

A photograph of the Rutherford Building at the University of Manchester, a large red brick building with multiple stories and many windows. A large, leafless tree stands in the foreground, partially obscuring the building. The sky is overcast and grey. In the background, other buildings and a street with parked vans are visible.

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Rutherford Building, University of Manchester

Heritage Impact Assessment

For University of Manchester



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Contents

1.0	Summary of Heritage Impact Assessment	1
2.0	Historical Background	6
3.0	Site Survey Descriptions	49
4.0	Assessment of Significance	83
5.0	Commentary on the Proposals	87
Appendix II	Planning Policy and Guidance	96
Appendix III	Commemorative Plaques	102
Appendix IV	Associated Figures	103

1.0 Summary of Heritage Impact Assessment

1.1 Introduction

Donald Insall Associates was commissioned by Arcadis IBI Group, in December 2022, to assist them in developing proposals, on behalf of the University of Manchester, for the refurbishment of the Rutherford Building to deliver new academic and postgraduate study and research spaces.

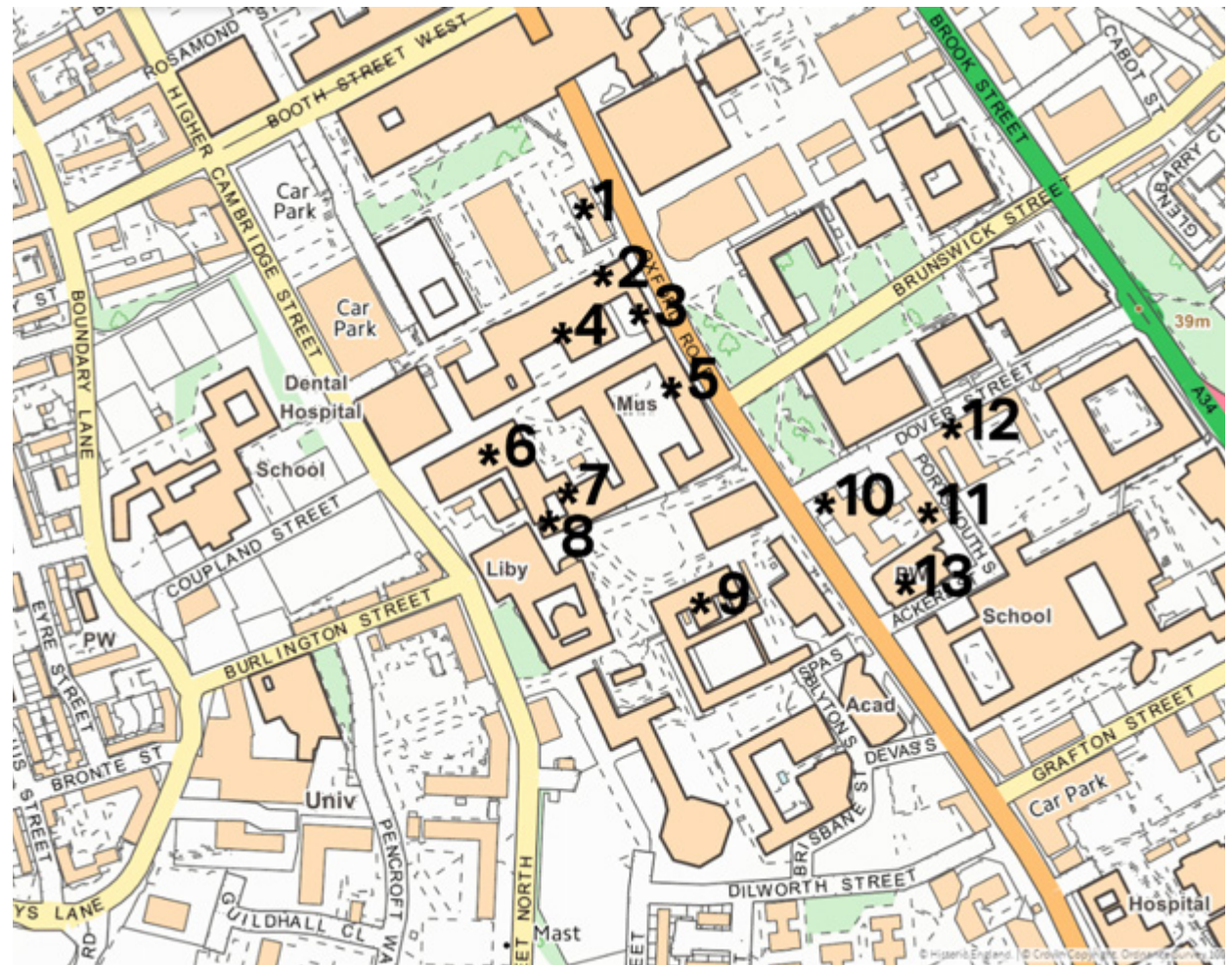
This involves select alterations to the internal layout alongside significant rationalisation and enhancement of interior finishes, a programme of upgrades to windows and roofs for thermal efficiency, as well as repair of historic fabric and enhancements to the modern external access ramp. The proposal should be considered in relation to an application (RN: 138277/LO/2023) currently being determined for repair works to the internal floor and ceiling structures.

The investigation has comprised historical research, using both archival and secondary material, and a site inspection. An illustrated history of the building, with sources of reference and bibliography, is in Section 2; the site survey findings are in Section 3. The investigation has established the significance of the building, which is set out in Section 4 and summarised below. Section 5 provides a justification of the scheme according to the relevant legislation, planning policy and guidance.

1.2 The Building, its Legal Status and Policy Context

The proposals relate to part of the Rutherford Building, a Grade II listed Building.

- * 1 Waterloo Place (Grade II)
- * 2 Former Department of Metallurgy, University of Manchester, and attached railings (Grade II)
- * 3 Manchester Museum Extensions (Grade II)
- * 4 Manchester University Rutherford Building and Hopkins Memorial Wing (Grade II)
- * 5 Victoria University of Manchester including Christie Library, Whitworth Hall (Grade II*)
- * 6 Pharmacy Department, Department of Adult Education, University of Manchester (Grade II)
- * 7 Manchester University Laboratories (Grade II)
- * 8 Burlington Rooms (Shunk Laboratories, Manchester University)
- * 9 Samuel Alexander Building (Grade II)
- * 10 323-7 Oxford Road (Grade II)
- * 11 Holy Name Presbytery (Grade II)
- * 12 University of Manchester Faculty of Economics and Social Studies and attached railings (Grade II)
- * 13 Roman Catholic Chrch of The Holy Name of Jesus (Grade I)



1.1 Heritage Assets

The Rutherford Building is in the context of a number of listed buildings **[Plate 1.1]** including:

- Former Department of Metallurgy, University of Manchester, and Attached Railings (Grade II)
- Manchester Museum Extensions (Grade II)
- Victoria University of Manchester including Christie Library, Whitworth Hall (Grade II*)
- Manchester University Laboratories (Grade II)
- Pharmacy Department, Department of Adult Education, University of Manchester (Grade II)
- Burlington Rooms (Schunk Laboratories, Manchester University) and Attached Railings (Grade II)

Alterations to a listed building generally require listed building consent. The statutory list description of the listed building is included in Appendix I, along with extracts from the relevant legislation and planning policy documents in Appendix II.

The Planning (Listed Buildings and Conservation Areas) Act 1990 is the legislative basis for decision-making on applications that relate to the historic environment. Sections 16 and 66 of the Act impose statutory duties upon local planning authorities which, with regard to listed buildings, require the planning authority to have *'special regard to the desirability of preserving the listed building or its setting or any features of special architectural or historic interest which it possesses'*.

Section 38(6) of the Planning and Compulsory Purchase Act 2004 requires planning applications to be determined in accordance with the development plan unless material considerations indicate otherwise. The development plan applicable to the site comprises the Manchester Core Strategy 2012-2027 (2012) specifically Policy ENV 3 'Heritage' and saved policies in the Unitary Development Plan (1995) including Policy 19 'Listed Buildings', which encourage development that secures the reuse of heritage assets when consistent with their conservation, avoiding adverse effect on their interest.

The courts have held that following the approach set out in the policies on the historic environment in the National Planning Policy Framework 2021 will effectively result in a decision-maker complying with its statutory duties. The Framework forms a material consideration for the purposes of section 38(6). At the heart of the Framework is *'a presumption in favour of sustainable development'* and there are also specific policies relating to the historic environment. The Framework states that heritage assets are *'an irreplaceable resource and should be conserved in a manner appropriate to their significance, so that they can be enjoyed for their contribution to the quality of life of existing and future generations'*. The Glossary to the National Planning Policy Framework defines a heritage asset as:

A building, monument, site, place, area, or landscape identified as having a degree of significance meriting consideration in planning decisions, because of its heritage interest. It

includes designated heritage assets and assets identified by the local planning authority (including local listing).

The Framework, in paragraph 194, states that:

In determining applications, local planning authorities should require an applicant to describe the significance of any heritage assets affected, including any contribution made by their setting. The level of detail should be proportionate to the assets' importance and no more than is sufficient to understand the potential impact of the proposal on their significance.

Section 4 of this report – the assessment of significance – meets this requirement and is based on the research and site surveys presented in sections 2 and 3, which are of a sufficient level of detail to understand the potential impact of the proposals.

The Framework also, in paragraph 199, requires that:

When considering the impact of a proposed development on the significance of a designated heritage asset, great weight should be given to the asset's conservation (and the more important the asset, the greater the weight should be). This is irrespective of whether any potential harm amounts to substantial harm, total loss or less than substantial harm to its significance.

The Framework goes on to state at paragraph 200 that:

Any harm to, or loss of, the significance of a designated heritage asset (from its alteration or destruction, or from development within its setting) should require clear and convincing justification.

The Framework requires that local planning authorities categorise harm as either 'substantial' or 'less than substantial'.

Where a development proposal will lead to 'less than substantial harm' to the significance of a designated heritage asset, the Framework states, in paragraph 202, that:

...this harm should be weighed against the public benefits of the proposal including, where appropriate, securing its optimum viable use.

Section 5 of this report provides this clear and convincing justification.

1.3 Summary Assessment of Significance

The Rutherford Building is an example of late 19th and early 20th century institutional architecture, constructed between 1898 and 1900 as the Physical Laboratories and designed by architect James William Beaumont. It is sited in a significant cluster of purpose-built university buildings developed from the 19th century onwards, reflecting the growth of Manchester as part of the country's first civic university (Victoria University).

Of arguably greater importance, however, is the building's historic interest. Through its design and layout, Beaumont in collaboration with The Langworthy Professor of Physics, Arthur Schuster, sought to adapt Germanic practices of collaborative teaching and learning, and create a space sufficient to enable research into the rapidly expanding topics within physics evident at the end of the 19th century, reflecting recent discoveries such as radium. As part of this, the building was used for internationally important research that has had a phenomenal influence on the course of human history, including atomic research, by key figures such as Ernest Rutherford.

Whilst the original uses of the building and its individual rooms are no longer extant, this importance is reflected in both the legibility of the original architectural design scheme, the integrity of the spatial layout of its interior and the survival of the original internal decorative schemes and of fragments that hint at the earlier uses of academic spaces. These have however been significantly impacted by later fitouts and additions.

1.4 Summary Impact Commentary

The proposal seeks to undertake substantial refurbishment of the Rutherford Building to secure its longer-term use as an academic research and study space. Read in conjunction with application 138277/LO/2023, this involves select changes to the internal layout to provide useable work and study spaces, the rationalisation and enhancement of interior finishes and services, repair of exterior fabric and enhancements to the modern external doors and ramp,

as well as a series of works to enhance the thermal efficiency of the building including replacement of the window glass and casements (retaining the frame) and insertion of mineral wool insulation into the roof. These works would result in 'less than substantial' harm in some areas, including a higher level of partitioning needed to service spaces to the interior, removal of some earlier window and roof fabric and changes to the roof profile. However, these works are considered necessary to achieve the key benefits which underpin the scheme, principally securing the building's longer-term use through the provision of amenities and spaces demanded by modern academic requirements and improvements to thermal efficiency, coinciding with specific benefits such as the removal of poor modern services, revealing previously covered historic surfaces and enhancing the aesthetic appearance of the prominent access ramp. It is therefore the conclusion of this report that the proposals would meet the statutory duties of the Town and Country Planning (Listed Buildings and Conservation Areas) Act 1990, the policy requirements of the Local Plan and the tests for sustainable development outlined in the NPPF insofar as they relate to the historic environment.

2.0 Historical Background

2.1 Summary History of Owens College (later Victoria University)

2.1.1 Founding and Early Operation, 1846-1870

In the 1820s and 1830s there were various proposals for an institution of higher education to educate the men of Manchester for careers in the professions and the upper levels of industry and commerce. These gained increasing volume in the 1840s and 1850s, as Manchester's growing economic confidence made itself manifest in several cultural and intellectual organisations.

On his death, the textile merchant and industrialist **John Owens** (1790-1846) bequeathed £96,954 for a non-denominational college "*providing the means of instructing and improving young persons of the male sex (and being of an age not less than fourteen years) in such branches of learning and science as are usually taught in the English Universities*". A traditional liberal curriculum combining maths, classics, philosophy, natural philosophy (sciences, broadly conceived), with natural history and modern languages as secondary subjects, was adopted by the trustees (engineering and commerce being identified as areas for future expansion).

The new college opened on Quay Street in **Cobden House** (formerly a residence) in 1851 and is regarded as the first modern university college outside of London. Its early years were problematic, with students often young and ill-prepared, the quality of tuition inconsistent and courses of varying merit. In 1859, however, Owens College was accepted as a provincial examination centre for the University of London

and in the 1860s changing cultural values created a new appreciation of higher education as advanced preparation for the professions.

Seizing on the example of the Germanic universities, where student involvement in research was actively encouraged, Owens College capitalised on this change in attitude. This was particularly true of the Chemistry Department, which was feted as the college's most important contribution to local industry. Building on the German example, Henry Roscoe (1833-1915), Professor of Chemistry from 1857, established a department offering regular courses of instruction, with the opportunity for accreditation, that were attuned to the needs of the local economy and yet simultaneously academically rigorous and research led. This was part of a growing shift in scientific higher education, moving away from simple instruction towards active involvement in investigation.

2.1.2 The Move to Oxford Street (now Oxford Road), 1868-73

Student numbers grew rapidly in the 1860s, the lecture rooms and laboratories now becoming inadequate. This was regarded as preventing both the introduction of engineering and physics and a proposed union with the Manchester Royal School of Medicine (founded in 1824). A Building Committee established in 1865 also identified the need for a museum that would the collections of the Manchester Natural History Society and Geological Society, and for halls of residence. An "Extension" committee under the industrialist **Thomas Ashton** (1818-1898) was formed and a programme of fundraising began.

At his own cost, Ashton purchased a site in **Chorlton on Medlock** in 1868 in trust for the college. Situated outside of the city centre, on the road that led to the new suburbs in the south, this was bound by **Oxford Street** (now known as Oxford Road) to the east, **Coupland Street** to the north and **Burlington Street** to the south. This area between modern-day Booth Street West and Dover Street had only recently been developed, mainly as housing. The map of 1836 shows that development had only just begun to spread west from Oxford Road, with several large gardens (and a bowling green) still existing and few buildings existing beyond Chatham Street [Plate 2.1.1]. Even in the 1850s, it remained outside of Manchester proper [Plate 2.1.2].



