
Building Environment and Services Engineers



Thermal Imaging Survey Report

CLIENT

Historic England

PROJECT

1703 – Decarbonisation of Cultural Heritage Buildings : Royal Theatre, Northampton

Revision 1.0 - 07.03.2025 - For Information

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Rev	Date of Issue	Status	Issued by	Checked by	Summary of changes
1.0	07/03/2025	Information	DH	DH	

1 Introduction and purpose

Skelly and Couch have been appointed by Historic England, as part of the umbrella project ‘Decarbonisation of Cultural Heritage Buildings, to undertake a thermal imaging survey of the building fabric at the Royal Theatre, Northampton. The survey took place on 6th Feb 2025.

The purpose of the survey was to identify a base point of the existing building fabric, identifying any weak areas such that practical solutions may be proposed to reduce energy use and improve thermal comfort with empathy to the historic nature of the building.

2 Method statement

The assessment was undertaken between 4pm and 5pm internally and between 5pm (sunset time) and 5.45pm externally on 6th February. The survey was undertaken using the Fluke TI10 thermal imaging camera.

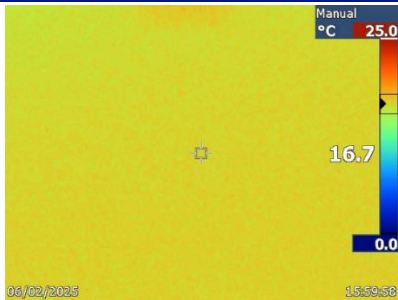
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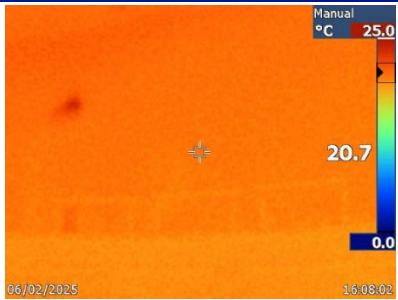
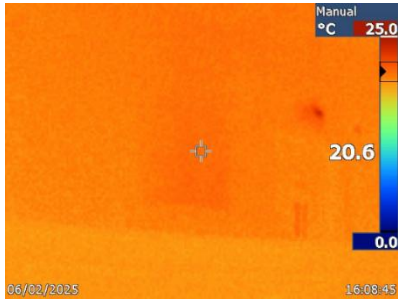
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- Internal: Approx 20-22°C (where heated)

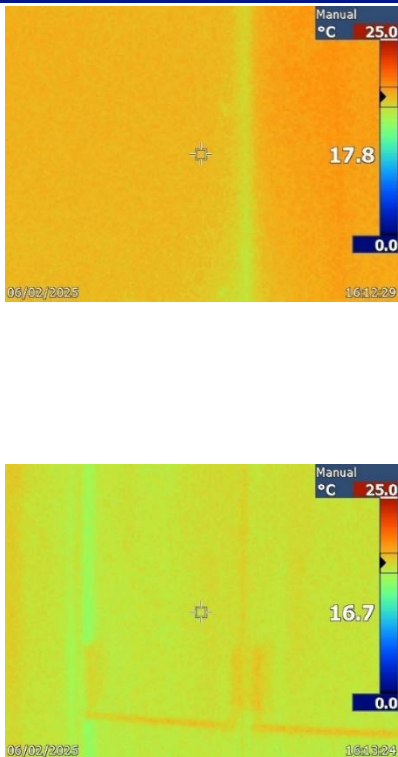
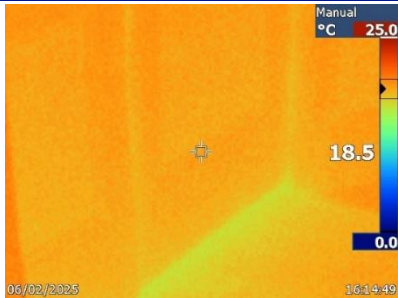
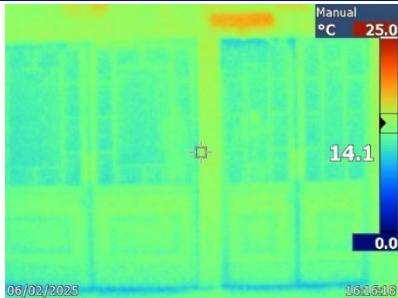
The weather conditions were dry, clear and calm when the thermal imaging survey was undertaken, and the heating systems in the building were on. Note that some parts of the theatre are unheated.

