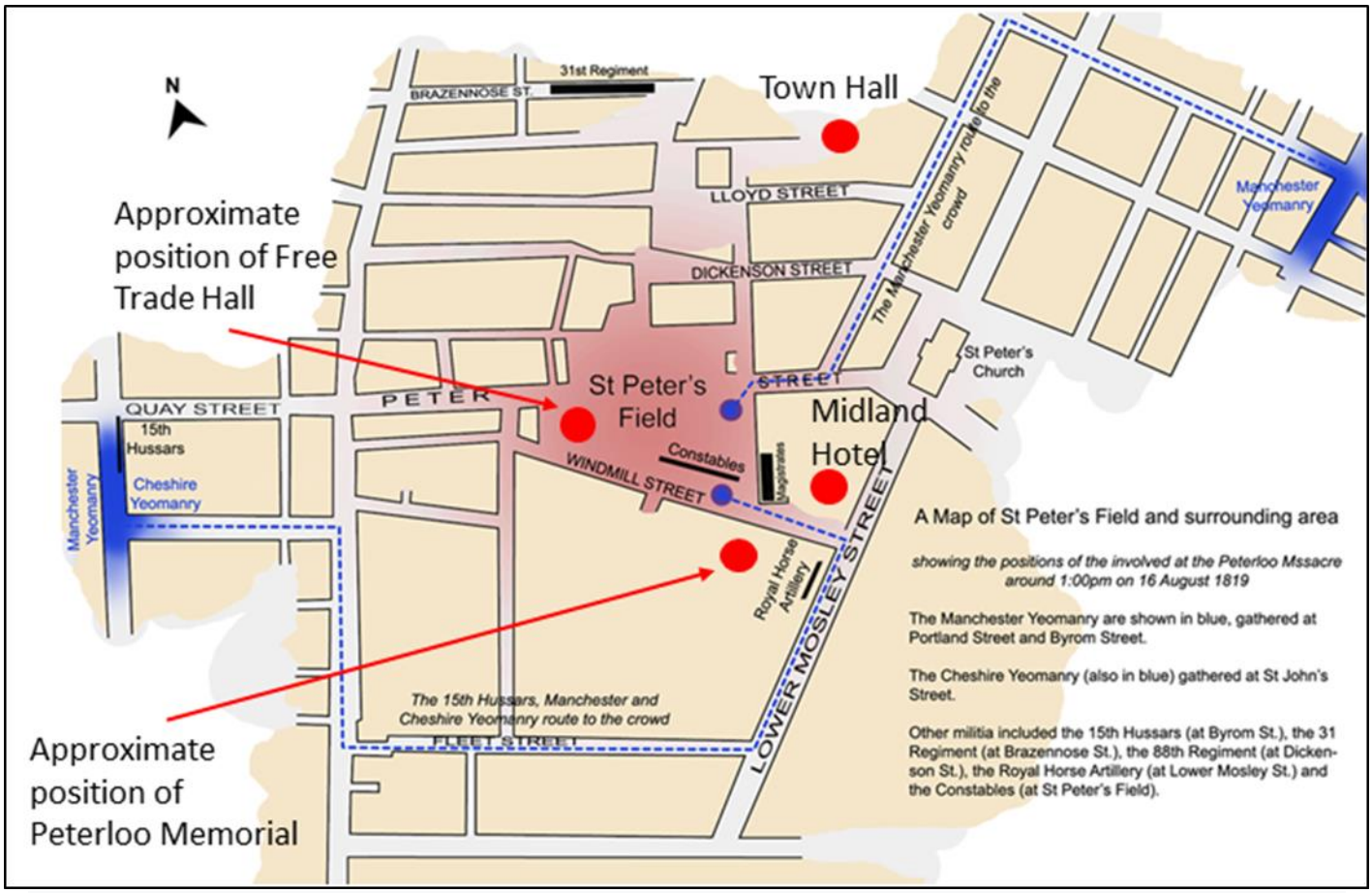
A walk to examine the building stones of Central Manchester

The walk begins at the newly opened Peterloo memorial, whose location is N 53° 28.594 W 02° 14.741
The memorial, designed by artist Jeremy Deller and architects Caruso St John, was built by local stonemasons Mather and Ellis. It stands at the junction of Lower Mosley Street and Windmill Street, just metres from the heart of the former St Peter's Field where the Peterloo massacre took place.

The Peterloo Massacre



Based on work in Reid, Robert (1989) *The Peterloo Massacre*, William Heinemann Ltd ISBN: 0434629014.

The massacre took place where we are standing, on Monday 16 August 1819, when cavalry charged into a crowd of 60,000–80,000 people who had gathered to demand the reform of parliamentary representation.

After the Napoleonic Wars in 1815, famine and chronic unemployment created social unrest, exacerbated by the introduction of the Corn Laws, which put even a loaf of bread beyond the reach of many families. In 1819, political radicalism was rising in popularity because of poor economic conditions, made worse by the relative lack of suffrage in Northern England. The Manchester Patriotic Union, agitating for parliamentary reform, organised a demonstration to be addressed by well-known radical orator Henry Hunt.

Shortly after the meeting began, local magistrates called on the Manchester and Salford Yeomanry to arrest Hunt and several others on the stage with him. The Yeomanry charged into the crowd, knocking down a woman and killing a child, and finally apprehended Hunt. Cheshire Magistrates' chairman William Hulton then summoned the 15th Hussars to disperse the crowd. They charged with sabres drawn; 18 people were killed and 400–700 were injured in the ensuing confusion.

Historian Robert Poole has called the Peterloo Massacre one of the defining moments of its age. The London and national papers shared the horror felt in the Manchester region, but Peterloo's immediate effect was to cause the government to pass the Six Acts, which were aimed at suppressing any meetings for the purpose of

radical reform. It also led directly to the foundation of the *Manchester Guardian*, but had little other effect on the pace of reform.

Although not included in the walk, the Free Trade Hall on St Peter's Street, now an hotel, has a connection with Richard Cobden, who owned and donated the land upon which it was built. (*See also 55 King Street*)

A caricature by George Cruikshank depicting the charge upon the rally; text reads*: "Down with 'em! Chop em down my brave boys: give them no quarter they want to take our Beef & Pudding from us! ---- & remember the more you kill the less poor rates you'll have to pay so go at it Lads show your courage & your Loyalty!"*

