The Planning and Building Process of Two Paris Bridges in the
Sixteenth and Seventeenth Century

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The outstanding importance of the Parisian bridges Pont Notre-Dame and Pont Marie rests on different achievements. Pont Notre-Dame represents the first bridge construction on pile foundations, and also exemplifies a new concept of housing by standardizing and regulating rows of buildings on either side of the bridge road, which became a source of revenue for the city. The bridge interconnected the main streets on both banks of the river within the city wall and produced the first European symmetrical road system, which came to influence the aesthetic concept of urban places, streets and quays. Planning and building this type of bridge was not obvious at the end of the fifteenth century and beginning of the sixteenth century, although Royal Paris was the biggest European city of that time. The bridge came to be a model for this type of built-on bridges, being cited by the Italian architect Vicenzo Scamozzi in his design for the Rialto bridge/Venice ...”quasi ad imitazione di quello di Nostra Donna di Parigi” (1588). Nearly one hundred years later the architect Arnold Nehring designed arcades and shops for his Mühlendammbrücke (1687) in Berlin, following the Parisian design of bridge houses.

In Paris itself the construction and aesthetics of the bridge and bridge houses came to be influencial for centuries. The bridge Pont Marie, which is still standing today, was erected one hundred years later as part of a speculative development plan for the vacant island of Saint-Louis. For this development plan with new housing blocks and several “Maisons” two bridges had to be built, the Pont de la Tournelle and the Pont Marie, connecting both river banks. Inspired by the Pont Notre-Dame, which had two decades earlier served as model for the Rialto Bridge, rows of houses with shops in the basement were to be built on the bridge. However financing was to follow commercial principles, an entrepreneur was responsible.

**PONT NOTRE-DAME**

Whereas in Italy a generation of architects had already appeared in the fifteenth century who took on responsibility for the design of buildings and were learned professionals (such as L. B. Alberti (1404-72) and Fra Giocondo (1433-1515)). In France all building work remained in the hands of master craftsmen. From the thirteenth to the sixteenth century the city of Paris had no building authority, instead two “Maîtres des Oeuvres” were in charge and only in the sixteenth century did the first architects gradually take charge of building works (for instance Ph. Delorme, Jean Goujon and Pierre Lescot ) being also familiar with the art of perspective, proportions and architectural theory.
At the turn of the century, after the collapse of the old Pont Notre-Dame the Paris Parliament appointed a commission for the planning and reconstruction of the bridge (1499). Members were the Governor of Paris, the President of the Parliament, the Major of the City and the Council of Elders. Responsible for technical matters were the city’s masters of masonry, other masons and bridge-makers, even the Seine-boatmen were invited to contribute. In addition the commission invited other qualified masters from all parts of France, and was in charge of the budget. Many years of professional experience were absolutely necessary to take part (Registre des Délibérations, I, Nr. 2, 16, 19, 69).

The building was erected on the same location as the previous wooden construction (1414-98). The dimensions and the spatial concept were influenced by this construction. Financing was to be achieved by duties on salt-water fish, salt, cattle and by a road toll for the carriages passing the bridge. The toll was collected until 1512 when the bridge houses were completed (Reg. des Dél. I, Nr. 61). According to the Livre Rouge Neuf des Châtelet the total costs amounted to 205 380 Livres. This corresponded to the total costs of the episcopal palace at Rouen and surpassed the costs of the castle of Gaillon by one third (Leroux de Lincy, Recherche historique sur la chute et la reconstruction du Pont Notre-Dame, BEC, II, 2. serie, 1845-46).

The Planning Process

The bridge design resulted from proposals from different masters and was not the concept of a single architect. The minutes of the municipal commission show that the decisions for the planning and building of the new bridge were all made during the meetings. This informal procedure, permanently calling upon masters of masonry, masons and bridgemakers, practically entailed the withdrawal of decisions of the preceding meeting and thus led to a delay of the building process and increased the costs.