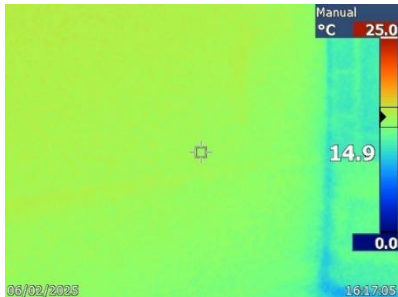
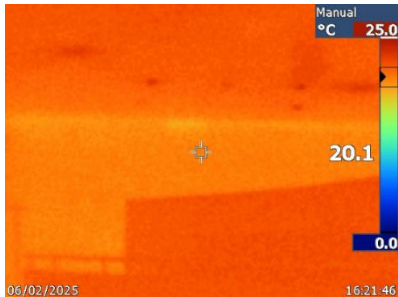
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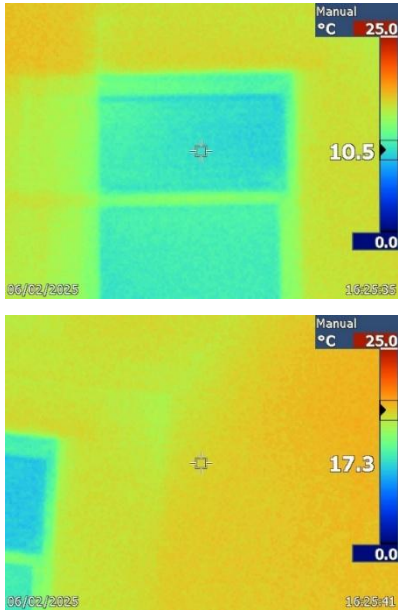
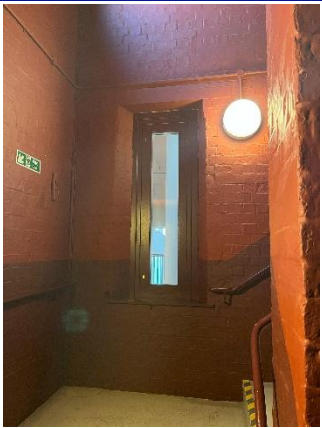
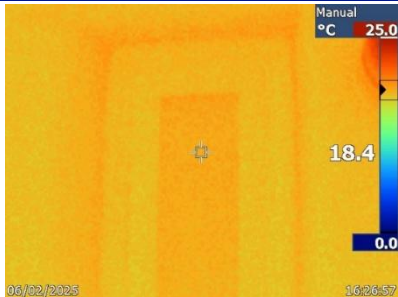
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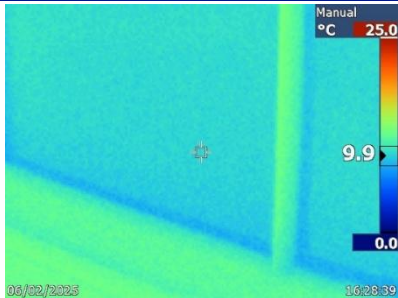
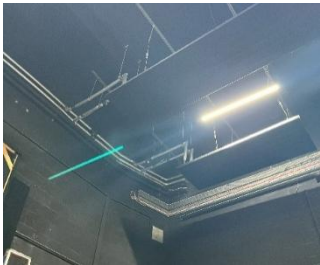
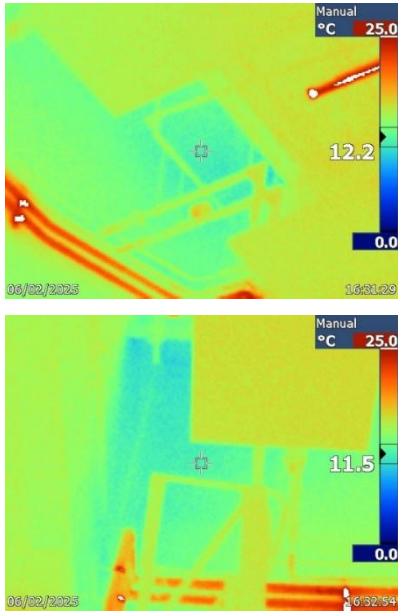
Location	Reference photo	Thermal image	Notes
Royal – auditorium stalls right			The interior wall appears to be uniformly relatively warm indicating limited heat loss (owing to buffer space on the other side)
Royal – auditorium ceiling			The ceiling to be uniformly relatively warm indicating limited heat loss owing to understood presence of insulation in the void above
Royal – auditorium gallery rear			The rear wall is appears to be uniformly relatively warm owing to buffer spaces behind, although heat loss through the rear gallery vent is noted

