



Houses of Parliament Restoration and Renewal

FACTSHEET

Fabric of the Building

The Palace of Westminster is one of the most iconic and significant buildings in the world. It is home to one of the busiest parliaments, with more than a million people, including 100,000 schoolchildren, passing through its doors each year

Following the fire of 1834, when the old Palace burned down, a competition was launched for its redesign, specifying that the new building should be 'Gothic or Elizabethan'.

As the old Houses were originally designed as royal apartments and were cramped and ill-ventilated, the fire was seen as an opportunity to create a state-of-the-art purpose-built home for Parliament, using cutting edge technology and the best of British craftsmanship.

Renowned architect Charles Barry was successful in his bid, with the support of Augustus Welby Pugin, who went on to design most of the Palace's magnificent Gothic interiors, including carvings, gilt work, panelling, and furniture.

The Palace is now considered to be one of the finest examples of neo-gothic architecture in the world and is Grade I-listed and part of a UNESCO World Heritage Site. However, years of under-investment and the need to conduct repairs around sittings of Parliament have resulted in a large backlog of major work.

The hidden problems of leaking roofs, gutters, and steam pipes, failing mechanical and electrical systems, and antiquated heating and ventilation systems, are all becoming a serious threat to the fabric of the building and its interiors.

Stonework

The Palace was built using Anston limestone from Yorkshire because it was ideal for elaborate carving. However, the stone quickly began to decay and very little was done to prevent its decline during the 19th century. Some stone cleaning and restoration work was carried out in the 1930s and again in the 1980s and 1990s, however there is still a huge amount of essential work to be done.

The main difficulties lie in access and the noise and disruption caused in a continuously used building. Internally, the original linings are Painswick stone from Gloucestershire and Caen stone from France, both chosen because they were ideal for carving.

Today, much of it is in need of cleaning or restoration due to wear and tear, leaking roofs, decaying windows and antiquated plumbing.

Windows

There are approximately 4,000 windows, from basic casements in rooms and corridors, to the ornate stained glass panels that allow light to fill the many hallways and chambers of the Palace.

This vast amount of glass, much of it set in bronze frames, no longer provides weather resistance and generates significant heat loss from the Palace.

The vast majority of windows do not close properly, and all are now in need of repair or replacement. This work is needed to halt further damage and decay to the surrounding stonework, and to reduce heat loss and running costs of the Palace.

Cast Iron Roofs

The cast iron tiled roofs were installed on wrought iron structures in the mid-1800s, and used innovative, leading-edge technology. However, they have never undergone major renovation or repair and now, 160 years on, the roofs are leaking, causing significant damage to the stonework and historic interiors of the building.

To avoid further damage to the fabric of the building, a phased programme of roof repairs is underway, which will also ensure the building is watertight before any major restoration and renewal work begins internally.

Key Facts

Stonework

- Built using sand-coloured limestone from Anston Quarry in Yorkshire
- Each block up to 4ft thick

Windows

- Approx. 4,000 windows
- Majority of these windows (approx. 3,800) are set in bronze frames, while others are iron-framed, leaded diamond-pane or wooden

Cast Iron Roofs

- 160 years old
- Weight of each tile: 75kg
- Number of tiles on roof: approx. 7,000
- Tile size: 100cm by 75cm by 1cm



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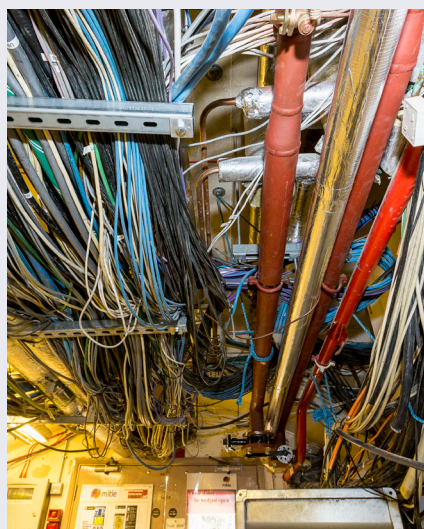
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Mechanical, Electric and Public Health

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The Palace of Westminster's Mechanical, Electrical and Public Health (MEP) systems provide essential services such as heating, water, ventilation and power. These services are essentially the arteries of the Palace and are critical for the ongoing functioning of the building.

