
To:	The British Museum	Job number:	1635/10
From:	PN	Date:	15/05/2023
Subject:	BM Low Level Roofs – Notes to Tenderers	Cc:	-

The British Museum – Low Level Roofs Essential Water Ingress: Stage 3 Notes to Tenderers

This document outlines any notes to tenderers for the proposed works. The following information should be read in conjunction with:

- Civic Engineers extent of opening up works drawings
- Civic Engineers existing structure drawings
- Civic Engineers proposed structure drawings

Additional loadings such as dead loads and imposed maintenance/access loads have been considered in the assessment of the existing roof structures and strengthening works. All of the roofs within the project scope are to be designed for a maintenance and access imposed loads of 0.6kN/m^2 , and it is assumed that all plant supported by roofs that is being altered is being replaced like for like in terms of loading, and does not result in an increase in applied loading.

Equipment Room/Store

Room: B/1/072

Roof: B/2/X01

Existing Structure Summary from opening-up works:

This building appears to be a masonry infill structure, which appears to comprise of timber joists with timber boarding over. The joists are supported off a wall plate with fixings into the adjacent walls to support the edges of the roof.

Opening-up works were made in one location, adjacent to the south wall, and identified 120mm deep x 45mm wide timber joists at approx. 400mm centres.

Investigations conducted by Hutton+Rostron timber specialists identified no structural defects, no active or significant historic decay and deemed the moisture contents at the time of visit too low to suggest water penetration at that time. Historic damp staining to the ceiling soffits in 2 no. locations was noted however indicating vulnerable locations in the roof waterproofing. H&R concluded that they saw no reason why the existing structure could not be retained.

Proposals:

The existing joists have been assessed and found to have sufficient capacity to support relevant dead loads, as well as access loading of 0.6kN/m^2 . It is therefore proposed that the existing joists are retained. Sufficient information cannot be determined in order to assess the fixings into the adjacent walls, therefore strengthening to the fixings is proposed.

The proposed strengthening to the wall fixings is based on the structural arrangement in the area of opening up, however details to other wall fixings may vary.

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WC

Room: B/1/176

Roof: B/2/X02

Summary of findings from opening-up works:

This is a concrete roof supporting existing mechanical plant. The slab was measured as a 120mm thick and is supported off masonry walls. Reinforcement has been identified on site using a stud finder, however no intrusive investigations have been undertaken to determine the extent and arrangement of the reinforcement. Water ingress has been noted internally, however no visible defects to the roof slab have been noted.

Proposals:

It is proposed that new waterproofing is to be installed above the roof to the architect's details, and some of the plant replaced. It is understood that existing plant is being replaced with lighter weight plant than is currently being supported. There appear to be no change in use to this roof and from viewing the structure on site there seemed to be no noticeable defects. It is proposed to reuse the roof structure in its current form.

Security Building

Kitchen: B/1/076 and Day Shift Office: B/1/075

Roof: B/2/X03

Summary of findings from opening-up works:

This building is a single storey structure. The timber roof joists span north to south, with the southern edge supported from the wall to the corridor building, and the north edge supported by a single storey masonry cavity wall.

The roof to this building comprises approx. 150mm x 50mm timber joists at 400mm centres, overlain with timber furring and timber boarding. The timbers in the roof of this building were found to be damp in places and some of the joists appeared to be rotten. It is recommended that both the kitchen and Day Shift Office is shut off and not accessed until proper demolition of the roof can be undertaken. If access is required, the existing joists should be locally propped. The existing roof should not be walked on. From site observations and Matterport survey it appears that the water tanks on the roof are supported off steelwork supported by the external walls of the building and the Contractor's Corridor wall. There was no access to this structure at the time of Hutton+Rostron's site visit, therefore no assessment of the timber joist condition has been made.

Proposals:

Full replacement of the roof structure is proposed to facilitate loading from maintenance roof access and applied dead loads. To satisfy the loading requirements of 0.6kN/m² access load, 175mm deep joists at 400mm c/c are required. It is assumed that the existing detail to the single storey cavity wall can be adopted in the proposed case, by notching the timber joists at their ends. It is proposed that a timber wall plate is resin fixed into the corridor wall to support the southern end of the roof.

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Contractor's Desk

Room: B/2/049

Roof: B/3/X03

Main Roof

Summary of findings from opening-up works:

This roof appears to be patent slate panels supported off slate joists which span onto the walls and onto cast iron beams. The slate joists are estimated to be at approximately 1.6m centres, spanning up to approx. 1.4m. This is a very unusual construction. Slate is an unusual material to use in this way and is brittle.

It is assumed that the structural elements to this roof are constructed from slate, due to the appearance on the face of the material, however a chiselled finish has been observed in other areas of the roof, therefore it is possible that there is a variance in construction materials throughout the roof structure. Slate is affected by the workmanship of installation and conditions it is situated in. From our initial appraisals of the slate joists they seem to be over capacity just supporting the dead load of the roof. The roof is assumed to be in place for over a 150 years so the existing structure appears to be capable of taking the dead load of the roof but it cannot be justified for an access load.

It was also noted that the cast iron beams seem to have no fire protection but there is a thick plaster underneath it. We understand that Nex are specify fire protection to this beam.

Timber drip style catch trays were noted in Hutton+Rostrons report, directly below the slate joists laid onto the suspended timber ceiling below. Slate debris was also noted in these drip trays and appears to be layers of the slate joists that have broken off. It appears that these sections correspond to missing sections of the joists around the ferrous fixings, which were noted to have weathered. It is assumed that the fixings have expanded and contracted over time, causing layers of the slate to delaminate around the fixings. Care should be taken when demolishing the ceiling as there is debris supported off the ceiling joists.

