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Long Eaton Aerial Survey 12 September 2017

Overview





Aerial Roof Survey

Site Details:

6 Warehouses

Long Eaton

Nottingham

NG10 3FZ

Inspection carried out by:

Sky Eye Plus Ltd

Shaw House

54 Bramhall Lane South

Bramhall

Cheshire

SK7 1AH



Aerial Roof Survey – Job Number 42669

Report Manager and Aerial Inspection Supervisor:

Simon Towers

Cleardon House

East Road

Tetford

Lincolnshire

LN9 6QQ

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The Advantages of Aerial Roof Surveys

An aerial roof survey, carried out by a qualified CAA pilot with the appropriate insurances and following all the correct aerospace laws and site safety requirements, is fast and cost effective.

To survey 6 large roofs would require cherry pickers and scaffolding walkways which is time consuming and costly.

This aerial site survey took 4 hours on site to complete. This then requires 48 hours post production of the photography and videos.

The complete photo roof coverage achieved with a drone is often difficult to achieve from cherry pickers.

With an aerial roof survey site interruption is limited to hours rather than days reducing costs and health and safety risks.



Site Permission for Take-off and Landing of the Drone

In compliance with CAA regulations and Sky Eye's insurance cover it is a requirement that written consent is given by the site owner for the take-off and landing of their small unmanned aerial vehicle (drone).

Opposite is a copy of the signed form that also includes a captured satellite image from Google Earth identifying the boundaries of the site.

A full site risk-assessment is produced from Google Earth photography prior to visit. Air traffic control is notified (East Midlands Airport in this instance) and all building managers are notified of the flight/survey.

Job No	42669
Start date	12 th September 2017
Site Owner	MWK Ltd – represented by: Mayfair Developments (Leicester) Ltd. 1 Meadow Way Desford, Leicester, LE9 9QG
Location	NG10 3FZ Long Eaton. 5 Warehouse asbestos roofs - video and photographic surveys – as estimated in Yellow outline shown in the image below.

By completing and signing the following section you are authorising on behalf of the site owner that Sky Eye Plus Ltd may use the Location as a take-off and landing site for their small unmanned aerial vehicles commencing from the start date until written notice is received that you are no longer happy for the site to be used for take-off and landing purposes.

Authorised signatory on behalf of: MWK Ltd

Name: VICKI MAXTED

Signature:

Position: FACILITIES MANAGER

Date:

11-9-2017





Scope of Works

In line with the Control of Asbestos at Work Regulations 2002 (CAWR), HSE MDHS 100 and other Health & Safety guidelines, the following aerial roof inspection, designed to visually inspect the condition of asbestos containing roofing materials, has been carried out.

Scope of Works:

The work carried out was an aerial survey using a Drone. Sky Eye's pilots are CAA qualified and fully insured drone pilots and have many hours flying experience whether filming for TV commercials, corporate videos, roofing surveys or stills for architectural CGI. Sky Eye use BBC broadcast cameras delivering 4K high definition footage and still images. These high definition cameras take photos that retain detail when zooming in on the photos essential for roof survey work.

The survey was confined to the visual examination of the exterior of the commercial roofs: B,C,E,F,G & H all of which are asbestos cement – most typically Chrysotile (white) asbestos. The survey did not examine the inside of the roofs or any other sites of potential asbestos use. .Photography of the roofs were also taken at 395ft high -5ft under the legal limit of 400 ft. to generate accurate roof measurement and pitch values for a dimensions report.

Under The Supervision of Simon Towers

The Sky Eye aerial survey was under the supervision of Simon Towers who's qualifications are: P402 Bulk sampling and Surveying and P405 Management of Asbestos in Buildings. Both are British Occupational Hygiene Society Qualifications. He was a Director of ASR Asbestos Surveyors for 4 years and worked for South Yorkshire Laboratories for 2 years as their Lead Surveyor.

Executive Summary.

Each roof had complete photographic coverage. A total of 807 photos were taken of the 6 roofs.

Each photo was individually viewed by Simon Towers to ascertain the condition of the individual roof sections.

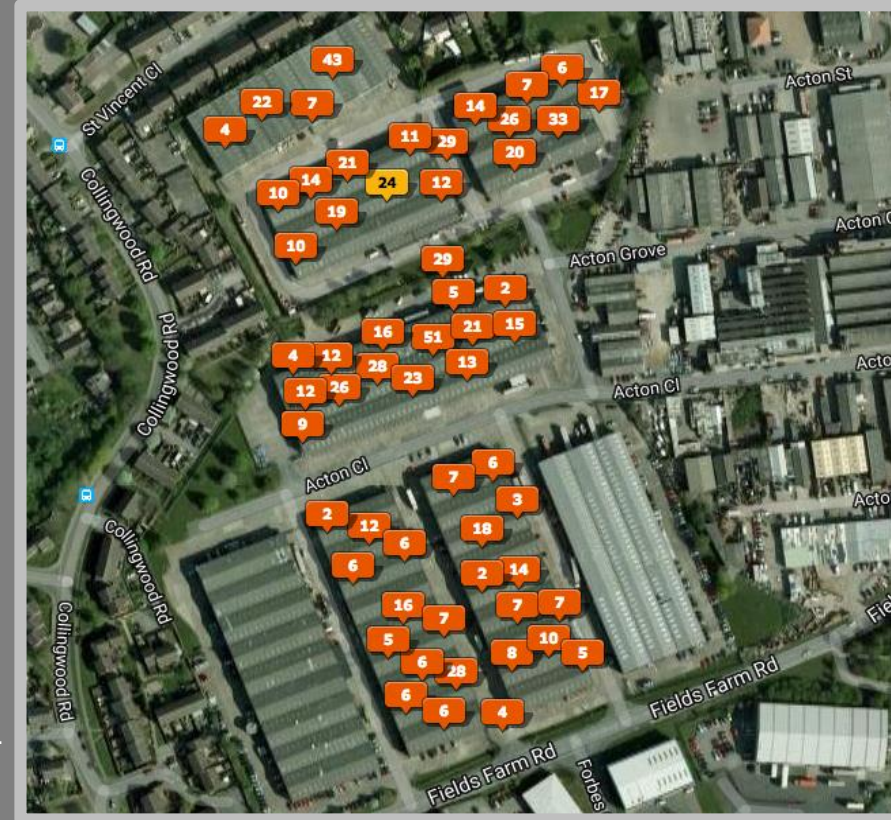
The objective was to identify problems and to ascertain individual roof condition with the objective of being able to prioritise their order of repair.

The roofs are all over 40 years of age and were all built within the same time period. From our examination of all the roofs we have concluded that they are all in the same deteriorated condition.

The overall condition of all the roofs is aged deterioration of the asbestos cement panels which has made them porous and brittle rendering them prone to cracking and leaking. Significant delamination is evident and consequently contributes to cracking and leaking.

The condition of the patches shows that the majority have been applied in the last 5 years indicating the universal deterioration of all the roofs in the last 5 years. All the roofs are now very porous and brittle and therefore will progressively fail over the next five years. This could be accelerated with hard frosts and heavy snow coverage.

Because of the overall condition of the roofs there is no obvious priority from a condition score but we are advised that G&H roofs leak into the warehouse below and therefore would be given priority.



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Aerial Survey Operation Procedure

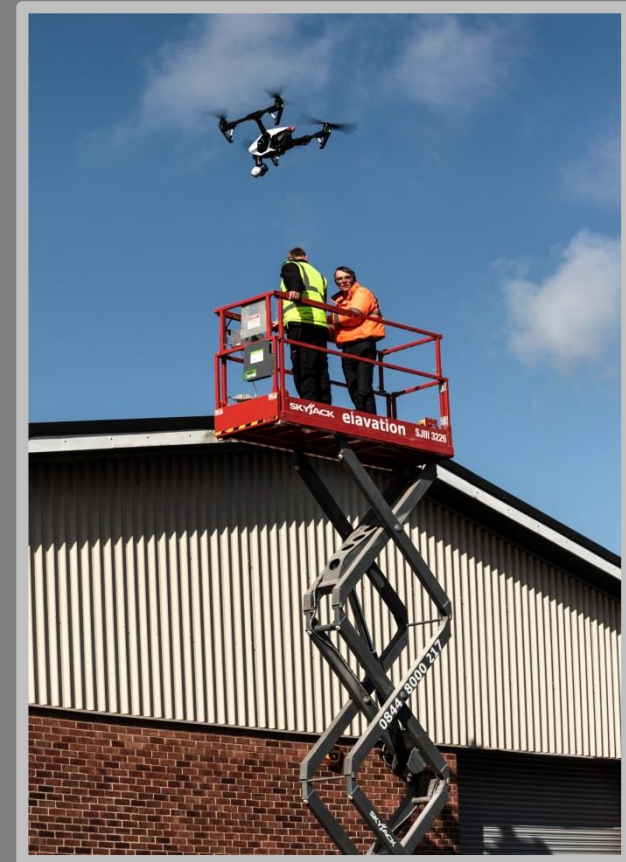
Dean Measom of Mayfair Developments was the overall site manager for the day representing the owners MWK Ltd.

Because of the expanse of the roofs being surveyed and the safety requirement of the drone pilot having to maintain constant line of sight of the drone a scissor lift was provided by the site manager.

Sky Eye Plus had their own qualified scissor lift operator with them. Ray Whitley operated the lift from which the drone pilot flew the drone.

Summary

In summary the pilot was CAA qualified and insured, Ray Whitley a qualified scissor operator, operated the scissor lift. Simon Towers the qualified asbestos surveyor instructed the survey and Dean Measom the Site Manager took overall control making sure that all health and safety measures were correctly carried out.