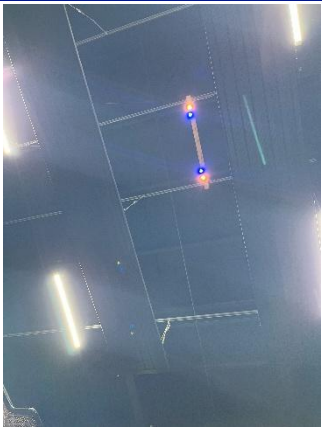
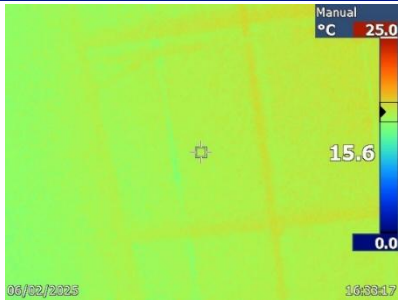
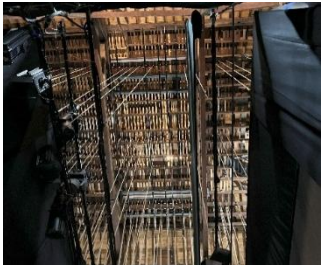
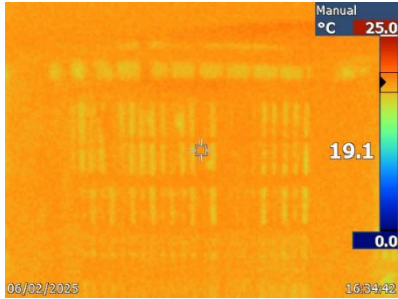
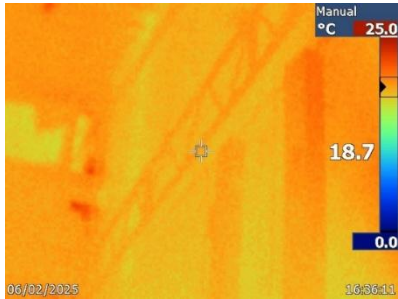
Location	Reference photo	Thermal image	Notes
Royal – supply grille above stage		 Thermal image showing a warm spot (23.3°C) at the supply grille above the stage. The ceiling is uniformly relatively warm. A color scale on the right indicates temperatures from 0.0 to 25.0°C. The date 06/02/2025 and time 16:05:21 are visible at the bottom.	The ceiling to be uniformly relatively warm (as notes above). A warm spot of about 23-24oC is noted where supply air is entering the auditorium
Royal – auditorium circle left		 Thermal image showing the interior wall of the auditorium circle left. The wall appears to be uniformly relatively warm, indicating limited heat loss. A color scale on the right indicates temperatures from 0.0 to 25.0°C. The date 06/02/2025 and time 16:08:02 are visible at the bottom.	As above notes, the interior wall appears to be uniformly relatively warm indicating limited heat loss (owing to buffer space on the other side)
Royal – auditorium circle right		 Thermal image showing the interior wall of the auditorium circle right. The wall appears to be uniformly relatively warm, indicating limited heat loss. A color scale on the right indicates temperatures from 0.0 to 25.0°C. The date 06/02/2025 and time 16:08:45 are visible at the bottom.	As above notes, the interior wall appears to be uniformly relatively warm indicating limited heat loss (owing to buffer space on the other side)

