City of Westminster

PLEASE NOTE

The Unitary Development Plan (UDP) policies and planning, building control and other legislation and regulations referred to in the text of this guide were current at the time of publication. Because this guidance is an electronic version of the printed guidance as approved and adopted, these references have NOT been changed. For ease of contact; names, telephone numbers and locations have been regarded as non-material editorial changes and have been updated.

As UDP policies and government legislation may have changed over time, before carrying out any work, it is recommended that you consult the current UDP http://www.westminster.gov.uk/planningandlicensing/udp/index.cfm for policy revisions and you may wish to check with planning and/or building control officers about your proposals.

RAILINGS IN WESTMINSTER
A Guide to their Design, Repair and Maintenance

CONTENTS

1. INTRODUCTION

Westminster contains more than 11,000 buildings which are formally listed as of special architectural or historic interest. The City Council has a legal obligation to protect these buildings against alterations which can harm their historic character and the contribution they make to the overall character and appearance of their streets and surrounding areas. In addition, approximately 75% of the City is covered with designated Conservation Areas whose historic character and appearance the Council must protect and enhance.

In dealing with planning applications for all types of development affecting Listed Buildings and Conservation Areas, the City Council applies its relevant planning and design policies, as set out in the Unitary Development Plan. These policies aim to protect the important elements of the City's historic heritage, including architectural features and other design characteristics which define the historic character of the City.

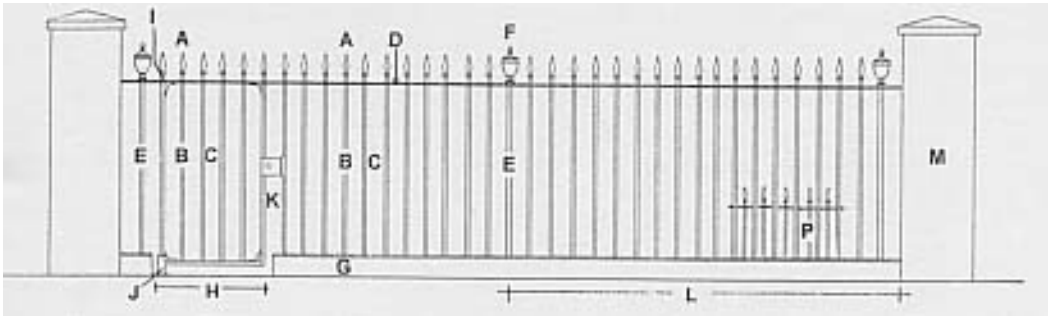
Railings and other ornamental ironwork are one of the most important elements of Westminster's historic architecture and townscape. Together with other traditional equipment, such as rainwater goods and door furniture, they introduce metal, as a material, its technology and its ornamental character to the composition of buildings and the streetscene. Boundary railings act as one of the most important

traditional elements between the buildings and the pedestrians, and emphasise principles of composition, such as symmetry, hierarchy and uniformity in the design of terraces and the appearance of streets and whole areas. Also, they underline the element of continuity which often characterises whole streets and areas of the same period, style, historic development or original ownership. In order to safeguard this important contribution of railings to the environment, the City Council requires that all new and replacement railings are designed appropriately, in order to preserve, complement or enhance the historic character of Westminster.

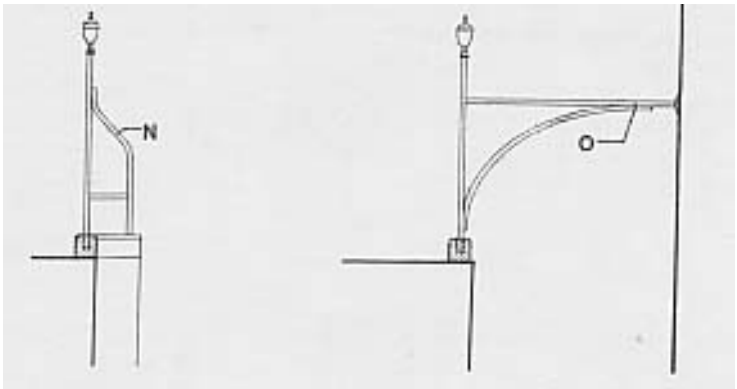
Most railings in London were removed during the Second World War and relatively few have been properly replaced. The City Council's policy is to seek their reinstatement not only on residential properties, but also on public open spaces, private 'greens' and squares. A considerable progress has been made in recent decades; in a number of cases, the City Council has taken initiative by using its legal powers, and in cases where the owners' agreement was forthcoming, the Council gave practical help in the form of design advice, organisational assistance and generous grants covering a considerable proportion of the cost.

This Grade is addressed to architects, developers and property owners, who are interested in replacing reinstating or repairing traditional railings on historic properties. This Guide aims to provide general information about the design, construction, installation and maintenance of traditional front boundary railings, mainly on typical 18th and 19th century domestic terraced buildings in Westminster. The Guide, also, sets out and explains the City Council's policies affecting railings and gives advice on types of railings that may be appropriate in different Conservation Areas in the City.

A Glossary on a typical set of domestic railings.



A.	*Railing Heads*	*G.*	*Plinth*	*M.*	*Brick Pier*
B.	*Vertical Bars*	*H.*	*Gate*	*N.*	*Back Stay or 'Dog-leg' Support*
C.	*Spacing*	*I.*	*Hinge or Top Pivot*		
D.	*Top Rail*	*J.*	*Ground Pivot*	*O.*	*Wall Strut*
E.	*Standards*	*K.*	*Lock*	*P.*	*Dog-rails*
F.	*Standard Heads of Finials*	*L.*	*Panel*		



2. HISTORY

Most of today's Westminster was developed in the late 18th and 19th centuries. Mayfair and Soho retain most of the street layout and a considerable number of properties from their original development of the late 17th and early 18th centuries. Pockets of early 17th century development survive in the Strand and Smith Square areas, in the south. The majority of the phases of the City's historic development are now protected by the current Conservation Areas and Listed Buildings legislation, as applied in Westminster by the City Council's planning policies.

Metal railings were used in domestic buildings since the early 17th century. After the Great Fire when London began to grow away from its old mediaeval nucleus near the river, railings were introduced as a common feature to ordinary houses. The trend continued and gained impetus in the 18th and 19th centuries, when residential developments covered most of today's inner London and some of the early suburbs.

The use of railings became common in these periods of London's development, mainly as a result of the following factors:

The expanding need for residential development, together with the considerable degree of standardisation in the layout of development sites. Metal railings were appropriate for the permanent, secure demarcation of boundaries.

The high degree of standardisation in the design of residential buildings, which enabled the adoption of 'standard' types of railings and, in turn, their prefabrication and competitive production.

The continuing improvement in the techniques of iron production and treatment, which contributed to the speed of manufacturing and the reduction of cost.

The remarkable wealth of skills and craftsmanship (particularly demonstrable in wrought iron goods) which enabled architects to complement their buildings with interesting simple or elaborate ironwork features.

Ironwork was to become an intrinsic element of the Georgian and Victorian architectural styles. The functional purpose of railings was to mark property boundaries and provide security, and to prevent people from falling into the basement light well - a common feature of Georgina and Victorian buildings. Visually, railings provided additional decoration, usually in character with the classical style of that period. They emphasise the human scale of Georgian and Victorian town-houses and they contribute to the uniform appearance of terraces, streets and whole areas.

Railings on open spaces (parks, squares or small 'greens'), were first introduced in the 1720s after complaints from residents about the improper use of these spaces. Squares especially, were used for dumping waste and as places were unlawful or dangerous acts were taking place. As a result these squares were enclosed by iron railings, only to be accessed and used by the residents of the surrounding streets.

In residential areas, the design and materials used for the railings on the squares were the same or very similar to those used on the surrounding terraces. It was most common for the railings to be of cast iron, whereas gates were sometimes made of wrought iron. There were very few squares where wrought iron was used on both railings and gates.

For the Royal Parks and other large enclosed open spaces, the designs were used of a grander scale and with more decorative detail. Cast iron was commonly used for the railings; the gates were very often made of wrought iron, with elaborate compositions of decorative foliage, classical motifs and often gilded in gold.

Railings and other ironwork are very important elements of Westminster's historic buildings and townscape. The City Council's conservation policies aim to protect these features in the same way as any other important parts of the City's architectural heritage.

3. LEGISLATION

In Planning Legislation, works related to boundary enclosures of all types are generally regarded as development on the land to which they belong. In this sense, works of alterations, restoration reinstatement, or erection of boundary walls and railings may require one or more of the consents which are normally required for other types of development, from the City Council.

The main statutory planning provisions affecting boundary walls and railings are contained in:
The Town and Country Planning Act 1990, in respect of the requirements for Planning Permission.
The Planning (Listed Buildings and Conservation Areas) Act 1990, in respect of works affecting Listed Buildings and buildings in Conservation Areas, and dealing with requirements for Listed Building Consent and Conservation Area Consent.
The Town and Country Planning (General Permitted Development) Order 1995. This Order deals with types of development which can be carried out with 'Deemed Consent' (i.e. without 'Express Consent' from the City Council). The Order also gives powers to Local Authorities to suspend Deemed Consent (Permitted Development) rights, in respect of specific properties or areas by means of special Directions made under its Article 4.

