

## **Appendix A4 – Report from Senior Project Manager, Bristol Beacon**

### **Introduction**

The purpose of this appendix is to provide more information on example project issues that have impacted project programme and delivery.

### **Site issues/discoveries**

There are several site issues and discoveries which have impacted overall project programme as described below.

#### **Sub-station**

The sub-station enclosure could not be built immediately as during soft strip it was found that the existing wall which was due to provide support to the enclosure, was in poor condition and resting upon rotten timbers. Remedial works had to therefore be specified and this wall demolished and rebuilt before the sub-station works could proceed. This knocked on the demolition of Az wall and further works in the get in yard.

#### **Wing walls demolition- hall 1 stage end**

This area is more complex than originally envisaged as, on further investigation, the walls connected to the top of the roof space. Subsequently, the works could not be undertaken during the enabling works phase as the roof space was still contaminated with asbestos. Overall, this impacted the demolition works to the back of stage area and the wing walls had to be removed by hand due to the constraints with the scaffolding installed as part of the main works. A conveyer was also required to remove this material through the main hall and to avoid the mobile crane outside. Arup have produced a design which has led to additional works required, which was updated and re-issued 26.06. Additional cost incurred on additional propping for this area.

This area has continued to cause further issues for the project following concerns from WD's engineer about the structural integrity of the piers and risk of installing padstones. MSP and Arup have developed a design which overcomes this risk with a series of steel angles and is to be finalised for construction w/c 15.02. They have worked closely with WD's temporary works engineer to ensure that the works are phased appropriately and are coordinated by the adjacent Az wall.

#### **Gable end**

The extremely poor condition of the gable end has led to complexities in achieving a temporary works design to stabilise the structure after removal of the roof. The instability of the piers at the back of hall 1, which were due to support the temporary works frame, were found to be in poor condition and masonry was crumbling. A decision was therefore taken to redesign this system rather than wait until the remedial works could be undertaken for the piers.

This activity was further delayed by Covid-19, with the fabricators firstly on furlough and then further impacted by the 2m distancing rules.

#### **Main Hall roof - Wood wool panels**

On removal of the main hall roof sheets and once works moved to the roof space it was discovered that additional wood wool panels were attached to the underside of the roof covering, which was not known of or recognised within the works information (this space could not be accessed). This slowed down removal of roof sheets which were due to simply be removed by crane, however a scaffold had to be erected to remove the wool panels from underneath as they contained traces of asbestos.

### Additional Asbestos discoveries

Further asbestos has been discovered in several areas to include:

- Hall 1 wing wall pipe lagging  
Time: 2 weeks, critical path- delay to demolition works whilst removed.
- Organ room slab
- Lantern entrance tiles
- Asbestos discovered within colonnade
- Cement soil pipe asbestos removal
- Potential asbestos in the lantern roof light during plaster removal, however this turned out to not be the case but delayed progress until results were confirmed

### Demolition of hall 1 parapets and ring beam

Due to the unusual site conditions, contractors have updated their works information. The ring beam has increased in size and steels have been discovered within the concrete beam which has increased complexity of the works.

### Condition of walls- hall 1)

Following soft strip of hall 1, concerns have been raised regarding the condition of the walls in hall 1. Additional remedial works have been required to both the walls and padstones to facilitate the installation of the new steels and address loose and dangerous stonework. This has been a significant exercise scoped and undertaken by Structural Technicians who have been bought in to provide additional project support. Solutions include two phases of concrete jackets and significant general buildersworks.

Contractors have also revised their balcony fixing designs to suit site conditions. Recent additional concerns over whether the balconies can fix safely to the existing walls in addition to the acoustic brickwork. This item is currently under further investigation.

### Acoustic brickwork

Due to the unknown physical condition of the wall the specialist acoustic brickwork has had to be redesigned to accommodate the condition of the walls. This final solution was instructed in January 2021.

### Hall 1 trenches

Whilst excavating the areas for the new embedded foundation transfer beams, existing beams were discovered, to allow space for the new beams, the discovered beams were removed there has been difficulty removing the existing beams causing time delays relating to the installation of new steelwork. This has been mitigated through working with the steel fabricators Overdale on their phased installation programme.

### Well 1

A well was discovered in the lower basement of Colston Hall the well has been plugged but there is still a significant amount of water the source of which is still unclear, the plug and water ingress is continually monitored. Design work is still ongoing as a solution need to be found to enable the completion the of hall 1 steelwork .

