Galway City
Building Stones Walks

OÉ Gaillimh
NUI Galway

DÚCHAS NA GAILLIMHE
GALWAY CIVIC TRUST

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Building Stones Walks

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Table of Contents

Introduction

The three walks highlight the wide variety of local and imported natural stone used in Galway City's buildings. The each walk is colour coded on the map inside the back cover. The map displays the locations of the buildings described along the course of each walk. Taken together the walks will take approximately three hours. However, you can use the map to choose a single walk that is less time consuming but equally interesting. Each building, and where appropriate clusters of buildings, are assigned a location number on the map which is linked to the descriptions below. We have arbitrarily chosen the three walks as follows: Walk N1 West of the River Corrib starts at NUI, Galway and includes Galway Cathedral, The City Museum, Spanish Arch and Blake's Castle, Walk N2 Galway City Centre highlights the buildings along Quay Street, High Street and Shop Street and includes St. Augustine's Church, St Nicholas Collegiate Church and Lynch's Castle and Walk N3 Eyre Square Area includes the Allied Irish Bank and Bank of Ireland buildings, Meyrick Hotel and the Railway Station.

The city's building stones display a variety of textures and fossils that reflect their geological origins. In addition, we can see the effects of weathering on the city's building stones such as rock weathering and water dissolution products growing on our limestone buildings. The tour can be followed by our city's visitors and geologists alike and will prove very useful for urban fieldwork by primary, secondary and third level student groups. Furthermore, it provides an opportunity to study rocks from around the globe e.g. China, Finland, Portugal, Italy, South Africa, Norway, Brazil, England and of course Ireland in a matter of a few hours. The book is an invitation to enjoy learning about the geological heritage that surrounds us in Galway's inner city.

- Walk 1 (1.56kms) West of the River Corrib -

The University was founded in 1845, one of three Queen's Colleges founded in that year, in Ireland. Joseph B. Keane designed the **Quadrangle Building (loc. 1),** its main tower is a replica of Christopher Wren's Tom Tower in Christ Church College, Oxford. It was constructed in 1848 of cut blocks of fossiliferous limestone, from the Angliham quarries (Menlo) at a cost of £38,000. Fossilised remains of coral and brachiopod occur with abundance in the cut blocks. The Quadrangle Building is decorated with mullioned windows and a crenulated parapet flanked by octagonal turrets. On close examination some limestone blocks exhibit thin milky white crusts of carbonate that tend to drape over the blocks. This results from the precipitation of carbonate (calcium carbonate CaCO3 called calcite) from water containing dissolved calcium carbonate from the limestone. Evaporation and precipitation occurs when the aqueous solution flows over the block. Rare purple fluorite (mineral containing calcium and fluorine) crystals can be seen in some blocks within the Quadrangle. Granite flagstone pathways have recently replaced the Quadrangle's tarmacadam footpaths.

The Quadrangle building at NUI, Galway - Location 1.

The flagstones were imported from Portugal. This project was undertaken as part of the University's celebrations in 1999 of 150 years since its first Graduation Ceremony. The archway

is floored with concrete cobblestones, known in the building trade as Castle Stone.

The James Mitchell Museum, Quadrangle Building, NUI, Galway - Location 1a.

If this permit, use this opportunity to visit The James Mitchell Museum (loc. 1a), which is situated in the Quadrangle and contains an impressive collection of rocks, minerals and fossils from all over the world, about 12,000 specimens in all. Noteworthy, is the William King (first Professor of Geology) Collection of Permian (290-250 mya) fossils, which include many specimens of great scientific importance. The Adrian Ryder gemstone collection is an eye-catching array of precious and semi-precious stones collected from all over the world and donated by Adrian Ryder in 2013. Other collections include the mineral and rock collections from the West of Ireland. The Museum was formally designated the James Mitchell Museum in 1977 in recognition of the considerable contributions made by James Mitchell (Prof. of Geology & Mineralogy 1921-1966 and College Secretary & Registrar 1934-1966) to the development of the University - for further information on the Museum see Harper (1996).

The Museum is open to the public and extends a warm welcome to visitors.

At the University Road entrance to the south campus stands the Gate-Lodge (loc. 2), constructed of dressed blocks of limestone and dark grey blocks of amphibolite and granite gneiss. The roof is constructed of slate from Bangor in Wales. Portuguese granite slabs

identical to those in the Quadrangle, are used in the pathways surrounding the lodge.

The Canal Wall leading to the boat club, displays examples of the rock types that make up the City's bedrock. Blocks of limestone, granite and amphibolite, combine to create this random rubble wall.

NUI, Galway's gate-lodge at the College Road entrance - Location 2.