Asbestos Cement Roof Synopsis

According to the Land Registry, 55% of all industrial type properties in the UK have an asbestos cement roof and 75% of all asbestos roofs ever installed are still in-situ today.

It's easy to spot an asbestos roof from the contoured outline and grey or buff colour.

The roof profiles are constructed from asbestos cement – most typically Chrysotile (white) asbestos.

The asbestos fibres in asbestos cement roofs is only 15% however all caution still must be exercised when repairing, cleaning and encapsulating.

With age comes deterioration and the panels can become porous and prone to leaks.

This creates additional problems because as they get porous, they are also weakened considerably, yet show little sign of this from the outside, though may appear soiled and partially covered with lichens and moss.

Porous weakened roofs can easily crack especially with heavy snowfalls which can lie on cement asbestos roofs as the moss and lichens create traction and prevent the snow from freely sliding off the roof.

Extreme caution should therefore be applied when walking on an asbestos cement roof, with professional access equipment being employed wherever possible.

When broken, an asbestos cement panel can release fibres and therefore, if working on a panel, it is necessary that breathing masks be worn to protect the lungs from asbestos fibres.

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Aerial site view showing B & C Warehouses



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Aerial video - stills & more

Aerial site view showing Warehouse E



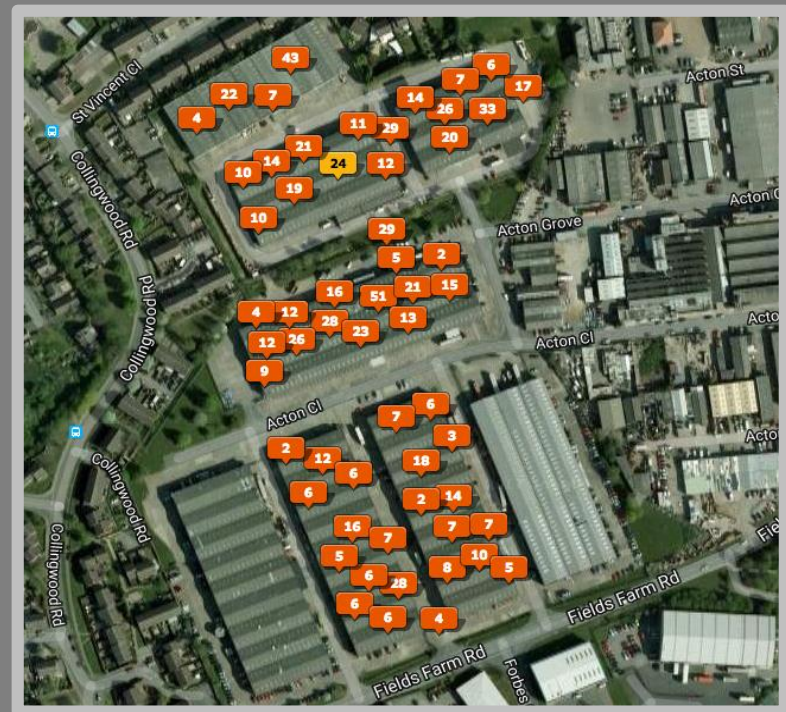
Aerial site view showing G H F & E Warehouses



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High resolution photography to identify problems is shown in its roof location for ease of assessing remedies.



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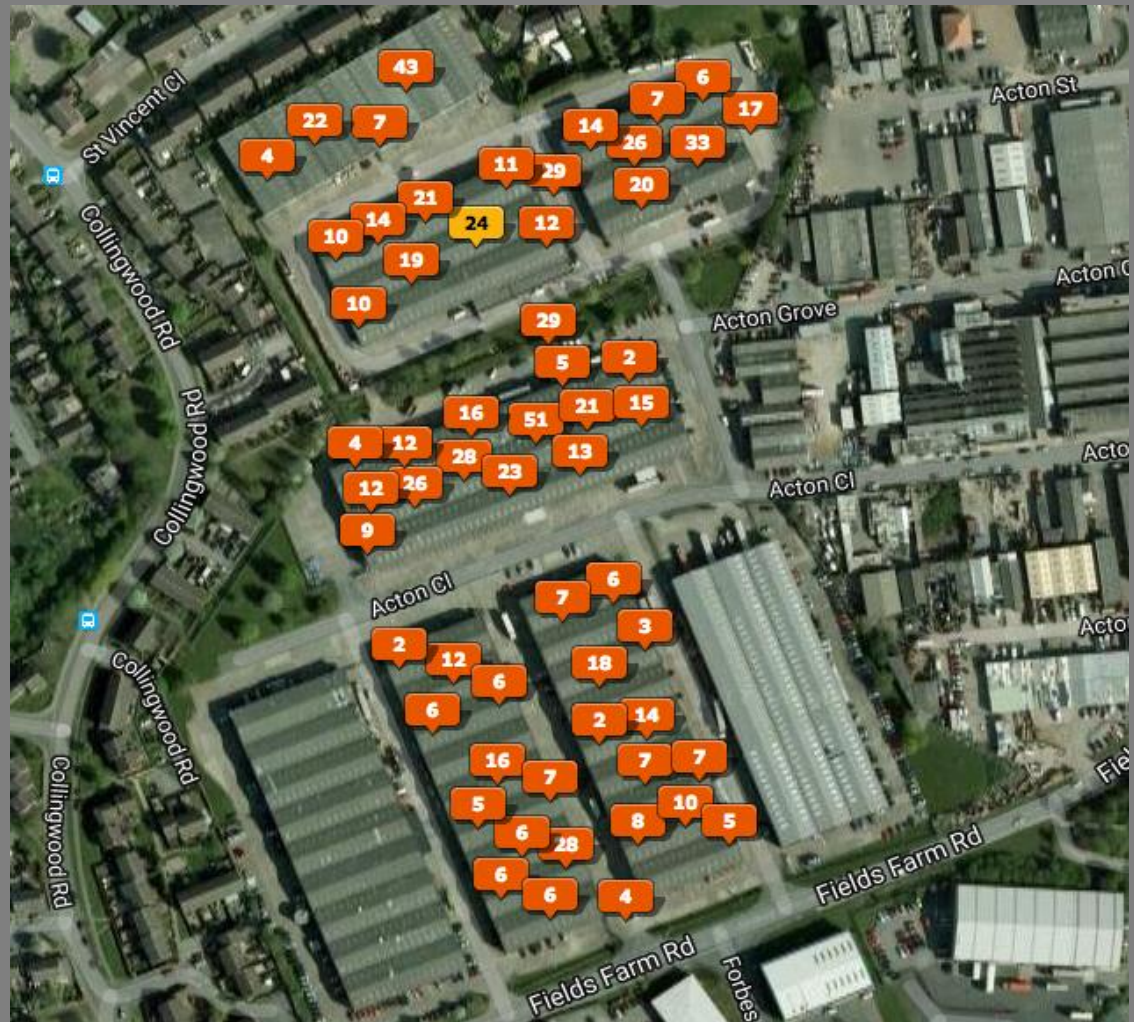
Aerial video - stills & more

Screen grab showing all the photos taken and their roof location.

Each photograph taken with the drone captures the GPS coordinates of the drone's position. The software that we use takes these coordinates and correctly places them on the google satellite photo that is on Google Earth.

Each icon on the map shows a number that corresponds to the number of photos that were taken from that GPS position.

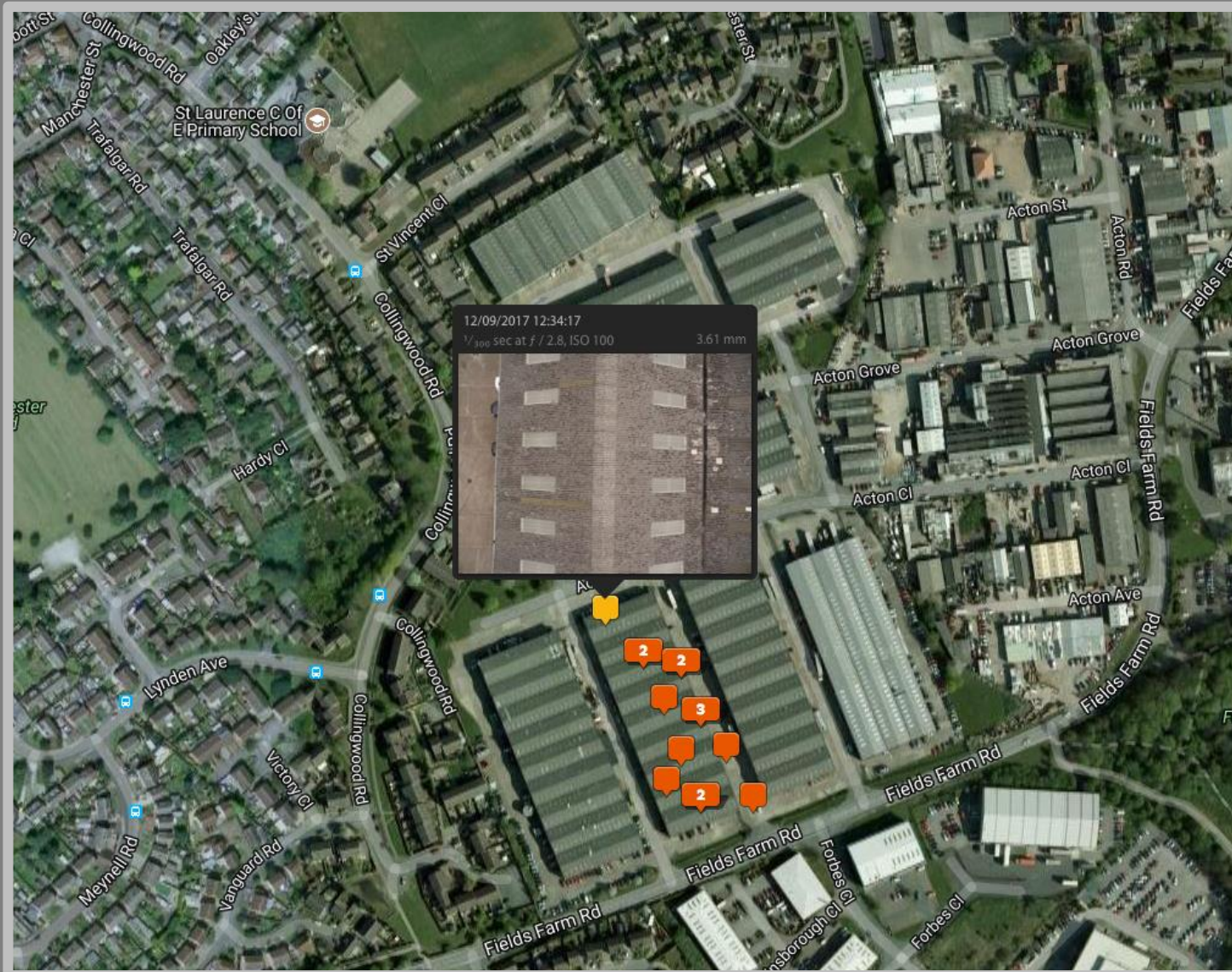
When using the software we can click an icon (which then highlights yellow) and scroll through the photos. Taking photos with GPS coordinates and using the software allows us to correctly locate problem areas.



