

A Building Site in Early Sixteenth-Century Normandy: the Castle of Gaillon, Organization, Workers, Materials and Technologies

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The castle of Gaillon, built in Normandy between 1498 and 1510 for cardinal Georges I d'Amboise, has been considered one of the first and most significant achievements of the early French Renaissance. Sited on the top of a pleasant hill, the cardinal's residence towered over the villages of Gaillon, Sainte-Barbe and Aubevoie, and enjoyed a wonderful view of the river Seine and the rich plain belonging to the Rouen episcopate (**fig.1**).

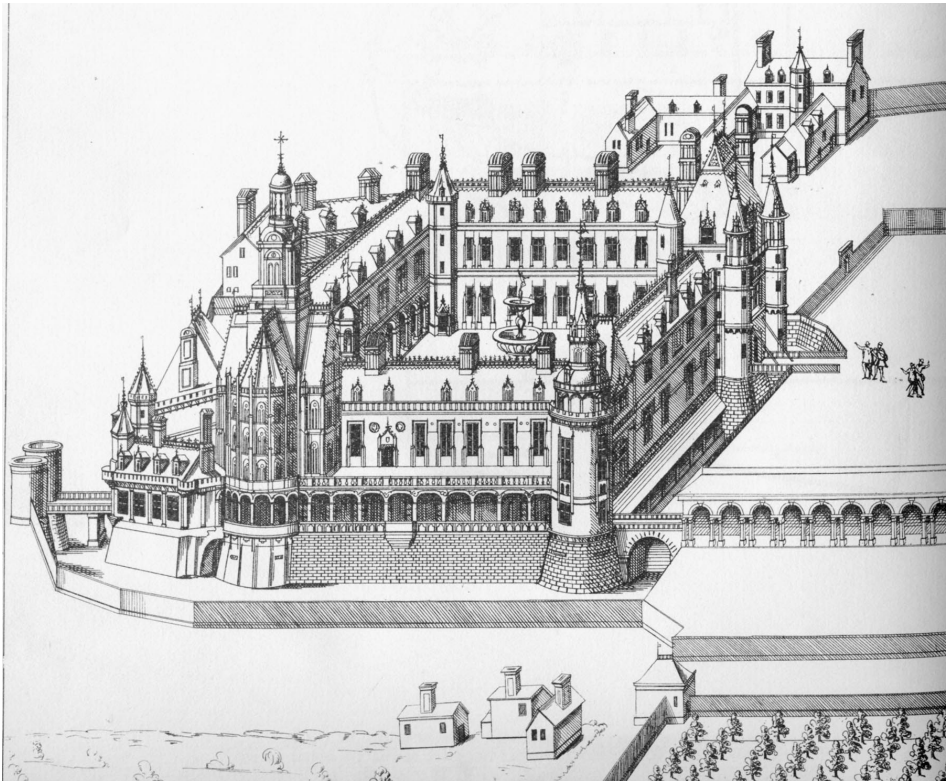


Figure 1. Jacques Androuet Du Cerceau, View of the castle of Gaillon (1576).

Because of its remarkable strategic geographic location, on the route from Paris to Rouen, Gaillon held a very important military position during the fight for the conquest of Normandy between the Plantagenets and the French crown. Definitively conquered by Philippe Auguste (1180-1223), the medieval castle was offered by King Saint Louis (1226-1270) to the archbishops of Rouen, who made Gaillon their principal residence until the French Revolution (Deville 1850, p. IX; Chirol 1952, pp. 86-91).

In 1424 the English army destroyed all the fortified elements. Cardinal Guillaume d'Estouteville (1412-1483), who had maintained a princely court in Rome, became archbishop of Rouen in 1453; from the time of his election he started some restoration works at Gaillon, concerning mostly the castle entrance -the *châtelet*- and a few new apartments on the south-west side, known as the *corps d'Estouteville* (**fig.2, G, N**).

From 1498 to 1510 Gaillon became the stage of the magnificent court orbiting around cardinal Georges I d'Amboise (1460-1510), the principal political and diplomatic protagonist of Louis XII's reign. During an embassy to the French court in 1507, Cardinal Pallavicino, wrote that Georges d'Amboise was the real king of France ("ipse est vere rex Franciae", ASV, Fondo Pio, 15, f. 140r) and this was ultimately the conclusion reached by all the foreign ambassadors of this period (Bardati, 2002, pp. 72-8).

Cardinal Georges d'Amboise was a great architectural patron and during his permanence at the Rouen episcopate he commissioned the construction of several residences: in addition to Gaillon he ordered the construction of a magnificent palace in Rouen, a pleasant suburban *villa* at Déville-les-Rouen, and a new castle, destined for the use of his family, at Vigny, a private dominion situated between Gaillon and Paris. According to Alberto Pio from Carpi, who followed the cardinal's court in 1507-8, Georges d'Amboise was involved in the reconstruction of the castle of Chaumont-sur-Loire (Sabattini, 1994, p. 102), the ancient fief of the Amboise family, destroyed by Louis XI in 1465 (Bardati, 2002, p. 73).

Thanks to Georges d'Amboise, for twelve years Gaillon was one the most important building sites of France : during this period a new, princely residence was built next to the *châtelet*, the *corps d'Estouteville* and the *Grant' Maison* – the ruins of the fortress destroyed by the English. The *Grant' Maison* (**fig.2 D**) was restored to house the cardinal's apartment, with its glorious views over the countryside that inflamed the letters and the diaries of all the foreign visitors (Bardati, 2005, p. 218, 228).