The Cathedral of Our Lady Assumed into Heaven and St. Nicholas (loc. 3) dates from 1965. Dr. Michael Browne, then bishop of Galway, authorised the construction of the present cathedral. The Cathedral was designed by J.J. Robinson of Robinson, Keefe and Devane and was built on the site of the former gaol. It is an outstanding example of an Irish mid-20th century building totally constructed of natural stone. It offers classic examples of the use of natural stone as a load bearing and as an ornamental material. Local and imported stone adorn every functional element of the Cathedral's interior space from the Connemara marble floor tiles to the white Italian Carrara marble high altar. At the entrance to the Cathedral there are gate pillars of Ballinasloe limestone blocks, capped with domes of worked Ballinasloe limestone. These domes

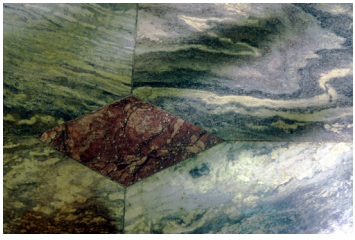
contain an abundance of fossil fragments. These fossils are the entombed remains of shellfish such as crinoid and brachiopods that lived some 350 million years ago in a shallow subtropical sea located south of the equator. Outside the building the surrounding area is paved with flagstones, from Liscannor, County Clare, with their distinctive worm or mollusc burrows, known as Olivellites.

The Cathedral itself is constructed of cut blocks of limestone sourced from Angliham quarries. These limestone blocks produce a light and dark grey patchwork visible on both the walls and interior arches and pillars. Connemara marble (from Streamstown quarry near Clifden) tiles matched with polished red sandstone insets, known as "Cork Red Marble" adorn the floor. The characteristic multilayered nature of the Connemara marble displays intricate folded patterns, produced by the earth's crustal movements, some 470 million years ago. The rails in front of the High Altar are constructed from white Carrara marble while the Altar is constructed of a dark serpentinite and marble support on which rests a single slab (5'x10'x0.5') of white Carrara marble. The floor surrounding the altar area is of Portuguese beige marble tiles with diamond shaped marble insets. In the Baptistry, the font is of polished limestone while the walls are panelled with

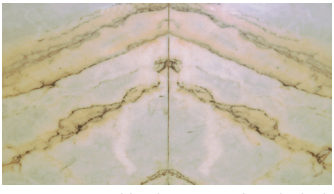
A typical block of fossiliferous Carboniferous limestone used in the construction of The Cathedral of Our Lady Assumed into Heaven and St. Nicholas - Location 3.

Portuguese marble quarried at Estrimoz, 125 km west of Lisbon. Note how the marble panels are matched to form kaleidoscope-like patterns using the natural layering in the stone. This cutting and polishing process is known as quartering and is a testament to the skills of the marble workers involved in the construction. The entire Cathedral offers one of the finest examples of the use of natural stone in Ireland - those interested in reading more should read a 32-page publication by the Administrators of Galway Cathedral entitled Cathedral of Our Lady Assumed into Heaven and St. Nicholas Galway, published in 1980 by Shanway Publications Ltd., Glengormley, N. Ireland.

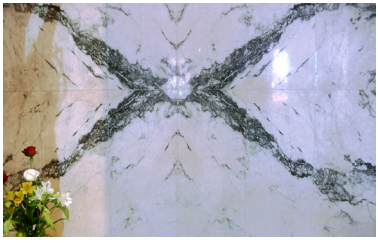
Interior of the Cathedral looking onto the high altar - Location 3a.



Detail of Connemara marble floor tiles with diamond shaped insets of Cork Red "marble" - Location 3b.



Portuguese marble tiles surrounding the high altar - Location 3c



The Baptistry wall with matched panels of layered Estrimoz marble from Portugal - Location 3d.

At the rear of the Cathedral is located Nun's Island. Island House, (loc. 4) the headquarters of Galway County Library, is constructed of cut limestone blocks. A distinguishing feature of this building is the dolerite plaque that bears its name. Further on, the Arts Centre (loc. 5) offers another example of the imaginative use of local limestone for building purposes.

Connemara marble exterior panels, Aniar Restaurant, Dominick Street - Location 8.

At the corner of Dominick St. and Mill St. stands the Galway Arms (loc. 6). On the wall of this building there can be seen a medieval limestone plaque, depicting the coat of arms of the city. Across the road the Bridge Mills (loc. 7) is an old mill constructed of limestone which has been carefully restored, and converted into a restaurant and a mini shopping centre for arts and crafts. Proceeding down Dominick St., a number of interesting buildings can be seen. The streetscape consists of buildings that are mainly constructed of limestone some are covered by mortar.

Close-up view of a Connemara marble panel, Aniar Restaurant, Dominick Street. The coloured layers reflect different amounts of the green mineral serpentine- Location 8a.

Aniar Restaurant (loc. 8) has replaced O'Toole's newsagent but has retained the Connemara marble cladding panels. No. 45 Áras na nGael and No. 47 Galway Arts Centre (loc. 9) are both constructed of limestone, and also offer fine examples of Georgian doorways. At the end of the street, the premise of Mc Dermott and Byrne Solicitors (loc. 10) are beautifully constructed of local limestone and amphibolite blocks, with some blocks of granite.