It was also noted by Hutton+Rostrons that the stone and ferrous fixings, and timber elements beneath/adjacent to the east area drainage goods should be investigated further, as this could not be assessed during the previous opening up works.

Proposals:

The roof is proposed to be strengthened with 200mm deep x 47mm wide timber joists at 600mm centres, spanning between existing cast iron beams, overlain by 18mm thick ply. It is proposed that timber folding wedges are installed above the joists to ensure a positive connection between the proposed and existing structural elements. Further investigations to establish the end bearing condition of the cast iron beams are required.

The ceiling in this location is constructed from timber joists, supporting traditional lath and plaster, which should be removed to allow access to the slate roof and installation of the proposed structure. Note that strip style trays, and debris from the slate joists have been identified above the ceiling panels.

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Back room with Skylight

Summary of findings from opening-up works:

This roof is of similar construction to the main roof, with a central skylight. Two opening-up works have been undertaken to this area of roof, either side of the skylight. The skylight is framed out with timber, along with the structure supporting the lath and plaster ceiling. The surrounding roof is constructed from what appears to be stone slabs due to a chiselled finish to the soffit, and is supported off slate joists, spanning between masonry walls. Again, these joists appear to be overcapacity with the dead load of the roof. Ferrous beams were observed to be framing out the structure at junctions between the adjacent buildings. It appears that these beams are supporting brickwork. Only one edge junction with the adjacent building could be observed during the opening up works. The junction between the room to the backroom and main room is to be determined following further opening up of this area.

The timber structural elements in this area were deemed to be of low vulnerability to decay/failure by Hutton+Rostron.

Proposals:

Strengthening works are proposed to the existing roof to justify dead loads and imposed access/maintenance loads to the roof. The proposed strengthening comprises 200mm deep x 47mm wide timber joists at 600mm centres, spanning between PFC spreader beams embedded within the existing adjacent masonry walls. The existing detail at the edges of this area of roof could not be attained and are therefore subject to further investigations.

The timber joists are to be overlain by 18mm thick ply, with timber folding wedges installed above the joists to create a positive connection between the proposed and existing structural elements. It is assumed that the timber elements framing out the skylights are to be retained in the proposals.

The ceiling in this location is constructed from timber joists, supporting traditional lath and plaster, which should be removed to allow access to the slate roof and installation of the proposed structure.

Contractor's Corridor

Main Corridor

Room: B/2/051

Roof: B/3/X04

Summary of findings from opening-up works:

This roof could not be adequately investigated due to the presence of slate ceiling, which prevented opening up. The roof void was viewed with an endoscope in one location to the eastern area of the corridor. A slate soffit was found fixed with ferrous fixings to joists (either timber, slate, or stone) that spanned onto the external walls. The structure of the roof could not be seen.

This roof is assumed to be patent slate or stone panels, supported off assumed slate joists which span onto the walls, with asphalt over the top. Approx. 80mm screed topping was found to the adjacent roof to the lobby to the contractor's desk. As the roofs are assumed to be of similar construction, it is assumed that there is a screed topping to this roof also.

Proposals:

Without viewing the roof structure, we cannot provide a loading capacity for this roof. It is currently assumed that there are slate joists supporting the roof, and that they are similarly over capacity as the Contractor's Desk and cannot be justified for access loads. The proposed strengthening is designed to support the existing dead loads from the roof, as well as maintenance/access imposed loads of 0.6kN/m². The proposed strengthening comprises 200mm deep x 47mm wide timber joists at 600mm centres, spanning between existing masonry walls. The timber joists are to be overlain by 18mm thick ply, with timber folding wedges installed above the joists to create a positive connection between the proposed and existing structural elements.

The proposals provided are heavily based on assumptions of the existing structural arrangement and are subject to further investigations.

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Lobby to Contractor's Desk

Room: B/2/050

Roof: B/3/X04

Summary of findings from opening-up works:

It is assumed that this area was constructed at a similar period to the Contractor's Desk area and the roof is assumed to be supported off slate joists, with patent slate or stone panels. Approx. 80mm screed topping was found to the roof with asphalt over the top. A slate soffit was found fixed with ferrous fixings to joists (either timber, slate, or stone) that spanned onto the external walls.

No investigations were made to this roof at the time of Civic Engineer's initial site visit. Following this, Hutton+Rostrons visited site and viewed the roof void with an endoscope in a number of locations, mainly towards the eastern area of the roof. Endoscope images from the investigations show what appear to be loose masonry piers supporting the roof joists, bearing directly onto the slate ceiling panels, both towards the edges of the roof and at midspan. Care will need to be taken when strengthening this roof to properly support these piers during the works.

Proposals:

As the roof is assumed to be constructed from slate joists, it is considered to be similarly over capacity as the Contractor's Desk and could not be justified for access loads. The proposed strengthening is designed to support the existing dead loads from the roof, as well as maintenance/access imposed loads of 0.6kN/m^2 . The proposed strengthening comprises 200mm deep x 47mm wide timber joists at 600mm centres, spanning between existing masonry walls. The timber joists are to be overlain by 18mm thick ply, with timber folding wedges installed above the joists to create a positive connection between the proposed and existing structural elements.

The proposals provided are heavily based on assumptions of the existing structural arrangement and are subject to further investigations.