The primary MEP services are run mainly along the extensive basement corridors and riser shafts (vertical ducts), while the many secondary MEP services run under the floors of the Palace upper storeys. Since construction of the Palace in the mid-1800s, the services infrastructure has developed significantly, with additional systems added and overlaid to serve the ever increasing and changing demands of the Houses of Parliament. These have included cabling for specialist systems such as division bells, and pipe work for heating and lighting.



Cables and pipes in the basement of the Palace.

More recent additions include cabling for telephones and communication systems, IT systems and asbestos insulation. By the late twentieth century the vertical and horizontal ducts had become severely congested, making access to the originally installed pipes and cables virtually impossible.

This has led to the current situation where it has become extremely difficult to repair, replace or remove many of the now redundant services. The condition and age of the mechanical pipe infrastructure is variable, but some of the pipe work is between 60-100 years old.

These infrastructure systems include, but are not limited to: steam, condensate, hot and cold water systems, mains cold water, fire mains, gas, compressed air and drainage. To reduce the risk of system failure to pipes and cables, and to ensure the safety of contractors working in the plant rooms, the steam system must now operate at a reduced pressure.

Because of the sheer scale of the MEP work required and the disruption it would cause to the operation of both Houses, the current medium-term risk reduction programme, being run over several years, focuses only on areas at particularly high risk of failure. Consequently, it only addresses 15% of the primary system plant rooms and just one of the 98 risers in the Palace.

KEY FACTS

- 128 MEP plant rooms, 80% in the basement
- 98 distribution risers throughout the Palace
- 778 radiators
- 701 fan coil units
- 272 other heaters (electric, oil and unidentified)
- 40 air handling units
- 34 heat exchangers
- 2 km of basement corridors

Cabling

- 2 km high voltage cabling
- 150 km low voltage cabling
- 4 km earthing
- 2 km lightning protection
- 4 km system clocks cabling
- 80 km fire system cabling
- 70 km security systems cabling
- 70 km Building Management Systems cabling
- 11 km division bell cabling

Pipework

- 11 km steam system
- 6 km low temperature hot water
- 5 km chilled water

Specialist IT cabling

- 80 km telephone cabling
- 180 km network cabling
- 50 km broadcast cables

Palace of Westminster

The Palace of Westminster is one of the most iconic and significant buildings in the world. It is home to one of the busiest parliaments, with more than a million people, including 100,000 schoolchildren, passing through its doors each year

The Palace is part of a UNESCO World Heritage Site which also incorporates Westminster Abbey, the Jewel Tower and St Margaret's Church.

The Palace contains a combination of ancient and modern structures and is home to a significant collection of works of art, archives and furnishings. It houses royal ceremonial rooms for the State Opening of Parliament, the Chambers for both Houses and their attendant spaces, offices for members of both Houses and their staff, together with staff working for the administrations.

Designed by the architect Charles Barry to be the purpose-built home of Parliament, it replaced the old Palace which burned down in a major fire in 1834, and is now considered to be one of the finest examples of neo-gothic architecture in the world. Augustus Welby Pugin assisted Barry by designing most of the Palace's ornate Gothic interiors, including carvings, gilt work, panelling and furniture.

The Palace is on four main levels and was designed so the surviving medieval buildings – Westminster Hall, the Cloisters of St Stephen's College, and the Chapel of St Mary Undercroft – formed an integral part of the whole.

The ground floor river front houses offices, catering facilities and meeting rooms, the first or principal floor includes the Chambers, libraries, and dining rooms, the second or Committee floor on the river front has Committee rooms, as does the third or Upper Committee floor.

The Palace was damaged by air raids on 14 different occasions during the Second World War. The most notable damage was caused in 1941, when the Commons Chamber was entirely destroyed. A replacement was constructed to the designs of Sir Giles Gilbert Scott and opened in 1950.

Key Facts

- Grade I listed building and part of UNESCO Westminster World Heritage Site
- Total ground area of Palace: 8 acres (32,375m²) – includes all courtyards, gardens and 5 acres of buildings
- Total internal area: 112,476m² – includes all floors, internal walls, plant rooms, hallways, storage spaces, and underground car park
- Nearly 300m in length
- More than 1,100 rooms, 100 staircases and 31 lifts
- More than 3km of passages set over seven levels

Central Tower

- Only Palace tower to have a stone spire
- Contains largest known octagonal gothic vault without a central pillar
- Originally designed to serve as a ventilating chimney for stale air and smoke from fireplaces