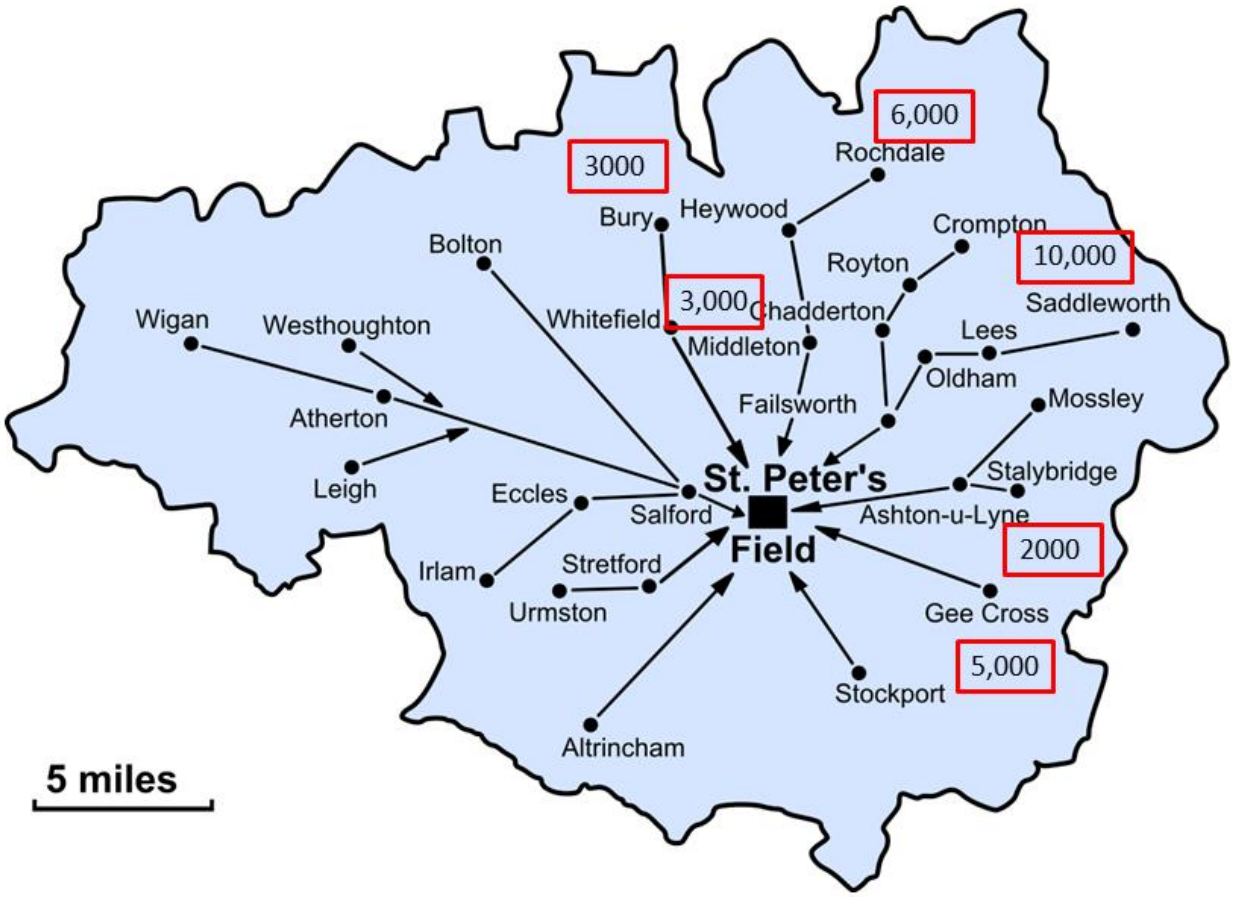
Why Parliamentary reform was needed

In 1819, Lancashire was represented by two members of parliament (MPs). Voting was restricted to the adult male owners of freehold land with an annual rental value of 40 shillings (£2) or more – equivalent to £142 in 2016 – and votes could only be cast at the county town of Lancaster, by a public spoken declaration at the hustings.

Constituency boundaries were out of date, and the so-called rotten boroughs had a hugely disproportionate influence on the membership of the Parliament of the United Kingdom compared to the size of their populations: Old Sarum in Wiltshire, with one voter, elected two MPs, as did Dunwich in Suffolk, which by the early 19th century had almost completely disappeared into the sea. The major urban centres of Manchester, Salford, Bolton, Blackburn, Rochdale, Ashton-under-Lyne, Oldham and Stockport, with a combined population of almost one million, plus Liverpool, Preston, Warrington, Wigan and other centres of population in the county, were represented by either the two county MPs for Lancashire, or the two for Cheshire in the case of Stockport.

By comparison, more than half of all MPs were returned by a total of just 154 owners of rotten or closed boroughs.[1] In 1816, Thomas Oldfield's The Representative History of Great Britain and Ireland; being a History of the House of Commons, and of the Counties, Cities, and Boroughs of the United Kingdom from the earliest Period claimed that of the 515 MPs for England and Wales 351 were returned by the patronage of 177 individuals and a further 16 by the direct patronage of the government: all 45 Scottish MPs owed their seats to patronage. These inequalities in political representation led to calls for reform.

Where people came from, how they were organised and what happened



The crowd that gathered in St Peter's Field arrived in disciplined and organised contingents. Each village or chapelry was given a time and a place to meet, from where its members were to proceed to assembly points in the larger towns or townships, and from there on to Manchester. Contingents were sent from all around the region, the largest and "best dressed" of which was a group of 10,000 who had travelled from Oldham Green, comprising people from Oldham, Royton (which included a sizeable female section), Crompton, Lees, Saddleworth and Mossley. Other sizeable contingents marched from Middleton and Rochdale (6,000 strong) and Stockport (1,500–5,000 strong). Reports of the size of the crowd at the meeting vary substantially. Contemporaries estimated it from 30,000 to as many as 150,000; modern estimates are 60,000–80,000.

Scholar Joyce Marlow describes the event as "The most numerous meeting that ever took place in Great Britain" and elaborates that the generally accepted figure of 60,000 would have been six per cent of the population of Lancashire, or half the population of the immediate area around Manchester.
The assembly was intended by its organisers and participants to be a peaceful meeting; Henry Hunt had exhorted everyone attending to come "armed with no other weapon but that of a self-approving conscience", and many were wearing their "Sunday best" clothes.

Samuel Bamford recounts the following incident, which occurred as the Middleton contingent reached the outskirts of Manchester:

> the bank of an open field on our left I perceived a gentleman observing us attentively. He beckoned me, and I went to him. He was one of my late employers. He took my hand, and rather concernedly, but kindly, said he hoped no harm was intended by all those people who were coming in. I said "I would pledge my life for their entire peaceableness." I asked him to notice them, "did they look like persons wishing to outrage the law? were they not, on the contrary, evidently heads of decent working families? or members of such families?" "No, no," I said, "my dear sir, and old respected master, if any wrong or violence take place, they will be committed by men of a different stamp from these." He said he was very glad to hear me say so; he was happy he had seen me, and gratified by the manner in which I had expressed myself. I asked, did he think we should be interrupted at the meeting? he said

> he did not believe we should; "then," I replied, "all will be well"; and shaking hands, with mutual good wishes, I left him, and took my station as before.

Although some observers, like the Rev. W. R. Hay, chairman of the Salford Quarter Sessions, claimed that "The active part of the meeting may be said to have come in wholly from the country", others such as John Shuttleworth, a local cotton manufacturer, estimated that most were from Manchester, a view that would subsequently be supported by the casualty lists. Of the casualties whose residence was recorded, sixty-one per cent lived within a three-mile radius of the centre of Manchester.