Advice on practical applications of the above legislation is given by the Department of the Environment and the Department of National Heritage, in their Planning Policy Guidance document **'Planning and the Historic Environment'** (PPG15) published in September 1994.

On **Listed Buildings**, any alterations, replacement or reinstatement of boundary walls or railings will normally require Listed Building Consent. If the listed building is in a Conservation Area, then Conservation Area Consent may also be required (see below). In addition, Planning Permission may also be necessary.

On **non-listed buildings which are not in a Conservation Area and are single family houses**, front boundary walls and railings can normally be removed or altered without Express Consent from the Council. However, the Council strongly advises that such works should not be carried out without careful consideration of the harm that they may cause to the appearance and value of the building and to the visual amenity of the whole area.

For the demolition of a front boundary wall and/or removal of railings **on a property which is not listed, but is in a Conservation Area and is a single family house**, an application may need to be submitted to the City Council, for Conservation Area Consent. Planning Permission may also be required in this case.

However, in areas where boundary enclosures play an important part in the definition and preservation of the area's character, the Council can use its powers to bring this type of demolition under strict planning control. The Council has made special Directions under these powers in a number of Conservation Areas. As a result, in areas where such Directions (known as Article 4 Directions) exist, certain types of works which would otherwise not require express planning consent, cannot be carried out without Planning Permission from the City Council. Article 4 Directions affecting front boundary walls and railings, currently exist in the following area or streets:

Most of the properties in the Queen's Park Estate Conservation Area, W10.
Numbers 168-208 (even) Sussex Gardens, W2.
Numbers 6-10 Monocorvo Close, SW7.
Numbers 1-47 (odd) and 2-56 (even) Abbey Gardens, NW8.
Numbers 1-27 Bridstow Place, W2.
Numbers 1-37 (odd) Bristol Gardens, W9.

If an **unlisted building is in a Conservation Area and is in multi-occupation or contains more than one use**, the demolition of the whole or part of its boundary wall or the removal or alteration of railings will normally require Planning Permission, in addition to the possible requirement for Conservation Area Consent.

For further information on the possible requirement for Planning Permission, Listed Building Consent or Conservation Area Consent in respect of a particular property, please contact the relevant Development Planning Services Area Teams (see 'Contacts').

In addition to the provisions of Planning legislation, the removal, installation or alterations to railings and the demolition or erection of front boundary walls may be affected by provisions of Highways legislation. For further information on this possibility, please contact the City Council's Highways Strategy and Forward Planning Team, Environment and Leisure Department (see 'Contacts'). Such works may also be affected by the provisions of the Building Regulations, if they affect the structural integrity of any part of the building, or if they raise considerations relating to public safety. To find out, please contact the District Surveyors Services (see 'Contacts').

4. THE COUNCIL'S POLICY

The City Council's Planning policies are set out in the Westminster Unitary Development Plan, chapter 9 of which deals with Conservation, Building Preservation and design of new development. The following sections give a selective general overview of policies which affect railings and other boundary treatments.
Note: *For definitive references to the City Council's policies, please contact the Unitary Development Plan or seek advice from the Development Planning Services' conservation officers (see 'Contacts').*

4.1 STRATEGY

The following are three of the objectives set by the Plan in its strategic policy statements:

Ensure the highest standards of design throughout the City, in alterations and additions to existing buildings and in new developments.
Preserve Listed Buildings, their setting and features of special architectural or historic interest.
Preserve or enhance the character or appearance of Conservation Areas.

4.2 SPECIAL POLICIES ON RAILINGS AND BOUNDARY WALLS

POLICY DES 16:
(A).In Conservation Areas where railings form an important feature of the townscape, the City Council will require the retention of traditional railings. Where appropriate the City Council will encourage the erection of replica railings or, in some areas, of new railings of an appropriate design.

(B).The City Council may make a financial contribution towards the reinstatement, repair and maintenance of traditional railings enclosing private squares open to the public, as and when funds are available. The City Council will continue to reinstate railings in squares for which it has responsibility.

(C).In Conservation Areas where characteristic boundary walls form an important feature in the townscape, their demolition or unsuitable replacement will not normally be permitted (where these are subject to planning control).

4.3 GENERAL DESIGN POLICIES
In addition to the above, other policies in chapter 9 of the Plan directly affect boundary walls and railings by making provisions for various types of development anywhere in the City and especially in Conservation Areas or affecting Listed Buildings, historic squares, gardens, etc.

The following is a selective summary of important points made in these policies.

4.3.1 NEW DEVELOPMENT
In all cases of new development, on whatever scale, the City Council will expect the highest standard of design.

Extensive new developments must relate satisfactorily to the scale and character of the adjacent townscape and to any features of open spaces, buildings or structures of character on or adjoining their site.

In Conservation Areas, the form and design of new developments should normally be disciplined by the building lines, scale, heights, massing, characteristic plot widths, architectural characteristics, colours and materials of adjoining buildings.

In terraces or groups of buildings of unified townscape of significant quality, new developments should be designed as scholarly replicas of the predominant pattern.

Materials used on new developments should be sympathetic to the design of the new building and be of high quality and durability.

In a street where the design of the properties is unified, but where it is more important to keep the townscape unity rather than the exact appearance of the buildings, proposals for radical changes to a group may be permitted provided they conform to the characteristics of the street, which give it its townscape unity.

Alterations to existing buildings should respect the period, architectural characteristics and the detailing of the original building, including external features, and should use matching materials.

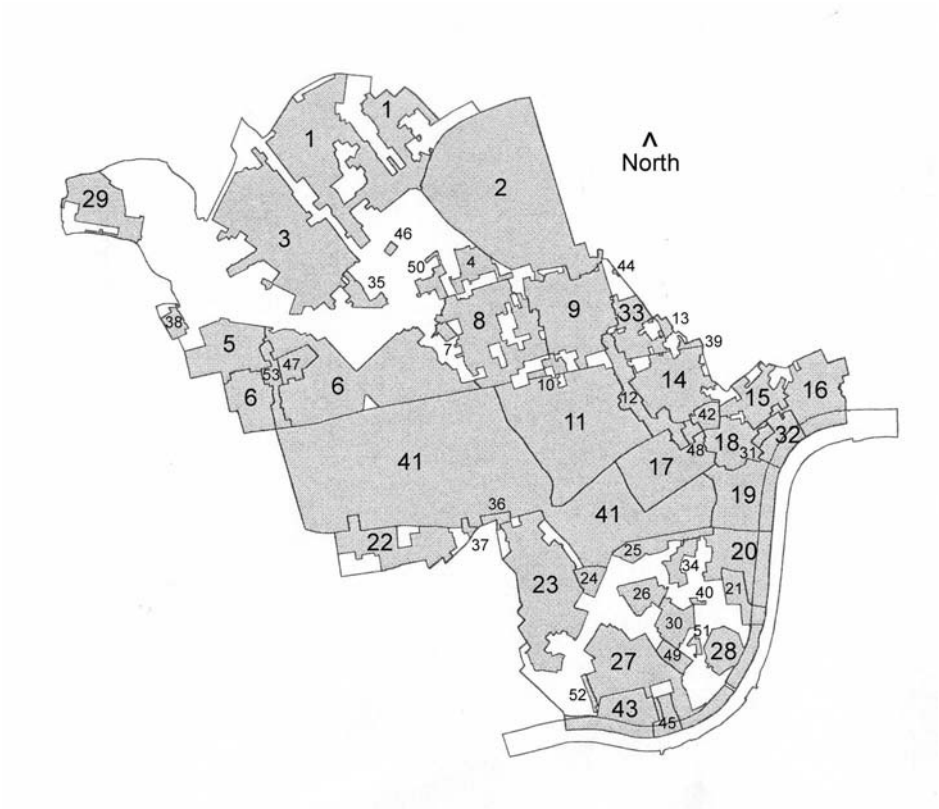
4.3.2 CONSERVATION AREAS
Applications for Planning Permission is outline for development within Conservation Areas will not normally be acceptable. The City Council will expect applicants to provide sufficient information about the proposed development and its immediate setting, to enable it to fully assess the effect of the proposals on the character and appearance of the relevant part of the Conservation Area.

Article 4 Directions may be imposed to control permitted developments, particularly in residential Conservation Areas.

In carrying out alterations to existing buildings which contribute to the character or appearance of Conservation Areas, it may be necessary to retain existing features or to replace them in facsimile. Non-traditional materials or features designed out of character with the existing buildings, will not normally be acceptable. The replacement of existing non-traditional features with traditional alternatives, will be encouraged.

In a building which has lost important original features, there will be a presumption in favour of either their reinstatement or their replacement with features designed to complement the architecture of that building.