However it should be taken into account that the building of a stone arched bridge on pile foundations was at that time an unrivalled project for Paris, calling for experts on all levels. The planning and building process followed the procedure common at the beginning of the renaissance: the responsibility and supervision for the building lay in the hands of the city’s masters of masonry, together with the master of carpentry. Several masters who had taken part in building the castles of Amboise, Cambord and Gaillon were invited to a number of meetings of the Paris Bridge Commission and were later ruled out. The importance of each individual master can be deduced from the numbers of meetings he attended and the salary grade.

On March 3rd 1500 the City master of masonry Didier de Felin, the master mason of Blois Colin Biart, who had worked for the Castle of Amboise under Charles VIII, and André de St.-Martin were engaged as “Maitres des Oeuvres en l’édifice dudit pont”. Also attending the meeting were the masters Guillaume Senault and Jehan Oreau, who were only needed for a short time, being paid as
workmen. Colin Biart soon was called by the Cardinal of Amboise to build the castle of Gaillon and left Paris together with Jehan Oreau on the 20th of March. Between 1500 and 1515 Colin Biart was engaged as constructor and architect for the castles of Le Verger, Gaillon and Blois. Guillaume Senault, who had been working together with Colin Biart for the planning and building of the palace at Rouen, left the masonic lodge of Pont Notre-Dame on August 20th (Reg. des Dél. I, Nr. 67-68, 22, 57, 59, 75). These masters took part at the meetings for the foundation of the pile gratings. Another very experienced master, Martin Chambridge, only took part for a short while. His proposal for a bridge without pile gratings did not succeed. Altogether 23 masters of masonry took part in the foundation planning.

On July 1st 1500 the Bridge Commission appointed the masters of masonry Jehan de Felin, Jehan Hernon, Robert de la Brosse, Gillet le Vacher and Waleran Hardy as head masters, responsible each for 14 masons. Their responsibility was the building, not the planning and drawing of the technical concept. But for Jehan de Felin these masters left the masonic lodge in this year. About the middle of the year the Italian architect Fra Giocondo, who had stayed in Amboise under Charles VIII (1497-98), was called to Paris (Reg. des Dél. I, Nr. 89, 104, 110, 109). Until then a number of meetings had dealt with the grounding of the piers, for instance the number of arches and piers had been agreed upon at a meeting on March 9th 1500. On March 12th the painter Gaultier drew the first elevation of the bridge (Reg. des Dél. I, Nr. 77, 78).

On June 4th of 1500 the masters started the first levelling of the planned ends of the bridge on the river banks. Two days later Fra Giocondo first took part in a commission meeting (Reg. des Dél. I, Nr. 85, 87) and his outstanding role became clear. We understand that Fra Giocondo did not accept the status of one of the advising masters, but defended his point of view before the commission. The minutes make mention of differences of opinion between Fra Giocondo and Didier de Felin, the City master of masonry, and the other masters about the height of the arches. In order to be able to decide the bridge commission even asked for drawings of the two differing proposals.

All the same on February 11th 1501 the Bridge Commission appointed Didier de Felin as “Maître principal de l’édifice dudit pont” with an annual salary of 120 livres. After his death his son Jehan de Felin became his successor (Reg. des Dél. I, Nr. 89, 104, 110). He also competed with Fra Giocondo for the best levelling of the bridge road, the commission later decided on a compromise between their proposals. In the end both, Jehan de Felin and Fra Giocondo can be looked upon as the master builders. The bridge was completed in 1507 R. Brenzoni, Fra Giocondo, 1960; V. Fontana, Fra Giovanni Giocondo, 1988).

**Building Construction**

The Bridge Commission met four times on the issue of how to do the foundations. The master of masonry Didier de Felin proposed on the commission meeting on March 9th 1500 to build a bridge
of stone with five piers and six arches. On April 26th 1500 the majority of the commission decided to build the bridge with pile gratings (Reg. des Dél. I, Nr. 18, 28, 40, 45). The minutes of the Bridge Committee refer to a total span of the bridge of 63.5 Toises or 123.82 m.

