



SAVED BY THE BELL!

THE RESURRECTION OF THE WHITECHAPEL BELL FOUNDRY

a proposal by

Factum Foundation

&

The United Kingdom Historic Building Preservation Trust

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Plaques on the wall above the old blacksmith's shop, honouring the lives of foundry workers over the centuries. Their bells still ring out through London. A final board now reads,

“Whitechapel Bell Foundry, 1570-2017”.



Memorial plaques in the Bell Foundry workshop honouring former workers.

CONTENTS

Overview – Executive Summary	5
Introduction	7
1 A Brief History of the Bell Foundry in Whitechapel	9
2 The Whitechapel Bell Foundry – Summary of the Situation	11
3 The Partners: UKHBPT and Factum Foundation	12
3.1 The United Kingdom Historic Building Preservation Trust (UKHBPT)	12
3.2 Factum Foundation	13
4 A 21st Century Bell Foundry	15
4.1 Scanning and Input Methods	19
4.2 Output Methods	19
4.3 Statements by Participating Foundrymen	21
4.3.1 Nigel Taylor of WBF – The Future of the Whitechapel Bell Foundry	21
4.3.2 Andrew Lacey – Centre for the Study of Historical Casting Techniques	23
4.4 Digital Restoration	25
4.5 Archive for Campanology	25
4.6 Projects for the Whitechapel Bell Foundry	27
5 Architectural Approach	28
5.1 Architectural Approach to the Resurrection of the Bell Foundry in Whitechapel – Introduction	28
5.2 Architects – Practice Profiles:	29
Skene Catling de la Peña	29
Purcell Architects	30
5.3 Georgian Foundry Buildings	31
5.4 New Building to Rear of Site	33
5.5 Diagrammatic Programme Layout	34
5.6 Sustainability Statement – Dr. Neil Smith of Max Fordham Engineers	36
5.7 Structural Statement – Stephen Haskins, EHRW Engineers	36
5.8 Planning Statement – Nick Thompson of Lichfields Planning and Development Consultancy	37
5.9 Heritage Report – Nigel Barker - Mills, Barker - Mills Conservation	38
5.10 The Site	39
5.11 Existing Buildings	43
6 Conclusion	47
Appendix	49
A.1 Appendix 1: Team Profiles & Contact details	49
A.1.1 Leading Partners	49
Factum Foundation	49
UKHBPT	49
A.1.2 Architects	49
Skene Catling de la Peña	49
Purcell Architects	49
A.1.3 Engineers	49
Max Fordham	49
Engineers HRW	49
A.1.4 Heritage and Planning Consultants	50
Lichfields Planning and Development Consultancy	50
Barker - Mills Conservation	50
A.2 Appendix 2: WBF Petition, 2017	51
A.3 Appendix 3: Supporting Organisations and Individuals	52
A.4 Appendix 4: Whitechapel Bell Foundry – List Entry Summary & History	57

“His soul swooned slowly as he heard the snow falling faintly through the universe and faintly falling, like the descent of their last end, upon all the living and the dead.”

James Joyce,
The Dead, 1914.



Internal courtyard of the Bell Foundry in snow. Photograph by Derek Kendall.

The Bell Foundry Can and Must be Resurrected for the 21st Century

In 2017 the historic Whitechapel Foundry was acquired and the use of these Grade 2* buildings for the making of bells, such as Big Ben, the Liberty Bell and the Bow Bells, ceased. Despite the historic listing the original equipment has now been stripped out in anticipation of the buildings being converted to a commercial use such as a boutique hotel or similar.

As the new owner commences a public consultation process, which would seek to secure a change of use, this document sets out a different future for the building which would see the continuation of a viable Foundry with the resultant employment, skills retention, life and vitality.

Bells have been made here since 1571 and London should not countenance the loss of such a valuable National and International asset.

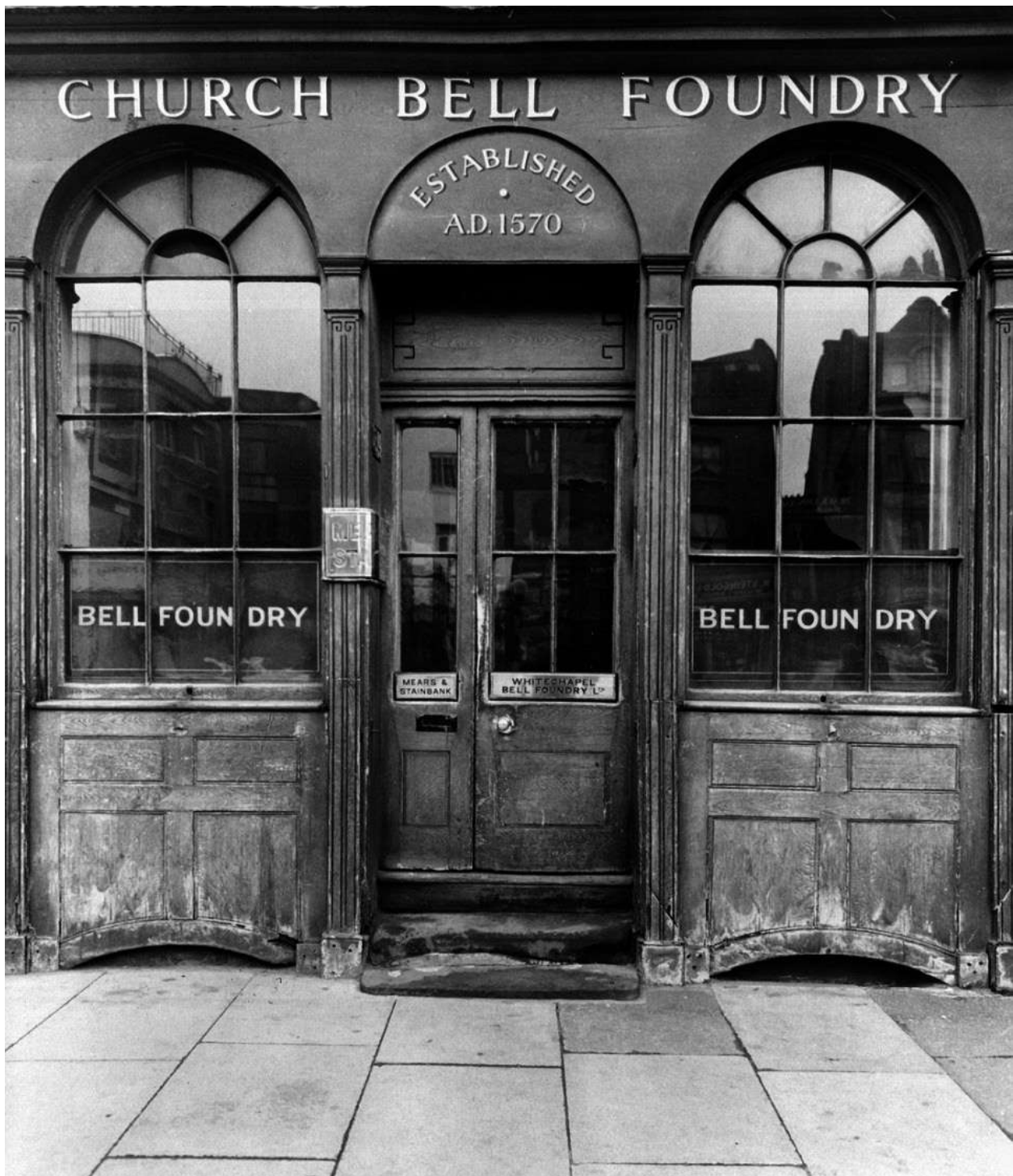
Purpose

This document has been jointly prepared by Factum Foundation (Factum) and The United Kingdom Buildings Preservation Trust (UKHBPT) to demonstrate a viable and sustainable foundry use at the Whitechapel Bell Foundry, how Factum-UKHBPT propose to continue to operate the world famous Whitechapel Foundry and how we will preserve its fine historic buildings for future generations as a working foundry.

Key Messages

- The Foundry is world famous and bells have been made in Whitechapel since the reign of Elizabeth I.
- The Foundry is the UK's oldest continuous manufacturing business and is one of London's and the UK's finest cultural and heritage assets.
- Factum Foundation and the UKHBPT have formed a partnership to continue the foundry business at the Whitechapel site. Factum Foundation is committed to the application of technology to the preservation of heritage while Factum Arte is a leading producer of works of art for artists. The UKHBPT is Britain's preeminent industrial heritage charity owning assets such as Middleport Pottery, the oldest working Victorian Pottery.
- On acquisition Factum-UKHBPT would re-equip the foundry and restart foundry manufacturing within a year once emergency repairs to the roof have been carried out.
- Factum-UKHBPT provide and generate work for the new foundry. During this initial period Factum-UKHBPT is committed to rejuvenating the foundry business and will enter into strategic foundry partnerships with other leading global institutions active in the East End, the V&A, Smithsonian and UCL at HERE EAST.
- Factum-UKHBPT will fund the foundry acquisition and re-equipment through patronage support and sponsorship in kind.
- The Foundry would reemploy key workers and will develop an apprenticeship and training scheme for bell making and tuning in partnership with the Prince's Trust and relevant public sector bodies.
- Once the foundry has been saved and operations restarted, Factum-UKHBPT will embark on the second phase to expand the black foundry building to create additional foundry, workshop and education space together with the potential for artisans studios, apprentice accommodation and genuinely affordable housing.
- Factum-UKHBPT are committed to invest in modern foundry technology to complement the traditional skills. Support will be forthcoming from artists around the world that will generate work and income for the foundry.
- The Foundry will be opened up to accommodate foundry tours for school groups and the wider public.
- The response of the heritage preservation institutions have been totally positive.

Factum-UKHBPT has been assisted in the preparation of this document with specialist planning, heritage and architectural conservation advice which has been invaluable in helping determine the sustainable use of the foundry and its preservation as a landmark cultural heritage asset for future generations.



Entrance to the Whitechapel Bell Foundry shown here in 1976.

“The world famous Whitechapel Foundry is a landmark – both for its splendid use and its fine historic buildings. Bells cast at the foundry have sounded in cities around the world for hundreds of years. For many, that sound represents the heart and soul of London, and in the case of Big Ben in the Palace of Westminster it is the sound of Freedom. The existing buildings deserve the highest level of recognition and protection as a unique and important part of our heritage.”

Dan Cruickshank
Art historian and television presenter

The **Whitechapel Bell Foundry** (WBF) is a cultural heritage site in the heart of London, in the borough of Tower Hamlets, of worldwide importance. This renowned foundry has been based in Whitechapel since the reign of Elizabeth I; until very recently it was Britain’s oldest manufacturing company, a working community and a repository of invaluable craft skills. Despite its unique and profound importance, campaigns in the national press and enormous, emotional public outcry, the WBF was sold and closed in 2017.

The **United Kingdom Historic Building Preservation Trust** (UKHBPT), an independent charity under the founding patronage of His Royal Highness, The Prince of Wales, has teamed up with **Factum Foundation**, a Spanish registered not-for-profit organisation dedicated to the documentation and preservation of cultural heritage through the application of new technologies together with craft skills.

Through this partnership, the WBF can again become a viable foundry that specialises in bells, but can also produce special edition artworks in bronze and other materials. Factum Foundation, with the UKHBPT, will refurbish, re-equip and renovate the foundry that has housed the WBF premises since 1739. This will be done preserving the Grade II* listed buildings, intact and serving their original purpose. The aim is to revive the Foundry and bring bell casting into the 21st century. An important part of the initiative is the creation of a centre for the study of historic casting as well as the development of apprenticeship and educational schemes. State-of-the-art equipment will be employed to record the shape and sound of bells throughout the UK to build a publicly accessible archive and research centre.

This document contains a summary of the current situation, a brief history of the site, a description of Factum Foundation and what a 21st century foundry does (with specific projects for the WBF); a profile of the UKHBPT, drawings and photographs of the existing buildings, diagrammatic layouts of the proposed new foundry and associated programme, practice profiles of the architects Skene Catling de la Peña and Purcell, statements by Max Fordham and EHRW engineers, Nigel Barker-Mills Heritage Consultancy and Lichfields Planning and Development Consultancy; professional profiles and an appendix which contains the Building Listing, further historic material and a public petition that collected 10,000 signatures in three weeks. It should be noted that all consultants have made their contributions on a pro-bono basis in recognition of the profound importance of this building and the heritage it represents.

An economically viable, environmentally and socially sustainable working foundry can operate from the site of the Whitechapel Bell Foundry. To that end, it is imperative that change of use is not granted to develop the site for any other purpose. With the focused support of the entire heritage community that this document demonstrates, we hope to convince the current owners of the building, Raycliffe Whitechapel LLP, to participate in the resurrection of the Foundry, or to sell the property to allow this to happen.



King George V and Queen Mary leaving the Whitechapel Bell Foundry in 1919.



Bell cast in 2002 to commemorate the 9/11 attacks in NY. Photograph by Kieran Doherty/Reuters.

Two Sticks and Apple, Ring ye Bells at Whitechapple,
Old Father Bald Pate, Ring ye Bells Aldgate,
Maids in White Aprons, Ring ye Bells a St. Catherines,
Oranges and Lemons, Ring ye bells at St. Clements,
When will you pay me, Ring ye Bells at ye Old Bailey,
When I am Rich, Ring ye Bells at Fleetditch,
When will that be, Ring ye Bells at Stepney,
When I am Old, Ring ye Bells at Pauls

From Tommy Thumb's Pretty Song Book, 1744.

"We do not necessarily need the evidence of the famous nursery rhyme to realise that the bells were a familiar and friendly presence in the life of Londoners. In 1994 the Meteorological Office reported that, before the sound of motorcars entered the already crowded streets, the bells of St Mary le Bow in Cheapside 'would have been audible all over London'. In a true sense then, every Londoner was a Cockney. Yet the East End may lay a special claim to that honorific since the oldest business in that area is the Whitechapel Bell Foundry, which was established in the fifteenth century. Citizens used to bet which parish could make its bells heard at the greatest distance and it was said that bell-ringing was a salutary way of keeping warm in winter. It was surmised that at the Last Judgement the angels would peal the bells of London, rather than sound their trumpets, in order to convince the citizens that day of doom had truly arrived. The bells were part of that sound and texture of its life. When the protagonist of George Orwell's 1984 recalls the famous song with its mention of St Clements and St Martin's, Bow and Shoreditch, he seems to 'hear the bells of a lost London that still existed somewhere or other, disguised and forgotten'. Some of the bells of that lost London can still be heard."

*From London, The Biography, Peter Ackroyd.
Chatto & Windus, London, 2000*

The Bell Foundry in Whitechapel was the first casting business to open in London after the Reformation. It has been responsible for casting some of the most famous bells in history, including the Liberty Bell (1752) marking American independence, 'Big Ben' (1858) for the Palace of Westminster, and the bells for Westminster Abbey.

The company has changed hands several times in its almost 450 years of history but has operated continuously in Whitechapel since it was formed, occupying the premises at 32-34 Whitechapel Road and 2 Fieldgate Street from the mid-1740s.

The foundry's origins have been traced to either Robert Doddes in 1567 or Robert Mot in 1572, giving rise to a traditional foundation date of 1570. It is said then to have been in Essex Court (where Gunthorpe Street is now). There is no continuous thread, but it has also been suggested that the Elizabethan establishment had grown out of a foundry in Aldgate that can be tracked back to Stephen Norton in 1363.

From 1701, the founder Richard Phelps was in charge. He made the great (5 ton) clock bell for St Paul's Cathedral in 1716. When he died in August 1738, he was succeeded by his foreman Thomas Lester. It is thought Lester moved the foundry into new buildings on the present site on Whitechapel Road. The site was said to have been previously occupied by the Artichoke Inn.

Thomas Lester took Thomas Pack into partnership in 1752 and acquired ownership of the foundry from a younger Edward Baynes in 1767. Lester's nephew William Chapman was a foundry foreman who, working at Canterbury Cathedral in 1762, met William Mears, a young man he brought back to London to learn the bell-founding trade.

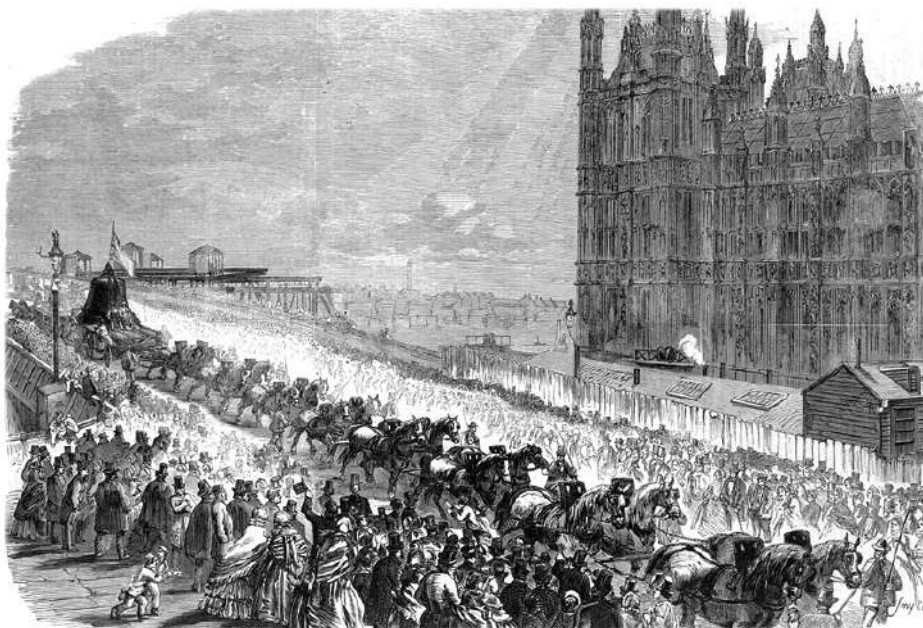
Lester died in 1769 and left the foundry to relatives to be leased to Pack and Chapman as partners. After Pack died in 1781 Chapman was pushed out and for a few years descendants of Lester ran the establishment. Their initiative failed and William Mears returned in partnership with his brother Thomas, who came to Whitechapel from Canterbury. Ownership of the property remained divided among descendants of Lester and in 1810 Thomas Mears was still trading as 'late Lester, Pack and Chapman'. On a promotional sheet he listed all the bells cast at the foundry since 1738, 1,858 in total, around 25 per year – including some for St Mary le Bow in 1738, St Petersburg in Russia in 1747, and Christ Church, Philadelphia, in 1754.

