Ponte Milvio in Rome. Building techniques and history of restoration work

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1. HISTORICAL SOURCES

The Milvio bridge was already standing in the 4th century BC. (Nibby 1837, II. p.583). Like many other bridges in Rome (Sublicio, Emilio, Fabricio, Cestio, Agrippa, Neroniano, Elio, Antonino or Ponte Aurelio, Probo, Valentiniano), (Adam 1994, 10, p.308-309) it was built in wood so that it could be destroyed should there be an enemy attack. Initially it served to facilitate traffic between Rome and Etruria after the conquest of Veio in 396 BC. Ponte Milvio became important when the Flaminian way was opened in 220 BC as it was part of the long route starting from the Flaminian Gate, now known as Porta del Popolo, and running northwards to the Adriatic Sea and the Po valley (Ashby-Fells 1921,134-138; Nash 1962, pp.210-212; Brizzi 1962, p.27, p.143; Carbonara-Messineo 1993, pp.7-8).Over the centuries the bridge is often mentioned: the earliest reference is dated 207 BC when the Roman army crossed the bridge on its return from the battle of Metauro after its victory over the Carthaginians. We can read of M. Emilio Scauro , the Censor, who in 109 BC re-enforced the structures: recent research shows that lime mortar was used to create greater adhesion between the blocks of tufa and travertine (Valentini-Zucchetti 1946, III, p.135; *Ibidem.* 1953, IV, p.283; Lugli 1953, II, p. 105-111, nn.107-112, Lugli 1958, p.243, 321).

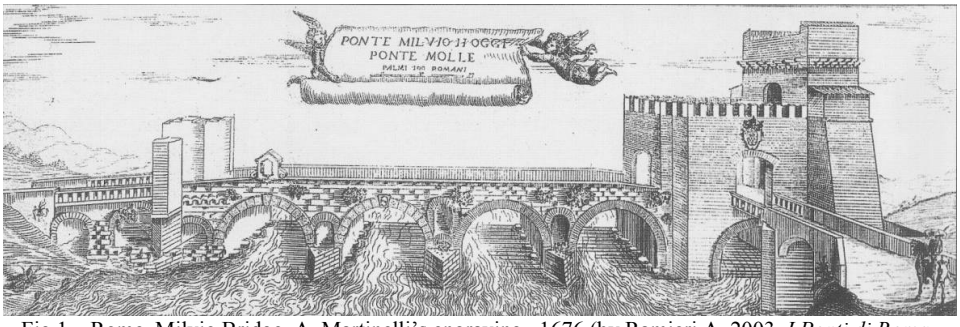

Fig.1 – Rome. Milvio Bridge. A. Martinelli's engraving , 1676 (by Ramieri.A. 2003. *I Ponti di Roma*, p. 47, fig. 30).

This important work was so well executed that there was no need to include it in Augustus' programme for restoring the bridges along the Flaminian Way (Blake 1947, p. 134; Ramieri 2003, p. 46). The *princeps* simply added an arch, on the Rome side, and placed on top Augustus, crowned by Victory, in a chariot drawn by four horses (Donini 1969, pp.24-27,

fig. 2).In this period Ponte Milvio was probably built in stone (Ballance 1951, p.80; O'Connor 1993, 5, p. 64-65) like Ponte Emilio : the first stone bridge in Rome with piers constructed in 179 BC and which probably had six arches. We can imagine what it looked like by examining the stone bridges still existing today and thereby define their technical features : the construction of the foundations and piers was the most difficult stage especially when river levels were high and watertight palissades were required to isolate the surface and the volume (Gros 1997, cap. V, 12). Special solutions and devices for the construction were needed to reduce a) the effects of erosion produced by the current and its pressure on the piers and b) the damage wrought by tree trunks brought down stream by flood water. Other sources, dating from the Republican and Imperial eras, refer to the bridge with descriptions of events occurring nearby and linked to wars or friendly or enemy troops crossing it. The most important records mention Constantine's victory over Massenzio: the latter was killed at Ponte Milvio in 312 AD; how Onorio crossed the bridge in 403 AD before reaching the Palatine and how in 466 AD the Prefect Lampadio, in going there, became the victim of the Roman citizens' discontent due to the serious economic situation (Ramieri 2003, p.46).

