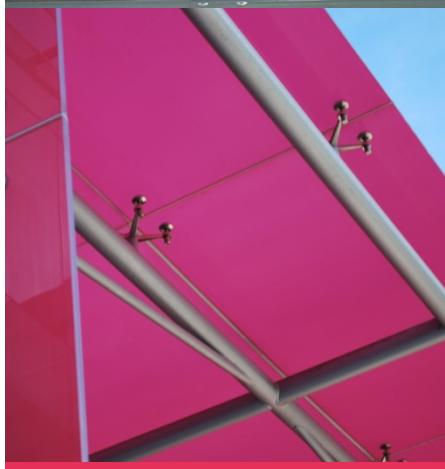








# Whitworth Art Gallery

## Basement retaining wall Condition Report

Curtins Ref: 078255-CUR-00-ZZ-SU-S-02001

Revision: 01

Issue Date: 18 March 2021

Client Name: The University of Manchester

Client Address: Oxford Road, Manchester, M13 9PL

Site Address: Whitworth Art Gallery, Oxford Road, Manchester, M15 6ER

**Curtins**
**Merchant Exchange**
**17-19 Whitworth Street West**
**Manchester, M1 5WG**
**Tel: 0161 236 2394**
**www.curtins.com**

STRUCTURES • CIVILS • ENVIRONMENTAL • INFRASTRUCTURE • TRANSPORT PLANNING • SUSTAINABILITY • EXPERT ADVISORY SERVICES

Birmingham • Bristol • Cardiff • Douglas • Edinburgh • Kendal • Leeds • Liverpool • London • **Manchester** • Nottingham

| Rev | Description | Issued by | Checked | Date |
|---|---|---|---|---|
| 00 | First Issue | LRA | DS | 18.03.21 |

This report has been prepared for the sole benefit, use, and information for the client. The liability of Curtins Consulting Limited with respect to the information contained in the report will not extend to any third party.

| Author | Signature | Date |
|---|---|---|
| **Laura Rodriguez Ariza**<br>BArch MSc<br>Project Engineer |  | 18.03.21 |

| Reviewed | Signature | Date |
|---|---|---|
| **David Sandbrook**<br>BEng (Hons) CEng MIStructE<br>Technical Director |  | 18.03.21 |

# Table of contents

**1.0 Introduction** ..... 1

1.1 Brief and Scope of Survey ..... 1

1.2 Contents of Appendices' ..... 1

**2.0 Overview and Building Description** ..... 2

2.1 Location ..... 2

2.2 Description ..... 2

2.3 Basement retaining wall ..... 3

**3.0 Record of Photographic Observations** ..... 4

**3.1 Description** ..... 4

**4.0 Discussion** ..... 5

**5.0 Recommendations** ..... 6

5.1 Remediation ..... 6

5.2 Cost plan ..... 7

**6.0 Appendices** ..... 8

# 1.0 Introduction

## 1.1 Brief and Scope of Survey

A visual inspection of an external basement retaining wall within the Whitworth Art Gallery in Manchester, was completed during one site visit undertaken on the 4th of March of 2021 for The University of Manchester.

The purpose of this report is to provide an overview to the overall condition of the retaining walls, in order to identify risks and input into the development of a robust cost plan for the proposed refurbishment works.

This report deals solely with the matters referred to within it and is prepared for the sole use of The Manchester University. The report is not for transmission in part or whole to a third party without the express permission of the client.

In completing our report, we have limited our inspection to the areas of the wall that were accessible at the time of the site visit. It should be noted that no fabric or finishes had been removed at the time of our site visit and that removal of these may expose further defects within the wall.

## 1.2 Contents of Appendices'

Appendix A contains original and current general arrangement basement and ground floor plans of the existing building and external retaining wall.

Appendix B contains a location key plan of the observations and recorded notes of the survey. It also includes visual reference to show evidence of the findings.

# 2.0 Overview and Building Description

## 2.1 Location

The site is located just outside the Mancunian Way. The main building is sited within Whitworth Park and it is bounded by Oxford Road to the Eastern boundary and Denmark Road to the Northern boundary.

## 2.2 Description

From reference to anecdotal documents the Art Gallery was founded in 1889, as the first English gallery in a park. It became part of the University of Manchester in 1958. The building was Grade II listed in 1974.

The Gallery is situated in the north east corner of Whitworth Park on the edge of the University campus in the Moss Side Ward, close to the local communities of Mos Side and Rusholme. The gallery fronts Oxford Road, opposite Manchester Royal Infirmary, and to the north is skirted by Denmark Road.

The Whitworth Art Gallery is an amalgamation of a number of separate stages of development that have been undertaken over the past 126 years. Beaumont, the original architect, undertook five projects over an 18-year period to transform a private residence, Gove House, into a public art gallery. The final project that he oversaw was the completion of the main frontage building in 1908. An early photograph of Be amount's work show that the retaining walls were part of the original design.

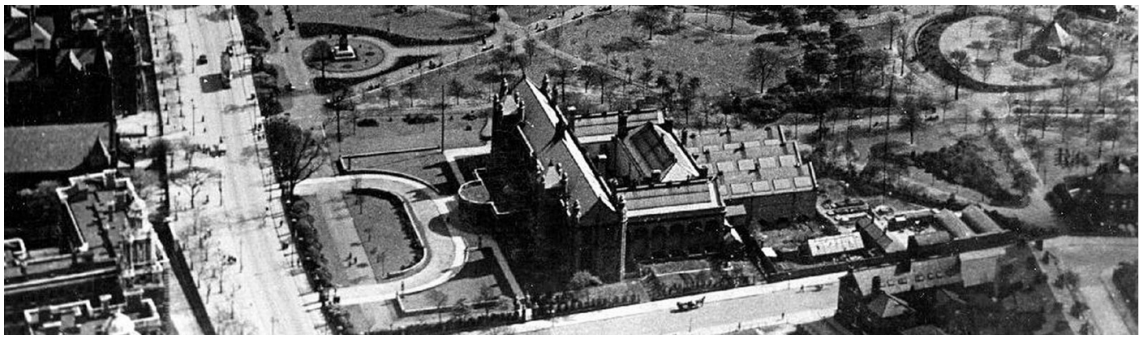


**Figure 1.** The Whitworth Galley. *The University of Manchester.*

During the 1960's, John Bickerdike and Partners substantially remodelled the interior of the building creating modern and contemporary galleries spaces.

