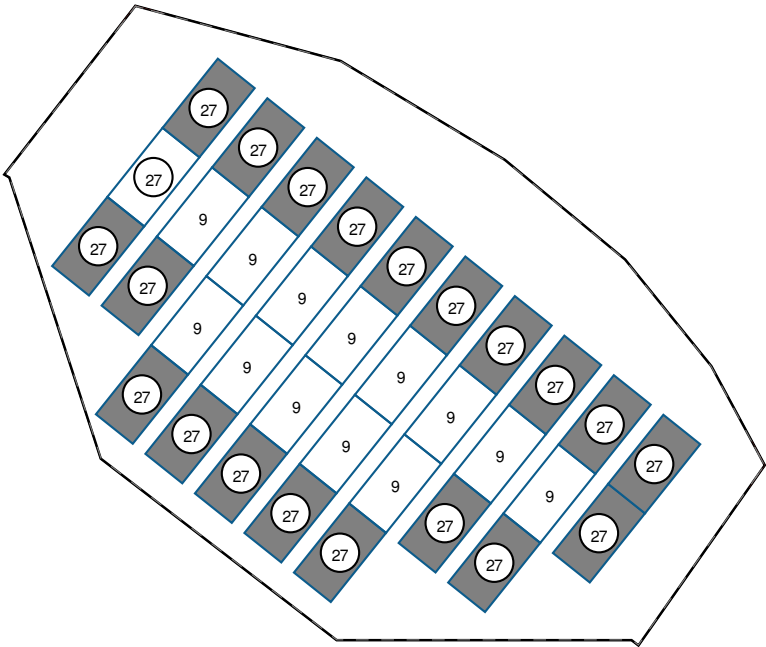
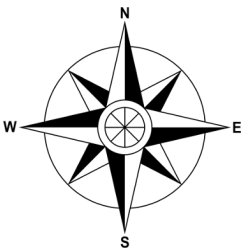
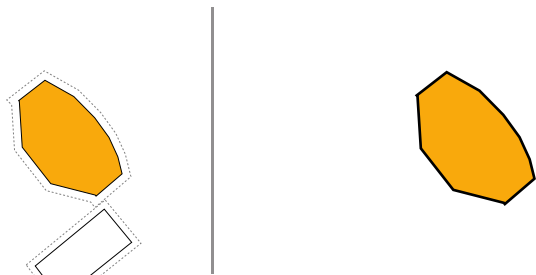
Bill of Materials |

