

Territorial and Urban Infrastructures: Ports, Roads, and Water Supply

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In the mid-15th century, Leon Battista Alberti in the preface to his *De re aedificatoria*, the first modern architectural treatise, claimed the primary role of architecture as the origin of all civilizations. Since cities, society, art, and culture could emerge only after wildness had been overcome, architecture was the starting point for every civilization and history, being the means by which humanity imposed its power over Nature.¹ “By cutting through rock”—Alberti writes—“by tunnelling through mountains or filling in valleys, by restraining the waters of the sea and lakes, and by drawing in marshes, through the building of ships, by altering the course and dredging the mouths of rivers, and through the construction of harbours and bridges, the architect has not only met the temporary needs of man, but also opened up new gateways to all provinces of the world”.²

These ideas were the legacy of ancient authors who had praised the construction of infrastructure as the main task of architecture. In the 1st century BCE, the Greek historian and rhetorician Dionysius of Halicarnassus declared that “the three most magnificent works of Rome, in which the greatness of her empire is best seen, are the aqueducts, the paved roads and the construction of the sewers.”³ According to Strabo, Roman prudence was more particularly employed on matters which had received little attention from the Greeks, such as “paving their roads, constructing aqueducts, and sewers,” and Cicero, for his part, wrote that it was more valuable to build aqueducts, ports, and city walls than any other buildings.⁴

In the early modern period, the remains of huge Roman infrastructures were still admired by humanists; their magnificence was still on display not only in Rome, but also in southern Italy, where many of them were clearly visible and

1 On the multiple implications of this notion in Alberti's thinking, see Tafuri 1992, 60 and the English translations in Tafuri 2006, 50.

2 Alberti (ed. Rykwert et al.) 1983, 3. See also Alberti (ed. Orlandi) 1966, 9–11.

3 *Dion. Hal. Ant.*, iii 67 5.

4 Cicero, *De Officiis*, II, 60. Strabo, 5.3.8.

some structures were still performing the functions they had been built for.⁵ In this chapter we will focus on the ports, roads, and aqueducts of the Kingdom of Naples between the 15th and 16th centuries. We will see how, rather than being most remarkable for their innovations presumed to be characteristic of the Renaissance, such works were notable for a continuity with antiquity and medieval times; even if they were less appealing in appearance than palaces or churches, they still acquired a literary renown, being celebrated in inscriptions, civic chronicles, and poems. In addition, although southern Italy contains many famous individual buildings, the enormous extent of the Kingdom, stretching from Sicily to Rome, made interventions in the territorial infrastructure take on even greater importance.

Travelling across Seas: Ports

The Kingdom of Naples occupied the southern portion of the Italian peninsula, jutting out into the centre of the Mediterranean with a coastline measuring about 2,500 km: it is quite obvious, therefore, that maritime connections played a pre-eminent role.⁶ The main ports were in the Terra di Lavoro (Gaeta, Baia, Naples), Terra di Bari (Trani [fig. 26], Barletta, Bari) and Terra d'Otranto (Brindisi, Taranto).⁷ The rest of the coast was served by a minor network of marinas and harbours used by medium-sized and small boats for trading agricultural and handcrafted products.⁸ In mostly mountainous regions, such as Calabria and Abruzzi, even these short-distance maritime connections had a great importance for assuring the exchange of goods.⁹

Several ports in southern Italy had been famed since antiquity. A few of them had declined in importance, such as Pozzuoli, where, however, the ruined arched structures of the Roman pier—the so-called ‘Bridge of Caligula’—continued to excite the admiration of Neapolitan and foreign architects (fig. 29).¹⁰

The natural port of Brindisi had been one of the most famous in antiquity: located at the eastern end of the Appian road, it was the link between Rome

5 Günther 2008.

6 Braudel (1949) 1995.

7 Simoncini 1993, 1–13.

8 Sirago 1993a; Sirago 1993b.

9 Figliuolo 2015. See Sakellariou in this volume.

10 Palladio 1570, 214; Fontana 1604, fol. 26^r; Scamozzi 1615, 293, 295. See Spampanato 1926, 266–267; Buccaro 1993, 129–131.