Elizabeth Tower

- Formerly called the Clock Tower
- Commonly known as Big Ben after its main bell
- Houses turret clock designed by E.B. Denison
- Height: 96.3m
- Steps to the belfry: 334
- Steps to the lantern (Ayrton Light): 399
- Weight of the Great Bell (Big Ben): 13.8 tonnes

Victoria Tower

- Designed as a royal entrance
- Gateways built wide enough to allow Queen's Coach to drive through for State Openings of Parliament
- Home to Parliamentary Archives
- Iron flagstaff flies Royal Standard if monarch is present or Union flag at all other times
- Height: 98.5m

Westminster Hall

- Oldest structure on the estate, completed in 1099
- One of very few parts of the ancient Palace which survives in almost its original form
- Probably the largest hall of its time in Europe
- Largest medieval timber roof in Northern Europe, measuring 20.7m by 73.2m

Protection from fire

The Palace of Westminster is one of the most iconic and significant buildings in the world. It is home to one of the busiest parliaments, with more than a million people, including 100,000 schoolchildren, passing through its doors each year

In 1834, fire destroyed most of the old medieval Palace, when wood being burned in a solid fuel boiler caused fire to spread, to devastating effect.

Given the fate of the old palace, its replacement was designed by architect Charles Barry with fire-proofing in mind. The main structural materials were stone and cast-iron to counter the risk from numerous smoke flues. However, a great deal of combustible material was used for the interior decoration and the building's complex network of ventilation shafts and floor voids unintentionally created conditions for fire and smoke to spread through the building.

The condition of fire safety systems in the Palace was reviewed by independent consultants during 2007-09, who confirmed that the coverage of automatic fire detection and voice alarm systems was incomplete and that the infrastructure was in need of upgrade, without which the already high level of alarm system failures could be expected to increase. Consequently, a fire safety improvement programme has been established to implement the necessary upgrades, albeit over many years, around sittings of Parliament.

The devastating fire at Notre Dame occurred while the spire was undergoing restoration work, and we stand ready to learn any lessons that emerge from this fire as part of our Restoration and Renewal Programme.

Another major cause of concern is the lack of effective compartmentation between sections of the Palace, as found in modern buildings. Compartmentation slows the spread of fire through a building, providing time for occupants, including disabled occupants, to be safely evacuated and for the London Fire Brigade to get fire fighters and specialist equipment on site.

Compartmentation needs to progress beyond the current 65% implementation. It is, however, extremely invasive work – in many cases requiring the removal and reinstatement of interior walls and wood panelling that contribute towards the Palace's Grade I-listed and World Heritage Site status.

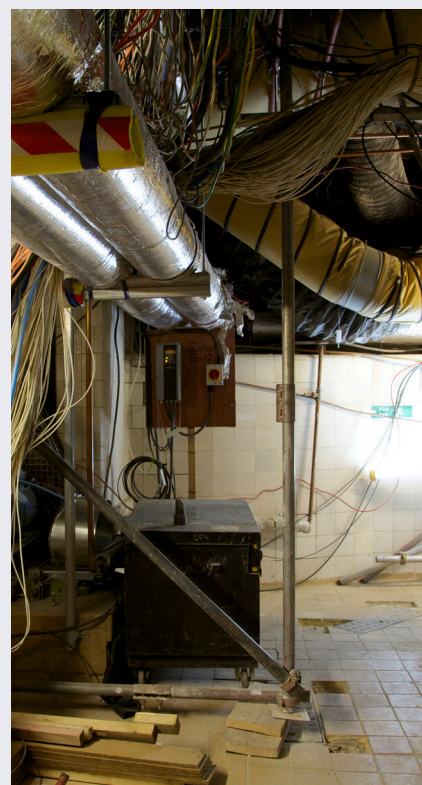
Much has been done to improve fire safety standards by providing effective fire alarms, means of escape and monitoring procedures as well as efficient fire and smoke prevention.

The Palace is safe for users and visitors because fire protection and prevention teams remain vigilant and the improvement programme and appropriate measures are in place to reduce the risk of fire as far as possible. However, much more needs to be done to ensure the building's fabric and its historic interiors are better safeguarded against another major fire.

Top image credit: Palace of Westminster on Fire 1834 by unknown artist, ©Palace of Westminster WOA1978 www.parliament.uk/art

Key Facts

- 6,969 fire detection devices including 2,584 smoke detectors
- 810 manual call points
- 1,500 fire extinguishers – 900 AFFF (foam) extinguishers and 600 CO2 extinguishers
- Last open coal fire in 1956



Fire exit in the basement of the Palace.