In 1995, ABK created a Sculpture Court at mezzanine level within the centre of the plan.

In 2015, an ambitious development transformed the gallery, doubling it its size and creating new spaces that embraced Whitworth Park.

The building is two storeys high with a one level basement. Its facade is constructed of red brick with bands of matching terracotta.

Reference should be made to the Appendix A for historic and current plans of the building and photographs.

The following section should be read in conjunction with Appendix B of this document that records our observations in relation to the nature of the retaining wall.

### 2.3 Basement retaining wall

The retaining wall to be inspected is located outside the main building, adjacent to the south gallery. Access to the top of the wall is attained from Whitworth Park. An external steel stair located to the western facade of the general office gives access to the basement level at which the lower level of the retaining wall has been surveyed.

The wall comprises a traditional cantilever retaining wall built from solid masonry. It has seven piers formed with terracotta cladding extending above the upper ground level forming a balustrade. A steel handrail is fixed to the terracotta copping at the top of the wall and in between the piers.

The wall has four segments as shown in Figure 2. The first one (circa 2m long) extends north to south from the southwest corner of the south gallery. The second (circa 16m long) extends west to east parallel to the south gallery façade and it is restrained at is vertical edges by the first and third wall segments. The third (circa 4m long) extends north to south and it is where the external stair access is located. The fourth (circa 4m long) extends west to east ending on the southwest corner of the general office.

The wall is retaining a height of approximately 2.1m and extends 0.5m above the upper ground floor level up to the top of the terracotta copping. The width of the retaining wall is circa 0.4m and it reduces to 0.23m above the upper ground floor level.

The wall presents weepholes located on the third brick course line at the bottom of the wall. At least two number of weepholes have been provided to each wall panel spanning in between piers.

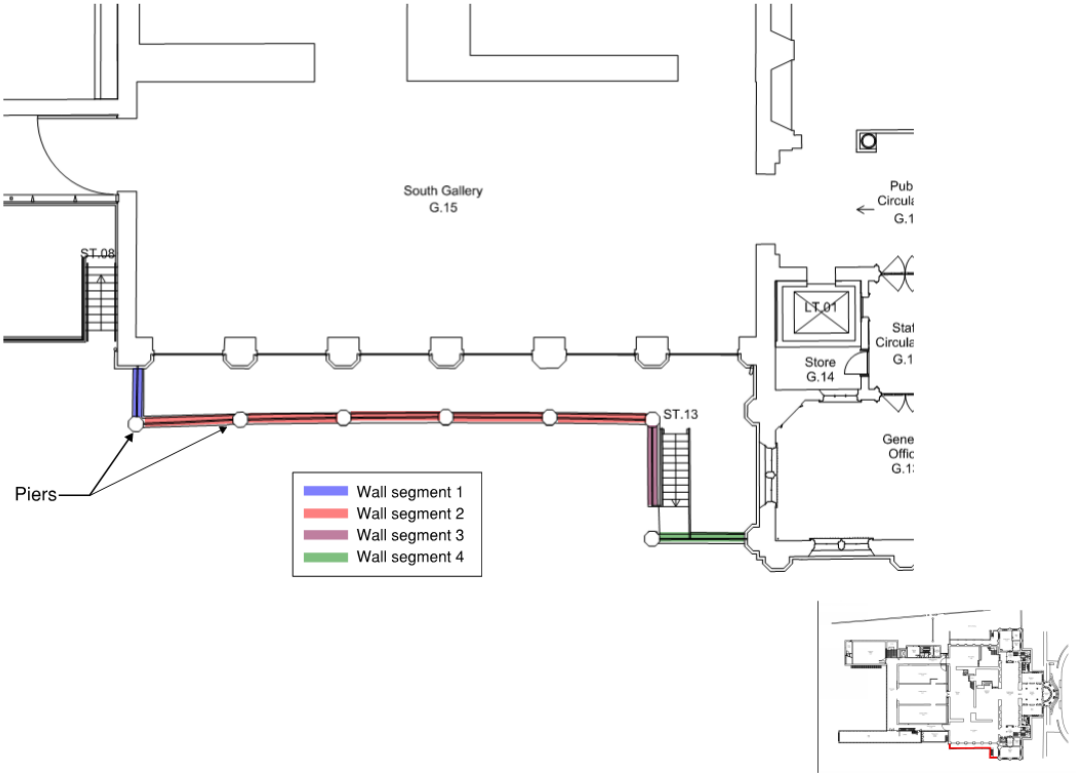



**Figure 2.** Basement plan showing wall's segments**.** *The University of Manchester.*

# 3.0 Record of Photographic Observations

## 3.1 Description

The following section should be read in conjunction with the visual record of our observations made during our visit to site in Appendix B of this document:

**Plate 1** – Edge panel (west) of the second segment of the retaining wall showing a diagonal crack extending from the top of the wall adjacent to the pier towards the re-entrant corner. The crack is 15mm width approximately.