Map of designated Conservation Areas in Westminster 2004



Key to Conservation Areas

1. St. John's Wood
2 .Regents Park
3 .Maida Vale
4. Dorset Square
5. Westbourne
6. Bayswater
7. Molyneux Street
8. Portman Estate
9 Harley Street
10. Stratford Place
11. Mayfair
12. Regent Street
13. Charlotte Street West
14. Soho
15. Covent Garden
16. Strand
17. St. James's
18. Trafalgar Square
19. Whitehall
20. Westminster Abbey and Parliament Square
21. Smith Square
22. Knightsbridge
23. Belgravia
24. Grosvenor Square
25. Birdcage Walk
26. Westminster Cathedral Area
27. Pimlico
28. Millbank
29. Queen's Park Estate
30. Vincent Square
31. Adelphi
32. Savoy
33. East Marylebone
34. Broadway and Christchurch Gardens
35. Paddington Green
36. Albert Gate
37. Knightsbridge Green
38. Aldridge Road Villas, Leamington Road Villas
39. Hanway Street
40. Medway Street
41. Royal Parks
42. Leicester Square
43. Churchill Gardens
44. Cleveland Street
45. Dolphin Square
46. Fisherton Estate
47. Hallfield Estate
48. Haymarket
49. Lillington Gardens
50. Lisson Grove
51. Regency Street
52. Peabody Avenue
53. Queensway

4.3.3 LISTED BUILDINGS

Alterations to Listed Buildings should normally be entirely in accordance with the period style and detailing of the original building or with later alterations of architectural interest.

Wherever possible, existing detailing and original features should be preserved, repaired or reinstated.

All repairs should be carried out in a correct scholarly manner, under proper supervision, by special labour where appropriate.

In order to reduce the risk of theft of architectural features from any historic building while it is empty or during building works, the City Council may require additional security arrangements.

Developments affecting adversely the setting of a Listed Building, will not normally be permitted.

4.3.4 RAILINGS ON OPEN SPACES

The City Council will normally refuse applications for development on public or private gardens which form an important element of the townscape, part of a planned Estate or street layout, contribute to the character of Conservation Areas or enhance the setting of a Listed Building.

5. TYPES OF RAILINGS IN WESTMINSTER: MATERIALS, CONSTRUCTION AND DETAIL

The different types of railings in Westminster are broadly determined by, and reveal, the historic growth of the City over the last three or four centuries. Section 2 in this booklet briefly outlines the main phases of this growth.

This part of the Guide deals in some detail with the main types of railings which evolved with the main historic types of residential buildings in the City since the late 17th century, but focuses more on residential terraced houses of the 18th and 19th centuries which represent the period of development of the majority of Westminster's architectural heritage.

5.1 MATERIALS

In broad historical succession, three main types of metal were used for the construction of railings between the 17th century and our times; these are **wrought iron, cast iron and mild steel** (modern types of metal include aluminium and 'soft' alloys which the City Council does not recommend, especially on Listed Buildings).

The type of metal(s) of a specific set of railings can be identified relatively easily on site. The following 'clues' are used by experienced manufacturers and restorers, and are generally reliable:

Wrought iron railings often have a hand-beaten or rolled surface. Because they are shaped by hand and because of the fibrous structure of wrought iron, these railings are found in a very wide variety with members of varying thickness and elegant forms, often depicting foliage or other 'free' natural themes.

Cast iron railings are usually more massive in appearance and more repetitive in design and construction. Mould (seam) lines are usually visible on cast iron sets. The surface of a cast iron member will usually reveal blow holes, casting flows or 'inclusions'.

Mild steel railings have a very smooth finish texture and the colour of the unpainted metal is normally a homogeneous ash-grey.

The crystalline structure of cast iron and the fibrous structure of wrought iron can be seen relatively easily at fractures. It is relatively easy to pare away a sliver of wrought iron with a sharp cold chisel. Cast iron, by contrast, chips away.

Visual distinction between wrought iron and steel may be more difficult if it cannot be made from the differences in the finishing texture of these two metals. Experienced metal workers can differentiate between wrought iron and steel by the shape and colour of sparks when grinding or by inspecting bent fractures. On the rare occasion when on site research cannot provide a satisfactory answer, samples can be sent to laboratories such as The Welding Institute or The British Cast-iron Research Association (see 'Contacts'). Samples from railings should be taken in minimal quantities and from places where they can be easily replaced.

Wrought iron, cast iron and mild steel.
Examples of wrought iron (top left), cast iron (top right) and mild steel (bottom) finials. Note the smooth texture and hand made quality of the wrought iron head, the rough texture and robust form of cast iron and the mechanical uniformity and simplified assembly details of the mild steel panels.

The following sections explain in some detail the main characteristics of railings made from the above three main types of metal.

5.1.1 WROUGHT IRON RAILINGS
Most early railings (late 17th century) were made of wrought iron; this is iron in an almost pure form, with less than 1% carbon content.

As a material, wrought iron is ductile, fibrous, with a high tensile strength and is easily shaped when hot, by hammering or rolling. It can withstand considerable tension, so it can be worked, hot or cold, to produce elaborate decorative motifs, by hammering when hot or by bending bars or other linear sections to shape. Wrought iron is relatively good in withstanding corrosion and it can be heat welded, i.e. two sections can be fused together by hammering or pressure if they are brought to appropriately high heat. Wrought iron was always hand worked; this allowed craftsmen to produce a great variety of individual designs with each element, feature and detail being given its form individually.

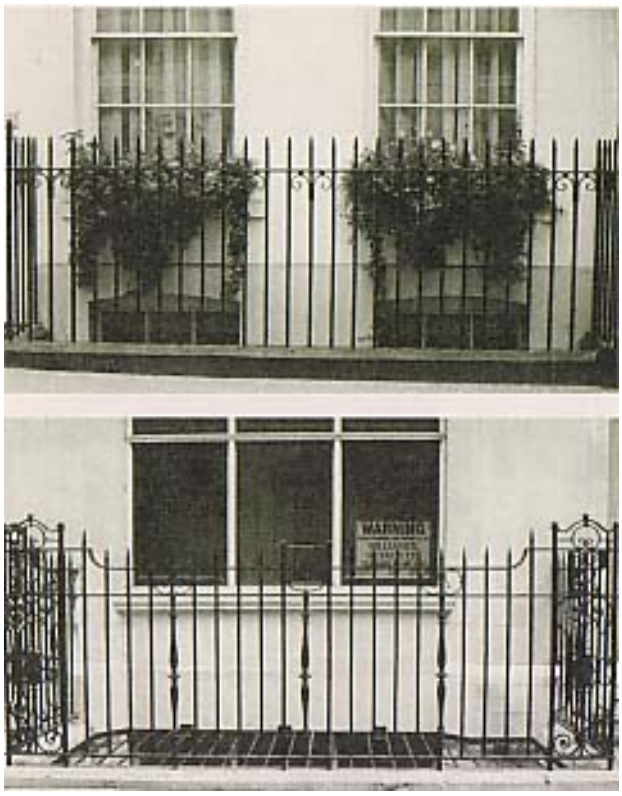
Despite the ability to heat-weld this metal, the manufacturing of wrought iron railings retained some of the characteristics of the technology of timber construction. Structural details, such as connection joints were usually similar to those of a timber construction, with lap-joints and with riveted and drill-bolted connections.

Early railings were even a combination of wrought iron vertical bars and wooden horizontal bars, put together with the use of adapted carpenter's joints; any decorative elements were either heat welded,

painted or gilded on the framework. Vertical bars were usually square in section. Anthems, spires and other ornamental features were formed either by hammering a hot iron plate or by bend-shaping a bar to a desirable shape.

Until the middle of the 18th century, wrought iron railings were plain spiked bars supported by a plain top rail. The only ornaments on them were the finials on the structural standards. Occasionally, the composition included decorative support standards, lamp standards and lantern overthrows.

Despite the advantages of wrought iron as a strong, easy-to-shape material, the fact that it is hand worked makes production labour/time consuming and consequently expensive and therefore not commonly used. In the manufacturing of railings for domestic buildings, this disadvantage was successfully overcome towards the end of the 18th century with the extensive use of cast iron for their production. Although in the late 19th century wrought iron railings became popular again for some time, cast iron remained the main material for this use until the introduction of modern metal technologies and alloys. Good examples of wrought iron railings in Westminster survive in the Mayfair, St. James's, Portman Estate, Smith Square and the Strand areas.



Examples of wrought iron railings in Conservation Areas:
Top: St. James's. Bottom: Adelphi.