Some groups carried banners with texts like "No Corn Laws", "Annual Parliaments", "Universal suffrage" and "Vote By Ballot". The first female reform societies were established in the textile areas in 1819 and women from the Manchester Female Reform Society, dressed in white, accompanied Hunt to the platform. The society's president Mary Fildes rode in Hunt's carriage carrying its flag. The only banner known to have survived is in Middleton Public Library; it was carried by Thomas Redford, who was injured by a yeomanry sabre. Made of green silk embossed with gold lettering, one side of the banner is inscribed "Liberty and Fraternity" and the other "Unity and Strength."

At about noon, several hundred special constables were led onto the field. They formed two lines in the crowd a few yards apart, in an attempt to form a corridor through the crowd between the house where the magistrates were watching and the hustings, two wagons lashed together. Believing that this might be intended as the route by which the magistrates would later send their representatives to arrest the speakers, some members of the crowd pushed the wagons away from the constables, and pressed around the hustings to form a human barrier.

Hunt's carriage arrived at the meeting shortly after 1:00 pm, and he made his way to the hustings. Alongside Hunt on the speakers' stand were John Knight, a cotton manufacturer and reformer, Joseph Johnson, the organiser of the meeting, John Thacker Saxton, managing editor of the *Manchester Observer*, the publisher Richard Carlile, and George Swift, reformer and shoemaker. There were also a number of reporters, including John Tyas of *The Times*, John Smith of the *Liverpool Mercury* and Edward Baines Jr, the son of the editor of the *Leeds Mercury.* By this time St Peter's Field, an area of 14,000 square yards (11,700 m^2), was packed with tens of thousands of men, women and children. The crowd around the speakers was so dense that "their hats seemed to touch"; large groups of curious spectators gathered on the outskirts of the crowd. The rest of Manchester was like a ghost town, the streets and shops were empty.

> When I wrote these two letters, I considered at that moment that the lives and properties of all the persons in Manchester were in the greatest possible danger. I took this into consideration, that the meeting was part of a great scheme, carrying on throughout the country.
> — William Hulton

William Hulton, the chairman of the magistrates watching from the house on the edge of St Peter's Field, saw the enthusiastic reception that Hunt received on his arrival at the assembly, and it encouraged him to action. He issued an arrest warrant for Henry Hunt, Joseph Johnson, John Knight, and James Moorhouse. On being handed the warrant the Constable, Jonathan Andrews, offered his opinion that the press of the crowd surrounding the hustings would make military assistance necessary for its execution. Hulton then wrote two letters, one to Major Thomas Trafford, the commanding officer of the Manchester and Salford Yeomanry Cavalry, and the other to the overall military commander in Manchester, Lieutenant Colonel Guy L'Estrange.

The contents of both notes were similar:

> Sir, as chairman of the select committee of magistrates, I request you to proceed immediately to no. 6 Mount Street, where the magistrates are assembled. They consider the Civil Power wholly inadequate to preserve the peace. I have the honour, & c. Wm. Hulton.
> *— Letter sent by William Hulton to Major Trafford of the Manchester and Salford Yeomanry Cavalry*

The notes were handed to two horsemen who were standing by. The Manchester and Salford Yeomanry were stationed just a short distance away in Portland Street, and so received their note first. They immediately drew their swords and galloped towards St Peter's Field. One trooper, in a frantic attempt to catch up,

knocked down Ann Fildes in Cooper Street, causing the death of her son when he was thrown from her arms; two-year-old William Fildes was the first casualty of Peterloo.

Sixty cavalrymen of the Manchester and Salford Yeomanry, led by Captain Hugh Hornby Birley, a local factory owner, arrived at the house from where the magistrates were watching; some reports allege that they were drunk. Andrews, the Chief Constable, instructed Birley that he had an arrest warrant which he needed assistance to execute. Birley was asked to take his cavalry to the hustings to allow the speakers to be removed; it was by then about 1:40 pm.

The route towards the hustings between the special constables was narrow, and as the inexperienced horses were thrust further and further into the crowd they reared and plunged as people tried to get out of their way. The arrest warrant had been given to the Deputy Constable, Joseph Nadin, who followed behind the yeomanry. As the cavalry pushed towards the speakers' stand they became stuck in the crowd, and in panic started to hack about them with their sabres. On his arrival at the stand Nadin arrested Hunt, Johnson and a number of others including John Tyas, the reporter from *The Times*. Their mission to execute the arrest warrant having been achieved, the yeomanry set about destroying the banners and flags on the stand. According to Tyas, the yeomanry then attempted to reach flags in the crowd "cutting most indiscriminately to the right and to the left to get at them" – only then (said Tyas) were brickbats thrown at the military: "From this point the Manchester and Salford Yeomanry lost all command of temper". From his vantage point William Hulton perceived the unfolding events as an assault on the yeomanry, and on L'Estrange's arrival at 1:50 pm, at the head of his hussars, he ordered them into the field to disperse the crowd with the words: "Good God, Sir, don't you see they are attacking the Yeomanry; disperse the meeting!" The 15th Hussars formed themselves into a line stretching across the eastern end of St Peter's Field, and charged into the crowd. At about the same time the Cheshire Yeomanry charged from the southern edge of the field. At first the crowd had some difficulty in dispersing, as the main exit route into Peter Street was blocked by the 88th Regiment of Foot, standing with bayonets fixed. One officer of the 15th Hussars was heard trying to restrain the by now out of control Manchester and Salford Yeomanry, who were "cutting at every one they could reach": "For shame! For shame! Gentlemen: forbear, forbear! The people cannot get away!"

On the other hand, Lieutenant Jolliffe of the 15th Hussars said "It was then for the first time that I saw the Manchester troop of Yeomanry; they were scattered singly or in small groups over the greater part of the Field, literally hemmed up and powerless either to make an impression or to escape; in fact, they were in the power of those whom they were designed to overawe and it required only a glance to discover their helpless position, and the necessity of our being *brought to their rescue*" Further Jolliffe asserted that ".. nine out of ten of the sabre wounds were caused by the *Hussars* ... however, the far greater amount of injuries were from the pressure of the routed multitude."

Within 10 minutes the crowd had been dispersed, at the cost of 11 dead and more than 600 injured. Only the wounded, their helpers, and the dead were left behind; a woman living nearby said she saw "a very great deal of blood." For some time afterwards there was rioting in the streets, most seriously at New Cross, where troops fired on a crowd attacking a shop belonging to someone rumoured to have taken one of the women reformers' flags as a souvenir. Peace was not restored in Manchester until the next morning, and in Stockport and Macclesfield rioting continued on the 17th. There was also a major riot in Oldham that day, during which one person was shot and wounded.