**Plate 2** – Existing water pipe penetration through first segment of the wall adjacent to southwest corner of south gallery. Minor diagonal crack above water pipe extending from underside of copping towards corner of the building. The water pipe is fixed to the main building façade, runs into the external ground and penetrates the back face of the retaining wall.

**Plate 3** – General view along second segment of retaining wall showing the presence of weepholes at the bottom of the wall, distributed along the panels.

**Plate 4** – Views showing inclination of wall panels and piers of the second segment of the wall. Measures have been taken and the inclination is approximately 2 degrees on the edge panels, increasing up to 4 degrees on the central panel.

**Plate 5** – Lateral displacement of terracotta copping and pier showing a disconnection of the handrail fixing detail from the pier. The gap formed due to this displacement is approximately 40mm between the copping pieces.

**Plate 6** – Signs of water ingress and damping at the bottom of the piers and extending up to mid height of the wall.

**Plate 7** – Edge panel (east) of the second segment of the retaining wall showing a diagonal crack extending from the top of the wall adjacent to pier towards the corner pier in the junction with the third segment of the wall. The crack is 10mm width approximately.

**Plate 8** – View of fourth segment of the wall showing a blocked weephole with some unknown material.

**Plate 9** – Vegetation growth through terracotta piers and copping.

**Plate 10** – View of cracked terracotta fragments located at the fixing detail of the handrail at both piers and copping. Signs of replacement of terracotta sections at the location of handrail fixing detail at the copping. Signs of corrosion on steel handrail.

# 4.0 Discussion

From our observations it would appear that the first, third and fourth segments of the retaining wall are generally in good conditions with only limited areas of degradation on the terracotta piers, copping and the handrail. However, the second and largest segment of the wall appears to be in poor condition, showing a significant inclination that it accentuates towards the central panel.

This structural movement is likely to be caused by a combination of several issues observed on site. Firstly, we have noted two substantial diagonal cracks, mirroring each other, located at both end panels of the wall, and extending towards the corners at the bottom side of the wall. This suggests that the pressures applied at the rear face of the wall by both the soils and hydrostatic pressure, are pushing the wall away from the vertical. The inclination gets more severe at the central panel where the distance to the restraints points is the furthest. Similarly, the edge panels are showing the minimum leaning since they are restrained by the adjacent perpendicular wall segments (one and three). The wall build up may not be sufficient to resist these loads and hence, it is showing signs of failure. It seems that the

failure has happened gradually over time as it may only be slightly overloaded rather than massively overload which would have cause failure as soon as the wall was constructed.

Secondly, we have observed one blocked weephole as well as signs of water ingress at the bottom of the piers. This suggests that the weepholes may not be draining the water contained within the soils and the rainwater that may filtrate through the ground. This may be causing water to build up behind the wall therefore increasing the hydrostatic pressure present at the rear face of the wall. It is likely that this additional pressure was not considered on the original design of the wall.

With regards to the damage of the terracotta fragments, we have observed significant cracked pieces at the copping and piers as well as signs of early replacement. The cracks seem to appear at the fixing points of the steel handrail. It may be that water is getting into the fixing locations causing corrosion of the steel is causing the material to expand, exerting pressure on the surrounding terracotta, and causing cracking and displacement.

# 5.0 Recommendations

The following recommendations should be considered to better understand the nature of the recorded observations and to provide sufficient detail to generate a robust budget to inform the cost plan.

## 5.1 Remediation

Our recommendation is that a full re-buildof the second segment of the wall is undertaken. The current wall build-up should be investigated prior to the works to see if the retaining wall build-up is sufficient to resist the current loading and if not, then the wall will need to be re-designed before it is re-built.

As part of the works, it is prudent to consider a complete removal of the existing steel handrail. This must receive a surface cleaning and paint protection application for an appropriate external environment against corrosion. We also recommend that damaged terracotta pieces are replaced and the new post fixing details of the handrail to the terracotta to be reconstructed.