**Piers and Arches**

In good time the foundation ground was excavated, and on 19th March 1500 works for an embankment were started. By order of the bridge commission the building masters Jehan de Felin, Jehan Hernou, Guillaume Senault and André de St. Martin had to draw an elevation of the bridge, giving detailed measurements of the height of the arches. The results of the levelling of the planned endings of the bridge called for a higher support of the bridge road, on the city side about 5.5 feet (1.78 m) and on the Tannerie banks about 4 feet (1.30 m). To allow the boats passage under the bridge, the bridge road was to mount slightly from both ends to the middle of the bridge. The scale of the piers was decided on the commission’s meeting on June 6th which was also attended by Fra Giocondo (Reg. des Dél. I, Nr. 77, 78). Above the foundation they were to have a width of 4.55 m. The arches were semicircular and those nearest to both banks a little lower (Biblio. École Nat. des Ponts et Chaussées, MS. 4°. 1701; Arch. Nat. H 2167). **Fig. 1.**

![Figure 1. Pont Notre-Dame, Pier and Arch Numbers, Reconstruction M. Mislin](image)
A survey of the structure in 1806 revealed slightly different spans of the arches from the ones which had been agreed upon by the Bridge Commission three centuries ago (Reg. des Dél. I., Nr. 88). Also according to the survey the piers did not have a width of 4.55 m, but measured 4.82 m.

1. Arch 15.60 m
2. Arch 17.25 m
3. Arch 17.28 m
4. Arch 17.19 m
5. Arch 17.23 m
6. Arch 15.26 m

Fig. 2

Another decision concerned the building of an embankment for the building of the foundations for the 2nd, 3rd and 4th pier, measuring 120 Toises (234 m). For the building of the foundations part of the river was embanked, which was easiest to do in summer when the water level was low. Then piles were to be driven into the ground at a spacing of 0.65 m. The spaces between the piles were closed by planks and further sealed with boards. The costs for transportation of the wood had to be payed by the master carpenter, who acted as entrepreneur. The emptying of the excavation was done by a bucket elevator which was built on the principle of a water mill ("moulin ... pour vuyder les eaus"). On their meeting on August 26th the commission decided to brick up the piers downstream with squint quoins up to the beginning of the arches (Reg. des Dél. I., Nr. 89, 94).

The masonry of the piers was composed of a plinth wall measuring in width 6.17 m (3 Toises), and square layers of bricks which tapered to 4.55 m (2.2 Toises). From this width the piers were to be bricked up straightly up to the beginning of the arches. The corners and fronts of the piers exposed to the water were executed with hard limestone from the quarry of Vernon and St.-Leu, which was later on often used for Parisien houses up to the seventeenth century, especially at places, for instance the Place des Vosges or Place Dauphine. The founding was composed of lime, sand and siliceous sandstone, reaching to a depth of 30 m.

For the tracing of the bridge road Fra Giocondo and Jehan de Fellin handed in different proposals in March 1504. The bridge commission decided on July 20th in favor of combining the design of Fra
Giocondo and Jehan de Felin. The bridge road was to mount from both ends to the middle of the bridge, beginning in the middle of the second arch with a gradient of 3.4 cm every 195 cm up to 5.40 cm (Reg. des Dél. I., Nr. 186). The construction of the vaults was composed of six arches, two for the load of the houses on either side of the bridge and two for the bridge road. These arches were fitted together by stone plates measuring 65 x 97 cm. Like roman concrete the inner masonry was composed of a mixture of rubble, siliceous sandstone, coarse stuff and lime-sand mortar (Reg. des Dél. I., Nr. 212). The reports on the execution of work and the costs for the rebuilding of the Pont Notre-Dame were handed over to the archives of the city of Paris in 14 separate registers, but got lost during the French revolution in 1789.

