Appendix 3: Feasibility Study into the Restoration of Turntable B. (Rev. B)

See Following Report

CRADDY PITCHERS DAVIDSON

KINGS CROSS

BUILDING FOR LIFE GOLD STANDARD

FEASIBILITY STUDY INTO

RESTORTION OF TURNTABLE B

CLIENT

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Revision	Date	Notes	Author	Checked	Approved
A	04.10.11	Initial Issue	CSD	SJP	CSD
B	18.11.11	Revised following comments	CSD	SJP	SJP

1. INTRODUCTION

1.1. **Instructions.** This report has been prepared following an instruction from Argent Estates Limited.

1.2. **History.** As part of the redevelopment of the Kings Cross area, two historic turntables have been uncovered within the curtlage of the listed buildings. The smaller of the turntables is known as Turntable B. It is proposed to refurbish both turntables and relocate them externally within the new development. The refurbished turntables will no longer be used as support loading other that pedestrian loading. The possibility of refurbishing turntable B into an operational condition whereby it would be capable of rotating whilst potentially supporting pedestrian loading is being considered.

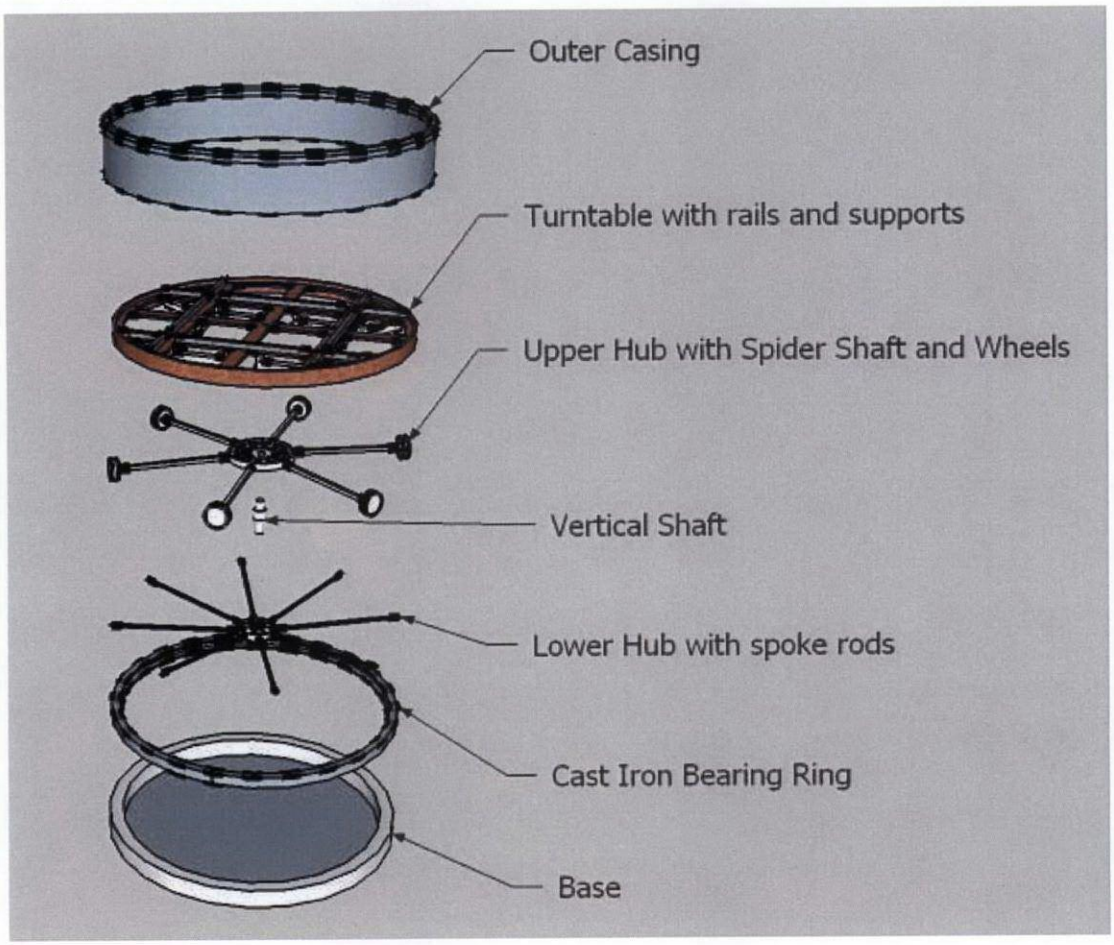
1.3. **Scope.** This report investigates the feasibility of refurbishing the turntable to allow it to rotate. The report considers the works that would be required to the Heritage fabric to allow the turntable to function. The mechanical and electrical elements that would be required to make the turntable operational are not considered within this report.