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Aerial video - stills & more

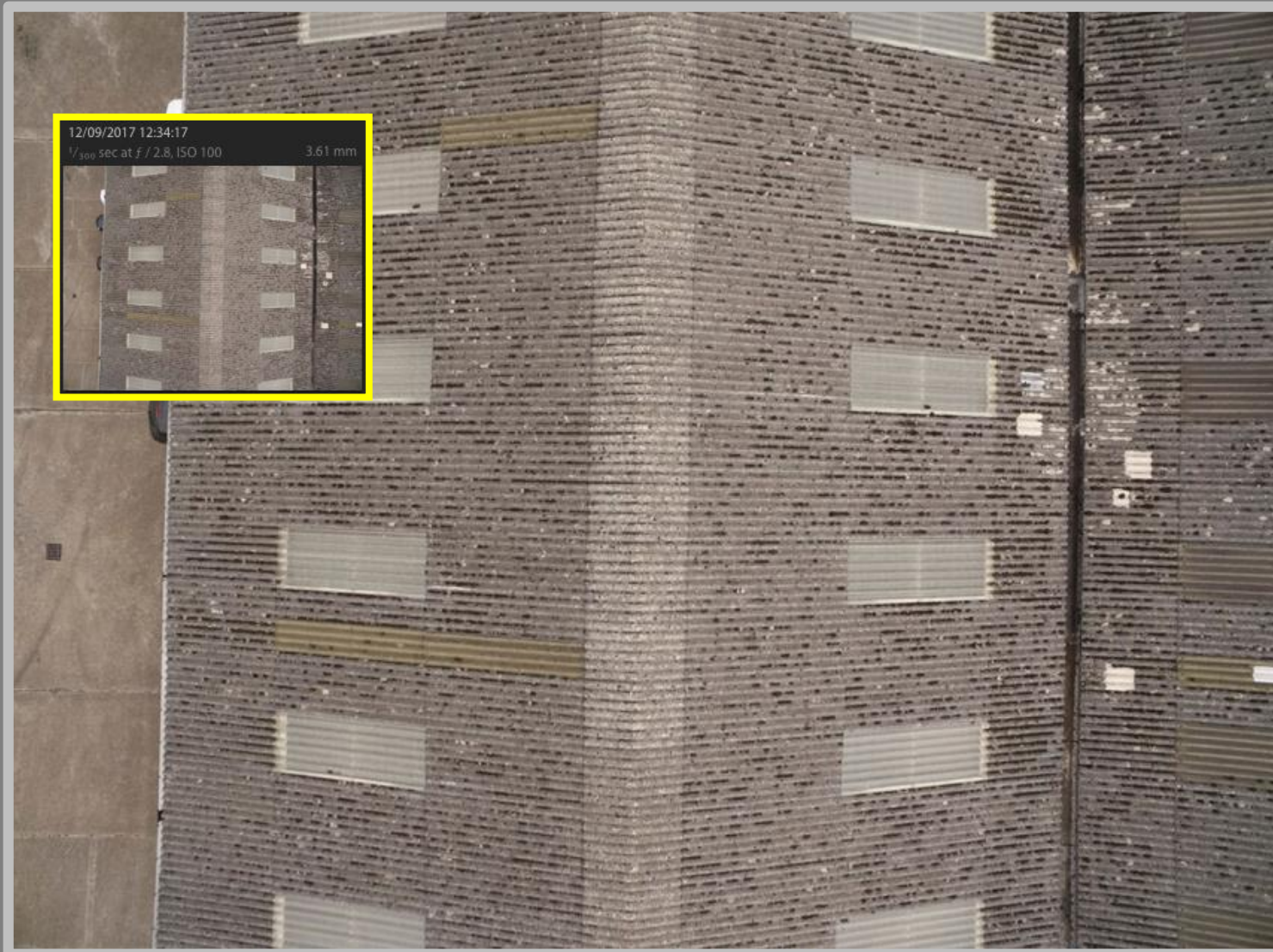
Click on speech bubble icon – thumbnail/s of specific roof location.



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Click on thumbnail to reveal high resolution photograph



Screen grab showing all the photos of the roof faults in their location.

Simon Towers our qualified Asbestos Surveyor has examined all the photos and identified those that show roofing problems and asbestos deterioration. These photos are then put into a roof fault file within the software.

The screen shot shows how the software then places these photos on the appropriate roof and their roof position.

Within the software we assign each photo with a file name which is the letter of the roof it depicts. Now in the metadata of the photos we have the date and time it was taken, its GPS position and the roof name.



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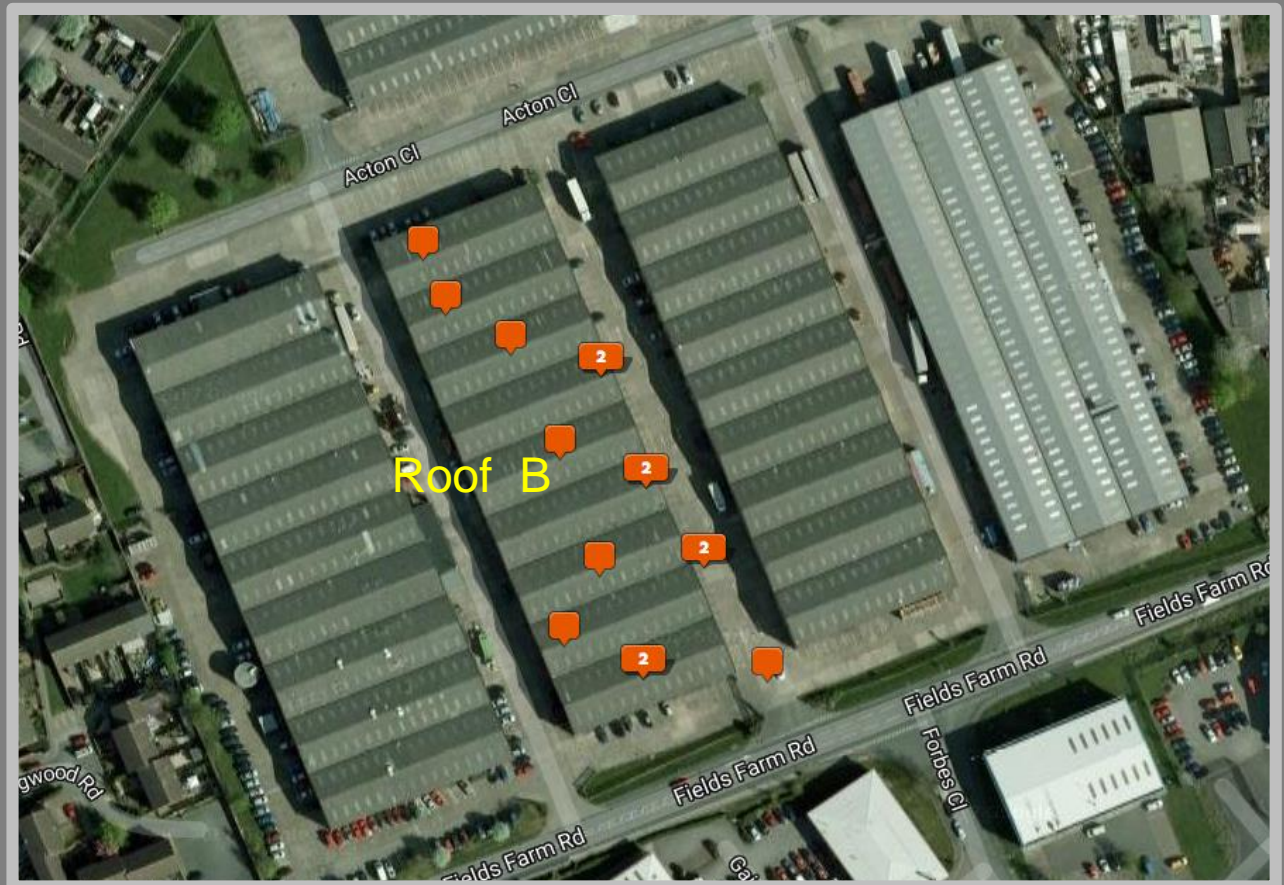
Roof B
Aerial Roof Survey
Overview

Screen grab showing the fault photos for Warehouse B

Within the software we create separate files for each roof which enables us to look at the photo data specifically for that roof. This screen shot demonstrates that function.