2.1.1 Design for Owens College, Alfred Waterhouse, 1872 (RIBA Pix)



2.1.2 Design for the west range of the quadrangle of Owens College, Alfred Waterhouse, 1869 (RIBA Pix)

Alfred Waterhouse was appointed as the architect in December 1868 and the foundation stone was laid in September 1870. A private bill resulted in the Owens Extension College Act (1870), which created a new body to administer the Extension funds. This was merged with Owens College in an Act of 1871, creating The Owens College.

Construction of the new buildings began in 1870; the west range, the first and main building – today the **John Owens Building** – was opened in 1873 and incorporated laboratories, lecture rooms and offices [Plate 2.1.3-2.1.4]. An ornate **Chemistry** building housing extensive laboratories and the College's largest lecture theatre was constructed on Burlington Street, designed to Roscoe's personal specifications and opened later in 1873. The equally decorative **Medical School**, on Coupland Street, was completed in 1874, these buildings together forming the beginnings of the quadrangle.

The curriculum expanded accordingly, with Political Economy, Zoology, Geology and Engineering added in the 1860s and 1870s, and the first private halls of residence to serve the new college erected in 1876.



2.1.3 Area between Booth Street and Dover Street, J. Pigot, 1836 (University of Manchester)



2.1.4 Southern extent of the built-up area of Manchester, J. Adshead, 1850-51 (University of Manchester)

2.1.3 Consolidation and Expansion, 1873-1914

Its efforts to become an independent university having failed, in 1880 Owens College became the first affiliate college of the new **Victoria University** (England's first civic university). Owens quickly became increasingly dominated by day-time students, a growing number following systematic three-year courses leading to degrees. A **teacher training college** was added in 1890 but the university's reputation was for science and, above all, Chemistry. Having established a syllabus that was attuned to the practical needs of local industry whilst equipping its students with the ability to carry out original research (in both academia and industry), the **Chemistry Department** was a recognised leader in pure research and, by the 1880s, England's leading university chemistry department. The **Medical School** was also thriving and its building on Coupland Street was extended in 1883 and (more substantially) in 1894, whilst an independent **Dental School** was established outside of the campus in 1884 and a **Department of Public Health** founded in 1888 [Plate 2.1.5]. Development had also occurred around the university site and by the 1890s it was thoroughly enclosed by a grid of streets of densely packed terraced housing and scattered industrial buildings (two at its immediate west) [Plates 2.1.6a-2.1.6b]. By 1899/1900 there were more than 1,000 students, over 1/3 studying in the Medical School, and Owens College had its first postgraduate researchers.



2.1.5 Owens College, undated, c.1890
(University of Manchester)



2.1.6a *Victoria University and surroundings, 1893 OS (Promap)*



2.1.6b *Victoria University, 1893 (Promap)*

Construction continued throughout the 1880s and 1890s, usually reliant on bequests and donations from Manchester's industrialists and merchants. The **Whitworth Engineering Laboratories** were opened in 1886, the **Beyer Laboratories** (Botany and Zoology) and the **Natural History Museum** in 1888 (Grade II*), the **Christie Library** in 1898 and the **Physical (Physics) Laboratories** in 1900, all of the academic departments (with the possible exception of Physics) heavily reliant upon, and named for, donors. On Oxford Road, the **Whitworth Hall** followed in c.1895-1902 to designs by Paul Waterhouse (Grade II*), the last building to be completed in the short quadrangle between Oxford Road, Coupland Street and Burlington Street (today known as the **Old Quadrangle**). The Museum was extended to the north in 1911-27, the designs by Paul and Michael Waterhouse adding the archway entrance into the Old Quadrangle, with bridge above (Grade II). This generosity also extended to apparatus and equipment and Manchester's reputation as one of the main centres for scientific research was by now firmly established.

2.1.4 The 20th Century

The federation began to break down in the first years of the 20th century and in 1903 the university was reconstituted as the **Victoria University of Manchester**. Owens College was legally merged with the university a year later.

The **Engineering Department** began to grow in prominence and by the interwar period it was a rival to **Chemistry** in its perceived contribution to the local economy. The **Physics Department** was

also attracting eminent researchers and a strong scientific community had been established in the group of buildings concentrated between Coupland Street and Burlington Street. Indeed, *'almost all the Manchester researchers who have become accepted as globally important contributors to science worked (albeit in different periods) in extremely close geographical proximity, on one side or the other of Coupland Street'*¹

Further donations and bequests allowed continued investment in new buildings and in 1908 a purpose-built **Dental School** (closely associated with the university but still officially independent) was constructed at the corner of Oxford Road and Coupland Street, designed by Charles Heathcote (Grade II). Some years later, the **Computer Laboratory** (as it was later named) was added on Coupland Street (1951) for the Ferranti Mark 1 computer. Housing both engineers and mathematicians, it was here that Alan Turing worked on morphogenesis modelling in the years immediately before his death.

In general, however, the university began to move beyond the site bound by Wright Street (to the west), Coupland Street, Oxford Road, and Burlington Street, expanding to the west, north and south. Maps of 1908 show buildings already running along the southern side of Coupland Street as far west as **Lloyd Street** [Plate 2.1.7]. The campus was also now expanding to the north, maps and photographs showing not only the Museum extension but also several other large buildings running between Coupland Street and

Bridgeford (Bridge) Street, where the new Engineering Building had been added in 1909 [Plates 2.1.8-2.1.9]. This trend continued, new **arts and humanities buildings** being added to the south of Burlington Street in 1918-39 whilst in 1940 the **Dental School** was relocated to Bridgeford (Bridge) Street. In 1945 the **Medical School** also moved out, relocating to buildings on the east side of Oxford Road and by 1950 an offshoot building also existed on the east side of Oxford Road, situated on Dover Street [Plate 2.1.10].

In the 1950s the **Science Quadrangle** began to emerge to the east of Oxford Road with the construction of the **Electrical Engineering Laboratory** (1954), **Simon Engineering Laboratories** (1962) and **Chemistry Building** (1964). The Science Quadrangle was completed in 1967, when the seven-storey **Schuster Building** was built on Brunswick Street (today Brunswick Park) to house what was now known as the **Physics and Astronomy Department** [Plate 2.1.11]. By the 1970s the sciences, and the Medical School, were firmly situated on the east of Oxford Road. Another major reconfiguration of the campus came in 1970-72 with the **Education Precinct Centre** project. Construction of the first phase, extending above Oxford Road from Booth Street West to Booth Steet East, involved heavy clearance but plans for the intended mile-long zoned precinct of academic and residential complexes were subsequently abandoned.

¹ Sumner (2013), p. 708.

Expansion continued in subsequent years, resulting in buildings such as the **Stopford Building** (the new medical school, 1974) and the **Information Technology Laboratories** (1988), and extending the university to both the southeast and the southwest [Plate 2.1.12]. By this time many of the historic buildings in the original core had entered new uses, whether by different department or under administrative teams.

In addition, buildings in other parts of Manchester have also been brought into the university estate, the **Whitworth Art Gallery** being acquired in 1958 and the **John Rylands Library** in 1972.



2.1.7 Victoria University and surroundings, 1908 OS (Promap)



2.1.8 Victoria University and surroundings, Kelly's Directory, 1920 (University of Manchester)



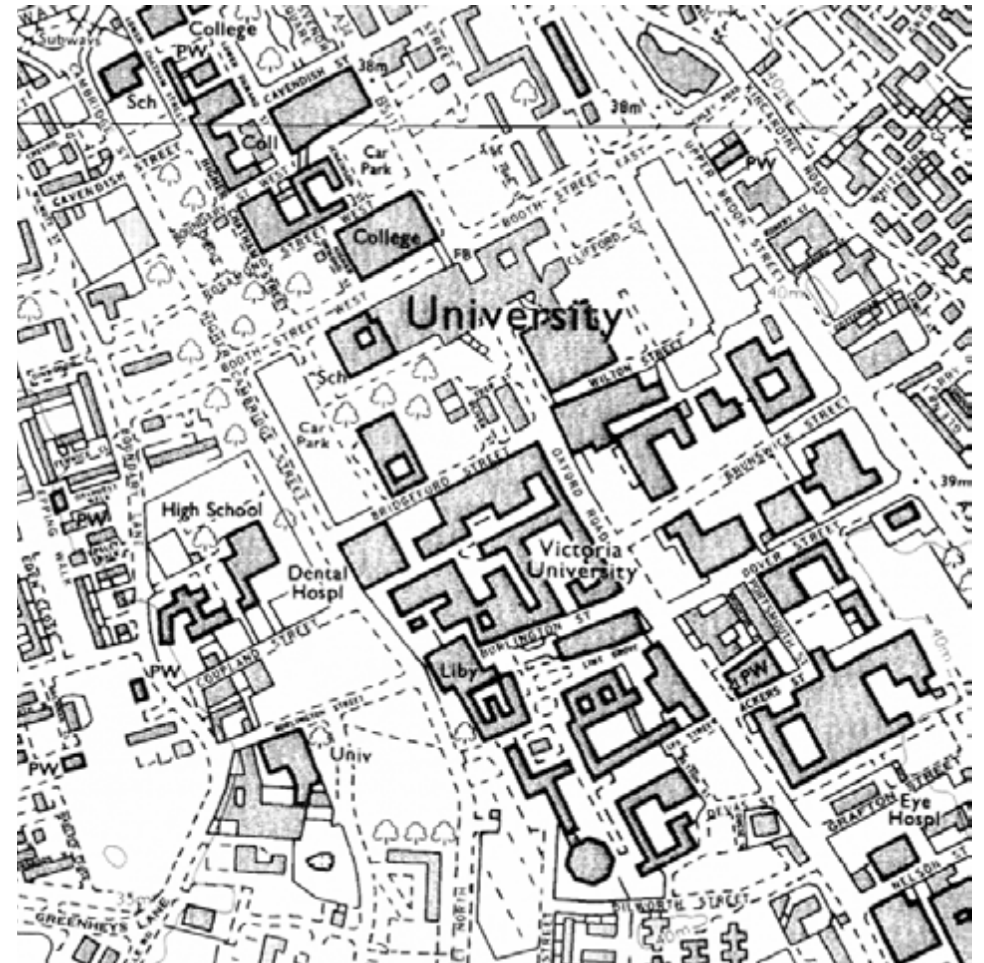
2.1.9 Victoria University and surroundings, c.1925 (University of Manchester)



2.1.10 Victoria University and surroundings, 1950-51 OS (Promap)



2.1.11 Victoria University, 1972 OS (Promap)



2.1.12 Victoria University, 1994 OS (Promap)

2.1.5 The 21st Century

The **Victoria University of Manchester** merged with the **University of Manchester Institute of Science and Technology** (UMIST) in 2004 to create the UK's largest single-site university. Today, the **University of Manchester** has the biggest university estate in England, comprised of some 229 buildings (30 of these statutorily listed), across a site of 270 hectares.² New buildings have included the £50m **Manchester Business School** (replacing the Precinct Centre) and the **Manchester Engineering Campus Development** (one of the single largest construction projects at any British institute of higher education).

In and around the Old Quadrangle, only the Museum, Whitworth Hall and 1940 Dental School have retained their original uses. The Dental School of 1908, fronting onto Oxford Street, was acquired by the Museum in 1977 and is now **Café**, as part of a wider development relocating the Museum's main entrance to Coupland Street (2003) [Plate 2.1.13]. The Chemistry building has been repurposed for Student Services and the Physics and Engineering buildings north of Coupland Street reallocated to Psychology, Music and Drama and the Museum. Little of Victorian Chorlton on Medlock survives, although the townhouses at 176-188 (even) Waterloo Place (Grade II, now offices) act as a reminder of the area's former residential character.

² University of Manchester (2018).



2.1.13 University of Manchester, site of first Oxford Road buildings, c.2022 (Historic England)

2.2 The Physics Department

2.2.1 Early Years

The **Chemistry Department** had quickly established a dominance at Owens College and its Professors, Edward Frankland (in post in 1851–57) and Enfield Roscoe (from 1857), were loud advocates of the need for a Physics faculty. Under their influence, the first Chair in Physics was appointed in 1860 (Robert Bellamy Clifton) and the second in 1865 (William Jack).

Little is known about the provision for Physics at Quay Street, said to have been ‘a few rooms which nobody else wanted in Cobden’s House’. This was not unique to Manchester, even at the end of 1870s so-called Physical Laboratories typically being confined to ‘a few odd rooms, wrung from a reluctant governing body by the importunity of the professor’.³

The Physics syllabus initially covered a broad range of mathematical physics and experimental mechanics but was reformulated in the 1870s under Balfour Stewart (1828–87) and Thomas Core (1836–1910). Greater emphasis was now given to laboratory research, regarded as an important means of providing training in method and encouraging analytical skills and inquisitiveness. The laboratory provision remained, however, poor, particularly in comparison to the Chemistry Department, although a **Dynamo House** was added in 1886, allowing **Electrotechnics** to be taught as a branch of Applied Physics.

2.2.2 Demand for a New Building

As a college, Owens could not offer degrees and Physics students studied simply in preparation either for work or for a degree course elsewhere. This changed when **Victoria University** was founded in 1890, two students graduating with Physics degrees in that year. One of these, Albert Griffiths, completed an MSc in 1893 and a doctorate in 1899, becoming the Head of the Physics Department at Birkbeck in 1900. However, the number of graduating students remained small, typically one or two per year (sometimes reaching three or four), with few postgraduate students.

The call for new laboratories was taken up by **Alfred Schuster** (1851–1934), former student and now **Langworthy Professor of Physics and Director of the Physical Laboratories** (1888–1907). He too believed in the importance of laboratory- and research-based study, with the opportunity for progression to advanced post-graduate research. For Schuster, new laboratories were needed not only to support research but also to equip young men, and, indeed industry itself, with the increasingly important knowledge of electricity and magnetism.

As with other buildings, construction of new **Physical Laboratories** was reliant upon bequests and donations, Schuster carrying out a rigorous fundraising programme (and, indeed, contributing from his own personal funds). He was also believed to have been heavily involved in influencing its design, informed by those that he had observed at universities in Cornell

and in Germany. In addition, Beaumont, the architect, ‘was sent by the council of the Owens College to visit the principal modern laboratories of Germany’.⁴

There were a number of contemporary trends combining to encourage, in Britain and abroad, the emergence of new academic research laboratories. Laboratories for Physics instruction were comparatively new, Schuster having experienced some of the very first physics laboratories in England during his time in Cambridge and Owens College. At this time, student laboratories had been intended mainly for observation, not for active investigation, whilst those institutions with superior laboratories, such as Cambridge, often reserved these for the exclusive use of “pure” research. By the end of the century, however, there was growing movement towards research and laboratory-based investigation in higher education, rejecting earlier purely lecture- and observation-based instruction. Expected standards of attainment were rising and as education became more widely accessible there was a growing desire to accommodate greater numbers of advanced-level students.

The subject matter of Physics was also entering a new age, X-rays, radioactivity, the electron and radium all being discovered between 1895 and 1898 and an “old physics” based on the qualitative discovery of new physical phenomena on the cusp of being displaced. New allied subjects, including electrical engineering, radioactivity and electrochemistry, were also emerging. This, it was argued, demanded professional, well-equipped, and plentiful laboratory accommodation.