and the eastern provinces of the Empire. In medieval times it became a main point of departure for the Crusades, and it was from there that Frederick II embarked for the Holy Land.¹¹ It preserved its importance under Angevin rule, when Charles I built the dockyard, and in 1278 had a massive iron chain made which could be used to close the entrance to the port in case of necessity.¹² With the connection to Angevin Greece, the Dalmatian coast, Hungary, and Jerusalem assured, the port flourished but went into rapid decline after 1446 when Giovanni Antonio Orsini Del Balzo (1401–1463) deliberately obstructed its channel of communication with the open sea.¹³ Yet its fame did not diminish and indeed expanded beyond the boundaries of the Kingdom. The Ottoman mapmaker Piri Reis (d. 1533) made a schematic representation of it, focusing on the exact location of the fortress and the appearance of the chain which was used to close access to the port.¹⁴ The architect Andrea Palladio (1508–1580), a cultivated antiquarian, also became interested in the port, which he depicted in an elegant woodcut made for the new illustrated edition of Caesar's *Commentaries* published in Venice in 1575 (fig. 28).¹⁵

Palladio would later publish another etching of a port in southern Italy, the image of Taranto in antiquity, as one of the illustrations made for a new edition of the *Histories* of Polybius (fig. 27).¹⁶ Taranto was a natural alternative to Brindisi for connections with the eastern Mediterranean, but unlike Brindisi it retained its importance during the 15th century, as demonstrated by a chronicle of 1444 which lists it among the leading cities of the Kingdom.¹⁷ It was formally the capital, if not the residence, of the powerful Princes of Taranto, the Orsini Del Balzo, who in 1459 led the rebellion against Ferrante. After they were defeated and the city became part of the royal domain, fortifications and other facilities for the port were enhanced. Between 1481 and 1492 the castle was rebuilt and a new canal constructed between the town and the mainland, thus transforming it into an island.¹⁸ It is worth noting that the information we

11 Sirago 2000.

12 Sirago 2000, 86–87. For chains enclosing ports, see Zorić 1989.

13 Della Monaca 1674, 52–66, 508–510; Pignonati 1781, 1, 3; Vacca 1956, 373–378; Sirago 2000, 89–90; Alaggio 2009, 227–245.

14 Baltimora, Walters Art Museum, manuscript W.658, fol. 205a. See Ventura 1988; Bausani 1990; Ventura 1991; Soucek 1992.

15 Caesar (ed. Palladio) 1575, plate between 204 and 205; Beltramini 2009b, 177–225, in particular 212, tav. 29.

16 Beltramini 2009b, 85–176, in particular 160–161, tav. 36. For a discussion of Palladio's illustration for modern editions of classical authors, *ibid.*, 12–77.

17 Fouchard 1877, 744.

18 Porsia and Scionti 1989, 52–53, 55; Kassler-Taub 2019.

have about this project comes from a literary source, the *De situ Japigae*, written around 1511 by the Puglian humanist Antonio de Ferraris, known as Galateo.¹⁹ Galateo compared the plan of Taranto to the form of a ship and wrote that on the side of the town that corresponded to the poop Ferrante and his son and heir Alfonso had a canal (*fossa*) excavated which was wide enough to allow the passage of “long ships”.²⁰

Between 1487 and 1497 a similar feat of engineering was achieved not far from Taranto, in Gallipoli, where again a canal was constructed, which detached the town from the mainland and thus transformed it into an island.²¹ Both these engineering exploits were part of a new and wider concern for fortifying the coastline of Puglia after the fall of Otranto to the Turks in 1480: this traumatic event triggered a large amount of fortification construction in almost every town along the coast.²² After the danger had retreated, the feverish drive to renovate the ports and fortresses of Puglia subsided. It was probably because it no longer served a useful purpose that the similar project undertaken in Bari by Isabella of Aragon soon after her return to the city in 1501 was never completed.²³ Her plan was to cut the isthmus linking Bari to the mainland in order to obtain a navigable channel between the two harbours of the city, one on the east coast and the other on the west. The work stopped after her death, and the parts which had already been carried out were destroyed in a torrential rain-storm in 1567.²⁴

While such large-scale projects or improvements were financed by the crown or local barons, the ordinary maintenance of ports, instead, was the responsibility of urban communities, which often negotiated with the king in order to obtain fiscal privileges which would allow them to undertake the work. For instance, in 1444 Alfonso I exempted Trani from customs tariffs so that the town could use the money it retained for repairing the port, and this privilege was renewed in 1468 by Ferrante.²⁵ Similar measures are documented in 1458,

19 See Iacono and Miletta in this volume.

20 Galateo 1558, 32: “Urbs circunflua, seu (ut Graeci dicunt) amphitalassa, oblonge insulae, aut longae navis habet speciem. A puppi manufacta est fossa longis navibus permeabilis, quae utrunque mare committit. Hanc Marcus Antonius Philomarinus, Ferdinandi et Alphonsi iussu, mira arte et ingenio perfodi curavit.” Marco Antonio Filomarino was not the architect, but the governor of the town, as specified in Galateo 1558, 42.