Building 1 - Area 1 - Default Subarea 1

1.1.1

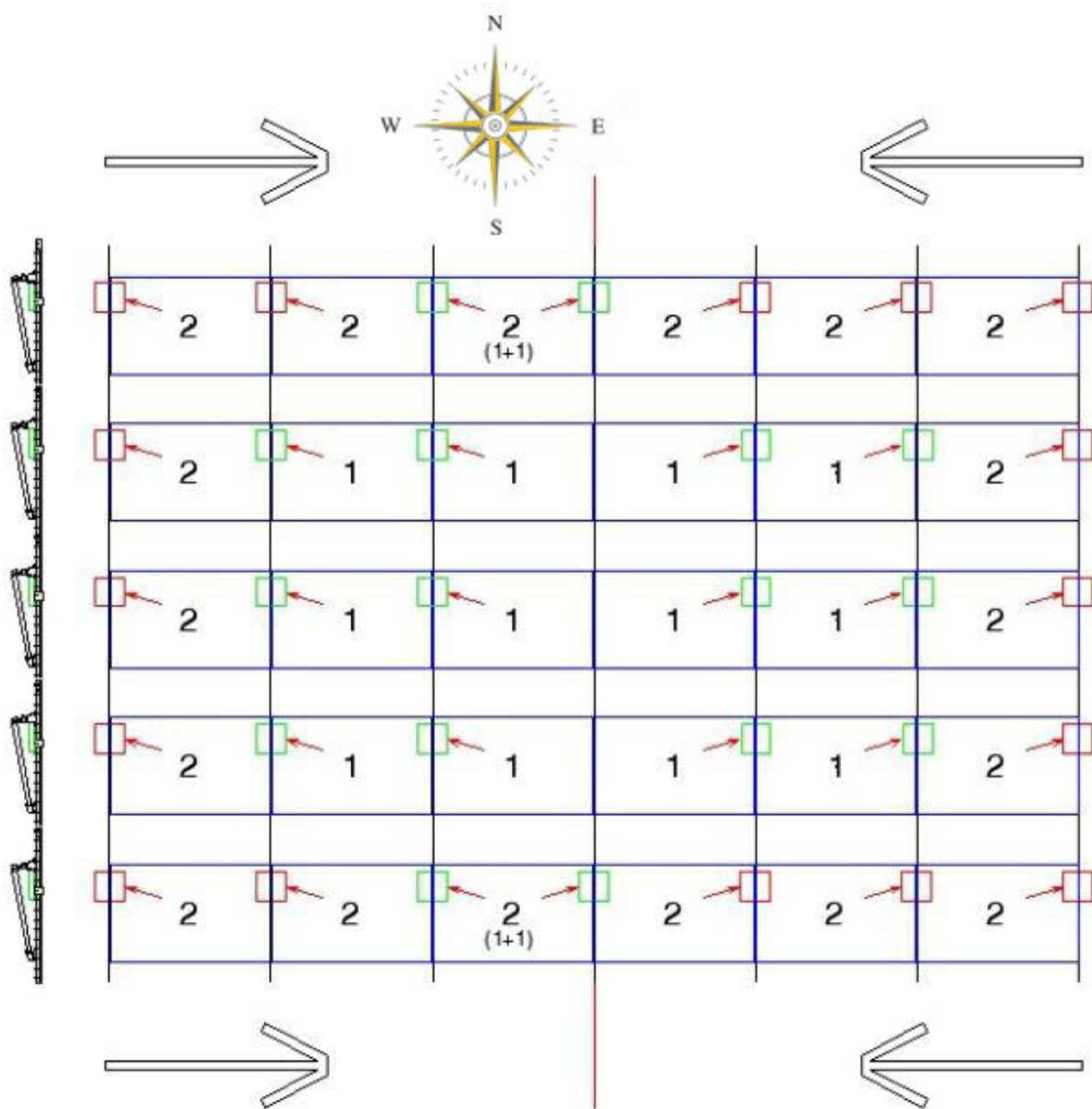
The bill of materials shown in this page apply to materials needed for Building 1 - Area 1 - Default Subarea 1

Article no.	Description	Package Qty.	Calc. Qty.	Extra Qty.	Total Qty.	Total weight
729622	Rubber tile carrier - click - ValkPro+	30	54	0	54	34,56
741801500	Galv roof carrier L=1500x1,5mm	100	44	0	44	113,08
7506301545G	Tile 30 x 15 x 4,5cm - 4,5kg - UK	104	0	0	0	0,00
7506303045G	Tile 30 x 30 x 4,5cm - 9kg - UK	52	76	0	76	684,00
774221	Ss hammerhead bolt M8x20mm + lock nut	100	39	0	39	1,01
724650	Alu rear foot ValkPro+ L10° middle	25	24	0	24	9,91
724651	Alu rear foot ValkPro+ L10° side	25	20	0	20	8,82
724660	Alu front foot ValkPro+ P/L10° middle	25	24	0	24	5,95
724661	Alu front foot ValkPro+ P/L10° side	25	20	0	20	5,50
742515	Galv back plate ValkPro+ L10° L=2180mm	100	34	0	34	88,74
742555	Galv mass carrier ValkPro+ L=2179mm	100	42	0	42	113,82
773320	Ss thread-forming bolt M6x20mm - T30	100	104	0	104	0,62
742540	Galv side plate ValkPro+ L10° universal	100	20	0	20	21,40
Total weight						1.087,42 kg



- Edge zone calculated: 1,20 m
- █ Edge zone adjusted: 1,20 m
- █ Dilatation line

Attention! When placing ballast: work from the outside edge of a row towards the centre. It is possible for one roof carrier in the middle of the row to have no ballast on it.