The selected photos for Warehouse B have been selected by Simon Towers to indicate asbestos damage and deterioration.

For each of the selected photos Simon Towers has made the appropriate statement about it's specific damage or deterioration and the recommended remedy.



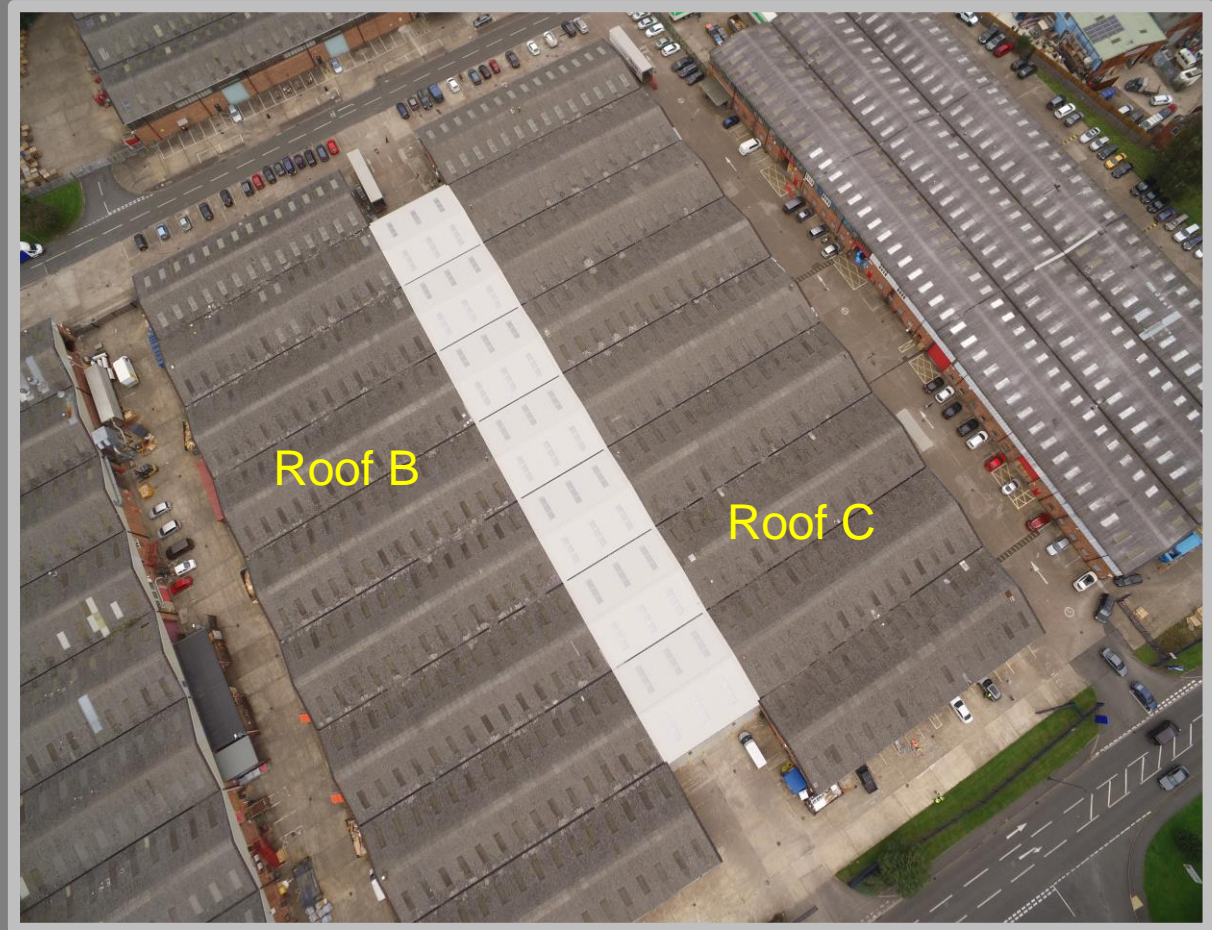
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This aerial shot shows the roof of Warehouse B. & C.

From this shot it can be seen that each roof comprises of 9 pitched asbestos cement roofs. The roofs have 8 valley gutters which have been inspected for damage and to make sure they are not blocked.

The roofs have also got many roof-lights which have been inspected for condition and damage.



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Roof B has been joined to Roof C and has a new tin roof on relatively new build. However, it came under the scrutiny of this survey to examine for any possible fitting errors especially where the new roof joins onto the asbestos roof.

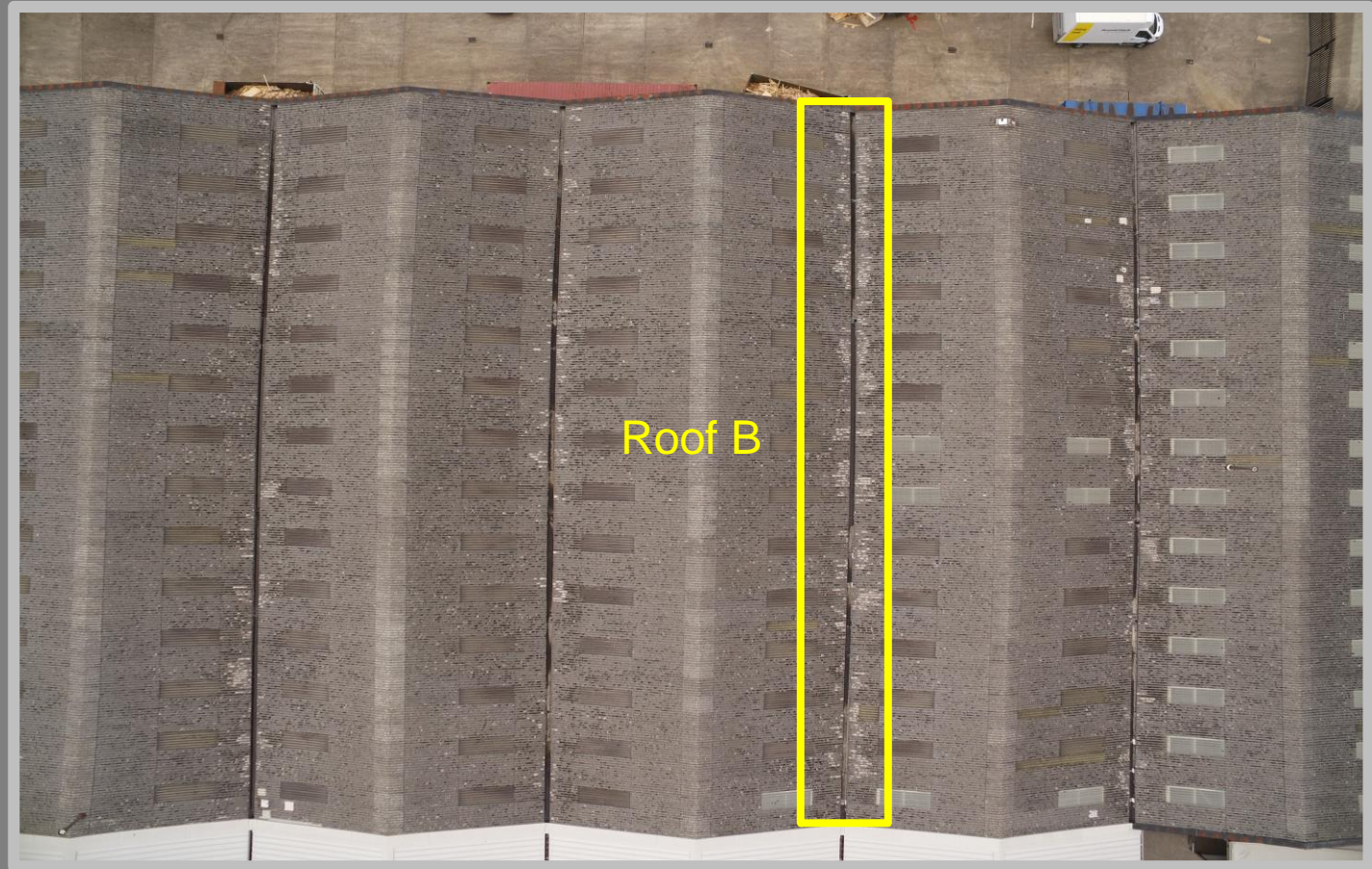


This aerial shot shows the roof of Warehouse B.

Delamination

From this expansive roof shot in the bottom of the valley gutters you can observe light grey patches indicating delamination.

This problem occurs over a long period of time. In some cases, its down to a faulty batch. Once signs of delamination occur then rapid repair is essential.



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Aerial video - stills & more

This aerial shot shows the roof of Warehouse B.

Delamination

From this shot in the bottom of the valley gutters you can observe delamination and see a number of patches. Delamination makes the asbestos very porous and brittle making it susceptible to leaks and cracks. These patches clearly indicate this is happening.



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This aerial shot shows the roof of Warehouse B where it joins the new roof.