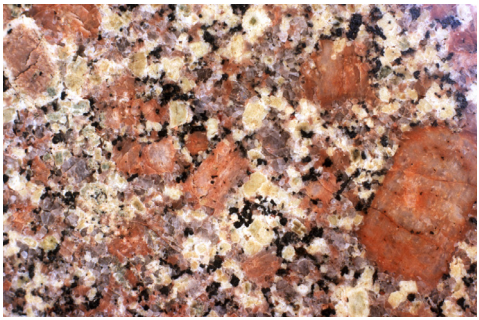
Streetscape of Dominick Street; the buildings are constructed from local limestone. Locations 8, 9 and 10 form part of this streetscape

Turning left at the end of Dominick St. proceed to the Fire Station (loc. 11) where pink Galway granite blocks capped with limestone are incorporated along it base. Heading towards the Spanish Parade, the statue of Fr. Tomas de Burca O.P. is made from local limestone and rests on a limestone-clad base. From here proceed right to Saint Mary's on the Hill, Dominican Church, commonly known as the Claddagh Church (loc.12). This church was opened on October 25th 1891 and is largely

The Dominican Church in the Claddagh - Location 12.

constructed of locally quarried pink Galway granite - indeed it is the best example of a granite building in the city, together with Galway grey limestone blocks.

Pillars of locally polished Galway granite adorn the interior. Two types of feldspar are visible. The potassium rich salmon pink orthoclase feldspar (up to ~3cm long), and the milky white sodium rich plagioclase feldspar. The dark flecks visible are iron rich mica called biotite - the grey glassy grains are quartz. The Dominican House Chronicle (1921-1962) includes a document describing the Claddagh Church as being 'on the verge of the Atlantic, in glistening Galway granite' (see O'Heideain, 1991).



Detail of a polished Galway granite support pillar from inside the Dominican Church - Location 12a.

After walking across the Wolfe Tone Bridge (loc. 13), second oldest bridge over the river Corrib. It links the Docks area on the eastern side of city to the Claddagh and Salthill on the west. It is constructed of limestone and amphibolite blocks. The Fisheries Watchtower, constructed in 1853 (restored by Dúchas na Gaillimhe - Galway Civic Trust in 1999) displays cut local limestone blocks at its base and stands on bedrock composed of amphibolite. Further along one comes face to face with the Spanish Parade (loc.14), and the adjoining streets preserving much of Galway's medieval character. The piazza area uses Castle Stone in a mosaic pattern and it is matched with Kilkenny limestone for borders, seating, mooring posts and tree surrounds.

The Spanish Arch was built in 1584. The 1651 city map shows a rectangular fort, Ceann na Bhalla, surmounting four arches. The arch itself is constructed of limestone, but also contains amphibolite.

Spanish parade with the 16th century Spanish Arch in view mainly constructed of limestone - Location 14.

The remains of the old city wall that still stands in this area contain rounded blocks of granite and limestone. Behind the Arch, Nimmo's Restaurant, named after the Scottish engineer who built most of Galway's 19th century piers, is constructed of similar stone. The old city museum building, Comerford House next door, has two limestone pillars on each side of its main door, and a limestone archway over a second, Georgian–style doorway. The new City Museum (loc. 15) is located close to the former and uses limestone and granite cladding and paving. The seats outside are topped with granite. Most of the surrounding buildings in this area were constructed in 19th century of local limestone blocks. Opposite the Spanish Arch stand the remains of Blake's Castle (loc. 16), probably built in the early 16th century, which passed through the hands of the families of O'Halloran, Blake and Morgan of Monksfield. It was at different times both a jailhouse and a corn store. Today, only the south wall remains intact, as well as a fraction of the east and west walls. Constructed of local limestone, two examples of cusped trefoil-type windows can be seen in the upper section of the east wall. It has recently been restored and incorporated into Jury's Inn (and Costa Coffee), which use exterior limestone

cladding. Pura Vida Coffee House and Claddagh and Celtic Jewellery (loc. 17), remodeled in the 19th century, preserve portions of a 17th century dwelling. This small building serves as a good example of the kind of stonework that is all too often concealed beneath plasterwork and pebbledash.

- Walk 2 (0.6kms) Galway City Centre -

Quay St., High St. and Shop St. have remains of the medieval city. Flagstones of light grey granite and limestone, both from China, and Castle Stone pave the walkways of the pedestrianised areas. Many of the 19th century buildings, have recycled medieval stonework in their reconstruction. In some instances the relatively modern plasterwork has been removed so as to reveal the limestone stonework underneath e.g. at Gemelles restaurant (loc. 1). On Druid's Lane, is the Hall of the Red Earl (loc. 2), the most important archaeological site in Galway City. It is intimately associated with the establishment of the town of Galway in the 13th century by the Anglo-Norman de Burgo family. The red haired Richard de Burgo who built the hall was granted the title Earl of Ulster and the building became known as the "Hall of the Red Earl". The hall became a key municipal building

Hall of the Red Earl - Location 2.

