



Fig.6.2.2: Detail of the concrete brick on the façade.

**6.3 24 Moore Street:** The three-storey three-bay brick-fronted building has cast concrete faux-quoins framing the façade. The frieze was not closely examined but is also likely to be a modern concrete cast in imitation of natural stone. The building was examined internally, but no opening up works were undertaken. However, the structure appears to be of modern origin.

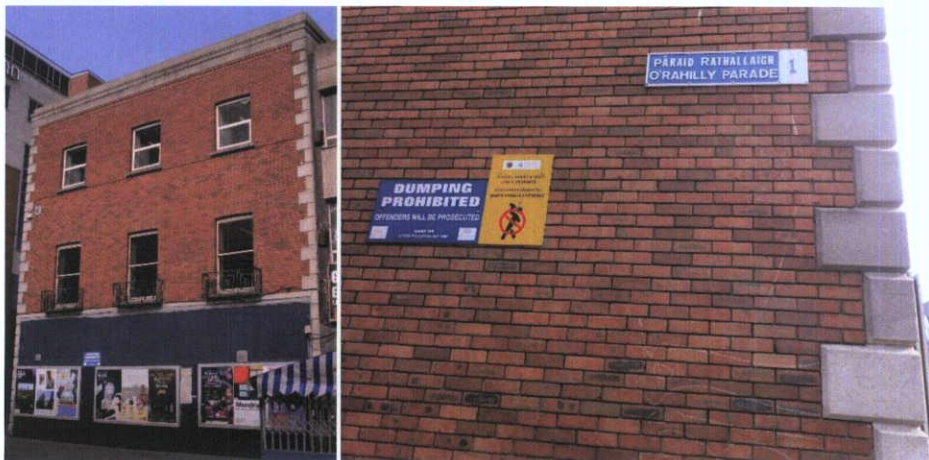


Fig.8.3.1: General view of Nos. 24-25 Moore Street.



Fig.8.3.2: Detail of the brickwork and cast stone quoins.

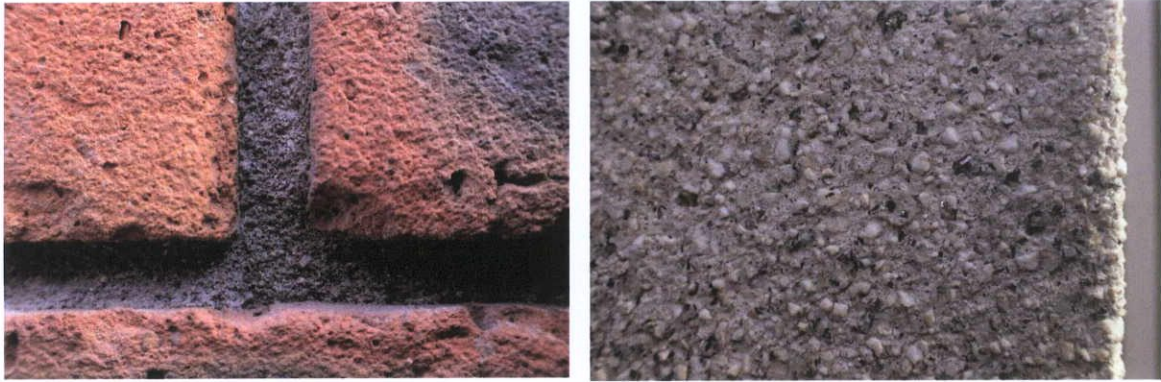


Fig.8.3.3: Detail of the brick and Portland Cement mortar (left) and cast stone quoin (right).



Fig.8.3.4: View of the north elevation and rear from Rahilly Parade.

**6.4 14 Moore Lane:** This wall consists of two parts: a probably late eighteenth or nineteenth century Calp limestone wall at the east end and a place brick wall at the west, with a scattered, disparate range of tiles, stamped and unstamped brick inserted haphazardly into the fabric (which were interpreted as later repairs). This plot is in use as a Dublin City Council depot, and is the site of the 'Old Brick Field' on John Rocque's map. A number of buildings are noted on the 1847 and 1864 Ordnance Survey maps, and the site is occupied by 'C.F. Allen Printing & Bookbinding Works' on the 1893 Goad's Fire Insurance map. The wall contains:

- External face of a Calp limestone masonry wall bedded in pozzolanic lime mortar with some rounded boulders and cobbles and tile which may be early nineteenth century. The wall uses the same construction techniques as seen in earlier walls and contains coarse brick aggregate, but lacks the fine brick pozzolan which provided hydraulic qualities seen in Georgian building fabric further south along Moore Lane.
- Internal face of irregular hand-made clamp-fired place brick bedded in lime mortar which is probably nineteenth century (as the brick is similar to that cheaply imported into Dublin along the canal networks, with the Royal Canal opening at the end of the eighteenth century).
- Stamped 'Bridgewater' nineteenth century Somerset brick imported from England. This brickmaker was established in 1857 and manufactured brick until the 1960s. The typeface used for the stamp appears turn of the century, but this single brick is likely to be an isolated repair.



Fig.6.4.1: General view of 14 Moore Lane.



Fig.6.4.2: Calp limestone masonry section with thin brick forming part of the fabric. Note that the masonry contains flaggy and rounded stones. The masonry is similar to the Calp limestone masonry forming the internal east wall at 9 Henry Place (probably the remnants of a nineteenth century stable).



Fig.6.4.3: Rounded cobble-sized limestone is also found in the wall fabric.



Fig.6.4.4: Irregular distorted clamp-fired vitrified yellow brick, possibly 18<sup>th</sup> century (left) and imported stamped 'Colhurst Symon & Co. Ltd Bridgwater' from Somerset. This brickmaker was in operation from 1857 until the 1960s



Fig.6.4.5: The eastern section of the wall consists of hewn Calp limestone masonry bonded in a lime-based mortar.



Fig.6.4.6: Ceramic tile used within the masonry.



Fig.6.4.5: Deep lime mortar joints with poorly sorted predominantly coarse limestone aggregate, slate pinnings and scarce coarse brick aggregate (arrowed).



Fig.6.4.6: Slate pinnings (left) and coarse brick aggregate (right, arrowed) as an occasional component of the aggregate fraction of the mortar.



Fig.8.4.9: Warped hand-made clamp fired brick (left) while the upper course contain occasional imported brick (right, arrowed) presumably added as a levelling-up course before the concrete was poured).



Fig.8.4.10: The western section of the wall is composed of red and yellow place brick, and appears to represent internal lining.



Fig.8.4.11: Poorly formed hand-made place brick, with modern concrete construction adjacent.



Fig.8.4.12: Poorly-fired place brick in a deep lime-based mortar joint, showing a remnant of a lime-based plaster adhering to part of the surface (left, arrowed). Right: Poorly-fired place brick showing vitrified areas, voids, warping, but with traces of limewash on the surface of the brick.

## 6. Summary of Key Findings

**6.1 Early Hand-made Brick:** There are a number of types of hand-made clamp-fired bricks found among the buildings of the Dublin Central Project. No.42 O’Connell Street (treated separately in an accompanying report) provides a useful ‘point in time’ reference. The façade of this building is composed of red facing brick, but the internal wall linings are composed of a coarser rich red-coloured stock brick containing sharp angular limestone inclusions which are seen in brick in other building on O’Connell Street and Parnell Street. Some of this early brick is also found in ‘Building C’ at 50-51 O’Connell Street. This is a good contender for brick burnt on the ‘Old Brick Field’ marked on John Rocque’s mid-eighteenth century map of Dublin. These are found bedded in pozzolan lime mortars (where fine brick dust was added to the mix) and lime mortars using only local coarse rounded aggregate with no intentional inclusions.

A second early brick in the area is a relatively soft hand-made clamp-fired mostly pale red-coloured ‘place’ brick found on internal wall linings along Moore Street and in the chimney of No.60 O’Connell Street. This brick would have little resistance to external weathering stresses and was intended to be concealed by a plaster or render. A proportion of these bricks contain shell which is likely to be a by-product of shellfish consumption rather than indicative of brickmaking along the coast. These bricks are found on internal and external walls along Moore Street, on buildings which were built on the grounds of the ‘Old Brick Field’ marked on John Rocque’s mid-eighteenth century map of Dublin. These are likely to be of late eighteenth or early nineteenth century date.



Fig.9.1.1: Brick with coarse angular limestone inclusions from the basement of No.43 O’Connell Street (left), and seen in the internal walls of No.71 Parnell Street (right).



Fig.9.1.2: 'Shell brick' is found at a number of buildings on Moore Street including No.10 Moore

A third early brick is a red, yellow and variegated colour 'stock' brick is found throughout the site. This type is often referred to as 'Dublin stock brick', but was more frequently made in brickfields to the west of the city. With the opening of the Grand and Royal Canals at the end of the eighteenth century, a large amount of small-scale brickfields opened up along the canals for the purposes of feeding the Dublin construction market. These bricks are variable in quality, with multiple colours seen within a single brick, and with some parts of the brick appearing black and glassy where it was over-fired. Classifying these bricks according to colour tends to be misleading, as the surface colour is often not the colour of the core of the brick. These bricks were made at multiple locations in west Dublin, Kildare, Laois and other places, with larger brickyards becoming established in Athy and other places, and with the quality varying. These bricks were made by many manufacturers between the late eighteenth century and the mid-twentieth century, but with the bulk of use seen in the Victorian period and before the widespread availability of well-fired extruded brick. Only a very small proportion of these bricks were frogged or had manufacturers stamped<sup>43</sup>. However, these bricks tend to be better fired with smaller pebbles than the 'stock' bricks found lining the internal walls of No.42 O'Connell Street, and of better quality than the 'shell brick' found along Moore Street.

A fourth early brick are the yellow-salmon coloured 'sammel' bricks found forming some vaults along O'Connell Street. These are soft and not of great quality in either manufacture or durability (though they have survived in waterlogged and poor conditions) but are visually distinctive and probably relate to mid-eighteenth century structures.

**6.2 19<sup>th</sup> Century Extruded Brick:** A number of the buildings retain nineteenth century extruded brick which became popular for building in Dublin City. These are not intact buildings, but often simply the retained ground floor of industrial buildings such as 5-8 Henry Place and 17-18 Henry Place. Campbell's of Moore Lane retains brick polychrome including a stamped brick indicating that the polychrome brick was sourced from Staffordshire. Polychrome brick is also used at 11-13 Henry Place. These bricks were often used in conjunction with terracotta, but only one example of terracotta has survived. White encaustic brick is known from a number of late nineteenth and early twentieth century buildings in Dublin City, and was popular for areas such as kitchens, W.C.s and other areas which needed high levels of hygiene.

**6.3 20<sup>th</sup> Century Brick:** A number of buildings are known from historical records to have been built c.1917 and in the 1920s and later. These provide useful reference points to clearly identify the type of bricks which were used, and those which were not used after the War of Independence. In general, these bricks tend to be well-formed, well-fired and homogenous red and yellow brick, and are found in both solid and perforated forms. The key different between these bricks and earlier Georgian and Victorian bricks is the choice of raw material. Facing brick from the late nineteenth and twentieth century tends to be formed from clay without natural coarse pebbly inclusions, and fired using controlled temperatures in a brick kiln to provide a consistent finish. The red bricks occasionally retain surface striae from wire-cutting, but are usually

homogenous and fine-grained showing almost no textural changes on the exposed faces. These red bricks may sometimes show colour changes, such as 'kiss marks' formed in the kiln during firing – but show none of the variation in texture seen in earlier bricks. Twentieth century yellow 'stock' brick is often solid and may contain small pebbly inclusions, but while medium-grained in texture, are consistent in appearance and texture and the result of a defined manufacturing process which is very different to the variability seen in earlier hand-made building materials. However, a key limitation is that some of these materials were available for decades - such as the red brick showing 'kiss marks' were available from the 1890s onwards, and are found in dated buildings such as the Iveagh Trust buildings in Dublin 8 which were built from 1891 onwards; but are also found in buildings erected in the 1920s; and therefore bridge the period of both the Easter Rising, the War of Independence and the Civil War, and cannot be used in isolation for close dating of structures.



## Appendix 1 – Sampling

The sampling below relates to buildings from all five sites under consideration in the Dublin Central project.

	Site 1
	Site 2
	Site 3
	Site 4
	Site 5

*Note:* In addition to the samples of bedding and pointing mortars, plasters, renders, brick and stone listed in the table below, non-disturbance *in situ* microscopy of materials exposed at wall and ceiling surfaces was undertaken in the majority of the buildings during the site visits.