Afterwards, and up to the Revolution Gaillon was the favourite residence of all Rouen archbishops. These rich clergymen left untouched the main part of the Renaissance castle as they made few transformations, principally involving the gardens, the park and the decoration of the apartments.

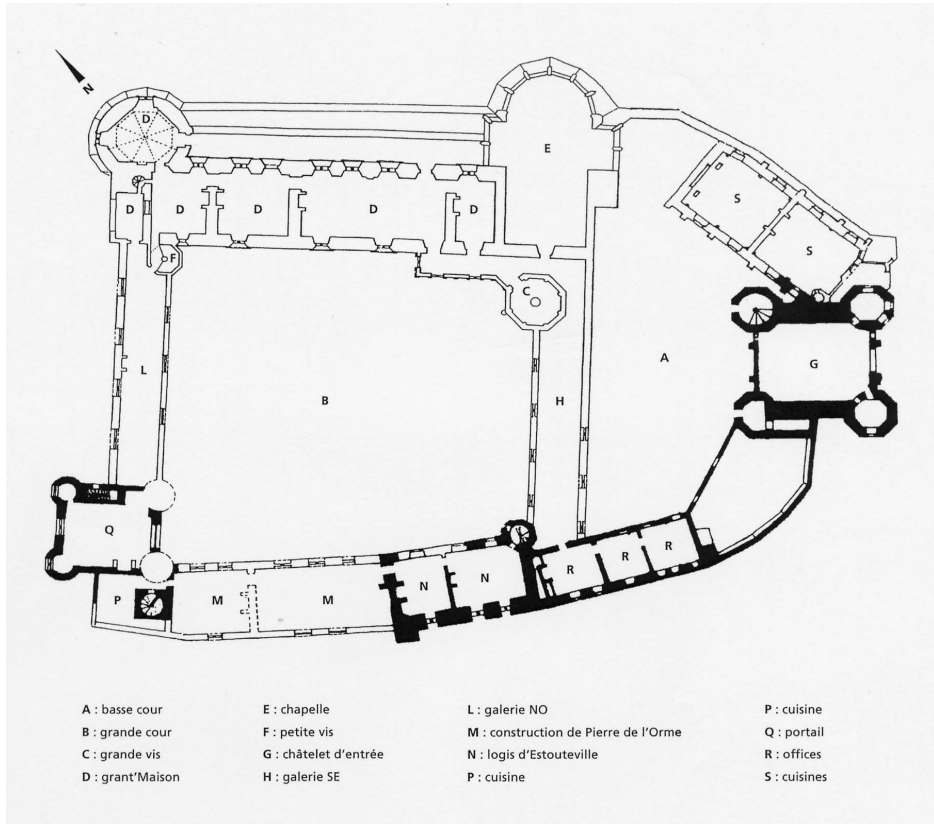


Figure 2. Castle of Gaillon. Plan of the *piano nobile* in 1510 (Bardati, Chatenet, Thomas 2003).

A remarkable number of foreign descriptions, written from the sixteenth to the eighteenth century, testify the international reputation of Gaillon (Chastel, Rosci, 2000, p. 504; Bardati, 2005, p. 228). As a major symbol of French aristocratic power, the castle was one of the most significant targets for French revolution violence and frenzy, but even though the building has been almost completely destroyed, fortunately the construction accounts survived the revolutionary tumults of 1789.

In contrast to the usual fragmentary state of preservation in the French archives of records regarding French Renaissance building sites, the survival of numerous detailed accounts dating from September 1498 to September 1510, in which several different bookkeepers assured the precise registration of all incoming and outgoing moneys from Gaillon, allows us to explore in detail the organization of one very large French building site in this period. This is a very rare situation, comparable only with the tower of Bourges Cathedral, which began just as the works at Gaillon were being completed and where we can find several masons coming from the Norman castle (Hamon, 2002).

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Published for the first time in 1850 by Achille Deville, hitherto the accounts of Gaillon have been exploited only to establish the chronology of construction (Deville, 1850; Chirol, 1952; Thomas 2003) or the names of some of the protagonists of the building site, such as the French master masons Colin Byart, Guillaume Senault, Pierre Fain and Pierre Delorme or some Italian artists, like the sculptor Guido Mazzoni, the painter Andrea Solario – the pupil of Leonardo da Vinci – or the stone carver Girolamo Pacherot (Deville 1850; Chirol 1952).

But the examination of these documents permits a detailed study of the timing of the site's activities, including the provisioning of materials, the modalities of salary payment, and the hierarchy of different masons, workers and artists. Moreover, because of a particularly fortunate circumstance, also some of the construction accounts of the archbishop palace in Rouen and of the *villa* of Déville-les-Rouen, both commissioned by Georges I d'Amboise in the same years of Gaillon, survived the destruction of the French revolution, permitting a very interesting comparison of chronologies and expenses of the three building sites (**Tables 1, 2**).