The bridge is frequently mentioned for various reasons in Medieval times. In 537 AD Vitige set up one of the seven so-called Nero's camps nearby to control the bridge during the siege of the Goths (Duchesne 1955, I, p.291); Belisario fortified the bridge with a bastion on the right bank probably using the structures of a previous embattled tower called Tripizone in masonry and wood which had been built to prevent enemies entering the city (D'Onofrio 1970, p.183; Tomassetti 1976, p.318). It is also mentioned in 14th century documents (Tomassetti 1976, p.216-219); it was the only bridge to be spared by Totila (*Ibidem* ,I, 19). who had destroyed the bridges over the Aniene river; in 770 AD it was crossed by Cristofero and Sergio, two members of the Rome nobility, who were in conflict with both King Desiderio of the Longobards and Pope Stefan III (Duchesne 1955, I, pp.469-470). The bridge's name appears in the biography of the popes : during the reign of Theodore (642- 649) it is used to locate St. Valentine's nearby basilica on the Via Flaminia and also associated with the flooding which occurred during the reigns of Pope Gregory II and Hadrian (*Ibidem,* I, p. 333, 399, 513). In the Carolingian era it saw important figures travelling over it such as Pope Leo III on his return from Paderborn in 499 AD, followed later by Charlemagne who journeyed to Rome to be crowned emperor (*Ibidem,* II, p. 6). In the 9th century AD two German sovereigns carefully selected the zone around Ponte Milvio for negotiations with their enemy: the Rome authorities; the former for communicating his intentions to the Roman citizens (855) (*Ibidem,* II, p.142) and the latter as a resting place while awaiting the Rome authorities' welcoming committee before being escorted to St. Peter's (896) (*Ibidem,* II, p.142); (Tomassetti 1976, p.314). At this time the bridge was a *statio* along the route of religious processions for the Rome faithful (Bosio 1632, p.575; Tomassetti 1976, p.260).

There are a great number of documents referring to the restoration work which took place between the 12th and 15th centuries, especially in the 15th century illustrating the changes the bridge underwent. The first document dated 1149, when the municipality of Rome carried out consolidation work, is a letter sent by the senators to Emperor Corrado III (Bartoloni,1948, p.5): proof of the restoration work is the presence of shingle in the wall structure on the right of the last arch of the bridge; a low tower was erected on the bridge, perhaps during the 1149 work, close behind the Tripizone, thereby thickening the underlying pier and closing the flood outlets (Ramieri 2003, p.60); more restoration work repaired the damage caused by the Orsini in 1335 (Gregorovius 1988, p.100), thanks to donations made by Queen Joan of Hungary who answered Brother Acuto's requests (Anonimo Romano 1979, p. 65); in 1408 the bridge became viable again after repairs (Antonii Petri 1917, p. 23) following the damage caused during a citizens' revolt triggered off by the decision to exclude the bridge from Municipality property (Giorni 1882, p. 170, 295-206; Infessura 1890, p. 11); *pons Mollinus* was subjected to a " reparazione" in 1428 by Francesco di Genzano, and followed immediately by an "aptatione" in 1432 (Müntz 1878, p.51); Pope Nicholas V started restoration work in 1454 which was completed by Pope Callistus III (1455-1458) and evidence of this can be seen in the marble plaques attached to various parts of the bridge(*Ibidem,* I, p. 158, 203, 297). In 1462 it was renovated for the transport of Andrew of Narni's relics which were carried in a solemn procession from Narni to Ponte Milvio where they were received by Pope Pius II (Infessura 1890, p.66).From 1464- 1471 Pope Paul II had repair work carried out as did Pope Sixtus IV

from 1471 - 1521 (*Ibidem,* II, p.99-100; III, p.199).Two early 15th century miniatures show the bridge with eight arches and three towers(Frutaz 1972, tavv. 148-150), other documents comprise a map painted by Taddeo di Bartolo in 1407 (*Ibidem,* tav.149), a miniature dated 1447 (*Ibidem,* tav. 153), two miniatures by Pietro del Massaio dated 1469 and 1471 (*Ibidem,* tavv. 157-158), Alessandro Strozzi's view of Rome (*Ibidem,* tav. 159) and Brother Giocondo's description of the bridge (Mikhailova 1970, p. 258,fig. 6).

In the 16th, 17th and 18th centuries the bridge was still the centre of historic events and therefore required occasional repairs (Infessura 1890, p. 178; Martinori 1929, p. 43-44; Bauer, 1927, p. 353; Tomassetti 1976, p.315; Gregorovius 1988, XIII, 5, vol. 5, p.246), it is mentioned in rent contracts (ASR, *Camerale* III, b. 1931, c. 183, cc. 172-176; D'Onofrio 1970, pp.196-197, nota 21), and appears in stories about Roman citizens (ASC, *Camera capitolina,* Credenzone XIV, t. 19, cc. 75, 75v, 78v, 81; *Ibidem,* t. 20, c. 158).Some of the work on the bridge was aimed at safeguarding the citizens from the effects of contagious diseases: a barrier was erected on the right bank of the bridge to stem a terrible plague: Matthiae 1947, p.68), or preventing damage from the Tiber's terrible floods: after the disastrous one in 1647 (Gigli 1994, p. 508) the Dutch engineer Cornelio Meyer was called, around 1680, to oversee the construction of long overdue piles (Meyer 1685, 28, tav. 26). Other restoration work saw consolidation to the east of the first arch of the bridge which had started crumbling in the 17th century (Meyer, tav. 28) consisting of small arches on corbels (early 17th century painting by G. van Wittel, : D'Onofrio 1970, fig. 36; engraving by Rossigni del 1822: Apollonj Ghetti 1975, p.24-25) which formed the lower, projecting part of one of the walls of the forepart at the southern entrance to the bridge.