No.	Building	Location and Notes
1.	10 Henry Place	NE corner. Internal Face. Bedding mortar of yellow & variegated brickwork
2.	10 Henry Place	East Elevation. Exterior. OPC render with coarse-grained bedding
3.	10 Henry Place	East Elevation. Exterior. 6x fragments of lime bedding mortar + 3x fragments of brick
4.	10 Henry Place	West Elevation. Interior. Ground Floor. Lime plaster with imprint of lime bedding mortar on reverse. <i>Thin Section 10.HP.4</i>
5.	10 Henry Place	West Elevation. Interior. Ground Floor. Bedding mortar beneath plaster with skim & paint layers
6.	10 Henry Place	West Elevation. Interior. Ground Floor. Bedding mortar at staircase
7.	10 Henry Place	East Elevation. Exterior. Ruled & lined OPC render with brick attached to underside <i>Note: see Sample #20</i>
8.	10 Henry Place	East Elevation. Exterior. Grey smooth-finished concrete door surround, inscribed "H.Dowling 9.10.1959"
9.	10 Henry Place	North Elevation. Interior. First Floor. NW corner. Brick bedding mortar 9a North Elevation. Interior. First Floor. NW corner. Solid yellow clay brick
10.	10 Henry Place	West Elevation. First Floor. Pier #4. Bedding mortar
11.	10 Henry Place	East Elevation. Exterior. 1959 render repair
12.	10 Henry Place	East Elevation. Interior. First Floor. Bedding mortar at SE corner <i>Thin Section 10.HP.12</i>
13.	60a O'Connell St 19 Henry Place	Hewn Calp limestone wall with brick pozzolan beneath modern Portland Cement render. <i>Thin Section 10.HP.13</i>
14.	9 Henry Place	West Elevation (south end). Exterior. Weatherstruck pointing & bedding
15.	10 Henry Place	West Elevation (south end). Interior. Bedding.
16.	10 Henry Place	West Elevation (centre of wall). Interior. Bedding.
17.	10 Henry Place	South Elevation. Exterior. First Floor Level. Bedding.
18.	9 Henry Place	West Elevation (south end). Exterior. Weatherstruck pointing & bedding
19.	37 Henry Street	Bedding mortar with brick pozzolan. <i>Thin Section 10.HP.19</i>
20.	4 Moore Street	East Elevation. Exterior. First Floor. Portland Cement render <i>see Sample #7 @ 10 Henry Place &amp; Sample #27 at 3 Moore Street</i>
21.	8-9 Moore Street	Interior. First Floor. Plaster. <i>Thin Section 89.MS.21</i>
22.	8-9 Moore Street	Interior. First Floor. Façade. Bedding mortar (inner leaf).
23.	8-9 Moore Street	Interior. First Floor. Façade. Plaster @ No.8. <i>Thin Section 89.MS.23</i>
24.	8-9 Moore Street	Rear Stairwell. Bedding mortar.
25.	8-9 Moore Street	Rear Stairwell. Bedding mortar + 2 no. brick fragments.
26.	3 Moore Street	Stairwell. Lime plaster (above concrete party wall)
27.	3 Moore Street	East Elevation. Stairwell. Dark grey low density concrete. <i>See Sample #20</i>

28.	4 Moore Street	West Façade. Interior. Lime plaster below window cill, c.1917
29.	4 Moore Street	West Façade. Interior. Lime bedding mortar from inner leaf of brick facade, c.1917
30.	11-13 Henry Place	North Façade. Brick & bedding mortars
31.	6-8 Moore Lane, rear 13 Moore St	East Elevation. Exterior. Lime bedding mortar where Calp limestone meets granite course
32.	6-8 Moore Lane, rear 13 Moore St	East Elevation. Exterior. Portland Cement strap pointing. 4 no. fragments
33.	6-8 Moore Lane, rear 13 Moore St	East Elevation. Exterior. Calp limestone masonry.
34.	10 Moore Street	East (rear) Elevation. Exterior. Handmade clamp-fired brick & lime bedding
35.	12 Moore Street	East (rear) Elevation. Half-brick with bedding mortar attached.
36.	12 Moore Street	East (rear) Elevation. Whole brick from wall-top
37.	12 Moore Street	East (rear) Elevation. Whole brick from wall-top
38.	12 Moore Street	East (rear) Elevation. Return. Loose brick from wall-top
39.	12 Moore Street	East (rear) Elevation. Return. Loose brick from wall-top
40.	17-18 Henry Place	East (rear) Elevation. Whole brick from wall-top
41.	17-18 Henry Place	East (rear) Elevation. Whole brick from wall-top
42.	17-18 Henry Place	East (rear) Elevation. Whole brick from wall-top
43.	13 Moore Street	Interior. First Floor. Party Wall with No.12. Brick bedding
44.	13 Moore Street	Interior. First Floor. 'Creephole' with light density Portland Cement fill
45.	13 Moore Street	Interior. Ground Floor. Party Wall with No.12. Brick bedding
46.	13 Moore Street	Interior. Ground Floor. Party Wall with No.12. 'Creephole'
47.	13 Moore Street	Interior. Ground Floor. Party Wall with No.12. Brick bedding
48.	10 Moore Street	Interior. First Floor. Party Wall with No.11. Brick bedding.
49.	10 Moore Street	Interior. First Floor. Party Wall with No.11. Haired lime plaster
50.	10 Moore Street	Interior. Second Floor. Party Wall with No.11. Brick bedding.
51.	10 Moore Street	Interior. Second Floor. Party Wall with No.11. Haired lime plaster
52.	10 Moore Street	Interior. Second Floor. Party Wall with No.11. Hole infill ('creephole'?)
53.	10 Moore Street	Interior. Second Floor. Party Wall with No.11. Plaster over hole infill ('creephole'?)
54.	17-18 Henry Place	North Elevation. Interior. Brick adjacent to window.
55.	5-8 Henry Place	Render
56.	42 O'Connell St	East Façade. Interior. Brick bedding.
57.	42 O'Connell St	East Façade. Interior. Brick bedding.
58.	42 O'Connell St	Link structure. Whole brick.
59.	42 O'Connell St	Link structure. Interior. Brick bedding.
60.	60 O'Connell St	Basement. East well. Calp limestone wall. Plaster/Render + limewash
61.	60 O'Connell St	Basement. Entrance to granite safe. Pozzolonic plaster.
62.	60 O'Connell St	Basement. Murray Gothic Arch. Bedding
63.	59 O'Connell St	Chimney. Bedding
64.	59 O'Connell St	Basement. Chimney bedding.
65.	59 O'Connell St	Basement. Chimney brick.
66.	59 O'Connell St	Basement. Haired lime plaster
67.	59 O'Connell St	Rooftop. Brick.
68.	9 Moore Street	Plaster
69.	58 O'Connell St	West Elevation 'Campbells'. Brick & bedding.
70.	20/2 Moore St	Party wall showing shell brick
71.	61 O'Connell St	'Flanagan's. Brick & bedding
72.	60a O'Connell St	Calp limestone bedding mortar
73.	17-18 Henry Place	South Elevation. Entrance. Brick & bedding.
74.	58-59 O'Connell St	Render & brick bedding

75.	58-59 O'Connell St	Rear. Calp limestone bedding mortar.
76.	58-59 O'Connell St	Rear. Calp limestone bedding mortar.
77.	71 Parnell St	Brick
78.	71 Parnell St	Brick. 3 no.
79.	71 Parnell St	Lath & plaster from ceiling.
80.	71 Parnell St	Clamp brick & bedding mortar
81.	71 Parnell St	West wall. Centre. Brick & bedding
82.	9 Henry Place	Calp limestone bedding mortar
83.	17-18 Henry Place	Moulded 'special' brick & bedding mortar
84.	17-18 Henry Place	2 no. yellow stock bricks
85.	17-18 Henry Place	Inner leaf of yellow stock brick & bedding mortar
86.	59 O'Connell St	Plaster from chimney
87.	59 O'Connell St	Brick bedding mortar
88.	59 O'Connell St	Portland Cement pointing & lime-based bedding mortar from Calp limestone wall
89.	59 O'Connell St	Bedding from garden wall to rear
90.	18 Moore Street	Clinker Concrete
91.	18 Moore Street	Yellow stock brick forming inner brick leaf at first floor level

## Endnotes

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<sup>1</sup> Sites 1 and 2 are contained in a separate report.

<sup>2</sup> Teutonico, J.M. (1988) *Architectural Materials – a Conservation Laboratory Manual*. Rome. Unpublished ICCROM manual.

<sup>3</sup> Cooper, T.P. (ed) (1997) *Conservation of historical buildings and associated property - EU project STEP 1994-1997*. Unpublished report. Trinity College Dublin.

<sup>4</sup> Pavia, S. and Bolton, J. (2001) *Stone Monuments Decay Study 2000: an assessment of the degree of erosion and degradation of a sample of stone monuments in Ireland*. Kilkenny. The Heritage Council.

<sup>5</sup> Fitzner, B. & Heinrichs, K. (2002) "Damage diagnosis on stone monuments – weathering forms, damage categories and damage indices", in Viles, H.A. and Prikryl, R. *Understanding and managing stone decay*. The Karolinum Press.

<sup>6</sup> Bolton, J. and Pavia, S. (2005) *Stone Monuments II: an assessment of stone monuments in South and West Cork, the Iveragh and Dingle peninsulas of Co. Kerry, and selected bedrock areas of Co. Donegal*. Unpublished technical report for The Heritage Council.

<sup>7</sup> Abrey, G. (2007) "Condition surveys of masonry ruins", in Ashurst, J. [ed] *Conservation of Ruins*. Oxford. Pp. 44-83

<sup>8</sup> Verges-Belmin, V. [ed.] (2008) *ICOMOS-ISCS: illustrated glossary on stone deterioration patterns*. Champigny/Marne, France. ICOMOS International Scientific committee for Stone (ISCS).

<sup>9</sup> Henry, A (2012) *English Heritage Practical Building Conservation Series - Stone* Ashgate. Surrey.

<sup>10</sup> Different laboratories were used due to closures and interruptions caused by covid restrictions in 2020.

<sup>11</sup> Mechanical resistance is lowered, thermal insulation is reduced, harmful chemical reactions, biodeterioration processes and salt-related decay processes may occur.

<sup>12</sup> 'Trapped' pores are an important fraction of the porous network, and may reach c.60% of the total porosity. These are filled with air and can act as an 'empty' expansion space during ice/salt growth.

<sup>13</sup> Henry, A. [et al] *Historic England Practical Building Conservation – Earth, Brick & Terracotta*. Surrey. Ashgate. P.405

<sup>14</sup> Hurst, L. (2010) "Place bricks – their making, properties and use", *BBS Information* 112, April 2010, Pp.20-26

<sup>15</sup> Several authors have noted that place bricks were those placed on the outside of a clamp of stock bricks (ie same material but underfired). This seems to derive from the Ordinances of Corporations Act of 1504 (19 Henry VII c.7) quoted by Nathaniel Lloyd:

'Notwithstanding Acts of Parliament, Orders and Ordinances, persons within fifteen miles of the City of London dig clay at unseasonable times of year, make bricks of bad stuff and unsizable dimensions, and do not thereof mix great quantities of soil called Spanish and in burning thereof use small ashes and cynders, commonly called breeze, instead of coal and burn the bricks, commonly called Grey Stock Bricks in Clamps, and the bricks commonly called Place Bricks in the same Clamps, on the outside of the said Grey Stock Bricks, by means whereof great part of the bricks now usually made are hollow and unsound that will scarcely bear their own weight. And whereas there is at present no provision made by any law for the dimensions of bricks etc ... and all bricks shall be burnt in kilns or in distinct clamps, the Place Bricks by themselves and the Stock Bricks by themselves'

However, this would not explain the much greater demand of place bricks required for building, or that under-fired orange/salmon coloured bricks were also termed 'samel/sammels'.

<sup>16</sup> The site is noted as the old brick field on John Rocques map and presumably had ceased production.

<sup>17</sup> For example, recent (<https://www.rte.ie/news/dublin/2020/0609/1146385-archaeological-dig/>) archaeological excavations at Ship Street, Dublin 2 in May and June 2020 located the bottom of the River Poddle c.15m below present street level, and the Calp limestone bedrock exposed during the course of the excavations would have provided ample building stone.

<sup>18</sup> There are a number of publications on building stone in Dublin City such as Wyse-Jackson, P. (1993) *The Building Stones of Dublin – a walking guide*. Dublin. Country House; Pavia & Bolton, *ibid.*; Hand. T. (2010) "Supplying stone for the Dublin House", in Casey, C. [ed] *The eighteenth-century Dublin Town House; form, function and finance*. Dublin. Four Courts Press. Pp.82-97; Casey, C. & Wyse-Jackson, P. (2019) *The Museum Building of Trinity College Dublin: a model of Victorian craftsmanship*. Dublin. Four Courts Press.

<sup>19</sup> Bolton, J. (1998) 'Irish Brickfields'. Unpublished report. Dublin Institute of Technology. Similar diversity was also seen in England, with the British Research Station estimating that before World War II "around 2000 different varieties of brick were being produced in over 1300 brickyards" in England. Henry, A. *ibid.* P.470

<sup>20</sup> Staffordshire Blue Bricks were a dark-coloured brick fired from Etruria mark to a blue colour in a high-firing kiln with a reducing atmosphere, and marketed for their high crushing strength. Staffordshire blue bricks were widely used for railway, road and canal bridges and were believed to have been developed about 1830 in England (BBS N.Midlands Bulletin, 2 Jan 1975, P.14).

<sup>21</sup> Courttown Brick and Tile Works produced a variety of solid and perforated brick from 1847. <https://www.buildingsofireland.ie/buildings-search/building/15701224/court-town-brick-and-tile-works-kilbride-bally-court-town-ed-county-wexford>

<sup>22</sup> Brick can be found on a number of eighteenth and nineteenth century shipwrecks around the coast of Ireland, providing physical evidence of the coastal trade in building materials including brick, stone, lime and slate. However, there was a limit on the economics of transport – Youghal bricks were highly regarded but were “not now in the Dublin market, it is said on account of prohibitory freight”.

<sup>23</sup> These handmade bricks continued to be made for local use and for the Dublin market in Co. Kildare until the 1950s.

<sup>24</sup> Kinahan, G. (1885-9). *Economic Geology of Ireland*. Journal of the Royal Geological Society of Ireland. Vol.VIII (new series) P.375

<sup>25</sup> Roundtree, S. (2020) “Brick in the eighteenth-century Dublin town house”, in Casey, C. [ed] *The eighteenth-century Dublin Town House; form, function and finance*. Dublin. Four Courts Press. P.75

<sup>26</sup> Marsh’s Library c.1700 used gauged and rubbed bricks for window lintels.

<sup>27</sup> Stamp, A.H. (1979) “The Brick Children”; BBS Information 19, November 1979, reprinted in BBS Information Compilation Volume 1 1793-1981, May 1988, Pp.40-42

<sup>28</sup> Various editions of George Smiths *The Cry of the Children from the Brickyards of England*, 1871, have extensive information about the atrocious conditions under which children worked in brickfields.

<sup>29</sup> Brunskill, R.W. & Clifton-Taylor, A. (1977) *English Brickwork*. London.

<sup>30</sup> Dobson’s 1850 *A Rudimentary Treatise on the Manufacture of Bricks and Tiles* made a clear distinction between clay processed by rollers and by the pug mill

<sup>31</sup> Hurst, L. (2011) “The introduction of wire-cut bricks”, BBS Information 118, October 2011, Pp.15-25.