3 Thomson (1926), p. 772.

4 Anon. (1899).

2.2.3 The Early-20th Century (1900-1945)

Having relocated to its new building in 1900 (see below, Section 2.3), the Physics Department continued to build on its earlier reputation. It also entered into the “new physics”, Schuster purchasing his first supply of **radium bromide** in 1903 and new Research Fellow Walter Makower also conducting research on radioactivity by 1905. By 1907 there were five researchers, including Schuster, involved in practical investigations with radioactivity using radium. Spectroscopic work had also started, perhaps carried out in the first floor **Optics Room** or second floor **Grating Room**.⁵

In 1907, when Schuster retired, there were some 150 students studying elementary courses in Physics and Electrical Engineering and around 100 carrying out advanced studies.⁶ The laboratories were still seen as some of the best in England, although perhaps now second to those at the Cavendish Laboratory in Cambridge.

The “second scientific revolution” was now underway and many students and researchers were attracted to Manchester by the prospect of working with the Nobel Prize winner **Ernest Rutherford, Langworthy Professor of Physics**. In 1911 Rutherford and his team of staff and advanced students (for which see below, Appendix III) developed *‘the nuclear model of the atom to account for alpha-particle scattering results achieved by Hans Geiger (who prototyped his eponymous radiation*

counter here), and Ernest Marsden’.⁷ This discovery, *‘the Bohr-Rutherford quantum atom and the firm establishment by Moseley of the concept of atomic number 1913, to name only the most outstanding’*, were of such importance that the Physical Laboratories have for a long time been regarded as “the birthplace of modern physics” [Plate 2.2.1].⁸

The teaching activities of the department were disrupted during the First World War (1914-19) and much of its research was paused. Rutherford became a consultant for the Admiralty Board of Invention and Research, investigating underwater acoustics as part of its work on anti-submarine warfare. He was, however, able to continue his own research and in 1917, whilst the war was still underway, *‘Rutherford demonstrated the **artificial disintegration of nitrogen**, the most prominent of the several discoveries known journalistically as “splitting the atom”*.⁹

An increase in the number of graduates occurred in the mid-1920s, reflecting not only growing intake but also the new value that was attached to degrees [Plate 2.2.2]. Further growth occurred in the immediate post-war years and by 1951 the Physics Department had 74 graduates, many students attracted by the opportunity for collaboration with the adjacent Electrical Engineering Department, led by F. C. Williams [Plates 2.2.3-2.2.4].

The department retained its international reputation for research and continued to attract staff and students of high calibre, Nobel Prizes being granted to **Lawrence Bragg** (1915, prior to his joining the department), **Niels Bohr** (1922, after his departure), **C. T. R. Wilson** (1927, a former undergraduate student), **James Chadwick** (1935, whilst working in Cambridge) and **Patrick Maynard Stuart Blackett** (1948, whilst Professor of Physics).¹⁰

10 University of Manchester (2018).

5 Todd (2008), p. 29.

6 Anon., (1934) p. 595.

7 Sumner (2013), p. 708.

8 Todd (2008), p. 12.

9 Sumner (2008), p. 708.



2.2.1 Rutherford and Physics staff and senior research students outside the main entrance, 1913 (Todd)



2.2.3 Graduating class of 1950 (Robin Marshall)



2.2.2 Graduating class of 1927, with lecturers W. L. Bragg and R. W. James (Alison Goddard)



2.2.4 Graduating class of 1953, with staff (Robin Marshall)

2.2.5 The Post-War Period to the Present Day (1945-2022)

Experimental Physics had divided from Theoretical Physics in 1938 to form a separate department and in 1952 Astronomy was similarly cleaved away. **Strange particles** were discovered in 1947 (in the former **Electrochemical Laboratory**) under the leadership of Patrick Blackett (1937-52), whilst Samuel Devons (Langworthy Chair in 1955-60) presided over a new interest in **nuclear physics**. The **Rutherford Jubilee** was held in 1951, celebrating the discovery of 1911, and brought figures such as Marsden, Chadwick and Bohr back to the building as visitors.

The **Electrical Engineering Department (formerly Electrotechnics)** which started as a section of the Physics Department, seemingly becoming independent in 1912, when it was given its own space in the new **John Hopkinson** annexe of 1912 and a dedicated Chair was founded. It was here that the engineer **Sir F. C. Williams** (1911-77) established the **Computing Group** on his appointment in 1946 and, with **Tom Kilburn** (1921-2001), developed the “Baby”, *‘the world’s first stored-program computer, a true universal computer, where changing a program would take minutes rather than days’* (1948), the Manchester Mark 1 and, in collaboration with the Ferranti engineering company, *‘the first commercial computer in the world’*.¹¹ **Dr Alan Turing** (1912-54) joined in 1948, researching the potential applications of computer technology and developing the “Turing test” definition of artificial intelligence. Until 1951, this

11 Sumner (2008), p. 708.

work was carried out in what had been built as the extension’s **Magnetic Testing Room**, renamed the **Computing Laboratory**.¹²

A building was then constructed on Coupland Street to house the Ferranti computer (1951), itself then superseded by a space in the new Electrical Engineering building (1954-55). The Computing Group became Britain’s first *Department of Computer Science* in 1964 and played a *‘prime role in the national computing infrastructure of the 1970s’*.¹³

The Physics Department has continued to attract eminent researchers and to carry out research of international importance. Nobel Prize winners associated with the department have included **John Cockcroft (1951)**, **Hans Albrecht Bethe (1967)**, **Nevill Francis Mott (1977)**, **Sir Kostya Novoselov (2010)** and **Sir Andre Geim (2010)**.¹⁴

12 University of Manchester School of Computer Science (2007).

13 Sumner (2008), p. 710.

14 University of Manchester (2018).

2.3 The Physical Laboratories (now the Rutherford Building)

2.3.1 Predecessor Building

The first space provided at **Oxford Road** was a ‘three-room laboratory’ in a basement, at a time when student numbers hovered around 10 or fewer.¹⁵ Additional rooms were added in an ad hoc manner as space allowed, with the result that by 1898 it ‘occupied almost the whole of the base of the west side of the quadrangle’ [Plate 2.3.1]. A **lecture room** with an associated **apparatus room** was situated on the first floor, while the **dynamometers** were located in a separate building inside the ‘courtyard’ (presumably the west quadrangle).¹⁶ The use of these buildings after 1900 is unknown.



2.3.1 Site of the predecessor building (red) and its future replacement (blue), 1893 OS, revised 1888-1889 (Promap)

15 Anon., (1934) p. 595.

16 Hartog (1900).

2.3.2 The new 'Physical Laboratories' (1900)

Design influences

A key influence shaping the design of the new building was 'Schuster's conception of laboratory work — that it should be interdisciplinary and cooperative', with space both for dually practical and theoretical teaching and for pure research.¹⁷

As Schuster also insisted the importance of shared knowledge, there was a conscious rejection of the tendency, allegedly commonplace in European universities, to spatially segregate the senior and elementary students and a similar renunciation of the new fashion for individual research rooms (regarded by Schuster as a barrier to the Professor's rounds). Indeed, according to a later publication, Schuster *'carefully thought out every detail likely to increase the comfort and efficiency of the Laboratories'*.¹⁸

At Schuster's behest, the building also made provision for both the **Electrotechnical** and the **Electrochemistry Laboratories**, Schuster envisioning *'an integrated culture spanning industrial testing, teaching and research'*.¹⁹ Initial plans to contain the Electrotechnical Laboratories in a large interconnected annexe, dedicated to the late **Dr John Hopkinson**, were, however, abandoned during construction and instead these rooms were incorporated within the main building, ostensibly as a temporary measure. The initial plans for an **Observatory** were also abandoned due to the cost

of equipment, although it was noted that the space remained available (and an octagonal dome can be seen on a photograph from 1912 – see plate 2.3.24 – suggesting it may have been added later).

The estate, or circle, of **John Hopkinson** is likely to have been a major source of funds, a memorial plaque being visible in photographs of the corridor between the Dynamo House and the Electrochemical Laboratory [Plate 2.3.2]. Also in this corridor, a separate plaque of unrecorded date states: 'THE JOHN HOPKINSON ELECTROTECHNICAL LABORATORY. This portion of the building was erected and equipped in the year 1899 in memory of Dr JOHN HOPKINSON F.R.S. by his parents relatives and friends'. Oddly, however, the several accounts and histories published by Schuster, the university and others, effusive on Schuster's role, make no reference to the donors.



2.3.2 Memorial plaque to John Hopkinson (Dynamo House), 1903 (University of Manchester)

Construction

A plot of 105 x 72 feet, containing room for future expansion, was purchased to the north of Coupland Street, bound by housing on Huntingdon Street to the north, Eagle Street to the west and Oxford Street to the west. A complex of buildings, seemingly industrial, already existed on the site but appears to have been vacant.

James William Beaumont (1848-1931) FRIBA was commissioned as the architect. The foundation stone was laid in October 1898, on the 25th anniversary of the opening Oxford Road site, by the donor **Henry Gustav Simon (1835-99)**, an engineer and proponent of both technical education and scientific knowledge.

Opened on 24 June 1900 by **Lord Rayleigh**, the building was 100 feet long and 60 feet wide, having three principal floors plus a basement. It was claimed (by Schuster) to be the **fourth largest university laboratory building in the world** and, in terms of working space, by Schuster, surpassed only by Baltimore and Darmstadt.

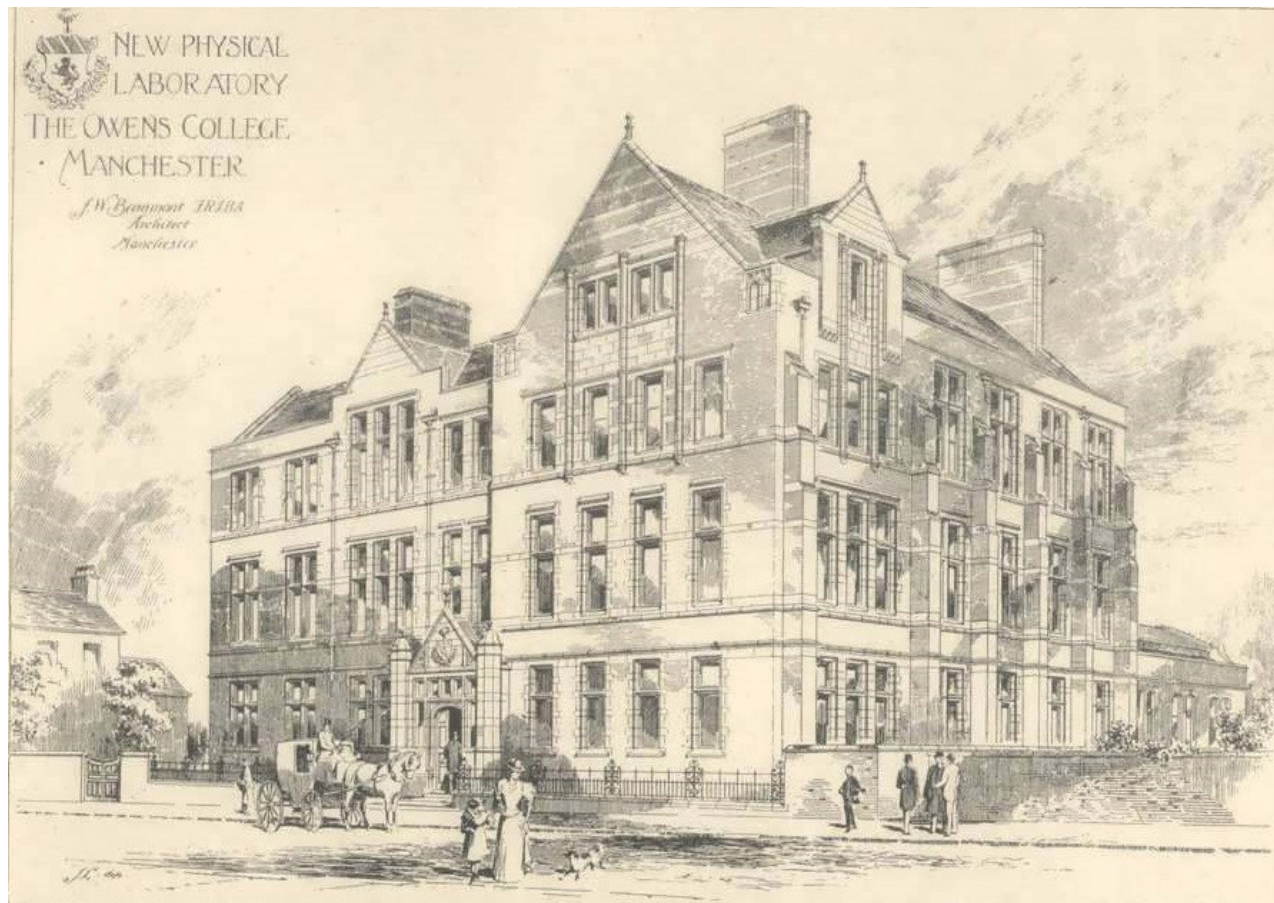
Plans show it as roughly square, with a small courtyard in the northwest of the building, leading to a loading door. A lightwell at basement level ran along the south elevation and the adjacent parts of the east and west walls, whilst a tunnel provided access to neighbouring buildings. The main entrance was on the south elevation at ground floor level, where a spine corridor ran north, through the main stairwell to terminate at the side of the Dynamo House. A second, shorter, corridor ran to the west and provided access to stairs to the basement and the lift. Externally, the

17 Peters (2020)

18 Schuster (1912).

19 Sumner (2013) p. 707.

red brick façade may have been a conscious decision, part of Schuster's invocation of the fertile relationship between industry and science (from which the building had evidently benefitted) and his vocal renunciation of alleged ivory tower elitism in those academic laboratories that shunned anything but pure research, carried out by elite staff alone [Plate 2.3.3].



2.3.3 The Builders' Journal, 1900 (Ebay)

Fit out

Schuster was also closely involved in the fit out of the building and responsible for all of its equipment and apparatus.

Initial reports stated that **air filtration equipment** had been provided, an electric **lift** had been fitted (running the full height of the building) and **electric lighting** was to be provided throughout. There was to be a carefully planned system of ventilation, combined with efforts to exclude dust, as far as possible, from all rooms, and especially from the instrument cases'. On the ground floor, the Electrotechnics room were to be provided with access to 'large currents... available for electric furnaces'.²⁰

It was expected that around £10,000 would be spent on equipment, bringing the total cost to **£30,000**. There was extensive use of glazed brickwork to the interior, the first available photographs showing dark glazing to the bottom and lighter bricks above (see above, Plate 2.3.1). Workbenches and other furniture were also installed as part of the construction.