This shot shows the joining of the new roof to the asbestos roof. The roofing contractors have done a good job in joining the two roofs.

The vulnerability of these joined roofs is the asbestos roof. It is apparent by the number of patches how porous and vulnerable the roof is in the valley bottoms.



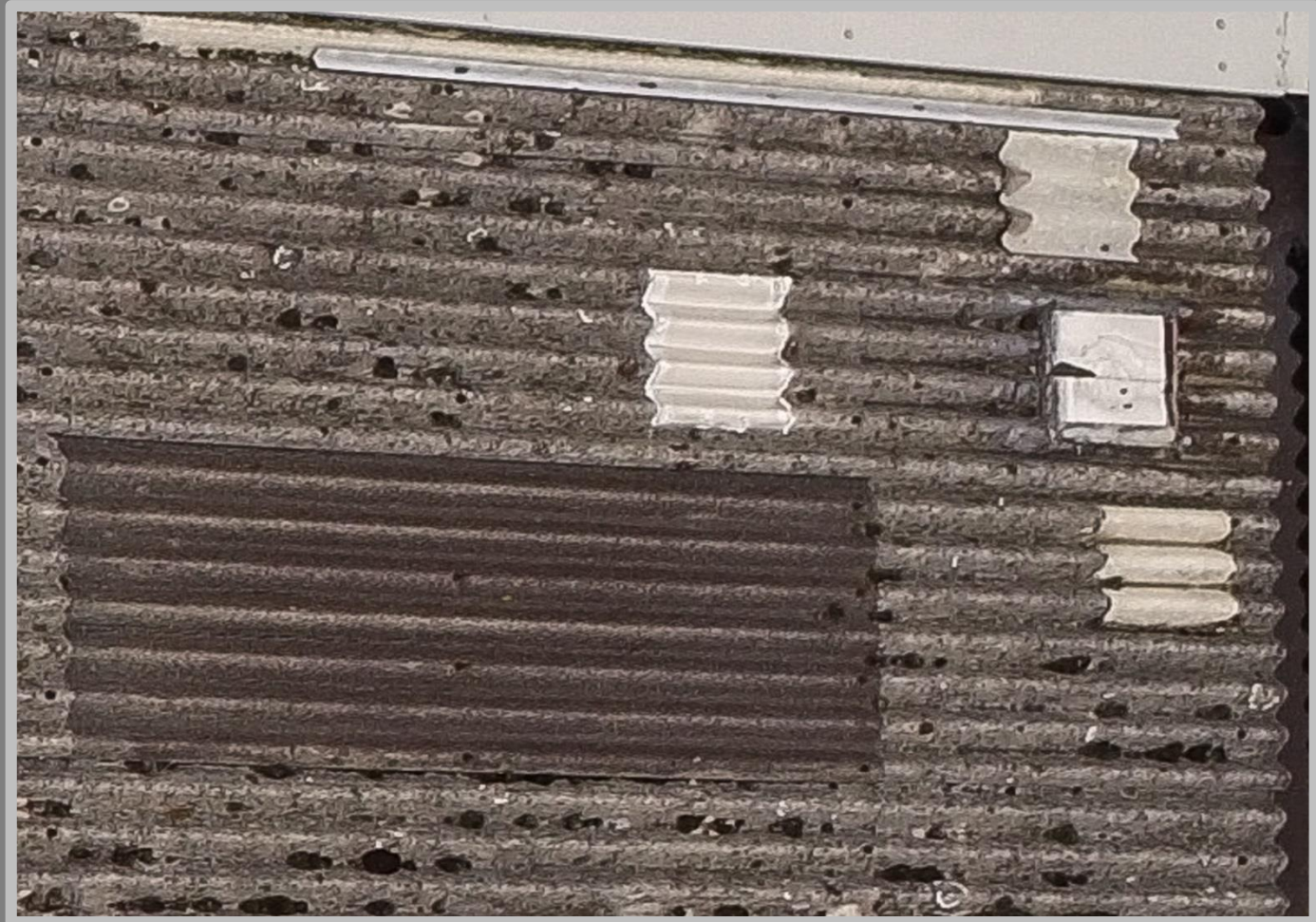
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Aerial video - stills & more

Existing Repairs

This close-up from the previous photo shows the patches very close to the new roof.

When a roof needs extensive patching like this it is a very clear indication of the overall condition of the roof. A patch is a short term measure to stop a leak. A patch is not a problem permanently solved because the sealants eventually fail and then start leaking again.



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Aerial video - stills & more

Existing Repairs

This shot shows another larger patch close to the new roof. The close-up photo shows the patch is covering a significant hole and crack in the roof.

Roof-Lights – GRP

Roof B is comprised of 9 pitched roofs each pitched roof has 28 roof-lights. Roof B has a total of 252 roof-lights.

This shot shows the general condition of all the roof-lights. UV light causes the roof-lights top resin coating and the sealant to degrade. Moss will also grow up and under the roof-lights allowing water to enter past the degraded sealant via capillary action. All the roof-lights were also examined for damage.

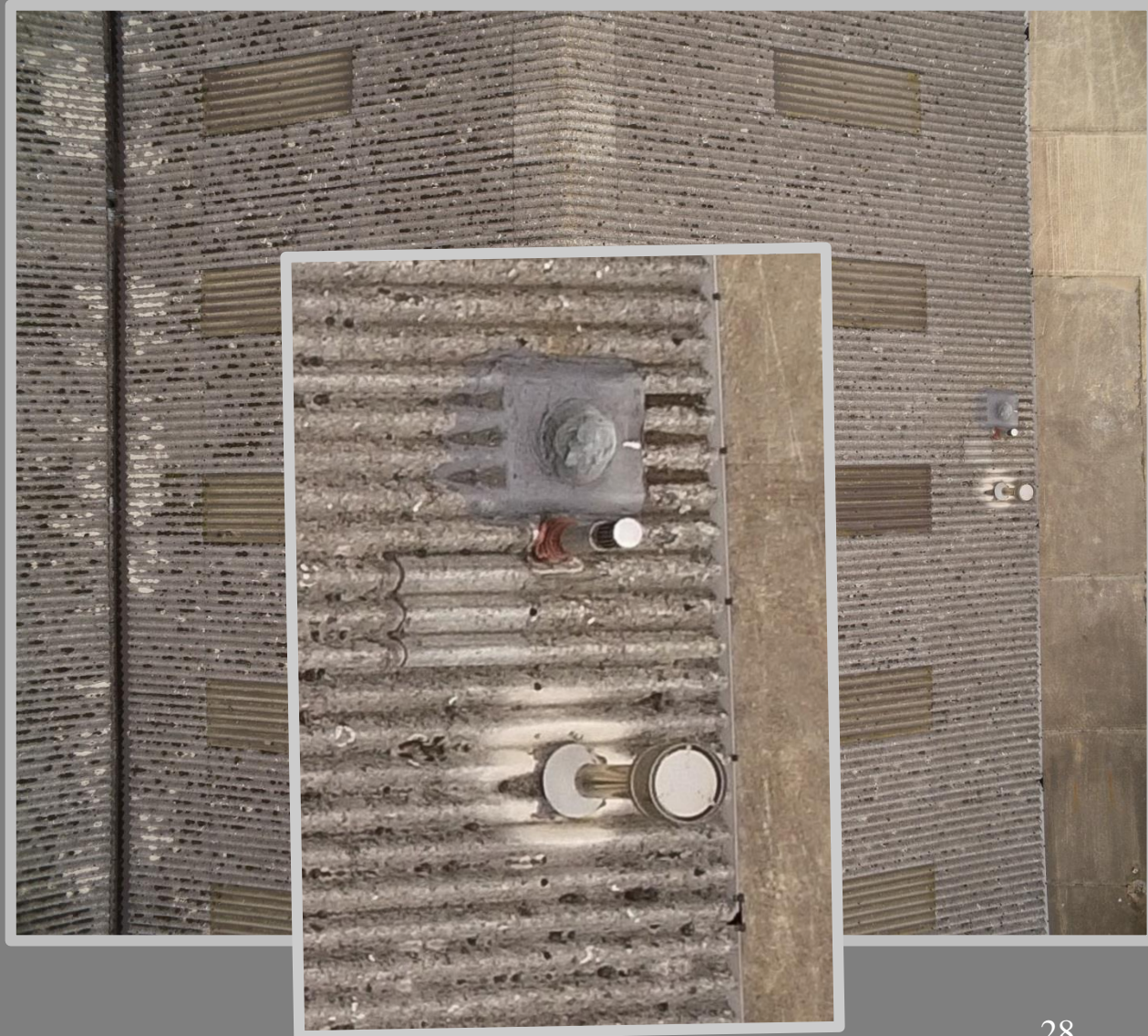


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Aerial video - stills & more

Ventilation outlets

This shot shows another problem where ventilation outlets have been installed in the roof. The sealants will eventually fail and cause leaking. Roof encapsulation addresses the problem by encapsulating the sealants.



SkyEye plus
Aerial video - stills & more

Roof C
Aerial Roof Survey
Overview

Screen grab showing the fault photos for Warehouse C

The highlighted photos for Warehouse C have been selected to indicate bad or deteriorating repair and asbestos damage and deterioration.

For each photo Simon Towers has made the appropriate statement about it's specific damage or deterioration and the recommended remedy and were appropriate its level of urgency.



SkyEye plus

Aerial video - stills & more

This aerial shot shows the roof of Warehouse C.

From this shot it can be seen that the roof comprises of 9 pitched asbestos cement roofs. The roof has 8 valley gutters which have been inspected for damage and to make sure they are not blocked.