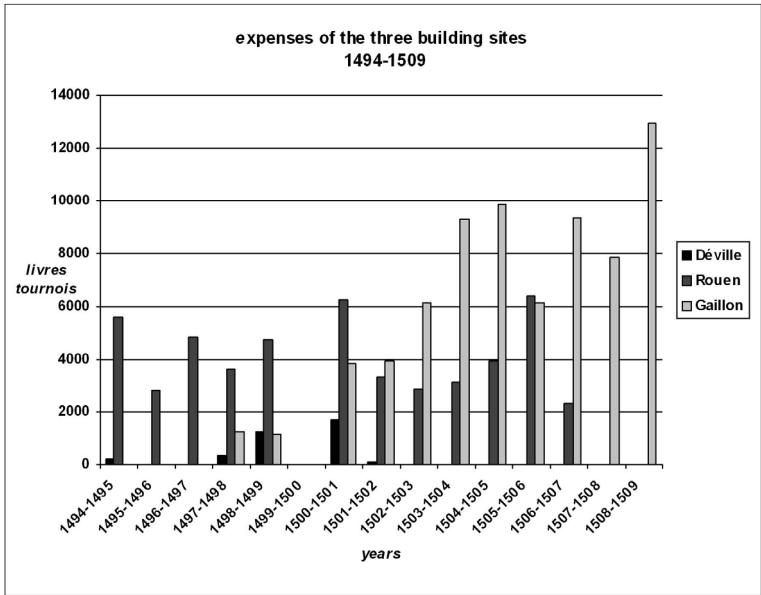
The precise registration of expenses permits an understanding of the various phases of the construction process and an estimate of the incidence of particular materials and techniques on the total construction budget. To take full advantage of the surviving data, a very large research project concerning the castle of Gaillon has been planned, which includes all the data of the accounts organized in a comprehensive database for systematic and complete analysis of the available

information. The final programme will permit searching and developing complete and simultaneous analysis of all the data contained in the accounts. Thanks to this analytical instruments, still in progress, some hypotheses can be advanced concerning the destination of different materials and building technologies in the various parts of the castle, for static and aesthetic reasons, but also because of the presence of foreign workmen (mostly Italian and Belgian) at the site.

Table 1. Compared chronologies of the building sites of Déville-les-Rouen, Rouen, Gaillon and Vigny.

	Déville-les-Rouen	palace of Rouen	château of Gaillon	château of Vigny
1493				
1494				
1495				
1496				
1497				
1498				
1499				
1500				
1501				
1502				
1503				
1504				
1505				
1506				
1507				
1508				
1509				
1510				

Table 2. Comparisons of the expenses of the building sites of Gaillon, Déville-les-Rouen and Rouen from 1494 to 1509.



ORGANISATION

It was the habit of the archbishop's treasurer to record the incoming and the outgoing of money from St. Michel's day. So, usually, the financial statements cover the period from 29 September to 28 September of the following year. A few books follow different dates, however generally situated around the end of September.

The construction accounts of Gaillon, as those of Rouen and Déville, were first included in the general annual financial records of the archbishop of Rouen. From September 1497 to September 1500 there is not any itemised accounting, so, for every year, we know only the final annual expense: 5296 livres tournois in 1497-8; 1143 in 1498-9; 3839 in 1500-01 (ADSM G 84-6). There is a gap for the period from September 1499 to September 1500. We ignore the nature of the works; the expenses are not very large and they may have concerned just the beginning of the building site. On the contrary, from September 1501 to the end of 1509, 22 books, all published by Deville (ADSM G 614-631) with the exception of one book (ADSM, G 2031) concerning the accounts beginning on 8 October 1502, registered almost all the incoming and outgoing funds destined to the castle of Gaillon. Some gaps exist for a few short periods, because some books were used only for a specific part of the residence, such as the garden or the Grant' Maison, which prevent a complete view of the situation. Very probably this change in the method of registration was caused by the new importance that the cardinal attributed to Gaillon. A drawing, named 'plan the Poitiers' and datable perhaps to 1501 (ADV, 37, 8), shows the first project for the new residence (**fig.3**).

Here some innovations appear, like the square towers or the stairs with two flights, but the general organisation remains close to the tradition of French castles, like Amboise, Montargis or Blois (Crozet, 1952; Chirol 1958).

The project that indicates the will to enlarge the fortress into an immense residence, had been left around 1503, probably after the stay of Georges d'Amboise in Rome, for the conclaves of Pius III and Julius II, when he lived in the apartments of Cesare Borgia in the Vatican palace (Bardati 2006, pp. 31-3).

If one of the reasons for the different way to register the expenses can be the change of the project, another cause is that the detailed accounts had been registered by five different book-keepers : Pierre Mesenge from the end of 1501 to the end of 1503; Richard Guere in 1504-5; Guillaume de Bonnaire in 1505; Monsieur de Genly from the end of 1505 to the end of 1506 and, finally, Claude de Launay from 1508. Everyone used his personal methods, abbreviations and codes, so, sometimes, we find several different ways of registration for the same type of work.

Generally, the books were also signed by a controller: very often it was the fiduciary of the cardinal,

Thomas Bohier, who was the brother of the abbot of St. Ouen, in Rouen, and was later to become archbishop of Bourges. It is interesting to remark that in the building site of Bourges cathedral tower several workers coming from Gaillon were employed. On other occasions the accounts were countersigned by Richard Guere, who was also charged to directly pay the masons in 1502-3, but also to register the books of 1504. Normally the bookkeeper first registered the incoming money, a very short document, followed by the outgoing accounts. These parts became longer and longer as the architectural demand became more complex, showing the evolution of the building site, from the first masonry works to the delicate decoration painted and sculpted on every surface of the castle. With only special exceptions, payments were made on Saturday. The increase of the expenses reached its highest level in 1507-8 (**table 3**), probably in the expectation of the stay of Louis XII's court in Gaillon, but also because the building site of the Rouen palace was finally over, and the cardinal could concentrate his financial means to finish the works of Gaillon.