A son, also Thomas Mears, acquired full control of the foundry in October 1818 when Lester's descendants sold up. The younger Mears took over the businesses of four rival bell-founders and undertook works of improvement. By 1840 the firm had only one major competitor in Britain (W. & J. Taylor of Oxford and Loughborough). The next generation, Charles and George Mears, ran the foundry from 1844 to 1859, the highlight of this period being the casting in 1858 of Big Ben (13.7 tons), still the foundry's largest bell. From 1865 George Mears was partnered by Robert Stainbank. Thereafter the business traded as Mears & Stainbank up to 1968. Arthur Hughes became the foundry manager in 1884 and took charge of operations in 1904. The business remained in the hands of the Hughes family throughout the 20th century and into the 21st.

Extract from the Survey of London's website. Published 9 December 2016.



Tuning a bell at Whitechapel in 1991. Photograph by Carlotta Luke.



Huge crowds turn out for the arrival of 'Big Ben' cast at WBF. London Illustrated News, 16th October, 1858.



Working on a bell for St James' Church, Chipping Campden, at the WBF in 2004.

The Whitechapel Bell foundry closed in June 2017. The Land Registry records that the building was owned by Mears and Stainbank Limited and was sold for £5.1 million. On the same day there was a sub-sale to Raycliff Whitechapel LLP for £7.9 million.

A company trading as Whitechapel Bell Foundry Ltd. still exists. It was incorporated in 1968 and is owned by the Hughes Family through a holding company. Before this, the bell foundry at 32-34 Whitechapel Road traded under different names as the business passed from one bell founder to another (see 'Brief History' above). From 1869 to 1968 it operated under the name of Mears and Stainbank, with various owners until the Hughes family acquired it in 1904. The Whitechapel Bell Foundry Ltd. still makes a small number of hand bells at Maybrey's, Belvedere, Kent. The finishing of these bells is done by Stephen McEwan, an ex-employee of WBF, who sells to the public through The Bells of Whitechapel Ltd.

The large bell-making equipment owned by the Whitechapel Bell Foundry Ltd. is currently in the yard of Westley Group, Stoke on Trent. The Westley group now uses more updated casting techniques developed by Nigel Taylor. The new system of casting produces bells of a very high quality with consistent results. The bells recently cast for Worcester Cathedral and Loughton by the Westley Group, using this method, are considered very fine. The change in the manufacturing method allows reduced costs and wastage and therefore a higher profit margin, making bell casting profitable.

London Metropolitan Archive is storing the records and workbooks from the Whitechapel Bell Foundry. The hope is that these will be catalogued and made publically accessible.

UKHBPT has been in communication with Raycliff Capital with the aim of ensuring that the WBF remains a working foundry. Raycliff has initiated consultancy meetings and is seeking a change of use to a boutique hotel and restaurant.

UKHBPT and Factum Foundation have demonstrated that a foundry on the site is viable. They have brought together a team of ex-employees, casting specialists, conservators, technicians, digital artisans, historians and archivists. They are working with the architectural practices Skene Catling de la Peña and Purcell, services engineers and acoustic specialists, heritage organisations and the local community to ensure the character of the listed building and its use is not changed.



Middleport Pottery in Stoke-on-Trent.

3.1 The United Kingdom Historic Building Preservation Trust (UKHBPT)

The United Kingdom Historic Building Preservation Trust (UKHBPT) is an independent charity under the founding patronage of His Royal Highness, The Prince of Wales. It has had significant success in the repurposing of some of the UK's important industrial heritage, an exemplar being the regeneration of the Middleport Pottery from 2010. In 2018 this is now a sustainable business and destination built around the Burleigh brand, with upwards of 50,000 visitors a year. In light of their experience with the Middleport Pottery, UKHBPT are ideal guardians for the WBF, with a proven track record and the governance to partner with Factum Foundation on this exciting project.

Middleport Pottery

Nestled in the heart of Stoke-on-Trent, the world-renowned centre of ceramics, Middleport Pottery's historic site was built in 1888 for well-known local ceramics company, Burgess & Leigh Limited. The Grade II* listed site is a red-brick maze, containing historic machinery, archives and collections in every corner.

In June 2011, The Prince's Regeneration Trust (PRT) – of which UKHBPT is the asset owning charity – stepped in to save Middleport Pottery from closure and to ensure that Burleigh stayed in Burslem. After buying the Pottery, PRT embarked on a £9 million, three-year project to regenerate and revitalise the site and has leased approximately half of it back to Burgess & Leigh for pottery production. As a result, 50 jobs have been saved at Middleport Pottery and a further 66 have been created since 2011.

In June 2014, HRH The Prince of Wales, Patron of PRT, opened the refurbished Middleport Pottery, containing the Burleigh factory, a visitor centre, cafe, shop, activity areas and workshops and offices for creative businesses. The Pottery is now a major visitor destination and has numerous awards including the RIBA National Award for architectural excellence, three RIBA West Midlands Awards, a Europa Nostra Award for heritage, a Civic Trust AABC Conservation Award for building conservation, a Placemaking Award for heritage and a Heritage Open Days' Community Champions Award.

Middleport Pottery is also now the home for the BBC's *The Great Pottery Throw Down* television series.



Prince Charles visiting the Borgherini Chapel by Sebastiano del Piombo (facsimile by Factum Foundation) at the exhibition *Michelangelo and Sebastiano* at the National Gallery (London, 2017).

3.2 Factum Foundation

“That immaculate eye for detail is typical of the work of Factum Arte, a Madrid-based studio whose combination of digital analysis with assiduous craft is transforming the way we see art. I have been watching their work develop for nearly a decade. I am now convinced it is the most important thing happening in 21st-century art – because it can quite literally save civilisation.”

Jonathan Jones. *Guardian*, 28 February 2017

Factum Foundation for Digital Technology in Conservation, founded in 2009 by Adam Lowe and based in Madrid, is a not-for-profit organisation using new technology in the preservation of at-risk cultural heritage. Their work in Egypt, Daghestan, Pakistan and many other at-risk areas has received worldwide attention. Their unique approach to the development of recording systems, the production of innovative software and their practical application of technology and training of local operators has led to close relationships with UNESCO, the V&A, The Prado, The National Gallery (London and Washington) and many other institutions.

For Factum Foundation, preserving heritage means applying technology to protect the material evidence of the past. Its mission is to use technology to inform, assist and bring new life to craft skills. Its method is based on training and transferring skills and technologies to local communities. This requires sharing and nurturing living skills and practical knowledge. The Foundation’s approach treats past and present as a continuum.

Factum Foundation works closely with its sister organisation Factum Arte, a multi-disciplinary workshop mediating the complex boundary between technology and contemporary art. Its Madrid-based studio is a space for technological and artistic innovation often referred to as a playground for artists. It employs a team with diverse skills: from electrical engineers, software writers, digital 3D and imaging specialists, to traditional moulders and casters, artists, architects and conservators.

Factum Arte collaborates with many of the world’s leading artists, including Anish Kapoor, Jenny Holzer, Marc Quinn, Cornelia Parker, Mariko Mori, Rachid Koraïchi, Grayson Perry, Marina Abramovic, Maya Lin, Sarah Sze and Ahmed Mater amongst others. Factum Arte and Factum Foundation have worked extensively with foundries based in Spain and the UK, producing a variety of works of extraordinary beauty and technical skill.



Factum's workshop for mould-making and casting.



Casting at Esfinge foundry, Madrid.

In order to thrive as a working, forward-looking foundry, the Whitechapel Bell Foundry will diversify and update its bell casting techniques and materials while working to integrate the latest technology in 3D recording and output methods, acoustic recording and multispectral photography.

Photogrammetry, white light scanning, LiDAR scanning and other input technologies will be used to record bells, creating a vast archive facilitating detailed study of the shape, decorative features and sound of bells from all over the country and the world. CAD modellers will use both geometric and organic modelling to design new bells while 3D printers, milling machines, water-jet and laser cutters will be used to produce the new patterns and profiles. Casting will be innovative and will embrace the latest developments made possible by 3D printing and a new approach to material transformation.

Foundry work is dependent on building close relationships that are based on sharing resources and technologies. Bell casting can benefit from predictive software that analyses shrinkage and material flow. The approach will be to build close working relationships with other foundries in the UK and outside so that skills, knowledge and equipment can be shared.

The Foundry will celebrate and share its prestigious history and the story of bell-making through educational exhibits and the creation of a nationwide archive of bells and their sounds. Apprenticeships and training programmes, together with school outreach activities, will be at the core of the new WBF.



Brass: Tree cast from life for Michele de Lucchi, Milan.



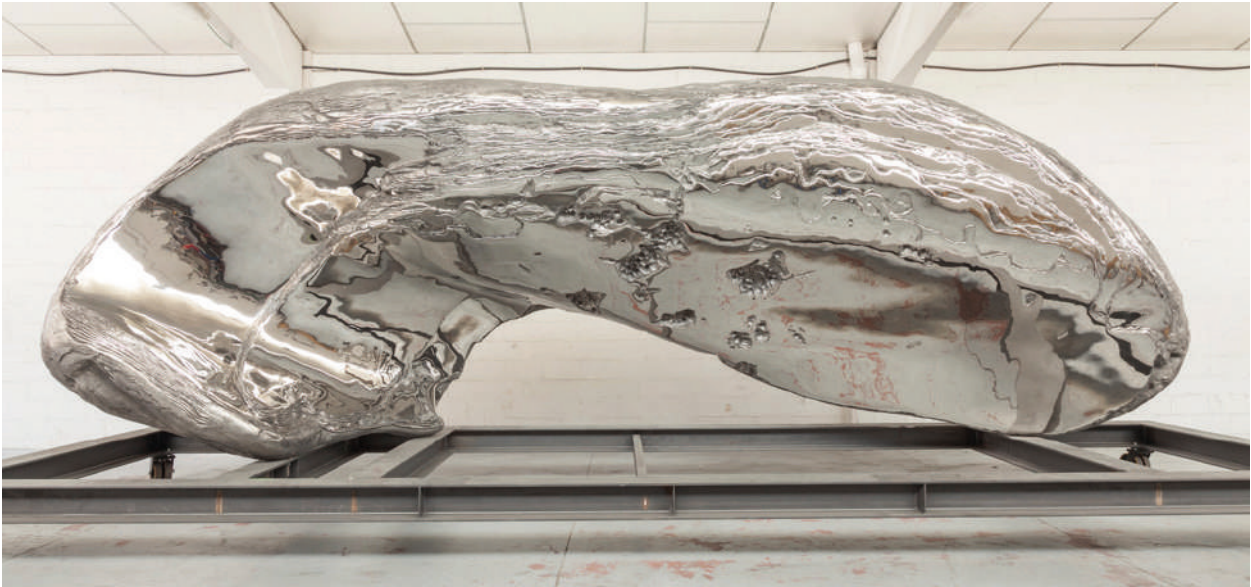
Bronze and steel: Marc Quinn, *Planet* at Chatsworth House.



Aluminium: Mariko Mori, a Möbius strip cast in aluminium.



Bronze: Rachid Koraïchi calligraphy cast in bronze.



Stainless Steel: Marc Quinn, 8 metre long fragment of a shell cast in stainless steel 316 at Fademesa foundry, Madrid.



Lava: experimentation casting lava.



Salt: The head of Marina Abramovic cast in salt.

All the pieces reproduced here and on the previous page have been made by Factum Arte for different artists.



Concrete: Marc Quinn *Eye of History* cast in concrete.



Corten: Conrad Shawcross *Manifest* cast in corten.



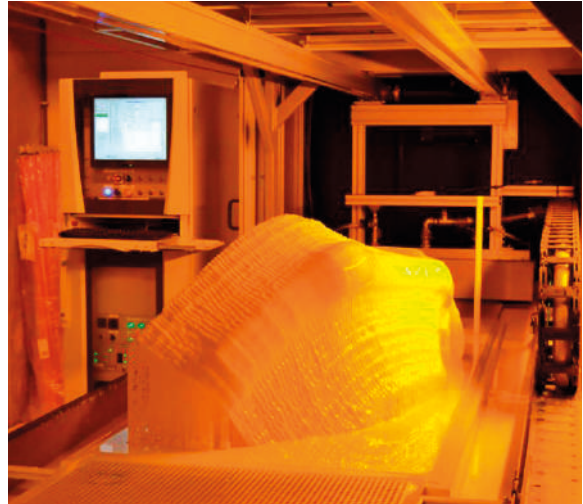
Silver: Piranesi's coffeepot cast in silver.



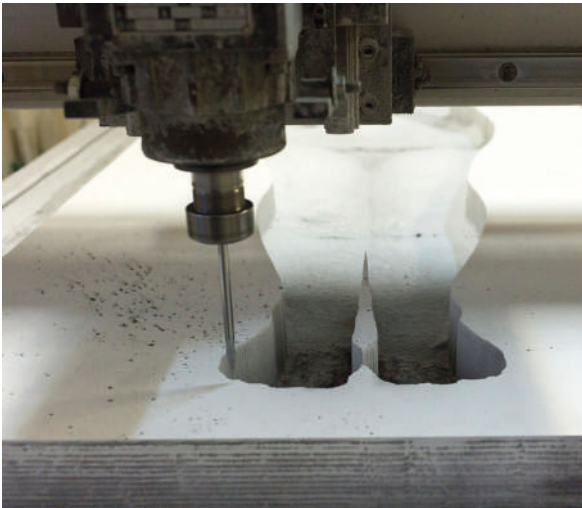
Glass: Canova's *Paolina Borghese* cast in glass.



CNC routing machine.



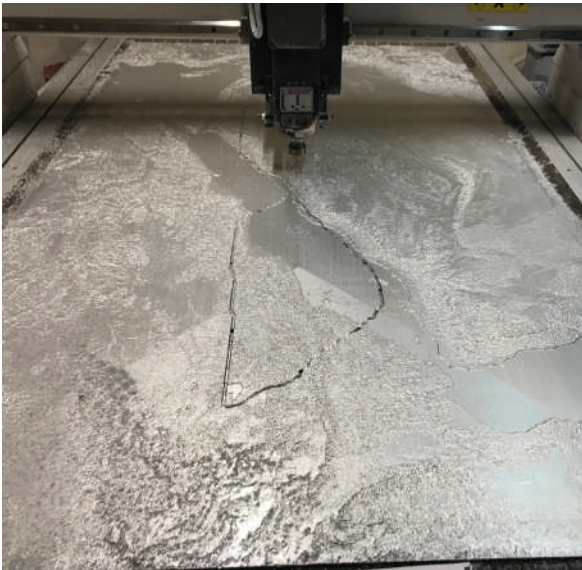
Materialising with a SLS printer.



Routing plaster blocks.



7 Axis robot capable of carving diverse materials.



CNC milling aluminium.



Centrifugal Casting.

4.1 Scanning and Input methods

3D scanning is becoming an integral part of foundry work around the world. Objects are scanned in three-dimensions, at high-resolution, 3D printed or CNC milled in preparation for moulding and casting. Factum Arte already employ this technique in conjunction with foundries in Spain and the UK, producing works of art and facsimiles of enormous complexity. Some of this work will be transferred to the new foundry.

The use of 3D scanning in bell-founding would bring this traditional craft into the 21st century. Scanning and 3D modelling technologies also provide an efficient method of producing new bells and making commemorative bells of different sizes.

Scanning technologies will be used to record existing bells, capturing their shape and decorative pattern with scientific accuracy. If these recordings are carried out alongside acoustic recording the result will be an archive for condition monitoring, preservation and the careful study of this crucial part of our cultural heritage. Applications are already being made to record Big Ben, produced at the WBF nearly 150 years ago.

3D scanning using different methods is becoming a highly sought-after skill in a variety of industries. At the WBF, Factum Foundation will run apprenticeships and training schemes to transfer the latest in 3D recording technology to a new generation of engineers and technicians.