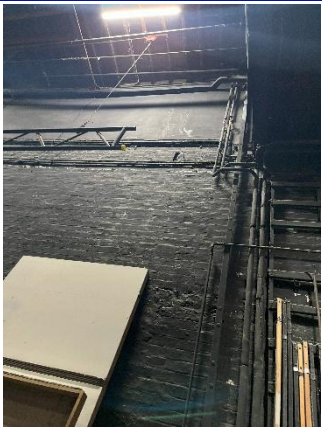
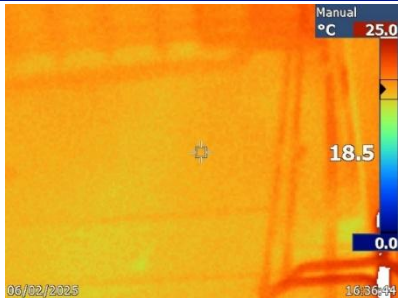
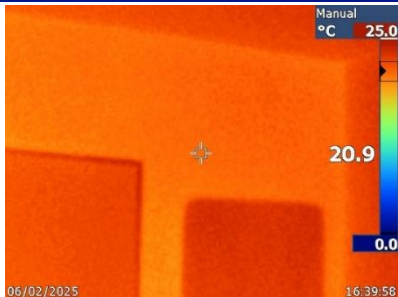
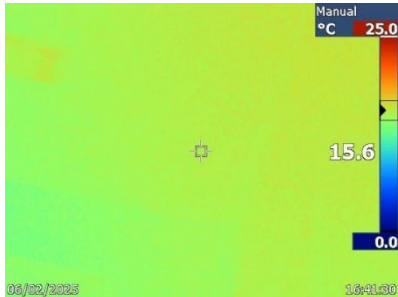
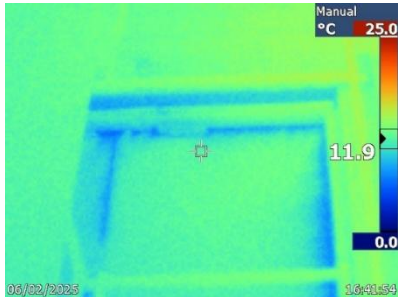
Location	Reference photo	Thermal image	Notes
Royal – lobby outside auditorium circle right			Heat loss is noted through the door to the lobby, particularly around cracks
Royal – door to old main entrance foyer			Heat loss is noted through the door to the lobby, particularly around cracks
Royal – old main entrance foyer doors (2)			The lobby doors and walls are generally cold owing to the space being unheated. Higher heat loss through the glazing and through cracks are also noted

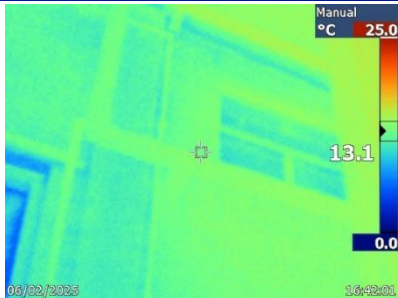
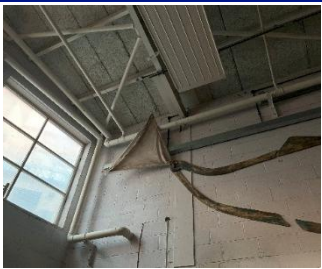
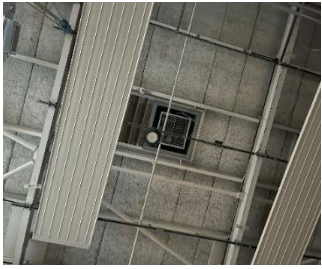
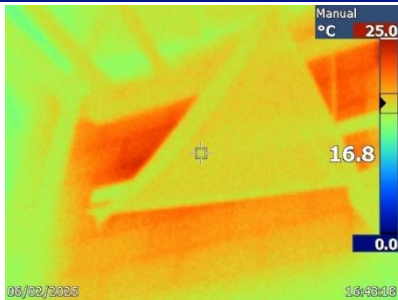
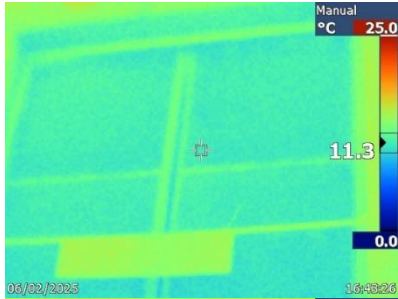
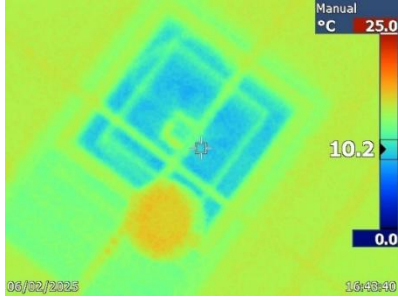
Location	Reference photo	Thermal image	Notes
			
Crown Room (above old main entrance)			The wall is relatively warm and heat loss through the glazing (which appears to be double glazed) is relatively low
Royal – auditorium gallery right (2)		 	Overall the wall is relatively warm although some heat loss is apparent through the boarded up window and along the interface with the ceiling

