Musée de Normandie

Château de Caen

PIERRE DE CAEN

Des dinosaures aux cathédrales

19 June – 31 October 2010
Musée de Normandie – Caen

www.pierre.caen.fr

CAEN Normandie

Exhibition curator

Pascal Leroux, Musée de Normandie

Scientific committee

Olivier Dugué, University of Caen

Laurent Dujardin, CRAHM, University of Caen

Xavier Savary, Calvados Departmental Archaeology Department, Calvados county council

Organizing committee

Jacques Avoine, University of Caen

Frédéric Coyer, City of Caen quarries department

Jean-Pierre Dauxerre, Société des Carrières de la Plaine de Caen

Arnaud Guérin, Lithosphère

Ronan Lechevallier, Greta, Honfleur – carpentry department

Dominique Lenrouilly, City of Caen quarries department

Jean-Marie Levesque, Musée de Normandie

Alain Marie, Entreprise Lefèvre

Didier Samson, Greta, Honfleur – carpentry department

What do the Tower of London and Caen Castle have in common ? Or Canterbury Cathedral and the abbey church of Saint-Etienne?

The Conqueror's destiny, no doubt, but also the stone used to build these monuments. Caen Stone, such a familiar item of our heritage and our architectural landscape, is this year going on show in the Salles du Rempart space in Caen Castle in an exhibition which we invite you to pursue further in the city itself and right into the heart of our underground heritage. The castle site is particularly well suited to this evocation of the City's heritage.

Apse of St Pierre's Church in Caen. 1852 (Musée de Normandie)

Caen Stone came into being 165 million years ago through the unlikely conjunction of several geological factors. Used in architecture already back in ancient times, it has been a great success ever since. The qualities of this outstanding limestone were recognized locally, and also in England, or the USA, for which several hundred tonnes of stone were mined in the quarries of Caen, Fleury sur Orne, Conteville and Bretteville sur Laize. Bermuda Cathedral is undoubtedly the most exotic example of any edifice built out of our famous stone. However, through its historic ties with Normandy dating back to the 11th century, England remained the largest importer of Caen stone up until the 18th century.

After going into decline in the early 20th century, when the Great War upset the market, mining was resumed, for the restoration first of the monuments of Caen and then of the English monuments. From nearly ten centuries of operations there now remains a substantial heritage linked to the mining work. The city of Caen alone has over 80 hectares (200 acres) of underground galleries and numerous opencast mine cutting edges that are still visible. The heritage of monuments that has been preserved is exceptional both in France and in other countries.

The exhibition will be a chance to take stock of the matchless career of Caen stone, and the difficult task of the quarry workers and masons who extracted it from the subsoil or used it as a building material.

The exhibition tour

I – Geology of Caen Limestone

165 million years ago the land distribution across the globe was very different from what it is now. France was then a vast sea with only three islands emerging from it: the London-Brabant Massif or Platform, the Massif Central and the Armorican Massif. It was along the latter's coastline, in a tropical lagoon with calm waters lined with mangroves, that a carbonated mud made up of fine silt particles from the decomposition of the limestone shells of marine bivalves was deposited. As the water receded, this mud was buried and then compacted, leading to cementation of the particles. The result of this was Caen Stone.

Quarrying the stone beds has made it possible to get a better understanding of the environment through the discovery of many fossil specimens studied back in the 19th century by the Norman palaeontologists Jacques-Amand Eudes-Deslongchamps, his son Eugène, then Eugène's son-in-law, Alexandre Bigot. 165 million years ago, the sea bed was populated by corals, belemnites, large nautiluses and giant ammonites. The banks of the lagoon were infested with crocodiles. *Teleosaurus cadomensis* was a gavial specific to the area recognizable from its thin snout about a metre long. Over 450 specimens of this species have been discovered in and around Caen, but sadly were destroyed in the bombing raids during the summer of 1944 which wiped out the university, where they were kept.