4.2 Output Methods

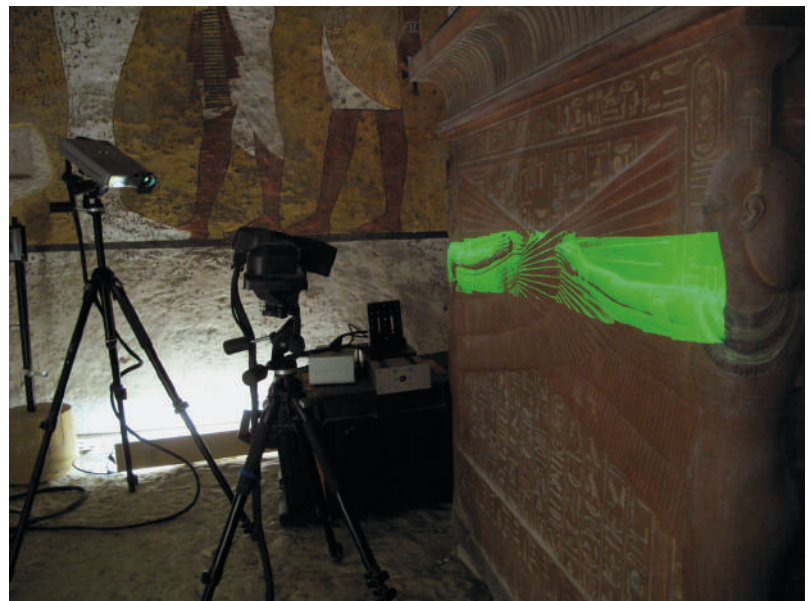
Factum Arte works with a cluster of specialist foundries which use state-of-the-art output methods including high-resolution CNC milling and 3D printing in wax, resin and a range of materials to produce complex forms for casting in different materials. Computer aided flow models and shrinkage projections are transforming the foundry arts. Innovation always goes hand in hand with experience and Factum foundry has been in close dialogue with Nigel Taylor who worked at WBF for 40 years and will return to work with the new foundry. He will be restated as the bell foundry manager. Adam Lowe, founder of the Factum foundation has also met with the previous owners and stressed the fact that the goal is to be inclusive as the foundry is revitalized.

The merging of the past and future of foundry work as well as connecting fine art and industrial casting will present many educational and employment opportunities and provide a vital resource in Whitechapel with international potential.

Expertise in both 3D input methods and 3D digital output methods is in-demand for a range of skilled industrial and craft applications. This will be reflected in the WBF's training and apprenticeship schemes.



3D scanning the statue of Idrimi at the British Museum.



3D scanning in the Tomb of Tutankhamun, the Valley of the Kings, Luxor.



Whitechapel Bell Foundry, 2016. Photograph by John Claridge



Interior of the Whitechapel Bell Foundry after the removal of the foundry equipment in June 2017.



Casting bells at Whitechapel in 1997 with the traditional loam and greensand method.

4.3.1 The Future of the Whitechapel Bell Foundry

By Nigel Taylor, Tower Bell Production Manager at the Whitechapel Bell Foundry

The closure of The Whitechapel Bell foundry in June, 2017, ended, for now at least, almost six hundred years of bell founding in the Whitechapel area. My part in the foundry's history was relatively small; forty years, but in that time, I learnt every process of designing and manufacturing church bells, becoming Tower Bell Production Manager. The techniques used during the period I was employed at the foundry were modifications of ancient techniques. I implemented a number of alterations and improvements to our casting methods. By 2012, sand and clay quarries were increasingly being given over to landfill, so sourcing appropriate traditional materials became ever more difficult and we were considering alternatives. When the foundry closed, its former owners sold all the moulding equipment and a vast amount of industrial history was lost.

We will need to totally re-equip the premises, but this presents the opportunity to obtain modern equipment and to employ state-of-the-art moulding and casting techniques which produce a consistently higher quality than that attained with the traditional methods. Before this happens the poor condition of the fabric of the existing buildings needs to be addressed. The foundry roof requires repair/replacement and the walls require damp-proofing. The electrics require modernisation, especially the fuse boxes. The extraction system needs completely rethinking in order to create a foundry that meets C21st standards. The former oil-fired furnaces can be replaced by modern, low-emission furnaces that are better for the environment and tend to produce castings with lower contamination and higher quality. A modern plant to process resin-bonded sand (which is far stronger than the previous 'greensand' moulding) will be installed along with vacuum casting and centrifugal casting systems. The foundry will require improved lighting, modern workbenches and an organised pattern storage area. A digital studio and 3D printing and CNC milling area will be required. A complete plan of the different uses will be prepared. The intention is to create a vital new foundry and training/archive/educational centre within the existing buildings without altering the fabric of the listed buildings. There is ample space for a shop to sell products manufactured on the premises. The offices can be adapted for website design, internet sales, social media, computer based work and a communications department to advertise the re-vitalised foundry and its services.

There are two foundries still casting large bells in the UK; the Westley Group in Stoke-on-Trent and Taylor's of Loughborough. The bell foundry community is small and everyone knows each other. I have been working with the Westley Group and introduced modern casting techniques to produce high quality castings. We are proposing to use similar techniques in the modernisation of the Whitechapel Bell Foundry. It is now not realistic to cast large bells on site in Whitechapel and we will develop a collaborative approach sharing the new work that will result from the application of technology to the recording existing bells and the revival of interest in bell making. We aim to launch a fundraising campaign to draw attention to the great bells of the past and create a range of scale replicas appealing to different audiences. The supportive public response to the closure of the bell foundry has been incredibly positive!

The original patterns are not available, so new patterns will be manufactured utilising computer aided design and 3D printing to create accurate scale models. These could include the Liberty Bell, Big-Ben, The Olympic Bell, The Lutine Bell. These commemorative bells can be manufactured alongside other specialist castings. Historical research into casting techniques, small-scale fine art castings and an innovative approach to bell-foundry work presents a wonderful opportunity for education. This will focus on schools, visits for the general public and apprenticeships. These apprenticeships will aim to take bell casting into its next phase. They will teach: investment casting (lost wax, ceramic shell and other innovations), moulding, alloys, casting techniques and fettling the castings. But they will also focus on digital scanning, processing and output technologies. A CNC (Computer Numerical Control) machine can be programmed to accurately work the surface of the casting to a given profile. The tuning of bells is another skill in its own right. Unlike piano tuning, there is no college course available to teach bell tuning. Apprenticeships are no longer commonplace in London's east end, so the former foundry site could become an invaluable employer and teaching centre.

I am willing to pass on my skills and knowledge, acquired over 40 years of bell foundry work, to the next generation. I am committed to the re-employment and retraining of former employees at the WBF. I welcome the chance to share my knowledge of the history of bells and the bell community and develop existing international connections. Working with a not-for-profit organisation like Factum Foundation, committed to the application of technology to the preservation of crafts skills, is exciting. This approach to the revitalisation of the Whitechapel Bell Foundry will keep the production of bells on this site for the foreseeable future.



Laser scanning of original bronze sculpture.



Neutron scan.



3D print of the sculpture.



The wax model and sprue system.



Clay investment being applied to the wax model.



Bronze poured into the investment mould.



The final bronze reconstruction.

The Centre for the Study of Historical Casting Techniques will focus its investigations on foundry work over the centuries from a practical perspective. The act of casting differs from theory in subtle ways and new insights are emerging from this analysis of a fundamentally important technology. The 'bronze age' defines a moment in human evolution yet there are many aspects of the casting process that need to be understood through practice rather than theory. Using scientific analysis coupled with a practical understanding of the complex, multi-stage process of lost-wax casting it is possible to assist in the conservation of objects, inform academic study, make attributions and understand the moments of innovation in casting techniques. As Bell foundry work goes into its next phase the understanding of the material evidence of previous technologies is more important than ever.

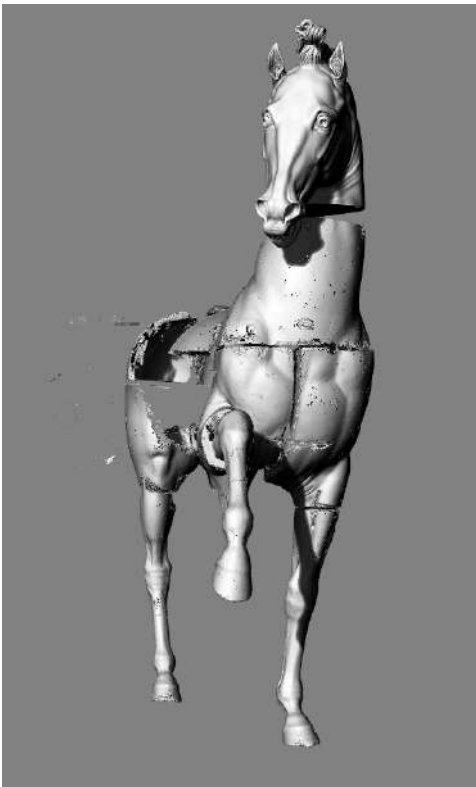
The creation of historically accurate, experimental reconstructions of bronze sculptures can improve the understanding of material usage, process and the artist/founders that made them. When this work is linked to material testing and the forensic analysis of existing sculptures (using X ray and X ray fluorescent spectroscopy) a new level of understanding emerges. When this approach is coupled with the high-resolution recording systems being promoted by Factum Foundation, an important archive will emerge. Not only of existing bells around the country whose condition can be accurately monitored, but the technologies also allow for the production of exact copies. Highly accurate facsimiles have an advantage where scientific uncertainties exist. Alternate hypotheses can be tested by altering variables in the casting process and the facsimile itself can be dissected or even tested to destruction.

Such reconstructions allow the modern-day artist/founder to step back in time, gaining insight to the difficulties and challenges faced by colleagues hundreds or even thousands of years ago. This approach is vital for museums like the Victoria & Albert, where process and industrial innovation plays a critical part of its identity. The V&A was formed to promote the technologies of the second half of the C19th and the new space they are opening on the former Olympic site will celebrate and communicate the museum's roots in industry. A close relationship with the practical work that will be carried out in the rejuvenated bell foundry will be a great asset to the area. The V&A site is next to Here East where UCL has established a collaborative venture between the Faculties of Engineering, Computer Science and Architecture (see letter of support from Peter Scully, Technical director, BMADE). A convergence of these historical, technological, and innovative centres can benefit from the manufacturing history of the East End generally and the Whitechapel Bell Foundry specifically.

Andrew Lacey is an historical foundry expert and artist. He works with experts from the UK, Europe and the United States in order to test, debate and share a working understanding of historical foundry techniques. His work has already resulted in the proposed attribution of the Rothschild bronzes to Michelangelo. He has worked with the conservation departments at the V&A, the Rijksmuseum, the Fitzwilliam Museum and others and the academic importance of this approach can be demonstrated by the work carried out with Pamela Smith to reconstruct Wenzel Jamnitzer casting methods.



The solid silver Cellini Bell, 1550, in the British Museum has been recorded by Factum Foundation, part of a facsimile project for Strawberry Hill House. The Cellini bell was cast by Wenzel Jamnitzer in Nuremberg. Jamnitzer was not only a master goldsmith and casting specialist but he developed a process capable of perfectly casting animals, grasses and leaves. Through a detailed study of his casting processes Andrew Lacey has been able to replicate the details of his casting methods.



Canova's horse reconstruction process by Factum Arte.

Factum Foundation is committed to using new technology in innovative ways to demonstrate the difference between preservation and restoration. The preservation of cultural objects can use an experimental approach to non-contact digital restoration as a powerful tool to educate a diverse audience about the problems of preserving the articulate evidence of the past.

Factum Foundation is currently working with the Museo Civico of Bassano del Grappa on several projects related to the preservation and communication of the importance of Antonio Canova. In February 2018 all the fragments of a destroyed equestrian statue created by Antonio Canova in 1806 were scanned and a complete digital restoration is underway. Hundreds of pieces of varying sizes have been recorded at high-resolution using white light scanning and photogrammetry. They are digitally analysed and painstakingly filled together both digitally and physically. Once the puzzle has been completed the missing sections will be re-created and 3D printed or CNC milled at actual size. These pieces will be cast using the lost wax process to create a bronze version of the original which will stand in the centre of Bassano del Grappa.

During the intense bombing of the second world war many bells were destroyed. In the years following the destruction of London, the Whitechapel Bell Foundry recast many of these bells. As a demonstration of good will and of the potential of digital technology, Factum Foundation will seek permission to record the famous smashed bells from Lübeck. During the fire caused by an air-raid in 1942, the bells are reported to have rung again in the upwind before crashing to the ground. The remains of two bells, the oldest bell, the “Sunday bell” by Heinrich von Kampen (2,000 kg) and the tenor bell by Albert Benningk from 1668 (7,134 kg) are preserved in their smashed state at the bottom of the bell tower. Factum Foundation will fund the work to scan and reconstruct these two bells. A commemorative edition could be made at different sizes in a gesture of peace and reconciliation.

Digital preservation of existing bells will be an important part of the new foundry.



Bells at St. Mary's Church, Lübeck.

4.5 Archive for Campanology

The 3D and acoustic recording of existing bells around the country will become the basis for a campanology archive at the WBF – an archive of this kind is sorely lacking in the UK, which has long been a centre of bell-making and bellringing. Factum Foundation's unique 3D scanning and training skills will establish a small full-time team who will be able to systematically record all the bells in the country. This will take many years but will be the type of project that can support the work on Art UK and the Public Catalogue Fund. Lidar scanning, white light scanning and photogrammetry will be used to record the shape and decoration of each bell. Working with the sound engineer Nathaniel Mann and the acoustics team at Max Fordham, a sound archive will accompany the 3D recording.

Factum Foundation has close contacts with the V&A, with UCL (through both Queen Mary's and the Bartlett). Both the V&A and UCL have made long term commitments to the former Olympic site and are based near or in Here East where engineering and digital technologies are being encouraged and promoted. In this context fabrication sites like the Whitechapel Bell Foundry are more relevant than ever. Mike Oldfield's Tubular Bells captured the imagination of a generation. In a synaesthetic age where bells and gongs are valued a bell foundry assumes genuine importance.



Grayson Perry; the artist has been approached to make a bell-related project for WBF.

A selection of artists' projects using bells,
selected from the internet



Barry Flanagan.



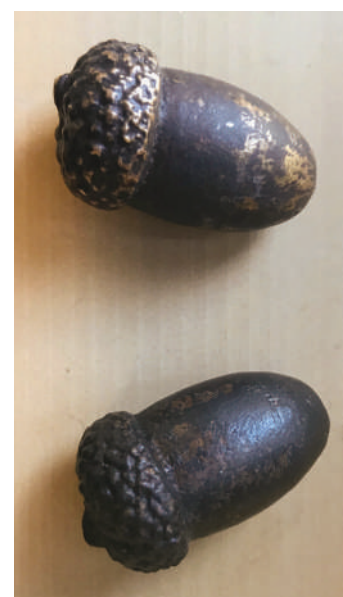
Jeff Koons.



Anish Kapoor.



Factum Foundation team recording the Signing Oak in Windsor Great Park in 2016 using photogrammetry.



Acorns scanned from the Signing Oak.

Art and Artist's Projects

Artists editions to provide work and an endowment for the Whitechapel Bell Foundry

Factum Arte and Factum Foundation work closely together in a dynamic relationship that has been highly effective in both assisting artists in the production of works of art and in the preservation of the artistic heritage of the past. Factum Arte collaborates actively works with artists to create unique works and editions and has been doing this since its formation in 2001. At that time we were working with a small group that included Anish Kapoor and Marc Quinn. Factum is still working with Anish and Marc but they have been joined by many others. This extraordinary network of artists will feed into the new editions that will be produced in support of the Bell Foundry and the tradition of casting in the East End. Grayson Perry has already been approached to make an edition that will be based on a bell and cast in the foundry. Norman Rosenthal, one of the greatest curators of recent years, and based at the Royal Academy for over 30 years will help to curate a collection of editions that will result in a remarkable collection: a great investment that provides constant revenue for the foundry from both casting work and sales.

Factum's first connection with a bell made at the foundry was when we scanned a scale model of the Liberty Bell as a test for Jeff Koons. He will be invited to be part of the first collection of 'bell related sculptures'. Other artists will include Anish Kapoor, Marc Quinn, Marina Abramovic, Cornelia Parker, Paula Crown, Conrad Shawcross, Anthony Gormley, Ahmed Mater, Shirazeh Houshiary, Maya Lin, Mariko Mori and Sarah Sze. (All have a working relationship with Factum Arte).

The Whitechapel Bell Foundry is in the centre of one of London's creative districts: the Whitechapel Gallery is opposite and Iwona Blaswick is a supporter of this initiative. The Foundry will run an annual competition for 'local' artists (people living within the sound of the Bells at Whitechapel on a still day). The selected work will be cast and made available as an edition thereby contributing to keeping one of London's most important manufacturers alive. It is a message that will resonate throughout the artistic community in London and abroad.

Bronze Oak Tree Initiative

On the 11th -16th April 2016, Pedro Miró, Manuel Franquelo, Ferdinand Saumarez Smith and Adam Lowe from Factum Arte/Foundation visited the site at Windsor Great Park and conducted a photogrammetric recording of the 900 year old Signing Oak. Two Canon 5DSR cameras with two different lenses were used to photograph the whole tree. Each image was captured with a 90% overlap. Over 5000 images were taken and stitched together using Capturing Reality, a specialist photogrammetry software. A Lidar scan of the tree was also made in the days before it burst into leaf. An exact copy can be made from the merged data, accurate to the smallest blemish. We are proposing to record the country's bells in the same way.

In October 2016, the year of Her Majesty's 90th birthday, a two metre tall version of the Signing Oak was presented to Queen Elizabeth II at the Royal Academy of Arts, London. This gift launched the Bronze Oak Project dedicated to drawing attention to the plight of oak trees across the UK and confirms the Queen's central role in the protection of oak trees across the UK. The Bronze Oak Project is now entering its next stage. Thousands of bronze acorns will be cast and given to supporters who help make the Signing Oak at a scale of 1:1 – almost 18 meters tall.