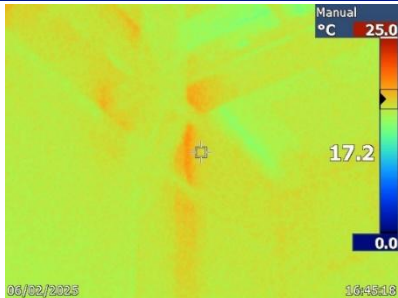
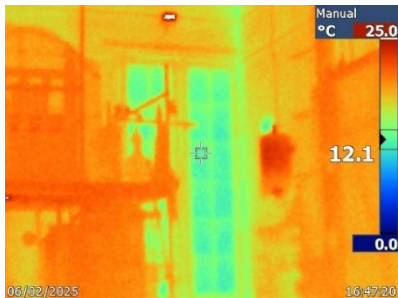
Location	Reference photo	Thermal image	Notes
Royal – auditorium gallery rear vent grille			Heat loss is apparent through the rear vent grille
Royal – auditorium gallery right rear stair (2)			Heat loss is apparent through the single glazed window and, to a lesser extent, the external wall. The wall adjoining the foyer appears to be warmer.
Royal – auditorium gallery right: window into 2006 foyer			The wall and window appear to be relatively warm owing to the foyer behind

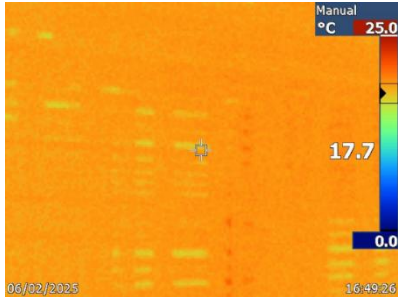
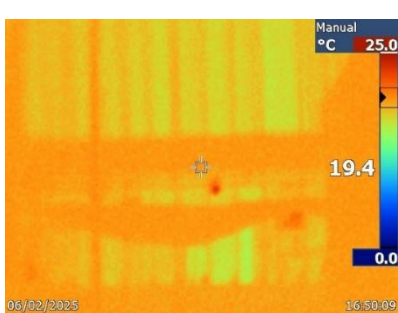
Location	Reference photo	Thermal image	Notes
Royal – old box office			Heat loss is apparent through the single glazing and frame
Royal – stage left get in			The external wall is relatively cool and high heat loss is apparent through and around the get-in door
Royal – stage left smoke vent (2)			High heat loss is apparent through the smoke vent

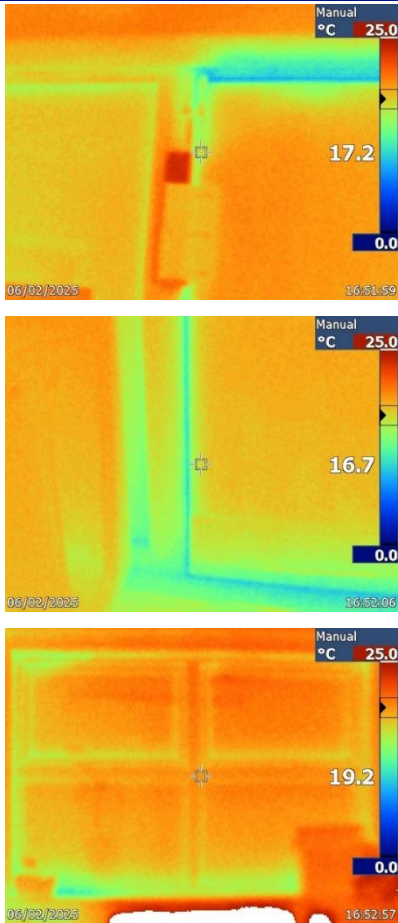
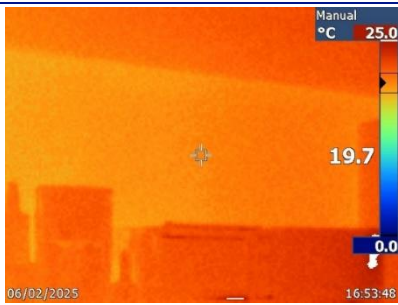
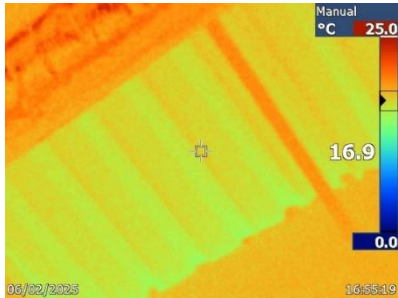
Location	Reference photo	Thermal image	Notes
Royal – stage left roof			The external roof is relatively cool indicating heat loss
Royal – stage house			Overall the stagehouse appears to be warm although some heat loss is apparent higher up towards the roof
Royal – stage house rear wall			Similarly, overall the stagehouse appears to be warm although cold spots are apparent, particularly higher up