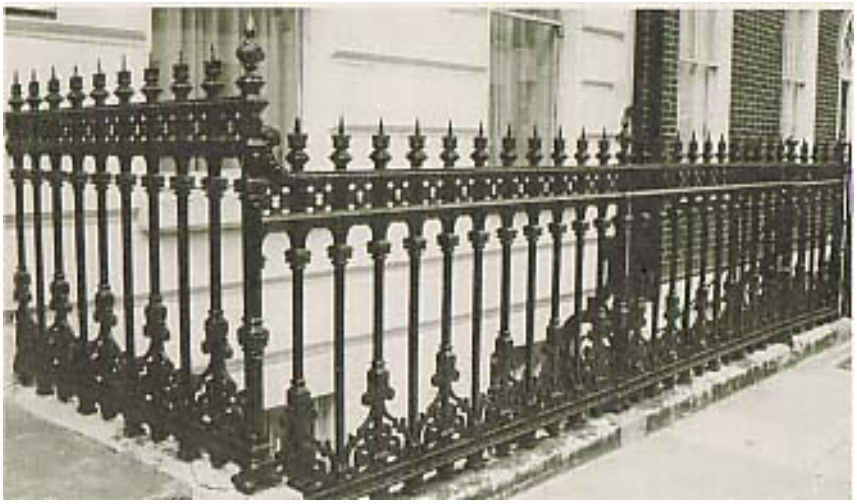
5.1.2 CAST IRON RAILINGS

At the end of the 18th century, the extensive use of cast iron made the design of railings for domestic buildings more formal and elaborate, and at the same time more standardised and repetitive. Stylised ornamental patterns were used extensively, secondary low bars, forming decorative patterns were introduced between the main bars ('dog bars', keeping dogs out of front gardens) and structural elements, such as 'dog-leg' brackets and wall supports became more elaborate.

Cast iron is not as pure as wrought iron; it contains about 5% carbon. It was very rarely used commercially before 1794, when a new type of furnace was developed, which made the manufacturing of this type of iron products quicker and cheaper. The peak of the production and use of cast iron came with the Industrial Revolution.

As a material, cast iron is weak in tension and strong in compression. It has a fine-grained texture which makes it very easy to cast. Under extensive tension, cast iron members break, with very little prior distortion. This makes the metal unsuitable to be worked (bent or otherwise shaped) mechanically or by hand. It is, however very good in compression and generally, it has a satisfactory corrosion resistance.

Common (grey) cast iron sections cannot be forge-welded together. Fusion welding is very difficult as high temperatures can change its molecular structure, and this can drastically affect its strength. Fusion welding of cast iron, if it is unavoidable should be done only under strict control and preferably in the workshop rather than on site.



Examples of cast iron railings in Conservation Areas:

Pimlico

Portman Estate

Characteristic designs of cast iron railings include massive ornamental sets, with heavy uprights, and heads representing arrows, javelins or other weapon heads or stylised anthems of classical, Egyptian and Gothic origins. The connections between cast iron sections are usually simple sockets, spigots and wrought iron bolts. The vertical bars were usually round in sections. Despite their highly decorative designs which sometimes resemble elaborate lace work, cast iron railings inevitably have the characteristic of mass production and mechanical repetition. Typical examples of cast iron railings in Westminster can be found on may properties in the Marylebone, Regent's Park, Belgravia, Bayswater and Pimlico Conservation Areas.

5.1.3 MILD STEEL RAILINGS

Mild steel was used extensively in the manufacturing of domestic railings in the last part of the 19th century and is currently in common use for the production of replica replacement railings for new designs.

The carbon content of mild steel is between those of wrought iron and cast iron. It is strong in tension and can be forged. Common technology for the manufacturing or ordinary mild steel railings uses 'mechanical' connection methods such as friction-grip-riveting, also, sockets, spigots, drill-bolted plates and brackets. Heat fusion can also be used. Mild steel is often used in the mass production of cast iron railings of relatively low cost. In most obvious visual characteristic is its very smooth texture. Examples of original mild steel railings in Westminster can be found in some of the 'turn of the century' housing Estates.

Examples of mild steel replacement railings: Where consent is required for the installation of mild steel railings, the City Council will seke to secure that not only the heads and finials but also the size of the bars, their spacing and all structural details are made to correct authentic design. On listed buildings, the City Council may require the use of the original type of metal. The above two examples are not entirely successful.

The City Council does not encourage the use of mild steel for reinstatement railings on Listed Buildings, but mild steel replicas have been used successfully on non-listed properties in Conservation Areas.

Generally, it is highly advisable, especially for part-replacement of railings and for railings on Listed Buildings, to use the same type of metal as that used originally. If no parts of the original railings survive, useful guidance can be obtained from adjacent or other properties in the street. Mild steel replacements may be acceptable only where they are castings of authentic original railing forms.

5.2 DESIGN AND CONSTRUCTION

he information and advice in this section refers mainly to railings of the 18th and 19th century terraced residential developments in Westminster. It is meant to apply generally (with minor adaptations for individual types of properties and to local conditions) to all common types of domestic railings of this period, irrespective of type of metal, manufacturing or decorations. The drawings b
elow illustrate the general principles of construction of such railings, the drawings in the Glossary of the Guide explain the names by which typical parts of railings are commonly referred to, and indicate the function and purpose of each part.

The plinth (or coping if there is a dwarf wall) should normally be made of natural stone, especially on Listed Buildings. Artificial (reconstituted) stone may be accepted only if it does not detract from the special character of the building or the area and if it is suitably shaped, faced and toned to resemble natural stone, or in order to conform with materials used originally on the property and/or in the terrace or street. Plinths made of reconstituted stone, should be cast in sections to avoid cracks which can be caused by shrinkage of lengthy single casts (if this happens, water will penetrate the cracks and cause corrosion at the feet of the bars). Plinths have usually chamfered top corners, in section, with cambered top.

Most original designs have all the vertical bars set individually into pre-drilled holes in the top of the plinth. Each bar is lead welded and caulked into lead sockets to prevent corrosion of the foot of the bar and to absorb differential movements. Lead is poured in the sockets, leaving approximately 20mm gap from the top. This gap is then filled with a stone dust mix. If stone dust is not used, the lead should not be left to overflow but should be pointed flash with the stone.

Critical to the appearance of the railings (and the building to which they belong) is the spacing of the bars. This is determined mainly by the railing heads (which should themselves be appropriately spaced from each other) and by the width of the bars which also have an effect on the 'transparency' of the whole composition. Care must be taken to avoid an over-transparent or over-dense appearance of the enclosure by spacing the bars too widely or too densely. Equally, the whole composition must not be made

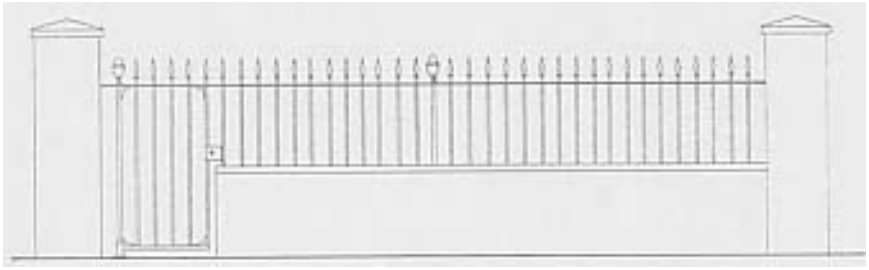
top-heavy or tin by the resulting spacing of the heads. As a general indication of the spacing, bars should be approximately 140mm apart (between centres) if they are approximately 25mm thick (this should always be adjusted to individual designs and local conditions).

The horizontal top bar is usually flat, approximately 12mm thick and 45mm wide, sometimes with the upper surface slightly cambered. No bottom horizontal bar is normally used and proposals which include such bars will not normally be accepted.

For properties which are the subject of this Guide, railings should be made of individual sections (or panels) of no more than 3 metres in length. These are supported by 'stays' or 'standards' on either side, spaced approximately to achieve a balanced subdivision of the total length of the enclosure. Stays are crowned with finials, which are larger heads and usually more decorative than those used on the railings.

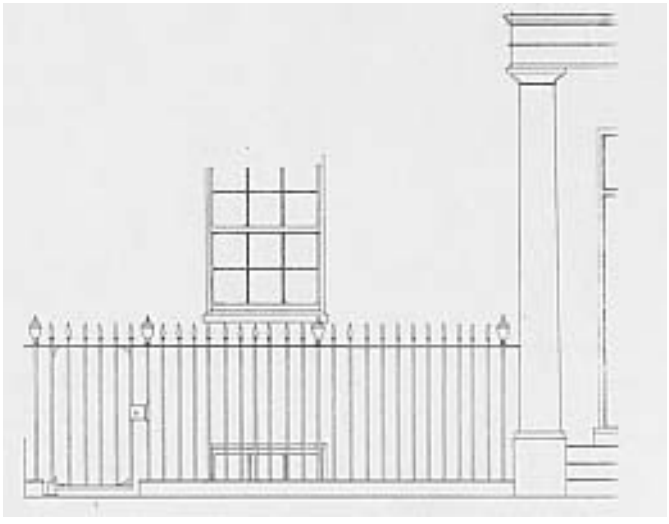
For structural reasons, stays are larger in section than railing bars, usually square in section, each side measuring approximately the width of the horizontal bar. For additional stability, stays are usually supported by 'dog-leg' stabilisers. On long lengths of railings or if the use of dog-leg brackets cannot provide sufficient support (e.g. when there is a basement light-well behind) the railings may also need wall struts; these are formed in a number of ways (see example, in “Glossary of a typical set of domestic railings” above).