5.1 Resurrection of the Bell Foundry in Whitechapel – Introduction

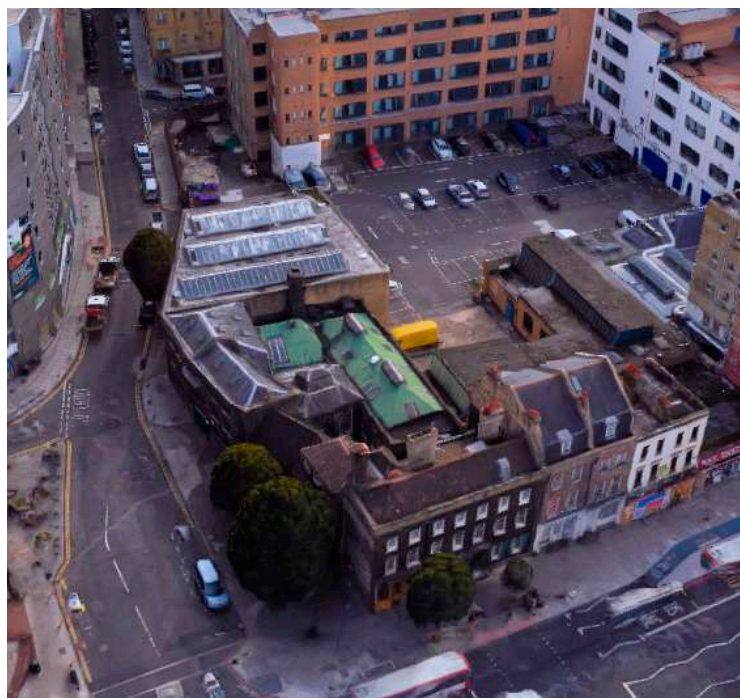
The Whitechapel Bell Foundry is a unique 18th century complex of buildings of profound historic and cultural importance. It has been a place of specialised and relatively unaltered industry - bell making –for nearly three hundred years. Just as the sand and loam foundry pits were carved into the earth and foundations of the city itself, so the building and its multiple, complex, human histories are embedded in the wider story of London, dating back to Elizabethan England, and reaching even further, to 13th century bell founding.

The building structure was adapted over time so that its form reflects subtle changes in bell making technologies. The arrival of a steam engine operated bell tuner in 1848 that led to changes in the building structure (and addition of the ‘Tuning Shop’) is only one example of many where the architecture becomes narrator of the building’s history and historic use. Bringing bell founding into this century has the potential to add another chapter, one that will infuse the site with new life, simultaneously preserving and revitalising its immensely rich past.

In order for the site to continue to function as a foundry, and to thrive as a 21st incarnation of its former self, there are essentially two architectural elements that need to be addressed and unified into an integrated whole. These are the existing, historic, listed buildings at the front of the site, and the unlisted area that was constructed in 1979-81 to the rear, built to replace bomb damaged structures. These counterpoints: the C18th, listed, historic structures, and the C20th, unlisted, ‘shed’ structure, are the perfect foundation for the new foundry programme.

Two different conditions will require two different approaches, developed in collaboration, to reach an operational and visual coherent whole. The demands of the project require a sensitive and expert handling of listed and heritage structures, a deep reading of site and history, and creative innovation and use of materials in adapting and expanding the rear of the site to create a new building.

To that end, Skene Catling de la Peña and Purcell will be collaborating from the outset to bridge these two component parts. The strengths of each practice will contribute to an architectural outcome that will both restore the heritage buildings and deliver an innovative new structure to house the elements of the programme at the rear of the site; one that reflects the materials, processes and histories of the old Bell Foundry. This team of architects, engineers and heritage consultants are regular collaborators who have a shared vision.



Aerial view of the Bell Foundry site.

Skene Catling de la Peña

Skene Catling de la Peña is an award winning architectural practice based in London and Madrid. Formed by Charlotte Skene Catling and Jaime de la Peña in 2003, they have completed projects around the world, addressing a variety of typologies for private and commercial clients. The practice follows an approach they call *Geoarcheology*, a process that excavates meaning from context as a way of developing architecture. Where geology is focused on the study of the earth and the rocks from which it is formed, archeology concentrates on the ‘biofacts’, artifacts, architectures and cultural landscapes within a given place.

The practice places a strong emphasis on research and collaboration throughout the development of projects leading to the rigorous exploration of ideas and possibilities at all scales from concept to detail. They collaborate regularly outside the normal boundaries of architecture to create unique work. Innovative environmental solutions have an inherent integrity and beauty, and make practical and economic sense.

They are experienced in the design and integration of contemporary projects into important historic sites, and in creating interventions within sensitive heritage contexts such as Waddesdon Manor, Buckinghamshire, and the Perm World Heritage Site, Russia. They have experience working with institutions such as The Royal Academy, London, or the Antikenmuseum, Basel. With the Flint House, commissioned by Jacob Rothschild for the grounds of Waddesdon Manor, they treated the building as a ‘geological extrusion’, pulled from the chalk and flint fault line that runs from Norfolk to the South Downs. A team of flint workers used the Neolithic art of flint knapping to create a completely contemporary structure that has a primal resonance with the site.

Skene Catling de la Peña are currently working on an art institution, as well as number of housing projects that seek to question the underlying assumptions about the way groups of people live together. They have just been appointed as architects for the new MiSK Art Institute in Riyadh, to begin on site in 2019. They have been extensively published internationally. In 2016, Charlotte Skene Catling was the only European to be shortlisted for the AR Women in Architecture award.



Flint House, Buckinghamshire, by Skene Catling de la Peña. Structure of flint and chalk, reviving flint knapping skills in a contemporary design. Winner of the 2016 RIBA House of the Year Award, among others. Photograph by James Morris 2015.

Purcell was founded by Donovan Purcell in 1947, and was one of the first practices in the UK to develop specialist heritage and conservation expertise. As Surveyor to the Fabric of Ely Cathedral (an appointment that the firm still holds) Purcell championed the use of traditional building materials and techniques in an age when unsympathetic modern interventions threatened the fabric of many of the UK's most important historic buildings.

Over the intervening 70 years the practice has built on this philosophy and has grown to the largest UK practice specialising in the care and conservation of historic buildings, with 15 offices nationally and 2 internationally. Purcell's list of projects included some of the UK's most significant historic buildings, including cathedrals, museums, galleries and prominent public institutions. Selected clients include Historic Royal Palaces, The British Museum, The National Gallery, The National Maritime Museum, Oxford University, Canterbury Cathedral, Durham Cathedral, Ely Cathedral, St. Paul's Cathedral, Wells Cathedral, Ministry of Defence, the Parliamentary Estate, Her Majesty's Court Service, The Crown Estate and the City of London.

Purcell's heritage expertise has been recognised through the highest national and international awarding bodies, including Europa Nostra, RIBA and RICS Conservation Awards (including several prestigious Project of the Year accolades), Museums and Heritage Awards, Civic Trust Awards, AABC Conservation Awards, National Trust Special Places and RIBA English Heritage Awards for Conservation. Purcell's historic building experts also include architectural historians, archaeologists and researchers. These are recognised through membership of professional institutions such as the Institute for Historic Building Conservation (IHBC) and the Chartered Institute for Archaeologists.

Between our in-house architects, surveyors, technicians and heritage consultants Purcell covers the full breadth of heritage practice, from technical conservation and design through to support with achieving listed building consents and heritage funding. Services provided include conservation architecture, heritage masterplanning, condition surveys, conservation management planning, heritage impact assessments, environmental impact assessment contributions, expert witness work and built heritage and archaeological advice.



Durham Cathedral, C14th Monastic Dormitory (the last in England). Purcell Architects have been involved in Durham's 'Open Treasure' project since 2010.

The project to resurrect the Whitechapel Bell Foundry will need to consider and respond carefully to the significance of the existing Grade II* listed buildings, and historically significant context in which they sit. Our methodology for undertaking this project would begin with the drafting of a Heritage Appraisal, comprising the following tasks:

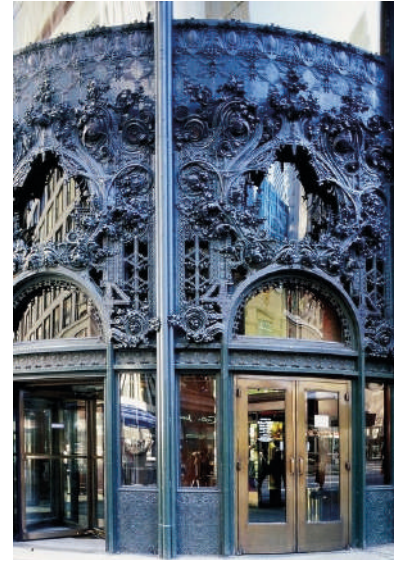
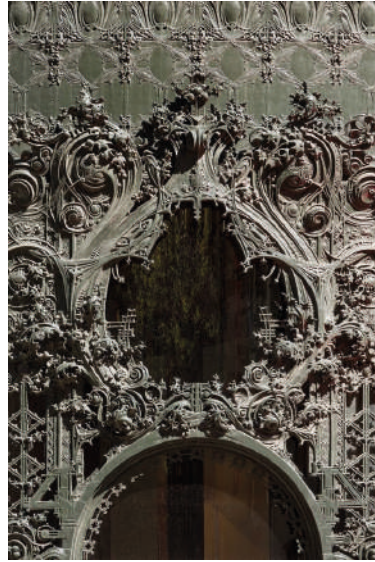
- Review of existing documentation and planning history search (in conjunction with Lichfields)
- Identification of surrounding heritage assets and designations
- Develop a thorough understanding of chronological pattern of development of existing building and identify areas of lesser/ greater significance through site survey
- Conduct archive research to collate historic building plans / photographs / maps that evidence the evolution of the building sufficient to understand the basics of significance

The heritage appraisal will begin at the outset of the project, informing our strategic approach from the very start of the concept design phase and allowing the proposal to evolve with true respect to historic significance of the existing buildings. This appraisal will be developed over the course of RIBA Stages 2 and 3 into a full heritage statement which will incorporate a heritage impact assessment reviewing the impact of the proposals for the listed building and remainder of the site as well as the wider context in support of a submission for planning and listed building consent.

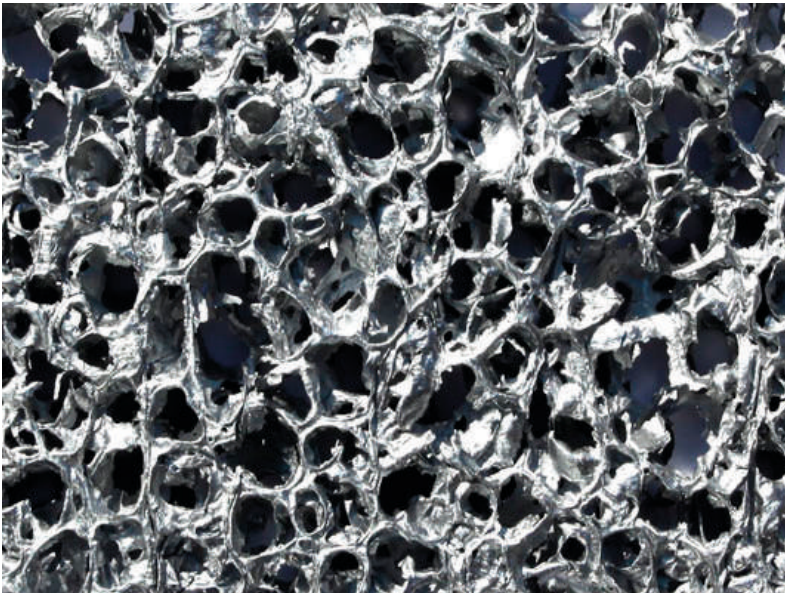
The conceptual starting point for resurrecting the Grade II* listed C18th foundry buildings will be to develop and refurbish with respect the pattern of historic fabric, and in response to those aspects of the building considered to be most historically significant. We will seek to limit intervention to the minimum necessary to bring the buildings back to life, drawing on historically significant aspects of the existing as touchstones for developing any intervention required. We are very interested in the role that appropriate re-use and adaption plays in conservation, and we feel strongly that the significance of this building locally, nationally and globally is drawn from its use as a foundry. We consider that continuity in this regard should be considered of the highest priority in respect of the preservation of what is valuable about this building as a heritage asset, and our proposal for the resurrection would be centred on this point.



Cast iron façade for Paul Smith by 6a Architects, 2013.



Louis Sullivan, bronze coated cast iron, Schlesinger & Mayer Building, Chicago 1899.



Aluminium foam.



Cast aluminium panels, Kengo Kuma.



Cast aluminium panel.



Cast bronze panels.

All new building will be restricted to the footprint of the 1979-81 workshop to the rear of the site. This part of the complex offers an opportunity to respond to the historic listed buildings in both materiality and process. This building would be developed to the height of its near neighbour on Plumbers Row, adding four stories to the existing double height volume. This will house the new programme related to and supporting the bell foundry. While not an architectural proposal, this outlines a simplified building programme and an architectural approach.

The new programme will include the following:

Ground Floor

- Double height ground floor extension of the Foundry to contain workshop and finishing space – (Level +1 & 2)
- With large vehicular street access for deliveries and collections
- Separate entrance to the upper levels

Upper Floors

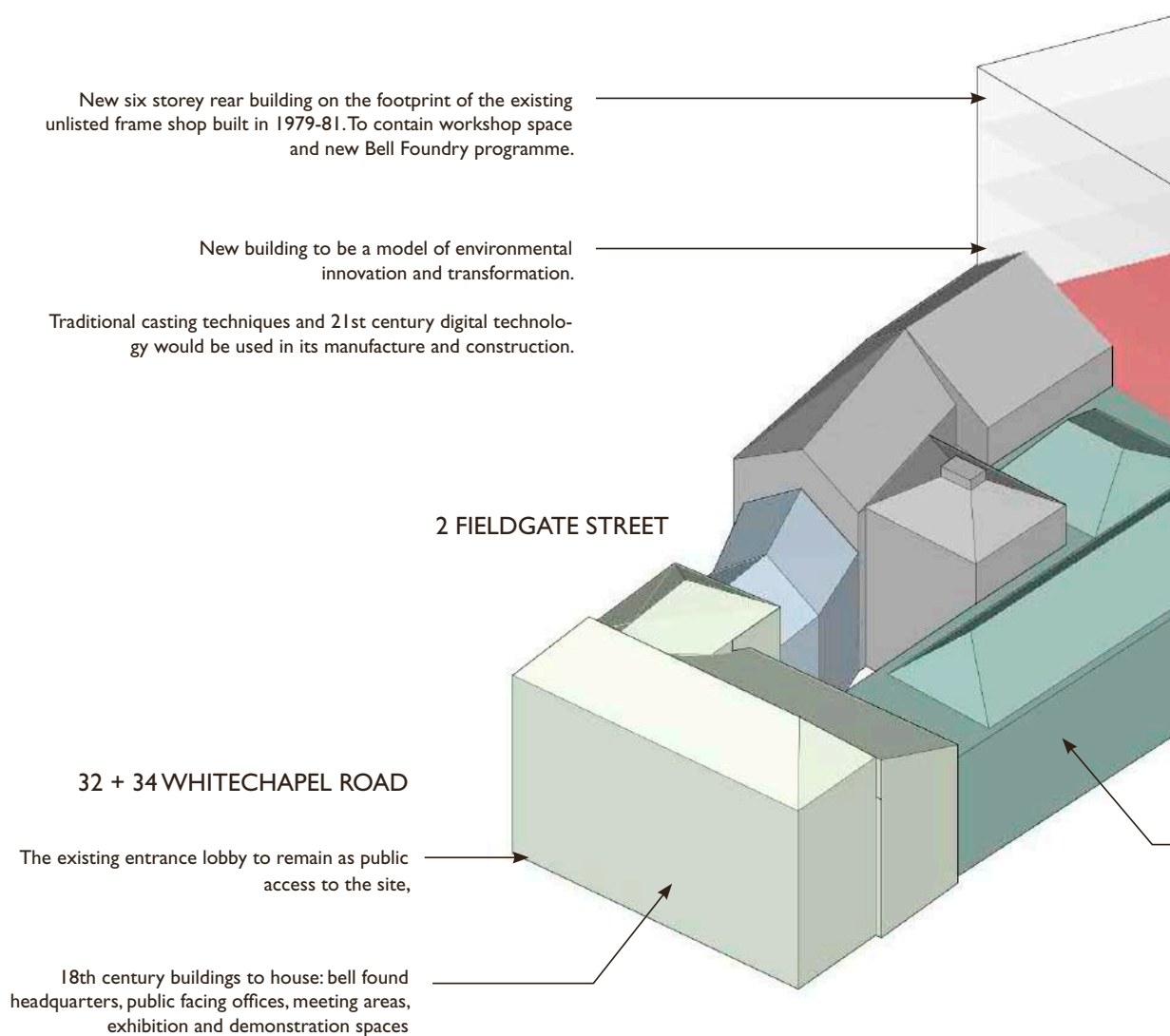
- Bell Foundry Archive & Research Centre for the study of Campanology and Acoustics – (Level +3)
- Centre for the study of Historical Bronzes – (Level +3)
- Educational & Apprentice Training Centre – (Level +4)
- Accommodation for Bell Foundry Apprentices & Visiting Specialists – (Level +5)
- Affordable Live-Work Studios for Artisans – (Level +6)
- Kitchen Garden Rooftop Amenity Space – (Roof Level)