Roof-Lights

Roof C is comprised of 9 pitched roofs each pitched roof has 28 roof-lights. Roof C has a total of 252 roof-lights.

All these roof-lights were inspected for condition and damage.



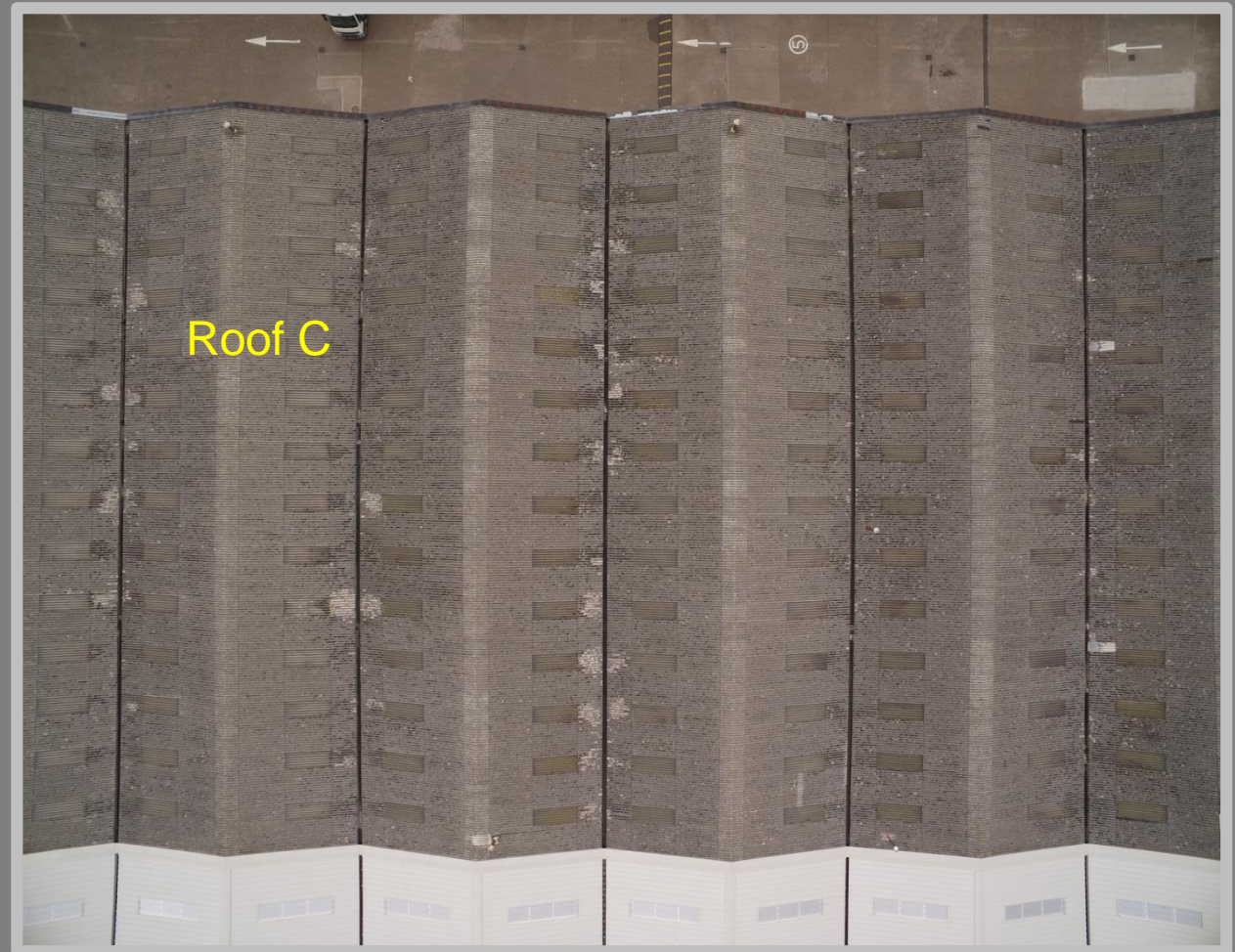
SkyEye plus

Aerial video - stills & more

This aerial shot shows the roof of Warehouse C. This Warehouse is adjacent to Warehouse B. They will have been built within the same time period and as a consequence this roof has the same problems.

Delamination

From this expansive roof shot in the bottom of the valley gutters you can observe delamination (white patches) which generally occurs over a long period of time.



SkyEye plus

Aerial video - stills & more

Existing Repairs

This aerial shot shows that roof C has had to have some patches applied to address a leak in the roof.

The close-up photo demonstrates that this patch is not a localised problem but is the result of the overall deterioration of the roof.



Sky  ye plus
Aerial video - stills & more

Roof E
Aerial Roof Survey
Overview

Screen grab showing all the fault photos for Warehouse E

The selected photos for Warehouse E have been selected to indicate bad or deteriorating repair and asbestos damage and deterioration.

For each photo Simon Towers has made the appropriate statement about its specific damage or deterioration and the recommended remedy and were appropriate its level of urgency.



SkyEye plus

Aerial video - stills & more

This aerial shot shows the roof of Warehouse E.

From this shot it can be seen that the roof comprises of 3 pitched asbestos cement roofs. The roof has 2 valley gutters which have been inspected for damage and to make sure they are not blocked.



Delamination

This roof shot is typical of the whole roof which shows widespread delamination with moss and lichen.

Moss & Lichen

Because moss or lichens growing on a roof surface will hold moisture longer than other areas, these growths can reduce the life of the roof covering particularly where the roofing materials are of a composite nature like asbestos cement. Holding water on the roof surface by any means speeds up wear of the roof panels. In freezing conditions there may be faster frost damage, cracking, and wear of the roof panels under the moss or lichens. Moss and lichen on roofs also creates roof traction preventing snow from sliding off the roof. Build up of snow on weakened asbestos roofs causes cracking.

Even in non-freezing conditions, the roots or growth structures of moss or lichens eventually penetrate and separate the roof materials, speeding their demise.



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Aerial video - stills & more

Roof-Lights

Roof E is comprised of 3 pitched roofs each pitched roof has 92 roof-lights. Roof E has a total of 276 roof-lights.

All these roof-lights were inspected for condition and damage

This shot shows some variation in the condition of the roof-lights. One of the roof-lights looks like a recent replacement.

UV light will cause the roof-lights top resin coating and the sealant to degrade. Moss will also grow up and under the roof-lights allow water to enter past the degraded sealant via capillary action.



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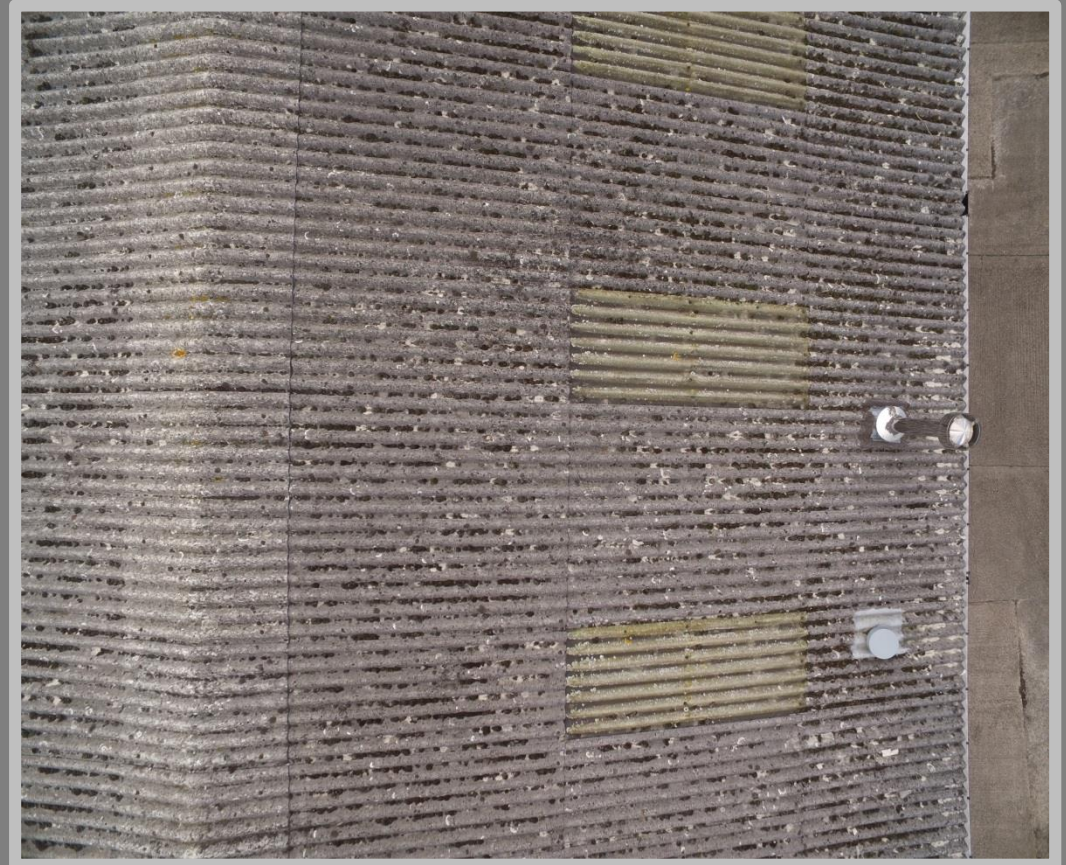
Aerial video - stills & more

Roof-Lights – GRP

This shot shows the general condition of the Roof-Lights.