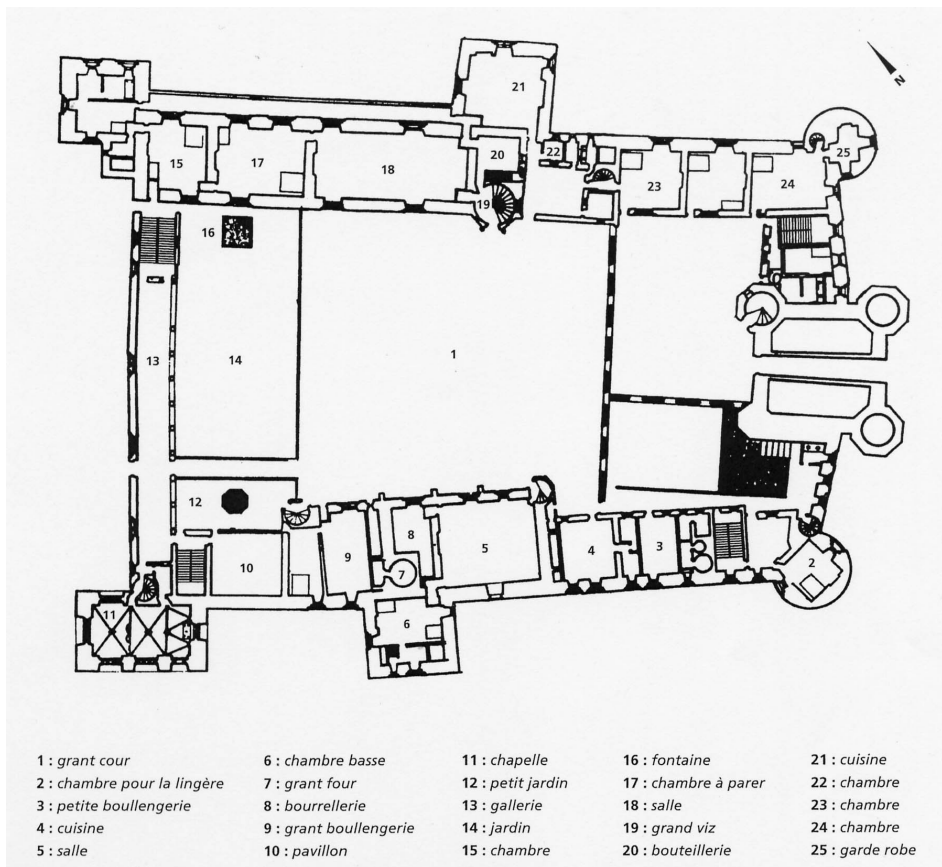
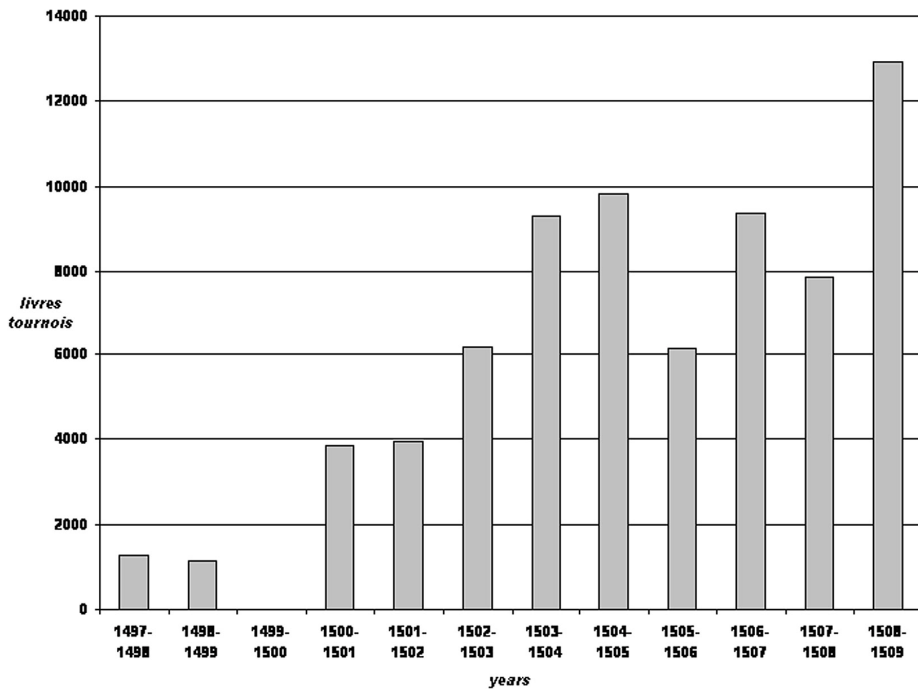


Figure 3. The so-called 'plan of Poitiers' re-drawn by René Crozet.

Table 3. Expenses of the building site of Gaillon from 1498 to 1509.