### Lantern

There was a change in design intent in the lantern, whereby the steels were due to fix to the existing piers and structure, however it has since been discovered that the condition of the masonry piers was not sufficient to support this. The ground conditions were found to be rock and could also allow footings, therefore contractor changed the steelwork design which led to a late issuing of information.

The ability to excavate the existing lantern foundations revealed them to be stepped rather than on pads, meaning that design changes were required to remediate the footings.

### Lantern rooflight

Structural investigations in preparation for the restoration of the lantern and lantern rooflight have been carried out discovering that the rooflight structural integrity has been compromised further. Opening-up works revealed significant rot to the base of the structural timber frame caused by water ingress. To prevent further water ingress and allow timber and plaster restoration works including replacing the glazing to continue, a temporary roof has been installed, covering the lantern rooflight to allow these repair works to continue and for more areas to be investigated.

### Hall 2 columns

It was discovered that the columns in hall 2 were filled with loose rubble which led to concerns about the structural integrity and ability to support the new steels. Remedial works were specified which involved filling the columns with concrete where possible. Shuttering was also required due to discovery of voids and ducts in the lantern area which also had to be filled. Additional steel columns were added to the scheme where it was too dangerous to unzip the existing columns.

Time: Concurrent with delays to issue of hall 2 steelwork information, overtaken by hall 1 delays.

It has recently been discovered that the perimeter walls in hall 2, where the steel angles are to be fixed to, contain loose rubble and there is a risk that the strengths cannot be achieved. The area is now prepared for the steelwork to be installed, however the render must now be removed and pull out testing undertaken to check structural integrity. This has already been achieved at stage end, where contractors have specified remedials and angles. There is a risk that these further works may have further programme and cost implications depending on the nature of the remedial works involved.

### Caretakers roof

It was recently discovered that a significant amount of the structural timber in the caretaker's roof was rotten, timber remedial works are being carried out to the roof structure. Remediation to timbers is being replaced in line with the conservation officers' requirements for like for like and using original timber where possible. These restoration works have taken time to discuss and plan for, with the previous scope being for repair and the new scope now full replacement.

### Well no.3

A third well has been discovered in the sub-basement whilst excavation works for new drainage was being carried out, which appears to be over 8m in depth further investigations and surveys are required to determine a remediation solution to plug the well.

### Hauling Arch

The hauling arch coordination (area between the lantern and hall 1) has been ongoing for several months by the design team to accommodate discovered site conditions and the lift sizes. There is an arch, for example, which is not fully in-tact and requires complex remedial works to solve.

Discussions have been ongoing regarding leaving the fill in the arch to reduce risk, however this is not acceptable to BCC Conservation. Further in-situ roof repairs and remedial works have been specified to the hauling arch this is more than previously scoped.

### Get in Yard

There are several interfaces in this area which experienced issues and challenges. These were as follows:

- Get in Yard lift: It was discovered during excavations in July that the get in yard wall was wider than expected and that this would impose on the proposed get in yard lift design. Following further investigations into whether this wall could be removed or integrated, a redesign and space planning exercise was undertaken in this area to skew the lift  
Time: works to the plant tower and lift have been re-sequenced to after the hall 1 steels are in, meaning that works in this area are not critical path.
- Well 2- A further well was discovered in the get in yard. This was resolved through the amended substructure design to the plant tower, remedial works to plug the well have been completed.  
Time: resolved within substructure, no critical path impact.
- Crane base- Crane base had to be relocated due to get in yard discoveries, there was also a clash with drainage and a sleeve had to be created through the base to coordinate this within the space. This led to delays in installing the tower crane and a mobile crane was erected on Trenchard Street to enable the hall 1 steels to be removed. The plant tower steelwork has also had to be redesigned to accommodate this change.  
Time: mitigated delay through mobile crane
- Nesting gulls- demolition of wall Az was delayed and on pause for a period due to nesting gulls in the area.  
Time: 2 weeks,
- Plant tower- delay to plant tower steelwork fabrication and installation due to discovery of get in yard wall, movement of crane base and lift skew.  
Time: delay mitigated through resequencing; works are not on the critical path.
- Unexpected physical condition of rock encountered whilst excavation for the plant tower foundations and drainage. This element of work has taken significantly longer than expected.  
Time: a significant number of physical conditions have been encountered, over the past few months. This has impacted the plant tower programme, however this is not critical path.