Megalosaurus skull fossilized in Caen Stone (Conteville, Calvados) - reconstitution (P. Leroux)

Several dinosaur discoveries have also been made in the area and usually correspond to drifting corpses. The most recently specimen was uncovered in 1994 by André Dubreuil, the mayor of the village of Conteville some fifteen kilometres (10 mi) south of Caen. He handed it over for study to the National Natural History Museum in Paris, which pieced together the unearthed elements to make a reconstitution, now on public show for the first time in this exhibition.

II - Quarrying of Caen Stone

In Caen, quarrying of the stone was helped along by the presence of outcrops cleared by the flow of the River Orne. The first blocks to be used for building purposes were recovered at the foot of the slopes. Back in ancient times, men became familiarized with the material, and sought to mine the best layers of Caen limestone, i.e. the 5 to 6 metres which the quarrymen named "Caen Stone". This was because the upper section of Caen limestone was loaded with flint, making it harder to work and less good-looking.

The lower layers of Caen limestone have a bigger clay content and so are less resistant to wear and tear over time.

Mining took place naturally, first open-cast, by working the natural slopes. The less interesting levels were first removed in order to get to the desired layers, which were worked in a succession of terraces.

When the surface waste rock become thicker and so took longer to remove, open-cast mine stone faces were used to excavate galleries and get directly to the superior beds. The parallel galleries were kept apart from each other by a few decimetres of stone that formed the walls and thus prevented them from collapsing.

Stone cutters, detail of the engraving Apse of St Pierre's Church in Caen.-1852 (Musée de Normandie)

Quarrier's winch (DR)

Quarrying then moved higher up the slopes, without the easier access via the stone faces. Hence a square shaft was dug down to the Caen Stone. The quarried blocks were brought up to the surface through these selfsame shafts fitted with a winch, a wheel of an average 6 metres in diameter which the quarrymen operated by raising the bars on it. The mining technique used underground was the room and pillar method. Every so often the quarriers would leave good stone in place which was not quarried. This formed pillars which held up the roof of the quarry.

The mining was directed by a master quarrier with perfect knowledge of the stone. He had several labourers to help him. It was a difficult trade, the tooling was heavy and rudimentary, consisting of bars, picks, wedges and sledgehammers. Accidents were a common occurrence in the quarries.

It was not until publication of the Order of Louis-Philippe in 1848 that the trade became organized and protecting the workmen became a concern. There were many petitions brought against this law, with the quarriers often defending the traditions of the trade in the face of social advances.

III - The Caen Stone trade

The abundant use of Caen Stone in the ancient constructions of Vieux la Romaine proves that there was already a trade in Caen Stone at that time and that the existing infrastructures made it possible to transport blocks weighing several tonnes.

However it was the 11th century that saw Caen Stone become a much sought-after product. Following his victory at Val-es-Dunes in 1047, Duke William turned Caen, then still a small harbour town, into a major city. The simultaneous building of the castle and of two abbeys called for colossal amounts of stone. This led to many quarries opening to meet the demand for the building work.

Spire of the Abbey Church of Saint-Etienne in Caen 11-13th c. (P. Leroux)

After the Conquest of England in 1066, William the Conqueror constructed or restored many buildings across the Channel, the Tower of London being unquestionably the most emblematic of these. Local stone resources were well-nigh non-existent in 11th century England, and so naturally enough they turned to the market in Caen, which was perfectly organized and able to supply stone in large quantities. The vast system of English rivers meant you could sail far inland all the way up to the building site. Paradoxically and despite the distances involved, sea transport was easier and cheaper than overland, for which the price of stone was estimated to double over a distance of fifteen kilometres (10 mi).

Canterbury Cathedral (P. Leroux)

Up until the 19th century, England was the main foreign outlet for Caen Stone. It was used there for the cathedrals or abbeys of Canterbury, Westminster, Chichester, Rochester, Durham, Norwich… Also in castles at Oxford, Bristol and Cardiff, Buckingham Palace, Eton College, Hatfield House…

In France, Caen Stone was used at Mont Saint-Michel, Rennes, Beauport Abbey, in Le Havre…

Caen Stone is also to be found in Belgium, Germany, the Netherlands and even the United States.

On being disrupted by World War I and the advent of new materials, quarrying of the stone and hence trade dropped to virtually nil at the turn of the 20th century. In the early 1970s, just two small operations remained.