The most innovative restoration in the 19th century was undoubtedly achieved in 1805 by G. Valadier, nominated by the Vatican, who sought to eliminate the defects arising from the poor state of conservation of the existing wooden parts of the bridge seriously damaged by yet another flood. G. Valadier himself recorded his work(ASR *Camerale* 1805, II, Tevere, b, 7, fasc. 40), highly praised by G. A. Guattani (Guattani 1806, I, p.6-7), who emphasised their importance since primarily they gave the bridge its definitive look. The work also eliminated the inconvenient vaulted structure near the tower at the entrance to the bridge; it was replaced by a wide opening and a series of big lacunar arches in a straight line so that carriages, men and carts and pedestrians were able to cross the bridge without accidents to vehicles or loss of life. Besides restoration of the structures, work was also undertaken to enhance the bridge's exterior: the existing statues were restored and new ones added: sites specifically chosen for more statues, the paving renewed, the bridge's railings and pavements repaired and trees planted on both banks. G. Valadier's exacting work was achieved so quickly that Pope Pius VII was able to cross the bridge in 1807 on his return from Napoleon's coronation in France(Donini 1969, p. 189-190). Some of the statues appearing in the plans were erected later: those of St. Peter and St.Paul were placed there after 1807 (Ramieri 2003, p.54). It was only in 1825 that the 17th century statues of Christ's baptism, originally destined by Mochi for the church of St. John of the Florentines, were erected in the little space at the northern abutment. In 1956 these statues were transferred, for better conservation, to Palazzo Braschi museum and replaced by copies (Pietrangeli 1971, p. 64-65). Certificates of payment dated 1812 give proof of unspecified maintenance work on the bridge (ASR, *S. Congregatione Buon Governo,* Serie III, b, 104) which continued to be the preferred site for welcoming illustrious visitors (Boschi 1885, p.18-24; Martinori 1929, p.46-47; Hartmann 1965, p.224-238). The fighting between the Garibaldini and the French troops caused damage to the bridge (*Rapport de la Commission mixte instutée à Rome pour constater le dégats occasionées aux monuments pendant la siège de cette ville, Ministre des Affaires Etrangères,* Paris 1850; Spada 1869, III, p.589-590) which was repaired after 1849 by Francesco Azzurri. His work entailed : filling the spaces between the arches and above the flood outlets in the piers, remodelling the parapets and reconstructing the ruined arch. In distinguishing the modern bricks from the old brickwork curtain he also covered 19th century bricks with a film of lime mortar to avoid a colour clash with the extrados of white travertine (Marconi 1979, p. 124). Even though the fighting in 1870 did not affect the bridge, it was probably F. Azzurri who carried out the complete restoration in 1871 (D'Onofrio 1980, p.196). In 1883 the first pier in the stream was found to be joined to the quay; the subsequent revision of R. Delbrueck's survey has provided the precise shape and measurements of the smaller arch in the southern abutment as well as the central position of

the two arched outlets . In more recent research (Galliazzo 1994, II, pp.34-36) it is suggested that the opening adjacent to the river provided a flood outlet, and the central arch a subway for men and carts. It is thought that the third small arch adjoining and slightly raised above the bank was for pedestrians. All three perfectly symmetrical corresponding openings were at the end on the bridgehead and provided an outlet for flood water. This hypothesis seems to be confirmed by Brother Giocondo's description of the bridge quoted earlier.

The bridge was damaged when crossed during the March on Rome and by German armed vehicles on both their entry and retreat from the city (Donini 1969, p.201). In 1962 a series of steps was constructed to slow down the current and increase the bridge's stability (Morelli 1980, p.30).During work on the Tiber embankment in 1982 a stretch of quay in tufa blocks came to light, edged on the river side by travertine blocks, which joined the left bank to the first old pier. A few metres away from the pier and close to the escarpment of the Tiber embankment road a square-based mausoleum was unearthed , probably dating back to the 1st century AD (Virgili. 1983, p.124-126).A few years later excavations made during consolidation work revealed tracks caused by cartwheels in the extrados of the Roman arches where defects in the keystones can be traced back to Massenzio's restoration work (Virgili. 1985, p.148).