The exact number of those killed and injured at Peterloo has never been established with certainty. Sources claim 11–15 killed and 400–700 injured. The Manchester Relief Committee, a body set up to provide relief for the victims of Peterloo, gave the number of injured as 420, while Radical sources listed 500. The true number is difficult to estimate, as many of the wounded hid their injuries for fear of retribution by the authorities. Three of William Marsh's six children worked in the factory belonging to Captain Hugh Birley of the Manchester Yeomanry, and lost their jobs because their father had attended the meeting. James Lees was admitted to Manchester Infirmary with two severe sabre wounds to the head, but was refused treatment and sent home after refusing to agree with the surgeon's insistence that "he had had enough of Manchester meetings."

A particular feature of the meeting at Peterloo was the number of women present. Female reform societies had been formed in North West England during June and July 1819, the first in Britain. Many of the women were dressed distinctively in white, and some formed all-female contingents, carrying their own flags. Of the 654 recorded casualties, at least 168 were women, four of whom died either at St Peter's Field or later as a result of their wounds. It has been estimated that less than 12 per cent of the crowd was made up of women, suggesting that they were at significantly greater risk of injury than men by a factor of almost 3:1. Richard Carlile claimed that the women were especially targeted, a view apparently supported by the large number who suffered from wounds caused by weapons.

Eleven of the fatalities listed occurred on St Peter's Field. Others, such as John Lees of Oldham, died later of their wounds, and some like Joshua Whitworth were killed in the rioting that followed the crowd's dispersal from the field**.**

The Peterloo Memorial

The monument is conceived as a landscaped 'hill' made of concentric steps. It is designed to be a gathering place and platform for oratory and references the march of people from surrounding towns and villages to demand recognition of their rights. These place names and the names of the 18 men, women and children who died, are engraved on the vertical faces of the steps around the memorial in positions that accurately depict their compass location.

The horizontal surfaces of the steps have inlaid decoration, imagery associated with Peterloo. The design of the top of the memorial refers to events similar to Peterloo around the world, where peaceful protests have been violently broken up by the state. The design of the top five layers has been repeated in a smaller circle adjoining the larger one, enabling the viewer to read the information on the flat slate top of the monument.

Different kinds of stone have been used to create the memorial, including granites, sandstones and slates from several parts of the UK. The bright range of colours, together with the names, emblems and texts incised into the surface of the stones, makes reference to the bold graphics of banners calling for social reform traditionally held up by protesters.

Councillor Luthfur Rahman, Executive Member for Skills, Culture and Leisure for Manchester City Council, said: "The spirit of radicalism which was present on that day is still woven into the thread of the city's character and we believe this memorial will be a visual depiction of that."


MIDLAND HOTEL

The Memorial stones

The base of the Peterloo Memorial is a semi-circle of Portland Stone, which serves to level the site of the memorial. A bronze plaque gives a summary of the events of 16 August 1819.
https://www.stonespecialist.com/news/stones-quarries/great-british-stone-portland-limestone

Above the base are 11 circles of decreasing diameter.

1. **Corrennie pink granite, from near Tillyfourie, Aberdeenshire**

From https://www.stonecontact.com/corrennie-granite/s12314

The Corrennie intrusion is a granite, of Silurian age (419-444 Ma).
https://canmore.org.uk/site/139486/corrennie-quarry

2. **Whitworth stone, Bury (Upper Haslingden Flags)**

This is a blue variant of Upper Haslingden Flags of Carboniferous age (~320 Ma) and is a well compacted, very hard, fine-grained, cross-bedded sandstone from the millstone grit series. (The best quality of this rock, almost a quartzite, was locally called Lonkey and was widely used for paving flags and for setts.) The stone shows ripples and is obviously water-lain. The ripples are polished flat on top, but they show in the cross-sections on the side. They could even be climbing ripples? The top surface features a heart in red banded sandstone on every second block, 14 hearts in total.

The riser of this step is inscribed with the names of those who were killed: Arthur O'Neill, Mary Heyes, Sarah Jones, William Bradshaw, Margaret Downes, Samuel Hall, William Evans, William Fildes, Thomas Ashworth, Martha Partington, John Ashton, Thomas Buckley, James Crompton, Joseph

Whitworth, Edmund Dawson, John Lees, the unborn child of Elizabeth Gaunt, John Rhodes.

3. **Fletcher Bank Grit, locally sourced in Lancashire**

Fletcher Bank Grit is a sandstone of the Namurian (Millstone Grit) series of Carboniferous age (322-320Ma) and lower in the succession than the Upper Haslingden Flags seen previously. This is another sedimentary rock laid down in a huge delta. The photograph shows well-marked Liesegang rings, caused by the percolation of iron salts through the sediment.

The top surface is decorated with references to the local textile trade with red sandstone bobbins, probably utilising St Bees sandstone and shuttles with cores of dark rock, probably Burlington slate. These emblems are repeated in level 7

The riser of this step is inscribed with the names of places from which people came to the Peterloo meeting: Burslem, Macclesfield, London, Huddersfield, Leeds, Ripponden, Burnley, Lancaster, Warrington and Northwich.

4. **St Bees Sandstone (Sherwood Sandstone) from Salton Bay near St Bees, West Cumberland**
https://cumbrianstone.co.uk/featuredhome/st-bees-sandstone/

St Bees Sandstone is a dark red, fine grained stone of early Triassic age (252-247Ma). It is fine grained with cross-bedding and is a water-lain sediment. St Bees quarry is on the west coast of Cumbria, where stone has been quarried and processed for hundreds of years.

The upper surfaces are inlaid with a total of 12 weighing scales on alternate blocks.

Inscriptions on the riser indicate the compass directions of some of the other places, from which people came to the meeting: Saddleworth, Rochdale, Tottington, Bolton and Tyldesley.

We shall see this sandstone again at the end of the walk at John Rylands Library.

5. Whinstone (Dolerite) from Dunaverig, Stirling, Central Scotland

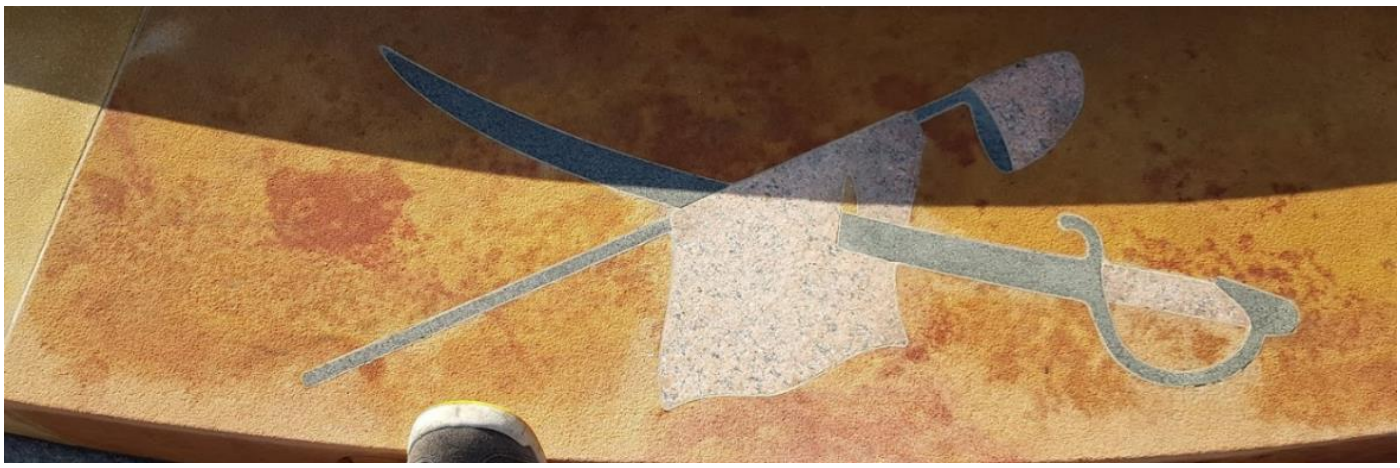
This is an igneous rock of basaltic composition. When cooled slowly as in the Black Cuillin of Skye it is called gabbro. This rock frequently occurs in sills and dykes, as for example in the Whin Sill. This example was quarried in Central Scotland. Plagioclase feldspar crystals can be seen in the enlarged image above.