## 5.2 Cost plan

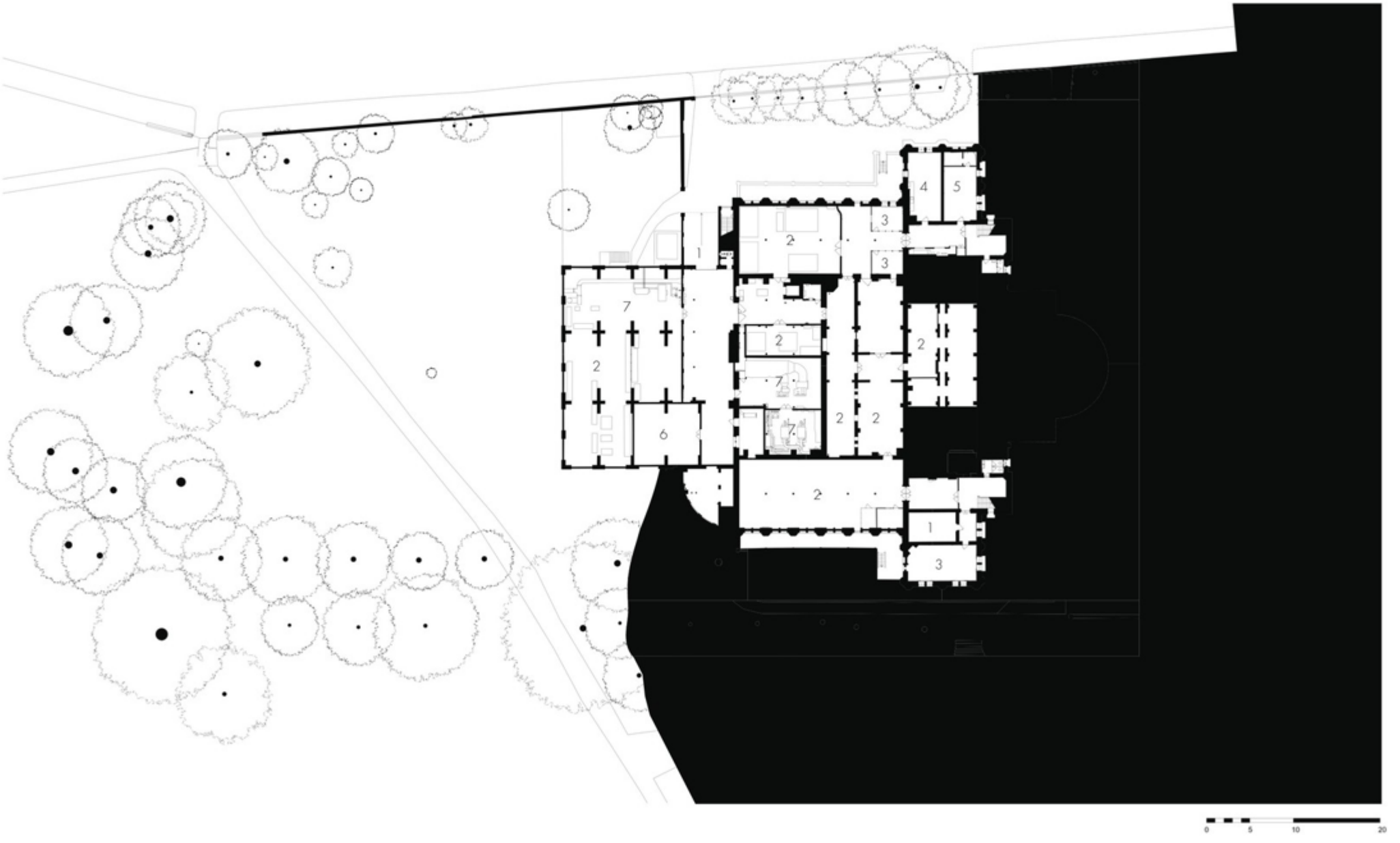
A robust allowance should be considered in the cost plant for repairs to the retaining wall and the following key areas are identified for information: -

- Replacement of second segment of the wall
- Removal of existing handrails, surface cleaning and paint protection
- Repair/replacement of damaged terracotta
- Rebuild of the handrail fixing details

# Appendices

# Appendix A – Original and current Plans

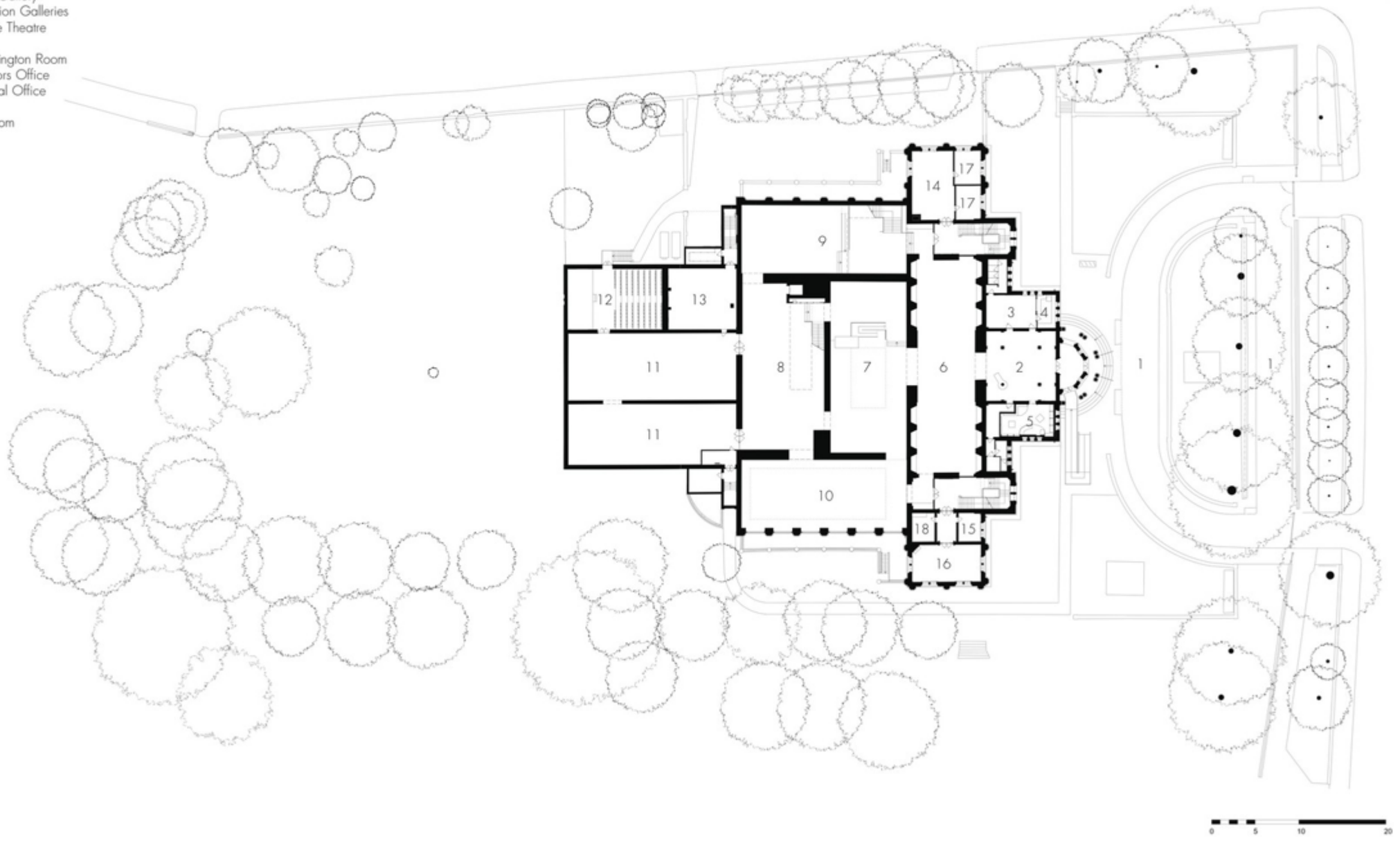
1. Loading
2. Collection Store
3. Office
4. Staffroom
5. Photography Studio
6. Workshop
7. Plant