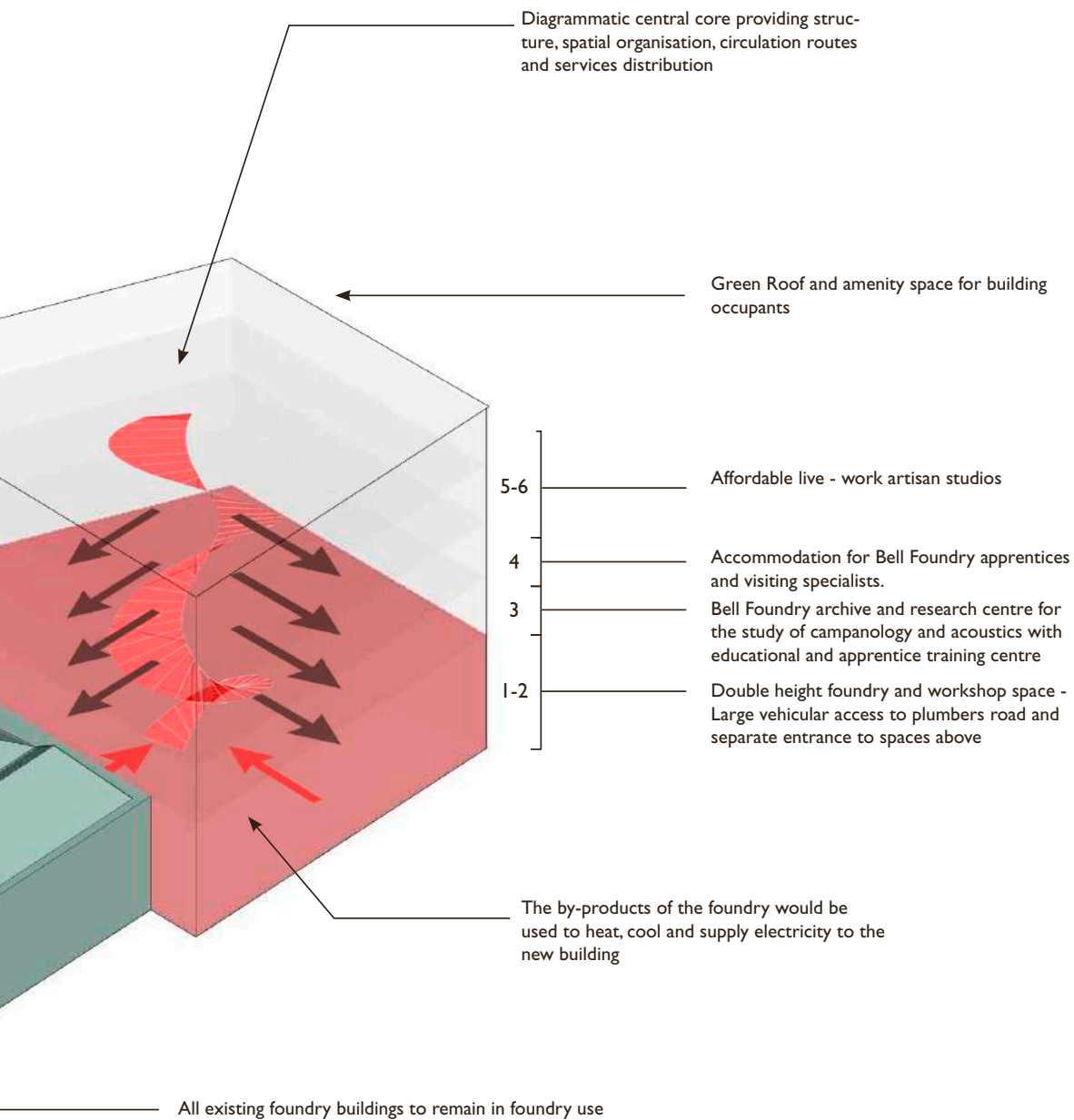
Casting On Site

At a larger scale, the programme will be conceptually ‘carved out of’ and ‘cast into’ the six storey volume. Elements of the cladding, core and structure will be cast on site, allowing the architecture to grow directly from its context as a visual declaration of the processes and materials worked inside the building. They will use a combination of new digital technology and historic craft techniques; the signature of the new Bell Foundry. Existing forms will be scanned and developed through on screen modeling, ‘carved’ using a 7-axis router, or 3D printed. These forms can then be cast using the traditional lost wax techniques and craft skills of the foundry. Materials could include cast iron, corten steel, aluminium, zinc and glass.

Innovation and Transformation

The unique by-products of the foundry would be used to heat, cool and supply electricity to the new building. Not only would this become a model of environmental innovation, this approach would generate a very high quality of life. The recycling and funneling of foundry waste heat through the new building central core would supply radiant heat in winter and – through inversion – act as a cooling device in summer. Excess heat at the high temperatures reached in the foundry can be converted to electricity and stored. The building will have a green roof as amenity space, offering kitchen and pleasure garden. The central element will become structural core, spatial organiser, circulation route and services distributor.





*Note: This is a diagram to show the distribution of the programme, not an architectural proposal.

Dr Neil Smith
Director, Max Fordham LLP . Building Services Consulting Engineers

The Whitechapel Bell Foundry rejuvenation provides an opportunity to apply best practice sustainable design that carefully balances the energy and environmental performance required by the London Plan, with the heritage, cultural and economic needs of the existing foundry.

The provision of new modern furnaces would allow waste process heat from the bell manufacturing to generate domestic hot water and space heating for the new archive/research centre, craft studios and worker accommodation. The waste heat can also be used for electricity generation through thermo-electric modules attached to the furnace flues.

The heat generated in the furnace workshops has the potential through space planning to drive summer ventilation via convection of other parts of the foundry support spaces, such as the frame shop, and studios. Similar methods were regularly used in Victorian times, including the houses of parliament. Also such careful organisation of spaces around the furnace areas can be used to buffer the heat flow to outside.

Installation of heritage considerate insulation to the roof of the listed building elements and the use of secondary glazing or replacement glazing could be considered to help reduce heat losses. Restored spaces would benefit from the use of the thermal mass of the exposed existing walls, which can help spaces balance heating and cooling loads over longer periods of time.

Heritage will be retained through the re-use of existing materials and fabrics. New materials and elements will be selected that have a low environmental impact and that make preference for recycled, reusable and reclaimed elements. There will also be a 'design out waste' strategy and construction waste management plan will also be used to address on site waste segregation and recycling and procurement planning.

New spaces would be constructed to the best modern standards for energy conservation and comfort, and would be designed to maximise the use of daylight. Efficient servicing strategies and the implementation of low and zero carbon technologies would be used to reduce CO₂ emissions.

Rainwater collection and water recycling could be investigated for use in the bell manufacturing process.

Stephen Haskins
Director, engineersHRW, Structural Engineers

To give new life to aging buildings and structures is not only laudable from a cultural heritage perspective, it is also a sustainable form of construction. For a set of buildings not only to be bought back into use, but also to be able to continue a manufacturing process that extends over many centuries, has to be a unique opportunity.

In respect to the re-use of these Grade II* buildings as a continuation of their original purpose, we would anticipate minimal structural intervention. The buildings' layouts (specifically mentioned as a reason for listing) the strength of the gantries, cranes and supporting structure will have been determined through decades / centuries of smelting, casting and associated operations as part of the function of a foundry.

In the rare instance that this proposal offers, it is the preservation of the existing building fabric that would be paramount. That process is one of close inspection, recording defects, liaison with heritage bodies and meticulous piecemeal repair. This is a process which engineers HRW have refined over the years and as a result, based on our knowledge of historic structures, we have developed specifications and details that work with and extend the life of the existing building structure.

Challenges will also exist in respect to the new build element of the proposal and the interface with the existing buildings, the proposals would avoid construction techniques or design details that could damage these structures, in particular from ground movement (settlement). Although not required by regulation, embodied energy and sustainable construction are important issues and ones that we would introduce at an early stage in the design development of the proposed new building.

5.8 Heritage Planning Statement: Lichfields

Nick Thompson
Senior Director, Lichfields, Planning and Development Consultancy

This statement has been prepared by heritage consultants at Lichfields, the pre-eminent planning and development consultancy in the UK. As Full Members of the Institute of Historic Building Conservation (IHBC), Lichfields' heritage consultants are well-placed to advise on the heritage planning context and strategy for the future use of the Whitechapel Bell Foundry site.

Lichfields, town planning and heritage consultants, has been asked to briefly set out the approach to take when considering the future use of a heritage asset, such as the Whitechapel Bell Foundry (WBF).

The approach is set out in national guidance, the National Planning Policy Framework (NPPF):

“Local planning authorities should identify and assess the particular significance of any heritage asset... They should take this assessment into account when considering the impact of a proposal on a heritage asset, to avoid or minimise conflict between the heritage asset's conservation and any aspect of the proposal.” (para. 129) (our emphasis).

The Grade II* listing of the WBF will be central to considerations for its future use. In addition to general architectural interest, the list description identifies architectural and historic interest related to its historic and original use as a foundry (including associated domestic residence). It also notes the WBF is a rare survival as there is only one other surviving bell foundry in the country. Due to its esteemed history, the WBF site has become synonymous with the now rare traditional skill and industry of bell founding in this country. It is clear that the unique special interest, both architectural and historic, and significance of the site primarily relate to its historic, original and, so far only, use as a bell foundry.

Statute requires local planning authorities to have special regard to the desirability of preserving a listed building or any features of special architectural or historic interest which it possesses when determining planning applications. The NPPF requires “great weight” to be attached to the conservation of designated heritage assets and “The more important the asset, the greater the weight should be...” It also notes that public benefits include securing the optimum viable use of heritage assets. The NPPF Planning Practice Guidance notes that where there is more than one viable use the optimum use is the one which is likely to cause the least harm to the significance of the designated asset. Historic England's ‘Conservation Principles’ importantly notes that the use of a building for its original purpose “...illustrates the relationship between design and function, and so may make a major contribution to its historical values. If so, cessation of that activity will diminish those values and, in the case of some specialised... buildings, may essentially destroy them.”

This highlights the statutory and national policy requirements regarding the conservation of heritage assets and their significance and the important role original use can play in this, as is the case with the WBF site. Therefore, retaining the original use on the site should be the starting point for considerations for the future of the site. Subject to detailed design, if it is possible to viably retain a bell foundry in some form on the site, this would be the optimum use in heritage terms and would preserve the unique special interest and significance of the site which would be harmed were its historic use to be completely removed.

Introduction and purpose of report

Barker-Mills Conservation is an independent, expert consultancy advising on the sustainable management of the historic environment. Following an approach by the Factum foundation setting out the campaign and proposals for the regeneration of the Bell Foundry, founded upon once again casting in metal, we were happy to provide heritage expertise pro-bono for such a worthwhile and in heritage terms, vital, project. The purpose of this report is to briefly set out the heritage significance of the complex and demonstrate how the aims of the project will both sustain and enhance the outstanding heritage interest of this unique site.

Significance of the Whitechapel Bell Foundry

Significance is a term used in “Conservation Principles: Policies and Guidance for the Sustainable Management of the Historic Environment” published by English Heritage in April 2008. For Heritage Policy it is defined as “The value of a heritage asset to this and future generations because of its heritage interest.”. Significance is the sum of an asset’s cultural and natural heritage values and only through understanding the significance of a place is it possible to assess how the qualities that people value are vulnerable to harm and loss.

Any building, monument, site, place, area or landscape has the potential to be a heritage asset and where significance reaches national thresholds it results in recognition through designation, including listing. The Whitechapel Bell Foundry complex has that recognition and is listed at Grade II*, placing it within the top 8% of listed buildings nationally, and having more than special interest. (Appendix 1: National Heritage List for England list description).

The Whitechapel Bell Foundry

Detailed information on the history and evolution of the casting of bells and the foundry itself can be found in The Survey of London volumes. Whitechapel has a long association with bell founding, starting in the medieval period, and specifically on this site from c.1740. The establishment of the foundry at Whitechapel Road and Plumbers Row is notable for being a distinctive, bespoke complex of domestic and industrial buildings that were continuously occupied for over 300 years manufacturing and casting bells.

The historic and cultural importance of this mid-C18th complex and its specialised industry is far-reaching, both literally and figuratively as it produced some of the most famous bells in both British but also international contexts. This was the complex that produced the bells for St Mary Le-Bow, in London; Great Peter in York; Big Ben in 1858, one of the most famous bells in the world and still the largest bell produced by the foundry; the bells for Montreal Cathedral; bells for the Cathedral in Washington DC; bells for the Catholic Cathedral in Liverpool; and famously, the Liberty Bell in 1752 a powerful symbol in the founding of the United States of America.

But the complex also has deep cultural and historic associations with Whitechapel itself, being an integral part of its character and identity, not least through the connections with generations of craftsmen and their families that lasted until its closure in 2017.

It was a rare example of its type, being one of only two such complexes in England and its significance still survives and can be read in the distinctive plan form of the C18th buildings; the mid C18th and early C19th shop fittings and panelling and elements like the timber crane dating from the 1840’s.

Summary Statement of significance for The Whitechapel Bell Foundry

The Whitechapel Bell Foundry is of unique historic and architectural value as a rare and outstanding survival of a purpose-built industrial complex dating from the C18th but also representing a much earlier history of specialised manufacturing and casting of bells in Whitechapel from medieval times. The distinctive C18th plan form still survives and later extensions and alterations illustrate the expansion of the foundry and the introduction of technological progress. The distinctive bespoke combination of the industrial and domestic character which still survives is a key characteristic of the complex.

The historic and cultural value of the foundry is deep rooted locally as well as in a London context, but is also of national, indeed international, significance through its products that include some of the most famous bells in history.

The Proposals and their impact upon significance

The proposals being developed for the complex by UKHBPT and the Factum Foundation for the future use of the complex are based upon a good understanding of the outstanding heritage interest of this site. The proposal to re-introduce bell casting, and repair, but using C21th techniques, provides a direct link back to the original purpose of the site and re-instates the golden thread of bell founding that has been an essential part of the identity of Whitechapel. It was the purpose for which the complex was created and on the evidence of the scheme as developed so far, will not cause any harm or raise any substantial issues for the surviving historic fabric or architectural interest of the buildings.

The proposal for the centre for the study of historic bell casting will enhance the historic significance of the heritage asset by increasing the understanding and appreciation of its original purpose. The proposed use will be an appropriate response to the historic character of the complex and the additional opportunities presented through apprenticeships and heritage education will also enhance its cultural value.

The recognition that there is a need for a new chapter for the foundry, but one that respects and responds to its unique heritage and cultural value underpins the proposals. Securing the future of the building in this manner would be a heritage benefit by enabling the heritage asset to survive and continue to illustrate the long history of manufacturing on this site. But importantly it would also be a wider public benefit for the local, national and international communities for whom this unique site has great value.

5.10 The Site :Whitechapel Road, Fieldgate Street and Plumbers Row

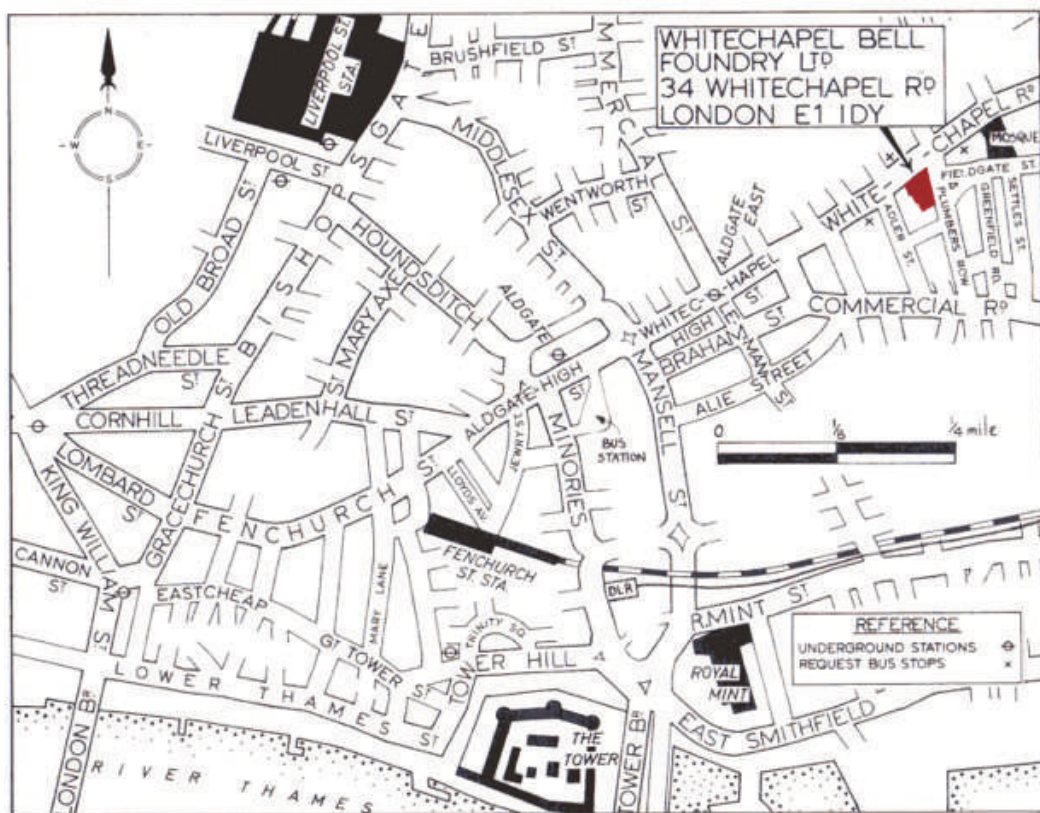
Excerpted from the Building Listing (For full listing see Appendix 4)

Whitechapel Bell Foundry, a complex established in the mid C18th, with alterations of the C19th and C20th, is listed at Grade II* for the following principal reasons:

- * Architectural interest: a distinctive, cohesive complex of domestic and industrial buildings spanning nearly 300 years of occupation including the dignified residence of the foundry owner at nos 32-34 Whitechapel Road, no. 2 Fieldgate Street and the industrial ranges to the rear;
- * Historic interest: for the national cultural and industrial significance as the mid C18th site of a specialised industry known to have been located elsewhere in Whitechapel since the medieval period, where well-known bells including Big Ben and the Liberty Bell, Philadelphia, were cast;
- * Degree of survival: nos 32 and 34 Whitechapel Road have a high level of exterior and interior intactness including the early-C19th shop at no 34;
- * Interiors: distinctive for the mid-C18th plan-form, and the mid-C18th and early-C19th shop fittings, wall panelling, chimney pieces, stairs, ironmongery and joinery in nos 32 and 34 Whitechapel Road, industrial workshops containing specialist bell-founding equipment, and the timber crane on the Plumbers Row frontage;
- * Rarity: one of only two remaining bell foundries in England, the other being Taylor's of Loughborough, also listed at Grade II*.