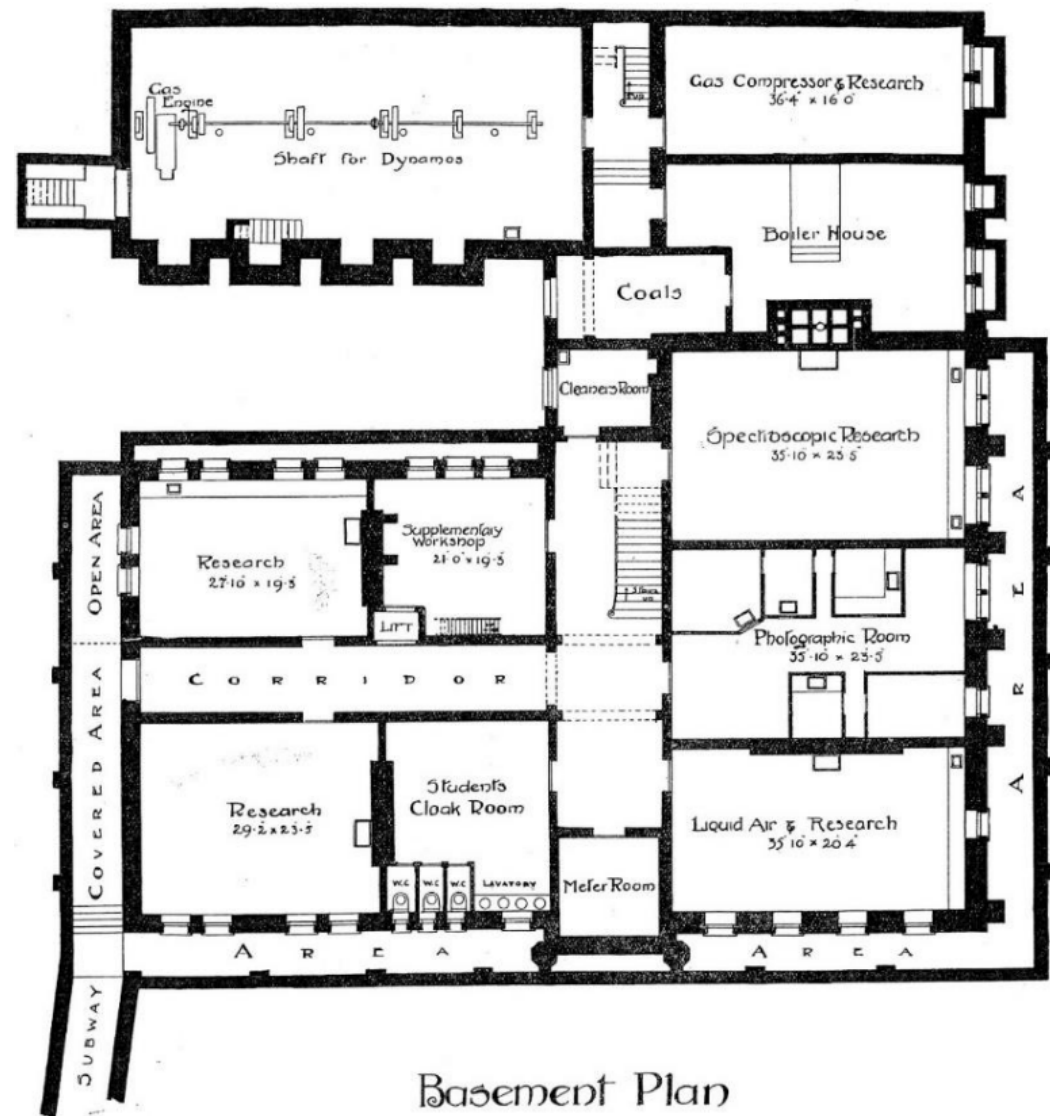
20 Anon. (1899); Schuster (1900).

Basement [Plate 2.3.4]²¹

Although necessarily containing a small amount of service space – the coal-fired boiler house (with coal store adjacent), the meter room, the cleaner's closet and student WCs – the basement was in the main given over to research, as the main research space for non-Electrotechnics.

This floor contained the lower level of the **Dynamo House** in the northwest, with a **Photographic Room** (divided into several darkrooms), a workshop and various Research spaces, some expressly dedicated to **Spectroscopic Research, Liquid Air & Research** (experiments with Liquid Air) and **Gas Compressor & Research**. Although not expressly named in the plans, there was also a room for research requiring constant temperatures, another (perhaps the workshop to be used for standardising equipment and a photometry space.

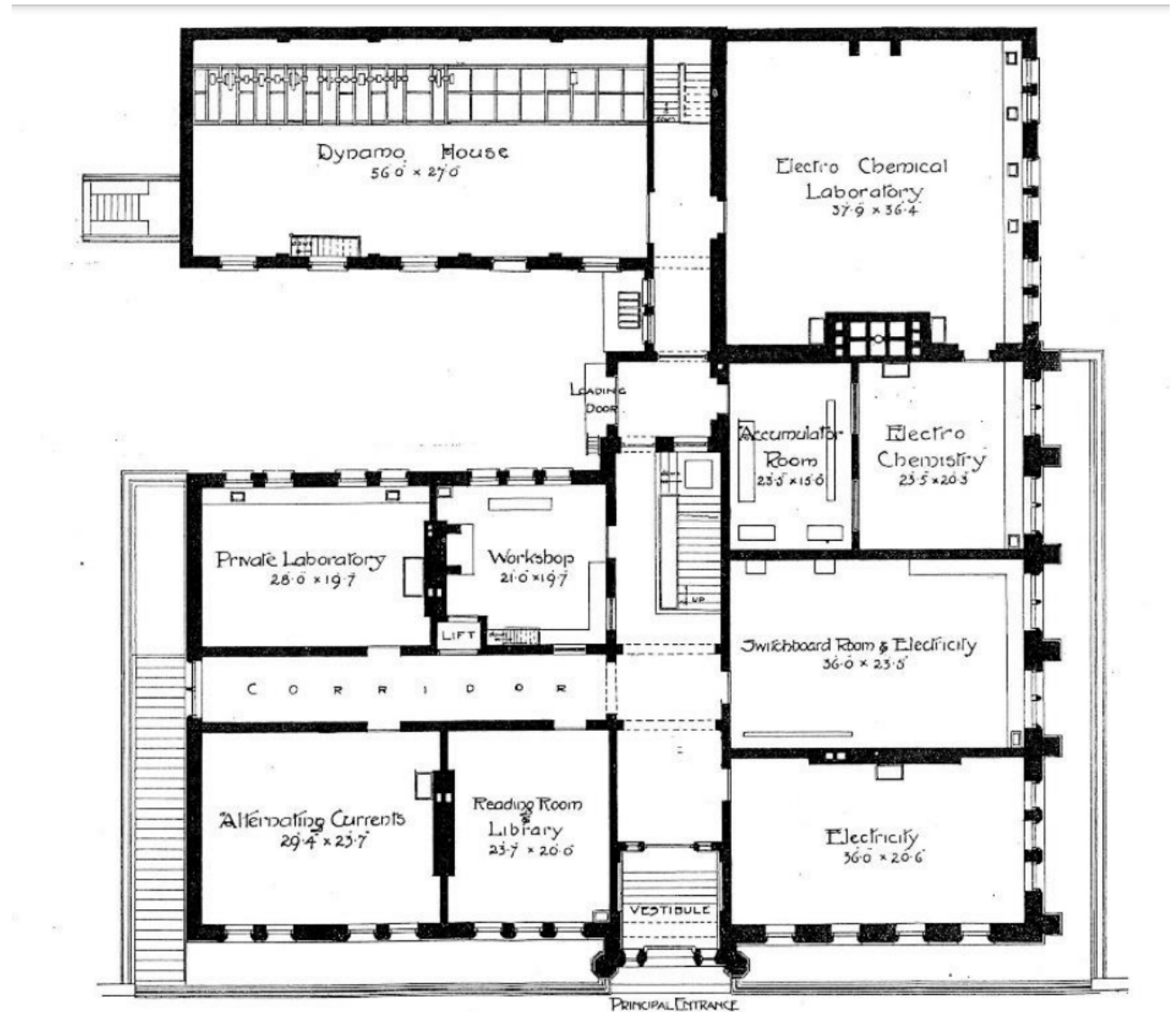
21 Descriptions of the floors use information from Hartog (1900).



2.3.4 Basement, undated plan, c.1900

Ground floor [Plate 2.3.5]

Plans indicate that with the exception of the entrance vestibule and the Reading Room & Library the ground floor was given over to teaching and research connected to electricity, in a mixture of **Electrochemistry** and **Electrotechnical Physics** (or Electrical Engineering), both under **Dr Beattie**. The north end of the floor was occupied by the sunken **Dynamo House** and adjacent **Electrochemical Laboratory** (for the study of the magnetic properties of iron), these rooms (both lit by large roof lanterns) and the intervening corridor (containing stairs to the basement) and lobby (with its loading door) being single-storey. The Dynamo House, named after John Hopkinson, was used for students' investigations into electricity and currents and, consequently, would sometimes also be referred to as the **John Hopkinson Laboratory** [Plate 2.3.6]. A **Switchboard Room** was included to provide the large quantities of electricity running through the building, whilst the **Private Laboratory** was presumably for Beattie's use [Plate 2.3.7].



2.3.5 Ground floor plan, undated, c.1900



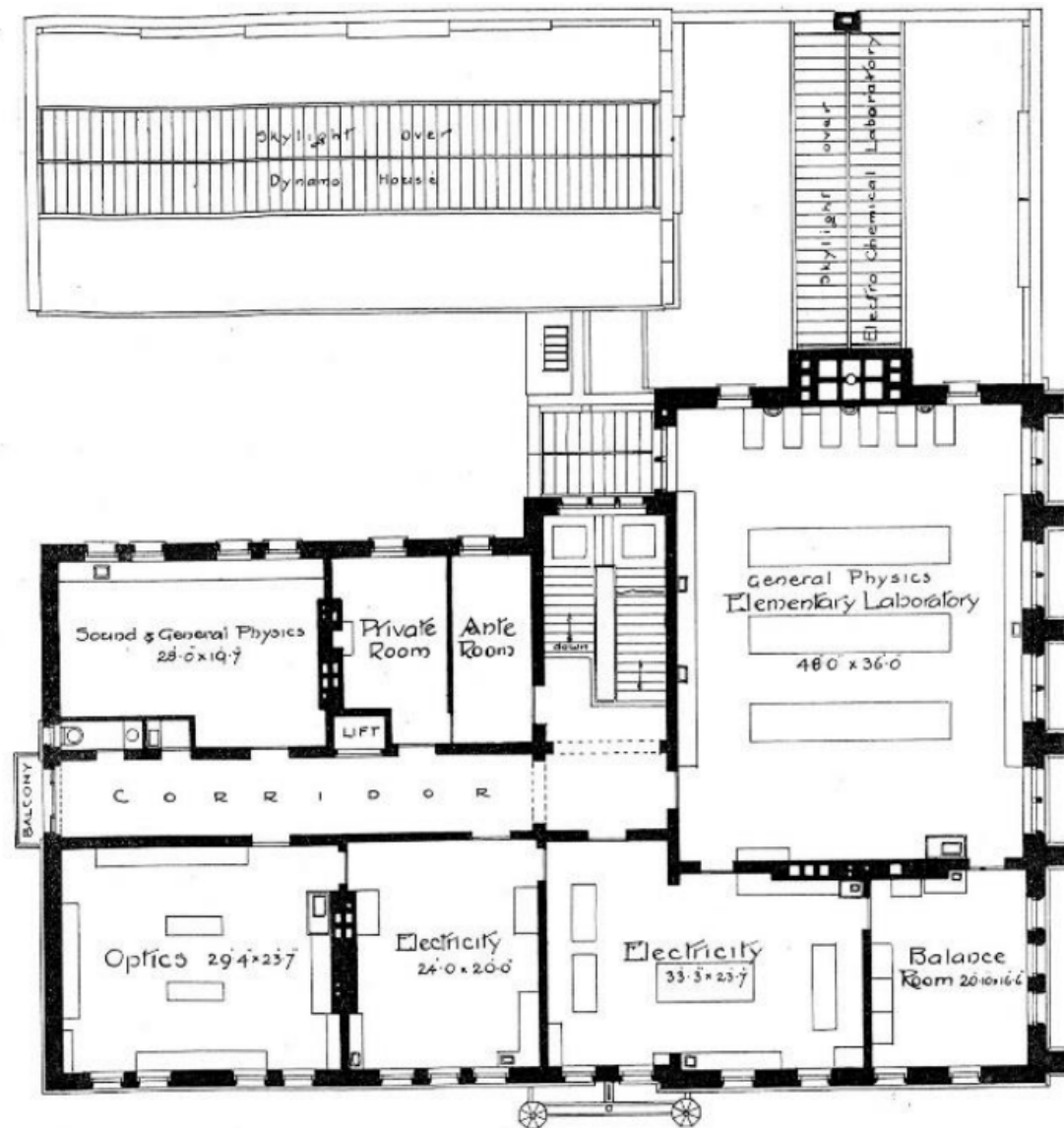
2.3.6 *Dynamo House (ground floor), 1906*



2.3.7 *Switchboard (ground floor), 1906*

First floor [Plate 2.3.8]

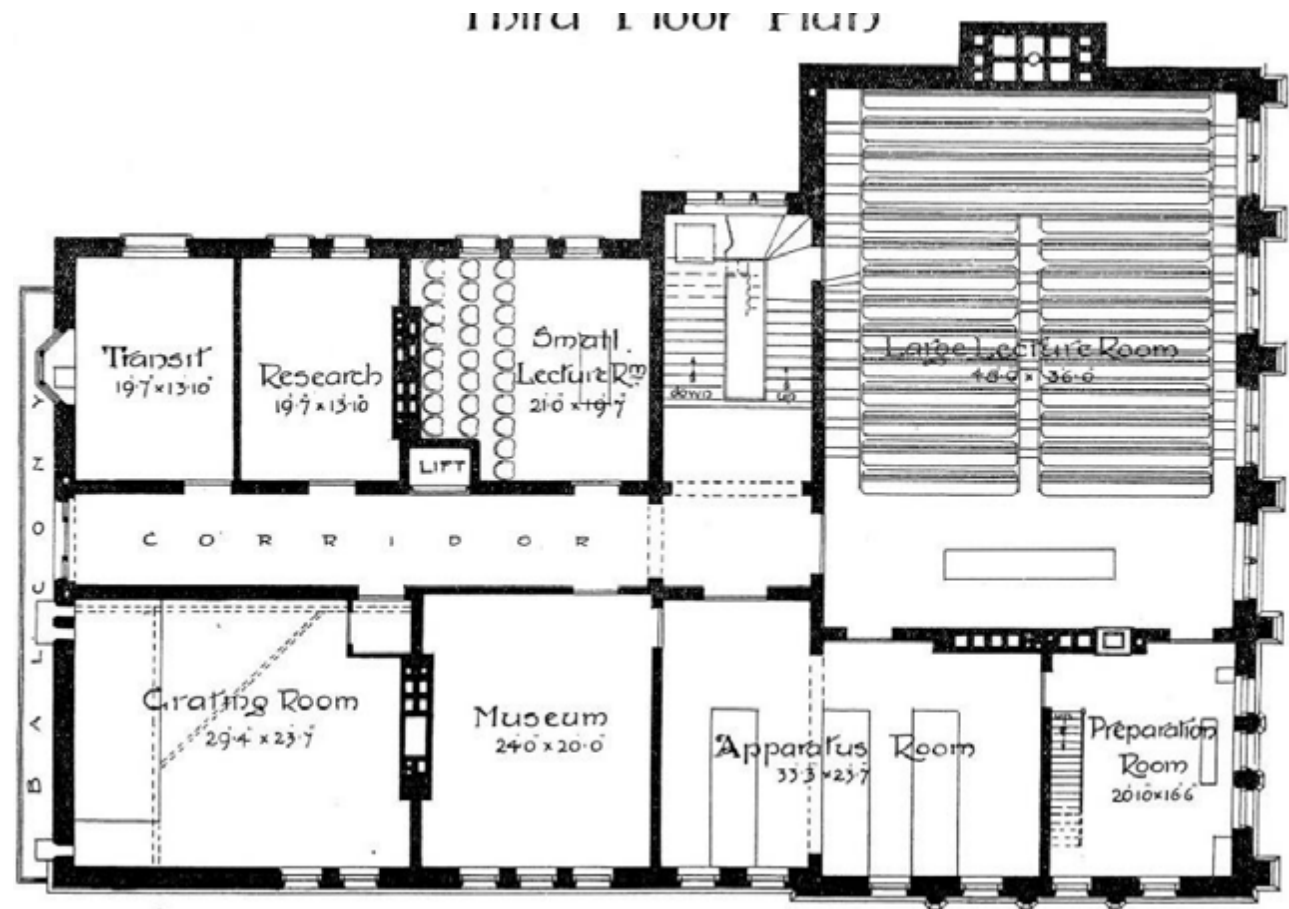
The same basic layout was replicated on the floors above. On the first floor were rooms for other facets of Physics, a staff WC, a **Private Room with Ante Room** for the **Langworthy Professor (at the time Schuster)** and a large Elementary Laboratory for the teaching of 'General Physics'. There were also two more rooms dedicated, as on the ground floor, to electrical experiments. Much of this floor seems to have been intended for undergraduate tuition in practical physics (light and sound), with teaching laboratories for electricity, optics and acoustics and a **Balance Room** (containing the analytical balances, or scales) adjoining the large laboratory. Externally, a short balcony was situated on the west elevation at the end of the second corridor (probably intended for adjusting telescopes or practising with the sextant).