The riser on this tier bears inscriptions of more places from which people walked: Lees, Crompton

6. **Cop Crag Sandstone from the Otterburn area of Northumberland**
https://www.dunhouse.co.uk/stonefinder/cop-crag/

Quarried near Otterburn in Northumberland, this is a very distinctive sandstone. Cop Crag is varied in colour, from rusty buff with swirls of browns and splashes of pink. In places the colour is burnt orange with deep pink banding, notably the blocks with the names Chadkirk and Bury.

This sandstone is from the Stainmore Formation and is of Carboniferous age (329-319Ma), laid down in an environment dominated by swamps, estuaries and deltas.



The images on this tier are nine crossed swords with liberty caps (bonnets de la Liberté), a reference to the French Revolution. On 20 June 1792, King Louis XVI was obliged to don a liberty cap by a crowd that had stormed the palace of Tuileries.

On the risers are the names of more towns from which people came: Chadkirk, Stalybridge, Oldham, Royton, Bury and Irlam.

7. **De Lank Granite from Bodmin Moor, Cornwall**
https://en.wikipedia.org/wiki/De_Lank_Quarries

This is a granite intrusion, part of the south-west England plutonic mass. It was emplaced during Permian/Carboniferous Periods (331-272Ma) and is characterised by large white orthoclase feldspars.

The surface features bobbins and shuttles, referencing Manchester's importance as a textile town.

The riser bears the names of more towns whose people came to Manchester: Hyde, Dukinfield, Ashton-under-Lyne, Hopwood, Worsley and Flixton.

8. **Whitworth Blue sandstone (Upper Haslingden Flags)**
This is the same stone as that used in level 2, but here the surface has been inlaid with handshake symbols.

The names on this level are: Heaton Norris, Stockport and Chadderton

9. Cove (Red) Sandstone from Kirkpatrick Fleming in south-west Scotland.
https://blockstone.com/stone-types/cove-red-sandstone/

Cove Red Sandstone is New Red Sandstone of Triassic age. It is a fine-grained, warm terracotta-red coloured sandstone. The stone can have distinct bed markings giving it an interesting character. This stone was used for the base of the Statue of Liberty. Lord Leverhulme's Bolton School and Thornton Manor, Wirral, the latter where the Irish and British Prime Ministers met last week, were also built from this stone.

Inscriptions on this tier refer to the towns of: Hollinwood, Middleton, Whitefield and Barton upon Irwell

10. Peak Moor Sandstone (Ashover Grit) from Stanton Moor near Matlock, Derbyshire

This is another sandstone of the Millstone Grit series of the Carboniferous (322-320Ma), deposited in an environment dominated by swamps, estuaries and deltas. Peak Moor is a fine- to medium-grained sandstone, predominantly buff in colour with occasional pink markings and/or brown iron staining.

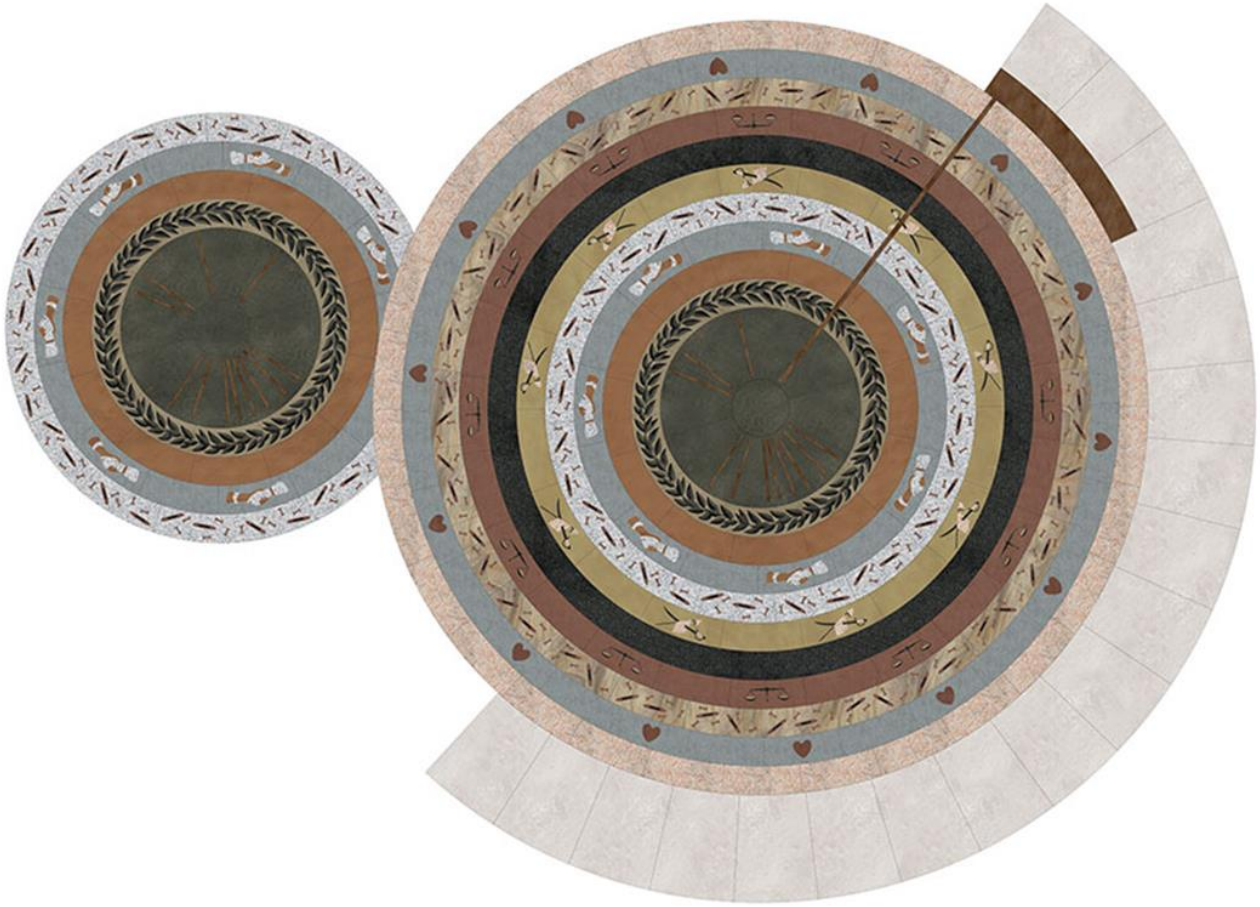
The stone has been used as a background for inlaid laurel wreaths, cut from two different types of slate. The darkest parts of the leaves are cut from Cwt-y-Bugail Welsh slate. The Cwt-y-Bugail Quarry is a former slate quarry located east of Blaenau Ffestiniog in Wales. It was first worked as a trial pit around 1840. Continuous production began in 1863 and continued until closure in 1961. The quarry was connected to the Ffestiniog Railway at Duffws Station via the Rhiwbach Tramway.
The lighter stone is Westmorland Green slate from Broughton Moor in Cumbria.