**Broadening and regulation of streets**

Of special interest is the traffic planning of the bridge and the adjoining streets on the banks (Reg. des Dél. I, Nr. 213, 218). Along with the tracing of the new bridge extensive road works for the adjoining streets became necessary, the roads had to be straightened and brought to the same level. On this occasion the City Council of Paris seized the chance to broaden and straighten for practical and esthetic reasons (“pour la décoration de la ville”) the main streets of the area between the Pont Notre-Dame and Petit Pont (Reg. des Dél. I., Nr. 266; Sauval, S., Hist. et Recherches ... de la ville de Paris, Paris 1724, vol. I.). According to the decision of the Building Commission on July 23th 1507 streets were to be broadened to a width of up to 6.50 m. To achieve this a number of houses had to be demolished, and this was considered necessary and tolerable for the benefit of the general public (“...pour le bien et utilité de la chose public”). Mention should be made of that the levelling of the streets also meant regulation and development of parts of the banks, for instance Quai des Gesvres and Quai de Pelleterie.

G. Corrozet mentions in “La Fleur des antiques... de la Ville de Paris” festivities on the occasion of finishing the sixth and last arch of the bridge of Pont Notre-Dame on July 10th 1507. However because of the still ongoing building of the bridge houses (up to 1512) the bridge road could not yet be opened to the public.

**House Structures**

The 23,60 m wide road of the bridge was designed from the very beginning not only for the traffic but so as to put up two rows of houses with shops on the groundfloor. These bridge houses, representing a new type of urban building blocks, have been of special interest. It has been argued, particularly by French authors, that the narrow buildings with gables to the street are similar to French medieval houses, so as to prove the influence of the French masters on the design (J. Mesqui, in: Rassegna, Dec. 1991, who also points to Didier de Felin as only architect). Certainly the building of two rows of houses with 34 houses each was realized under the master of building Jehan de Felin, who held the office of the city master builder till 1529. The houses had shops at ground level, opening to the street, lightened by an uninterrupted sequence of large windows, which were
framed by arches, on the river side balconies and kitchens, two upper floors and an attic on the third floor.

But the planning and construction of the facades were only possible in an understanding of Italian design principles of composition. Only a few years earlier the symmetrical concept of the place Piazza Ducale with arched arcades in Vigevano/Lombardy (1495-98) had been completed, probably by Bramante (Braunfels, W., Abendländische Stadtbaukunst, Köln 1976). It can be assumed that Fra Giocondo knew the Piazza and more so that his elevations and models were taken into consideration for the construction of the Parisian bridge, the arches, the piers and the road with rows of houses (1502-05).

Another possible indication of authorship leads to the Castle of Amboise. For the modernization of the building from the Middle Ages Charles VIII had called for Fra Giocondo. He and Domenico da Cortona began 1497 with redesigning and construction of a side wing of the castle (Montaiglon, A. de, Etat des Gages de Ouvriers italien employés par Charles VIII, Archives de l’Art français 1851/52). The (probably in 1497-1500) newly designed wing of the castle, called “Logis des Sept Vertus”, showed standardized fronts with arcades and gables of the same type which became later the architectural style of the Pont Notre-Dame (Ducerceau, J. A., Les Plus Excellents Bâtiments de France, 1576-79). The preserved drawings by Fra Giocondo in the Bibliotheca Medicea-Laurenziana show an amazing row of similar houses with gable houses which may serve as proof for his authorship of the design of the Parisian bridge houses. The explaining text, written by Fra Giocondo in French, even mentions measurements of the houses (Bibliotheca Medicea-Laurenziana, Plut 29, Cod. 43; V. Fontana, Fra Giocondo, 1988). **Figs. 3, 4.**

![Figure 3. Castle of Amboise, Courtyard with the “Logis des Sept Vertus”](image)
The shops and workshops of the groundfloor of the bridgehouses were made of parallelepipedal cut stone and according to the contract the adjoining floors were to be built with limestone. Finally the upper floors were bricked up and framed with limestone on the corners and window openings. The combined use of bricks and hawn stone for constructional and functional reasons was new at that time in Paris. Because of danger of fire it had been decided to make use of fireproof materials, and hawn stone served this purpose best. The lesser weight of bricks allowed to reduce the total weight of the construction. The use of square stones for the corners, windows and on groundlevel stabilized the thin bricks walls.  