C19th Map of Whitechapel, showing the Whitechapel Bell Foundry in the context of Whitechapel Road, Fieldgate Street and Plumbers Row.

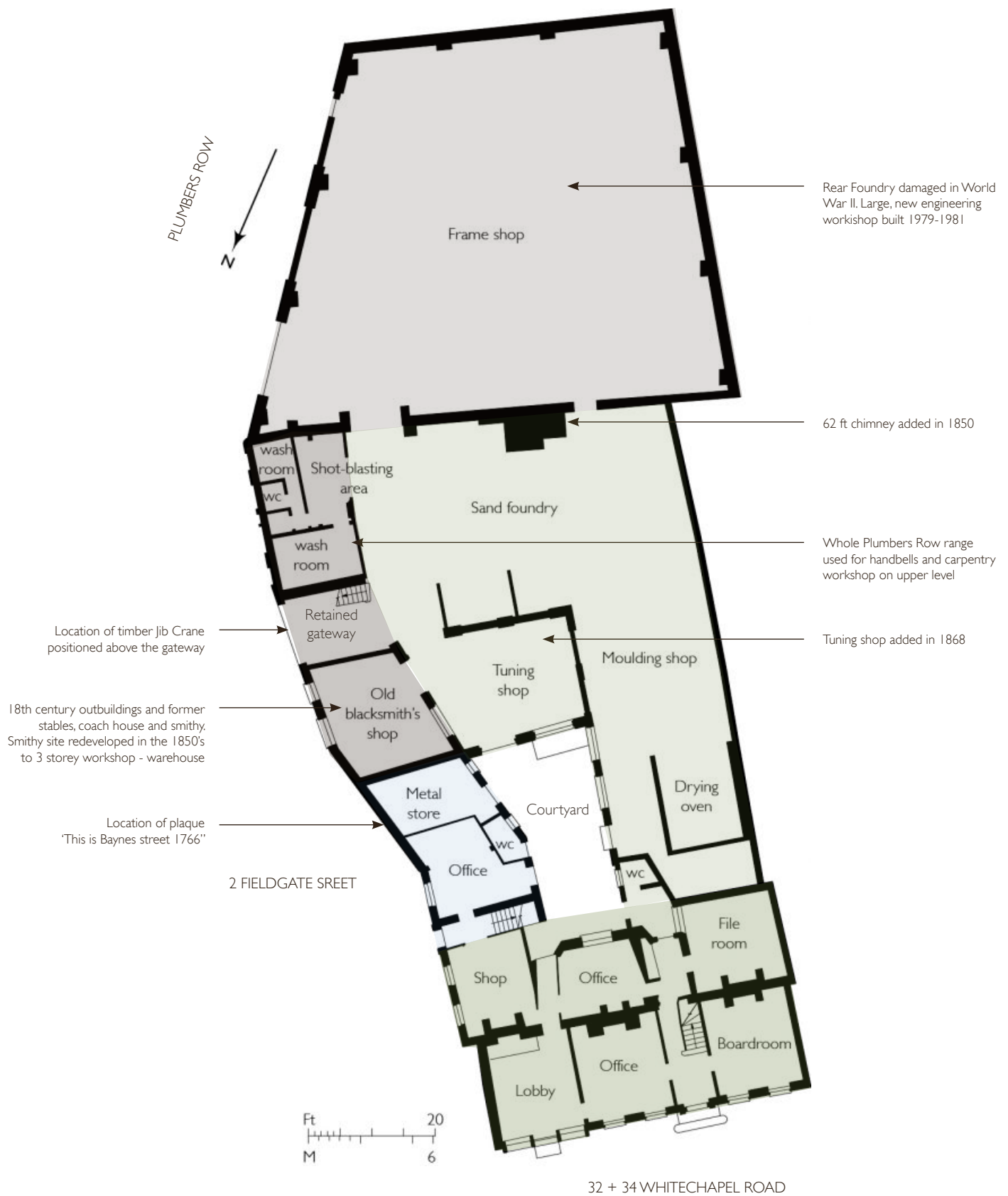


Site plan showing the Whitechapel Bell Foundry, in proximity to the Tower of London and the Royal Mint.



Complex of Listed
18th and 19th Century
Foundry Buildings

Unlisted Rear Building
Constructed 1979-81



Existing Building

Ground-floor plan of the Whitechapel Bell Foundry (Survey of London, Helen Jones), with annotations.

32 and 34 Whitechapel Road

The seven-bay brick range that is 32 and 34 Whitechapel Road is a single room deep with three rooms in line on each storey, all heated from the back wall. It was built to be Lester's house and has probably always incorporated an office. The Doric doorcase appears to be an original feature, while the shopfront at the east end is of the early nineteenth century, either an insertion or a replacement. Internally the house retains much original fielded panelling, a good original staircase, chimneypieces of several eighteenth- and nineteenth-century dates and, in the central room on the first floor, a fine apsidal niche cupboard. Behind the east end is 2 Fieldgate Street, a separately built house of just one room per story, perhaps for a foreman. Its Gibbsian door surround is of timber, as is its back wall.



Top left: Plumber's Row range in 2010. Top right: Tablet inscribed 'This is Baynes Street' on the foundry's former stabling range. Bottom: Tuning shop, 2010. Courtesy of Historic England Archive, Derek Kendall.



Top: Plumber's Row range with timber jib crane in 2010. Middle: The ground-floor front 'lobby' (former shop) at 34 Whitechapel Road in 2010, showing the casting profile of Big Ben over the front door. Bottom: Handbell workshop in 2010. Courtesy of Historic England Archive, photographed by Derek Kendall.

Fieldgate Street

Eighteenth-century outbuildings to the south are single storeyed: a former stables, coach-house and smithery range along Fieldgate Street; and the former foundry (latterly moulding shop) itself, across a yard behind the west part of the house. Facing the street on the former stabling range is a tablet inscribed: 'This is Baynes Street' with an illegible date, perhaps 1766, a reference to what later became Fieldgate Street. This junction, which now incorporates Plumber's Row, bisected property owned by Edward Baynes from 1729.

C18th and C19th Alterations

Given the ownership history, there was little significant investment in the buildings before 1818. However, the smithery end of the eastern outbuilding does appear to have been altered if not rebuilt between 1794 and 1813. Around 1820 a small pair of three-storey houses was added beyond a gateway that gave access to the foundry yard. There are also early nineteenth-century additions behind the centre and west bays of the main house, the last room incorporating a chimneypiece bearing 'TM 1820'.

Thereafter, possibly following a fire in 1837 or in the 1850s, the smithery site was redeveloped as a three-storey workshop/warehouse block extending across a retained gateway. In 1846 the foundry was enlarged with a new furnace by enclosing the south end of the yard, to make an 11.5 ton bell for Montreal Cathedral. Another furnace was added in 1848 when a tuning machine was housed in a specially built room that ate further into the yard with a largely glazed north wall. Two years later a 62ft-tall chimney was erected against the south wall. A large additional workshop or back foundry had been added to the far south-west by the 1870s, by when the pair of houses to the south-east had been cleared for a carpenter's shop, the front wall retained with its doors and windows blocked. The whole Plumber's Row range has latterly been used for making handbells and timber bell wheels.

Back Foundry – 1972-81

The back foundry was damaged during the Second World War. Proposals to rebuild entirely behind the Whitechapel Road houses emerged in 1958 by when the foundry was already protected by listing. The workshops were considered expendable, but even then it was suggested that the timber jib crane on the east wall should be preserved. First plans were shelved and a more modest scheme of 1964-5 was postponed for want of capital, though plant and furnaces were replaced and there were repairs. In 1972 Moss Sprawson tried to acquire the site for office development.

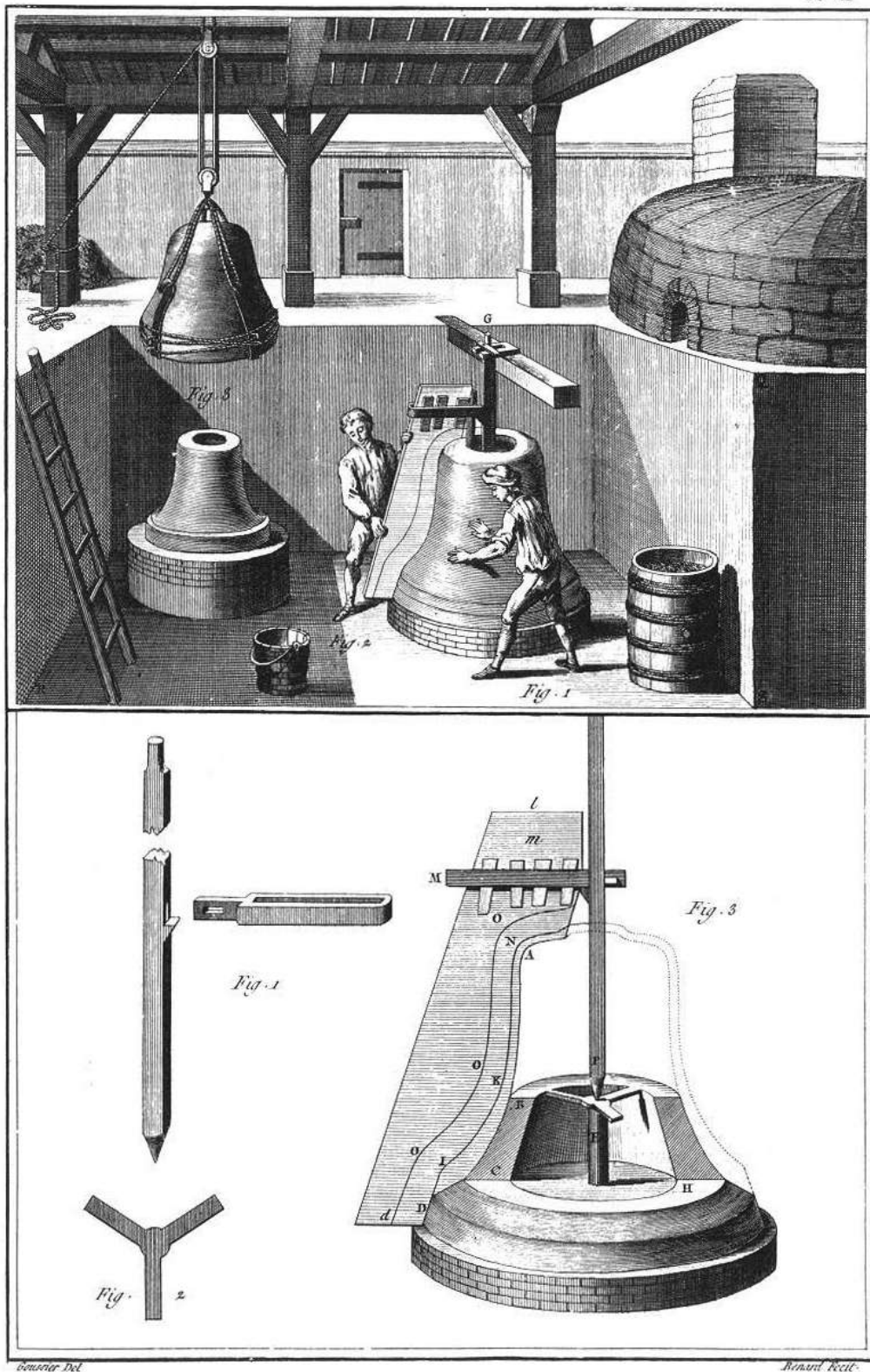
For the foundry, Douglas Hughes (one of Arthur's grandsons) proposed a move east across Fieldgate Street to what was then a car park owned by the Greater London Council. A move entirely out of London was also considered. The GLC's Historic Buildings Division involved itself in trying to maintain what it considered 'a unique and important living industry where crafts essentially unchanged for 400 years are practised by local craftsmen.'^[3] But plans came unstuck again in 1976 when the GLC conceded it had no locus to help keep the business in situ. In the same year the UK gave the USA a Bicentennial Bell cast in Whitechapel.

A large new engineering workshop was at last built in 1979-81, with James Strike as architect. At the back of the site, it was faced with arcaded yellow stock brick on conservation grounds. In 1984-5 the GLC oversaw and helped pay for underpinning and refurbishment of the front buildings."



Test scan of a miniature version of the Liberty Bell made by Factum Arte in 2007.

There can only be one conclusion;
The Whitechapel Bell Foundry is far too important to lose.
The site has been a foundry since 1739
and should continue to transform metal into bells.



Fonte des Cloches, Fabrication du Moule.

"Bell Casting, Manufacture of Moulds", from *The Encyclopædia of Diderot & d'Alembert*, Paris 1767. This book was published 27 years after the move of the Bell Foundry to the site at 32 and 34 Whitechapel Road.

A.1.1 Leading Partners

Factum Foundation for Digital Technology in Conservation, founded in 2009 by Adam Lowe and based in Madrid, is a not-for-profit organisation dedicated to the conservation of endangered cultural heritage through recording, rematerialisation and training.

Website: www.factumfoundation.org

Contact: Adam Lowe, Founder: alowe@factumfoundation.org

The United Kingdom Historic Building Preservation Trust (UKHBPT) is an independent charity under the founding patronage of His Royal Highness, The Prince of Wales. It has had significant success in the repurposing of some of the UK's important industrial heritage, an exemplar being the regeneration of the Middleport Pottery from 2010.

Website: www.ukhbpt.org/information

Contact: Stephen Clarke, Trustee: sclarke.moatfarm@btinternet.com

A.1.2 Architects

Skene Catling de la Peña is an award winning architectural practice based in London and Madrid. They place strong emphasis on research and collaboration throughout the development of projects and collaborate regularly outside the normal boundaries of architecture to create unique work. They are experienced in the design and integration of contemporary projects into important historic sites, and in creating interventions within sensitive heritage contexts.

Website: www.scdlp.net

Contact: Charlotte Skene Catling, Founder: charlotte@scdlp.net

Purcell Architects, established for over 70 years, have vast experience in working sensitively within important historical contexts. The practice has worked on some of the UK's most significant historic buildings including cathedrals, museums, galleries and public institutions, including nine projects located within World Heritage Sites.

Website: www.purcelluk.com

Contact: Martin Dunseath-Franklin, Partner: Martin.Dunseath@purcelluk.com

A.1.3 Engineers

Services Engineers

Max Fordham are a building services engineers. Their approach differs from that of conventional environmental building services engineers. Each member of our team is trained in electrical and mechanical engineering, environmental design and building physics. This training takes place in-house, creating an integrated understanding that considers the whole building. Max Fordham deliver buildings that work, with a focus on detail and finish, to ensure their engineering serves the architecture.

Website: www.maxfordham.com

Contact: Dr. Neil Smith, Senior Partner: n.smith@maxfordham.com

Structural Engineers

Engineers HRW are structural engineers. Through their extensive understanding of historic materials and construction techniques, combined with contemporary technology and building processes, engineers HRW are adept at the art of sympathetic refurbishment and re-use. The importance of working as part of a team is key to their approach, contributing to ideas in the early stages that help to inform the architectural and environmental solutions as well as cost, build ability and delight in the structure.

Website: www.ehrw.co.uk

Contact: Stephen Haskins, Founder: Stephen@engineers-hrw.co.uk

Lichfields is the pre-eminent planning and development consultancy in the UK. Its specialists deliver insight, innovation and advice to create great places for future generations. It has offices in Bristol, Cardiff, Edinburgh, Leeds, London, Manchester, Newcastle and Thames Valley. It offers a broad range of planning services including economics, heritage, sustainability, and urban design. Its clients include local authorities and government bodies, as well as developers, landowners and operators in the housing, retail, leisure, commercial, and infrastructure sectors.

Website: www.lichfields.uk

Contact: Nick Thompson, Senior Director: nick.thompson@lichfields.uk

Barker-Mills Conservation an independent, expert consultancy advising on the historic environment. Dr. Nigel Barker-Mills trained as an architectural historian and from 2011-2016, was Planning Director for the London Region leading a team of 40 specialist Inspectors and advisers, including architects, planners and surveyors providing the statutory advice and grant assistance across the capital. Barker-Mills retired from Historic Britain in 2016. He is a member of the Institute of Historic Building Conservation (IHBC) and has been a member of many expert design panels and published on architectural history and conservation.