The inscriptions on this tier reference: Droylsden, Failsworth, Prestwich, Pendlebury, Eccles and Stretford.

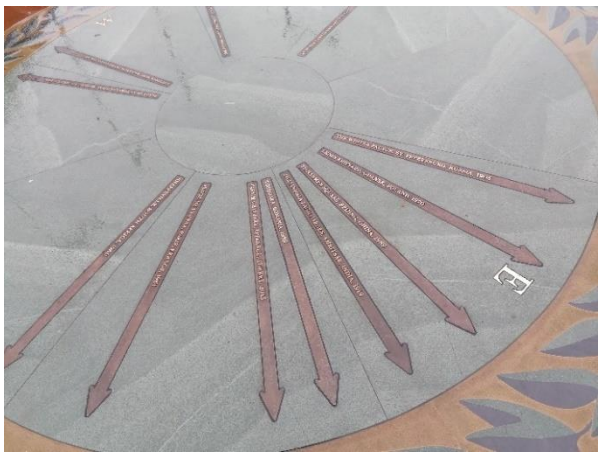
11. Burlington Slate - Broughton Moor near Kirkby in Furness, Lancashire (Cumbria)

Burlington slate is one of the quarry products produced by the Holker Group. Burlington slate was used for many of Manchester's Victorian buildings, including the Town Hall and was used as cladding on John Dalton House, which we shall pass later in the walk.

Plan view of the Memorial



From https://www.carusostjohn.com/projects/peterloo-massacre-memorial/



Images of the memorial *(S J Rhodes)*

Edited extracts from 'A Building Stones Guide to Central Manchester'

ISBN 978-0-9928713-1-4

Geological time divisions	Age in millions of years before present	
Quaternary	2	0
Tertiary	65	2
Cretaceous	145	65
Jurassic	199	145
Triassic (New Red Sandstone)	251	199
Permian	299	251
Carboniferous	359	299
Devonian	416	359
Silurian	443	416
Ordovician	488	443
Cambrian	542	488
Precambrian era	4700	542

Note: Numbering from the building stones book has been added to the Itinerary.

A8 Manchester Central (A8 in the Building Stones book)
The front of the building, formerly Manchester Central Station, has been faced with Locharbriggs sandstone from the Dumfries area of south-west Scotland.
The slope, believed to be the approximate position of the platform from which Henry Hunt was expected to address the crowd on 16 August 1819, is surfaced with reclaimed paving 'setts' made from a variety of stone types., an odd choice as it doesn't show off the stone at all.

A4 Multicolor gneiss
A brief pause was made to look at the beautiful stone which has been used to face a recessed area of an unprepossessing building

A3 Midland Hotel
The lower parts of the hotel walls are faced with various kinds of granite, while the upper storeys are of terracotta, a building material used in many of Manchester's Victorian buildings. The base is grey granite from quarries at Dalbeattie in south-west Scotland. The bulk of the walls utilise Peterhead granite (pink) from Aberdeenshire with bands of the dark variant of Shap granite with its conspicuous orthoclase feldspar crystals. It is therefore strictly speaking, not a granite but adamellite. The hotel's main entrance features steps of Balmoral Red granite from Finland, which have been flame treated to reduce slip hazards.

A2 Central Library
The building has a steel frame clad with Portland Stone. Shell fossils can be seen standing proud of the main stone-work. A grey granite and pink Shap granite have been used in the steps. The library was built in the early 1930s as part of a programme of works providing employment during the Depression. The first Mersey tunnel, the A580 (East Lancashire Road) and the library were all opened on the same day in 1934 by King George V and Queen Mary.

D1 Town Hall Extension

Built in 1938, the Town Hall Extension is faced with Darley Dale sandstone of Carboniferous age (~320 Ma) from Derbyshire. If you look carefully you can see the individual grains of quartz, which are cemented with silica, the same material as the sand and very resistant to weathering. It's no accident that beach sand is mostly quartz, because it is resistant to both chemical and physical weathering processes. One disadvantage of using sandstone in the foundation courses of a building can be seen here. This isn't an ideal material for foundations because it soaks up salt-laden water, and then when the water evaporates the salt breaks up the surface of the sandstone. You will see another example at 82 King Street. The problem is often solved in Manchester by having foundations made of granite, which is neither porous nor permeable and thus not affected by water. You can see granite used in this way in several buildings along our route.

The glass atrium between the Library and the Town Hall Extension is open to the public even when the associated buildings are not accessible. The floor has been decorated with mosaic representing cotton flowers, some of whose centres now have red circular plaques commemorating the names of those killed at Peterloo. (Thank you to two of the participants for drawing our attention to this feature.)

D2 Town Hall

The Town Hall is built of brick, clad with sandstone of Carboniferous age from Spinkwell quarries near Bradford. Its roof is made from Burlington slate from Kirkby in Furness which we saw in the Peterloo Memorial. The original roof was installed in 1877 and was replaced with stone from the same quarry in 1977. Abel Heywood, a former Mayor of Manchester, was instrumental in the construction of the Town Hall. His statue is among those in Albert Square and the clock bell in the Town Hall tower is named the Great Abel. The pub used on Friday for the GA gathering is the Abel Heywood, named after the same man.

A1 Cenotaph

The Cenotaph was designed by Edwin Lutyens, who also designed the one in Whitehall, London. It was erected in 1924 and is constructed from Portland Stone, which is limestone from the Albion Quarries on the Isle of Portland in Dorset.

The stone has been deeply weathered by solution in Manchester's acid rain. Fossil shell fragments stand proud on the most weathered face (which was on the south-west side of the obelisk before the move to its new location, but now faces south-east) because they weather less rapidly than the matrix limestone. The fossils are mostly marine bivalves related to today's scallops and oysters, indicating that the rock was once a sea-floor sediment. If you have a hand-lens you can see that much of the stone is made up of tiny spheres, each about a millimetre in diameter. These spheres are known as ooliths, so the limestone is described as oolitic. The word ‘oolith’ literally means "egg stone", but they are precipitated pellets, not eggs. The fossils indicate that the age of the rock is late Jurassic, about 150 million years old.