The latest findings and most recent reports following restoration work in 1985 make no substantial changes to the bridge's original system as outlined by R.Delbrueck, at the beginning of the 20th century. His analysis based on the material used for all the surviving, recognisable parts: Tufa from Grotta Oscura for the nucleus of the construction, Gabine tufa and travertine for external facing, is still accepted today (Delbrueck 1907, pp.3-11, tav.II; Lugli 1958, p. 308-310, 325, 356, tav. LXIX,3).

2. DESCRIPTION OF THE ARCHITECTURAL STRUCTURE

Ponte Milvio, 150 metres long, and about 7.50 metres wide, crossed the Tiber with six arches: the central arches were about 19 metres wide and the two smaller lateral arches about 9 metres wide. The two major arches nearest the left bank with their slightly lowered curved arch and travertine extrados, are the only ones almost completely conserved .Their almost identical height entails a slight drop in the road surface above the smaller arches at both ends. The three square piers widen gradually under water; in early times , both up- and down-stream , they had triangular points which over the centuries have been mostly restored. Parts of the ample flood relief outlets are still visible in the first three piers with their travertine extrados and sills set two rows above the springer of the arches. The first span and south abutment have been extensively reconstructed, and the original northern abutment is now buried (P, Gazzola shows a seventh span in the northern approach). There are also floodways in the four more southerly piers. They differ considerably in geometry: the first two are small in height and set low; the next has its crest high up, close under the roadway, but the bottom of the opening is also high; the fourth again has a high crest, but its base is somewhat lower, providing the tallest opening of the four. There is no flood opening between the last two spans from the southern end. The first span, which is of brick, is entirely new; the second and third spans have travertine facing for the complete arches, but in two different styles. The lower courses have alternate stretchers and headers; that is, each alternate voussoir is composed of two stones. The upper voussoirs are each formed of a single stone, with the outer face left rough. Travertine is used only for the facing and the first course of the vault; the remainder is Gabine stone. The fourth span has three styles of construction; the lower courses show the two stages of travertine facing found in the second and third spans; the upper courses are of brick. The fifth span, apart from seven courses at its southern end, which are of the second period of second and four foot spans entirely of brick, as is the sixth span. The earliest work is from 109 BC; the second travertine stage may belong to the first century AD.; and the brickwork of the fourth and fifth spans is from the time of Nicholas V. The roadway was originally horizontal between the centres of the second and fifth spans, and then sloped down to each bank. This has since been modified at the southern end, where the roadway is now horizontal. The upper arch in the first span presumably also forms part of this modification. The tower on the north abutment carries an inscription from 1849. There was an arch erected on the bridge in 27 BC. to honour Augustus at the time

of his restoration of the Via Flaminia, but this may have stood over the central pier. The first span and south abutment have been extensively reconstructed, and the original nothern abutment is now buried (P, Gazzola shows a seventh span in the nothern approach). There are also floodways in the four more southerly piers.They differ considerably in geometry: the first two are small in height and set low; the next has its crest high up, close under the roadway, but the bottom of the opening is also high; the fourth again has a high crest, but its base is somewhat lower, providing the tallest opening of the four. There is no flood opening between the last two spans froim southern end. The first span, which is of brick, isentirely new; the second and third spans have travertine facingfor the complete arches, but in two different styles.

Fig. 2 – Rome.Milvio Bridge. The arches and Valadier's Tower (East side).

Fig. 3 – Rome.Milvio Bridge. The arches and Valadier's Tower (West side).

The lower courses have alternate stretchers and headers; that is, each alternate voussoir is composed of two stones. The upper voussoirs are each formed of a single stone, ith the outer face left rough. Travertine is used only for the facing and the first course of the vault; the remainder is Gabine stone. The fourth span has three styles of construction; the lower courses show the two stages of travertine facing found in the second and third spans; the upper courses are of brick. Fifth span, apart from seven courses at its southern end, which are of the second period of seond and fourft spans entirely of brick, as is sixth span. The earliest work is from 109 BC; the second travertine stage may belong to the first century AD.;and the brickwork of fourth and fifth spans is from the time of Nicholas V.

Fig. 4 - Rome. Milvio Bridge.The Valadier's Tower, North-West side.

Fig. 5 - Rome. Milvio Bridge.The Valadier's Tower, South side.

The roadway was originally horizontal between the centres of second and fifth spans, and then sloped down to each bank. This has since been modified at the southern end, where the roadway is now horizontal. The upper arch in first span presumably also forms part of this modification. The tower on the north abutment carries an inscription from 1849. There was an arch erected on the bridge in 27 BC. to honour Augustus at the time of his restoration of the Via Flaminia, but this may have stood over the central pier.

3. CONCLUSION

Today Ponte Milvio is a pedestrian zone and is still one of the most outstanding examples of construction technique having resisted the river currents and flooding as well as human misuse and destruction. It is still an historical and topographical point of reference in the millennial annals of Rome.

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