<sup>32</sup> The McGladery & Sons brickworks were established in 1859, investing in a steam engine and brickmaking machine before 1885 when the company moved to a new location where it operated from 1885-1945 and where it and invested in newer machines and hot floor drying sheds to increase production along with draught kilns and a continuous chamber kiln. McGladery bricks were shipped to Dublin throughout, and used in the Donabate Asylum for example. Sloane, D. (1995) “Brickmaking in Northern Ireland”, BBS Information 65, Pp.13-16

<sup>33</sup> Roundtree, S. (2007) “Dublin Bricks & Brickmakers”, Dublin Historical Record. Vol.LX, No.1 Pp.61-70

<sup>34</sup> Widespread use of cement in Ireland did not seem to occur until after the Irish Government’s Cement Act of 1933 which allowed the construction of cement factories in Drogheda and Limerick. <http://www.irishstatutebook.ie/eli/1933/act/17/enacted/en/html>

<sup>35</sup> Kilns marked on historic Ordnance Survey maps tend to be relatively small, but sufficient to meet demand for both agricultural and building lime. While limestone predominated, other calcareous materials were also fired to produce quicklime, and ‘traditional’ lime in Ireland varied in quality and hydraulicity. For an example of local production, see Morahan, L., Cagney, L., Taylor, K., O’Sullivan, J. & Bolton, J. (2020) “Relics of transport and industry in early 19th-century Conamara: archaeological investigation of an old road and a lime kiln, in Lurgan and Bunnakil”, *Journal of the Galway Archaeological and Historical Society*, Volume 72, Pp.125-150

<sup>36</sup> Bolton, J. (forthcoming 2021) “Blood, lime and sand: fortifications, hydraulic limes and natural cements in Ireland during the Napoleonic Wars”, *Journal of the Building Limes Forum*.

<sup>37</sup> Bolton, J. (2010) “Conserving historic buildings: the problem of ‘black lime’ mortars”, *Journal of the Building Limes Forum*. Vol. 17 (2010)

<sup>38</sup> This does raise the possibility that a mason from outside of Dublin (and so not familiar to the hydraulic properties of the local lime and the presence of reactive aggregate in local sand pits).

<sup>39</sup> Seen from ground level, the brick differs in colour and hue and the mortar joints are very different to the work below.

<sup>40</sup> The masonry shows run-off stains from failures at the coping stones, but only a relatively light deposit of atmospheric particulate soiling. Given the smog found in Dublin prior to the introduction of the Air Pollution Act 1987 (which prohibited the production, use, import, distribution or sale of any substance which may cause air pollution, and specifically the emission of smoke) it is likely that the soiling found on the brickwork post-dates this environmental legislation.

<sup>41</sup> It would be necessary to gain close access to the brickwork above first floor level from the exterior to determine if they were indeed different.

<sup>42</sup> The frieze was not closely inspected but appears to be a cast stone or concrete feature.

<sup>43</sup> Brick stamps became more popular in the second half of the nineteenth century, with stamps from Kildare, Wicklow and Dublin known. However, stamped bricks represent only a fraction of the amount of bricks burnt; and the relatively few brick manufacturers who did stamp, do not appear to have stamped all their wares, and the style of brick stamps changed from time to time. The Athy brickworks stamp is well known; but small farms in the Athy area continued to make unstamped clamp-fired bricks for both the local and Dublin construction markets up until the 1950s. As yet, there has been no comprehensive cataloguing of Irish bricks.

Dublin Central Masterplan Area Conservation Management Plan

**Appendix A6** Building Materials Analysis Report

Sites 1 and 2

Volume 2

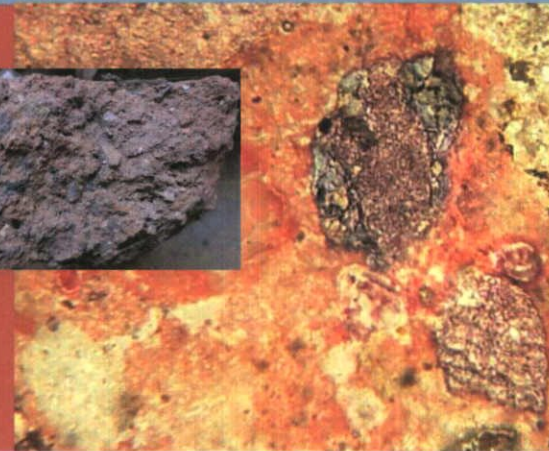
Dr. Jason Bolton



Conservation

Research

Analysis



## Dublin Central

Historic Building Materials Analysis Report Volume 2 – Sites 1 & 2

April 2021

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### **IMPORTANT**

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## 1. Introduction & Purpose of the Report

This report was prepared at the request of Molloy & Associates Conservation Architects to inform the Dublin Central Built Heritage Review for Hammerson Plc. The purpose of the work was to analyse the physical fabric of buildings on O'Connell Street, Parnell Street, Henry Street, Moore Street, Moore Lane and Henry Place; and to use the physical evidence gathered through study of the building materials to gain a better understanding of the significance and dating of each of the buildings. This report is Volume 2 (of 2)<sup>1</sup> and focuses on the buildings contains in Sites 1 and 2 in the Dublin Central project.



Fig.1.1: GoogleMaps aerial view of the study area.

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## 2. Methodology & Limitations of Inspection

The work began in June 2020 with sampling from July until April 2021. The buildings were visited as access was made available (some of the buildings had been disused and vacant for some time). The work comprised initial reconnaissance surveys of the exterior of the all the buildings listed for the project from the public street; followed by a visual assessment survey of the exterior and accessible parts of the interior of the buildings; investigative opening-up of targeted parts of the buildings to determine the nature of the masonry; sampling of a representative number of building materials from each of the sites; and analysis of those samples.

The details of the methodology and limitations of inspection with respect to the visual assessment survey, sampling in-situ testing and analysis, terminology, inaccessible areas and limitations of the work together with an introductory discourse on historic buildings materials in Dublin City from the eighteenth until the first half of the twentieth century are provided in Volume 1.

No historical research was undertaken (but is being undertaken by other Design Team members); apart from reference to a limited selection of historic maps of the Moore Street and O'Connell Street area. Some of the interpretations and opinions below may be revised in the light of historical, cartographic and survey work undertaken by the Design Team in subsequent drafts.

## 3. Sampling

Table 1 below notes the sample of building materials taken from buildings within Sites 1 and 2 of the Dublin Central project. In addition to the samples of bedding and pointing mortars, plasters, renders, brick and stone in the table below, non-disturbance *in situ* microscopy of materials exposed at wall and ceiling surfaces was undertaken in the majority of the buildings. A full list of samples is provided as Appendix 1 in the Volume 1 report.

Site 1  
 Site 2

No.	Building	Location and Notes
13	60a O'Connell St 19 Henry Place	Hewn Calp limestone wall with brick pozzolan beneath modern Portland Cement render. <i>Thin Section 10.HP.13</i>
56	42 O'Connell St	East Façade. Interior. Brick bedding.
57	42 O'Connell St	East Façade. Interior. Brick bedding.
58	42 O'Connell St	Link structure. Whole brick.
59	42 O'Connell St	Link structure. Interior. Brick bedding.
60	60 O'Connell St	Basement. East well. Calp limestone wall. Plaster/Render + limewash
61	60 O'Connell St	Basement. Entrance to granite safe. Pozzolonic plaster.
62	60 O'Connell St	Basement. Murray Gothic Arch. Bedding
63	59 O'Connell St	Chimney. Bedding
64	59 O'Connell St	Basement. Chimney bedding.
65	59 O'Connell St	Basement. Chimney brick.
66	59 O'Connell St	Basement. Haired lime plaster
67	59 O'Connell St	Rooftop. Brick.
69	58 O'Connell St	West Elevation 'Campbells'. Brick & bedding.
71	61 O'Connell St	'Flanagan's. Brick & bedding
72	60a O'Connell St	Calp limestone bedding mortar
74	58-59 O'Connell St	Render & brick bedding
75	58-59 O'Connell St	Rear. Calp limestone bedding mortar.
76	58-59 O'Connell St	Rear. Calp limestone bedding mortar.
77	71 Parnell St	Brick
78	71 Parnell St	Brick. 3 no.
79	71 Parnell St	Lath & plaster from ceiling.
80	71 Parnell St	Clamp brick & bedding mortar
81	71 Parnell St	West wall. Centre. Brick & bedding
86	59 O'Connell St	Plaster from chimney
87	59 O'Connell St	Brick bedding mortar
88	59 O'Connell St	Portland Cement pointing & lime-based bedding mortar from Calp limestone wall
89	59 O'Connell St	Bedding from garden wall to rear

Table 1: Building materials sampled from Sites 1 and 2 of the Dublin Central Project.

#### 4. Site 1

The description of the buildings and structures in the Dublin Central project below has followed the scheme outlined in the Preliminary Built Heritage Review prepared for Hammerson Plc. By Molloy & Associates Architects. Site 1 consists of four sites: 71 Parnell Street, 40-41 Parnell Street, 42 O'Connell Street and 42 O'Connell Street-O'Connell Hall.

**4.1 71 Parnell Street:** The four-storey two-bay building has a yellow 'stock' brick façade over a shopfront, with the east side of the façade slightly advanced of the west side. The brick is laid in English garden wall bond. The internal face of the façade wall is composed of concrete blockwork (Fig.4.1.1), but the internal party walls contain brickwork comparable to that seen in mid-eighteenth century works at Nos.42 and 43 O'Connell Street. This brick contains distinctive fired limestone shards (Figs.4.1.2 & 4.1.3), and may represent brick from the 'Old Brick Field' marked on John Rocque's mid-eighteenth century map of Dublin.

The internal walls were built with relatively low-quality irregular hand-made clamp-fired bricks showing many manufacturing defects (Fig.4.1.2). These are laid in thick, deep lime mortar joints where the bedding joint depth is c.1/3 the height of the brick. The bricks were made from unsorted and unprocessed natural raw clay containing abundant low-sphericity sub-angular limestone fragments; some of which were partially calcined during brick firing. These coarse non-plastic inclusions also include chert fragments suggesting that the brick field lay on a substrate of Dublin Calp limestone (the bedrock which underlies Dublin City and environs). This suggests these bricks were made in or close to Dublin City. The bricks also contain black, glassy, vitrified over-fired zones. The medium-grained lime-rich mortars contain poorly-sorted sub-rounded coarse (<5mm $\varnothing$ ) predominantly limestone aggregate, coarse crushed brick (1-4mm $\varnothing$ ) probably added as a pozzolan, and irregular lime lumps c.2mm $\varnothing$  extending to >5mm in places indicating poor-quality mixing and craftsmanship.

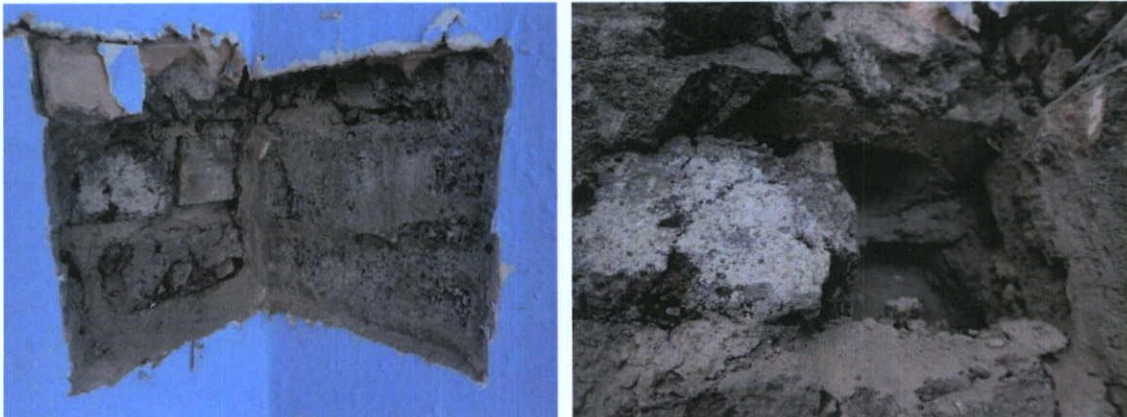


Fig.4.1.1: Inner face of the façade wall at the stairwell showing concrete blockwork, with repairs to the party wall.

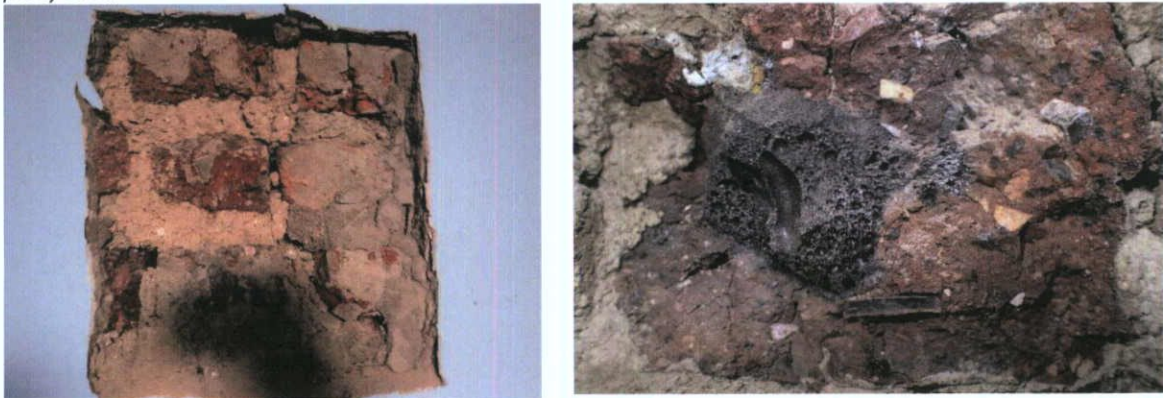


Fig.4.1.2: The internal party wall contains clamp-fired brick laid in thick beds of lime-based mortar. The hand-made brick contains coarse limestone inclusions and black over-fired vitrified zones.