Contact: Nigel Barker-Mills, Founder: nbarkermills@gmail.com



Shopfront at the east end of 32-34 Whitechapel Road in 2010. Courtesy of Historic England Archive, Derek Kendall.

On April 19, 2017, Dan Cruickshank and representatives of leading heritage groups delivered a petition of more than ten thousand signatures to Karen Bradley, Secretary of State for Culture and Sport, accompanied by the following letter. There was no response to this.

Dear Secretary of State,

We, the undersigned national and local organisations, wish to express our deep concern about the imminent loss of the Whitechapel Bell Foundry and have also strongly registered our views with Historic England.

Our campaign has been supported by many high-profile individuals in the arts and cultural world including architect, writer and TV presenter George Clarke, author Charles Saumarez Smith, historian Dan Cruickshank, architect Sir Nicholas Grimshaw, sculptor Sir Antony Gormley and many more. The petition attached has been signed and supported by over 10,000 individuals in just three weeks.

We also wish to highlight the exceptional historical and cultural significance of the site that has been at the heart of British bell casting for centuries. The business, principally the making of church bells, has operated continuously in Whitechapel since at least the 1570s. It has been on its present site with the existing house and office buildings since the mid 1740s. In our view this uniquely important historic asset should be properly protected and celebrated through listing at Grade I.

A straightforward redevelopment of this site is not the only option. The UK Heritage Building Preservation Trust which owns and manages Middleport Pottery in Stoke, has made an open request to the owners of the buildings and business to defer the current sale. This would enable an alternative model to be assembled which would save the foundry for the nation where it has been in continuous operation for over 250 years.

We, along with thousands of other people, ask you to understand our concerns and respond accordingly.

Yours faithfully,

Tom Antoniwi, The East End Preservation Society
Henrietta Billings, Director, SAVE Britain's Heritage
Peter Guillery, Senior Historian and Editor, Survey of London
Mike Heyworth, Director, Council for British Archaeology
David McKinstry, Director, The Georgian Group
Matthew Saunders, Secretary, Ancient Monuments Society
Matthew Slocombe, Director, The Society for the Protection of Ancient Buildings
Tim Whittaker, The Spitalfields Trust



Dan Cruickshank and representatives of leading heritage groups delivering a petition with 10,000 signatures to the Secretary of State at Number 10 Downing Street.

Statements by Supporting Organisations and Individuals

Members of the local and bell founding community, heritage organisations, world-famous artists, leading cultural institutions and academics from different fields are supportive of keeping a working Whitechapel Bell Foundry.

“I visited the Whitechapel Bell Foundry not long before it closed and was astonished by what a remarkable survival it was of proto-industrial workshop production, turning out church bells from the fourteenth century onwards and sending them from Whitechapel all over the world.

I sincerely hope that it can be re-established as a working foundry under the auspices of Factum Foundations, keeping alive the traditions of bronze casting in a new working environment.”

Charles Saumarez Smith
Chief Executive, Royal Academy of Arts

The historic value of the Whitechapel Bell Foundry is inseparable from the site’s long continuity of use. The foundry, purpose-built in the 1740s and gradually adapted and enlarged since then, has unparalleled integrity as a long-lived workshop complex. The rarity anywhere in the world of such enduring manufacturing so deeply rooted in a single locality has long been recognised. The foundry had already been making bells for more than 200 years in 1951 when Denys Munby wrote that it ‘is so connected with the history of Whitechapel that it would be impossible to move it without wanton disregard of the associations of many generations.’ Sadly, 66 years later it moved. Alternative uses must be found. In this case, more than most, continuity should be a priority.

Peter Guillery,
Survey of London, The Bartlett School of Architecture, University College London

“London is one of the world’s greatest capitals of music making - and the ringing of bells throughout the city is at its very heart - “Oranges and Lemons” and so on goes the famous rhyme, “Ringing out all over the towns, over the countryside and indeed across the world from Big Ben to America’s mythic Liberty Bell, but many many others too have been lovingly made over more than four centuries at the legendary Whitechapel Bell Foundry at the heart of London’s East End. Bells made to the highest standard are not easy to make. Are we really to allow this most special craft hailing from a special site in London just to disappear? The making of bells are at the heart of so many cultures from China to the East End of London. It needs more than ever to survive. ‘I do not know said the great Bell of Bow?’ We now need find ways to say ‘Yes’”.

Sir Norman Rosenthal
Curator

“It’s high time that London started protecting its most atmospheric historic shops and businesses. If the Metropolis’s streets aren’t to become dreary canyons of identikit boutiques, luxury flays and fast-food joints, we’ve got to act now!
The Whitechapel Bell Foundry is a near-miraculous, Dickensian, survival, and it’s in very grave danger of being lost forever. Possible salvation lies with Factum Arte - one of the most innovative and exciting impresarios of our time - who will cherish its idiosyncrasies, ancientness and spirit.”

Todd Longstaffe-Gowan
Landscape designer and former local resident

“Whitechapel Bell Foundry has been one of the world’s most important industrial enterprises linking unrivalled artisan skill with a great history of metalwork, moulding and casting. The Factum Foundation project will certainly make these skills and history viable and exciting for the coming century of artful digital knowhow and ingenious forms of retraining. WBF will retain and reinforce its place as an astonishing centre of the most sophisticated technical knowledge and its shared embodiment in the London community.”

Simon Schaffer
Professor of History of Science, Cambridge and Advisory Board Member, Science Museum

“I broke the story of the closure of the Bell Foundry last year and, as the voice of the community in Spitalfields, I recognise the immense support there is among the people of the East End to keep the bell foundry alive as a living resource for the future.

Britain’s oldest manufacturing business, the Whitechapel Bell Foundry, sits today within the most deprived part of Tower Hamlets which is itself one of the most deprived boroughs in London, yet I believe it can serve a crucial role in the regeneration of Whitechapel by offering employment, apprenticeships, and genuinely affordable working and living spaces for local people.

The closure of the foundry in 2017 permits the opportunity of reconfiguration and a revitalised future, by combining the production of small bells and art casting, to create a commercial viable business which can offer a sustainable future to this unique complex of listed buildings.

The foundry is integral to the identity of Whitechapel with a line of forty-two master bell founders stretching back to Robert Chamberlain in 1420 and a history spanning twenty-seven English monarchs. Operating at its current site from the seventeen-forties, the foundry cast the Liberty Bell in 1752, a touchstone for anti-slavery campaigners and a symbol of the Civil Rights movement today. More recently, the memorial bell for the victims of the 9/11 attacks in New York which strikes every day, was cast in Whitechapel.

Big Ben, the most famous bell in the world, which tolls the hour at the Palace of Westminster was cast at Whitechapel in 1858. Whitechapel’s Bow Bells of St Mary Le Bow in Cheapside were broadcast by the BBC to occupied Europe as a symbol of hope during WWII.

The Whitechapel Bell Foundry is an asset of local, national and international significance that is too valuable to be sacrificed.”

Spitalfields Life - The Gentle Author



Senior bell ringer Peter Scott installing a bell at St. Magnus the Martyr, London. Twelve new bells were produced for the church in 2011 – the original bells had been removed in WWII. Photograph by Oli Scarff/Getty Images.

“Saving the foundry would make such a valuable stand for the retention of urban diversity, authenticity and our national cultural heritage. A place that cast both Big Ben and the Liberty Bell and is one of the oldest and most significant manufactories in the UK cannot be allowed to become another piece of bland and packaged townscape.”

Tom Stuart-Smith

Award-winning landscape architect, garden designer and writer

“The Whitechapel Bell Foundry is a crucial component of historic Whitechapel. That it has survived for so long on this site and in such romantic Dickensian buildings is nothing short of a miracle. It’s survival as a working site is vital for both future generations and Whitechapel area as a whole.”

Tim Whittaker

The Spitalfields Historic Buildings Trust

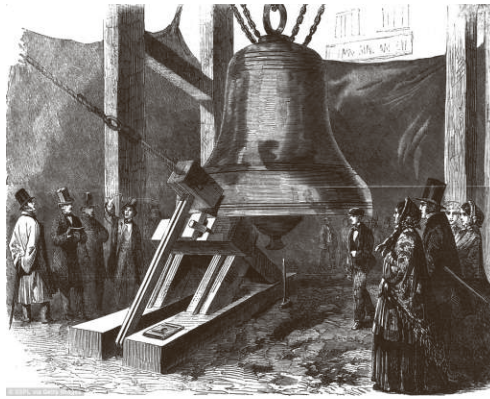
“In 1900 there were around 90 bell foundries in the UK, keeping going a tradition of several hundred years of supporting the wonderful heritage of ‘English Change Ringing’.

There are now 2 left: Taylor’s of Loughborough and Westley Group, who took on the famous name of the Whitechapel Bell Foundry on its closure in 2017.

However, the ending of Whitechapel as a bell foundry is historically tragic, as is the age-old craftsmanship that the company represented in creating new bells for the UK and countries that have English Change Ringing. If the foundry can be restored this will be a major and historic success for the bell world that I am sure that all of us will applaud and support.”

Gregory Rose

Bell ringer



Installing Big Ben at Westminster, Illustrated London News.

The bells and bronzes of the Whitechapel Bell Foundry have defined historic civic and church architecture around the world; the sound of Big Ben is the sound of Britain itself. This remarkable institution has been pivotal to the heritage of East London and should continue to be a centre for cultural tourism, historical research and the current resurgence of interest in crafts by becoming a permanent historic site. We at the Whitechapel Gallery have been proud to count the Whitechapel Bell Foundry as our neighbour and would support a future that would give it the international recognition it deserves.

Iwona Blazwick, OBE
Director, Whitechapel Gallery

It's very sad news that the yet another piece manufacturing heritage is set to hand over its value for short term gains. It's a colossal waste of value and if there is an opportunity that could see this asset purposed towards the UK re-connecting with its manufacturing heritage, then all should be done to take it.

UCL has taken its first steps in establishing a presence in the east end of London with its new facility on the Olympic Park at Here East. It opened in January this year and it's a collaborative venture with the Faculties of Engineering, Computer Science and The Bartlett all sharing Facilities and most importantly, space. A key driver here is around tying design through to manufacturing. Our new facilities support the established and traditional technologies with the disruptive tech that is coming into play in supporting research and teaching. Alongside a new apprenticeship scheme to grow the talent needed to operate in this sphere. The new masters courses and the facility itself comes about as a response from the UK Government and Industry to bring the next generation of skilled people who can think across the boundaries of design and manufacturing and to connect with the industries in the east end in order that our students are responding to real world challenges in industry. The Whitechapel foundry would be a perfect opportunity for us to demonstrate to our students the disciplines and processes that they need knowledge of in order for design to leverage the affordances of process. It also underlines that the UK has a manufacturing history. It's all too easy to surrender our heritage and manufacturing assets in the interests of short sighted visions, were we not to take advantage of this opportunity to save the Whitechapel Foundry then we are further encouraging a time when we will become a customer of our own capabilities.

We are looking forward to establishing ourselves into the east end communities, and with the recent news of the V&A moving in next door to us and UCL's Institute of Sustainable Heritage setting itself up at Here East it seems that the pieces will be in place to enable the utilisation of disruptive technology with an understanding of manufacturing heritage. The Whitechapel Foundry will be a key player this. So we thoroughly support its retention and would be honoured to be involved in its next steps.

Peter Scully
Technical Director, The Bartlett Manufacturing & Design Exchange (BMADE)
Bartlett School of Architecture, UCL



Top: Bell mould and bell templates, 2016. Photographs by John Claridge. Bottom: Bells in the courtyard, 1991. Photograph by Carlotta Luke.

Whitechapel Bell Foundry, 32-34 Whitechapel Road, 2 Fieldgate Street and workshops to the rear.

This building is listed under the Planning (Listed Buildings and Conservation Areas) Act 1990 as amended for its special architectural or historic interest.

Name: Whitechapel Bell Foundry, 32-34 Whitechapel Road, 2 Fieldgate Street and workshops to the rear

List entry Number: 1357529

Location: Church Bell Foundry, 32 and 34, Whitechapel Road, and 2 Fieldgate Street, Whitechapel, London, E1 1DY

County: Greater London Authority

District: Tower Hamlets

District Type: London Borough

Parish: Non Civil Parish

National Park: Not applicable to this List entry.

Grade: II*

Date first listed: 29-Dec-1950

Date of most recent amendment: 19-Apr-2017

WHITECHAPEL ROAD E1

4431 (South Side)

29.12.50 Nos. 32 and 34 (Church Bell Foundry)

Railings and gate to No. 32

TQ 3481 15/473

II*

With No.2 Plumbers Row.

C18th. Red brick with parapet. Roof not visible. 3 storeys. 5 and 2 windows respectively. Gauged flat arches to recessed windows with glazing bars. No.32 has wooden shutters to ground floor windows and wooden Doric doorcase with broad flat pilasters and pediment. Simple wrought iron railings and gate to entrance. No. 34 - wood shop front with narrow pilasters, moulded cornice and 2 round headed windows. Central entrance with blank, round headed fanlight. Return to Plumbers Row has flush frame windows, corbelled brick eaves cornice, tiled roof and rusticated wooden door surround. Good interior. On extension at rear is an interesting old jib crane beneath a bracketed canopy.

Listing NGR: TQ3422181543

This text is from the original listing, and may not necessarily reflect the current setting of the building.

SUMMARY

Bell foundry established in the 1740s with extensions and modifications of the early and late C19th and C20.

DESCRIPTION

The Whitechapel Bell Foundry comprises: a front residential range at nos.32-34 Whitechapel Road, built for Thomas Lester in the mid-1740s, extended in the early C19th: no.2 Fieldgate Street, probably also built for Lester in the 1740s, its rear (W) wall rebuilt and the interior reconfigured in the 1960s and later: a single storey range to the rear of no.2 Fieldgate Street probably mid-C18th in date, attached to a three storey stables and workshop range of c1840 with C20th modifications: cottages of 1820 modified and extended in the late C19th and C20th: foundry outbuildings to the W and S of the front range of mid-C18th and C19th date, modified in the C20th. Attached to the rear of the S outbuilding is a workshop extension of 1979-81*.

Nos.32-34 WHITECHAPEL ROAD AND No.2 FIELDGATE STREET

MATERIALS

Dark purple-red brick and yellow stock brick, with tile roof coverings.

PLAN

The plan of nos.32-34 Whitechapel Road comprises three axial rooms heated from the rear and one-room deep, with

a stair hall between the central and W room. The early C19th extension to the rear of no.32 has a two room plan with a central hall bay. The plan of no.2 Fieldgate Street has been reconfigured in the mid C20th, but is similarly one room deep with the stair at the S side.

EXTERIOR

Nos.32-34 Whitechapel Road is a seven window-bay range of three storeys with an attic to the W and cellar to the centre. The roof is hipped at the E end and gabled to the W where it abuts the adjoining property; there are small dormers to the front and rear. The front (N) elevation has a variable bond, but is generally Flemish. At the ground floor is a Doric doorcase at the fifth bay from the E, flanked by two windows with external, panelled shutters with ironmongery; all windows on this elevation are mid-C18th, slightly-recessed six-over-six timber sashes with glazing bars beneath straight brick heads. The door case has moulded pilasters, cornice and pediment. A glazed oblong fanlight is flanked by triglyph and guttae motifs. The door has six panels, the top two being smaller, divided by a central muntin; some of the ironmongery may be mid C18th. The door is approached by two stone steps, surmounted by replica railings and a central gate. C18th boot-scrapers to either side of the steps are embedded in lead. At the E end of the building is a two-bay shop front, probably of the early C19, with a central, recessed panelled and glazed door approached by steps. The panelled stallrisers, flanked by moulded pilasters, support recessed arched windows with glazing bars. The words 'CHURCH BELL FOUNDRY' are painted on the fascia beneath the moulded cornice, with 'ESTABLISHED AD 1570' in the blind arched panel above the door. The fenestration on the first and second floors is uniformly spaced, the windows to the first floor being a little taller than those on the second. Above the top storey is a plat band beneath the yellow stock brick parapet with flat coping.

The rear (S) elevation is dominated by the two storey, early C19th extension with a recessed entrance to the rear of no.32, accessed from the yard through a brick arch of the mid-C20th, with toilets to the S. The timber panelled door has top glazes. The extension, in yellow brick laid in Flemish bond, has horned three-over-three timber sash windows beneath straight heads to the ground and first floors: the windows appear to be late-C19th in date. The roof of the extension cannot be seen, but rising above are the two broad stacks of the front range, with some renewed pots. The blind E elevation is part-rendered at the base, the exposed bricks above laid in English bond; the plat band wraps around from the façade.

No.2 Fieldgate Street is a three window-bay and three storey former house attached to the rear of no.34 Whitechapel Road, projecting forward onto Fieldgate Street. The front (E) elevation is of red-purple bricks, the S and W elevations of yellow stock brick, all laid in Flemish bond. On the ground floor at the S is a timber, Gibbs door surround beneath a flat hood; the door has six panels, a boot scraper is set in the wall to its right. The windows are near-flush, with moulded timber surrounds beneath straight red brick heads. The Whitechapel Bell Foundry – List Entry Summary (continued) two ground floor windows and three to the first floor are horned six-over-six timber sashes and post-1840 in date. The second floor windows are smaller, six-light casements; above, the eaves have dentils. The roof is hipped to the S, the tall chimney in yellow brick rises at the N end, next to a prominent gable-end marking the division of property. The rear (W) elevation was rebuilt in the 1960s with renewed timber cladding.