### Party wall (No.15)

There have been protracted negotiations with the party wall surveyor due to the get in yard discoveries set out above. The agreement for the lift works and crane base was separated out to enable this item to progress and the crane to be erected. This has now been signed and discussions have been ongoing between BCC and neighbours regarding noise and vibration, to minimise disruption during the works. An addendum will be completed for the get in yard lift and work adjacent to the wall once the lift and plant tower redesign exercise is complete.

### Hall 2 roof

On further investigation of the hall 2 roof space, it has been discovered that the scope of works were greater than what was previously specified. Closer inspection of the roof timbers has revealed dry and wet rot, with further investigations currently being undertaken to identify the remedial works and requirements which will be presented to BCC for further consideration. Through various surveys and consultation significant remediation works have been recommended to remediate the roof, works such as strengthening works to the roof trusses and associated timbers, replacement of concrete guttering works carried out in accordance with heritage requirements.

Arup and LB have specified repairs and remedial works to suit on site conditions and discoveries. These works are now ongoing.

#### Other discoveries

There have been other smaller discoveries such as repairs to cracking arches, filling of flues or additional façade repair works which Arup RE has specified remedial details for as these items are found.

#### **Impact of Covid-19**

The biggest impact from COVID19 has been to the temporary works installation in hall 1 where it has been challenging for the workforce to maintain a 2m gap at all times. Following recent update of the Site operating procedures (version 3) by the Construction Leadership Council, these works have recommenced and activities are progressing at a much slower rate. This again is primarily down to only being able to have less people in works areas to ensure the 2m gap is maintained. Constrained areas like the sub-basement are also particularly affected.

Additional costs, although minimal, have also been received for additional hand washing stations, cleaning and sanitiser. It has also been agreed that contractors can use the foyer as additional space to maintain distancing when works become busier on site, reducing the need to pay for additional site cabins.

Many contractor team members have been furloughed, however these team members are now slowly returning. There are currently risks of redundancies at some firms. The project has also experienced high sickness rates during January, with a number of staff isolating or sick with Covid-19.

Contractors have implemented rigorous COVID19 controls that allow the majority of works to continue while maintaining a 2m gap between operatives. Version 3 of the Site Operating Procedures from the construction Leadership Council released on 15th April, has given guidance on working within a 2m gap. Contractors have submitted costs as compensation events to cover the additional cleaning regime required.

We are monitoring outputs with weekly progress summaries. This has shown that whilst at the beginning of Covid, productivity was down to around 65% this has now increased to 80%, however we are expecting to return to normal levels within the next few weeks

## Sub-station

Suspected asbestos and area of structural concern.



## Poor condition and instability of wall- voids discovered

Investigation required to check that infill wall is packed tight to top of arch (remove plaster, local brick unit removal)

Remove plaster from face of wall to check condition of brickwork. Limited exposure to date suggests variety of types of brick forming this wall. Bonding between these units needs to be reviewed as we are increasing vertical loads.

Void should be cleared of all debris. Concrete infill not preferred option as concrete may shrink. Wall requires a solid bearing. Suggest rebuild at low level in brick and pack with non-shrink grout.

Padstone size will need to be increased in length to offset discovery that wall thickness is reduced on site (300mm assumed from survey)

Helibars may be required across interface between infill wall and arch - TBC once plaster has been removed and interface exposed.

Infill existing opening with 20N clay brick, with M2 mortar. Toothed in both sides. Refer to Arup masonry spec for more information.

Carry out Hilti tests on existing wall. Check both pull-out and shear to 5kN ULS. Refer to Arup general notes drawing for further information.

Investigation required to check whether this side of wall is also bearing onto timber floor boards. If this is found to be the case, clear out timber and debris, rebuild at low level in brick and pack with non shrink grout.