Railing heads have historically been used in a wide variety of forms, typically representing spear heads or anthems, or other decorative motifs. Early types are normally simpler, such as pointed bars or obelisk-shaped spikes. In the late Victorian times head became more elaborate and decorative, as anthems and other stylised motifs, usually of classical origin.

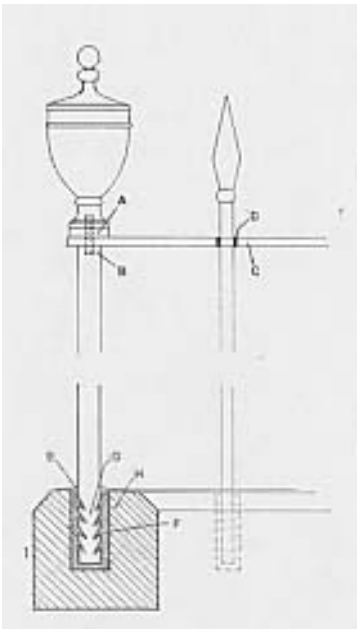


Typical elevation of domestic iron railings with brick piers on either side and brick dwarf wall.

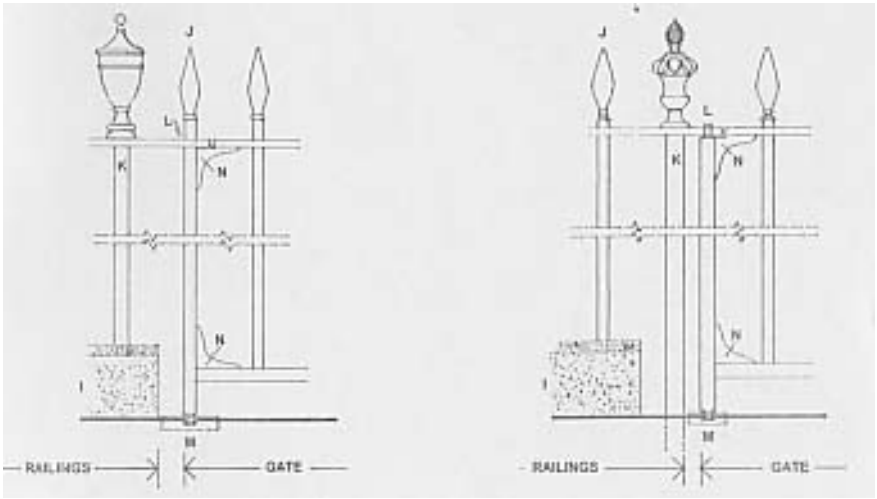
Iron railings in a typical residential terrace with classical porches and basement light-wells.



Typical structural details of railings and gates.



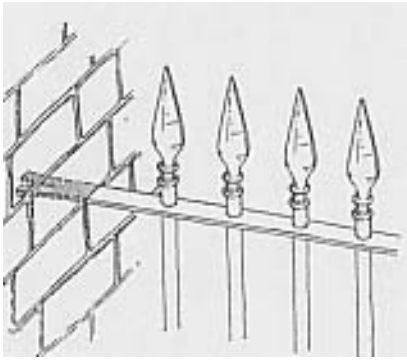
A FINIAL, drilled, screwed and spot welded to position.
B. UPRIGHT STANDARD drilled and tapped.
C. TOP RAIL drilled to accommodate vertical bar.
D .LEAD to secure vertical bar.
E. CAULKING colour matched to colour of plinth.
F. LEAD poured and stayed.
G. END OF BAR RAGGED, to provide key.
H. STONE PLINTH DRILLED to house standards and bars.
I. PLINTH./
J. RAILINGS and railing heads.
K. STANDARDS and finials.
L. TOP PIVOT.
M. GROUND PIVOT with metal plate.
N. CORNER BRACKET.



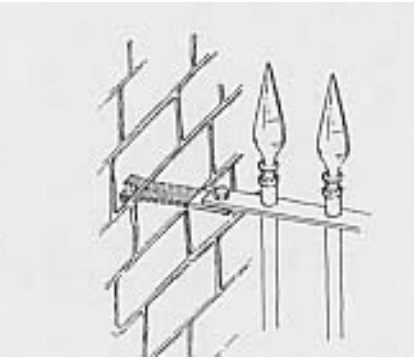
Simple obelisk-form spike heads and flattened spearheads were formed directly on the vertical bars where square section wrought iron or steel was used. More elaborate cast iron spear, foliate and other ornamental heads had to be made separately and permanently screwed to the verticals. In most cases (invariably with obelisk and flattened spearheads) a 'neck' of plain bar should be visible above the top rail. This is sometimes slightly 'waisted' below an obelisk. Some of the more elaborate heads, however, may need to sit directly on the top rail.

If gates are required to give access to the front garden or to steps to basements, these are normally formed by sections of the railings, supported by a frame which is hinged appropriately onto a stay or a wall. Gate railings should maintain the dimensions, spacing and heads used on the railing panels. The plinth is normally omitted for the width of the gate. For entrance gates of secondary importance however, the plinth is sometimes continued under the gate, often forming the top step of the stairs leading to the basement area.

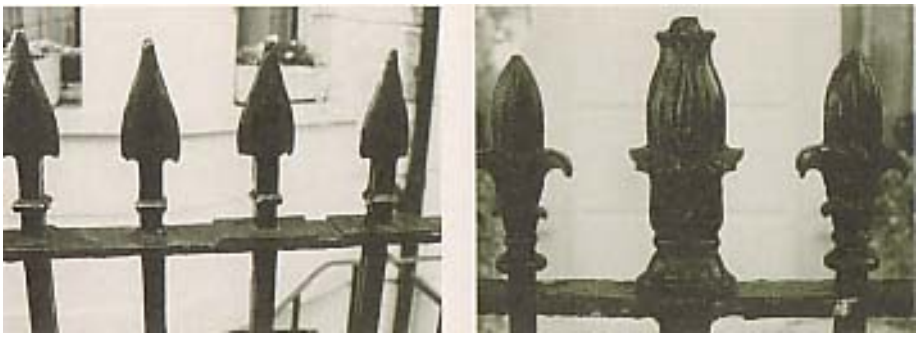
Fixing the top rail to a brick wall or pier.



Example of fixing where the fish-tail end of the top rail can be built into the brickwork.

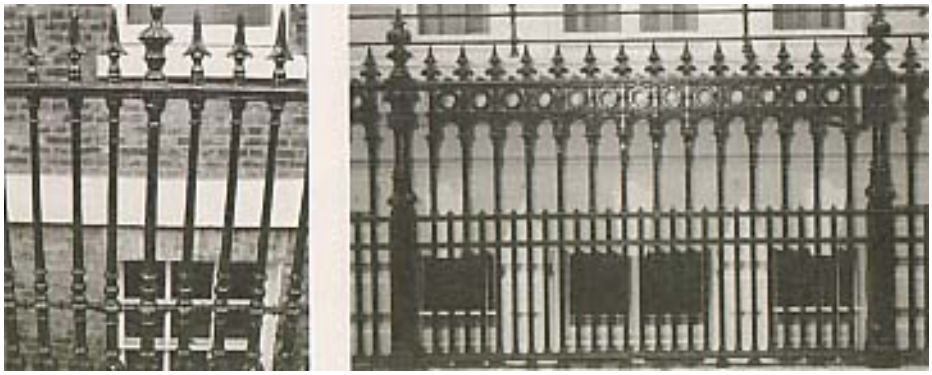


In cases where the panel of railings is installed between two existing walls or piers, it is usually necessary to use separate fixing brackets.



Examples of mid/late 18th (left) and early/mid 19th (right) century railing heads and finials from the Portman Estate and Belgravia Conservation Areas, respectively.

Examples of 'Standard' types of 19th century cast iron railings in the Belgravia (left), Regent's Park (right) Conservation Areas.



Examples of 'heavier', more decorative types of 19th century cast iron railings from the St. James's (left), and Westminster Cathedral (middle) Maida Vale (right) Conservation Areas.

Early/mid 19th century types of cast iron railings with decorative horizontal bars, from the Regent's Park Conservation Area.

Examples of early historic types of domestic railings in Westminster.

Simple and elegant late 17th and 18th century types of wrought iron railings in the St. James's (above) and Adelphi (right) conservation areas.

Typical example of corrosion at points of contact of two different metals where different movement of two parts can cause water penetration.

6. DETERIORATION OF IRON RAILINGS

As with all other historic fabric in old buildings, ironwork suffers deteriorating, which must be identified and treated effectively as early as possible. Iron railings on Westminster's historic buildings have been exposed to harsh weather conditions for nearly, or well over, a hundred years, sometimes without proper protection and maintenance. They have suffered deterioration in a variety of forms, the most common of which are corrosion, structural damage and poor previous repairs.

6.1 CORROSION
Corrosion is the formation of iron oxide (rust) by the reaction of iron with oxygen and water. In the absence of either of these elements, corrosion does not occur. Prevention of water penetration and retention is, therefore, a vital aspect of rust prevention.