WAG © MUMA llp

THE WHITWORTH - BASEMENT FLOOR PLAN - BEFORE

1. Carriageway & Car-parking
2. Entrance Hall & Cafe
3. Cafe
4. Kitchen
5. Shop
6. Darbishire Hall - Textile Gallery
7. Gulbenkian Gallery
8. Pilkington Gallery
9. North Gallery
10. South Gallery
11. Exhibition Galleries
12. Lecture Theatre
13. Store
14. Worthington Room
15. Directors Office
16. General Office
17. Office
18. Staffroom



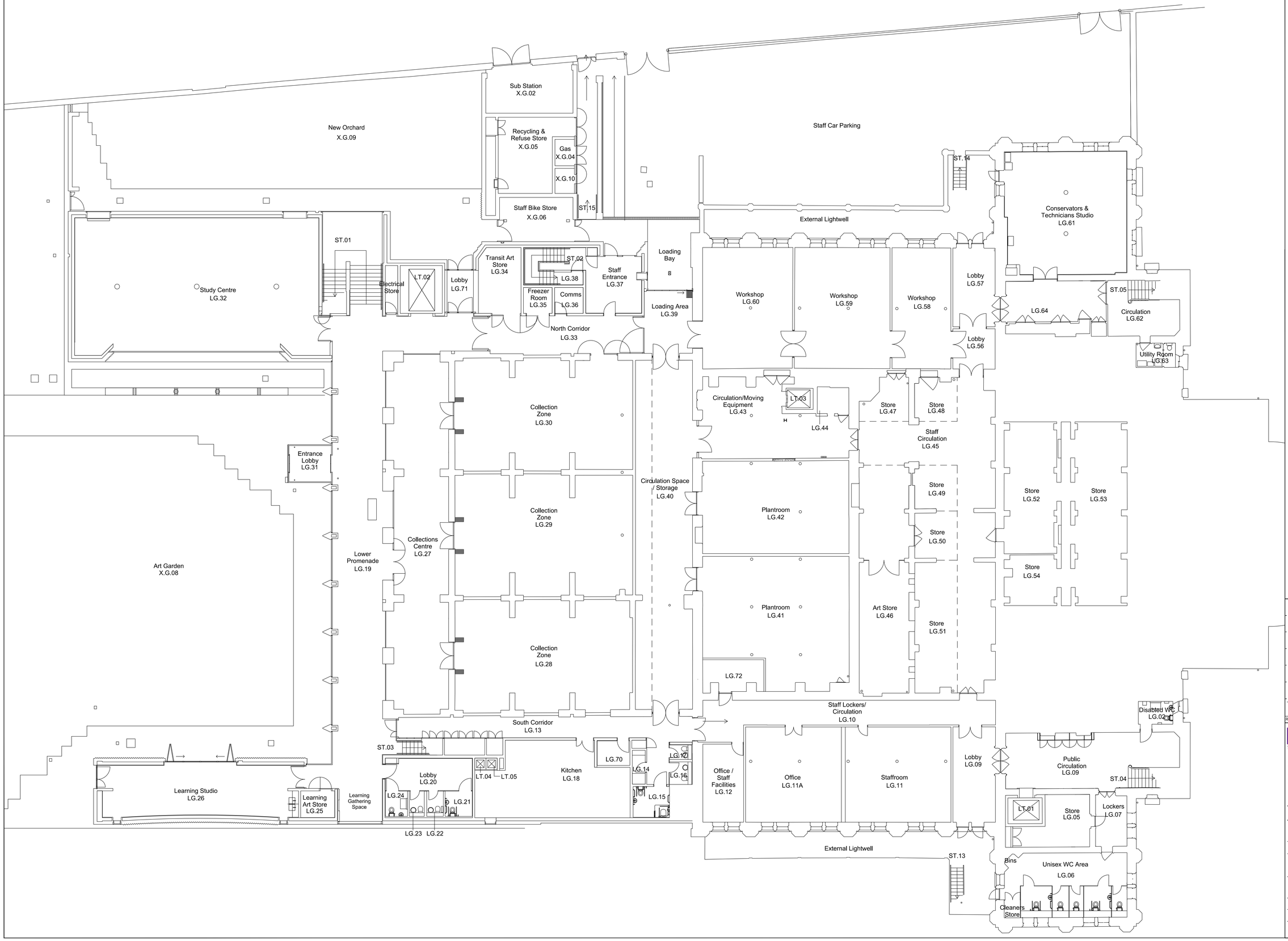

WAG © MUMA llp

THE WHITWORTH - GROUND FLOOR PLAN - BEFORE




WAG © MUMA llp

THE WHITWORTH - SOUTH ELEVATION - BEFORE




The University of Manchester

NOTES

1. DO NOT SCALE FROM THIS DRAWING.
2. ALL MEASUREMENTS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.
3. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE SPECIFICATION AND ALL RELEVANT ARCHITECTURAL, ELECTRICAL, MECHANICAL, AND STRUCTURAL DRAWINGS.
4. (c) UNIVERSITY OF MANCHESTER. THIS DRAWING MUST NOT BE REPRODUCED WITHOUT PERMISSION.
5. DIRECTORATE OF ESTATES AND FACILITIES TO BE NOTIFIED OF ANY DISCREPANCIES.