WORKERS

In publishing the accounts, Deville gave the "revue des artistes de Gaillon", a complete list of all the workers, artists and craftsmen active in the building site of Gaillon. He identified 22 masons, 14 carpenters, seven sculptors, 19 painters, five painters on glass, eight joiners, three melters, three plumbers, seven goldbeaters, six principal brick makers, four blacksmiths, two farriers, six slate roofers and generally for covering structures, seven carters, approximately 30 suppliers of lime, three goldsmiths, 11 upholsterers and embroiderers, three Flemish weavers.... Evidently this list points out all kinds of works necessary to a magnificent cardinal's residence, ranging over all skills, from construction, to decoration, final touches and furnishing. Moreover, sometimes it is very difficult to be able to distinguish shades of meaning between the different roles: for instance Jean Barbe is listed with the painters and with the glass painters, while Girolamo Pacherot and his Italian assistants are presented only among the masons but they are also good marble carvers. Pacherot, perhaps a pupil of the brothers Giuliano and Benedetto from Maiano, works wood and bronze equally as a sculptor. In 1508 he was responsible for the construction of an ephemeral wooden triumphal arch for the entry of Louis XII: in this case his mention only in the list of the masons does not indicate his various artistic competences. Moreover, Deville inserted only the major actors in his list, and ignored all the helpers, labourers, and minor suppliers. Therefore his results must be re-considered in greater detail.

Following the standard practice of the French masonry corporation, in the accounts nobody is qualified as an architect (Bardati, 2006, p. 19). Nevertheless, a hierarchy between the masons is evidenced by the different salaries. Some are responsible for the most delicate execution in stone carving ("l'art de la taille"), and sometimes they are dispatched from Gaillon to Rouen and vice versa to control the progress of the two building sites. Workers named Dumouchel, Castille, Valence, as well as Colin Byart and Pierre Delorme were tasked with visits to the stone quarries to evaluate the quality of the stone, or to visit the future site of a building to estimate future works and expenses (Deville, 1850, pp. 39, 42, 48, 124, 164, 354). Perhaps some master masons were responsible also for parts of the project, as the existence of the "plan de Poitiers" suggests. However Guillaume Senault, chief of the masons working in the Grant'Maison in 1501-3, was charged to carry some "portraits" (drawings) from Gaillon to Rouen, to permit the cardinal to control the advance of the construction (Deville, 1850, p. 39).

Normally, the workers were paid on Saturday, for a six day working week. They could also receive a daily salary or be paid *à tache* for providing of a certain number of elements, like bricks, trusses, carved stone dormer windows, steps etc. The daily pay of a master mason was 7 sols and 6 deniers; the others masons, in accordance with their specialisation, were paid from 2 sols to 3 sols and 4 deniers day. The labourers' salary was between 20 deniers and 2 sols the day.

A very particular case was the contract stipulated with the master mason Pierre Delorme for the construction of the building located between the corps d'Estouteville and the portal toward the garden (**fig.2, M**). The accounts mention a "corps d'ostel baillé à pris fait" (a building allocated for a lump-sum payment). In this case Delorme presents himself as a building contractor who assures the material's provision and the salary of his workers (Deville, 1850, p. 205). In 1507-8 Pierre Fain made some more scant, but similar, contracts (Deville, 1850, p. 424).

Masons, specialised workers and artists often worked as a team. This is true especially for masons, where a complete list of the workers can be found, beginning with the master mason (Senault, Byart, Fain, Delorme and the Italian Pacherot), followed by the others masons ordered in a rigid hierarchy, according to their salaries. On other occasions there is only mention of the master mason "et ses compagnons" (and his companions), with the total amount for the week, which makes it very difficult to pull out reliable statistical data.

Because of the imminent royal visit, from 1507 the rhythm of the building site accelerated and many artists arrived at Gaillon; most of them foreigners. This international context allows an analysis of the transmission of forms and techniques within Europe at the beginning of the sixteenth century. In fact, afterward, some of the artists left Gaillon for the building site of the tower of Bourges cathedral, which was starting in 1508. The most important was Colin Byart, one of the masons responsible for Gaillon, who at Bourges assumed completely the role of architect (Hamon 2002). But on the same building site we find also Jean Chersalle, an Italian stone carver active at

Gaillon in the team of Girolamo Pacherot. The two Italian artists were responsible for the altar of the high Chapel of the castle, characterized by a fine sculpted architectural structure which framed the bas-relief of *Saint George and the dragon*, executed by Michel Colombe (**fig.4**).

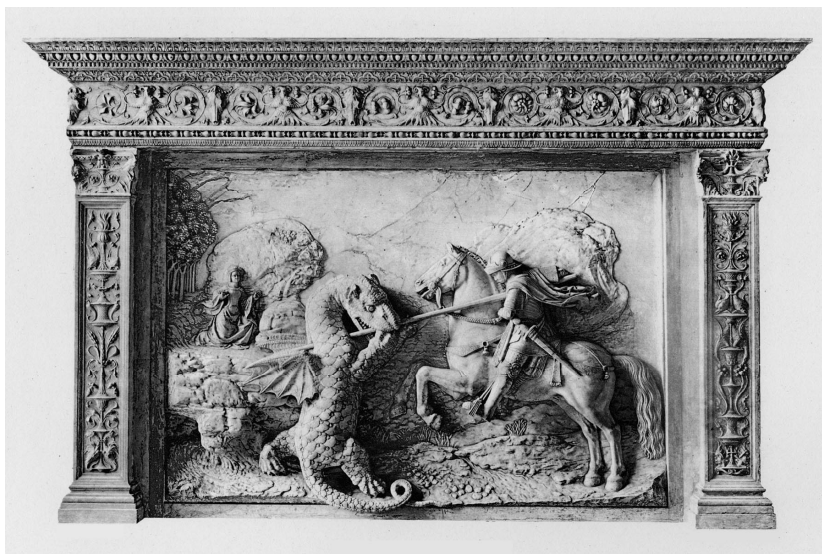


Figure 4. The altar of the high chapel, now in the Louvre (bas-relief by Michel Colombe; frame by Girolamo Pacherot, Jean Chersalle, Bernardo de Meynal).