Corrosion prevention usually involves the application of a protective coating to separate the iron from the water and oxygen in its environment. An increased amount of corrosion will occur where two different metals are in contact with each other, between different qualities or conditions of the same metal and between areas of different aeration and moisture on the surface of the metal. If the affected areas are not treated as soon as they are spotted, then rust can move across the railings and can cause serious problems to the metal and also to the fixing areas, such as cracks in the stone plinth or the wall.

Treatment and protection of rust affected connection point. Note the complete removal of old paint before the application of the protective primer.

The application of paint has long been recognised as the most practical method of protecting iron railings from corrosion. It is important to maintain a continuous paint layer to ensure proper metal protection. When corrosion starts attacking the coated metal at a defective point in the painting, it tends to propagate under the coating itself because the areas which have less access to oxygen are differently charged from the exposed ones. The corrosion will therefore spread under the coating, it will progressively turn the iron into iron oxide (rust) which will flake away and will eventually destroy large areas of metal around the original defect in the coating.

Coatings are applied in several layers to reduce the chance that 'pin holes' or thin areas of coating will coincide in all layers. The aim is to make the isolation of the iron from its environment as complete as possible (see also 'Maintenance', in this Guide).

6.2 STRUCTURAL DAMAGE
Vandalism or vehicles are the most common cause of structural damage to railings. Thermal movement can also affect the structure of railings, by pulling individual pieces of iron apart. The same type of deterioration can also be caused by ground or building movement or even persistent vibration. Moving parts of the ironwork, such as gates, can be distorted or broken as a result of a combination of age and lack of repair and maintenance. Wrought iron can absorb considerable physical abuse; due to its fibrous structure, it will deform but, within reasonable limits, will not break. In contrast, if subjected to tension, cast iron railings will break with very little prior distortion.

6.3 POOR PREVIOUS REPAIRS OR MAINTENANCE
Poor repairs or incorrect maintenance done in the past, are amongst the common reasons for serious deterioration of railings. In all types of metal, previous poor repairs usually include replacement defective (corroded, broken or distorted) members or sections, with one or more of the following having taken place:
use of different, or incomplete type of metal;
wrong type of method of connection between the new and the old parts and/or inadequate preparation of the connection points.

Poor previous maintenance usually involves:
very long intervals between proper maintenance works;
painting without proper surface preparation.

7. REPAIRS AND REPLACEMENT

7.1 REPLACING WHOLE SETS OF RAILINGS

As with most other parts of historic buildings, replacement of old ironwork should be avoided, unless it is established that repair is totally impractical or impossible.

If replacement of old railings is unavoidable, the new sets should normally be exact replicas of the old in every aspect of design and construction. Any deviations from this principle should be discarded and, if it is acceptable, agreed with the Development Planning Services' conservation officers.

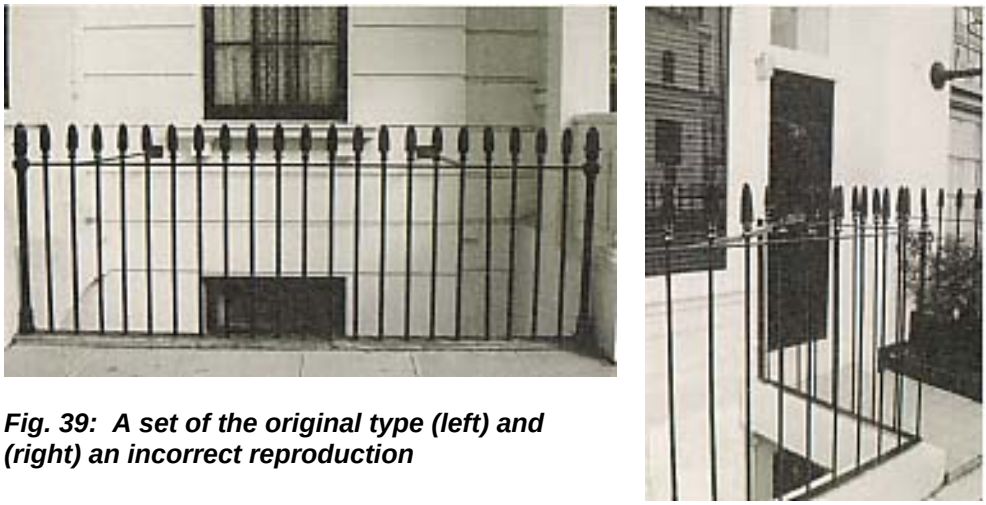


Fig. 39: A set of the original type (left) and (right) an incorrect reproduction

On replacement railings, it is important to retain all the elements of the original type i.e.:
The overall dimensions (height and length) of an original panel and set;
The type and size of railing heads, finials and other individual features;
The type/method of construction and fixing;
The width of the railing bars, standards, dog rails, the dimensions, shape and exact position of the horizontal top-bar, and all of their other design characteristics;
The spacing of the railings.

For replacement of railings on Listed Buildings, Listed Building Consent will normally be required. Before deciding applications, the City Council may require a specialist's report confirming the type of metal, the condition of the old railings and the necessity for their total replacement.

It is highly advisable that the type of metal should be the same as that used originally. If no parts of the original railings survive, useful guidance can be obtained from adjacent or other properties in the street. Ordinary types of modern mild steel are inferior to wrought iron or cast iron and may be acceptable only for the reproduction of railings for non-listed buildings, provided the new railings are appropriately designed and painted. For Listed Buildings, use of the original type of metal may be required.

An example of a correct reproduction of railings in the St. James's Conservation Area.

Heights, spacing, dimensions and sections of metal bars, panels and ornamental details should be based, so far as possible, on evidence obtained from the site itself. Care must be taken, however, to distinguish remnants of original work from later, inappropriate replacements. It should be noted that paint may have obscured detail or increased the apparent thickness of old members. Even where the railings have been completely removed, sockets in stone plinths and remnants of wall fixings may give useful information about their original design and construction.

7.2 REPLACING PARTS OF OLD RAILINGS

In many cases of repair, replacing defective parts of the ironwork may be necessary. This may involve small parts of members which have been affected by corrosion or have suffered other damage, or whole relatively independent members such as railing bars, heads or brackets. The most common parts of railings to be affected are footings, fastenings, interlocking parts and water traps such as bolts and rivets, because they are the most vulnerable. Before any kind of repair is undertaken, it is vital that the nature of the damage is identified and the appropriate method of repair is established. Very often, such repairs will involve cutting off a defective section, preparing a new section of exact dimensions and other characteristics as the old one and connecting the new to the ironwork. It is advisable that even small new parts are made of metal of the same type as the existing railings. On Listed Buildings this would normally be a requirement.

7.2.1 WELDING CAST IRON

Heat-welding of cast iron can be effective only if it is done with great expertise and careful supervision. If the heat is excessive or if it is applied rapidly, or if the cooling down process takes place too quickly, the strength of the metal can be reduced drastically. Good quality welding in cast iron usually requires the whole section to be taken to a workshop where it can be heat-welded under strict control (this contributes to the relatively high cost of this method). It is inadvisable to attempt to weld large sections of cast iron on site.

Metallic bond (gas welding) is a relatively easier 'hot' technique which uses a far lower temperature which is applied and removed at a slower rate. This reduces the risk of weakening the metal and the resulting welding is considered reliable.

Fractures in cast iron can be repaired by several 'cold' methods. These avoid heating processes, which in the case of cast iron can seriously weaken the metal. The traditional cold repair method was to insert a 'dumb bell' shaped piece of wrought iron across a fracture. This method has developed into several contemporary cold 'stitching' systems. They produce a sound repair to fractures and are easy to use on site. Cold metal stitching can be used on all cast iron which is over 6mm thick. It can be used also between cast iron and other metals of similar hardness, such as steel.

7.2.2 WELDING WROUGHT IRON

Most types of wrought iron can be welded satisfactorily. If necessary, the Welding Institute (see 'Contacts') can do tests on iron samples to demonstrate the best welding parameters and filler rod. Wrought iron can also be successfully welded to steel and stainless steel (but bimetallic corrosion may occur in such cases).

It is advisable not to weld near rivets as welding distortion may form a gap between the rivet and the sides of the whole. This will loosen the fixing and will allow water inside the gap.

7.2.3 THE USE OF FILLERS

Metal fillers may be used on cast iron and wrought iron to make good an area of superficial corrosion or defects such as casting flaws, water traps, etc. but only if the metal is in sound condition. The use of fillers to fill larger gaps or as a metal substitute for missing parts is strictly not recommended.

Certain types of fillers may not be compatible with different types of metal and in different local conditions. More importantly, it is difficult to know how these relatively new materials will weather or affect the metal in the longer term.

If the use of fillers is appropriate in principle, users are strongly advised to seek information or specialist advice on the type of filler(s) that would be suitable in a specific case.

7.2.4 NEW CASTINGS

Seriously corroded, broken or missing parts of cast metal may need to be recast and replaced. As mentioned before in this Grade, it is strongly recommended that new castings should be made of the same type of metal as that used for the original railings. Replacements in different metals are historically incorrect, they may cause physical distortion of the railings, and corrosion.