| Rev | Description | By | Date | Chk'd | Auth |
|---|---|---|---|---|---|

MANCHESTER 1824
The University of Manchester

Directorate of Estates and Facilities
Beyer Building
The University of Manchester
Oxford Road
Manchester
M13 9PL

Drawing Status
MASTER

Project

Building Name
THE WHITWORTH

Sub Site Name

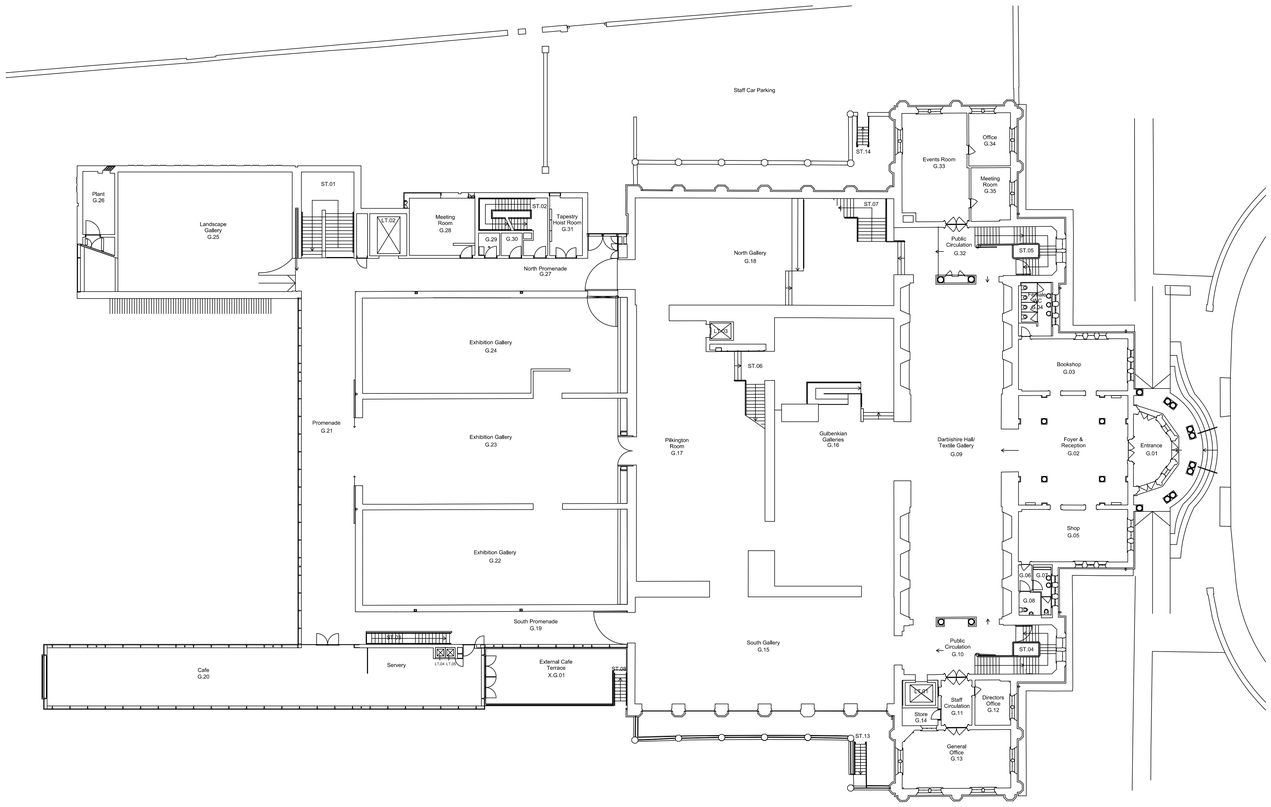
Site Name
OXFORD ROAD

Drawing Title
BASEMENT PLAN

| PM | Drawn | Checked | Authorised |
|---|---|---|---|
| CADCAP | CADCAP | CADCAP | Auth |
| Scale | Date | Date | Date |
| 1:100 @A0 | 27.06.06 | 27.06.06 | --/--/-- |

Drawing No.
MGA031AA-B001

Revision
--




# The University of Manchester

NOTES

1. DO NOT SCALE FROM THIS DRAWING.
2. ALL MEASUREMENTS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.
3. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE SPECIFICATION AND ALL RELEVANT ARCHITECTURAL, ELECTRICAL, MECHANICAL, AND STRUCTURAL DRAWINGS.
4. (c) UNIVERSITY OF MANCHESTER. THIS DRAWING MUST NOT BE REPRODUCED WITHOUT PERMISSION.
5. DIRECTORATE OF ESTATES AND FACILITIES TO BE NOTIFIED OF ANY DISCREPANCIES.

| Rev | Description | By | Date | Chk'd | Auth |
|---|---|---|---|---|---|


MANCHESTER 1824
The University of Manchester

Directorate of Estates and Facilities
Beyer Building
The University of Manchester
Oxford Road
Manchester
M13 9PL


Drawing Status: MASTER

Project:

Building Name: THE WHITWORTH

Sub Site Name:

Site Name: OXFORD ROAD

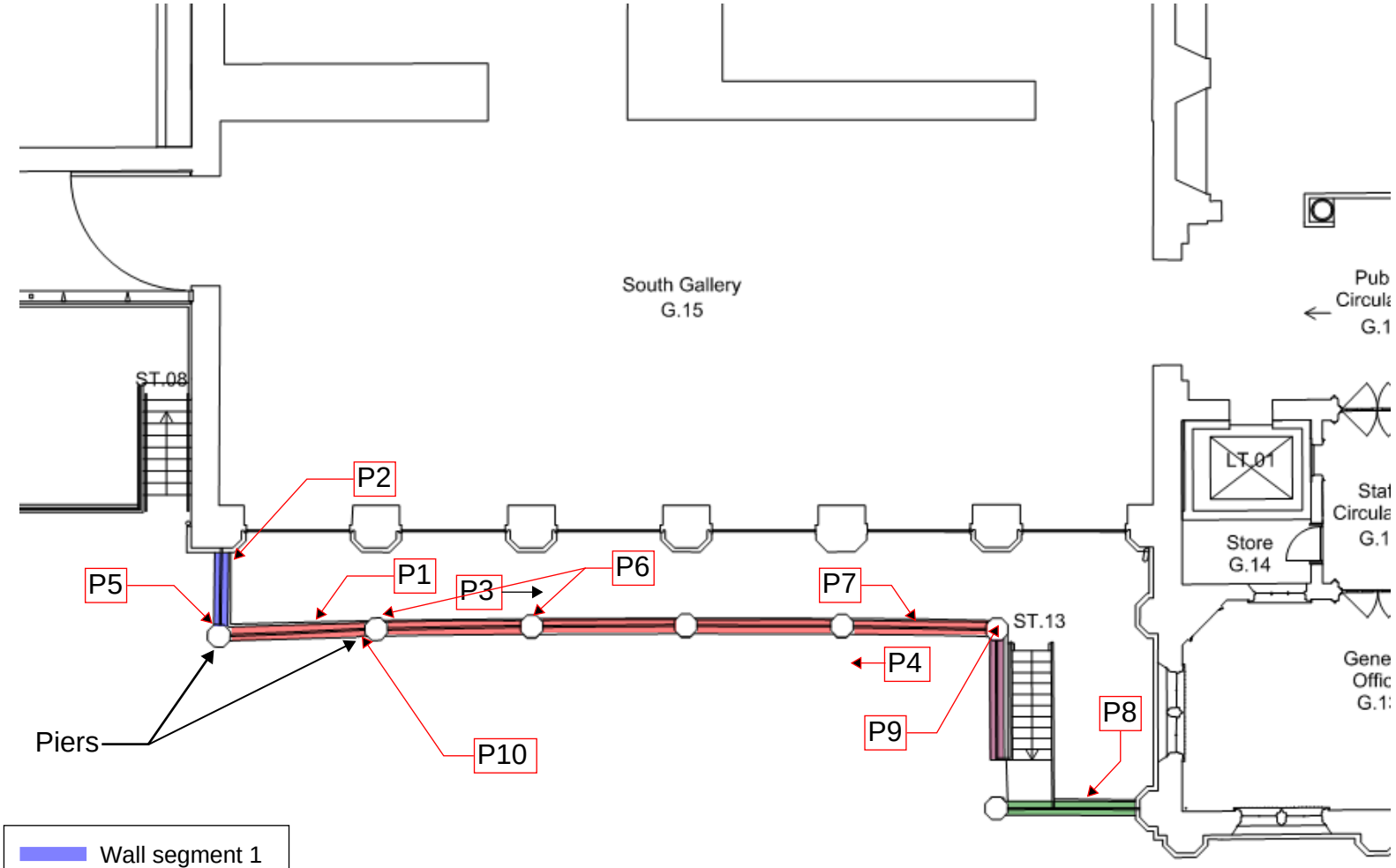
Drawing Title: GROUND FLOOR

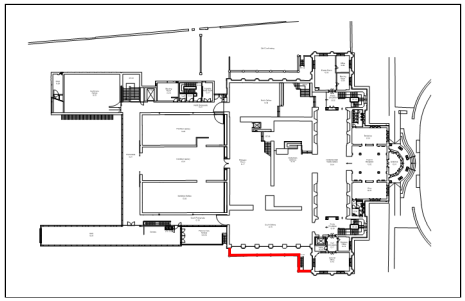
| PM | Drawn | Checked | Authorised |
|---|---|---|---|
| CADCAP | CADCAP | CADCAP | Auth |
| Scale: 1:200 @A0 | Date: 27.06.06 | Date: 27.06.06 | Date: --/--/-- |

Drawing No: MGA031AA-F000

Revision: --

# KEY PLAN OF OBSERVATIONS



# Appendix B – Structural Observations

# SURVEY PROFORMA

| | | | | | |
|---|---|---|---|---|---|
| **Project Number:** | 078255 | **Date** | 11/03/21 | **Page No** | |
| **Project Title**: | Whitworth Gallery Survey | **Plate Reference** | | P1 | |

**Site Observations:**

| | |
|---|---|
| Photo/Evidence and description. | |
| | 1. Edge panel (west) of the second segment of the retaining wall showing a diagonal crack extending from the top of the wall adjacent to the pier towards the re-entrant corner. The crack is 15mm width approximately. |








# SURVEY PROFORMA

| | | | | | |
|---|---|---|---|---|---|
| **Project Number:** | 078255 | **Date** | 11/03/21 | **Page No** | |
| **Project Title**: | Whitworth Gallery Survey | **Plate Reference** | | P2 | |

**Site Observations:**

| | |
|---|---|
| Photo/Evidence and description. | |
| | 2. Existing water pipe penetration through first segment of the wall adjacent to southwest corner of south gallery. Minor diagonal crack above water pipe extending from underside of copping towards corner of the building. The water pipe is fixed to the main building façade, runs into the external ground and penetrates the back face of the retaining wall.   |