INTERIOR

Nos.32-34 Whitechapel Road retain their plan form and historic fixtures and fittings of the C18th and C19th. On the ground floor, the far E room is the shop entrance to the foundry; panelling beneath the shop windows appears contemporary as do the wall-mounted cupboards to the right. A wooden hook projects from the middle of these cupboards; reams of brown paper are said to have been hung from here which could be fashioned into head-coverings for the foundry workers, shown in an illustration in the shop. A cabinet at the rear of the shop is of 1851. The central ground floor room, in use as an office, has wall panelling and a C19th fireplace. Further W is the panelled stair hall; the walls are half-panelled and the door has its original ironmongery. The quarter-turn stair is mid-C18th and intact, with a landing to the front at each floor level lit by a sash window. The stair has a curtail stop at the ground floor, a ramped, moulded handrail and open strings. The simply-moulded turned newels have flat caps; the balusters are turned and moulded. Beyond the hall, the western room (formerly the board room, then a dining room) and all three rooms on the first floor are fully panelled with simply moulded cornices and dado rails in places. There are four or six panel doors with moulded architraves. The windows have internal shutters, shutter boxes and panelled aprons. All rooms retain their chimney pieces, mostly hob grates with simple surrounds; all are of mid-C18th or early-C19th date and flanked by arched alcoves or cupboards with two-panel doors. In the central first floor room, there is a good

apsidal niche cupboard with marble surround to the right of the chimney piece; it is probably early-C19th in date. The floorboards in general are wide, except where replaced. The third floor rooms are much simpler, without wall panelling or window shutters, but with simple chimney pieces to each room. The doors are four-panelled; all joinery on this floor is simply moulded. In the eastern room there is a two-panelled door to a corner cupboard; another cupboard has a round-headed strap hinge. The interconnecting door here has the ghost markings of a HL hinge, but all other hinges observed throughout are C19th or later. From the top landing, a narrow winder stair leads to the attic where the room has no historic fixtures or fittings.

The ground floor of the rear extension had a service function; the room to the W of the rear entrance door was the kitchen with matchboard panelling to the lower walls and a timber surround to the range recess carved with the initials TM and the date 1820. The first floor rooms of the extension accommodate a modern kitchen and bathroom. The interior of no.2 Fieldgate Street is accessed from the eastern room of no.34 at all floor levels. The interior was reconfigured in the 1960s and no historic interior fixtures and fittings are thought to survive. At the ground floor, the entrance door has modern ironmongery. The stairs are in their original position, but the banisters are replaced on the ground to first floor flight. The upper two storeys were not inspected.

THE FOUNDRY BUILDINGS

There are workshops to the S and W of the yard at the rear of nos.32-34 Whitechapel Road and buildings at the E side of the complex fronting Fieldgate Street and Plumbers Row ranging from the mid-C18th to the mid-C19th in date, all are modified in the late C19th and C20th. The current process of bell-founding starts with making shaped inner (for the bell core) and outer (for the cope) moulds from loam and loam-bricks, which, after being baked, are clamped together to form the shape of the bell. Metal is heated in a furnace, poured into a crucible which is transported by a gantry crane and then poured into the bell mould. All of this takes place in the loam shop at the W of the site. After cooling, the outer mould is removed to reveal the newly-cast bell; after excess loam and metal is removed the bell is tuned to reach the required tone by using a lathe (tuning machine) that shaves off metal until the right sound is achieved. This takes place in the Montreal foundry (E of the loam shop) and tuning shop to the N. Hand bells are cast in sand and metal patterns, moulded conventionally and finished in the three-storey 1840 range fronting Plumbers Row. On the top floor of this building is the carpenter's shop where all formwork, including bell wheels, are made. This range incorporates the C19th vehicular access to the foundry.

MATERIALS

Mostly yellow stock brick with slate and corrugated iron coverings to the roofs.

PLAN

The east range is cranked and incorporates a pair of early-C19th cottages. The workshops to the rear of nos.32-34 Whitechapel Road and no.2 Fieldgate Street are located on the S and W sides of a small yard with a flagstone surface.

EXTERIOR

Attached to the S side of no.2 Fieldgate Street is a single storey, red and yellow brick building of mid C18th date, but rebuilt at the rear in the 1960s when the pantile covering to the roof was renewed. The E elevation faces Fieldgate Street. The lower part of the wall is rendered set into which is a plaque (with a brick surround) incised with the words 'This is Baynes Street 1766'; this was dug up from nearby and set into the wall in the 1980s. To the right is a metal casement window. A sign above reads 'WHITECHAPEL BELL FOUNDRY'. To the S (left) is the 1840 blacksmiths and warehouse range of three bays and three storeys, with a recessed attic, built in yellow brick laid in Flemish bond. At the far left is a retained plank double-door for vehicular access in the C19th (not in use in 2017), above which, and to the left of, is a timber jib crane of c.1840 beneath a bracketed canopy. The crane is thought to be one of the oldest timber cranes in London and was used, presumably, for taking in materials to the upper floors and lowering heavy items onto carts. The windows have elliptical-arched heads; three of the openings are blocked, and a fourth partly so. The other four openings have casement windows of the late C19th or C20th. Attached to the S (left) of this range, cranked to follow the road line, is the pair of former cottages, again of three storeys with an attic, and with a hipped roof to the S. The round-arched door openings are blocked as are all of the elliptical-arched window openings to each floor; a ground floor window has an inserted casement, with a later window inset to the right of it.

The rear elevations of these structures are partly obscured by the foundry workshops to the W; where observed the construction and treatment are consistent with the front elevation. The roof coverings are slate.

The exterior elevations of the loam shop and Montreal foundry are mostly obscured; the E elevation of the loam shop was reconstructed in the 1960s in mixed yellow stock and red brick with straight yellow brick heads to the window openings. It is entered from the yard through doors on its E elevation, above which is casement window and clock of unknown date. On the S side of the yard is the N elevation of the 1848 tuning shop, with double timber panelled and glazed entrance doors from the yard. Above the door is a casement window of 25 lights and to the right is another with 40 lights. There is a plain timber cornice above; the lantern roof has a corrugated asbestos and slate covering. Fixed to the yard surface, beside the tuning shop door, is a modern electric bell chime of 9 bells erected in 1981. The S workshop of 1979-81* is excluded from the listing.

INTERIOR

The single storey building attached to no.2 Fieldgate Street is used as part of the visitor attraction and has no historic fixtures and fittings. The ground floors of the warehouse, including the former blacksmiths shop, and the former cottages, are entirely remodelled to provide a fire escape and washroom facilities, and are partly open to the workshops to the W. A C20th stair rises from the former vehicular entrance of the warehouse to the upper floors where hand-bell finishing and carpentry takes place. The external rear windows to the rear are blocked and there are no historic fixtures and fittings remaining, apart from a section of the forge chimney in one of the northern rooms. The roof structure comprises tie beams with raking shores, common rafters and ridge pieces, with some replaced members from when the structure was rebuilt in the late C20th. The cottages evidently had rear wings, and the southernmost wing on the second floor was extended in the late C20th into the Montreal foundry to the W. This is the carpenters shop; features of note are the memorial slate plaques attached to the remaining part of the cottage's party wall which record the names, dates of birth and death of some of the foundry's former employees. The hatches through which the bell-wheels were lowered from the carpenters shop remain.

The interiors of both the loam shop and Montreal foundry have painted brick walls. The loam shop has a late-C20th drying kiln* to the N and furnace* to the S. At approximately the centre of the shop is the casting pit, thought to be the location of the original C18th pit. It has C20th brick lining and was covered with boiler plates at the time of the inspection in 2017. The roof covering is corrugated iron, supported on king post trusses, with two louvred lanterns to the roof. The Montreal foundry opens to the E and has a bespoke timber roof structure, of common rafters and substantial tie beams and upright posts. The 1848 tuning shop has a tuning machine and steel supports of 1922, and retains the original timber beam to the earlier (removed) tuning machine (all included in the listing). The remains of the line shafting to the steam engine attached to the E wall of the tuning shop are also included in the listing. The roof structure has common rafters and diagonal bracing.

The workshops contain C20th equipment generic to small-scale manufacturing including travelling cranes/gantries*, furnaces*, lathes*, planes* and other wood-working equipment*, mills* and welders*. All of these items, and other unspecified C20th equipment not bespoke to the manufacture of bells, have limited heritage significance and are excluded from the listing. The tuning machine of 1976* in the Montreal Foundry, although specifically for the tuning of bells, is a late example of its type and is also excluded from the listing.

SUBSIDIARY FEATURES

The railings to the front of no.32 Whitechapel Road are 1950s replicas of the originals. The steps are concrete and of the same date as the railings but the boot scrapers are mid-C18th.

* Pursuant to s1(5A) of the Planning (Listed Buildings and Conservation Areas) Act 1990 ('the Act') it is declared that these aforementioned features are not of special architectural or historic interest.

HISTORY

BELL-FOUNDING IN THE C18th, C19th AND C20th

Bells have played an important part in our culture; the ringing of bells for commemoration, time keeping and warning is embedded in our national consciousness. Bell-founding in this country has medieval originals at least and remains a highly specialised craft; the casting, finishing and tuning processes are specific to the manufacture of bells. The

preparation of moulds for the core and cope, casting, finishing and tuning have changed considerably since the C12th when the process was described in infinite detail by a monk. By the C18th the shape of bells had changed enormously as had the method of manufacture, although the process of firstly creating the core, secondly creating a false bell and thirdly creating a clay cope followed the same medieval practice. The moulds were prepared and assembled within a casting pit so that metal could be run from a reverberatory furnace, usually timber fired, by gravity. Tuning was by hammer and chisel with only the harmonic that we now refer to as the 'nominal' being adjusted; by the end of the C18th the first tuning machine was in use (at a foundry in Gloucester).

By the latter half of the C19th the false bell method of moulding had been abandoned in favour of producing the cores and copes independently and with the copes created in bell-shaped cast iron flasks. The introduction of overhead cranes in the late C19th and early C20th allowed the moulds to be assembled on the foundry floor, rather than in casting pits, and with the metal transferred from the furnace to the mould by overhead crane.

The end of the C19th also saw the development of harmonic tuning which required a greater sophistication in the design of the tuning machine. This period also saw the concept of bells being tuned to an external pitch standard so that they were in tune with other instruments. Whilst the accuracy of early harmonically tuning bells was reasonable, tuning accuracies have been improved gradually through the C20th with a greater number of harmonic tones being controlled. To accommodate the introduction of harmonic tuning the shape of bells was changed subtly and these changes have continued into the early C21st.

The wide use of electricity to power machinery from the early part of the C20th has seen the introduction of electrically powered cranes as well as electrically powered furnaces. Fuel has moved from timber to coal and again from coal to oil or gas. These newer cleaner fuels also provide a greater predictability in both temperature and melting times.

WHITECHAPEL BELL FOUNDRY

Whitechapel Bell Foundry has operated continuously in Whitechapel since at least the 1570s, but on this site probably since the mid-1740s. The foundry originated with either Robert Doddes in 1567 or Robert Mot in 1572 and may have been located in Essex Court, in the present Gunthorpe Street area. The C16th foundry may have grown out of a foundry in Aldgate, established in 1363 by Stephen Norton.

In 1716, the foundry, ran by Richard Phelps, made the great clock bell for St Paul's Cathedral. It has been long believed that when Phelps died in 1738, his successor Thomas Lester moved the foundry to the current site, which had previously been occupied by the Artichoke Inn.

However, contemporary reports suggest that this site was probably occupied a little later. The Survey of London records an advertisement to let the site in the Daily Advertiser of 31 August 1743. The Stepney Manor Court Rolls refer to the Artichoke Alehouse as being empty in April 1743 and to a 'newly built messuage now in possession of Thomas Leicester' in 1747. It is probable that Lester redeveloped the site of the Artichoke in 1744-6 and in doing so provided the opportunity for a larger foundry with bespoke accommodation on the frontage of Whitechapel Road. In addition to nos. 32-34 Whitechapel Road, the residence of the foundry owner, an attached building to the rear of no. 34, no. 2 Fieldgate Street, was constructed perhaps to accommodate a foreman. It is probably broadly contemporary with the front range, although the brick is slightly larger in size, laid in a different bond, and the window treatment differs. The former smithery, stables and coach house building at the rear of no. 2 Fieldgate Street was replaced by a three-storey workshop and warehouse building in c1840. The foundry itself, which originally contained four crucible furnaces, was located across a yard to the rear of the front range. The mixed fortunes of the foundry in the late C18th and early C19th, and the somewhat complicated changes in ownership, are recorded in detail in the Survey of London and other sources and will not be repeated here. It should be noted, however, that during this time the foundry cast around 25 bells per year including some for St Mary le Bow in 1738, Petersburg in Russia in 1747 and Christ Church, Philadelphia in 1754. The most famous bell cast during this period is the Liberty Bell of 1752.

Thomas Mears acquired full control of the foundry from the descendants of Lester in October 1818 and embarked on a building campaign, extending no. 32 Whitechapel Road at the rear and replacing some of the internal fixtures.

The shop front to no.34 probably dates from this period. A building to the S of a former gateway into the foundry was probably built for Mears in 1820; these may have been cottages that were extended and altered by the late C19th when externally the door openings were curtailed and infilled, and internally they were entirely remodelled to house a steam engine at the ground floor, handbell workshops on the first floor and a carpenter's shop on the second. The cranked blacksmiths, workshop and warehouse range N of the cottages is probably c.1840 in date, replacing the earlier smithy building and gateway to the foundry. This range was re-roofed in the 1980s.

Charles and George Mears ran the foundry from 1844-1859; Big Ben was cast here in 1858, and at 13.7 tons is still the foundry's largest bell. From 1865, George Mears and Robert Stainbank ran the foundry trading as Mears and Stainbank until 1968. Arthur Hughes became foundry manager in 1884, and his descendants ran the business from 1968 to the current day.

The foundry buildings evolved during the ownerships of Mears and Stainbank and the Hughes family. The earliest workshop aligned N-S along the W boundary of the complex (known in 2017 as the loam shop or moulding shop) are mid-C18th in origin, but was extended to the W in 1846, encroaching onto the S part of the yard, to accommodate a new furnace required to make a 11.5 ton bell for Montreal Cathedral (this extension is known in 2017 as the Montreal foundry or sand foundry). Another furnace was added two years later and in 1850 a 19m (62ft) chimney was built against the S wall (later truncated). A tuning shop was added to the N of the 1846 extension in approximately 1848 to house the tuning machine brought to Whitechapel from Rudhalls Gloucester foundry. The machine was powered by a steam engine, located on the ground floor of the former cottages remodelled for the purpose. The tuning machine was replaced in 1922. A back foundry added to the rear of the complex by the 1870s was damaged during the Second World War.

Post-war plans to rebuild did not proceed until a new frame workshop was added to the S of the earlier outbuildings in 1979-81; this S workshop is excluded from the listing. In the mid-1960s, the E wall of the loam shop and the W wall of no.2 Fieldgate Street including the weatherboard cladding, and the interior, were rebuilt. The roof coverings of the single storey link, loam shop and former cottages were replaced. The second floor of the southernmost cottage was extended to form a small mezzanine within the 1846 foundry space. A new drying oven was inserted into the N end of the loam shop and steel stanchions were added to its W wall. All of the equipment in use is C20th in date, and where not itemised in the description below is excluded from the listing.

Nos.32-34 Whitechapel Road are little altered. The railings to no.32 are 1950s replicas of the originals and the steps are concrete.

The uses of some areas of the complex changed in the late C20th. The ground floor of no.2 Fieldgate Street is the shop, the upper floors are the drawing rooms, interlinked with the ground, first and second floors of the eastern bay of no.34 Whitechapel Road. The single storey building to the S of no.2 Fieldgate Street is part of the visitor attraction. The ground floors of the warehouse range and former cottages have been further modified to provide facilities for the foundry workers and a fire escape. The Greater London Council (GLC) were involved in the conservation of the premises in the 1980s.

REASONS FOR LISTING

Whitechapel Bell Foundry, a complex established in the mid C18th, with alterations of the C19th and C20th, is listed at Grade II* for the following principal reasons:

* Architectural interest: a distinctive, cohesive complex of domestic and industrial buildings spanning nearly 300 years of occupation including the dignified residence of the foundry owner at nos.32-34 Whitechapel Road, no.2 Fieldgate Street and the industrial ranges to the rear;

* Historic interest: for the national cultural and industrial significance as the mid C18th site of a specialised industry known to have been located elsewhere in Whitechapel since the medieval period, where well-known bells including Big Ben and the Liberty Bell, Philadelphia, were cast;

* Degree of survival: nos.32 and 34 Whitechapel Road have a high level of exterior and interior intactness including the early-C19th shop at no.34;

* Interiors: distinctive for the mid-C18th plan-form, and the mid-C18th and early-C19th shop fittings, wall panelling, chimney pieces, stairs, ironmongery and joinery in nos.32 and 34 Whitechapel Road, industrial workshops containing specialist bell-founding equipment, and the timber crane on the Plumbers Row frontage;

* Rarity: one of only two remaining bell foundries in England, the other being Taylor's of Loughborough, also listed at Grade II*.

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Bell tuning, 1991. Photograph by Carlotta Luke.



From a Miniature of Henry III, Enthroned, and Flanked by Westminster Abbey and Church Bells, c 1370



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