Fig.4.1.3: Coarse burnt inclusions (left) and calcined limestone inclusion (right).



Fig.4.1.4: Brick pozzolan (arrowed) was added to the mortar. This imparts hydraulic qualities to the mortar, while the larger brick fragments also function as porous aggregate. The mortars commonly show relatively coarse 'lime lumps'.

**4.2 40-41 O'Connell Street:** This vacant site has boundaries to the north, south and east formed of reinforced concrete with no visible historic fabric. Some historic material does survive at basement level beneath the pavement of O'Connell Street, accessed through a doorway in the reinforced concrete wall at the east boundary of the site. This area was not visited, but a photographic record was made by Murphy Surveys. The layout of this area is difficult to clearly interpret from the photographs, but does contain historic building fabric. These comprise a series of vaults, including a red brick arch with a limewash surface finish. A section of massive hewn Calp limestone roughly coursed masonry walling bedded in a lime-based mortar was also shown. These structures are consistent with basement walling in the Georgian period. The Calp limestone wall includes rounded cobbles (suggestive of field clearance) and is indicative of early walling. The brick shown in the Murphy Survey photographs are variegated red, orange and yellow in colour and laid in deep fat lime bedding mortar joints. One section of largely brick (with some Calp limestone masonry) has an irregular bond pattern including segments of English bond with header bond interrupted with unworked Calp limestone boulders and hew blocks. The basement area seems quite extensive. The relative position of these sections of walls and vaults are unclear – but are consistent with remnants of Georgian basements.



Fig.4.2.1: The vacant site of 40-41 O'Connell Street.

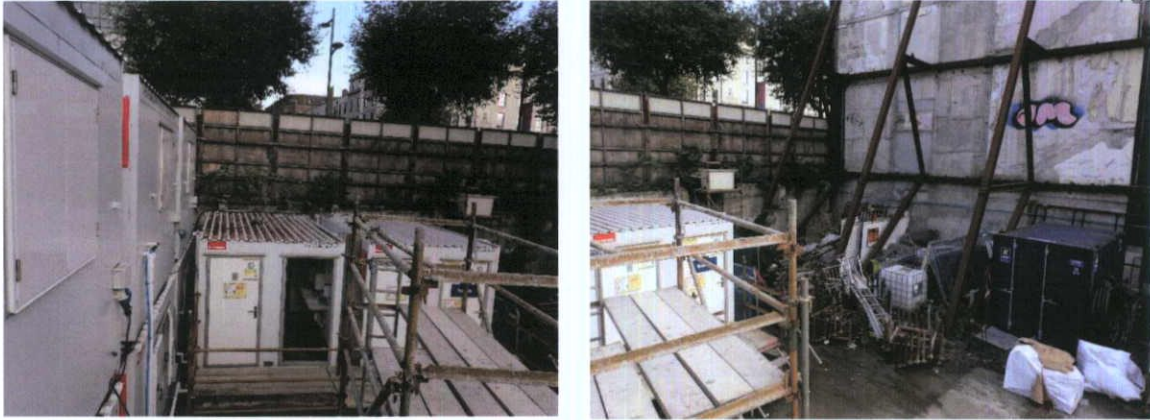


Fig.4.2.2: Reinforced concrete on the east (left) and south (right) boundaries.



Fig.4.2.3: Reinforced concrete on the south side, with historic masonry of the adjacent property visible at the south-west corner of the site.



Fig.4.2.4: Reinforced concrete structures on the north side of the vacant lot.



Fig.4.2.5: Detail of reinforced concrete structure on the north side of the site.

**4.3 42 O’Connell Street:** This three-bay four-storey-over-basement mid-eighteenth century Georgian town house provides a significant dating horizon with which to compare and date similar materials found elsewhere in the Dublin Central project. The building has a brick façade laid in Flemish bond and has been repointed throughout in a Portland Cement-based mortar; with a tripartite stone principal historic entrance, punctuated by timber sash windows set in plain reveals with granite cills; with a granite string course dividing the brick superstructure from the hewn coursed limestone at basement level. The basement level is separated from the brick superstructure by a moulded granite strong course, with the well-cut Calp limestone face of the basement wall laid in a coarse-grained lime mortar. One large limestone block is coarsely fossiliferous and may be Ardbraconn limestone. The internal plan is largely intact, with the original staircase, ceiling plasterwork and Georgian timber door surrounds surviving. The walls had been largely stripped at ground and first floor level which allowed access to the inner leaf of the façade, party and internal brick wall surfaces.



Fig.4.3.1: Four-storey-over-basement façade with parapet in later brick, with railings on a granite plinth enclosing the basement well; and a tripartite Neo-Classical doorway of imported English limestone.

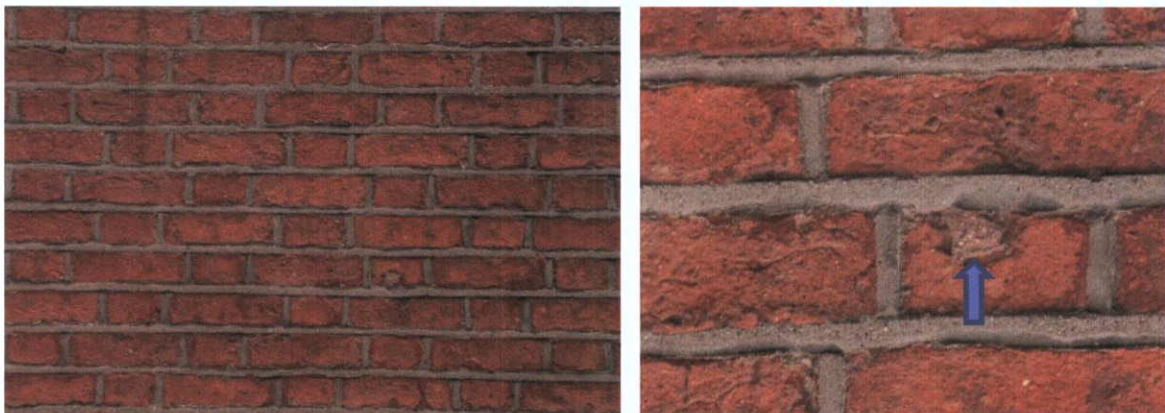
The façade facing brick is handmade and contains abundant inclusions of pebbles and fired material (Fig.4.3.4). The lime bedding mortar contains relatively coarse aggregate (up to ½ the joint height). The internal walls were built with place brick, lower in quality than the facing brick used for the façade (Fig.4.3.4) and showing numerous manufacturing defects. The lime mortar of the internal walls has been horizontally struck throughout. The large aggregate in the coarse-grained bedding mortars is similar in shape, dimension and mineralogical composition to the poorly sorted and often partially calcined limestone and

fine quartz seen in the handmade place bricks – suggesting a similar source. This is probably brick from the Moore Street brickfield (Fig.4.3.15). The most carefully crafted materials are likely to be those found in the stairwell which include the aforementioned construction brick and mortars, but also decorative building materials (Fig.4.3.12) including:

- a) Flatwork ceiling plaster (probably haired lime with additions)
- b) Ornate cornice probably built out from timber or brick base
- c) Flatwork wall plaster (probably not haired, but likely to contain brick pozzolan).



*Fig.4.3.2: The red facing brick is laid in Flemish bond and has been repointed throughout in a Portland Cement-based mortar. The repointing is failing (losing bond) in areas of saturation, and loss of the surface of the brick is evidence in many areas.*



*Fig.4.3.3: Repointed eighteenth-century brickwork with probably coloured Portland Cement repair (arrowed). Where the repointing mortar has failed, the underlying lime bedding mortar is exposed along with the brick core.*



Fig.4.3.4: The façade brick is handmade and contains abundant inclusions of pebbles and fired material. The lime bedding mortar contains relatively coarse aggregate (up to  $\frac{1}{2}$  the joint height).



Fig.4.3.5: The basement level is separated from the brick superstructure by a moulded granite strong course, with the well-cut Calp limestone face of the basement wall laid in a coarse-grained lime mortar. One large limestone block is coarsely fossiliferous and may be Ardbraccan limestone.



Fig.4.3.6: The ground floor shows later alterations, but the party wall shows place brick laid in a coarse-grained lime bedding mortar with poorly sorted limestone, quartz and chert aggregate and large lime lumps.





Fig.4.3.7: Place bricks in a coarse-grained lime bedding mortar. Internal walls at first floor level.



Fig.4.3.8 (left): The internal wall surfaces of the staircase retains decorative plasterwork finishes and enrichment. These were not sampled, but analysis of Georgian plasterwork elsewhere in north Dublin City indicates that the flatwork and the enrichment are composed of different materials – each of which uses very high-grade components and required a great deal of craftsmanship in successful execution.

Fig.4.3.9 (right): The internal walls were built with place brick, lower in quality than the facing brick used for the façade (Fig.4.3.4) and showing numerous manufacturing defects. The lime mortar of the internal walls has been horizontally struck throughout.



Fig.4.3.10: The large aggregate in the coarse-grained bedding mortars is similar in shape, dimension and mineralogical composition to the stone inclusions seen in the handmade bricks – suggesting a similar source. This is probably brick from the Moore Street brickfield.



Fig.4.3.11: Wire-cut firebrick at ground floor level, north wall, rear (west) room.



Fig.4.3.12: Detail of the ceiling at the head of the staircase showing three different materials:

- a) Flatwork ceiling plaster (probably haired lime with additions)
- b) Ornate cornice probably built out from timber or brick base
- c) Flatwork wall plaster (probably not haired, but likely to contain brick pozzolan).



Fig.4.3.13: The rear retains a tripartite arched window in the curving bay, mirroring the treatment of the main door. The rear has been re-rendered throughout in a Portland Cement-based mortar.



Fig.4.3.14: Microscopic views of a coarse-grained pozzolanic lime mortar used to bed the place brick of the internal walls and wall linings of 41 O'Connell Street. Note common occurrence of large lime lumps.



Fig.4.3.15: Microscopic detail of the core of a brick, likely to originate from the Moore Street brickfield. The brick contains poorly sorted and often partially calcined limestone and fine quartz.

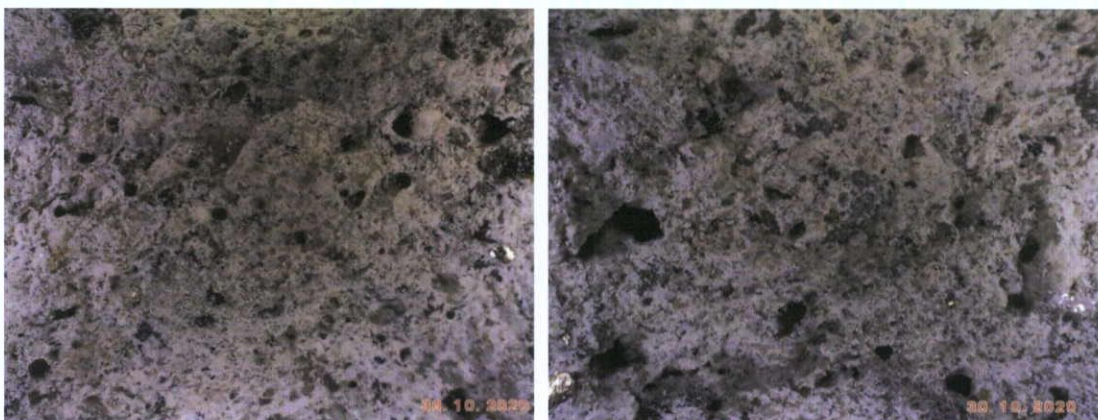


Fig.4.3.16: Detail of fine-grained lime mortar from the window reveals of the façade of No.41 O'Connell Street showing limestone, quartz and mica in the aggregate.

- 4.3 **42 O'Connell Street – O'Connell Hall:** The nineteenth-century building contains a decorative coffered ceiling and is a detached structure with independent access from Moore Lane. The Hall is linked to No.42 O'Connell Street by a series of later structures – and these were the focus of the site inspection. The boundary wall with No.43 O'Connell Street is formed of clamp-fired yellow stock brick (Fig.4.4.4) typical of the brick products shipped to Dublin City along the Royal and Grand Canal networks and is likely to be of nineteenth century date.

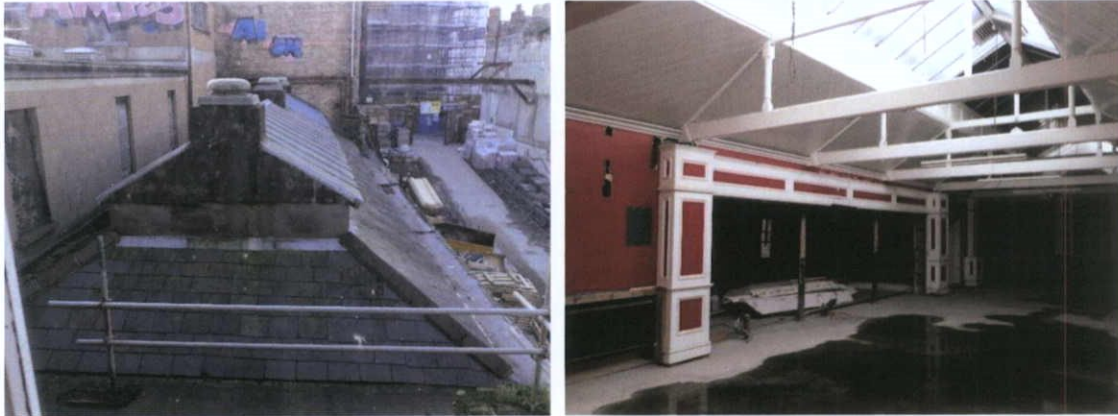


Fig.4.4.1: General view of the link structure between O'Connell Hall and 42 O'Connell Street.



Fig.4.4.2: The brickwork is covered by modern plasterboard.



Fig.4.4.3: Yellow machine-cut yellow-stock brick in a lime bedding mortar.