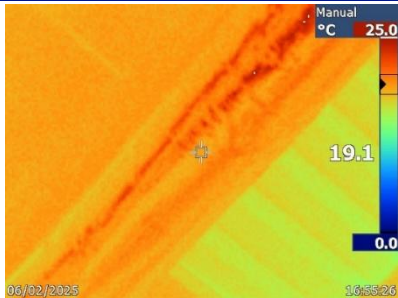
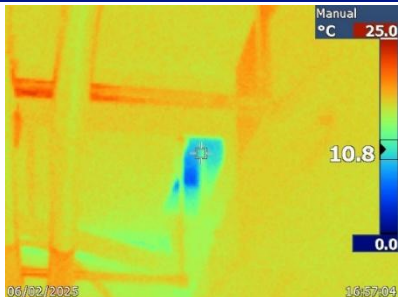
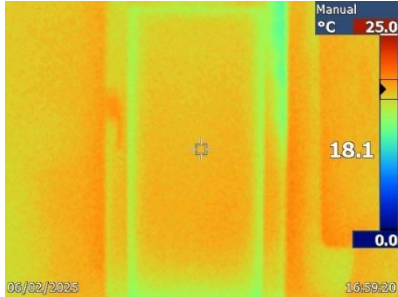
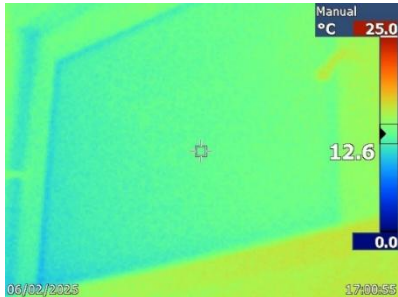
Location	Reference photo	Thermal image	Notes
			
Back of house WC			The WC wall is relatively warm
Prop store – rear and sides		 	The walls of the prop store are relatively cool and heat loss is apparent through glazed elements, although this space may generally be at a cooler temperature than occupied spaces.

Location	Reference photo	Thermal image	Notes
			
Workshop	  	  	Heat gain is apparent from the adjacent plant space at high level. Overall, the walls are relatively cool, likely partly owing to space not being heated at the time. Particular heat loss is apparent through the single glazing and the roof

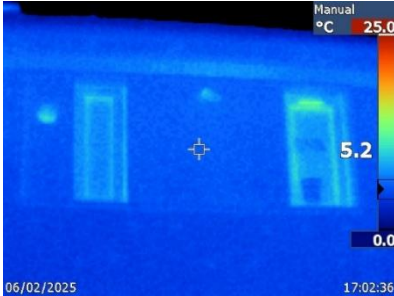
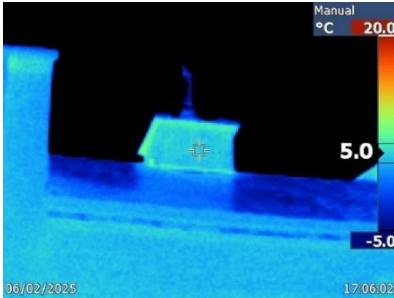
Location	Reference photo	Thermal image	Notes
			
Paint spray frame room	 	 	Generally the walls and exposed structure were relatively warm, possibly owing to heating and solar heat gains during the day

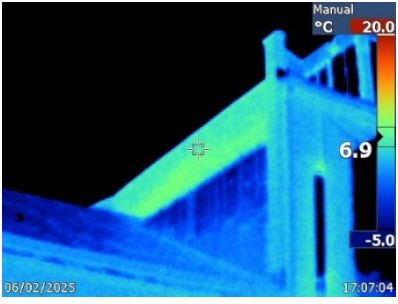
Location	Reference photo	Thermal image	Notes
			
Royal – stagehouse fly gallery			As per image above, overall the stagehouse appears to be warm although some heat loss is apparent higher up towards the roof
			