Today the Caen Stone trade is once more flourishing, with a quarry reopening at Cintheaux some fifteen kilometres (10 mi) south of Caen, Caen Stone being used for restoring the city's monuments and again for export to the UK. More astonishingly, a recent order was dispatched to Saudi Arabia…

IV – Twenty centuries of heritage in Caen stone.

It was not until the Romanization of Gaul that stone buildings came to be preferred to housing made of earth and timber. Rural homes were then made with stone bases, using the stone available on the spot, upon which rested a superstructure made of wood and cob. Only the corners of the wall called for a special search for bigger blocks that could be squared up to strengthen the building. In wealthy Gallo-Roman housing such as we find at Vieux la Romaine, Caen Stone was already being used for its recognized qualities: whiteness, easy cutting, frost resistance… Hence it was used along with various marbles and precious mosaics.

With the fall of the Holy Roman Empire, the knowhow involved in building in stone was lost. The one notable exception to this vanished technique, the Upper Middles Ages were characterized by large-scale use of sarcophagi to bury the dead. These were mass produced and distributed throughout the region.

With the growth of Christianity, architectural research made rapid advances and Caen Stone was a natural accompaniment for the art of sculpture. Masons were on the lookout for stone with such qualities, especially one so easy to cut. The Romanesque, Gothic and Renaissance styles all helped to produce many buildings

both within and beyond the city of Caen. The great town planning operations of the 18th century, masterminded notably by the Intendant Fontette, helped to draw the old town out of its medieval enclosure, which had become too constricted and was a real brake on growth.

Medallion, 1180. Canterbury Cathedral (Steve Cole – English Heritage)

It was not until the beginning of the 20th century that interest in Caen Stone went into a steep decline. The reason for this was the advent of new materials like cement and brick, which were cheap to produce and easy to build with. Quarrying almost disappeared altogether by the start of World War II, and the output at the time was insufficient to meet city Reconstruction requirements. Limestone had to be brought in from other areas, sometimes with incompatibilities between the different stone types only coming to light several decades later on.

In 1986, quarrying saw a temporary revival for construction of the Caen Memorial, with its frontage faced with Caen Stone, and mining was resumed at an old 19th century quarry. Once the idea of restarting quarrying was floated, it took several attempts to find a perfect deposit and a team of professionals capable of arranging the contract. Since 2004, the Société des Carrières de la Plaine de Caen has been working the Cintheaux site and supplying Caen Stone to major restoration projects in France, and in England as well.

Overview …

Geology

- Formation: 165 million years ago in a tropical lagoon on the edge of the Armorican Massif.
- Composition: Caen Stone is the result of compression of carbonated mud.
- Density: one cubic metre of stone weighs around 2.3 tonnes
- Fossils: Ammonites, belemnites, corals, nautiluses, crocodilians including *Teleausorus Cadomensis*, a species specific to the area. Note also the discovery of megalosauruses, the latest of which being the one at Conteville (Calvados).

Mining

- Types of mining:
  - Open cast. Working the natural slopes
  - In galleries from old stone faces in open-cast mines
  - Room and pillar mining. A shaft 15 metres deep takes you directly to the Caen Stone layers. The blocks are brought up to the surface with a quarry winch. This is a 6 metre diameter wheel fitted with rungs on which the quarrymen stand in order to activate the mechanism.
- Main quarrying centres: Caen, Fleury sur Orne, Bretteville sur Laize, Conteville.
- Volumes: An estimated 11 million cubic metres of Caen Stone have been mined within the city boundaries alone.
- Stone in the news: Reopened since 2004, a quarry located at Cintheaux. It supplies restoration projects in France and England and private customers as well.

Trade

Judgement of Solomon capital, 1120. Westminster Abbey

From the 11th century, there was a thriving trade with England. Up until the start of the 20th century that country was the main importer of Caen Stone.