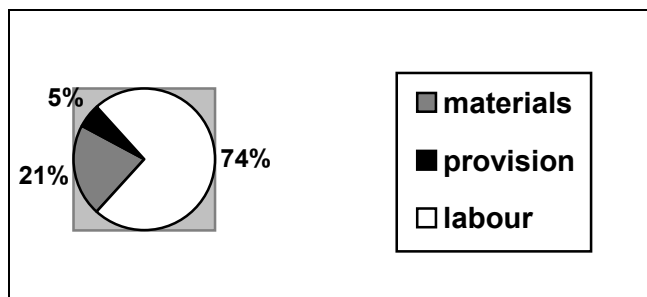
Afterwards, Chersalle is listed from 1511 to 1515 at Bourges, among the assistants of the sculptor Marsault Paule, and it is very plausible that he was responsible for the Italian Renaissance influence evident in the Porte Saint-Guillaume, as pointed out by Helen J. Dow (1965, p. 290). The English sculptor John Hudde, who later on worked in England for the Henry VII Chapel in Westminster Abbey, was active in the same team. Helen Dow has even suggested that Chersalle could "have accompanied Hudde back to England when the work at Bourges had finished" (Dow, 1965, p. 292). This particular case shows very well how Renaissance building sites were ready to recruit any kind of specialised workers, including foreigners, and, at the same time, it illustrates the process of transmission of forms and techniques, because Chersalle was a specialist in marble carving, a kind of material not well known by his French colleagues.

MATERIALS

The accounts record every kind of expenses: labour (the main entry), construction materials, machinery, final touches elements like decorated windows, locks, frames, ironware, as well as plants for the garden and the park, sculptures, paintings, tapestries, manuscripts for the rich cardinal's library, wine for the workers, paper for the bookkeepers.... Therefore, specific inquiries

are not so easy to carry out. Anyway, mostly helped by explicit queries of the data-base, we could try to draw some conclusions. For instance the following table (**table 4**) shows the incidence of labour, provision and rough materials in 1501-3.

Table 4. Allocation of expenses (labour, materials, provision) in 1501-1503.



Even with some luxurious final touches, materials have a higher unit cost; the several different kinds of stone represent the most important expense. Consequently, the labour concerning the stone is better paid : so in the percentages of table 4 the incidence of the salaries of masons and labourers is very important (3879 livres tournois).

Thanks to the proximity of the river Seine, the provision of raw materials was generally done by the "voicturier par eaue" (boatmen; Deville, 1850, p. 354), and then by carts from the harbour to the building site. Normally manufacturers of special objects were personally engaged in carrying their own production. Raw materials, especially stone, were worked near the final destination site, in proper sheltered huts (Deville, 1850, pp. 47-9). Bricks were manufactured on the site that was rich in wood and clay: Deville enumerates 15 different kilns, scattered all over the immense area of the building site. At Gaillon, because of the several hunting lodges and of the party wall surrounding the park, enclosing a surface of about 500 hectares, the huts could be very far from the castle, and supplementary land transport, by carts or by rope, manually dragged was needed. The storage of rough and worked materials was also done in sheltered huts.

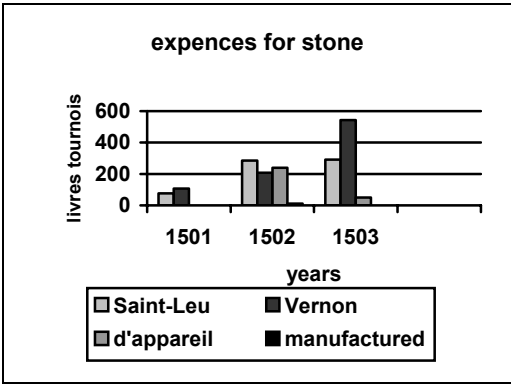
The stone

In accordance with French construction tradition, the buildings were built mostly of stone, with wood ceilings and high slate roofs supported by complex systems of wood trusses. Stone vaults were certainly built at Gaillon in the basement and in the chapels; perhaps in the passages of the main entry (the *châtelet*) and in the big portal towards the garden (**fig.2, Q**), which housed the private cardinal's apartment on the *piano nobile* (Bardati, 2002, pp. 144-5).

Stone supplies were of two categories: rough stone, coming from the quarries of Vernon and Saint-Leu d'Esserent, and pre-cut stone elements, like the steps of the *petite vis* (**fig.2, F**) and the *grande*

vis (fig.2, C), the two spiral stairs of the Grant'Maison, the little one built from 1502 to 1507 and the main one from 1505 to 1509 (Thomas, 2003, p. 159). A very hard and compact stone, coming from the quarries of Louviers was especially selected for these steps (table 5).

Table 5. Incidence of the different kind of stone from 1501 to1503.