2.3.8 First floor plan, undated, c.1900

Second floor [Plate 2.3.9]

The second floor followed a similar plan but was more varied in its use, having a 'lofty' **Large Lecture Room** seating 200 in its northeast and a **Small Lecture Room** (for advanced students, seating 25) on the opposite side of the stairwell. The **Apparatus Room and Preparation Room** connected with the Large Lecture Room and were for use of technicians, the latter room being 'for the preparation of lecture experiments' and also containing the stairs to the **Observatory** (whether actual or intended at this date). This floor also contained a **Museum** for historic apparatus and, intended for advanced students, a **Transit** room (housing a transit instrument, for astronomic transit research) and a small research laboratory. The western section of the Apparatus Room may also have originally been intended as a senior research room. The **Grating Room**, a dark space, was for use for with the Rowland's Grating (for spectroscopic research) and for experiments on physical optics, small openings in the wall allowing beams of sunlight to enter via helioscopes situated on the projecting stone ledge of the long balcony that ran the full length of the west elevation.

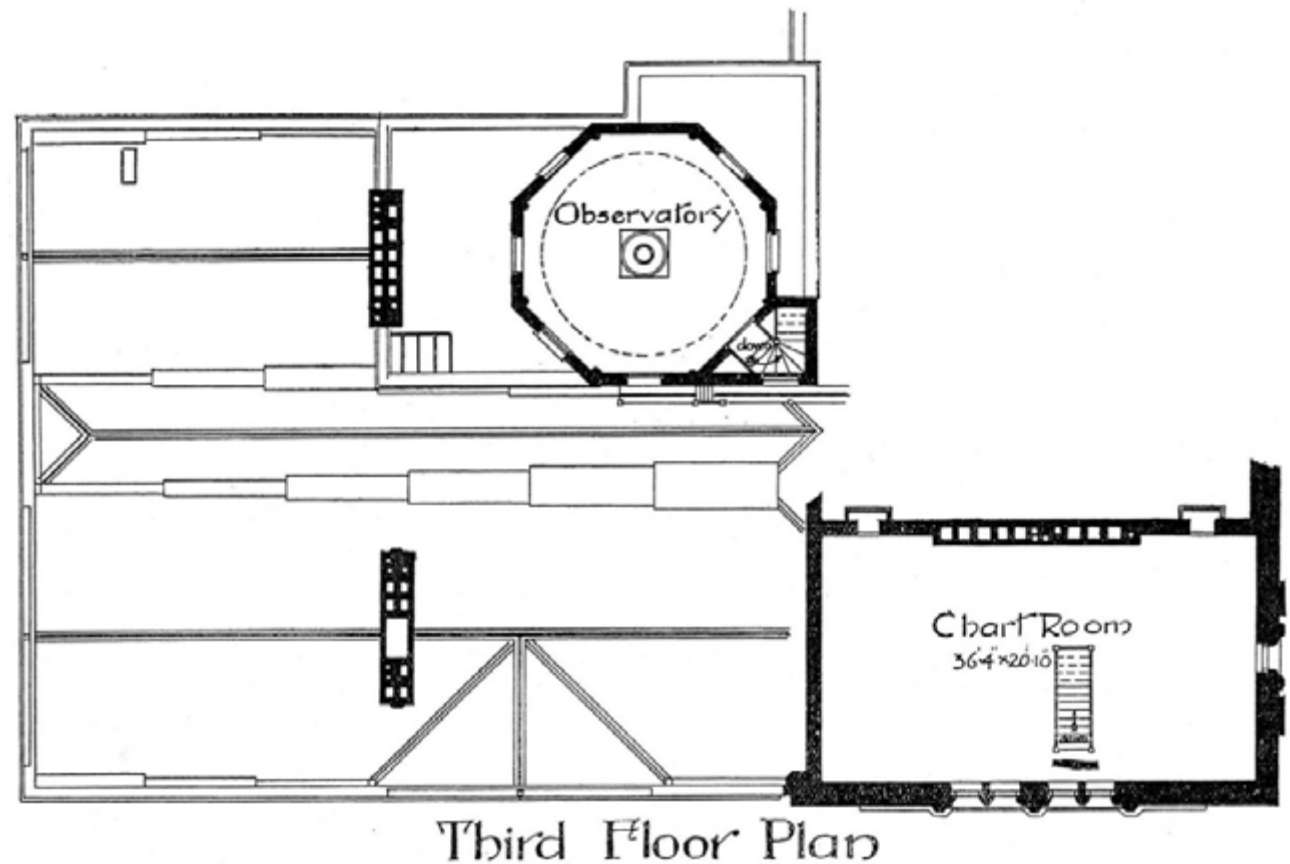


2.3.9 Second floor plan, undated, c.1900

Third floor [Plate 2.3.10]

Situated above the second floor Small Lecture Room and the adjacent stairwell was the (intended) octagonal **Observatory**, accessed from below by stairs in its southwest corner. The **Chart Room** was situated in the southwest of the building, above the Preparation Room and part of the adjacent Apparatus Room, accessed via a central flight of stairs and with two doorways that looked out across the Large Lecture Room.²²

22 See also the description in Anon. (1899).

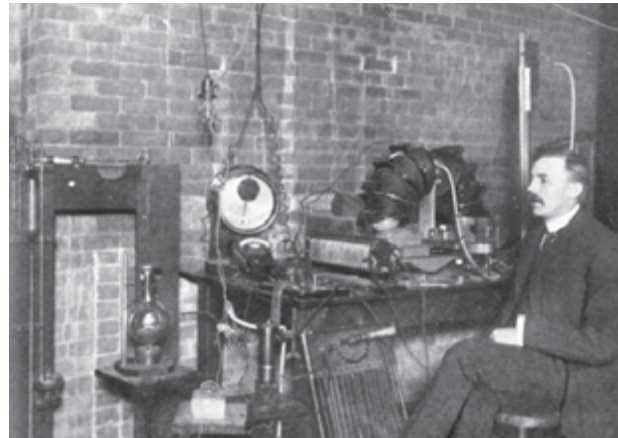


2.3.10 Third floor plan, undated, c.1900

2.3.2 Use of the 'Physical Laboratories' under Schuster, 1900-1906

The building was opened to great fanfare by **Lord Rayleigh** on 24 June 1900, with an associated publication recounting the history of the Physics Department and the origins of the new 'Physical Laboratories' [Plate 2.3.11]. Now completely fitted out, it was claimed to be '*the most up-to-date in the country*'.²³ Contemporary photographs confirm what to modern eyes would appear the comparatively basic nature of many university Physics laboratories both at this time and in immediately subsequent years [Plates 2.3.12-2.3.15].

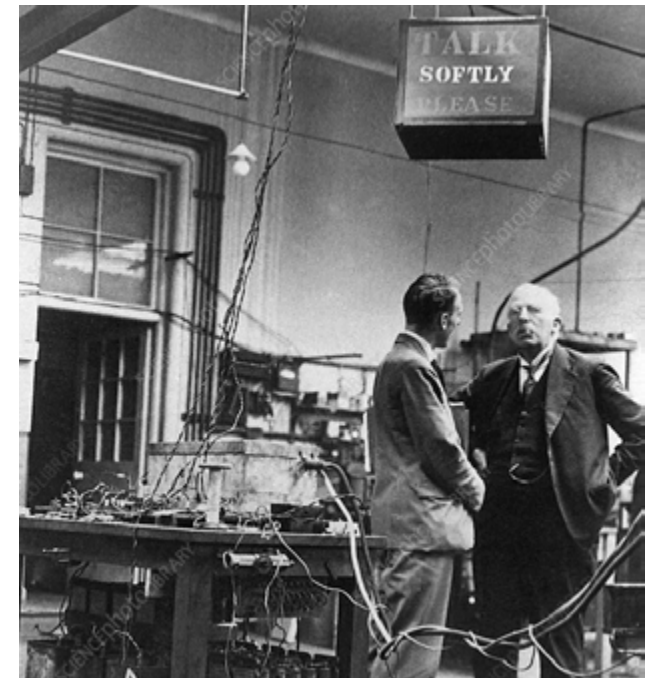
23 See Peters (2020).



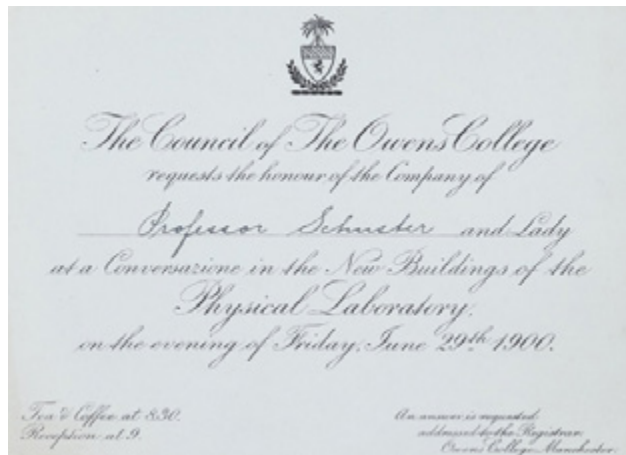
2.3.12 Ernest Rutherford in the basement of the Macdonald Laboratory, McGill University, 1905 (National Library of Medicine)



2.3.14 Ernest Rutherford's Research room on the ground floor of the Cavendish Laboratory, University of Cambridge (Science & Society)



2.3.15 Ernest Rutherford in the Cavendish Laboratory, University of Cambridge, undated (Science Photo Library)



2.3.11 Arthur Schuster's invitation to the opening of the new Physical Laboratory on 28 June, 1900 (University of Manchester)



2.3.13 UMIST Advanced Physical Laboratory, c.1902-1910 (University of Manchester)

A small number of photographs show the new building in the first years of its use. Visible in many of the rooms are the glazed bricks, insisted on by Schuster as being easy to clean.²⁴ At first floor, the **Elementary Laboratory** for undergraduate students has glazed brickwork in two colours to the walls, a floor of indeterminate type and various large workbenches with stools (as recorded in the first floor plan). A single wooden-framed window is visible in the northwest corner, adjacent to the doors that led onto the stairwell [Plate 2.3.16].

24 Sumner (2013), p. 709.



2.3.16 Elementary Laboratory (first floor), 1906

On the floor above, the advanced **Lecture Room** is shown with the demonstration bench at the front and student bench seating to the rear, the walls lined with panelling to the base and glazed brick above. In the front of the room a sliding door opens into the apparatus cell enclosed within the wall, adjacent to the door leading into the Preparation Room used by the technicians who supported the demonstrations. Above, at third floor or mezzanine level, were doors (with balustrades) opening off the Chart Room, perhaps to allow supervision of lectures from a distance. Between these, a wooden frame attached to the brickwork provides a means of displaying instructional sheets [Plate 2.3.17]. As in the lecture room below, all joinery is darkly coloured.



2.3.17 Large Lecture Room (second floor), 1906

Externally, there are no photographs of the main entrance but the courtyard (with loading door) at the immediate south of the Dynamo House is included in a photograph of Schuster's "jubilee" celebrations (1906) [Plate 2.3.18]. In later years this location was also often chosen as the typical location for graduation photos. Externally, the map of 1908 shows the footprint as depicted in the plans, complete with the southern lightwell and railings on the steps leading up to the Dynamo House. There is no indication as to the use of the two buildings to the immediate west, which were not included in the plans, although they may have served an ancillary or supporting function (whether for Physics specifically or the various departmental laboratories as a whole). One features in a photograph of 1908, as a flat roofed structure located adjacent to the gates providing access into the site. As the map confirms, houses still lay to the immediate west, east and north of the site [Plates 2.3.19-2.3.20].

The building was named the **Schuster Laboratory** at an unknown date, perhaps soon after construction (or, alternatively, on his retirement).



2.3.18 West courtyard of the Physical Laboratories, Schuster's Jubilee Fest, 1906



2.3.19 Rutherford Building, 1908 OS (Promap)



2.3.20 Physical Laboratories with an addition at the west, 1908 (University of Manchester)

2.3.3 Use of the Physical Laboratory under Rutherford, 1907-1917

Under Rutherford the Physic Department's research and teaching became much more heavily focused upon atomic physics. In recent years, the university has celebrated the investigations carried out by Ernest Rutherford and his team of staff and students in the years from 1907 to 1919. Their experiments into the disintegration of nitrogen have received particular attention, with the Professor's **Private Laboratory** on the ground floor (now known as the "Rutherford Room") often celebrated as the site of the investigations.

Recent work by Neil Todd has sought to identify the activities taking place in different parts of the building at this time. It should be noted that there was a prevalent concern that "emanation" escaping from the stored radium, and from the radium as it was being prepared, would contaminate the rest of the building and the equipment, distorting the results of experiments. By storing the radium on the second floor and carrying out the investigations in the most distant part of the building, the basement, it was hoped to minimise these effects.

It should also be noted that the exact location of the experiments leading to "the splitting of the atom" is unconfirmed, with William Kay (technician to Rutherford) later identifying the basement as their site. Indeed, 'trying to identify "the room where the disintegration experiments happened" may necessarily involve some oversimplification of a spatially distributed operation.'²⁵

25 Sumner (2013), p.714.

Basement

As before, the basement laboratories remained the focal point of the staff research. However, their focus was now nuclear investigation, housing student John Nuttall, whose investigations culminated in the 1912 Geiger-Nuttall law, Ernest Marsden and Oxford graduate Henry Moseley. In addition, Hans Geiger seems to have occupied the **Liquid Air & Research Room** (where in c.1909 an electrical method for counting radioactive decays was invented, paving the way to the Geiger Counter) [Plates 2.3.21a-2.3.21b].²⁶

Rutherford himself used one of the basement rooms abutting the Boiler House for his study of α -rays. This was remembered as being traversed by hot water pipes and is likely to have been the **Spectroscopic Research Room**.²⁷ A large water tank was installed in the basement during the First World War used in his Admiralty experiments in submarine detection.

26 Todd (2008), p. 38.

27 Todd (2008), p. 34.



2.3.21a Hans Geiger and Ernest Rutherford in Geiger's basement laboratory (Liquid Air & Research Room), 1912



2.3.21b Closeup of Ernest Rutherford in Geiger's basement laboratory, 1914 (PA Images)

Ground floor

There are only very occasional references to a research room on the ground floor being used for investigations with radioactivity, and nothing specific to Rutherford. The basement was seemingly the preferred option, being more distant from the second floor “radium room”, where the “emanation rays” were produced. The Electrotechnical Laboratories vacated the ground floor in 1912 (see below, Section 2.3.4) but there is no record of how these rooms, or the adjacent Electrochemical Laboratory, were used subsequently [Plate 2.3.22].