The solution would be to either clean the roof - lights and apply a shatter proof top coat and seal the bottom or totally replace the roof-lights. Both are fairly easy and cheap to do.

When repairing roof-lights en masse it is often advisable to replace all or apply the same repair remedy to all otherwise you end up with a roof that is in various stages of wear and repair. This scenario leads to continual unsynchronised roof repairs which is costly both in terms of repair and business interruption.



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Ridge damage

In this shot there is a roof ridge patch it is difficult to say what caused this damage other than general wear of the asbestos panels.



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Roof-Lights

This close up shot of the roof-light clearly demonstrates the variation in their condition. The top roof-light seems to be a recent replacement or repair but the tape patch shows there was a problem with this repair.



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Aerial video - stills & more

This shot typifies the whole roof's varying condition of roof-lights, widespread de-laminating and the need to apply patches to leaking roof panels.



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Aerial video - stills & more

Roof G
Aerial Roof Survey
Overview

Screen grab showing all the fault photos for Warehouse G

Within the software we create separate files for each roof which enables us to look at the photo data specifically for that roof. This screen shot demonstrates that function.

The selected photos for Warehouse G have been selected by Simon Towers to indicate bad or deteriorating repair and asbestos damage and deterioration.

For each photo Simon Towers has made the appropriate statement about it's specific damage or deterioration and the recommended remedy and where appropriate its level of urgency.



Screen grab showing moss and lichen condition for Warehouse G

From this direct overhead shot it can be seen that roof pitches A & B are in a more moss and lichen free state than the rest of the roof pitches. They have either been cleaned or are relatively recent replacements.



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Aerial video - stills & more

This aerial shot shows the roof of Warehouse G.

From this shot it can be seen that the roof comprises of 7 pitched asbestos cement roofs. The roof has 6 valley gutters which have to be inspected for damage and to make sure they are not blocked.

The roof has also got many roof-lights which have been inspected for damage.



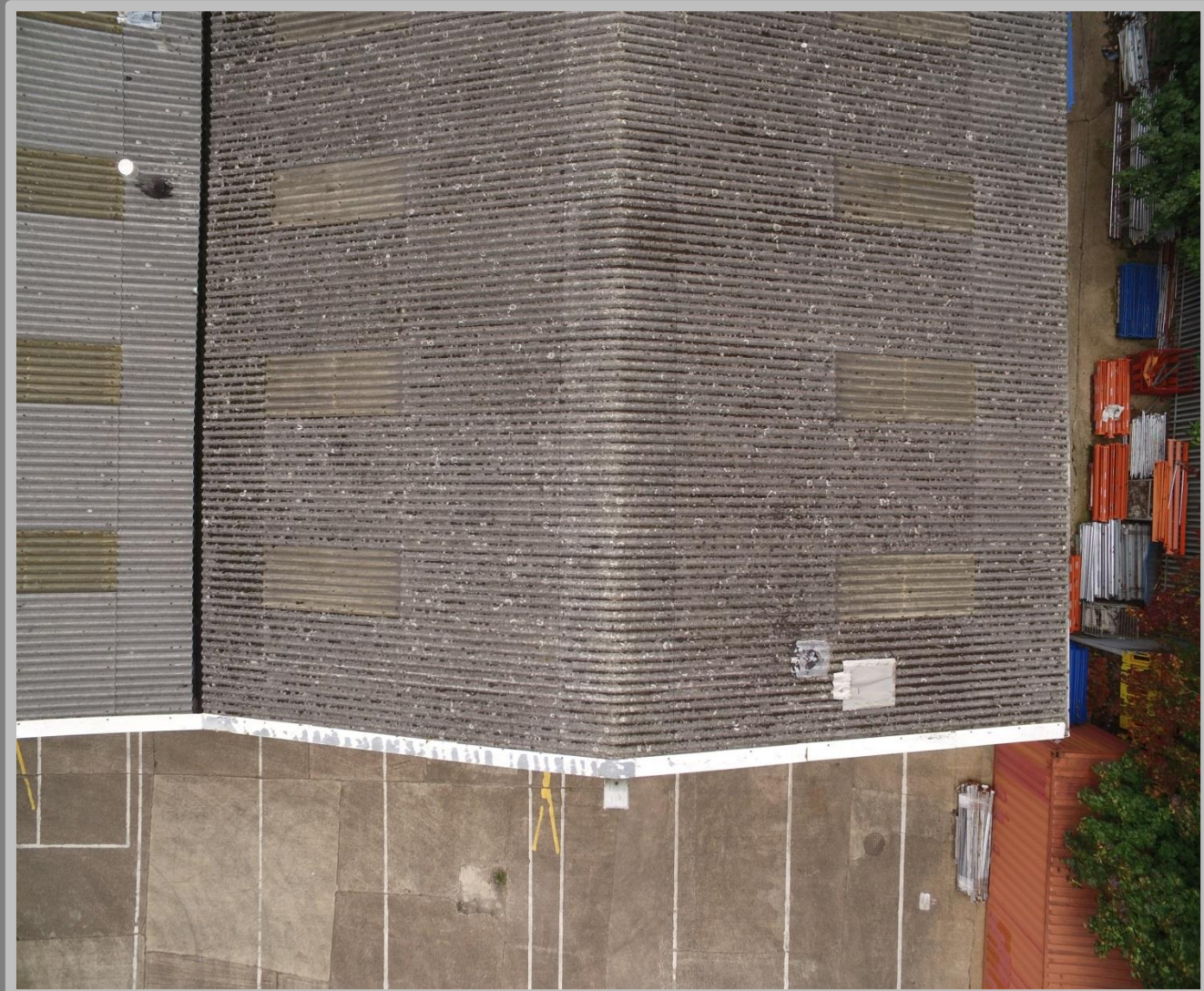
SkyEye plus

Aerial video - stills & more

Roof- Lights

Roof G comprises 7 pitched roofs with each pitched roof having a total of 24 roof-lights. Roof G has a total of 168 roof-lights.

This shot shows the variation in the condition of the roof-lights. The shot is representational of the whole roof once again evidence of delamination throughout and lichen growth.



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Aerial video - stills & more

Valley cleaning & repair

This shot shows that the valley gutters is blocked with moss. The roof has significant moss and lichen growth which need to be cleaned and sealed.

As is prevalent on all of the roofs there is evidence of delamination.



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Aerial video - stills & more

This aerial shot shows roof H and its join to the new roof. The join is sound however, as the asbestos cement deteriorates and cracks along this edge repair will prove problematic.

The close up of the patch repair once again shows the general condition of the roof and why frequent repairs have been necessary.



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Aerial video - stills & more

Existing Repairs

This shot shows that the roof has had a number of patches as stated previously this is an indication that the roof is becoming porous and brittle due to delamination.



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Aerial video - stills & more

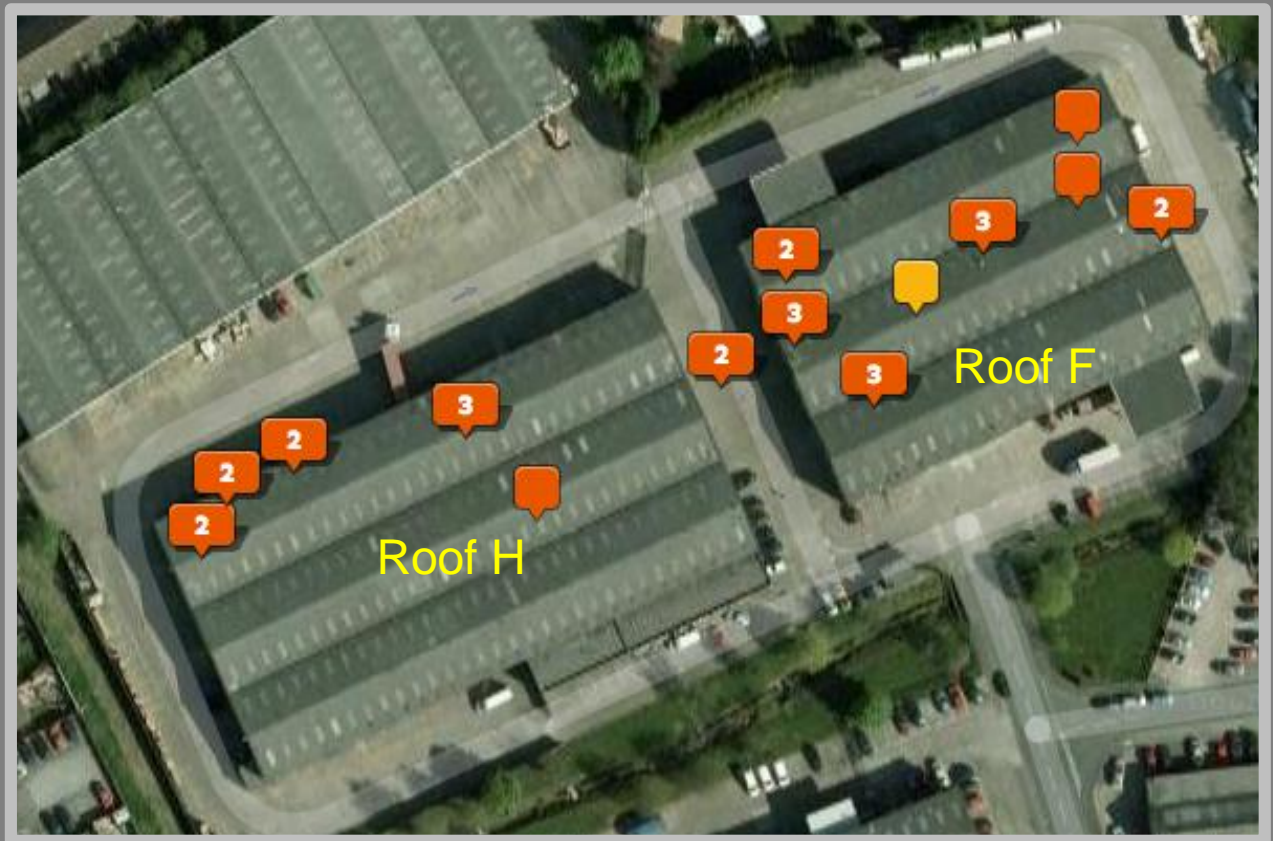
Roofs F & H
Aerial Roof Survey
Overview

Screen grab showing fault photos for Warehouse F & H

Within the software we create separate files for each roof which enables us to look at the photo data specifically for that roof. This screen shot demonstrates that function.