A load bearing column in the Hall of the Red Earl - Location 2a.

and was used to collect taxes, dispense justice and to host banquets. In the late 15th century the de Burgos were forced out of the city and the hall fell into ruin and over the centuries was covered over and built upon. The building was unearthed by Office of Public Works (OPW) archaeologists in 1997. The discovery of the Red Earl's Hall led to the proposed extension to the Revenue Commissioners offices being completely redesigned to allow for the preservation of the archaeological site. Realising the immense importance of the hall, the offices were instead constructed by the OPW in bridge-like fashion overhead. Added to this, the hall was housed within glass panelling and a viewing gangway complete with flood-lighting was erected around it. Interpretive panels now explain the significance of the site and artefact replicas are prominently displayed. Since late 2009 Dúchas na Gaillimhe – Galway Civic Trust has welcomed thousand of visitors to The Hall of Red Earl. This hugely important site stands as testament to the medieval origins our modern, vibrant city and is a must-see site for anyone wishing to learn about the story of Galway. The rubble walls of the hall were constructed of local metamorphic rock and limestone-rare Galway Granite blocks are also present. The base of the load bearing columns is preserved and was constructed of cut blocks of local limestone. One of these clearly was erected on a bedrock of metamorphic rock called amphibolite. Thin ~2cm wide veins of light pink granite (Galway Granite) cut through the bedrock.

Streetscape of Quay street where locations 1, 2, 3 and 4 occur.

Seaghan Ui Neachtain's public house (loc. 3), and the restaurant next door,

The mid-19th century St. Augustine Church constructed of local limestone - Location 5.

The baptismal font, carved from Merlin Black Limestone, located inside the main entrance of the Augustinian Church - Location 5a.

originally constituted the town house of "Humanity Dick" Martin. A fine example of a late medieval limestone window can be seen on an upper storey of the restaurant, while the pub displays a 17th century limestone window on its Quay Street facade, as well as an early 17th century door case with an elliptical chamfered arch and a dripstone all in local limestone. Across the road, Wooden Heart (loc. 4), a late medieval building dating from 1580 was restored in 1980, and retains a fine late medieval limestone window. In Middle Street, the mid-19th century Augustinian Church (St. Augustine Church, loc. 5) is constructed of local limestone and the steps are made from Merlin Black Limestone (see location loc. 15 on this walk). Inside mosaics of polished stone adorn the floor. These include Blue Pearl, pink granite gneiss and beige limestone. The rails throughout the church are composed of marble (Carrara?) with columns of Connemara Marble and insets of "Cork Red Marble". A baptismal font inside the main entrance, carved from Merlin Black Limestone, is centred on a mosaic of polished stone panels including Blue Pearl, pink granite gneiss and beige limestone. On High St., a late medieval limestone arch with a 15th/16th century dripstone

fronts Galway Bay Gifts (loc. 6). Tom Nally's Barbers (loc. 7) contains a late medieval limestone doorway. Across the road, in Mainguard St., the Bank of Ireland (loc. 8) displays an unusual finish using calcite fragments set in cement.

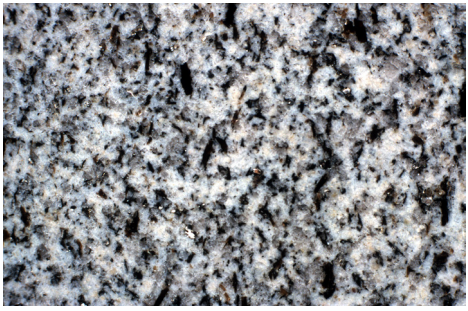
St. Nicholas' Collegiate Church (loc. 9) was built from local limestone in 1320 and subsequently enlarged in the 15th and 16th centuries. It is one of the best preserved medieval churches in Ireland and is the oldest surviving building in the city. Inside local limestone was used for the pillars and fonts. The floors and surrounding areas are paved with flagstones, from Liscannor, County Clare, with their distinctive worm or mollusc burrows, known as Olivellites.

St. Nicholas' Church - Location 9.

St. Nicholas' Church Obelisk - Location 9a.

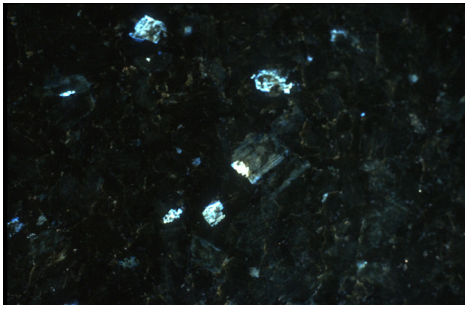
For those interested in more information regarding this majestic building there is a book – The Story of St. Nicholas' Collegiate Church, Galway, by Rev. J. Fleetwood (1912) and recently revised by Dr. Jim Higgins, Rev., Canon Leslie D. A. Forrest and Derek Biddulph (1989). The obelisk in front of the Church is made from Galway granite and limestone. The obelisk was erected in 1887 and commemorates the tragic

death of three young men - John Shelton Thompson, Francis John Langley Kinkead and Thomas Leopold Roberts. They were drowned on the 17th August 1887 while sailing to Oughterard on a wind swept Lough Corrib. The limestone carving on the front of the obelisk is the Claddagh ring emblem - joined hands supporting a crowned heart - a symbol of love, friendship and loyalty. The right side has the skull and crossbones with the words "Memento mori", on the left side is an Irish harp and on the back are the arms of Galway. Eason's (loc. 10) provides a good example of the use of dressed limestone blocks from the local Menlough quarries. Barry's Hair Studio and Holland & Barrett (loc. 11) are clad with panels of grey Leinster granite, quarried at Ballybrew, Co. Wicklow, note how crystals of the mineral muscovite reflect the sunlight which is a characteristic of this rock type.