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Fig.4.4.4: The boundary wall with No.43 O'Connell Street is formed of clamp-fired yellow stock brick and likely to be of nineteenth century date.



Fig.4.4.5: Overburnt clamp-fired yellow stock brick showing calcined stone and vitrified zones.



Fig.4.4.6: Clamp-fired yellow stock brick showing shrinkage cracks and over-burnt edges; laid in a coarse-grained lime mortar of rounded limestone pebbles with angular chert and quartzite and crushed brick pozzolan added.



Fig.4.4.7: Coarse-grained limestone, quartz and chert with brick pozzolan and lime lumps.

## 5. Site 2

**5.1 43 O'Connell Street:** Five-storey four-bay terraced building c.1920s. The rear elevation is of 1920s construction with wire-cut brick, lime-cement bedding and concrete lintels. The boundary wall between Nos.42 and 43 O'Connell Street (Figs.4.4.4-4.4.7) is of clamp-fired brick laid in pozzolanic lime mortar and is likely of nineteenth century date. The basement retains early fabric of red clamp-fired brick with struck joints, possibly from the Moore Street brickfields and very similar to that seen from No.42 O'Connell Street (see Section 4.3). The rear elevation is built with machine-cut brick laid in a lime-cement bedding mortar and using a very different sand (Fig.5.1.2) to that found in Georgian and Victorian period buildings in Dublin City.



Fig.5.1.1: The interior shows 1920s décor and finishes.



Fig.5.1.2: The rear is composed of machine-cut red brick laid in English garden bond with a lime-cement mortar and having concrete courses above the window openings.

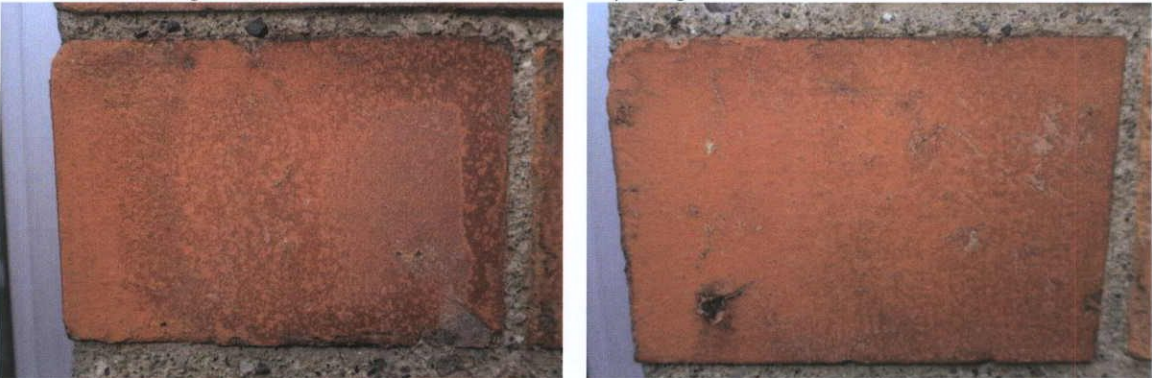


Fig.5.1.3: The fired brick has colour variations from kiln firing. The brick is laid in a relatively coarse-grained bedding mortar of variable aggregate (very different to those seen in Georgian and Victorian period mortars from Dublin City) of limestone, chert, quartz, sandstone and other lithics.

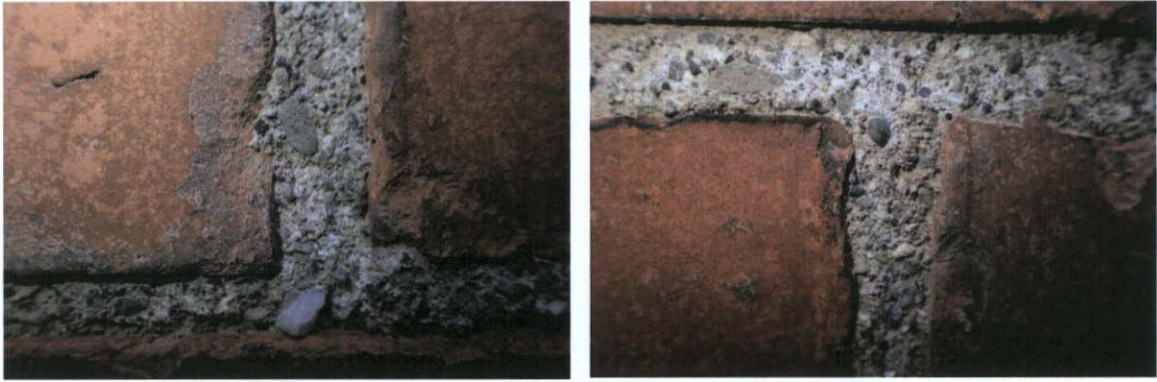


Fig.5.1.4: Detail of aggregate-rich matrix, very different in composition, texture and character to Georgian and Victorian mortars. Brick pozzolan has been added to the bedding mortar.

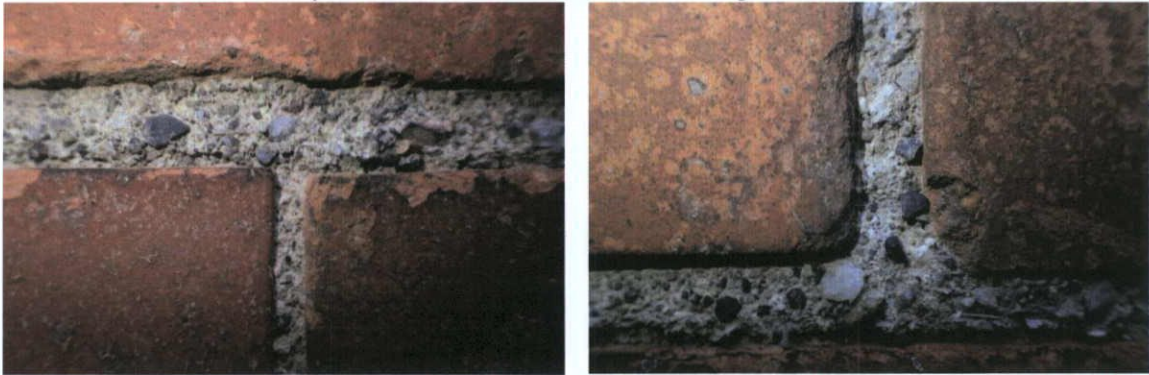


Fig.5.1.5: Coarse-grained lime-cement mortar, c.1920s.

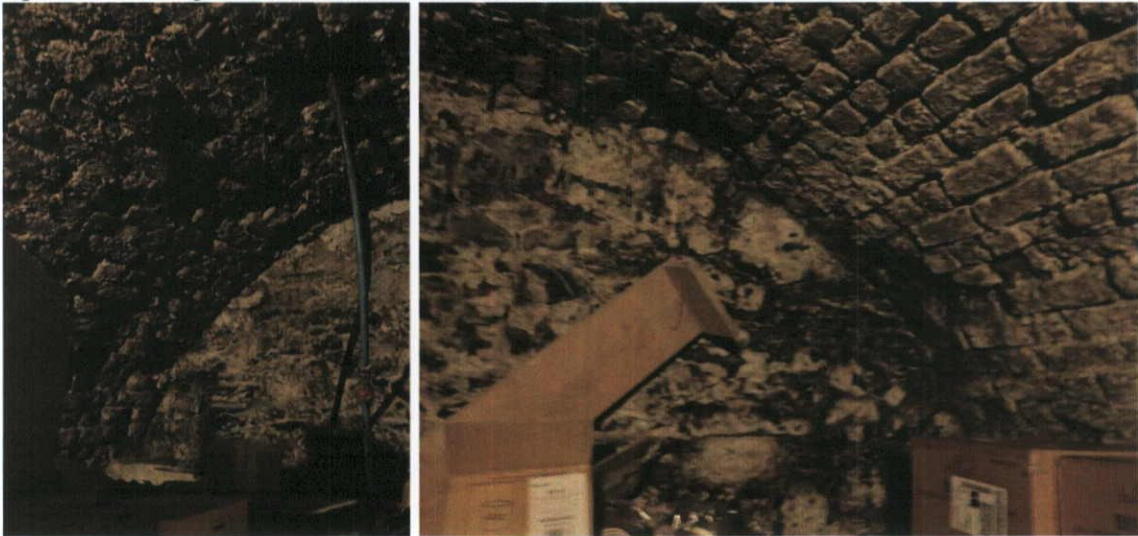


Fig.5.1.6: Brick vault at basement level.

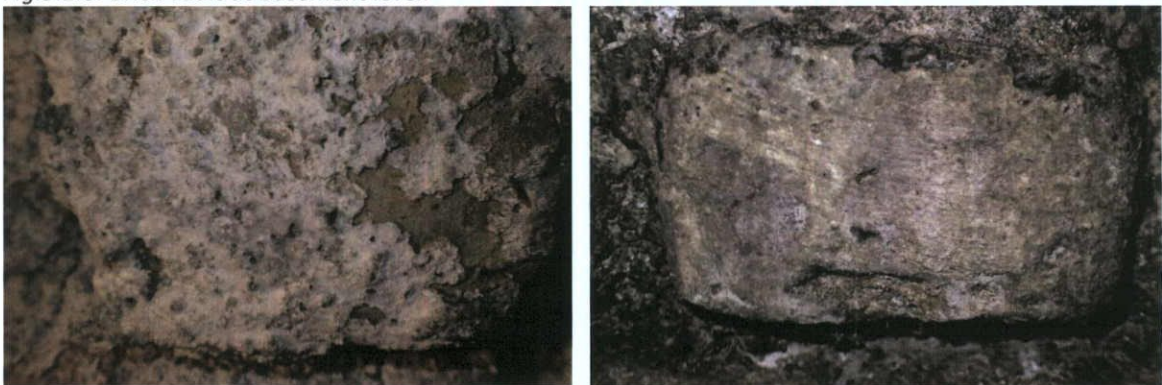


Fig.5.1.7: The vault brickwork was coated with a limewash (brush marks remain evident).



*Fig.5.1.8: The coarse-grained lime bedding joints are horizontally struck joints. The lime mortar contains limestone, quartz, chert and lime limps. The clamp-fired brick is similar to that seen in No.42. The mortar and clamp-fired brick contain similar aggregate (morphology, size range and mineralogy) suggesting a similar source of raw materials. This is probably brick from the Moore Street brickfields.*



*Fig.5.1.9: Detail of a clamp-fired brick seen at basement level showing limestone inclusions.*

**5.2 44 O'Connell Street:** The basement level retains a yellow stock brick vault with a 'coal hole' shaft and Calp limestone masonry walling at basement level – these appear to be remnants of the basement level of earlier, probably Georgian period buildings. The brick and Calp masonry walls are coated in limewash in most areas. The superstructure of the four-storey three-bay granite ashlar façade appears to be 1920s, as is the masonry of the rear, side and internal walls of the building.



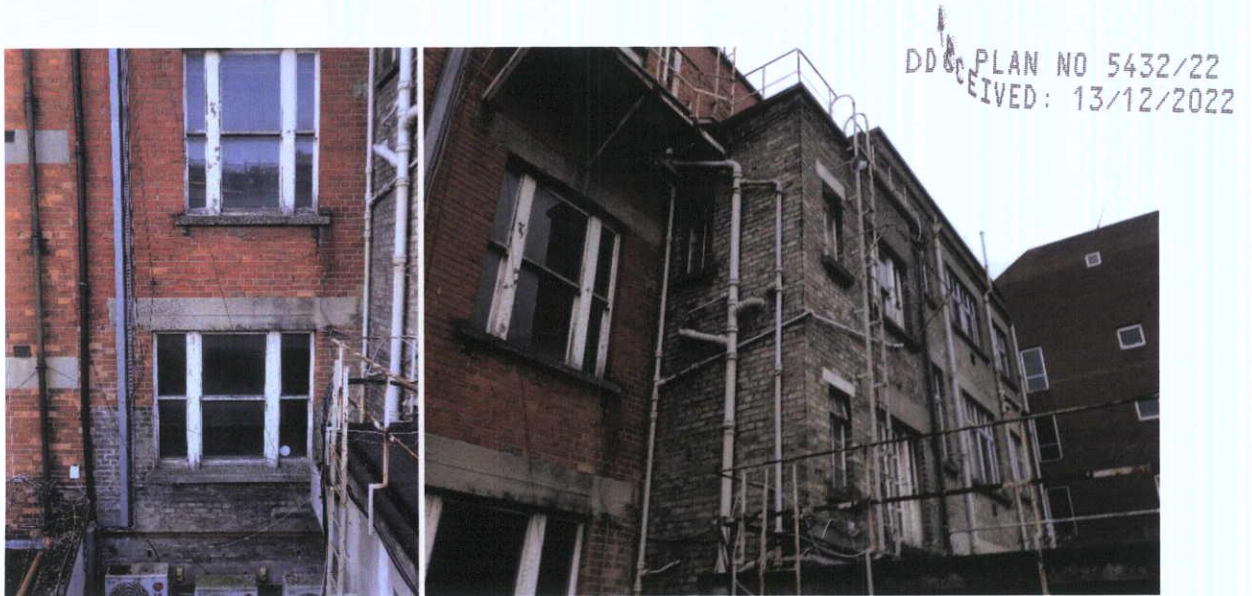


Fig.5.2.1: The rear of 44 O'Connell Street consists of 1920s red brick with concrete lintels similar to that seen at 43 O'Connell Street, with a yellow stock brick return.



Fig.5.2.2: Detail of the 1920s machine-cut brick and concrete lintel of the superstructure, above yellow stock brick at the rear basement level.



Fig.5.2.3: Dublin Calp limestone at basement level with single-coat lime plaster and multiple coats of limewash.