Placing ballast:

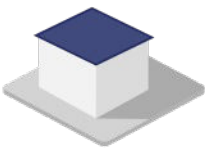
- Always work from the sides of the system inwards to the centre, when placing ballast
- In the centre row of the system (East to West), there is always on position without ballast (see red line)
- On this row, the ballast can be spread over the different positions (if possible)

► Building information

Building name	: Building 2
Ridge height	: 6,00 m

► Roof information

Roof type	: Flat
Roof material	: Bitumen
Gravel present	: No
Roof friction coefficient	: 0.6

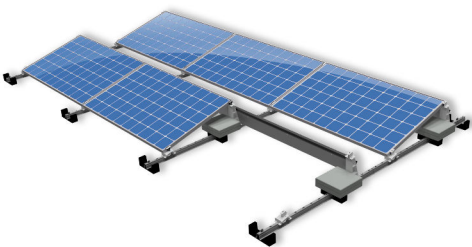


► System information

No. of panels south wall	: 16
Module	: JA SOLAR 500w 2.094 x 1.134 x 0.030
Panel weight	: 25,00 Kg
Module orientation	: Landscape
Edge zone calculated	: 1,20 m
Edge zone adjusted	: 1,00 m
System choice	: ValkPro+
System colour	: Aluminium
Panel inclination	: 10
Azimuth	: 141
Foundation type	: Tile carrier
Include side plate	: Yes

► System type

ValkPro+



► Weight information

Weight of panels	:	400,00 kg
Weight of mounting system	:	200,27 kg
Weight of ballast	:	360,00 kg
Total weight	:	960,27 kg

► System dimensions

Subarea dimensions	:	88,69 m ²
System dimensions	:	50,52 m ²

► Roof loadings

Roof load based on subarea dimension	:	10,83 kg/m ² (106,22 N/m ²)
Roof load based on system dimension	:	19,01 kg/m ² (186,47 N/m ²)
Point load max. (max. ballasted points)	:	31 kPa (0,031 N/mm ²)
Point load min. (min. ballasted points)	:	22 kPa (0,022 N/mm ²)

► Option to reduce point load of max ballasted point

For projects where it is required to keep the point load to a minimum, there is the option to add load distributors for additional support of the ballasted points. The following reduction of point load can be achieved:

Point load reduction of the ValkPro+ system per ballast point		
Number of rubber load distributors per ballast point	Reduction of point load for ValkPro+ South	Reduction of point load for ValkPro+ East-West
0	0%	0%
1	71%	55%
2	73%	71%
3	88%	78%

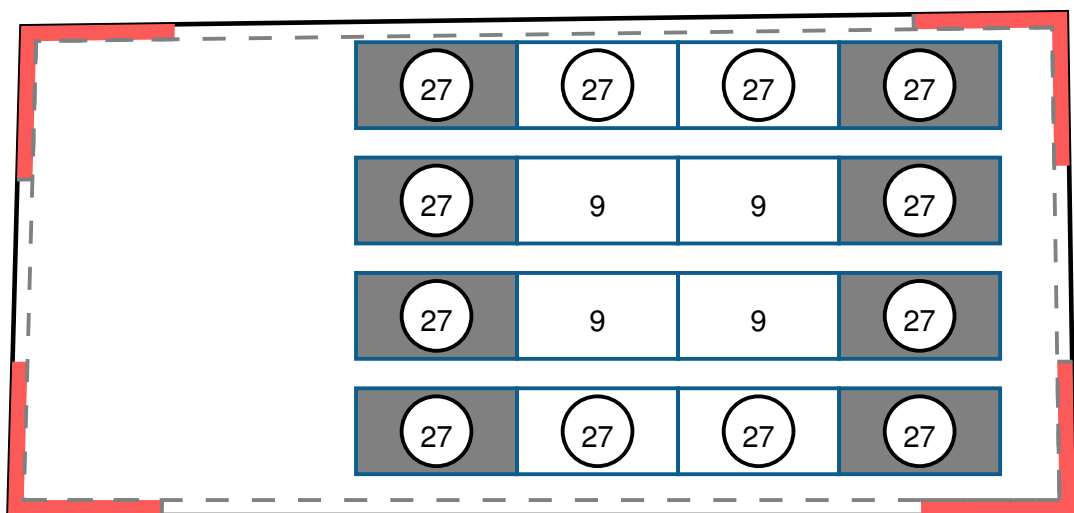
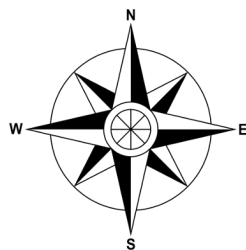
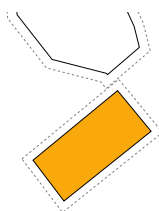
The load distributors can be ordered using the following codes:

729630 for standard roofs

729631 for PVC roof membrane

The bill of materials shown in this page apply to materials needed for Building 2 - Area 1 - Default Subarea 1

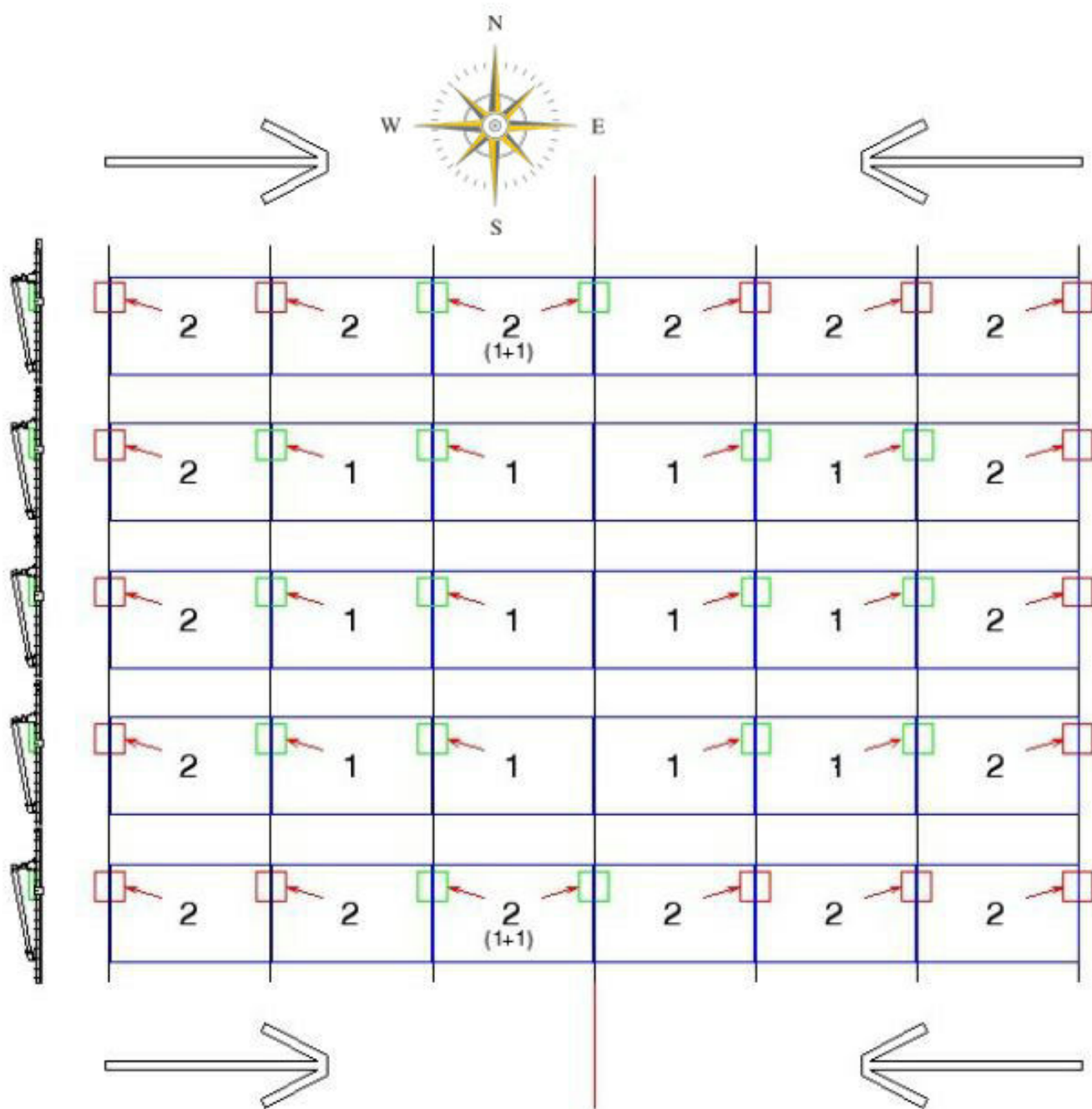
Article no.	Description	Package Qty.	Calc. Qty.	Extra Qty.	Total Qty.	Total weight
729622	Rubber tile carrier - click - ValkPro+	30	30	0	30	19,20
741801500	Galv roof carrier L=1500x1,5mm	100	20	0	20	51,40
7506301545G	Tile 30 x 15 x 4,5cm - 4,5kg - UK	104	0	0	0	0,00
7506303045G	Tile 30 x 30 x 4,5cm - 9kg - UK	52	40	0	40	360,00
774221	Ss hammerhead bolt M8x20mm + lock nut	100	15	0	15	0,39
724650	Alu rear foot ValkPro+ L10° middle	25	12	0	12	4,96
724651	Alu rear foot ValkPro+ L10° side	25	8	0	8	3,53
724660	Alu front foot ValkPro+ P/L10° middle	25	12	0	12	2,98
724661	Alu front foot ValkPro+ P/L10° side	25	8	0	8	2,20
742515	Galv back plate ValkPro+ L10° L=2180mm	100	16	0	16	41,76
742555	Galv mass carrier ValkPro+ L=2179mm	100	24	0	24	65,04
773320	Ss thread-forming bolt M6x20mm - T30	100	44	0	44	0,26
742540	Galv side plate ValkPro+ L10° universal	100	8	0	8	8,56
Total weight						560,27 kg