# SURVEY PROFORMA

| | | | | | |
|---|---|---|---|---|---|
| **Project Number:** | 078255 | **Date** | 11/03/21 | **Page No** | |
| **Project Title**: | Whitworth Gallery Survey | **Plate Reference** | | P3 | |

**Site Observations:**

| Photo/Evidence and description. | |
|---|---|
| | 3. General view along second segment of retaining wall showing the presence of weepholes at the bottom of the wall, distributed along the panels.<br> |

# SURVEY PROFORMA

| | | | | | |
|---|---|---|---|---|---|
| **Project Number:** | 078255 | **Date** | 11/03/21 | **Page No** | |
| **Project Title**: | Whitworth Gallery Survey | **Plate Reference** | | P4 | |

**Site Observations:**

| | |
|---|---|
| Photo/Evidence and description. | |
| | 4. Views showing inclination of wall panels and piers of the second segment of the wall. Measures have been taken and the inclination is approximately 2 degrees on the edge panels, increasing up to 4 degrees on the central panel. |





# SURVEY PROFORMA

| | | | | | |
|---|---|---|---|---|---|
| **Project Number:** | 078255 | **Date** | 11/03/21 | **Page No** | |
| **Project Title**: | Whitworth Gallery Survey | **Plate Reference** | | P5 | |

**Site Observations:**

| | |
|---|---|
| Photo/Evidence and description. | |
| | 5. Lateral displacement of terracotta copping and pier showing a disconnection of the handrail fixing detail from the pier. The gap formed due to this displacement is approximately 40mm between the copping pieces.     |

# SURVEY PROFORMA

| | | | | | |
|---|---|---|---|---|---|
| **Project Number:** | 078255 | **Date** | 11/03/21 | **Page No** | |
| **Project Title**: | Whitworth Gallery Survey | **Plate Reference** | | P6 | |

**Site Observations:**

| | Photo/Evidence and description. |
|---|---|
| | 6. Signs of water ingress and damping at the bottom of the piers and extending up to mid height of the wall.   |

# SURVEY PROFORMA

| | | | | | |
|---|---|---|---|---|---|
| **Project Number:** | 078255 | **Date** | 11/03/21 | **Page No** | |
| **Project Title**: | Whitworth Gallery Survey | **Plate Reference** | | P7 | |

**Site Observations:**

| Photo/Evidence and description. | |
|---|---|
| | 7. Edge panel (east) of the second segment of the retaining wall showing a diagonal crack extending from the top of the wall adjacent to pier towards the corner pier in the junction with the third segment of the wall. The crack is 10mm width approximately.    |

# SURVEY PROFORMA

| | | | | | |
|---|---|---|---|---|---|
| **Project Number:** | 078255 | **Date** | 11/03/21 | **Page No** | |
| **Project Title**: | Whitworth Gallery Survey | **Plate Reference** | | P8 | |

**Site Observations:**

| | Photo/Evidence and description. |
|---|---|
| | 8. View of fourth segment of the wall showing a blocked weephole with some unknown material.<br> |

# SURVEY PROFORMA

| | | | | | |
|---|---|---|---|---|---|
| **Project Number:** | 078255 | **Date** | 11/03/21 | **Page No** | |
| **Project Title**: | Whitworth Gallery Survey | **Plate Reference** | | P9 | |

**Site Observations:**

| | |
|---|---|
| Photo/Evidence and description. | |
| | 9. Vegetation growth through terracotta piers and copping.<br> |

# SURVEY PROFORMA

| | | | | | |
|---|---|---|---|---|---|
| **Project Number:** | 078255 | **Date** | 11/03/21 | **Page No** | |
| **Project Title**: | Whitworth Gallery Survey | **Plate Reference** | | P10 | |

**Site Observations:**

| | |
|---|---|
| Photo/Evidence and description. | |
| | 10. View of cracked terracotta fragments located at the fixing detail of the handrail at both piers and copping. Signs of replacement of terracotta sections at the location of handrail fixing detail at the copping. Signs of corrosion on steel handrail.    |

# Our Locations

**Birmingham**
2 The Wharf
Bridge Street
Birmingham B1 2JS
T. 0121 643 4694
birmingham@curtins.com

**Bristol**
Quayside
40-58 Hotwell Road
Bristol BS8 4UQ
T. 0117 302 7560
bristol@curtins.com

**Cardiff**
3 Cwrt-y-Parc
Earlswood Road
Cardiff
CF14 5GH
T. 029 2068 0900
cardiff@curtins.com

**Douglas**
Varley House
29-31 Duke Street
Douglas
Isle of Man IM1 2AZ
T. 01624 624 585
douglas@curtins.com

**Edinburgh**
35 Manor Place
Edinburgh
EH3 7EB
T. 0131 225 2175
edinburgh@curtins.com

**Kendal**
28 Lowther Street
Kendal
Cumbria LA9 4DH
T. 01539 724 823
kendal@curtins.com

**Leeds**
Rose Wharf
Ground Floor
Leeds L29 8EE
T. 0113 274 8509
leeds@curtins.com

**Liverpool**
Curtin House
Columbus Quay
Riverside Drive
Liverpool L3 4DB
T. 0151 726 2000
liverpool@curtins.com

**London**
40 Compton Street
London EC1V 0BD
T. 020 7324 2240
london@curtins.com

**Manchester**
Merchant Exchange
17-19 Whitworth Street West
Manchester M1 5WG
T. 0161 236 2394
manchester@curtins.com

**Nottingham**
56 The Ropewalk
Nottingham
NG1 5DW
T. 0115 941 5551
nottingham@curtins.com



Registered in England and Wales number: 2054159
Registered office: Curtin House, Columbus Quay, Riverside Drive, Liverpool L3 4DB