2.3.22 Electrochemical Laboratory (ground floor), 1912

First floor

Rutherford also turned one of the rooms into a **training laboratory**, used for introductory courses in the experimental methods of radioactive research. This seems to have also functioned as the **departmental tearoom** and may have been situated in the first floor Electricity Room above the principal entrance.

Second floor

Although Schuster had also brought radium to the university for research it was now used in vast quantities, Rutherford devising a way of obtaining “emanation” by heating the radium in a quartz tube, aided by a mercury pump.

The **Transit Room** in the northwest corner of the second floor (now 2.057) became the “**radium room**”, possibly retaining this role until 1919 (occupied by Radium Technician or Laboratory Assistant Walter Lantsberry). The use of an upper floor room to store the radium, prepare radioactive sources for use in experiments and isolate the associated apparatus was by this date becoming commonplace in the belief that escaping “emanation” (radiation) could be vented out via the windows, thereby preventing the contamination of the building and its instruments.²⁸ This room, situated on the top floor and having two windows, would have appeared ideal. It thus became ‘*the inner sanctum of the laboratory making possible all of the experiments which Rutherford and his school carried out*’.²⁹ Here, a Toepler pump (probably situated in the bay window) and various secondary apparatus,

including a mercury pump (likely placed in the smaller window) was used to produce and purify the radium “emanation”, in a process involving large quantities of mercury. The glass apparatus used in the process was also stored in this room. The prepared radioactive sources, now releasing “emanation-rays”, were then carried down the stairs and into the laboratories (primarily situated in the basement).

It was also in this room that in 1908 Rutherford and student Thomas Royds built on the work of Soddy and Ramsay to determine the **helium nature of the alpha particle**, demonstrating that alpha-particles are ionised atoms of helium (the apparatus that they use now displayed at the Cavendish Museum, Cambridge). It was also the room in which the glass apparatus was stored.³⁰

High levels of mercury contamination indicate that these activities also extended into the adjacent **Research Room** (2.058), with the opening between the two rooms perhaps made at this time [Plate 2.3.23].

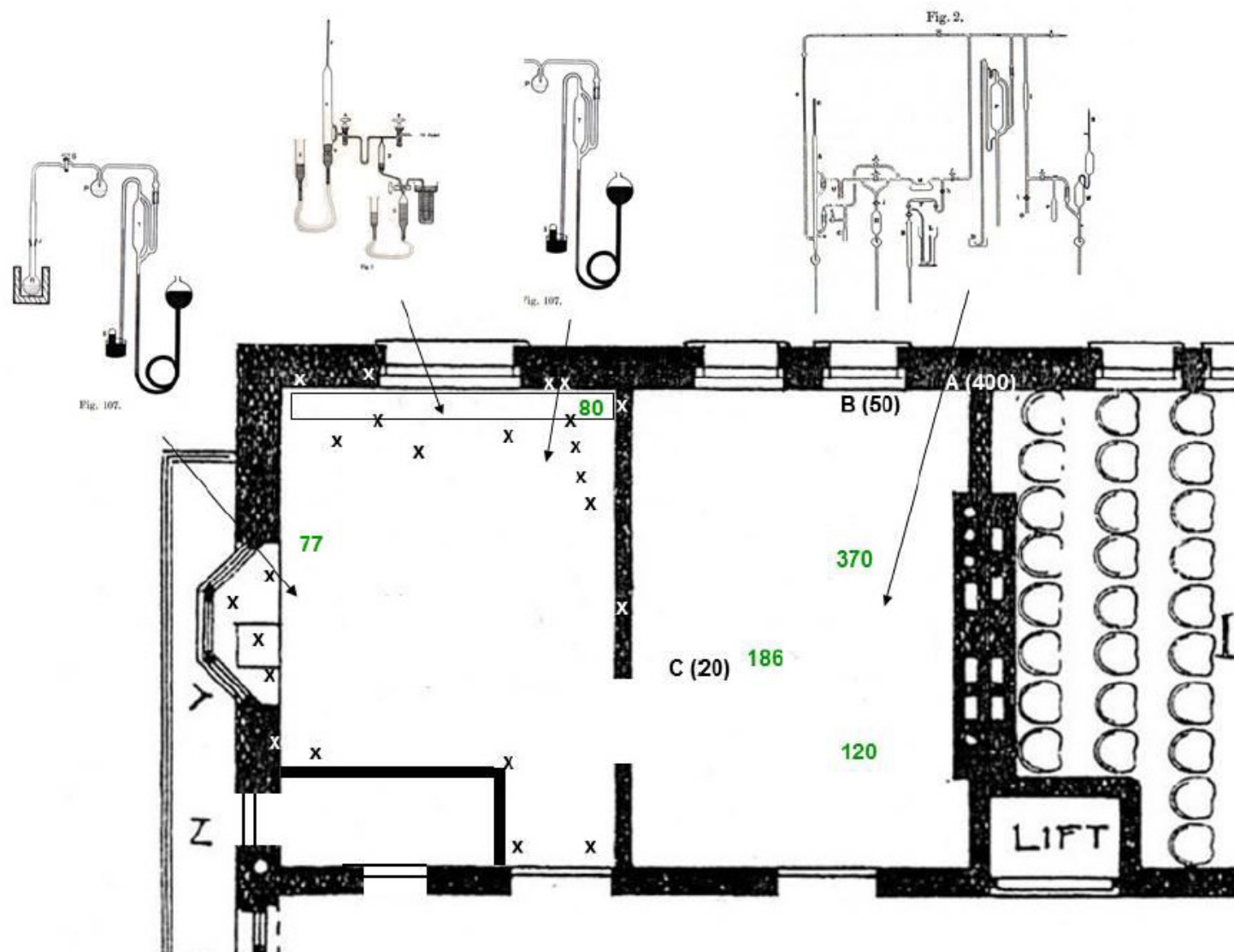
The **Preparation Room** in the southeast corner became the workspace of Laboratory Steward William Kay, who during the First World War used this space to prepare the **radioactive source preparation** for Rutherford’s research.³¹ It is not known whether the “radium room” also remained in use for this purpose.

28 Todd (2021), p. 24.

29 Todd (2021), p. 26.

30 Todd (2021), pp. 44-45.

31 Todd (2021), pp. 25-26.



2.3.23 Second floor Transit Room and Research Room, showing areas of radioactive contamination (X) and mercury contamination (green) and probable sites of apparatus during the Rutherford era (Todd)

Third floor

The phrasing of many retrospective accounts is unclear, with references to Rutherford using an “attic” room as a radium store and laboratory. This may refer to the “radium room” but could also indicate use of the **Chart Room** situated above the Preparation Room.

A pamphlet published in 1912 (on the completion of the extension) found much to praise at the Physical Laboratories. The equipment was ‘unusually complete’ in a number of areas, light research, for example, having an echelon spectroscope, a quartz spectrograph and ‘a large Rowland grating admirably mounted’. There were also ‘several high-potential batteries, numerous electrometers, electroscopes and other instruments of measurement’, which had allowed Manchester to become ‘one of the chief centres of research in Europe on Radioactivity and allied subjects’, conducting large-scale radium experiments using the 450mg of radium bromide provided by the Vienna Academy of Sciences. For experiments requiring high pressure or temperatures, the Dynamo House provided pressures up to 1,000 amps, whilst the Electrochemical Laboratory contained several high-pressure furnaces. Further pressure furnaces, and a high-pressure pump, had been donated by Professor Petavel, whilst basic equipment could be produced (and repaired) in the Steward’s workshop. For more complex equipment, the nearby University Engineering Works was on hand.

2.3.4 The John Hopkinson Annexe, 1912

Context and design

The original plans of 1900 had included an ‘annexe’ in memoriam to **Sir John Hopkinson**, dedicated to what was at that time the **Electrotechnical** section of the Department of Physics. As early as 1908 Rutherford was reporting a shortage of space for research and training and requesting the reallocation of the ground floor. As expressed by Rutherford, the building’s equipment, research provision and reputation as a centre for original research was attracting a growing number of advanced students, creating increasing pressure. Simultaneously, the amount of space available for teaching had fallen, not least because of the creation of a radiation training laboratory for the advanced classes. The problem of contamination was believed to be substantial, some researchers having commandeered the teaching laboratories in an effort to create a greater distance between those using radioactive substances and others taking measurements that the “y waves” were believed to be distorting. Background contamination was believed to be an even greater problem. The existing building, it was believed, was so contaminated by radioactive “emanations” that experimental results were distorted. Any work needing precision could be carried out only in brand new laboratories, free of and (at a distance from) the existing contamination.

Discussions proper began in 1910, when it was decided to erect the annexe on either side of the Dynamo House, and to relocate the Electrotechnical staff from the ground floor of the main building. Again, much of the funds were raised through bequests and donations.

Beaumont was again commissioned as the architect, with input from Rutherford and Beattie. The plot was now extended over Huntingdon Street, reaching as far north as Bridge (Bridgeford) Street. By this time the houses to the west of the building had been replaced by university buildings, built over the former side street. To the east, further houses had been demolished and the large Dental Hospital now ran along the southern side of Bridgeford (Bridge) Street (1908, Grade II).

Construction [Plates 2.3.24-2.3.25]

The structures to the west of the building were demolished in 1912. Construction of the annexe began in spring 1911 and involved the addition of two new connected wings abutting the existing Dynamo House, the **north wing** also being joined to the main building at the end of its spine corridor. The southern elevation of the west wing contained the principal entrance to the annexe and, consequently, was more elaborate, both wings being faced in red Ruabon brick with stone details. This created a self-contained annexe, incorporating the existing Dynamo House, that was renamed in its entirety the **John Hopkinson Building**.

Fit out

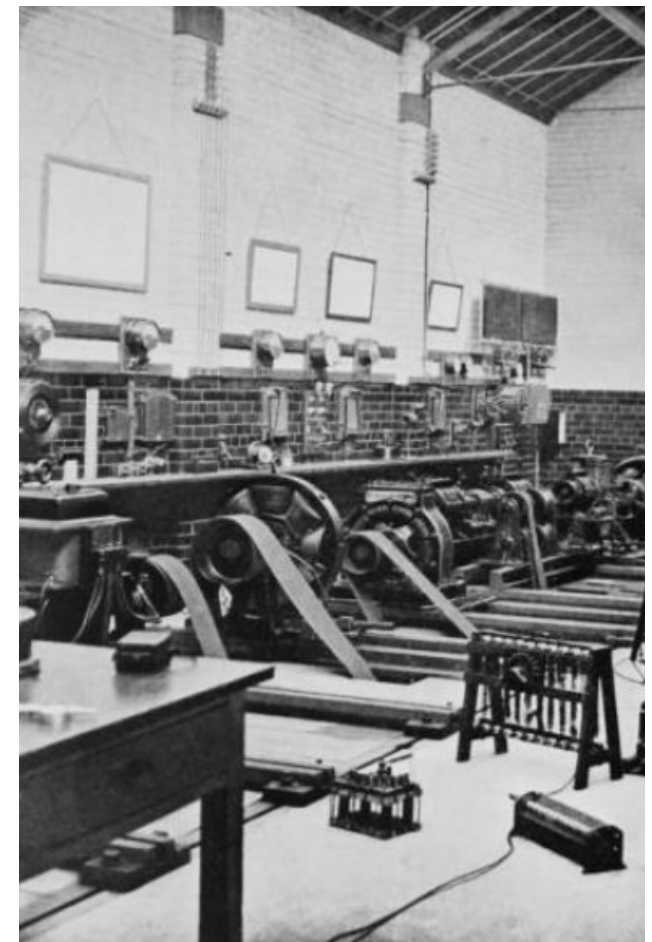
The new annexe was fitted out to the instructions of Dr Beattie, with extensive use of **white glazed brick**, although the Dynamo House appears to have remained unchanged [Plate 2.3.26]. £725 was bequeathed by friends and family of Hopkinson for equipment and Messrs Vaughan and Son donated the **2-ton gantry and lifting gear**.



2.3.24 1912 John Hopkinson annexe north wing, viewed from the north (Bridge Street) 1912



2.3.25 1912 John Hopkinson annexe west wing, viewed from the south (approached from Coupland Street), 1912



2.3.26 Dynamo House, 1912

Use of the annexe: Electrotechnics [Plates 2.3.27-2.3.28]

Much of the annexe was allocated to the **Electrotechnics** team (later increasingly known as Electrical Engineering) under Dr Beattie. At ground floor, the Dynamo House was at the functional and now physical heart of the team. At its immediate north, in the north wing, were the interconnected **Direct Current** and **Alternating Current Rooms**, used for the instruction of elementary students in the testing and working of electrical equipment before they progressed to investigations on the larger machines in the Dynamo House. Brick dividing walls in the Direct Current Room increased the amount of space available for benches and wall-mounted instruments. A **Drawing Room/Library** sat to their west whilst to the north, beyond the central corridor, were the **Standardising Room, Workshop, Switch Room** (controlling the substantial flow of electricity through the building) and **Magnetic Testing Room**, plus the staircase.

In the west wing, the **Battery Room** (a gas turbine engine room) sat adjacent to the Dynamo House, with stairs, WCs and Beattie's own private study and laboratory.

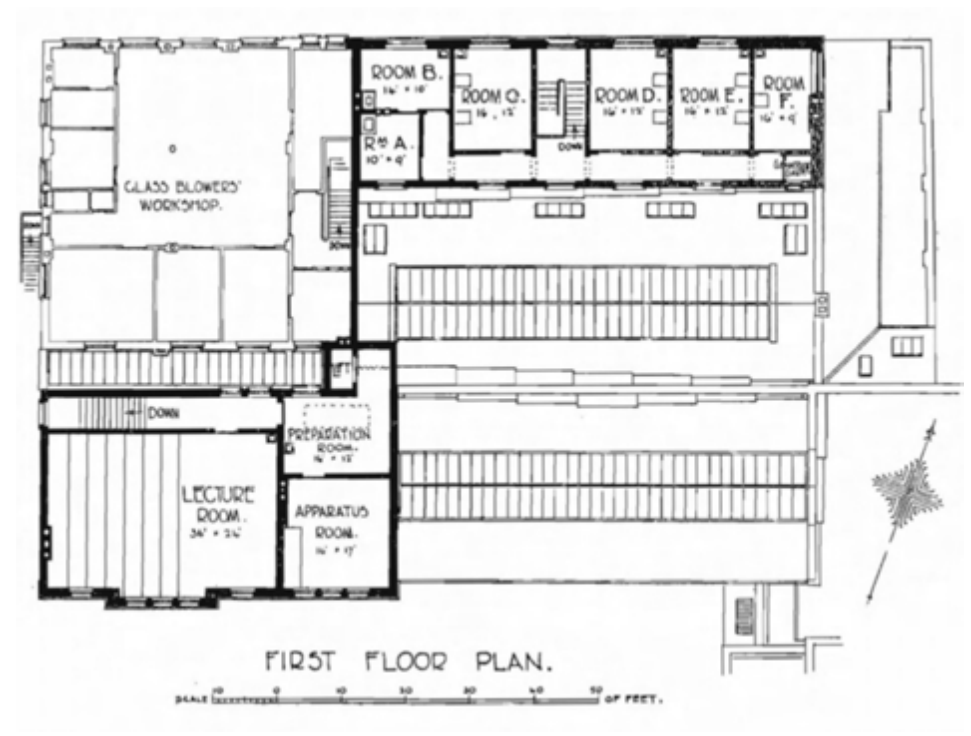
At first floor, a **Lecture Room** for 100 students, served by **Preparation and Apparatus Rooms** (as in the main building) occupied the west wing. Attached to its walls were various large-scale electrical instruments, which could be connected to the apparatus on the demonstrating table, making the results visible to the entire class. There were no rooms at first floor in the south of the north wing, and those in the north were allocated to Physics (see below).