	Panels with side plates	
Units are shown in Kg		

- Edge zone calculated: 1,20 m
- Edge zone adjusted: 1,00 m
- Dilatation line

Attention! When placing ballast: work from the outside edge of a row towards the centre. It is possible for one roof carrier in the middle of the row to have no ballast on it.



Placing ballast:

- Always work from the sides of the system inwards to the centre, when placing ballast
- In the centre row of the system (East to West), there is always on position without ballast (see red line)
- On this row, the ballast can be spread over the different positions (if possible)

All solar mounting systems of Van der Valk Solar Systems have been designed, calculated and manufactured according to Eurocodes and NEN 7250 regulations and its derivatives (listed below). These regulations have been used for the calculations in the Project Report. Van der Valk Solar Systems meets the applicable CE requirements regarding 2001/95/EG product safety and the applicable sections of BRL9931, components for solar systems. Van der Valk Solar Systems pitched roof clamp systems are MCS012 approved (MCS BBA 0159).

- **EN 1990 Base of Structural design**

National Annexes:

- BS EN 1990:2002+A1:2005
- DIN EN 1990/NA/A1
- IS-EN 1990:2002+A1:2005
- NBN EN 1990 ANB
- NEN-EN 1990+A1+A1/C2/NB
- NS-EN 1990:2002/NA:2008+A1:2010
- PN-EN 1990:2004/NA
- SFS-EN 1990/A1/AC
- SS-EN 1990/A1:2005/AC:2010

- **EN 1991-1-3 Actions on structures / Snow load**

National Annexes:

- BS-EN 1991-1-3:2003
- DIN EN 1991-1-3/NA
- IS-EN 1991-1-3:2003
- NBN EN 1991-1-3 ANB
- NEN-EN 1991-1-3:2003
- NS-EN 1991-1-3:2003/NA:2008
- PN-EN 1991-1-3:2005/NA
- SFS-EN 1991-1-3/AC
- SS-EN 1991-1-3/A1:2015

- **EN 1991-1-4 Actions on structures / Wind load**

National Annexes:

- BS EN 1991-1-4:2005+A1:2010
- DIN EN 1991-1-4/NA
- IS-EN 1991-1-4:2005/NA:2013
- NBN EN 1991-1-4 ANB
- NEN-EN 1991-1-4:2005
- NS-EN 1991-1-4:2005/NA:2009
- PN-EN 1991-1-4:2008/NA
- SFS-EN 1991-1-4+AC+A1
- SS-EN 1991-1-4:2005/AC:2010

- **EN 1993-1-1 Design of steel structures / Rules for buildings**

- **EN 1993-1-3 Design of steel structures / Rules for cold formed members**

- **EN 1997 Geotechnical design**

- **EN 1998-1 Design of structures / Seismic actions**

- **EN 1999-1-1 Design of aluminium structures**

- **NEN 7250 Solar systems - Integration in roofs and facades**

- **2001/95/EG Product safety**

- **BRL9931 Components of solar systems**

► Wind tunnel testing

Van der Valk Solar Systems have elaborated the results of wind tunnel studies in the product design and calculation tools for both flat and pitched roofs. The application and interpretation of the results have been checked thoroughly and match the assumption and findings as laid down in reports W15328-1ERA-002 (dated December 5th, 2016), W15328-2ERA-007 (dated September 9th, 2018) and W15328-3E-RA-003 (dated June 13th, 2018) for flat roofs and WA 15328-1E-RA-002 (dated December 22nd, 2016) for pitched roofs.

► Default values

- This project report is based on the input and results of the online calculation tool ValkPVplanner. The results derived from this tool were calculated with the greatest possible care. Nonetheless, it is possible that some information might not be entirely correct as the results for each project report can be based on default values. Please check carefully if all values are correct.

► Safety instructions

- This ValkPVplanner project report is complementary to the Valk Solar Systems installation manuals, which show how to install the Van der Valk solar mounting system.
- The instructions provided in this ValkPVplanner project report must be observed at all times.
- All structural, safety and building regulations currently applicable must be observed.
- Solar mounting systems installed on roofs can be exposed to wind and snow conditions. This will result in additional pressure load of the installed PV system on the roof and building. A design calculation must be used to establish whether or not the roof and building, will be able to withstand the extra pressure load. Where necessary, modifications need to be made.
- To prevent flat roof systems from moving, lift or tip over, the system needs to be either fixed to the roof or weighed-up by ballast. The ballast calculated in this project report is of critical importance to ensure that the mounting system can be placed and used safely on the roof(s) in subject for this project report.
- Flat roof systems placed on a roof with an inclination of 5 degrees or more must be fixed to the roof.
- Restrictions apply for the position of the solar system on a roof. The solar panels must be placed at a the recommended distance from the roof edge, as shown in this project report.

► Warranty

- Standard warranty for pitched roof, flat roof and ground mount systems is 10 years. This can be extended under certain conditions.
- The warranty provided is subject to the warranty conditions stated in the general terms and conditions supplied by Van der Solar Systems BV. Our terms and conditions can be found on our website: www.valksolarsystems.nl.

► Disclaimer

- Van der Valk Solar Systems B.V. does not accept any liability for any direct and/or indirect consequences of any act (or omission) ensuing from the information or the failure to observe the instructions provided in this project report and the installation manual, nor for possible incorrect use of the ValkPVplanner by the customer.
- The calculations do not take into account obstacles in the near surrounding like high buildings, cliffs and mountains.
- For the full disclaimer of the ValkPVplanner, please visit our website.: www.valksolarsystems.nl.

► Contact

- If you have any questions about the ValkPVplanner, calculation results or this project report: please contact the Van der Valk Solar Systems team.