A polished Leinster granite panel from the front of Barry's Hair Studio - Location 11.

McCambridge's (loc. 12) polished fascia is of larvikite panels and is one of several buildings on this walk to use this interesting building stone. It is an igneous rock which is quarried at Larvik



Norwegian larvikite panel from McCambridge's shop front - Location 12.

in southern Norway. It is described as a brilliant blue or green rock whose constituent feldspar crystals catch the weakest sunlight and shimmer, producing a colourful iridescent effect called schillerisation. This schiller effect has led to the immense popularity of this stone in cities throughout the world. Both green and blue varieties, otherwise known in the stone trade as Emerald Pearl and Blue Pearl (or Viking Blue), are used in the city.

Lynch's Castle constructed from local limestone - Location 15.

The variety used here is Emerald Pearl. Another popular construction use for this stone is as an armourstone which means it is used in the construction of harbours and the protection of vulnerable sections of coastline. The Mutton Island sewage plant has used larvikite as an armourstone for protection from Atlantic storms. Across the street a late medieval limestone doorway, dated 1616 and bearing three family coats of arms with a dragon stands on the first floor of River Island (loc. 13). O2 Mobile (loc. 14) on the corner offers another fine example of Emerald Pearl polished panels. Lynch's Castle (loc. 15), the home of Allied Irish Bank, is the only complete secular medieval building in Galway. It was constructed of local Angliham or Menlough limestone in the late 15th to early 16th century. On the castle's Shop St. front there is a rectangular panel showing the coat of arms of King

Henry VIII, and a stone roundel containing the coat of arms of the Lynch family.

17th century limestone fireplace in foyer of Lynch's Castle. - Location 15a.

On the castle's Abbeygate St. front the coat of arms of the Earl of Kildare is visible. In the foyer of the building, there is a 17th century limestone fireplace. Underfoot, are flagstones made of Merlin Black Limestone which was quarried at Merlin Park. Fossils of corals and brachiopods composed of white calcite contrast with black colour of the host limestone. An interesting feature of the exterior is the sixteen carved limestone gargoyles (water spouts) that can be seen under the parapets. Powell's (loc. 16) retains a late 16th century limestone window, as well as two other 16th century dripstones. Raymond O'Brien's Newsagents (loc. 17) shop front is clad with shimmering Emerald Pearl panels. Galway Camera Shop (loc. 18) has a plaque of Emerald Pearl but the building is clad with a Brazilian coarse grained

17th century limestone fireplace in foyer of Lynch's Castle. - Location 15a.

feldspar rich igneous rock called a syenite, with the exotic trade name Verde Ubatuba sometimes referred to as Green Pearl. Dark grey panels of South African norite are used at the base of the shop front.

- Walk 3 (0.7kms) Galway City Centre -

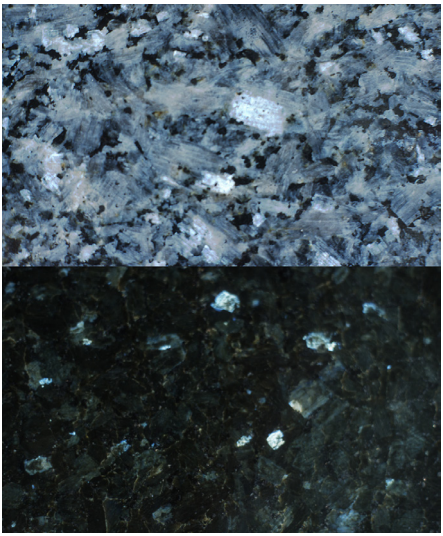
On Williamsgate Street, The Corbett Court entrance (loc. 1) to the Eyre Square shopping centre displays panels of granite of unknown origin. Across the street Faller's Jewellers (loc. 2) is clad with norite imported from the Bushveld in South Africa and commonly referred to as Black Granite. Hanley & Co. (loc. 2) use polished panels of slate from the English Lake District (quarried near Grizebeck, Cumbria). Variations in grain size are visible in the panels and reflect different sedimentary layers or beds. Although quarried by Burlington Slate Ltd. for over 150 years it is a recent addition to the imported stone inventory of Galway.

Close-up view of a Burlington slate panel from Hanley & Co.'s shop front - Location 2.


Baltic Brown used to clad the front of the Ulster Bank - Location 3.

This particular variety is known as Broughton Moor. The front of the Ulster Bank (loc. 3) in Eyre Square uses polished panels of the distinctive and spectacular Rapakivi granite known as Baltic Brown from Southern Finland. It displays a crystal growth texture termed Rapakivi texture, which accounts for its geological name. The type locality is Kengis in South Finland. The texture displays rounded reddish to pink orthoclase feldspar crystals (2-3cm across) mantled by a second growth of a different type of feldspar called plagioclase.