There also appears to have been a basement beneath the north wing, containing a store and a **Photometric Room**.

Over 50 students were typically attending its lectures by 1912 and Electrotechnics (also known as Electrical Engineering) now gained a new academic status, a Chair of Electrotechnics (held by Beattie) and a Demonstrator post being created and its study now elevated to a qualifying subject for accreditation. This in effect established a separate department. Research focused upon alternating current measurements and magnetism.



2.3.27 1912 extension, ground floor, undated, c.1910



2.3.28 1912 extension, first floor, undated, c.1910

Use of the annexe: Physics

The north wing of the annexe was also designed to include provision for other parts of the Physics Department. At ground floor, the spine corridor from the main building continued towards a single-storey offshoot of the north wing where an outdoor **Chemical Laboratory** for chemists working on radioactive substances had been positioned outside in an effort to prevent the radiation from affecting the Physics experiments taking place inside the building. It contained a draught cupboard and is believed to have been the laboratory in which later in the decade *the radio-chemist* **A. S. Russell** carried out the investigations that allowed him to first state the β -ray displacement law. At its side, in the same enclosed yard, was a small shed for open-air electrochemical experiments, plus stores [Plates 2.3.29-2.3.30].

Upstairs, above the north wing proper, six **Physical Research Rooms** were allocated to Physics for experiments with radioactivity and the conduction of electricity through gases, the annexe being believed to be beyond '*the range of penetrating radiations*' from the radium store in the main building and from the contamination believed to have infected the main building as a whole. Each of these six rooms had electricity, gas, water, compressed air and fixed benches and slate slabs (attached to the walls), smaller offices (some of which could be darkened where required) offering workspaces free of disturbance. There is no record of how the Physics Department used these rooms.



2.3.29 A. S. Russell, probably in the John Hopkinson annexe Chemical Laboratory, undated (Todd)



2.3.30 John Hopkinson annexe Chemical Shed, showing Geiger, Boltwood and others, 1912 (Todd)

The plans also included a two-storey workshop for the university **tinsmith and glassmaker**, who provided the finer and more complicated apparatus that was beyond the capabilities of the departmental Steward. The Ordnance Survey map suggests that this was built adjoining, and possibly as part of, the west wing [Plate 2.3.31].



2.3.31 Rutherford Building and John Hopkinson annexe, 1922 OS, revised 1915-16 (NLS)

2.3.5 Use of the Extended Building after Rutherford, 1919-1964

When Rutherford left in 1919 he took with him his radium supply, a large amount of apparatus and the majority of the glassware from the “radium room”. Under his successor, W. L. Braggs (Chair in 1919-37), the focus now shifted to X-ray crystallography.

Main building

The rooms in the main building of 1900 were unsuitable for X-ray crystallography (the radioactive contamination causing photography to fog) and were put to other uses. The **Liquid Air & Research Room** in the basement (previously used by Geiger) housed a **differential analyser** from 1935 onwards whilst Moseley’s basement room was occupied by the **spectroscopy** researcher Samuel Tolansky [Plate 2.3.32]. The “radium room” on the second floor was now the **tearoom**, whilst various other rooms were adapted for use by final-year undergraduate students. It was later reported by the assistant Bernard Lovell, that in the late-1930s his Geiger counters had shown the “radium room” and many other rooms to be



2.3.32 Liquid Air & Research Room now housing the differential analyser, undated, 1935 or later (Todd)

Patrick Maynard Stuart Blackett replaced Bragg as Langworthy Chair in 1937 (serving until 1952) and the Electrochemistry Laboratory at the east of the Dynamo House was adopted for cosmic ray research [Plate 2.3.33]. A major reconfiguration of the main building occurred during this period and William Kay was finally removed from the Preparation Room and installed in the ground floor Workshop.

In the 1960s the basement was used for third-year undergraduate teaching, although the Photographic Room remained a darkroom (probably still partitioned). On the ground floor the Electrochemistry Laboratory became an electronics workshop and “the Rutherford Room” an electronics workshop. The second floor “radium room” remained the tearoom.



2.3.33 Cosmic ray research in the former Electrochemistry Laboratory, undated, c.1940 (Todd)

John Hopkinson annexe

In the **north wing** of the **John Hopkinson Extension**, in the **Magnet Testing Room**, what was known as the **Royal Society Computer Laboratory** was established in 1948. It subsequently expanded into Room E or D above, this makeshift accommodation requiring ‘the revolutionary data-transfer process incorporated, for a time, an element of “running to the bottom of the stairs and shouting”; the architectural milieu was “late lavatorial” [due to the white glazed tiles], a phrase seized upon gleefully by subsequent authors’.³²

Further additions

In 1920 an **extension** was added, on the site of the courtyard to the west of the Dynamo House, to cater for the increase in students that accompanied demobilisation at the end of the war. A third extension (later known as the **Bragg Building**) was built in the southeast corner of the 1909 Whitworth Engineering Laboratories in 1932 and was opened by Rutherford [Plates 2.3.34-2.3.36].

A detached building was added sometime in the 1950s, situated between the main building and the extension of 1931/32 (since demolished). Another extension, running along the east of the main building, housed the **Theoretical Physics Group** and was probably added in the same decade [Plate 2.2.37].

32 Sumner (2013), p. 709.

Bu 1960 a small **Van de Graaff accelerator** was housed at the immediate south to the Theoretical Physics Group extension, abutting the main building (with a larger one on Ackers Street and a heavy ion linear accelerator on Oxford Road).³³

33 Todd (2021), p. 40.



2.3.34 Main building and John Hopkinson annexe, c.1925 (University of Manchester)



2.3.35 Rutherford Building and John Hopkinson annexe, 1935 OS, revised 1933 (NLS)



2.3.37 Physics buildings and surroundings as they existed in 1950, also showing buildings since demolished (hashed line) and principal later additions (shaded) (Summer)



2.3.36 Rutherford Building, 1937 (Britain From Above)

2.3.6 Changing Use, 1964-1999

In 1964 the John Hopkinson annexe was vacated by what had by this time been renamed the Electrical Engineering Department (incorporating the Computing Group). A new purpose-built Physics building (now the Schuster Building) was also constructed in 1967 and the bulk of the Physics Department relocated, although it is possible that some members of staff remained in the building as late as 1970.

Some or all of vacated spaces were for a short time occupied by the **Physiology Department**.

In 1972 the **Psychology Department** moved into the John Hopkinson annexe, the first 1950s extension and most of the ground, first and second floors of the main building, these areas together being renamed the **Coupland I Building**. On the second floor, the Lecture Room became the Cohen Lecture Theatre and the "radium room" (formerly the Transit Room) a staff room (presumably an office). Wiring for a computer system was added in the 1990s, causing loss of some historic fabric to the walls.

In the main building, all of the basement and some of the east rooms of the ground and first floors passed to the **Museum**.

At an unrecorded date it was discovered that the main building was affected both by **radioactive contamination** and by contamination from the **mercury** that had been used in the pumps and apparatus used to manipulate radium emanation. The part of the Psychology Department occupying the main building was moved out in 1999, initially

temporarily, whilst a programme of remediation was delivered. However, its relocation to the 1954 Electrical Engineering building (now known as the Zochonis Building) proved to be permanent.

2.3.7 Changing Use and Continued Works, 2000-2022

By the early 2000s the buildings between Coupland Street and Bridgeford (formerly Bridge) Street had lost their distinct identities, overspanning, infill, extensions and glassing-in creating a dense mass of inter-connected structures. There are few photographs of the interior of the building at this time. One shows the ground floor Private Research Room (today "**Rutherford's Room**") with cream-painted walls with a darker skirting below, and a covered floor [Plate 2.3.38]. The second floor "**radium room**" (**Transit Room**) is shown with a similar scheme to the walls, the floor covering stripped to reveal the floorboards below, the door to the corridor glazed and being surrounded by a moulded architrave [Plate 2.3.39]. The doorframe to the adjacent Research Room, being a later addition, is visibly much plainer. Both photographs were probably taken during preparations for the remediation works. Various rooms had been subdivided and partition walls in the basement Liquid Air Room and in "**Rutherford's Room**" were now removed.

Remediation and refurbishment of the main building

In 1999 the university's Radiological Protection Service identified elevated levels of radon still surviving in the ground floor Private Research Room (today "**Rutherford's Room**"), the first floor "**radium room**" (**Transit Room**) and two other rooms within the main building, resulting in remediation works (completed in



2.3.38 Ground floor Private Research Room with Rutherford's desk, c.2000 (Todd)



2.3.39 Transit Room, undated, c.2000 Todd

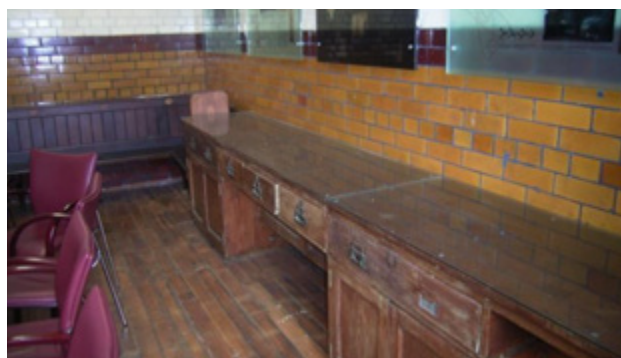
2002). However, tests of 2002 showed high levels of radon contamination in several other rooms, including the second floor **Large Lecture Room**.

In the main building, another programme of **remediation** was completed in 2004 and the subsequent refurbishment in 2006. In the principal entrance vestibule, an inserted porter's room was removed whilst damaged tiling was replaced using replicas sourced from the original manufacturer, Maw & Co. of Burlsem [Plate 2.3.40]. In "**Rutherford's Room**" the paintwork was removed and the glazed bricks re-exposed, with the floor covering also stripped (and Rutherford's bench, being heavily contaminated, sandblasted). Above, in the first floor (**Transit**) "**radium room**", the paintwork was stripped on the west wall to expose the glazed bricks and a new colour scheme was introduced to the wooden panelling around the bay window [Plates 2.3.41-2.3.42]. On the second floor, the large Lecture Room and its Preparation and Apparatus Rooms, still intact at this time, were also stripped out.³⁴ Across the building as a whole, new doors and screens were added at the entrances to the stairwell and fluorescent tube lighting was installed. Further minor contamination was also removed prior to the building being reoccupied. Various further programmes of remediation appear to have been carried out in subsequent years, including lowering the floor in the "**radium room**" (2010).

On the ground floor, by the early 2010s the side door was the main entrance into the building and the principal entrance had been taken out of use [Plate



2.3.40 Main entrance with porter's lodge, undated, c.2003 (University of Manchester)



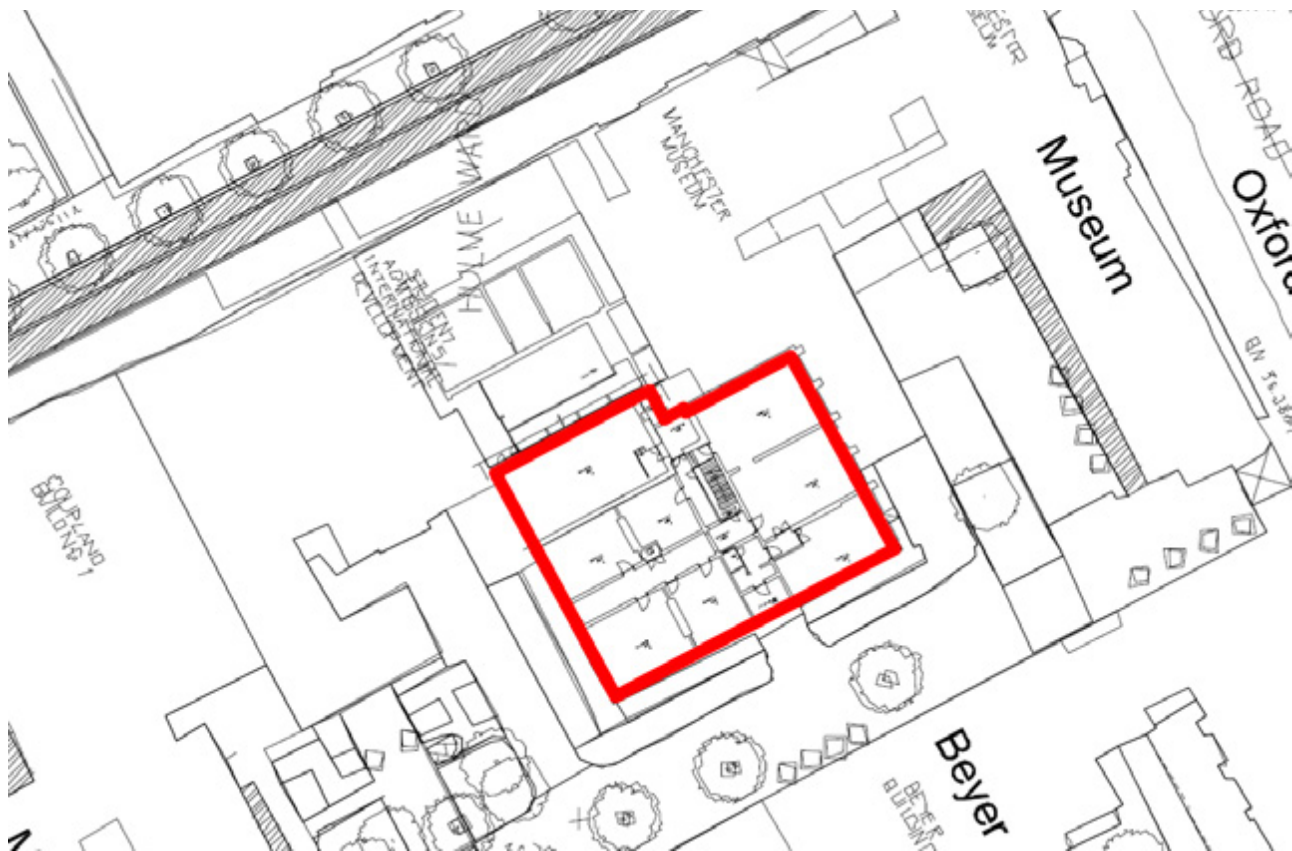
2.3.41 Ground floor Private Research Room and Rutherford's desk after refurbishment works, c.2008 (Todd)



2.3.42 Transit Room before (c.2000) and after (c.2008) refurbishment(Todd)

2.3.43]. Subsequent works (approved in 2012 and 2013) concluded that the corridors throughout the building had non-original plastering above the dado line whilst the grouting to the tiling had been affected by cable routing and was also a later replacement. A frameless glass doorset and screen had added in the ground floor west corridor by 2012 (and was subsequently replaced to allow automation). As part of proposals to reinstate the principal entrance, a former doorway (plastered and tiled over, perhaps in 2006) was opened up and converted into a window-sized opening. This was designed to serve a new reception, which was to be relocated from the southwest corner of the building (not executed). Associated proposals to create a surrounding draught lobby were not executed.