- Main English monuments using Caen Stone:

  - Cathedrals and abbeys: St Alban's, St Paul's in London, Westminster, Glastonbury, Canterbury, Chichester, Rochester, Durham, Norwich…

  - Castles: Oxford, Buckingham Palace, Bristol, Cardiff, Tower of London and London Bridge, Hatfield House, Eton College…

- Elsewhere in France and abroad

Brittany: St Pol de Léon's Church, Beauport Abbey, Rennes Trade Centre…

- Upper Normandy: Theatre at Le Havre, church at Dieppe, abbey church at Bernay…
- Belgium: Royal Palace, Brussels.
- United States: St Patrick's Cathedral New York, Basilica at Saint-Louis (Missouri)

Exhibition Catalogue

Caen Stone – From the Dinosaurs to the Cathedrals

Contents

Exhibition partners

GRETA (Honfleur)
Rediscovering a skill set

As part of the exhibition, the Musée de Normandie wanted to have a 6 metre diameter hoisting wheel made, like the ones used at the shaft heads to bring up the Caen stone blocks weighing several tonnes up to the surface. It was the trainee carpenters at the GRETA adult education establishment at Honfleur that were chosen, with their consent, to carry out this experiment, and rediscover a skill set that had been completely lost. Their work will enable exhibition visitors to view a unique item in France.

Société des Carrières de la Plaine de Caen

The only company to work Caen Stone since 2004, the Société des Carrières de la Plaine de Caen has shown the dynamism needed to revive an activity that had disappeared and to make Caen Stone a noble material once again.

Entreprise Lefèvre

Given its familiarity with stone-related trades working on the major restoration projects on City of Caen Historic Monuments, the Lefèvre firm has naturally put a lot of effort into the exhibition project.

Cultural activities:

Tours, special events, walks, shows, workshops, courses, play books, visits to the quarries of Caen, lectures …

Tours and special events

Guided tours and educational events are available for groups by appointment.
As of September, guided tours for individuals will be scheduled every Sunday.

Walks on the Caen Stone theme

Take a walk in the city following the traces of Caen Stone…
For individuals on certain Sundays from September.

Children's shows for all the family

- September – October

The Amavada company is putting on a new show
Every Wednesday at 2.30 pm and Sundays at 11 am from 22 September to Sunday 24 October
All publics (aged 8 and over)

.

Workshops

The Museum is offering two workshops:

- Stone cutting workshop for children over 8
- Modelling workshop: making low reliefs for 6 year-olds and over

By appointment for schools and other groups
Every Saturday at 10 am for families from September to October

Courses for leisure centres

Courses lasting several half-days alternating visits and workshops can be arranged for all leisure centres during the holidays and on Wednesdays.

Children's games to play with all the family

Small illustrated booklets accessible from the age of 4 for an active visit in full complicity with the parents…
Two levels, 4-7 years and 8-12 years

An interactive space for accompanied children

Playing by manipulating models, jigsaw puzzles and other games to extend the visit…

Series of lectures on the exhibition proposed by Musée de Normandie friendly society

Tours of the Caen quarries

❖ Practical information about the museum

Address	MUSEE DE NORMANDIE Château - 14000 CAEN Tel : 33 (0)2 31 30 47 60 Fax : 33 (0)2 31 30 47 69 www.musee-de-normandie.eu mdn@ville-caen.fr www.pierre.caen.fr
Visiting conditions	Exhibition open daily from 9.30 am to 6 pm From 19 June until 31 October 2010 Enquiries and bookings 02 31 30 47 60 Rates: Information at the museum and on the website.
Public service -	- Guided tours of the exhibition: September / October - Walks on the Caen Stone theme - September - Shows – September / October - Workshops - September / October - Courses for leisure centres - Games of observation for all the family - Series of lectures organized by the Musée de Normandie friendly society - Tours of the Caen quarries – for exhibition visitors only (by appointment, limited number of places)
Publications	- Catalogue *Caen Stone – From the Dinosaurs to the Cathedrals*, Editions Corlet, Condé sur Noireau, 112 pages, format 20 x 26.5 cm, €25 - La Pierre de Caen/Pascal Leroux, Edition OREP, Cully, €5.50
Press contact	- Claire FORTIN : Tel. +00 33 (0)2 31 30 47 62 cfortin@ville-caen.fr