Figs. 5, 6, 7, 8.

Figure 5. Pont Notre-Dame, Engraving by Jacques A. Dürercedeau, the Elder, around 1575
(the Title “Pont St. Michel” is a mistake)
Figure 6. Pont Notre-Dame, Bridge Houses Plan, Reconstruction M. Mislin

Figure 7. Prospect of the Pont Notre-Dame, around 1660, Engraving by J. Marot
According to the building contracts ("Comptes des Bâtiments du Roi") the square stones were fitted into the walls throughout in such a way that they could carry on all floors the joists of the floors. This combination of hewn stone and bricks proved to be a very accentuated new element of design and was going to be taken up one hundred years later on building the Place de Dauphine, the Place Royale (Place des Vosges) and others. 68 houses were completed in September 1512 and the bridge was opened to traffic (Livre Rouge de Châtelet, in: Registre des Délibérations, I., Nr. 266) 1786 the houses were demolished by edict. The painting of Hubert Robert, shows the bridge construction, stripped by its massive superstructures. Fig. 9.
PONT MARIE

The building of the bridge Pont Marie, connecting the district of St.-Paul on the right river bank and the island of St.Louis, was one of the first building actions for the development of the vacant island, which can be looked at as speculative operation. Already in 1610 the king Henry IV had given his consent, and also the City Council of Paris was in favor of building the new bridges Pont Marie and Pont de la Tournelle, the more so because the financial responsibility lay with the entrepreneur. The entrepreneur Christophe Marie was allowed to buy the grounds at a price of 1 Dernier per square-Toise (4 square-meter) (Dumolin, M., Études de topographie parisienne, vol. III, p. 9,10,16 f.). Two more financiers joined the enterprise 1611: L. Pulletier and F. Le Regrattier. They sponsored the building materials. The nearly rectangled piece of 4200 square meters of land on both sides of the Rue St. Louis was devided into three shares, one for each entrepreneur. However the allotment of the plots and the tracing of the streets were executed by the master of masonry for royal buildings Remy Collin and the master of carpentry Louis Marchant. Figs. 10, 11.

But difficulties arose because the proper owner of the island, the chapter of Notre-Dame, had not been informed beforehand. Between 1616 and 1618 an annual revenue of 1200 Livres for Notre-Dame was agreed upon (Delamare, N., Traité de Police, I, p. 102). Recurring financial difficulties caused the royal secretary Jean de la Grange to take over the financing from 1623 up to 1627, when
the entrepreneur Christophe Marie took over again responsibility. The bridge was completed in 1630 and open to traffic in 1635 (Malingre, C., Annales de la Ville de Paris, 1640, p. 514, in: Arch. Nat., S 230).

Figure 11. Pont Marie and Île St.-Louis, Plan of Plots, Reconstruction M. Mislin

Building Construction

According to the first notes from April nineteenth 1614 the bridge Pont Marie was going to be built with square stones like the Pont Notre-Dame: “in model, structure and symmetry”. Like in the case of the Pont Notre-Dame the final dimensions were decided by a Building Commission, August 1614. A span of 91.65 m (47 Toises) was laid down for the bridge Pont Marie, the width of the road being 15.60 m (8 Toises). Festivities for the laying of the foundation-stone took place in presence of the royal family on October 11th 1624. Responsible for the bridge construction were the master masons Charles Contesse and Jean de la Noue. Figs. 12, 13.
Figure 12. Pont Marie, Arch and Pier Numbers, Reconstruction M. Mislin

Figure 13. Île St.-Louis, Pont Marie, Section of the Map of Brettez, called “Map Turgot”, 1737-41
Varying from the Building Commission’s decision in 1614 for a bridge with 5 arches, 4 piers on pile grating and 2 supports the building survey of 1806 shows two piers on pile gratings and a third one with half pile grating. The remaining piers are built on wooden plates with foundation layers (Bibl. Ec. Nat. Des Ponts et Ch., Ms. 4°.1701). The total span measured 92,27 m, die bridge road 23,52 m. The width of the arches which were but for the second arch executed semicircular was as follows:

1. Arch 13,96 m
2. Arch 17,65 m
3. Arch 16,20 m
4. Arch 14,25 m
5. Arch 13,76 m

Figure 14

After the flood in March 1658 the two arches near the island of St. Louis tumbled down, 1667 they were reconstructed on a plate foundation (Arch. Nat., Z 1 F 1065; Félibien, M., Histoire., II, p. 1725).

**Bridge Architecture**

The architectural impression is given by the alteration of piers and semicircular arches. The piers are enforced downstream and upstream by acute-angled ice-aprons at a height of 4,15 m, ending with a triangular capping. The four piers are decorated underneath the bridge road with 1,10 m wide niches, the height varying with the rise of the bridge from 3,35 to 3,65 m. The niches are framed by two wall pillars and closed by triangular gables. The architecture of the niches did not orientate on Roman models but rather on models of the early baroque like projects of A. Palladio, for instance the Rialto bridge in Venice.

**Bridge Houses**

The Bridge Commission had agreed on April 13^{th} 1614 to build two rows of houses with 25 buildings. Finally the rows were to be prolonged along the Quai des Ormes downstream and
upstream. The major part of the work had been finished when Christophe Marie and his partners retired in 1643 from the operation. The State Council appointed on May 2\textsuperscript{nd} 1643 a commission of six proprietors for the bridge houses to carry out and control further building. The master carpenter Claude Dublet took over responsibility on June 10\textsuperscript{th} 1643. He worked with Denis Hébert and Louis Le Vau, later architect of the king, who designed several houses on the island and also financed their building as speculating entrepreneur. They built 46 bridge houses on plots of 30.43 square meters (8 square Toises) which had not been erected hitherto at costs of 172 000 Livres each. The majority of the buildings were completed by 1647 and occupied at the latest by 1652 (Dumolin, M., op. Cit., p. 39 ; Lambeau, L., Rapport concernant la conversation du Pont Marie, in: CVP 1920, p. 147). The bridge houses were demolished by edict of 1786, just before the French Revolution. \textbf{Fig. 15}.

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure15.jpg}
\caption{Pont Marie and the Île St.-Louis, 1757, Oil on Canvas, Nicolas and Jean-Baptiste Raguenet, Paris, Musée Carnavalet}
\end{figure}

The bridge houses of the Pont Marie, built in the middle of the seventeenth century, show with their continuous roofing on the eaves fronts the spirit of the baroque. The facades are no longer built with narrow gables like the houses of the Pont Notre Dame, but are combined into one elongated building. Due to the speculative character of the development project, the houses were executed economically. The facades to the river were no longer built with hewn stones and bricks, but half-timbered and decorated with plaster. This was done in such a perfect manner that on the painting of Nicolas and Jean-B. Ragueret the outer appearance of the houses of the Pont Marie resembles the better built ones on the island and the banks.

\textbf{Maison Le Vau}

Differing from those poorly-built bridge houses, the “Maison” was the residence of affluent citizens, belonging to the bourgeois class, having already come to wealth and influence. The “Maison” represented their social position and repeats the model of the aristocratic Hotel de Ville or even the royal castles: with a garden, a court of honours, stairs and the “apartment of parade”

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(parlour), salon, cabinet, chambre and antichambre. The still today standing Louis Le Vau Maison at the north of the island has 4 floors (182 square-metres), is executed in hewn stone and decorated with plaster. Massive wall pillars run up the middle of the front facade up two floors. The house was built between 1640 and 1641 and was not only meant as a residence for the owner but contained small flats for rental. After having lived there for a short time, Louis Le Vau sold the house to his neighbour Jean-Baptiste Lambert, Counselle and Secretary of the king (Arch. Nat., Z 1j 258; Bibl. Nat. Est. Ve 53 j).

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