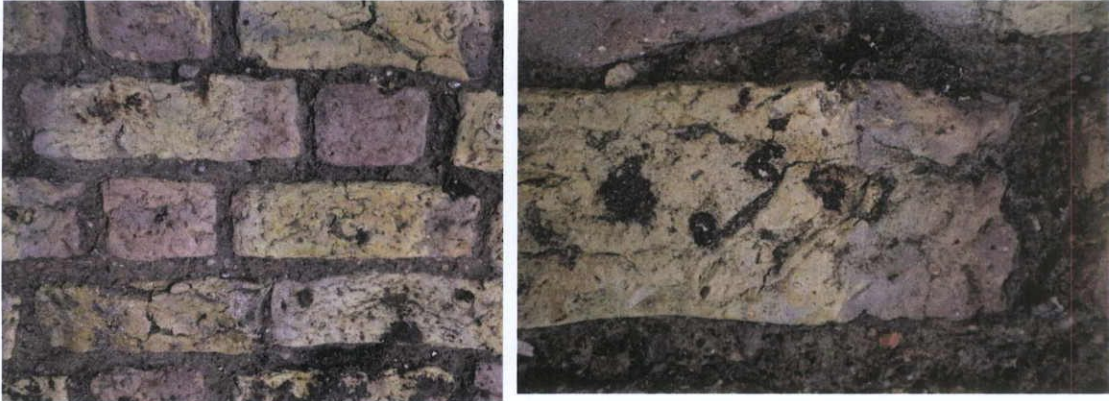


Fig.5.2.4: Detail of yellow-pink clamp-fired stock brick from the basement vaults set in saturated pozzolanic lime mortar; with traces of brick dust adhering to the surface of the brick.



Fig.5.2.5: Stretcher and header views of yellow-pink stock brick with shrinkage cracks laid in coarse-grained pozzolanic lime mortar.



Fig.5.2.6: The return is made from c.1920s yellow stock brick in a lime-cement mortar, with concrete lintels above the openings and forming the parapet coping.



Fig.5.2.7: The window cills are of concrete. The 1920s yellow stock brick also includes occasional earlier clamp-fired yellow stock brick (arrowed), likely to be an example of salvage.



Fig.5.2.8: Cross section showing the 1920s brick with natural stone inclusions in an evenly-fired matrix and bonded with a cementitious bedding mortar. Sample #90.



Fig.5.2.10: Salvaged earlier clamp-fired yellow stock brick in the return.

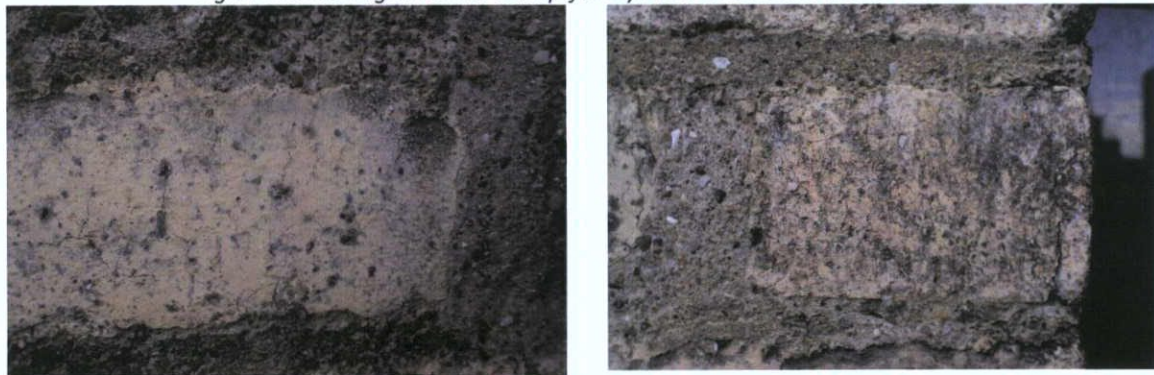


Fig.5.2.11: Detail of 1920s yellow stock brick in cementitious mortar.



Fig.5.2.12: Yellow 1920s yellow stock brick in grey cementitious bedding mortar.



Fig.5.2.13: 1920s yellow stock brick in cementitious mortar exposed in the party walls of the north (left) and east (façade) walls of the first floor level.



Fig.5.2.14: 1920s yellow stock brick in cementitious mortar exposed in the party walls of the south (left) and west (rear) walls of the first floor level.

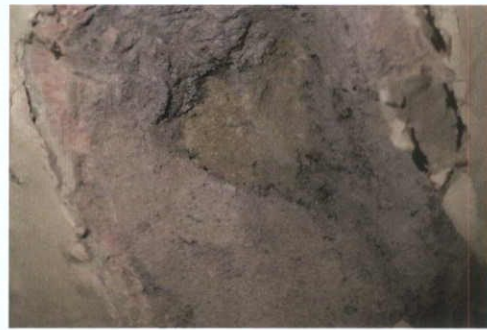
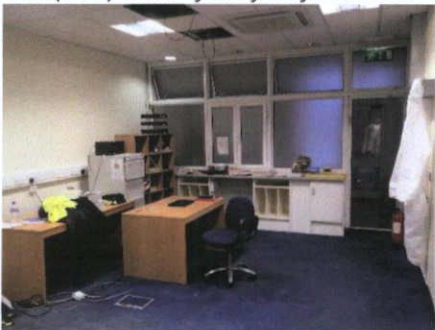


Fig.5.2.15: 1920s yellow stock brick in cementitious mortar exposed in the party walls of the north wall at ground floor level.



Fig.5.2.16: 1920s yellow stock brick in cementitious mortar exposed in the party walls of the south wall at ground floor level.

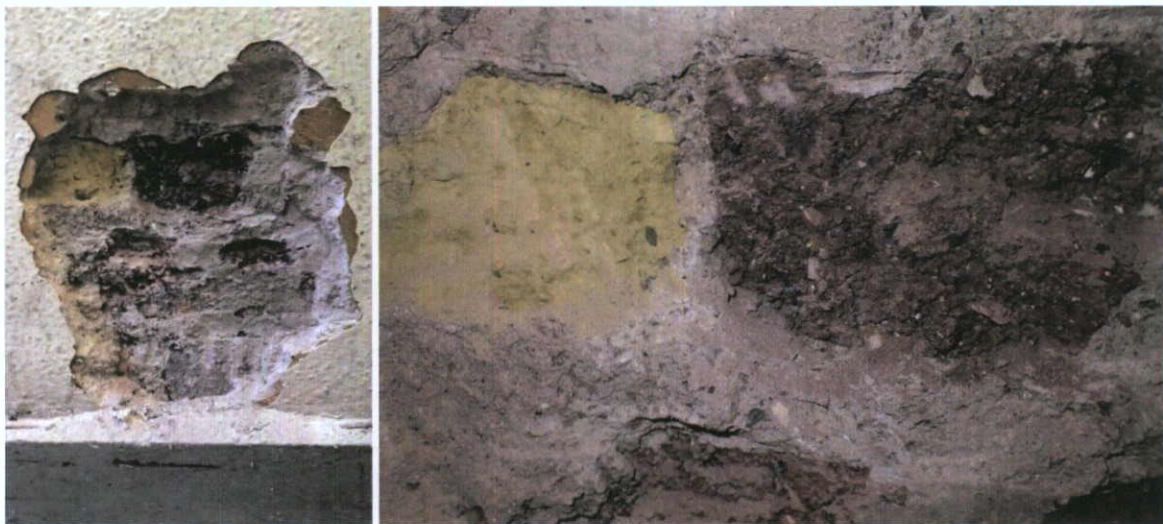


Fig.5.2.17: Ground floor, south wall, interior showing 1920s yellow stock brick and dark-red hand-made clamp-fired brick above skirting level, both bedded in a cementitious bedding mortar. The red brick appears to be a Georgian period brick, similar to others seen along the west side of O'Connell Street and possibly an example of a brick from the Moore Street brickfield. This appears to be a salvaged brick, reused in the masonry of the 1920s construction work.



Fig.5.2.18: Detail of the fine-grained yellow stock brick from the 1920s (left) and the dark-red clamp-fired Georgian brick which contains abundant natural stone inclusions, partially calcined limestone and burnt 'hot spots' suspended in the matrix.

**5.3 50-51 O'Connell Street:** This site consists of a vacant lot accessed from Moore Lane, with the built remains of five structures remaining readable and now forming the north and south boundaries of the site.

**Building A:** The wall consists of hewn Dublin Calp limestone with a breakfront brick-edged stack possibly containing a blocked-up chimney; with a line of brick-formed joist holes extending horizontally until this section terminates at the stump of a cross-wall. The masonry is bedded in a coarse-grained lime mortar. The brick in the joist holes is variegated hand-made clamp-fired red and yellow stock brick bedded in a lime-based mortar above embedded timbers. Shaley Calp limestone was also used to form some of the joist holes. The brick in the chimney breast differs from that in the joist holes, and uses yellow stock brick to edge both sides of the stack and form the flue.

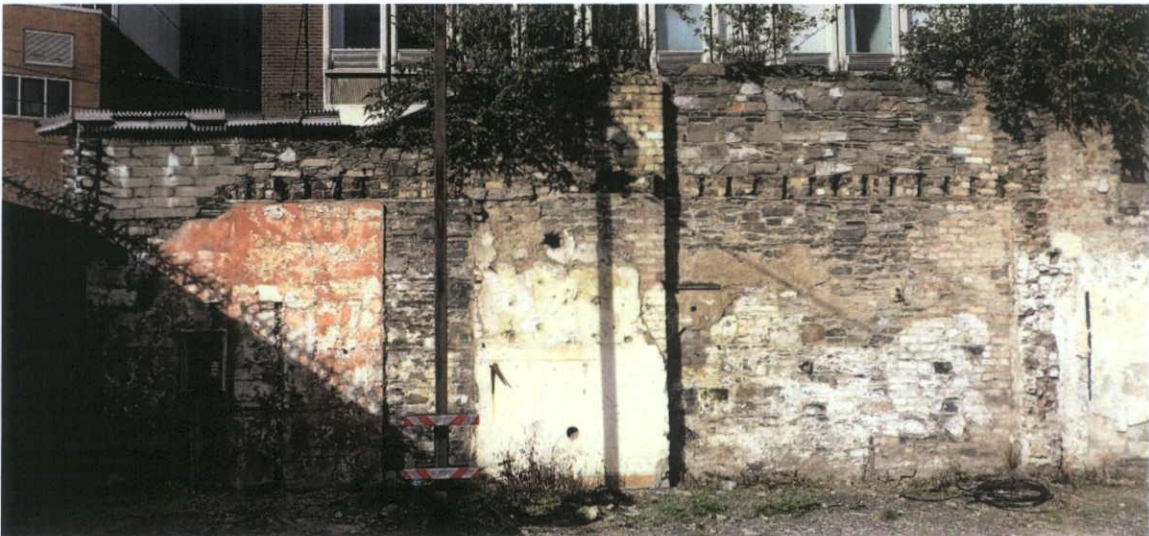


Fig.5.3.1: General view of Building A

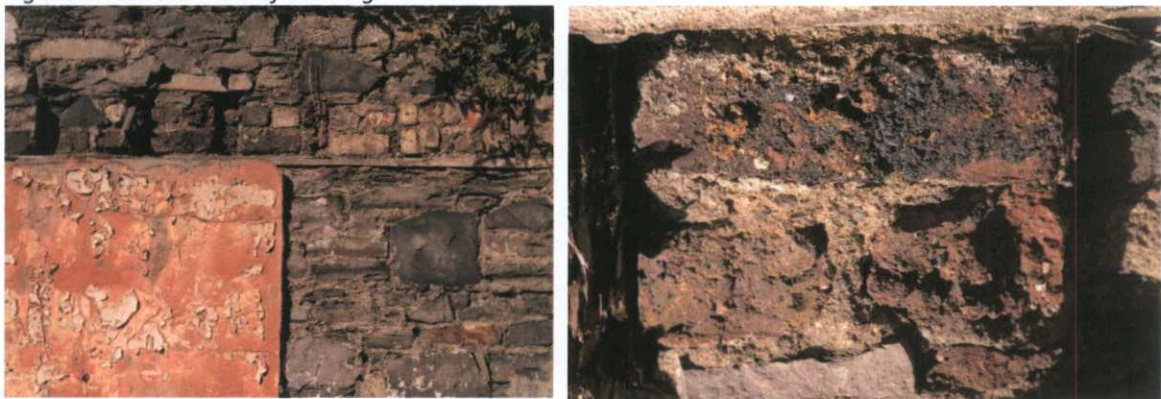


Fig.5.3.2: Detail of Dublin Calp limestone masonry and clamp-fired brick set in a traditional coarse-grained lime bedding mortar used to form the joist holes.

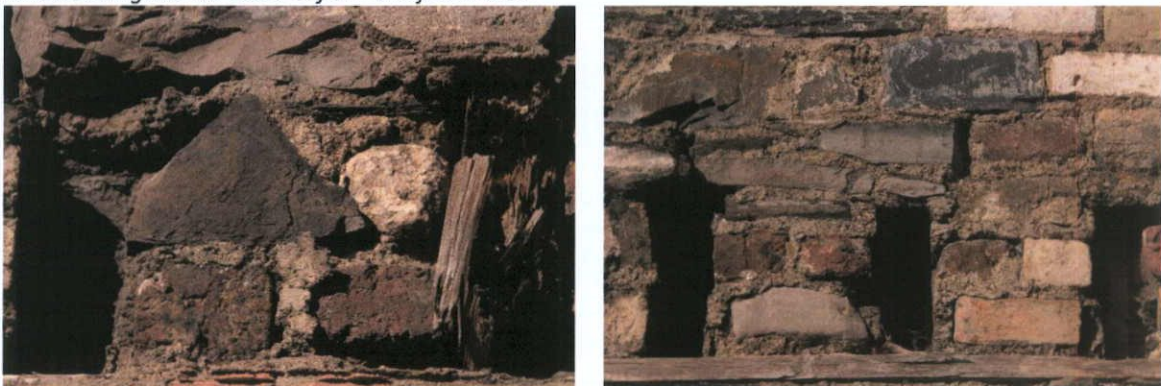


Fig.5.3.3: Calp was also used to form the joist holes.