The Imperial Hotel (loc. 3) is clad with sandstone and granitic panels. Both Emerald and Green Pearl panels are used on the front of The Entertainment exchange (loc. 4). The upper storey of Café Express (loc. 4) is clad with panels of Connemara marble and a Norwegian schist.



The front of the Entertainment exchange and Café Express utilizes polished panels of two Norwegian larvikites - the green larvikite called Emerald Pearl and the blue larvikite called Blue Pearl or Viking Blue - Location 4.

Eyre Square (loc. 5) was Galway's first public park, officially presented to the city in 1710 by Mayor Edward Eyre. The Browne Doorway was removed from its original site in Abbeygate St. to Eyre Square in 1905. The limestone structure has an arched door case, surmounted by a window. It contains a "marriage stone" bearing the arms of Martin Browne and Marie Lynch, dated 1627. It is constructed of Menlough limestone. The John F. Kennedy lectern commemorates the President's visit to Galway in 1963, and is clad with Ballinasloe limestone. The fourth predominant structure in the square is the 1984 Quincentennial Fountain and metal sculpture by Eamon Doherty, depicting the sails of a Galway Hooker, presented to the city by the Bank of Ireland. Further down the Eyre Square shopping centre (loc. 6) offers a diversion. In the course of excavations prior to the construction of the centre, a section of the old city wall

Eyre Square showing the metal sculpture depicting the sails of a Galway hooker - Location 5.

was discovered, including the bases of two medieval towers. The crumbling city wall has been restored, and the two towers reconstructed, although not to their original height. The stonework employed in the reconstruction corresponds to that found in the original remains. Penrice's Tower has been rebuilt of limestone, while a mixture of limestone, granite and sandstone has been used in the reconstruction of Shoemaker's Tower, and the wall itself.

Back on the west side of the Square, next door to the shopping centre, the Halifax Bank (loc. 7), formerly the Bank of Ireland, is an Italianate version of 19th century Irish architecture. Designed by William Calbeck, it was built in 1863 of Menlough limestone. It displays fine Doric porches with interesting architectural features. Ballinasloe limestone panelling is used on a recent

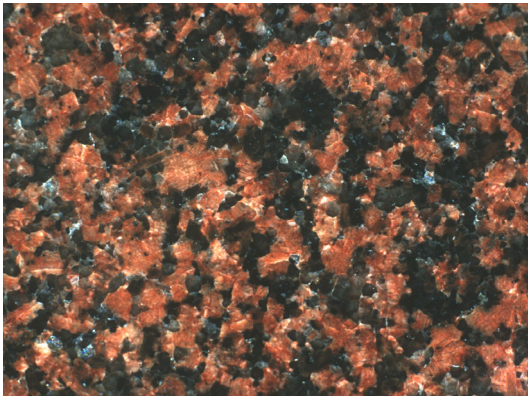
The John F. Kennedy lectern clad with Ballinasloe Limestone panels - Location 5a.

The mid-19th century Hotel Meyrick (originally the Great Southern Hotel) constructed of local limestone - Location 9.

extension to the bank. Across the road, on the southern side of the Square, the Allied Irish Bank (loc. 8) building is clad with Ballinasloe limestone, in which brachiopod fragments are clearly visible. An interesting feature of the panels here is the circular saw-marks left behind by the blade as it cut through the blocks of limestone at the quarry. Hotel Meyrick (formerly the Great Southern Hotel loc. 9) and the Railway Station (loc. 10) were designed by J.S. Mulvaney in 1851 for the Midland and Great Western Railway Company. It is constructed of limestone over a ground floor of rusticated limestone blocks. In the foyer of the hotel is a fireplace made from Connemara marble.

Moving back towards Eyre Square the Bank of Ireland (loc. 15) building was opened in 1830, and acted as a principal distribution centre for famine relief in the west. The building

The Italian travertine panel, Richardson's public house, Eyre Square - Location 12.



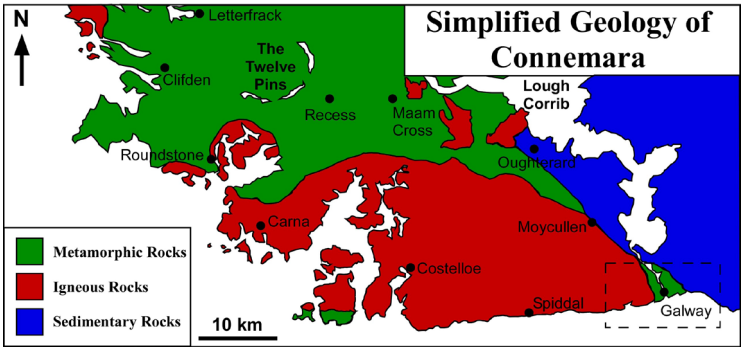
Paddy's Restaurant uses polished panels of the distinctive red granite from Finland, called Balmoral Red in the stone trade - Location 13.

was probably constructed in the 1780's as a market house, and served as the County Club before being taken over by the bank. In the 19th century the bank was fronted by open ground, on which fairs and markets were traditionally held- it is built of cut Angliham limestone. Finally, the Galway Advertiser's (loc. 16) building displays columns and panels of Ballinasloe limestone.