This report does not consider the detailed design requirements and should it be considered feasible to carry out the works, a detailed design will be required to confirm the detail of the refurbishment an mechanisation works.

2. TURNTABLE COMPONENTS

2.1. **Condition of the turntable.** The turntable is constructed out of a series of cast iron and wrought iron components. Over recent decades the turntable has been located below ground and surrounded by granular fill material within a generally damp environment and as such the elements of the turntable have corroded. As the area has been trafficked, it is also likely that the turntable structure has been subject to varying horizontal and vertical loads. The combination of these influences has lead to various elements of the structure being bent, buckled or out of line. Whilst this damage is not considered significant in terms of the ability to preserve the structure itself into the future, they are significant in terms of the desire to return the turntable into a functional state, where much greater accuracy of the components is required.

2.2. **Turntable Components.** The exploded view of the turntable below gives an indication of the primary components that make up the turntable. These components act similar to a roller bearing. The lower cast iron bearing ring would be supported on a brickwork ring and would act as the base to the bearing. The lower hub and spoke rods would maintain the circular shape of the cast iron bearing ring whilst providing a central base to the main vertical shaft around which all components rotate. The upper hub with the spider shafts and wheels act as the balls to the bearing and allow the turntable to rotate relative to the bearing ring. When the turntable was operated, the turntable with rails and supports would rotate at twice the rate of the upper hub with spider shafts, whilst the lower hub and bearing ring would remain stationary. All of these components are then housed within, and rotate within the outer casting. The outer casting remains stationary throughout.



2.3. **Outer Casing.** The outer casing is constructed from cast iron plate formed into a circular ring. Corrosion of the structure since its last use, combined with external forces applied to the structure whilst it has been buried has had an effect on the geometry of the ring and it is no longer circular. A detailed survey of the ring has taken place which suggests that the plate itself is out of line by up to 25mm from its likely original position.

2.4. **Turntable .** Similar to the outer casting, the turntable itself has been affected by corrosion and the application of load and is no longer truly circular in plan. The detailed survey information suggests that the outer ring of the turntable may be out of line by up to 25mm.

2.5. **Upper Hub and Wheels.** All components are showing signs of corrosion, however this is generally limited to surface corrosion. The existing wheels **appear to be "rusted" onto the existing shafts and** it is unlikely that these could be rotated or removed due to the corrosion locking the wheels onto the shaft.