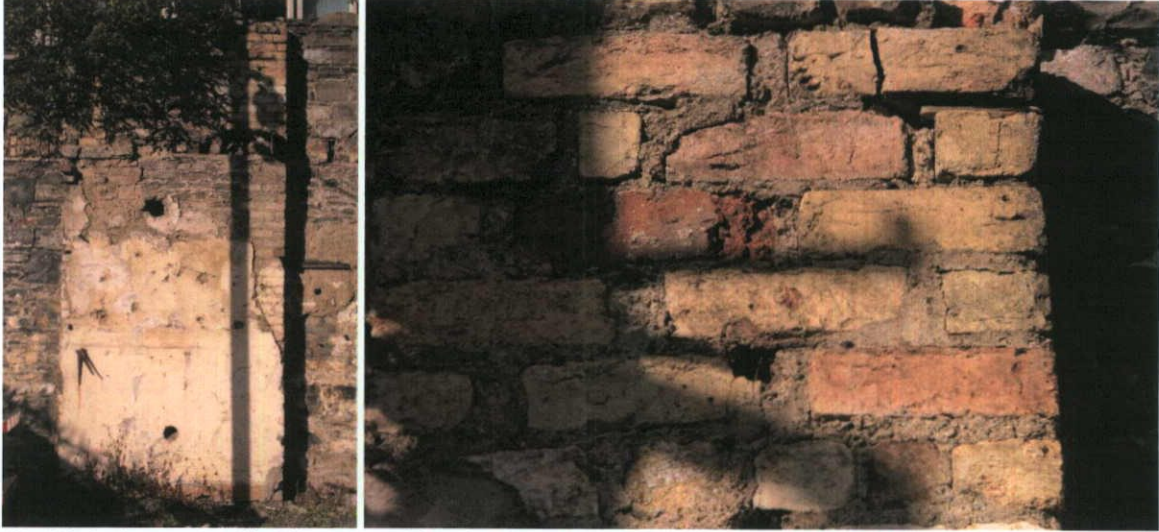


Fig.5.3.4: Fine-grained brick was used for the chimney stack.

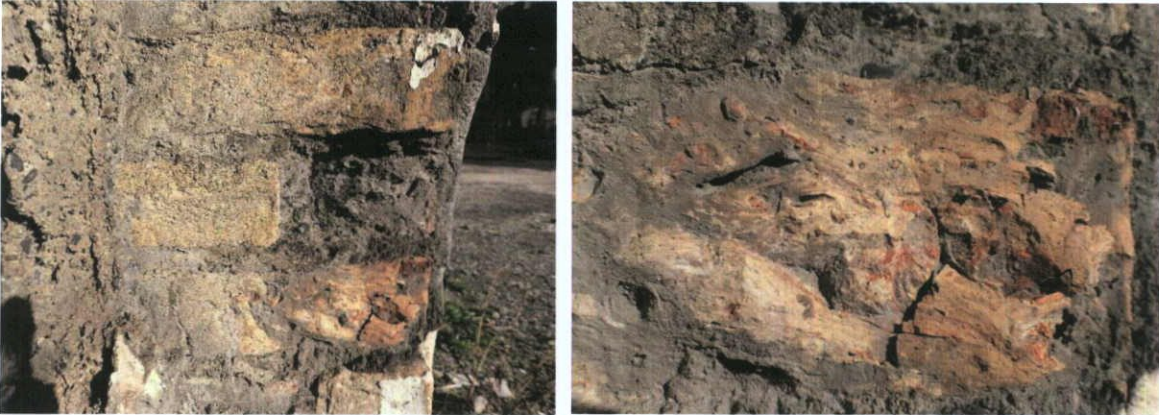


Fig.5.3.5: Detail of yellow stock brick in the chimney stack. The brick retains sedimentary structures indicating hand-made work; but has less inclusions and defects than the brick used for form the joist holes.



Fig.5.3.6: Detail of the mortar showing rounded limestone, quartz, greywacke and other lithic aggregate.

**Building B:** This section consists of a chimney breast with a shallow-arched brick fireplace flanked by arched recesses containing plaster (statue?) niches (Fig.5.3.7). The wall has timber battens attached to the upper part of the wall as a later alteration. The walls are primarily Dublin Calp limestone with a brick fireplace, brick relieving arch and brick flue. The plaster niches contain a binder-rich plaster mix with brick pozzolan and underfired calcined limestone (Fig.5.3.8). The fireplace is formed by brick with a limewash and is similar to nineteenth century fabric (Fig.5.3.9). The eastern arch is composed of a gypsum plaster on a keyed and netted plaster substrate (Figs.5.3.11-5.3.12). The walls are therefore two-phase, with twentieth century

alteration to the nineteenth century fabric. The plaster surface retains some keying indicating now-lost embellishment (Fig.5.3.13). The chimney breast is edged by irregular clamp-fired brick (Fig.5.3.14) similar to that used to form the niche arches (Fig.5.3.15). The brick is bedded in a pozzolanic lime bedding mortar, and there are traces of a pozzolanic lime plaster also.



Fig.5.3.7: General view of 'Building B'.



Fig.5.3.8: Cross-section of plaster from the niches.

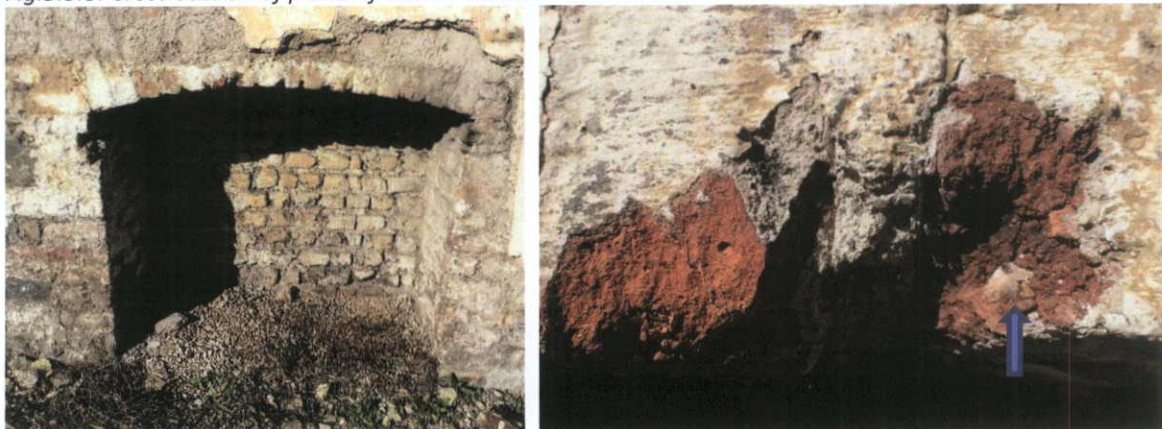


Fig.5.3.9: The yellow stock brick colour on the fireplace bricks is a surface colouration caused by the firing conditions, with the brick core a red colour and containing pebble sized inclusions in the matrix (arrowed). The surface has been coated with a limewash, with brush marks remaining visible on the surface. This was subsequently covered by the plaster which was applied onto the wall.



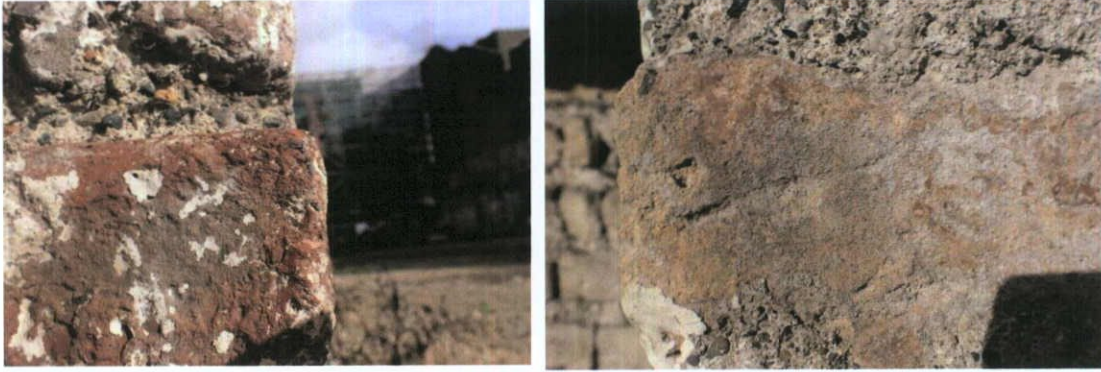


Fig.5.3.10: The stock brick at the chimney retains surface defects from the moulding process.

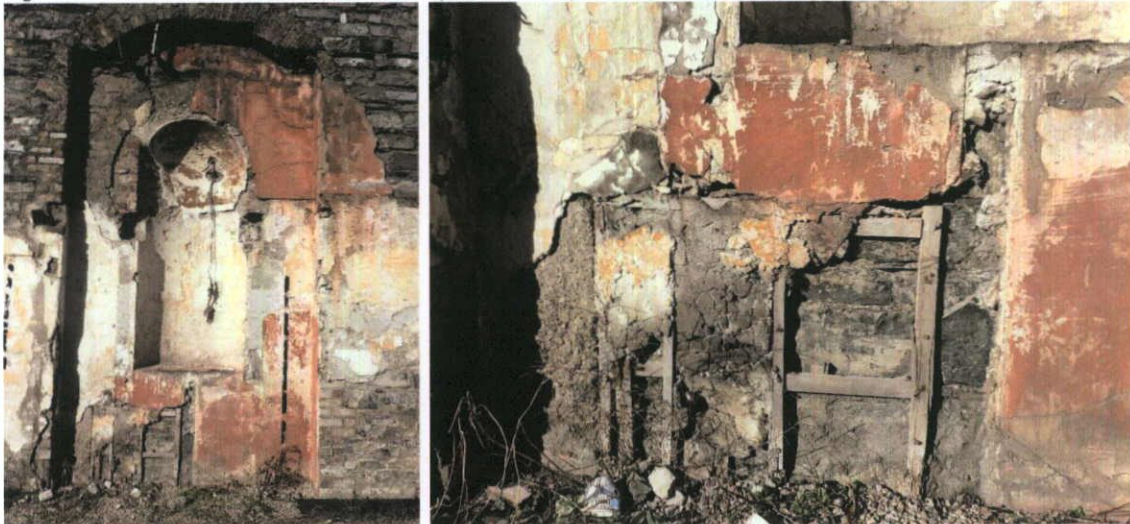


Fig.5.3.11: The eastern arch has gypsum plaster on a modern keyed and netted plaster.

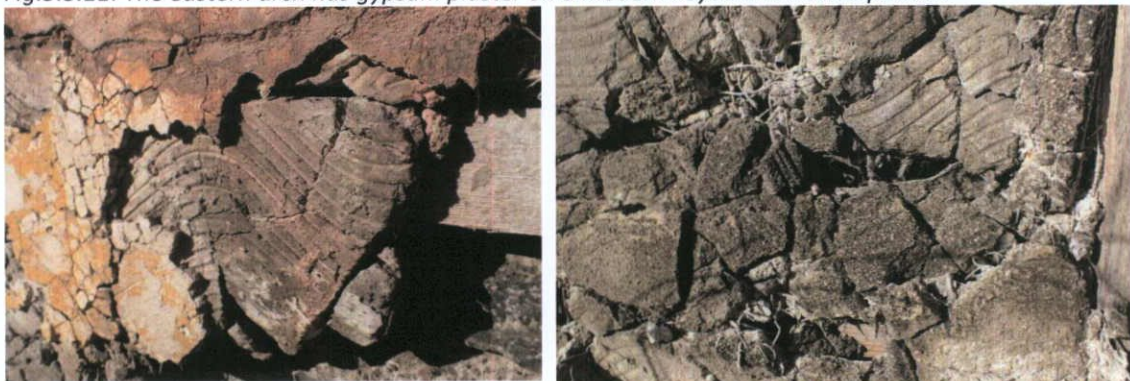


Fig.5.3.12: Eastern Arch: gypsum plaster applied on a keyed and netted plaster substrate on timber battens

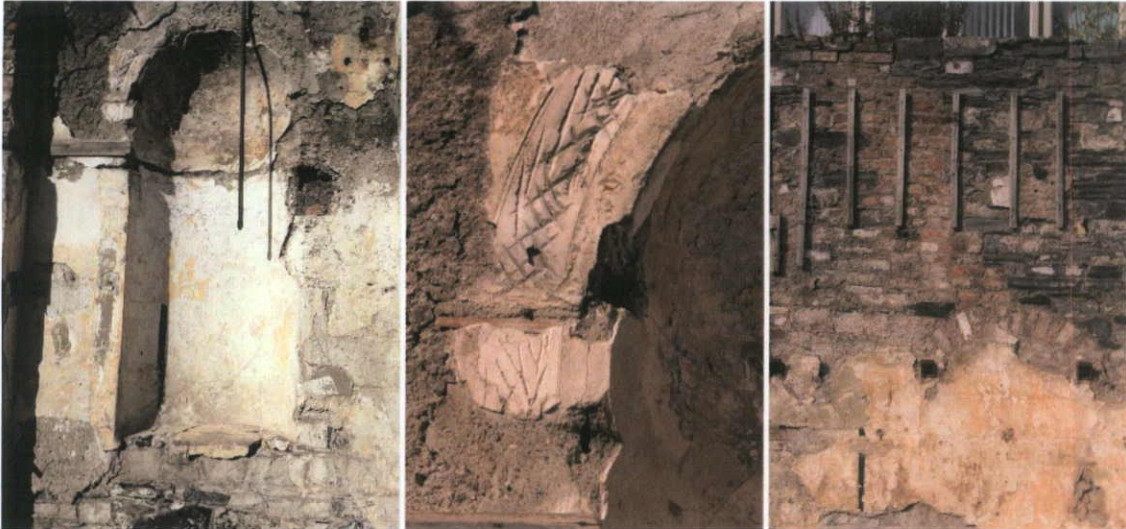


Fig.5.3.13: The western niche retains keying from now-lost embellishment; with timber battens indicating later alteration to the wall surface.