The mid-19th century Bank of Ireland building, Eyre Square constructed of local limestone. - Location 15.

- Bedrock Geology of Galway -

Rocks are divided on the basis of their origin into three major groups: igneous, metamorphic and sedimentary rocks. Igneous rocks form from magma (molten rock material) e.g. granites and basalts; surface agents of weathering and erosion produce detritus which then is laid down in layers to make sedimentary rocks e.g.



A simplified regional geological map of South Connemara. Note the bedrock geology of Galway City (outlined) is composed of igneous, metamorphic and sedimentary rocks (see also figure 2)

sandstones and mudstones; the effects of pressure and heat deep in the Earth's crust convert existing rocks to new metamorphic rocks e.g. slates, schists, gneisses and marbles. Consequently, rock-forming minerals in igneous rocks crystallised from a magma, the minerals of metamorphic rocks form in response to elevated pressure and/or temperature acting on pre-existent rocks, while most sedimentary rocks are composed of minerals inherited from older eroded rocks. Each of the major rock groups is further subdivided according to well-established criteria based upon mineral compositions and rock textures (Press & Siever, 1998). Throughout the guide, words underlined and in italics are explained in the glossary.

The bedrock of Galway is a geological mosaic of metamorphic, igneous and sedimentary rocks covered in places by recent (<1 million years old) glacial sand and gravel deposits (Coats & Wilson, 1971; Pracht et al., 2004; Hennessy et al., 2010). The distribution of these rock types reflects a fundamental geological divide between the eastern and western regions of Co. Galway. The metamorphic and igneous rocks make up the bedrock of the South Connemara region to the west (Leake & Tanner, 1994; Pracht et al., 2004; Feely et al., 2006). The sedimentary rocks, mostly Carboniferous limestones, extend eastwards forming the bedrock of the Irish Midlands (Pracht et al., 2004; see figures 1 and 2).

The metamorphic rocks of Galway

Galway's inner city, which is the oldest part of the city, was coincidentally founded on the oldest rocks, which are amphibolite and granite gneiss (figures 1 and 2). These were originally igneous rocks (gabbro and granite) formed about 470 million years ago (mya). However, at this time extreme pressure and temperature conditions deep within the earth's crust exerted their influence on these igneous rocks and converted them to metamorphic rocks called amphibolite and gneiss. Other manifestations of this metamorphism are the corrugated quartzite mountains of the Twelve Pins and their intricate multicoloured layers of the renowned Connemara Marble. The amphibolite and granite gneiss can be observed in many of the dry stonewalls in the inner part of the city e.g. along the canal and opposite the Cathedral. The amphibolite is easily recognized by its dark grey colour reflecting a dominance of a dark iron-bearing mineral called hornblende. The Gate Lodge at the main entrance to NUI, Galway is mainly built from this stone. The Corrib River cuts through this dark grey rock and forms its steep banks at the Salmon Weir Bridge for example. The Galway Docks are located on this rock

type also -Wilkinson (1845) states that this amphibolite bedrock "was met with in the sinkings for the new docks, and from the difficulty of quarrying it, caused great loss to the contractor." Needless to say this stone found little favour with the builders of the city. The granite gneiss, lighter grey in colour, is spatially related to the amphibolite and both can be seen together in the some of the blocks in the inner city walls.

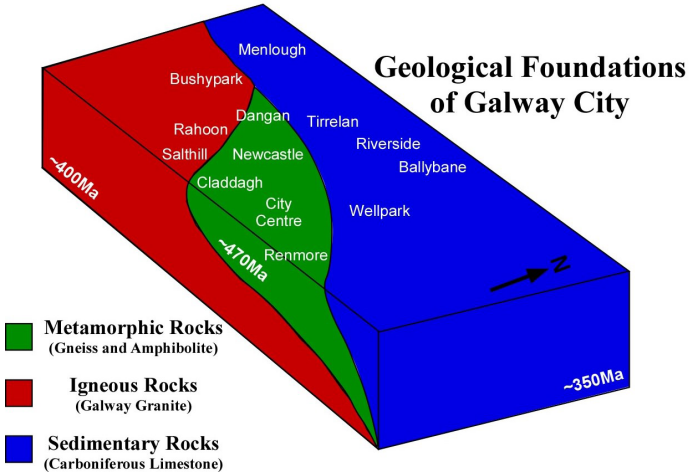
The Connemara Marble has been quarried for centuries and records go back to at least the 18th century. Ideal as an ornamental and decorative stone, and very popular in the manufacture of jewellery, it is not suitable for exterior cladding, as it weathers easily and loses its colour when exposed to the elements over a long period, but has been widely used for panelling, pillars, fireplaces and other interior work. The interior of Galway Cathedral offers a spectacular example of the use of Connemara Marble as interior floor tiles.