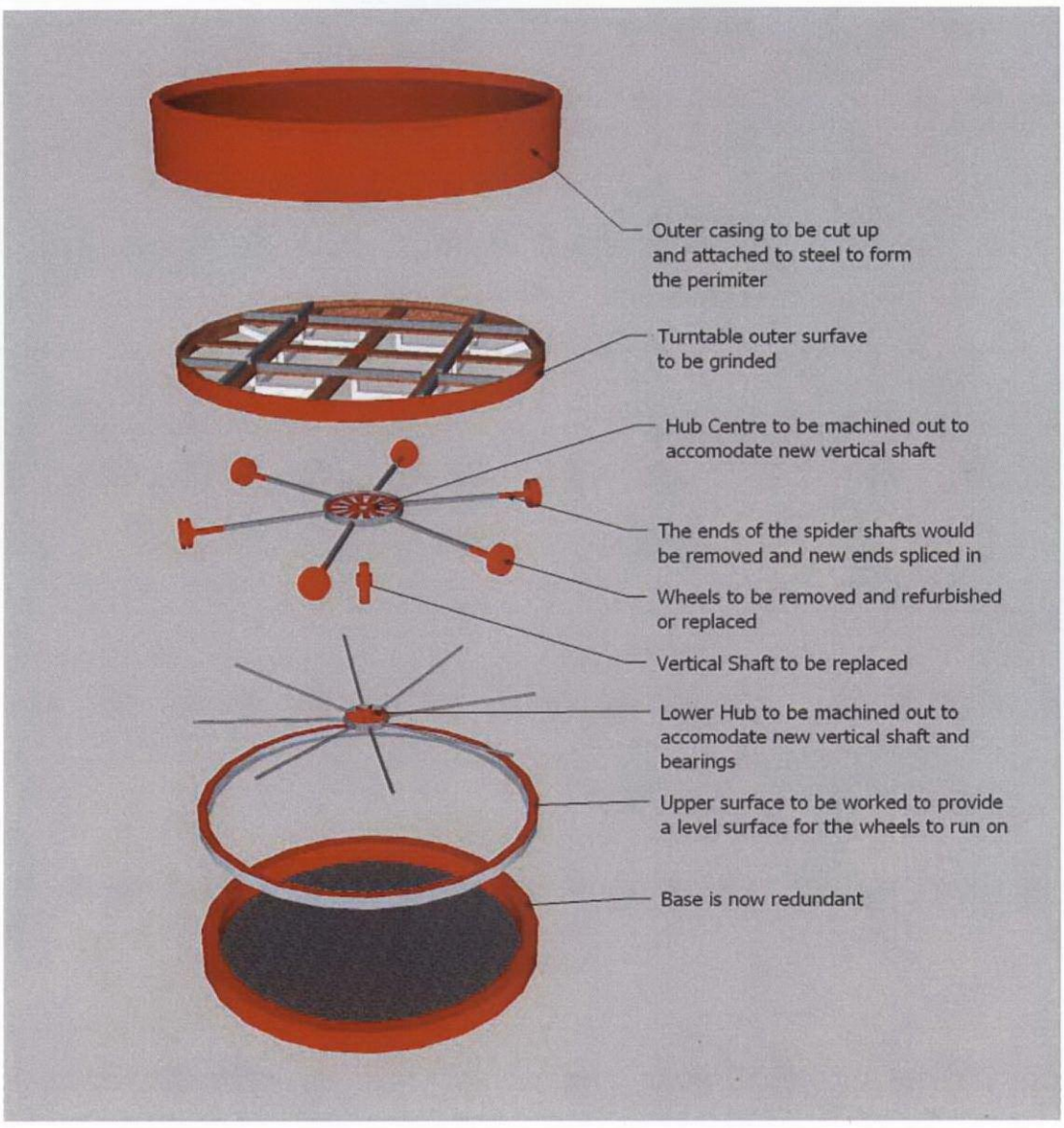
2.6. **Vertical Shaft**. The shaft is showing signs of vertical corrosion and it appears as though the corrosion has locked the shaft into the upper and lower hubs and any rotational capability is considered unlikely.

2.7. **Lower Hub with spoke rods.** The wrought iron spoke rods show signs of corrosion. At their connection with the lower hub the spoke rods are threaded and are secured by nuts locking the rod to the hub. It is likely that these nuts originally provided some adjustment allowing the hub to be centred. These nuts are corroded and locked on to the spoke rods.

2.8. **Cast Iron Bearing Ring.** The cast iron bearing ring is showing signs of corrosion and pitting. The ring is made up of a number of individual elements bolted together. The bolts have almost completely rusted away. The upper running surface has significant pitting.

3. REFURBISHMENT WORKS REQUIRED

3.1. **Extent of works.** It is likely that significant alterations and modifications will be required to the individual components of the turntable to allow rotation. Below is a summary of the likely works, however it will not be possible to accurately define these works until the turntable is fully stripped out and the condition of the individual elements accurately assessed.



3.2. **Outer Casting.** It will be necessary to return the outer casting to a true circular form. This is likely to consist of cutting the casting into a series of smaller parts and then fixing these to a circular steel former around the perimeter.

3.3. **Turntable with supports and rails.** This element would be refurbished and any corrosion removed to allow the turntable to rotate within the outer casting. As a minimum this is likely to include grinding to the outer surface to remove any protrusions. This may however not be sufficient and it may be necessary to strip the turntable down to its component parts to allow any corrosion products to be removed and re-constructing it ensuring its circular form is reinstated and maintained. It would be necessary to machine out the centre of the hub to allow a new vertical shaft and bearing to be installed. The lower face of the turntable which is in contact with the bearing wheels would need to be machined / treated to provide a true level bearing surface.

3.4. **Upper Hub with Spider Shafts and Wheels.** The centre of the hub would need to be machined out accommodate a new vertical shaft and bearing. The existing wheels would be removed and if possible refurbished for re use. It is however possible that these wheels are no longer serviceable and new replacement wheels are likely to be required. The ends of the existing spider shafts would be removed and new ends spliced in to provide support to new bearings.

3.5. **Vertical Shaft.** The existing vertical shaft will be redundant and would be replaced with a new shaft and bearings to facilitate the movement.

3.6. **Lower Hub with Spoke Rods.** The centre of the lower hub would be machined out to accept a new vertical shaft and bearing. The upper surface of the casting would be worked to provide a true level surface for the bearing wheels to run on.

3.7. **Base.** The existing base is now redundant and the lower hub would be supported on a new reinforced concrete base.

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