The stone coming from Saint-Leu is yellow, of a mid-grain texture and contains traces of fossils. The quarries were very far from Gaillon, near Chantilly, but the proximity of the river Oise, a tributary of the Seine, made transport quite easy. On the contrary, the quarries of Vernon, were situated along the Seine, just to the south of Gaillon, and produced a white, fine-grained, calcareous stone. As the Seine flows toward the English Channel, both of the quarries were well sited to reach the building site. Instead for the quarries of Louviers, sited to the north of Gaillon, quite far from the river, the accounts do not permit us to determine whether transport was only by carts, directly from the quarries to the building site, or the stone was carried first to the Seine, then carried by boat from there to the little harbour of Gaillon, and finally carted from there to the building site (fig.5).

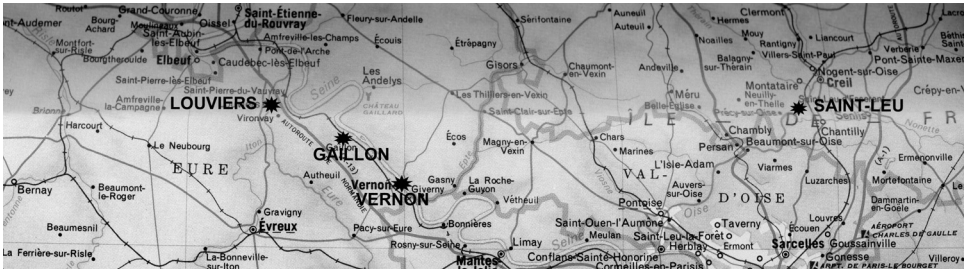


Figure 5. Quarries of Vernon, Louviers and Saint-Leu d'Esserent.

Both the Vernon and the Saint-Leu stone could be of differing quality, more or less hard, as shown by the fluctuating price recorded in the accounts. Probably the variability depends on the final

destination of the stone, because of the need to have a quite soft stone for the best carved elements and a harder stone for supporting walls and for the structure or the flares, exposed to strong, sudden changes of temperature.

The accounts mention also some "pierre d'appareil" (face stone), without specifying the provenance. Even if the largest parts of the structure were certainly made of stone, all the same, the enormous quantity of bricks destined to the Grant'Maison raises a question concerning their utilisation. Obviously a part of them was used for the chimney stacks, but another part could have been used for the interior structure of the walls, then covered by face stone, a kind of mixed structure often used in Normandy in this period and recalled later by Philibert Delorme.

TECHNOLOGIES

The accounts do not give a lot of information concerning the technologies and the machinery employed at Gaillon. Anyway some hypothesis can be proposed.

Machinery

Some wood scaffolding was employed to reach the highest levels of the castle: the accounts record some "grues" (crane; Deville, 1850, p. 401). A large crane, made of wood and drops, was mounted in the main court of the castle (**fig.2 B**); four carpenters were paid "pour avoir dessemblé la grue de la court", i.e. for having removed the crane (Deville, 1850, p. 372). Another carpenter, Jehan Avisse, is paid both for "gresse et suif pour les gruyes et camions" (the grease for the crane) and for "avoir desassemblé et reassemblé les deux grues qui estoient au par bas du corps d'ostel et mises par le hault sur la charpenterie" (Deville, 1850, pp. 120-2) : two cranes which were at the foot of the building had been dismantled and remounted on the highest parts of the building, at the level of the carpentry, so this means that this type of machinery could be quite small and easily handled.

Generally other machinery, whose structures are not detailed, named "angin" (ancient writing for "engin", i.e. mechanism, tool), are often mentioned. A relatively small wooden machine was used to move the heavy marble bas-relief of *Saint-Georges and the Dragon* in the high chapel (Deville, 1850, p. 371).

The building site continually needed the provision of others tools: "brouettes" (wheelbarrows), "chiviers" (probably shovels), to carry materials all over the site; "ceaulx " (ancient writing for "seaux", i.e. buckets) strangely mentioned as tools to cut the stone; "clayes" (sieves); "maces à deffaire le mortier" (sledgehammers to crumble the mortar). Bucket-wheels were also used, probably to carry the water to the wall of the park, which was built after 1502 (Deville, 1850, pp. 32-9). The carpenter Raulin de la Haye was paid for the "auges pour fere aller l'eau pour faire le mortier du jardin" (buckets to let the water arrive somewhere, to make the mortar in the garden) even if some hand-pails were employed too (Deville, 1850, pp. 79, 122).



Figure 6. Gaillon. Ruins of the guide-wall of the garden (June 2005).

Unfortunately no detailed records explain the technological means used to sink the artificial pond of the park or to excavate the hill located below the castle, where a flat hanging garden was made in 1504-5. The ruins of the impressive garden guide wall (**fig.6**) still testify to the enormous excavation work, which struck foreign visitors : Jacopo Probo d'Atri, in a letter to Isabella d'Este (1509) says that the garden was "cavato dal monte con fatica et spesa inestimabile" (excavated from the mountain by inestimable price and labour), while an anonymous merchant from Milan also reported on the high and large guide wall (Bardati, 2002, pp. 184-6).

Vaults

Few vaults existed at Gaillon. For the basement of the *Tours de la Syrène*, the circular tower which housed the cardinal's official room (**fig.2 D**), the accounts record several entries for wood and labour for the construction of the vault's wood centerings (ADSM, G, 2031; Bardati, 2002, p. IX). The interior of the tower basement was polygonal, but the vault should be not so different from the one that we can see actually in another part of the Grant'Maison (**fig.7**).