The igneous rocks of Galway

The bedrock geology along the Northern shoreline of Galway Bay is dominated by granite (figure 1). Many varieties are encountered in the region and they range in colour from pink to dark grey reflecting varying proportions of the three minerals e.g. feldspar, quartz and mica. All varieties are collectively termed the Galway Granite, which formed from a magma between 425 and 380 mya (Feely et al., 2010). Proceeding westwards from the City centre to Salthill the bedrock geology changes from amphibolite and gneiss to the granite (figures 1 and 2). Outcrops of the Granite can be observed along the beaches at Salthill and westwards along the coast to west of Roundstone. The 19th century Claddagh Dominican Church was built from Galway granite.

The sedimentary rocks of Galway

Proceeding eastwards from the city centre the amphibolite and granite gneiss gives way to the Carboniferous limestone, the youngest of the three bedrock varieties. The term "Carboniferous" comes from England, in reference to the rich deposits of coal that formed during this period. The Limestone of the Galway region formed during the early stages of this period (~350 mya). Shallow subtropical seas, in which marine life (e.g. corals and shellfish varieties) abounded, was the environment for the formation of the limestone - a setting akin to today's Great Barrier Reef off the west coast of Australia. This limestone has provided the Galway region with a huge natural resource of building stone. Local quarries at Angliham, Menlough and Merlin Park provided cut limestone blocks that have been used extensively over the centuries in the building of Galway city.



A block diagram showing the bedrock geology of Galway and its surrounds. The oldest part of the city is coincidentally built on the oldest rocks i.e. the metamorphic rocks.

- Glossary -

Amphibolite: A metamorphic rock composed mainly of the mineral amphibole.

Basalt: A dark grey, fine-grained, volcanic rock essentially composed of the minerals plagioclase and pyroxene with or without olivine.

Brachiopod: A fossilised shellfish that lived in subtropical shallow seas.

Calcite: Calcite is a common carbonate mineral (calcium carbonate: CaCO3). It is the main mineral in limestones and marbles.

Carboniferous: A geological period that began ~362 million years ago and ended about 290 million years ago.

Coral: Fossilised coral that lived in the company of brachiopods in shallow subtropical seas.

Crenulated parapet: Very small indentations like the margins of leaves (crenulated) around a defensive wall or elevation (parapet).

Crinoid: Crinoids are fossilised marine organisms that lived in shallow subtropical seas. They are sometimes called sea lilies. Limestones containing an abundance of this fossil type are called crinoidal limestones.

Dolerite: A fine to medium-grained igneous rock similar to basalt.

Dripstone: In architecture is a projecting tablet or moulding over the heads of doorways, windows or archways, either used for ornament

or to throw off the rain.

Feldspar: An important rock-forming silicate. There are two Feldspar groups i.e. the calcium and sodium bearing Plagioclase feldspars and the Alkali feldspars containing potassium and sodium.

Flagstones: Thinly bedded and easily cleaveable dimension stone commonly used for paving.

Fossiliferous: A rock containing an abundance of fossils.

Gabbro: A group of dark-coloured, coarse-grained igneous rocks composed largely of the minerals plagioclase feldspar and pyroxene (a calcium, iron and magnesium bearing silicate mineral).

Gneiss: A metamorphic rock consisting of bands of light and dark minerals - usually the product of very high temperatures and pressures deep within the Earth's crust.

Granite: A coarse grained igneous rock containing quartz feldspar and mica.

Hornblende: An important rock-forming silicate mineral and a member of the amphibole group.

Larvikite: An igneous rock called syenite from Larvik in Norway rich in plagioclase feldspar.

Limestone: A sedimentary rock consisting largely of calcium carbonate i.e. the mineral calcite.

Magma: The molten rock material from which igneous rocks are formed.

Marble: A metamorphosed limestone.

Mica: An important group of sheet-like silicates characterized by their shiny platy habit and perfect basal cleavage. It includes the minerals biotite (dark in colour containing Magnesium& Iron) and muscovite (silvery grey in colour containing potassium).

Mudstones: Fine-grained sedimentary rocks composed chiefly of clay minerals.

Mullioned: Vertical members of stone between the lights of a window.

Muscovite: A common rock-forming mineral that is part of the mica group (see mica above).

Norite: A dark-coloured igneous rock composed essentially of the minerals plagioclase and pyroxene related to gabbro (above).

Olivellites: Fossilised sinuous burrowing trails left by an organism - they are characteristic of the Liscannor flagstones.

Quartz: A very important rock forming silicate mineral of simple chemistry i.e. Silicon dioxide (SiO2).

Quartzite: A metamorphosed sandstone.

Sandstone: A sedimentary rock composed of grains of quartz.

Schist: A metamorphosed mudstone exhibiting a sheen on its cleaveable surfaces.

Serpentine: A greenish hydrous magnesium silicate of which two forms occur, a fibrous (asbestiform) one known as chrysotile and lamellar one called antigorite.

Serpentinite: A metamorphic rock largely made up of serpentine.

Slate: A fine-grained metamorphic rock that cleaves easily.

Syenite: An coarse grained igneous rock that contains feldspar but little quartz.

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