The Cenotaph was moved to its present location, south-east of the Town Hall, in June 2014, as part of the refurbishment of Manchester's Civic Centre and in time to mark the centenary of the start of World War I. The relocated monument has also been turned through 90˚ and has been set in an area paved with slabs of pale Crosland Hill stone, which is a coarse-grained sandstone of Carboniferous age (~320 Ma) from the Huddersfield area. The walls are of Portland Stone from the Albion Quarry on the Isle of Portland where the Cenotaph Portland stone also came from. Around the paved Cenotaph area is a ring of Broughton Moor Westmorland green slate which is of Ordovician age and comes from another of the Holker Group’s quarries near Ulverston. A close look at this stone reveals interesting structures in the slate similar to those you will see in King Street. Information about Portland stone can be found at:
http://www.southampton.ac.uk/~imw/

D17 Manchester City Art Gallery

This building was designed in the 1820s by sir Charles Barry who collaborated on the Houses of Parliament with Augustus Pugin. It is a sandstone building and features flagstones with planed-off ripples, on each side of

the entrance.

D16 Building at Mosley Street/Nicholas Street junction

This building is also clad in plastic sheeting and scaffolding but extensive use of Portland Roach can be made out in the gable end of the building. This is Portland limestone from Dorset but in this case, the rock is full of fossils, some of which have dissolved leaving conspicuous cavities, moulds of the orogonal organisms. The gastropod Aptyxiella 'Portland Screw' is particularly common in this example, and was once able to be viewed at close quarters.

Greggs Bakery shop opposite the City Art Gallery (not included in the book)

This building has deep sills beneath its windows, made from Rapakivi granite, an igneous rock from Kotka in Finland. Also known as Baltic Brown, it is unusual in that the feldspar crystals are more or less spherical, a texture described as orbicular. Close inspection reveals that some feldspar crystals are surrounded by pale-green haloes of plagioclase feldspar. This granite is older than 1600 Ma and it is part of the Precambrian Baltic Shield, ancient continental crust. A small detour was introduced to the walk because the next site had been wrapped in plastic and scaffolding, making the granite less visible.

A walk around this area reveals that at one period in Manchester's history this was the preferred stone for cladding buildings. When the research for the book was undertaken, Rapakivi could be found on many buildings in this area, but in the intervening five years, many of these buildings have been refurbished and the stone removed.

60 Spring Gardens (not included in the book)

On the lowest part of the facade is an example of Rapakivi Granite, visible beneath the scaffolding.

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B3 81 King Street

This building is of fine-grained sandstone which can be carved, as you can see around the door on the lower part of the building. The columns either side of the door are the dark variety of Shap Granite. Shap is on the eastern side of the Lake District near the M6. Shap Granite is very distinctive because of the large pink feldspar crystals which show up well in this dark variety of the rock.

The Reform Club was originally a gentleman's club for the liberal elite and included Winston Churchill and David Lloyd George among its members.

98 King Street (not included in the book)

This is Ship Canal House and is built of Portland stone on a granite base. The granite, with its very large white orthoclase feldspar crystals, probably came from south-west England. If you look up you will see some carvings, including a magnificent ship which mirrors the coat of arms on the bronze plaque by the door. The ship canal was built because Manchester merchants wanted to avoid the high rates for imports to Manchester charged by the port of Liverpool. Information about Dartmoor granite can be found at:
http://www.southampton.ac.uk/~imw/Dartmoor.htm

B4 73-79 King Street

This facade uses slate from the Lake District. It is Ordovician (~450Ma). Explosive volcanoes in this area emitted large quantities of ash which was then washed into local lakes forming distinct beds which can be seen in the slate. Over long periods of time the sediment was deeply buried and metamorphosed, becoming the hard rock that you see today. This slate started as volcanic ash (igneous), was deposited as ash layers (sedimentary) and altered by burial and heating (metamorphic) and thus belongs to all three classifications of rocks. There are some beautiful examples of bedding structures in the examples in front of you.

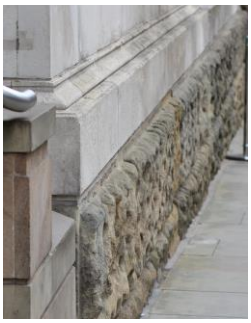
B5 55 King Street

A plaque on this building states that this was the site of the York Hotel, where Manchester Council was formed in 1838. It was also where the Anti Corn Law League was formed by manufacturers Richard Cobden and John Bright, with support from other local mill owners, politicians and members of the public. The Corn Laws which restricted free trade in grain were introduced in 1815 and not repealed until 1846.

This building was also the place where a meeting was held in 1839 to establish the Royal Victoria Gallery for the Encouragement of Practical Science. Hugh Hornby Birley was in the chair. His tomb is in Manchester Cathedral, and he was one of Manchester's first MPs. Incidentally, James Prescott Joule, born in Salford and whose name is now used for the standard unit of energy (a Joule is the work needed to produce one watt of power for one second) gave his first public lecture at this Gallery, which opened in 1840 but sadly closed in 1842 for lack of public support.

The present building, designed on the footprint of the triangular Natwest logo, was formerly the Manchester HQ of Natwest. It is now a large store. The building is clad with Emerald Pearl, a dark variety of larvikite from Larvik in Norway. This is a coarsely crystalline igneous rock containing large feldspars. In this case the architects specified that the stone should be textured with vertical grooves so that it merely looks dark and the impact of the schiller effect of the feldspars is lost. After it was sold by Natwest, the new owners installed huge window surrounds using a polished version of the same stone.

B6 82 King Street



The lower part of the wall beneath the blue plaque is made from coarse-grained sandstone.
The blue plaque records that this building once housed a branch of the Bank of England, one of four in Manchester, Liverpool, Bristol and Plymouth. Its architect, Charles Robert Cockerell, was surveyor to the Bank of England and to St Paul's Cathedral, in whose crypt he is buried.

B8 St. Ann's Passage

The shop-front here makes use of almost white Carrara marble which is another variety of limestone. In this case it has been baked, probably by being in an area experiencing volcanic activity, so the limestone has been recrystallised into marble and lost almost all its structure. If it was pure marble it would be completely white. In this case impurities cause the black streaks. The rest of the facade of the shop is made of two different varieties of gabbro, the dark colour in very marked contrast to the white marble. This is an igneous rock which formed in a magma chamber as it cooled at the end of its activity. As the magma cooled crystals formed; the slower the cooling, the bigger the crystals. The Black Cuillin range of the Isle of Skye is a very good example of the remnants of a magma chamber, where erosion has removed the 'roof' so that the gabbro is at the surface. If this magma had been extruded in a volcanic eruption it would be called basalt and it would look black. Basalt, like gabbro, is crystalline, but the crystals are so small that they cannot be seen with the naked eye.