The selected photos for Warehouse F & H have been selected to indicate bad or deteriorating repair and asbestos damage and deterioration.

For each photo Simon Towers has made the appropriate statement about it's specific damage or deterioration and the recommended remedy and where appropriate its level of urgency.



Sky Eye plus

Aerial video - stills & more

This aerial shot shows the roof F & H these two roofs have been joined with a new tin roof between them.

From this shot it can be seen that both of the roofs comprise 3 pitched asbestos cement roofs. Each roof has 2 valley gutters which have been inspected for damage and to make sure they are not blocked.

The roof has also got many roof-lights which all need to be inspected for damage.



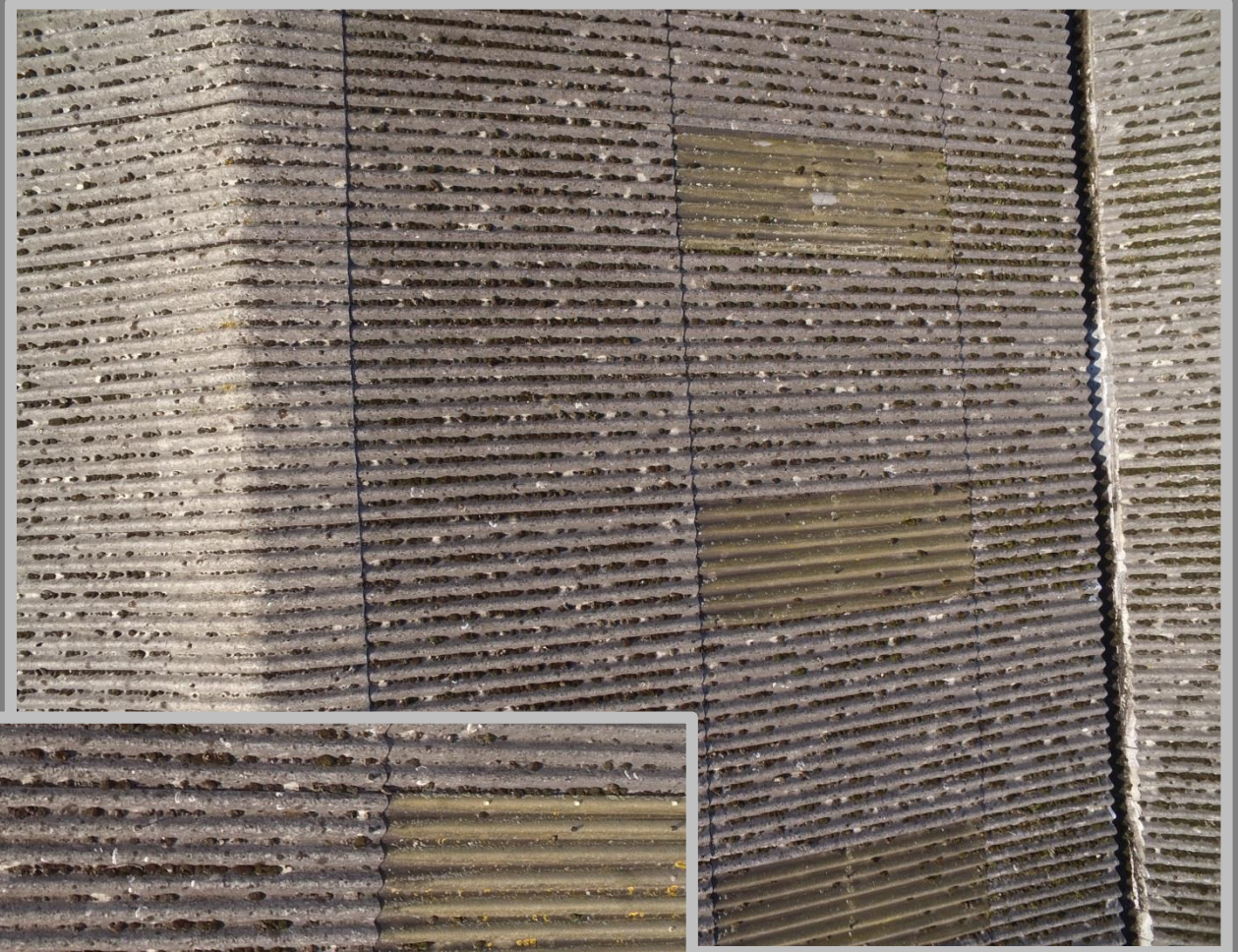
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Roof-Lights – GRP

This shot shows the general condition of the roof-lights.

UV light will cause the roof-lights top resin coating and the sealant to degrade. Moss will also grow up and under the roof-lights allow water to enter past the degraded sealant via capillary action.



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This aerial shot shows the roof F & H and is from the back of the building showing another new building adjoining the two.

From this shot it can be seen that roof H has had a number of patch repairs applied.

The close-up shot shows the condition of the roof where once again deterioration of the asbestos cement has taken place over a period of years.

Roof-Lights

Roof F comprises 3 pitched roofs with each pitched roof having a total of 60 roof-lights. Roof F has a total of 180 roof-lights.

Roof H comprises 3 pitched roofs with each pitched roof having a total of 44 roof-lights. Roof H has a total of 132 roof-lights.



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This aerial shot shows the roof of Warehouse F.

Delamination

From this shot you can see delamination all along the bottom edge of the roof.



Recommended Remedies

The roof will need to be completely cleaned. Work needs to be carried out to prepare bolts, cracks & de-laminated areas and encapsulate to prevent further delamination. This is a much cheaper option than re-roofing or over cladding. Over cladding also puts much more stress on the existing roof structure.

Roof- Light Remedy

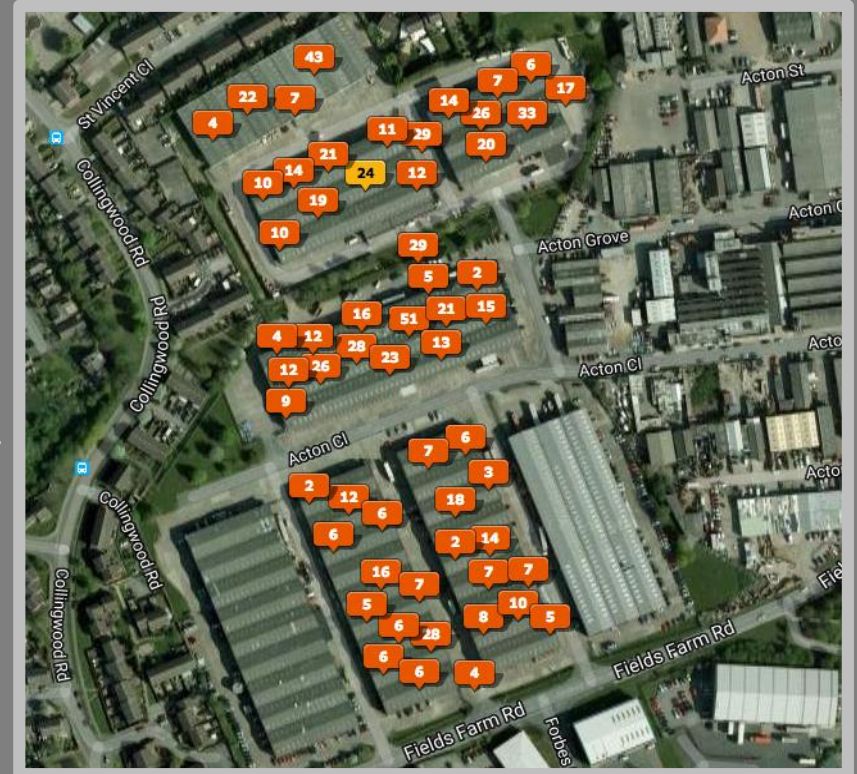
The six roofs surveyed have a total of 1260 roof-lights. The solution would be to either clean the roof- lights and apply a shatter proof top coat and seal the bottom or totally replace the roof- lights. Both are fairly easy and cheap to do.

Conclusion

When roofs become porous and brittle they need encapsulating as soon as possible. A roof in this state can very quickly start cracking which moves the roof from a repair to a roof demolition and replacement. The cost incurred through demolition and asbestos disposal and business interruption can be very inhibitive. It is the classical case of a stitch in time! If the roofs are all repaired in the above stated manner this could add another 25 years to their functional life expectancy.

Recommendation

That you engage a roofing contractor to clean and encapsulate the roofs and to address the roof-lights at the same time. It is recommended that all roofs are repaired in this stated manner.



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Long Eaton Aerial Survey 12 September 2017

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