Cast iron shrinks by about 1% on cooling from melting point. For this reason, where existing pieces of cast iron are used as patterns for new castings, it should be remembered that the new part will be 1% smaller than the original. Where this is acceptable, existing pieces may be used as patterns; where shrinkage cannot be tolerated or where the shape of the item does not permit direct moulding, a new pattern will need to be made.

It is always advisable to speak to a traditional iron foundry at an early stage, to determine the appropriate way and cost involved in order to obtain a new casting.

7.2.5 RE-HOUSING IRONWORK INTO MASONRY

When old railings are removed for treatment or repair, it is important to retain their fixing parts. These are usually the ends of horizontal bars, which are set into the wall, pier or other masonry. It is also important to plan how the railings will be re-fixed onto the building. Fig. 19 shows the traditional fixing method.

In many cases it is impossible to remove railings together with their fixing ends, without seriously damaging the railings or without practically demolishing a whole pier or part of a wall. The method of re-fixing the railings in such cases is shown in Fig. 20.

The ends of existing ironwork which are to be reset into masonry must be cleaned thoroughly of any existing rust and treated with epoxy paint against further corrosion. On resetting, the fixing holes should be filled with lead or lead-wool packing. Seriously corroded ends can be tipped with stainless steel, bronze or new wrought iron for the depth of the hole plus at least 12mm from the masonry face. If corrosion is so severe that the fixing ends cannot be re-used, they should be cut off and the fixing method shown in Fig. 20 should be followed.

For ironwork on Listed Buildings, all repairs, treatment and fixing methods may require Listed Building Consent. For clarification on this requirement in respect of an individual case, please contact the conservation officers, Development Planning Services (see 'Contacts').

8. MAINTENANCE: CLEANING AND PAINTING

Painting is the most common and, in the majority of cases, the best protection that can be given to railings, if it is done regularly and effectively.

Corrosion begins at breaks in the surface of the protective paint and then spreads beneath it. Paint-work on iron should be maintained annually. Defects should be made good by completely removing the old pain and any rust and then priming and painting before more rust is formed.

Painting over rust is a waste of money and time. It will not only stain and flake away quickly but it will also attract corrosion and help it spread, by trapping moisture under the cracked surface.

Ironwork which is coated with many layers of paint will lose much of its crispness and detail. Especially if the old paint is defective, it is sensible to remove and replace it.

Cast iron and wrought iron require different methods of cleaning. A test area which includes the various types of metal and different types of detailing, should be selected and the cleaning method(s) demonstrated on this, so that the correct variables for the job can be determined. The use of experienced operatives is essential.

8.1 SURFACE PREPARATION AND CLEANING METHODS

Correct surface preparations is probably the most important single factor in the success or failure of a painting operation. Even the best paints may fail on a badly prepared surface, whilst the simplest and cheapest paint may perform well if the surface is correctly prepared. Good surface preparation is essential for good adhesion which, in turn, will provide a satisfactory appearance and an effective protection to the old railings.

The preparation of a sound surface for painting usually involves one or more of the following:
Removal of old paint;
Removal of rust;
Removal of loose metal flats or 'mill-scale';
Removal of soluble salts, solidified atmospheric dust and other substances.

Each of these processes requires special knowledge and methods, which are briefly outlined in the following sections.

8.1.1 REMOVAL OF OLD PAINT

All paint is loose, perished or flaking, must be removed. It may not be necessary to remove all previous paint coatings, if they are sound, hard and firmly attached to the metal (provided they do no hide important detailing of the ironwork, and they do not make the texture of the material 'lumpy' or 'spotty' in some areas). Subject to avoiding these undesirable effects, sound paint surfaces may simply be rubbed down and re-finished with one or two suitable coats of paint. The use of mechanical - especially dry high speed - abrasive tools should be avoided if possible, because of the risk of inhaling lead dust which is usually contained in old paints. Rubbing should preferably be done using hand abrasive tools and other dust should be carefully contained. Chipped areas of paint-work can similarly be rubbed down, ensuring that the surface under the paint to which corrosion has spread is also cleaned. New paint coatings should overlap at least 50mm onto existing sound surrounding paint coatings, and must be compatible with the existing paint.

Small areas of paint can be removed with paint strippers such as methylene chloride. Their residues must be removed by white spirit or water, as appropriate. Flame cleaning and hot air blowers are also effective paint removers, but these must be used with care on thin cast iron because of the thermal stresses which can be set up by localised overheating.

It must be remembered that paint removal may reveal cracks, corrosion and casting defects which were not previously visible. Allowance should therefore be made at the outset for dealing with these problems.

An example of loss of detail caused by overpainting. Note the shrinkage of the paint at the base of the finial, usually caused by the application of thick layers of paint.

8.1.2 REMOVAL OF 'MILL SCALE' FROM WROUGHT IRON AND STEEL

'Mill scale' is formed on wrought iron and steel railings, as the result of the hot rolling process and their manufacturing. As the sections leave the mill rolls, they cool and the surface oxidises, producing 'mill scale' (a non-metallic, brittle surface which is easily damaged and tends to detach from the underlying metal). Rust can form at the break in the scale and can spread between it and the metal. Loose or defective 'mill scale' must be removed (sound, adherent mill scale is thought to give corrosive protection to wrought iron). Generally, mill scale can be removed by abrasive action, helped, if necessary by application of heat.

8.1.3 REMOVAL OF RUST

Rust is an unsatisfactory base for paint and must be removed before any of the new coats are applied. Rust which remains provides a source of further corrosion beneath new paint surfaces. Very small amounts of rust can normally be cleaned with abrasive action and can be treated with a chemical rust converter. Deeper affected patches of metal may need to be repaired with metal fillers after cleaning and treatment. In severe cases, the affected part of the metal may have to be removed and replaced.

8.1.4 REMOVAL OF OTHER FOREIGN SUBSTANCES

Any other foreign substances, such as soluble corrosion salts, grease or solidified atmospheric dust are undesirable and should be removed. Such substances may be firmly embedded on old railings and not be easily removable by simple wash; targeted local abrasive cleaning or the use of hot water with detergents and other mild chemicals may often be necessary.

An example of totally unsatisfactory treatment of rust. The epoxy (red) coat has been applied without previous removal of the rust and without cleaning of the old flaking paint.

8.1.5. CHOOSING THE RIGHT CLEANING METHOD

Cleaning of old painting from railings can be done with different methods, depending on the type of the metal, the actual design and detailing on the parts and sections and very significantly, on the condition of the railings. For specific ironwork, the Council's Conservation officers can be contacted for advice in the first instance, but the opinion of a specialist may also be necessary.

In ordinary cases, cleaning of metalwork before painting can be achieved satisfactorily by manually applied abrasion using special (carborundum) blocks and tools of general use such as knives and scrapers. Manual cleaning allows good targeting of action and less risk of accidental damage of the metal.

In cases of very extensive cleaning projects or railings of complex design, or defective ironwork, one or more of the following methods can be employed:

Mechanical cleaning methods generally involve the use of power driven tools with a variety of specialised attachments such as brushes and grinders which can be selected to match the detailing, type of metal and condition of the ironwork. Care must be. taken to avoid loss of detail, harmful scoring and even noticeable reduction of the size of iron bars, by excessive abrasion. Also, to avoid inhalation of potentially harmful dust which this method inevitably generates. The use of experienced operatives is highly recommended.

Dry air-abrasive cleaning involves a jet of compressed air containing abrasive particles, blasted through a hose and gun onto the surface of the metal; their abrasive action removes paint or other deposits or rust. This method can be used on wrought iron but, because of its relative softness, this type of metal can easily be scored or even more seriously damaged by abrasion. Dry abrasion is much more appropriate for cast iron. Attention is drawn to the need for the use of protective masks during mechanical and dry abrasive cleaning; any available measures should be employed to contain the dust.

Wet abrasive cleaning methods are similar to the dry abrasive cleaning, with the main difference that the abrasive particles used in wet cleaning are contained in a pressurised stream of water and air and blasted on to the metal. Wet methods are generally preferable to dry cleaning, because the water contains the generated dust. However, these methods may cause unwanted water penetration at junctions or cavities in the metal. Priming/painting should not take place before the ironwork is perfectly dry, unless special water-tolerant primers are used.

Flame cleaning is done by passing a flame across the metal. This causes differential thermal movement which quickly detaches dry paint, rust and scale, from the iron. Flame cleaning is very effective and is the most appropriate method for wrought iron. Care must be taken when this method is used on very thin wrought iron sections, which may distort or warp permanently because of the heat. If the flame is traversed too slowly, paint or other foreign matter may be fused to the surface. Excessive heating of cast iron can change its molecular structure and weaken it considerably.