But the most interesting vaults of the castle are those of the chapels. Unfortunately, the magnificent high chapel (**fig.2, E**), celebrated in all the descriptions of the sixteenth and seventeenth centuries, was destroyed during the French revolution and later when the castle was transformed into a jail (1812-27). But the structure of the lower chapel survives and shows the particular techniques of the *voûtes-plates* i.e. "flat-vaults", a sort of stone coffered ceiling, which employed a supporting structure of *arcs-diaphragm*, i.e. of screen-arches, to discharge the cover's weight on the perimeter walls (Bardati, 2003, pp. 314-5). The first French buildings where we find this kind of vault is the

porch of the Saint-Etienne-le-Vieux church in Caen and the lower chapel of Gaillon. "The *arcs-diaphragm* present a full parting wall, whose horizontal mortar beds totally correspond to those of the boundary walls of the chapel (**fig.8**). Above the horizontal slabs rests the wood frame of the first floor deckhead, as we can see in the ambulatory (**fig.9**), where some stone flags have been lost" (Bardati, 2003, p. 315). Because of the possibility of inserting a rich sculpted decoration on the vertical screen arches as well as on the horizontal slabs, the construction system of the *voûtes plates* expanded greatly in Normandy until 1552, even if some later buildings, as the ambulatory of the church of Saint-Germain d'Argentan, built in 1600-10, still employ this sort of hybrid system.

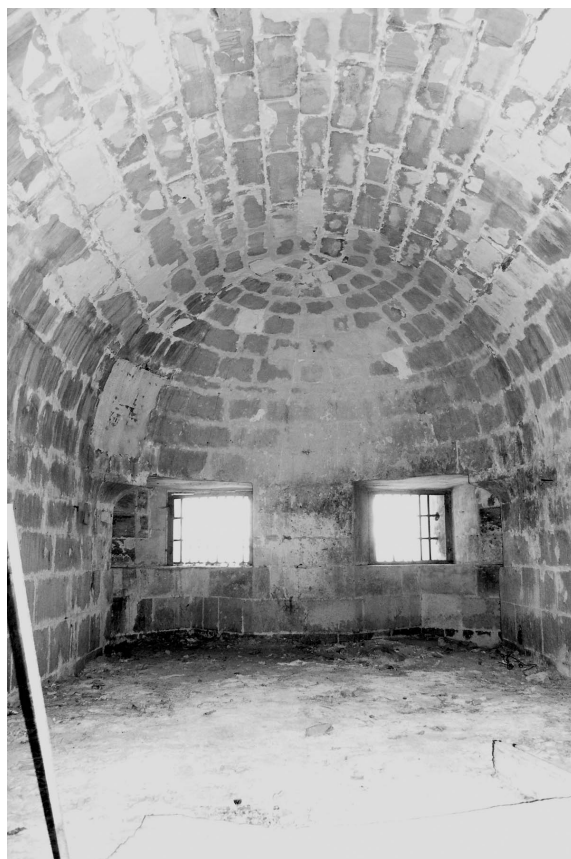


Figure 7. Gaillon. Basement's vault of the Grant'Maison (June 2005).

Stairs

Some final considerations concern the spiral stairs of the castle. The accounts mention clearly the provision of steps, largely prepared far from the building site and probably finished on site. The comparison between the data of the accounts and the ruins preserved in the lapidary warehouse of

the castle, recently catalogued by Xavier Pagazani, permits us to advance some hypothesis concerning the kind of structures employed for the stairs of Gaillon. For the main stairs the accounts record the provision of several steps, whose linear measures vary from 4 to 7 ancient French "pieds", i.e. from 130 cm. to 230 cm each one, so that the interior staircase diameter could reach 6 m. For these main stairs there were two kind of supporting structure:

1) the provisioned steps were radially arranged, in the form of a circular arc ("marche rayonnante"), and they were housed in apposite hollows in the parietal staircase and into the drilled newel.

2) the steps included in themselves their own drilled newel ring ("marche portant noyau"), with each element piled over the preceding one. This second type, that anyway rest on the staircase, is a self-supporting structure (Boudon, Blecon, 1985, pp. 75-81).



Figure 8. Gaillon. 'Flat-vaults' of the lower chapel (June 2005).

Beside this two groups of steps, evidently belonging to the main stairs sited at the four corners of the principal court of the castle, some other objects found in the lapidary warehouse show other techniques and solutions. It is a question of some pre-manufactured objects which include the components of a few steps, complete with their own drilled newel rings but also with their portions of parietal staircase. Evidently the diameter of this second kind of stair is really shorter. Probably they belonged to the little spiral hanging stairs used to reach the higher rooms of the castle ("chambres hautes"), independent of the horizontal circulation of the residence. Several textual and iconographic documents permit us to affirm that this kind of hanging stairs were also placed in thick walls to permit the arrival of servants into the cardinal's room, without interfering with the official

and ceremonial stairs, or, to permit Georges d'Amboise to reach a private study, housed in a mezzanine over the cabinet of his room.



Figure 9. 'Flat-vault' of the ambulatory of the lower chapel (June 2005).

ACKNOWLEDGEMENTS

I am grateful to Xavier Pagazani, with whom I am preparing a monograph on Gaillon, for all his suggestions.

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