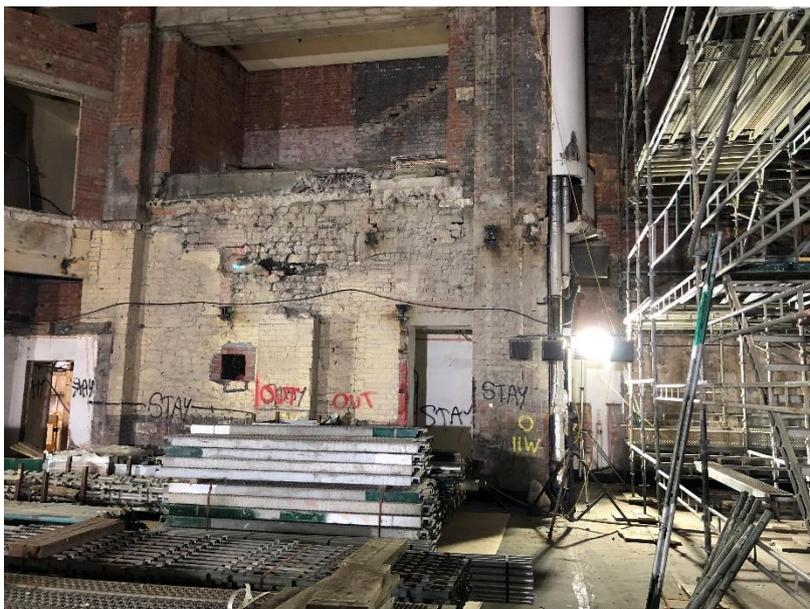


Wing walls demolition

Get in Yard side



Hall 1 side



Hall 1 Gable end



Wood wool panels to underside of hall 1 roof



Condition of walls- hall 1



Well 1



Vaccum excavation of well 1

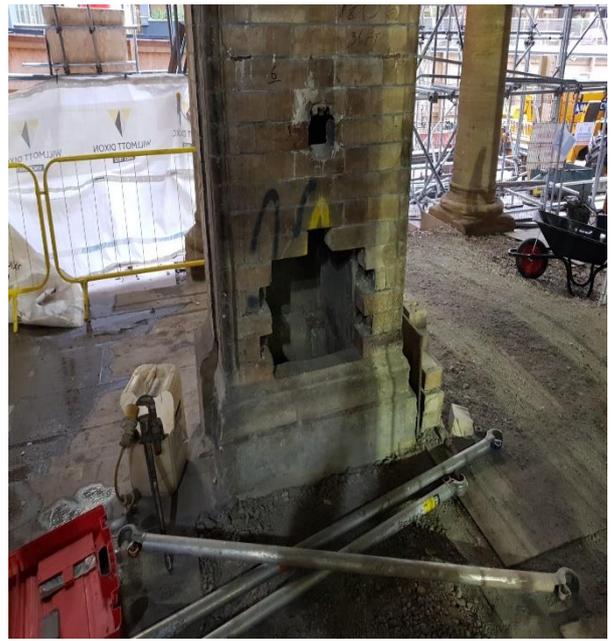


Embedded foundation beams



Hall 2

Rubble filled columns



Top of hollow column



Discovered historic ventilation ducts

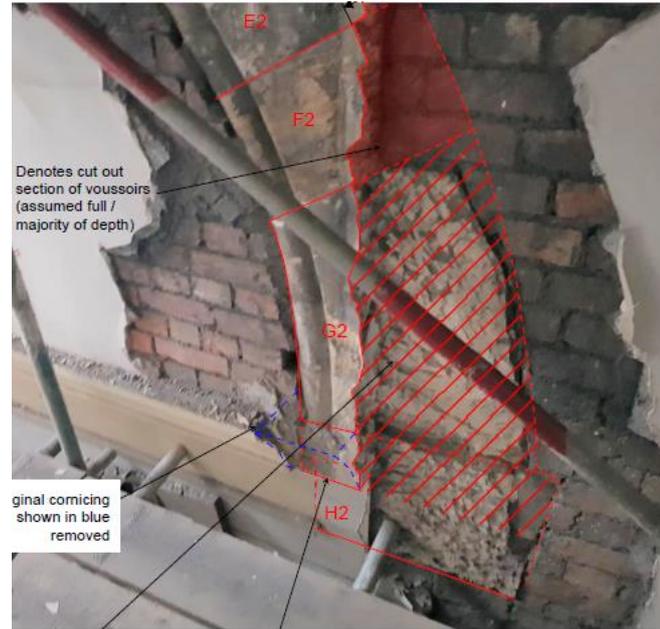


## Basement Support Wall

Poor condition and loose masonry leading to complex sequencing.



# Hauling Arch



Get in Yard

Lift- discovery of wall under No.15 where the lift was due to be located



Well 2





Hall 2 roof

'Fruiting bodies' and dry/wet rot discovered



Poor condition timbers



Poor condition of lead flashings and cracked tiles





Lantern rooflight





Victorian stoves uncovered during soft strip works.