Chemical cleaning methods are based on the use of chemical substances to soften or dissolve old painting or other unwanted matter, which is then removed. Depending on the chemical constitution of the substances used, their form (liquid or gel), and the method of their application on the metal, a number of different processes are available offering a relatively wide choice depending also on the type of metal, type of unwanted paint or other matter, the complexity of the design and detailing and the condition of a particular set of railings. Solvent or alkaline-based strippers can be obtained readily in the market; careful study of the instructions is always essential.

If a set of railings can be dismantled, it can be immersed in a bath of acid, which can remove paint rust and scale. This chemical method is known as 'acid pickling'. It can be very effective but it is recommended that the dismantled parts are taken away and treated in the workshop where the cleaning process can be carefully controlled. The main advantage of the chemical cleaning methods is that, if they are undertaken by experienced specialists, they can be highly effective and adaptable to specific requirements.

Special attention is drawn to the fact that these methods use concentrations of chemicals which are potentially dangerous to health and can easily damage the skin and most surfaces on accidental contact.

Most cleaning methods are likely to cause loosening, dislocation or complete removal of lead or other caulking, bolts and nuts and rivets. Care must be taken for immediate reinstatement of such dislodged parts, to avoid further structural deterioration of the railing panels, gates etc., or damage to the plinth. Cleaning, especially the removal of thick layers of old paint, may reveal minor cracks in the ironwork, or other damage that was invisible before. Such damage must be repaired properly; a thorough inspection of the cleaned ironwork is necessary before any preparatory coatings or paint is applied on the metal.

8.2. ADDITIONAL MEASURES OF PROTECTION

Traditionally, thoroughly cleaned and dried ironwork is ready to receive priming, undercoating and finishing coats of paint. Extra protection can be given by additional treatments, which are sometimes applied to new ironwork but can also be done to cleaned old railings. Methods of extra protection generally provide a metal coating (a simple process known as spray-metal-coating) or a series of protective alloy layers bonded chemically to the surface of the metal (hot dip galvanising). These can reduce the need for maintenance and increase the useful life of the ironwork. They should never be undertaken without expert advice; maintenance of ironwork treated with these methods may require special primers and paints

8.3 PAINTING

8.3.1 COLOUR

Historically, railings were painted in 'muted' or 'metallic' colours. In the early 18th century dark grey or grey-blue tones were not unusual. At the end of the 18th century, a patinated bronze became fashionable, although dark green, known as 'Brunswick Green' was very widely used. Black has been used on railings in the 18th century and before, but it became more common in the 19th and 20th centuries.

Gilding was normally used on railings of mansions and grander town houses or public buildings, to pick out special features such as gate crests, anthems, foliage or other motifs on elaborate compositions. As a matter of general policy, the Council discourages gilding for ordinary railings on historic domestic properties. Where consent is required for gilding, it will normally be refused unless evidence can show that, in a particular case, the proposed gilding is of historical significance and that it would not harm the uniformity or continuity of a group of buildings.

8.3.2 PAINT SYSTEMS

Traditional and current conventional paint systems consist of the application of a primer, an undercoat and the finishing coat(s).

Paints for all coats within a system should have compatibility with each other and with the metal substrate. There should be adequate adhesion to the substrate and between coats and there should be no under-softening to cause 'lifting', 'wrinkling' or 'bleeding'. For these reasons it is advisable to obtain all the components of a paint system from the same source, following manufacturers' instructions or specialists' specifications, to ensure such compatibility.

8.3.3 PRIMERS

The type, quality and method of application of the primer are of crucial importance for the appearance and protection of the metalwork. There are different types of primers, which may be more or less suitable for different metals and determine the appropriate type of undercoat and finishing coats. Apart from this type of metal, the choice of the primer depends also on the design and detailing of a specific set of railings and its exposure to weather conditions.

Primers must be applied thoroughly, covering all the surface of the metal, including difficult welded corners which are most vulnerable to corrosion. As it is almost impossible to produce a continuous film of adequate and even thickness and free from 'pinholes' with one coat, it is recommended that two coats of conventional primer are applied. A second coat of primer, rather than an extra finishing coat, can result in a longer life for the whole paint system and the metalwork.

8.3.4 UNDERCOATS

Undercoats are applied between the primer and the finishing coats. They provide protection to the primer and they form a key-surface of adhesion for the finish. By their relatively thick texture, undercoats increase the thickness of the film; by doing so, they reduce considerably water and oxygen permeability, they smooth the surface of the primed metal to enable the final coat to present an even texture, and they provide adequate opacity for the (often semi-transparent) finish to have an even colour. Very importantly, the relatively thick and flexible layer of the undercoat provides a 'cushion' which absorbs differential micro-movements (due to different consistency and different exposure) between the primed metal and the finishing layers of paint, thus reducing the risk of cracks in the outer film.

Undercoat layers must be applied evenly and must cover the primed metal completely. Two coats are usually preferable to one.

In some modern paint systems, undercoats have been replaced by thicker applications of 'high build' finishing coats. Before using non-traditional paint systems, it is advisable to take specialist advice.

8.3.5 FINISHING COATS

These form the external 'skin' of the whole paint system. Their function is to insulate the metal from water and oxygen, to provide a hard protection to the paint system and to give a 'perfect' texture and the desirable colour to the ironwork.

There is a very large range of different types of finishing paints in the market, and specific reference to each group of these products is clearly beyond the purpose of this Guide. Their differences originate

mainly from their chemical constitution. In practice, their performance is assessed on variables such as texture, drying time, surface hardness, elasticity, waterproofing qualities, resistance to weather conditions and atmospheric chemicals, detailed application techniques and even dust repellence, length of potential storage time, and others.

The principal criterion in choosing the finishing paint is that it should be compatible with the other paints of the system which is specified for use in a particular case.

Preventative maintenance is best achieved by properly planned inspections at regular intervals and by keeping reliable records which should form the basis of a comprehensive maintenance schedule.

Repainting should take place before the finishing coats cease to provide total protection to the paint system and to the metal.

9. CONTACTS

CLICK HERE FOR LINK TO WESTMINSTER CITY COUNCIL CONTACTS LIST

For additional historical or technical advice, please contact:
English Heritage
23 Savile Row
London W1X 2HE

Tel: **(020) 7641 3000**

The following organisations may be able to assist with specialist information or advice: (Addresses, as referred to in 'Practical Building Conservation', English Heritage, 1988)

British Cast Iron Research Association
Alvechurch, Birmingham, B48 7QB

British Foundry Association
Ridge House, Smallbrook, Queensway, Birmingham, B5 4JP

Worshipful Company of Ironmongers
Ironmongers Hall, Barbican, London, EC2Y 8AA

The Welding Institute
Abington Hall, Abington, Cambridge, CG1 6AL

Paint Research Association
Waldegrave Road, Teddington, Middlesex, TW11 8LD

10. OTHER RELEVANT COUNCIL PUBLICATIONS AND FURTHER READING

The Development planning Services has published a series of guides on various planning aspects, relating to planning legislation, design policy, development control procedures and enforcement. The following list refers to some of those guides, which relate to the subject of this booklet:

Map of Designated Conservation Areas in Westminster
Conservation Areas: A Guide to Property Owners
The Listing of Historic Buildings
Shopfronts, Blinds and Signs
Mews: A Guide to Alterations

Front Garden Parking: A Guide to Legislation and Design
Facade Cleaning
Repairs and Alterations to Listed Buildings
Development and Demolition in Conservation Areas
The Pimlico Design Guide
The Queen's Park Estate Design Guide
Building Conservation Grants
Architectural Theft (Architectural Heritage at Risk)
Lighting-Up the City
Public Art in Westminster
Access for All
The Planning Enforcement System in Westminster
Trees and Other Planting on Development Sites
Historic Parks and Gardens in Westminster
Designing-Out Crime
One General Information Leaflet for each of the 53 designated Conservation Areas in Westminster

The following publications have been used for the preparation of this Guide and are recommended for further information:

Ashurst J. & N. : **Practical Building Conservation**. English Heritage Technical Book, Volume 4, Metals, Camelot Press, 1988.
Bosomworth, D : **Railings Revived**. Traditional Homes, May 1985.
Catt, R. : **Railings, Structural Survey**. University Press, 1995.
Cruickshank, D. & Wyld, P. : **Georgian Town House and their Details**. Butterworths, 1990.
Cruickshank, D. & Wyld. P. : **London: The Art of Georgian Building**. Architectural Press, 1975.
English Heritage: **Development in the Historic Environment**. A Guide to Policy, Procedure and Good Practice, 1995.
English Heritage: **Ornamental Ironwork: Gates and Railings**. Guidance leaflet, 1993.
Fox, C. : **The Battle of the Railings**. AA Files, 29.
Greater London Council: **Iron Railings 1**. Information Sheet.
The Georgian Group: **Ironwork**. Guide No. 8.
Jemison, T. : **Railings**. Landscape Design, 6/83.
Phillips, E. : **On the Rails**. Perspectives, Jan. 1997.

Royal Courts of Justice, The Strand: An excellent example of mid/late 19th century wrought iron railings of Gothic style. An essential component of the overall design of these magnificent buildings, by G.E. Street.

Department of Planning and City Development, Development Planning Services, September 1997