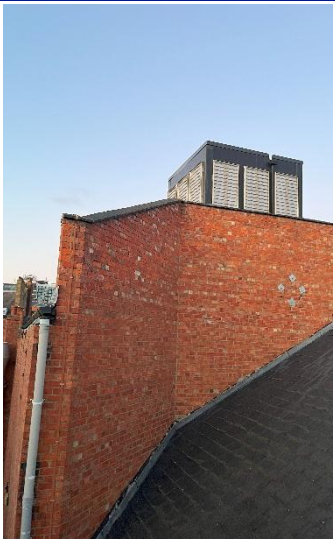
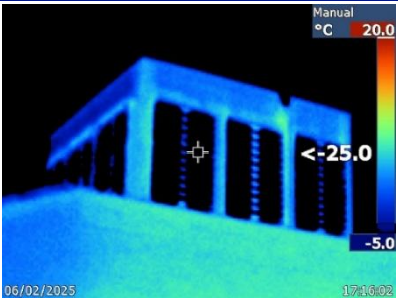
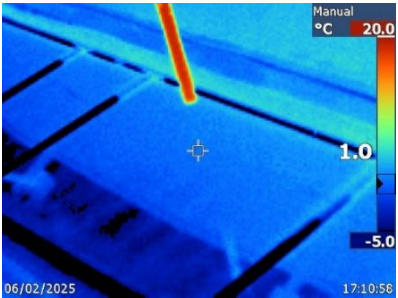
Location	Reference photo	Thermal image	Notes
Royal – stage door			Heat loss is apparent around the edge of the door and the glazing. Overall heat loss through the door and glazing is relatively low
Green room			The green room wall is relatively warm
Back of house office roof			The roof is relatively cool indicating heat loss

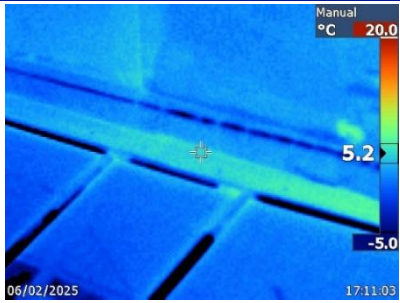
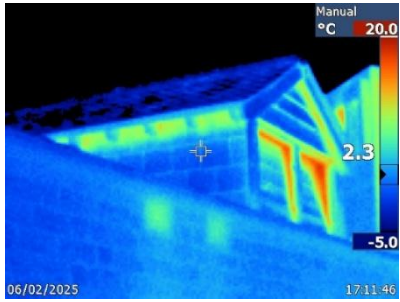
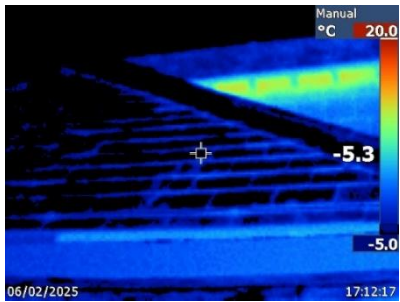
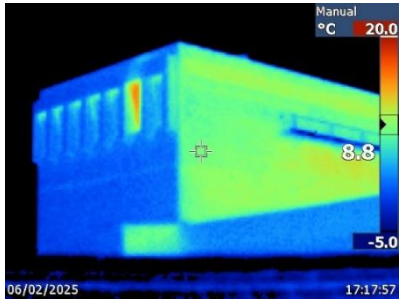
Location	Reference photo	Thermal image	Notes
			
Back of house office corridor			Overall the roof is relatively cool indicating heat loss. Particularly high heat loss is apparent via the unsealed penetration
Dressing room 4 window			Heat loss through the glazing (double glazed) is relatively low, although it is apparent around the frame
Dressing rooms stairs windows			The walls and glazing are relatively cool indicating some heat loss, although the circulation space is likely at a lower temperature generally