Another small detour from the original itinerary involved walking through St Ann's Passage to

C16 St Ann's Church

The church was built in 1709, before the development of canals or railways. The best available local stone was Binney sandstone of Permian age, from quarries in nearby Collyhurst and notable for its purple tint. This stone weathered easily because of clayey lenses in the stone and replacements were made in the following years. Stone came from several different quarries in Cheshire, Lancashire and Derbyshire and only when the stone was cleaned after the Clean Air Act of 1956 that it was realised that the colours of the stone were very varied.

C17 Shop front near St Ann's Passage

This shop has window surrounds of limestone with fossil foramininfera, oval in shape and up to about 10 millimetres across. This proved to be the 'star of the show' as far as the walkers were concerned.

B9 23 King Street

The doorway of number 23 King Street is surrounded by Larvikite, a coarsely crystalline igneous rock from Larvik in Southern Norway. It is famous for its beautiful feldspar crystals which shine blue-green as the light catches them. This is an interference colour, similar to what you see in a thin film of petrol on water. The website below has some stunning images of schillerisation.
https://geologi.no/images/GeologskeGuider/PEG2017_Excursion_Guide_NGF_Series_2017-6_red.pdf

B10 Junction of King Street with Ridgefield

The building on the corner between Ridgefield and King Street is faced with red desert sandstone. In some of the slabs, you can see dune cross-bedding caused by sand grains being carried up and over the dune crest. Some of the grains might have been transported by water currents, because you can see streaks where mud has been washed out. Desert rainstorms are sudden and violent and create wadis, in which large volumes of sediment are transported and deposited.

C20 John Dalton Street between Ridgefield and Bow Street

The building opposite Ridgefield House is faced with Serpentinite, formed when deep mantle rocks are brought to the surface and metamorphosed at low temperatures. They react with water to form the very colourful rock we see today at locations including Kynance Cove in Cornwall.

C22 Ridgefield House

The rock used in the facade and the entrance at Ridgefield House is a form of limestone called travertine. This is probably the youngest rock you will see on your tour and probably came from Italy or Turkey.

The spectacular photograph is of Pamukkale in Turkey. The name in Turkish means ‘cotton castles’. The rock forms when water saturated with calcium carbonate comes out of the ground as hot springs and the calcium carbonate is precipitated. The holes in the rock are evidence of microbial activity at the time of deposition.

C21 John Dalton House

Despite the plastic covering, I have included this building, which is clad with riven slabs of Lancashire slate supplied by Burlington Stone from the Furness district of Lancashire. "Riven" meaning split not sawn, so the surface is rough and sometimes ‘wavy’. This rock is of Ordovician age (488–443 Ma), laid down as a sediment, which was then deeply buried during a period of mountain building similar to today’s Andes mountains. The sedimentary rock was altered during its burial by a combination of heat and pressure which changed it into slate. This process is called metamorphism, so slate is a metamorphic rock. The original bedding of the sediment which became slate can be seen as lines across the slabs. The Burlington Stone company, part of the Holker Group, has been in operation for more than a hundred years and supplied slate for the roofs of many Manchester buildings including the Town Hall.

John Dalton (1766-1844) was one of the most important people in the development of the science of chemistry. He grew up in Cumberland and taught at the Quaker School in Kendal before moving to Manchester at the age of twenty-seven to become a teacher at New College, Manchester, which went on to become UMIST now part of the University of Manchester. Dalton joined the Manchester Literary and Philosophical Society where he presented his first paper on colour blindness, from which he suffered. The word "Daltonism" is sometimes used for colour blindness.

He was interested in meteorology and kept daily weather records from 1787 until his death. He was interested in the composition and behaviour of the atmosphere and challenged the views of Lavoisier and Humphrey Davy. As a Quaker, Dalton led a modest existence, although he received many honours later in life. In Manchester more than 40,000 people followed his funeral procession.

A13 Crown Court

If you walk along the path to the left of the steps and look at the wall of the main building, you can see spectacular examples of Portland Roach, which is limestone of Jurassic age, (199-145 Ma). This rock is the same age as the Portland stone of the Cenotaph and comes from the same quarries on the Isle of Portland in Dorset. In Portland Roach the fossils have been dissolved out leaving spectacular cavities, once occupied by bivalves and calcareous red algae.

A15 Magistrates' and Coroner's Courts

The upper part of the Manchester and Salford Magistrates' and Coroner's Court building is made from desert sandstone of Triassic age (251-199 Ma) from Locharbriggs near Dumfries.

The dark-coloured igneous rock is gabbro, which has been used for the lower part of the building. Its dark colour means that the large crystals are difficult to see. The rock crystallised slowly from molten rock, at depth, often in the core of a volcano or in the magma chamber which fed the volcano.

A17 John Rylands Library

The red sandstone on the outside of the Deansgate building is Permian sandstone from Lazonby, in the Eden valley near Penrith. The rock was laid down in desert conditions between 299 and 251 Ma ago, when the land which now forms the British Isles was at the latitude of the present day Sahara Desert.

Close examination of this stone shows that the sand grains, made of the very hard mineral, quartz, are frosted and very rounded. This is typical of sand which has been moved by the wind over considerable distances. When quartz grains are moved in water as on a beach, the water forms a protective layer around each grain so the particles are cushioned against collisions. Where wind is the carrier, no such barrier exists, so that sand grains collide and become frosted and rounded.

Pure quartz (SiO_2) is a colourless mineral, but most sandstones have a reddish coloration which is caused by a surface coating of iron oxides (rust). Silicon, oxygen and iron are three of the most commonly occurring

minerals on earth.

A recent addition to the stonework at the West end of the Library is built from a red sandstone of similar age to the Penrith stone but this comes from Lockerbie in Dumfriesshire. This sandstone was also deposited in a desert landscape as was the stone used for the interior, which is red Triassic sandstone (251–199 Ma), from St Bees on the coast of Cumbria. This is the rock in the Peterloo Memorial. The sandstone used inside the building is very fine-grained and homogeneous, making it difficult to see depositional structures.

Enriqueta, the widow of John Rylands, built the library, which opened to the public in 1900, in her husband's memory. John Rylands was a textile manufacturer and Manchester's first multi-millionaire. More information about John and Enriqueta Rylands can be found in the library, where you will find Carrara marble statues of the couple.

In 1972 the John Rylands Library and Manchester University Library were combined as the John Rylands University Library which is now the third largest academic library in the United Kingdom.

An image typical of Manchester, at present undergoing a huge building programme.

John Rylands Library

The walk ends here, but you might be interested to know that John Rylands Library is open from 12 noon until 5.00pm on Sunday. It has an excellent café on the ground floor. An exhibition of archives relating to Peterloo is on display but finishes today.

Note: the café sold only coffee and cake and could provide neither on 20 October, so was a great disappointment to the tour leader, who had fond memories of a good service here.

All items included in the Peterloo exhibition have been uploaded to a digital archive and are available to view online. The luna website is best:
https://https:manchester.ac.uk/rylands/whats-on/peterloo///www.library.
https://luna.manchester.ac.uk/luna/servlet/view/all?sort=reference_number%2Cdate_created%2Cimage_sequence_number%2Cvolume