34 Todd (2008), p. 4.

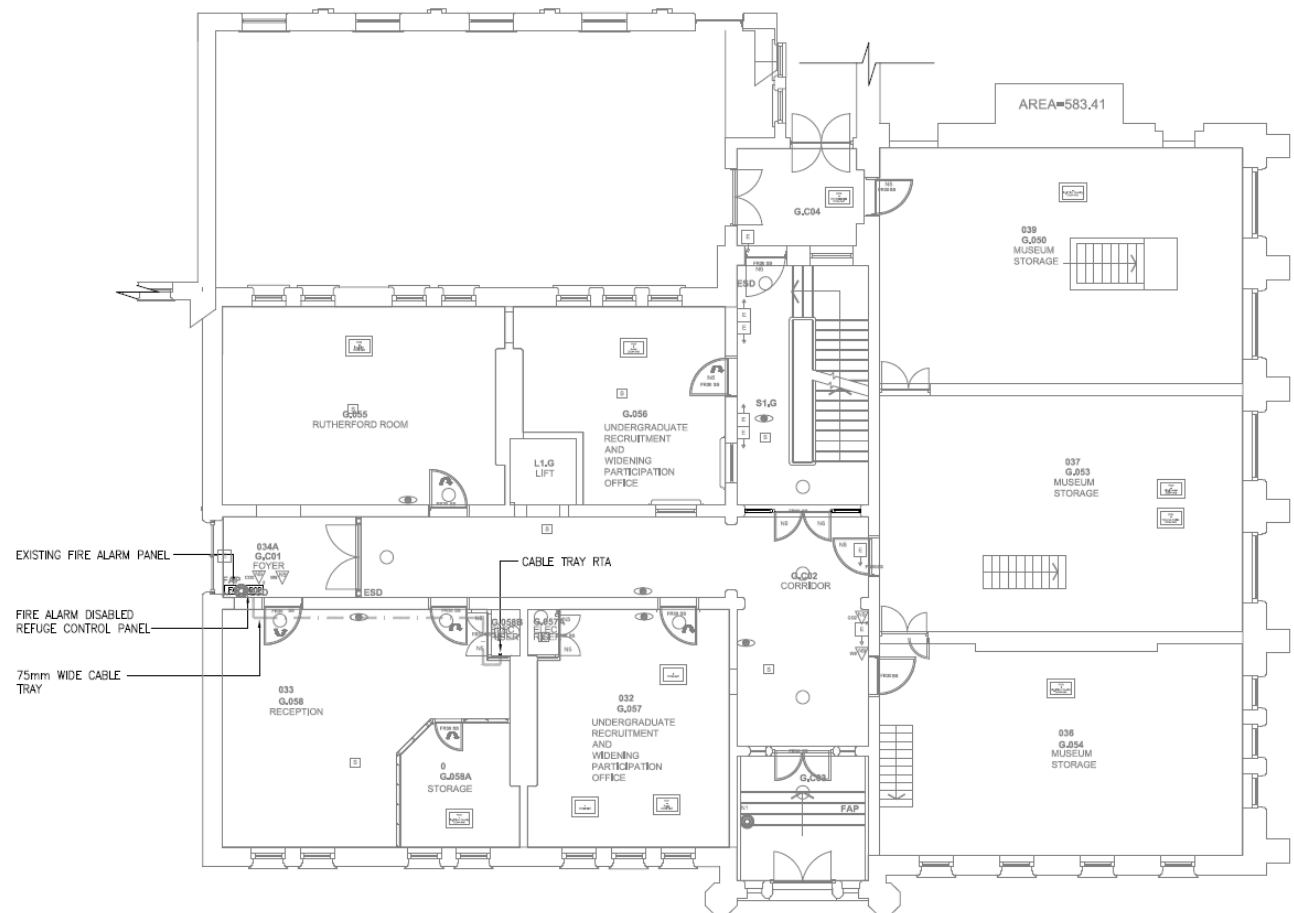


2.3.43 Rutherford Building, 2013 (Wilson and Mason)

As part of the university's celebration of its scientific heritage and past Nobel-prize winners, in 2006 the main building was renamed the **Rutherford Building** and "Rutherford's Room" (G.055) officially opened by Rutherford's granddaughter.

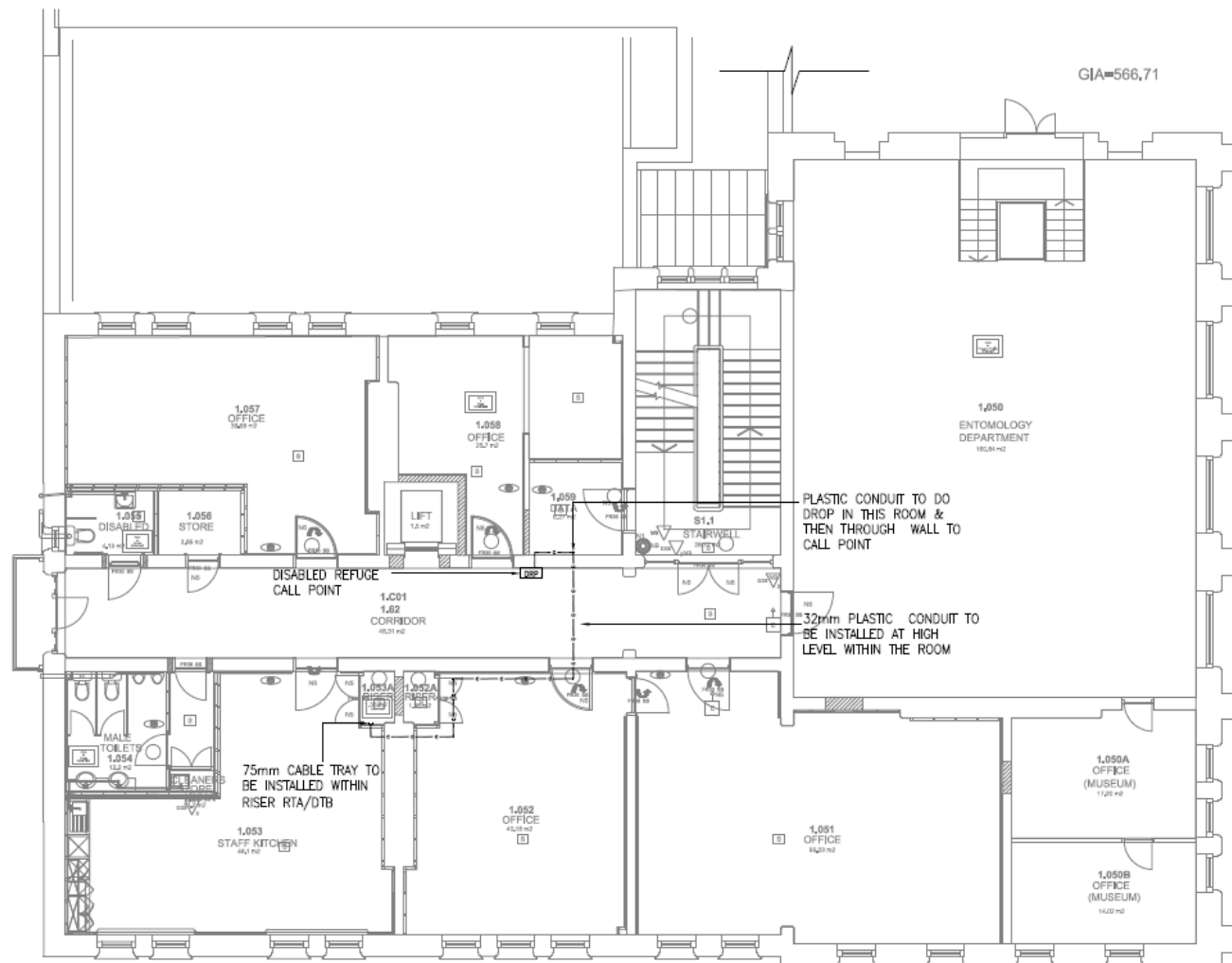
The John Hopkinson annexe is still occupied by the Psychology Department and, with the first 1950s extension, is still known as the **Coupland I Building**. The Dynamo House has since been converted to a common room whilst the Battery Room is occupied by the Museum. The outdoor Chemistry Laboratory was demolished at an unknown date.

By 2009 the main building was occupied by Students Admissions & Widening Participation and the International Development Team. It was listed at Grade II in 2011. The building as it existed at this time (excluding the basement) is recorded in a set of plans of 2012 **[Plates 2.3.44-2.3.46]**.



2.3.44 *Ground floor, 2012 (University of Manchester)*

FIRST FLOOR PLAN



2.3.45 *First floor, 2012 (University of Manchester)*

The main building today

The 1950s Theoretical Physics Group extension on the east elevation was removed as part of the programme of works at the Museum carried out in 1996-2003 [Plate 2.3.47]. As part of recent works to the (extended) Museum the east elevation has recently undergone a programme of spot repairs (approved in 2017).

To the north, the historic integrity of the building and its annexe of 1912 has been obscured by overspanning and infill from adjacent buildings [Plate 2.3.48]. There is, however, some evidence of the building's past use on the west elevation, in the ledges for mounting the heliostat retained outside the **Grating Room**. The bay window in the **"radium room" (Transit Room)** is a reminder of the Transit instrument (now displayed in the Schuster Building) that was once located inside the window. Internally, a wooden bracket still surviving to the side of the window may have been part of the Toepler pump apparatus.



2.3.48 Rutherford Building and abutting buildings, c.2022 (Historic England)



2.3.47 1950s extension along the east elevation, undated, c. late-20th century (Purcell)

2.4 Relevant Planning History

Manchester City Council lists the following relevant applications on its online planning portal.

118413/LO/2017; 2017-18; Approved

Listed building consent for works to the Rutherford Building associated with the construction of a two storey extension to house two new galleries, Special Exhibition Gallery (temporary exhibition) & South Asia Gallery (housing permanent collection) and associated ancillary space, escape stair and bridge link. Alteration and refurbishment of existing ground floor, relocation shop and reception, provision of new WCs and refurbishment of cafe/kitchen. New entrance and canopy to Bridgford Street and new signage totem

108895/LO/2015/C1; 2015; Approved

Listed building consent for internal alterations to subdivide a first floor office.

106421/LO/2014/C1; 2014; Approved

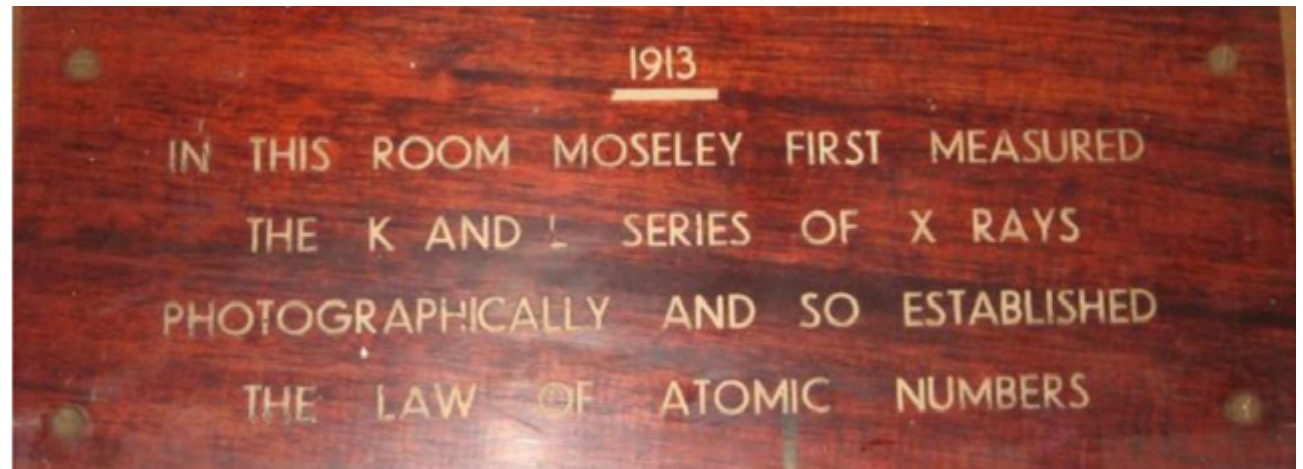
Listed building consent for internal alterations to include Installation of glazed screen and doors, re-forming an existing opening to create a new reception area, removal and replacement of modern partition

103111/LO/2013/C1; 2013; Approved

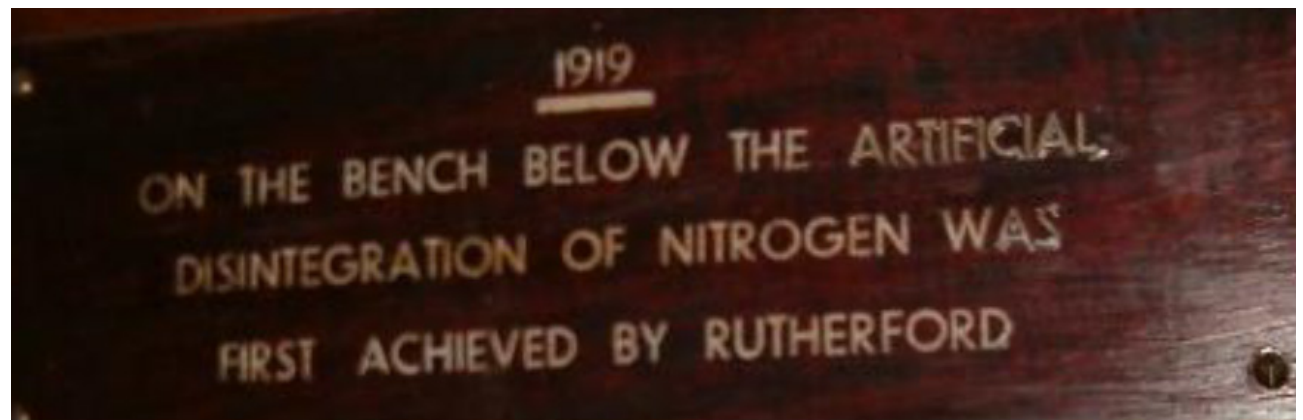
Listed building consent for works in association with the installation of a disabled refuge communications system within the 1st and 2nd floor corridors and communications receiver within ground floor lobby

101115/LO/2012/C1; 2012; Approved

Listed building consent for the installation of new internal doors and the automation of existing doors



2.4.1 Basement Research Room plaque, since lost (Todd)



2.4.2 Ground floor Private Research Room plaque, since lost (Todd)

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9. The Manchester University Physical and Electro-Technical Laboratories staff and research students, 1912. L to R: front row: R. Rossi, H. G. J. Moseley, J. N. Pring, H. Gerrard, E. Marsden; row 2: H. Geiger, W. Makower, A. Schuster, E. Rutherford, R. Beattie, H. Stansfield, E. J. Evans; row 3: C. G. Darwin, J. A. Gray, D. C. H. Florance, Margaret White, May Leslie, H. R. Robinson, A. S. Russell, H. Schrader, Y. Tuomikoski; row 4: J. M. Nuttall, W. Kay, H. P. Walmsley, J. Chadwick. Courtesy of Kasimir Fajans.

2.5.1 Physical and Electrotechnical Laboratories staff and research students, John Hopkinson annexe entrance, 1912 (Todd)