Fig.5.3.14: The chimney breast is edged by irregular clamp-fired brick.

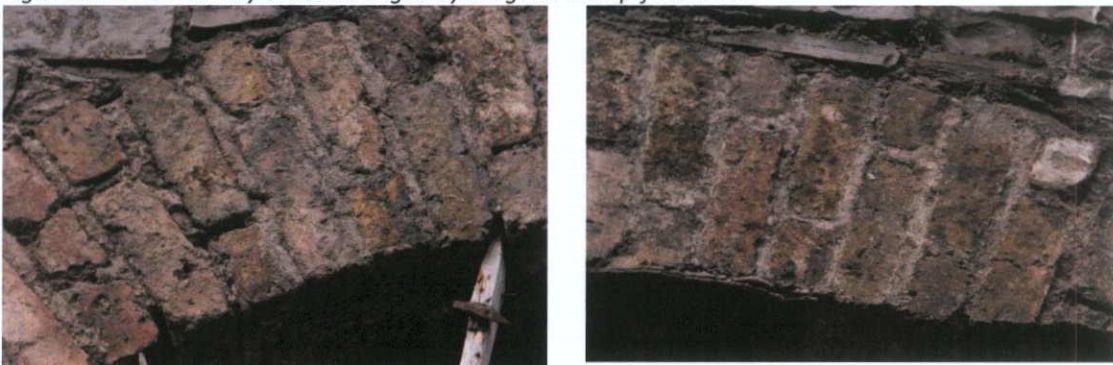


Fig.5.3.15: Brick arches above the plaster niches.

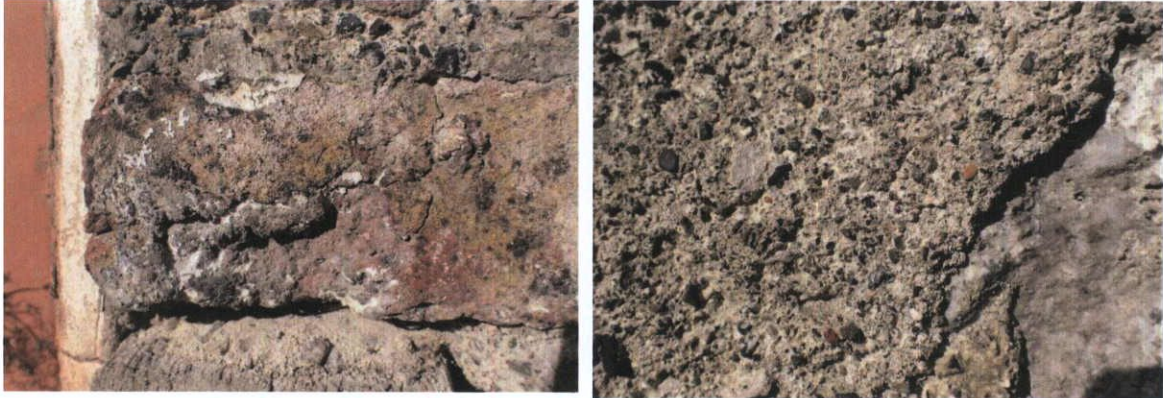


Fig.5.3.16: Clamp-fired brick set in pozzolanic lime bedding mortar; and coated with a pozzolanic lime plaster.

**Building C:** This section of wall features three blocked-up door openings and a series of burnt battens at first floor level. The brick is made-made clamp-fired stock brick in deep lime bedding mortar joints; some of which is partially over-burnt and indicative of clamp firing. The blocked-up doorways were filled with brick or Calp limestone masonry. The brick infill is bonded with lime mortar, suggesting a nineteenth century date. The Calp limestone blocked openings at the east end of the wall has been infilled with clamp-fired brick with the lime mortar showing both crush brick pozzolan and clay inclusions (i.e. a clay-lime mix).

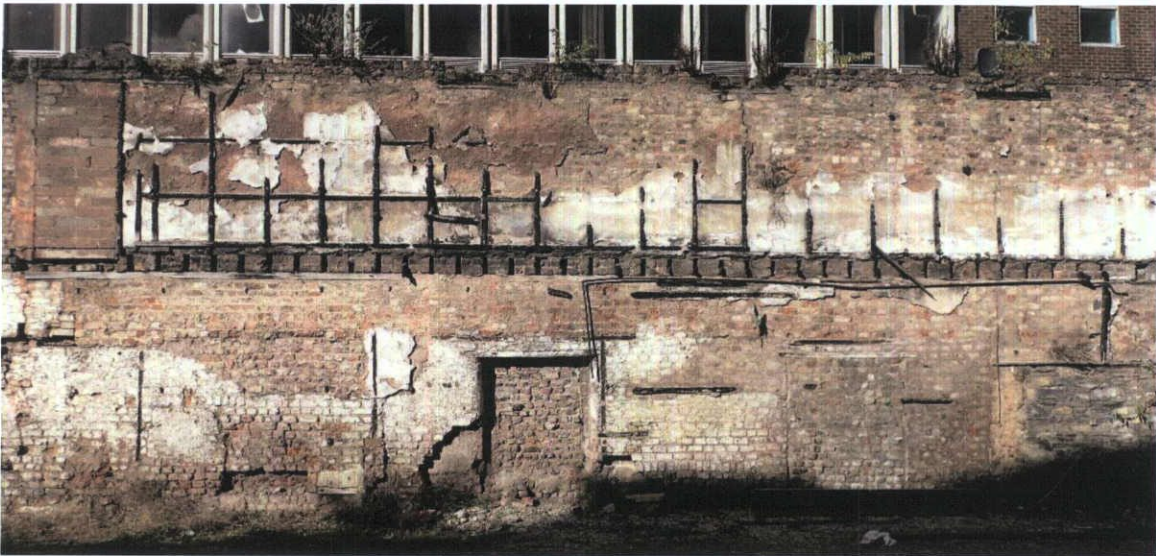


Fig.5.3.17: General view of Section C.

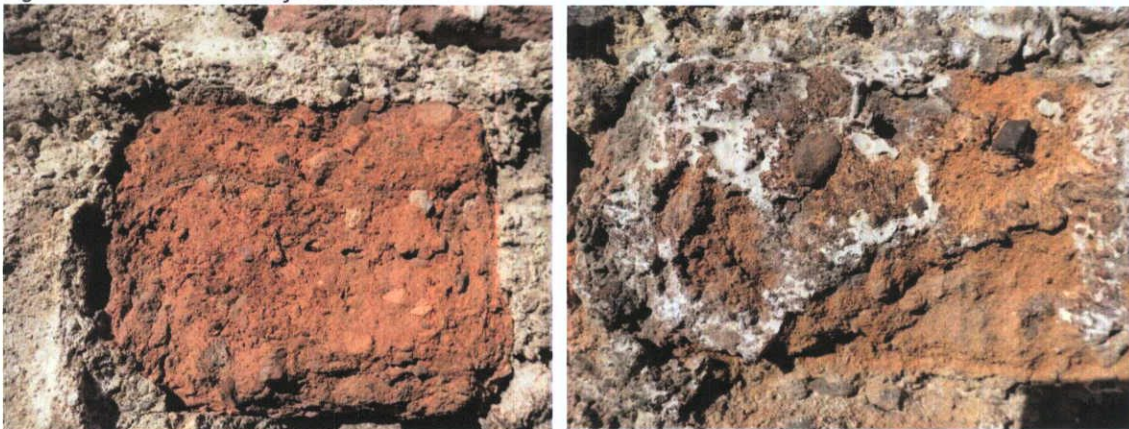


Fig.5.3.18: Handmade clamp fired red stock brick in lime bedding mortars.



Fig.5.3.19: Partially overburnt clamp fired brick with angular limestone inclusions, some partially calcined.



Fig.5.3.20: Irregular clamp fired brick in lime bedding joints infilling a door opening.

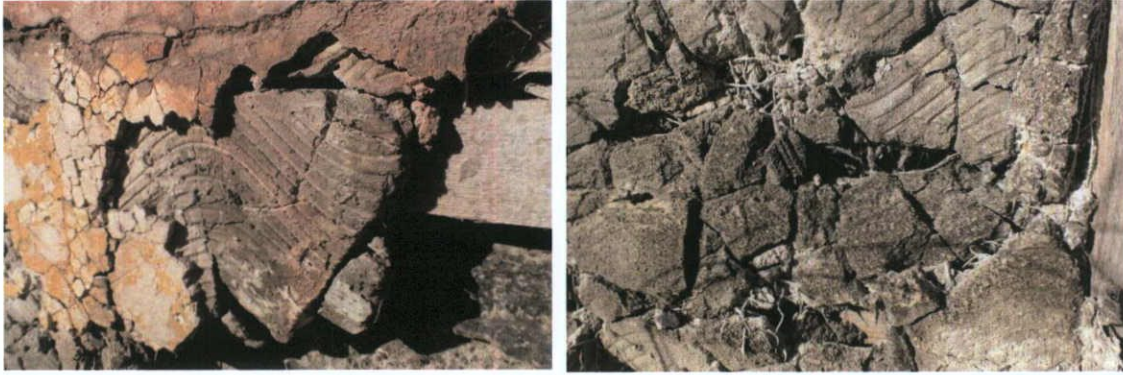


Fig.5.3.21: Later keyed plaster with netting support and gypsum top coat laid over the wall.

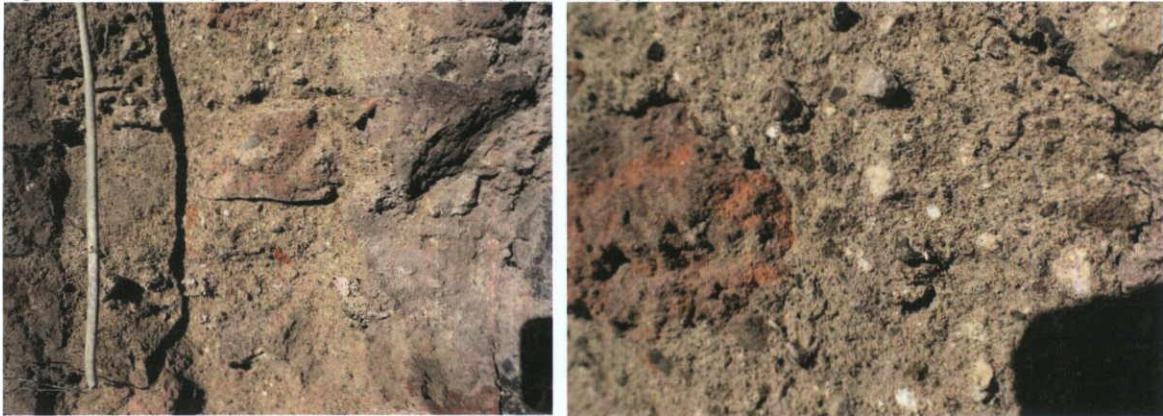


Fig.5.3.22: Mortar 'fill' within the doorway with crushed brick aggregate.

**Building D:** The wall stands in four 'lifts': Calp limestone masonry at the base; red stock brick; yellow stock brick; and white encaustic brick at the top of the wall. The white encaustic brick appears in the last quarter of the nineteenth century, but its use becomes more common in Dublin City in the Edwardian period at the beginning of the twentieth century. The yellow stock bricks appear similar to those seen on the north side of the site. The red brick has coarse pebbly inclusions, overpainted with a white paint (though deterioration including loss of fireskin has revealed the fabric of the bricks).



Fig.5.3.23: Section D, south side of the site.



Fig.5.3.24: White glazed 'encaustic' brick which became popular towards the end of the 19<sup>th</sup> and early 20<sup>th</sup> century for bathrooms, kitchens, high traffic areas and some rear elevations.



Fig.5.3.25: Yellow stock brick in lime bedding mortar.



Fig.5.3.26: The red stock brick, in poor condition with the fireskin lost in many places, and the lower section of Calp limestone masonry also visible (left, bottom).

**Building E:** Three-storey Calp limestone masonry wall with rectangular (chute?) openings and limewash and/or lime plaster at ground and first floor levels. The Calp limestone masonry is bedded in a medium-grained lime bedding mortar while the surviving plaster at ground floor level is lime-based, with brick pozzolan and abundant lime lumps.

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Fig.5.3.27: General view of Section E.



Fig.5.3.28: Calp limestone masonry.



Fig.5.3.29: Detail of the plaster showing brick pozzolan and animal hair. The fine brick dust (& saturation) has contributed to the pinkish hue of this section of the mortar.



Fig.5.3.30: Detail of the surface of the exposed plaster showing limestone aggregate, occasional burnt fuel fragments, clumps of animal hair added to improve mechanical strength (but with poor craftsmanship as the hair is not teased through) and crushed brick (porous aggregate) and fine brick dust.



**5.4 57 O’Connell Street:** The four-storey three-bay building has a granite shopfront bearing the inscription ‘A & R Thwaites & Co.’ and a granite ‘piano nobile’ at first floor level framing the three windows. The brick superstructure is very similar to 1920s brickwork seen further north along O’Connell Street. The basement of the building is of reinforced concrete construction but with small areas of Calp limestone masonry surviving along the party walls. However, none of these are coherent. The basement is currently in use as a storeroom and it is unclear where basement vaults survive below-ground level on O’Connell Street (these have survived at properties further north along O’Connell Street).

The rear on Moore Lane has a fragment of Calp limestone masonry with a brick opening, and a granite window cill on the south side. The brick forming the window is hand-made clamp-fired yellow stock brick with black vitrified zones; however, the yellow surface conceals a red core. This brickwork retains flush lime bedding/pointing mortar. These bricks are bedded in a coarse-grained lime mortar. The yellow stock brick jambs on the south side of the opening has a cylindrical groove - said to be from a bullet impact from the 1916 Easter Rising.



Fig.5.4.1: Brickwork at the façade of 57 O’Connell Street.



Fig.5.4.2: Calp masonry fabric at the rear of the building with a brick window, and a granite cill.