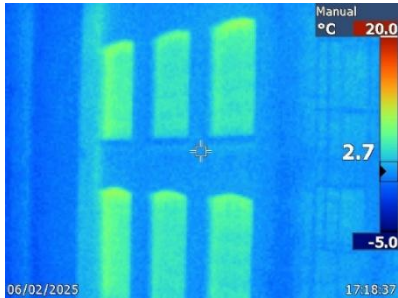
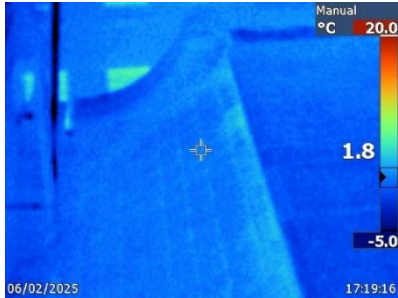
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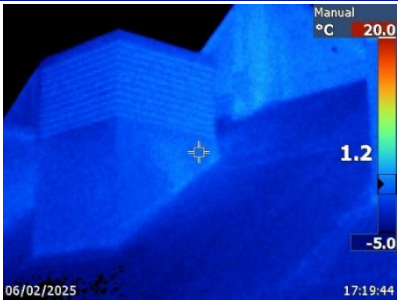
Location	Reference photo	Thermal image	Notes
Dressing rooms facade			Overall the façade is relatively cool with some heat loss apparent through the windows (double glazed)
Royal – east façade (southern section)			The façade is slightly warm, indicating some heat loss, particularly around the existing window and roof junction (also noted on the internal gallery wall photo)
Royal – east façade (north section and auditorium roof cupola)			Overall the façade is slightly warm indicating some heat loss. The cupola is also relatively warm, although not significantly so given its construction; this is likely assisted by insulation in the loft space

Location	Reference photo	Thermal image	Notes
		 06/02/2025 17:15:40	
Royal - stagehouse		 06/02/2025 17:07:04	The wall at the top of the stage house appears relatively warm, possibly owing to heat accumulation at the top. This wall will likely have also been in sunshine during the day however
Royal - stagehouse		 06/02/2025 17:07:32	Observations for the stagehouse smoke vent are inconclusive as the metal louvre blades appear to be reflecting the (cool) sky

Location	Reference photo	Thermal image	Notes
			
			
2006 foyer – roof lights / smoke vents			Heat loss through the rooflights does not appear to be significant (note: the red object is an electric actuator)

Location	Reference photo	Thermal image	Notes
			
Royal – gallery rear vent and housing	 	 	High heat loss is apparent through the gallery rear vents and around the housing. Some heat loss is apparent through the small vents in the foreground although these do not appear to be internally connected. The roof temperature does not appear to be high, although this could be affected by sky reflection
Derngate – stage house			Heat loss is apparent through the smoke vents on the side. This is particularly high for one vent, although this was understood to be owing to damage that was subsequently repaired. The stagehouse south wall appears warm but this is likely owing to sunshine during the day

Location	Reference photo	Thermal image	Notes
			
Admin building			Overall the façade is relatively cool although heat loss noted through the glazing
Crown Room - roof			The roof appears relatively cool, although this could be an effect of sky reflection

Location	Reference photo	Thermal image	Notes
Rehearsal studio roof and vents	 A photograph showing a dark, sloped roof with several white, rectangular ventilation units or vents protruding from it. The sky is a pale blue, suggesting dusk or dawn.	 A thermal image of the same roof area. The roof surface is predominantly blue, indicating it is relatively cool. A color scale on the right shows a range from -5.0 to 20.0 °C, with a current reading of 1.2 °C. The date 06/02/2025 and time 17:19:44 are visible in the bottom left corner.	Overall the roof and vents appear to be relatively cool, although this could be an effect of sky reflection
2006 foyer atrium glazing	 A photograph of a modern building's atrium glazing. The glass reflects the surrounding urban environment and the sky. The building has a white facade.	 A thermal image of the same atrium glazing. The glass shows significant heat loss, appearing in yellow and red colors. A color scale on the right shows a range from -5.0 to 20.0 °C, with a current reading of 7.2 °C. The date 06/02/2025 and time 17:20:37 are visible in the bottom left corner.	Heat loss is apparent through the glazing, particularly high through the framing

4 Summary

- Direct heat loss from the Royal auditorium area appears to be relatively low. This is mitigated by the surrounding lobbies, apparent insulation to the roof void and general limited glazing/vents. High heat loss is evident through the vent to the rear of the gallery and its associated housing.
- The surrounding lobbies to the Royal benefit from connections to the new and existing foyers themselves, although heat loss to outside is apparent through the single glazed elements and uninsulated brick walls.
- The Royal stagehouse appears generally warm internally, although some heat loss is apparent through the roofs and external stagehouse walls from internal imaging.
- High heat loss (conduction and air leakage) is evident from the existing Royal foyer doors. The effect of this is mitigated by the space being unheated, but this will likely contribute to higher heating demands in connected spaces.
- Relatively high heat loss was noted through the existing fabric – roof, walls and glazing – of the Royal back of house workshop areas and ancillary spaces.
- Areas of high heat loss were not noted in the newer Royal back of house areas such as the dressing room block and stage door.