21 Bacile di Castiglione 1915, 80; Bacile di Castiglione 1927, 148–149; Kassler-Taub 2019.

22 Bacile di Castiglione 1927; Adam 1994, 127–138; Brunetti 2006.

23 See Cappelli and De Divitiis in this volume.

24 Beatillo 1637, 189–190.

25 Vitale 1912, doc. XIII; Sirago 1998, 123–124.

1465, and 1481 at Barletta, where a specific tax was created to support the maintenance of the jetty and port basin.²⁶

The ports on the Adriatic were more exposed to attacks from the Turks, but were also preferred by the merchants trading on the route between Venice and the East. From 1494 until the defeat of Agnadello (1509) many important seaside towns such as Trani, Barletta, Monopoli, Brindisi, and Otranto were under the control of the Republic of Venice.²⁷ The Venetians invested in their recent acquisitions: in 1496 they enlarged the jetty at Monopoli and in 1503 built a new arsenal in Trani.²⁸ It was during this period of Venetian dominion that the medieval *Ordinamenta et consuetudo maris* of Trani were printed.²⁹ During the War of the League of Cognac (1526–1530), Brindisi and other Puglian ports were taken again by Venice, but it was a short-lived conquest. The Spanish soon regained these towns and in 1532 included them among those needing fortification against the possibility of Turkish attacks. The list included the ports of Manfredonia, Barletta, Trani, Bisceglie, Monopoli, Brindisi and Otranto on the Adriatic Sea, Gallipoli, Taranto, and Crotone on the Ionian Sea and Gaeta, Ischia, and Reggio on the western coast.³⁰

The main aim of the Spanish government was not to develop port facilities, but to fortify the coastline and the ports in order to face the assault of enemies, in particular the Turks, coming from the sea.³¹ During the long peace which followed the battle of Lepanto in 1571, while the network of watch towers was expanded, the attention paid to the ports on the part of the Spanish diminished.³²

At the very end of the 16th century, however, it became impossible to ignore the need to repair the port facilities in southern Italy. However, the main efforts of the viceroys would be focused on the port of Naples. The great number of manuscript documents and drawings left by the Neapolitan and foreign architects who were commissioned to work on these projects in the city give us an idea of their professional and artistic calibre and attainment, men such as the former papal architect Domenico Fontana (1543–1606), renowned for raising

26 Loffredo 1893, I, 309, 327, 384, 399, 419; II, 323–335; Rivera Magos 2009, 55, note 44.

27 Jacoviello 1986; Jacoviello 1992.

28 Giustiniani 1797–1805, IX, 234; Jacoviello 1986; Labrot 1992, 215–292, 238; Sirago 1993a, 362.

29 Beltrani 1873; Fonseca 1984, 267–276; Sirago 1998, 127.

30 Sirago 2000, 94, who quotes from documents in the Archivo General de Simancas. On the fortification works undertaken under the Spanish, see Hernando Sánchez 2000a; Hernando Sánchez 2000b; Brunetti 2006.

31 Sirago 2005; Sirago 2009.

32 For watch towers in southern Italy, see Pasanisi 1926; Valente 1960; Gambacorta 1965; Santoro 1967; Faglia 1969; Faglia 1977.

the Vatican obelisk, the Nolan mathematician Colantonio Stigliola (1546–1623), a member of the Accademia dei Lincei and friend of Galileo Galilei, the architect Fabio Borsotto (d. 1608), who had also worked on rebuilding the ports of Palermo and Malaga.³³

In the same period Domenico Fontana was asked to provide a project for the port of Bari, of which the little we know comes only from what the architect himself wrote in his *Secondo Libro*.³⁴ However, it can be inferred that this project had close links to the one carried out for the port of Naples and also involved improvements in the overland connections between the two cities. In the Kingdom of Naples the network of ports was interlinked with the network of roads. For instance, in 1552 the French traveller Charles Estiennes described what was at that time the only route between Paris and Naples, i.e. to Venice overland, and then by boat as far as the port of Ortona, in Abruzzo; from there again by land crossing the Apennines as far as Capua and then finally on to Naples.³⁵ Sea and land offered alternative routes both for people travelling and for goods being transported, in their efforts to evade the dangers from the brigands found in the inner mountain regions of southern Italy, or the Moorish pirates who infested the Mediterranean.³⁶

Travelling by Land: Roads

In the early modern period the road network in southern Italy was based on the ancient Roman ways, apart from some roads that had been abandoned, such as the Via Domitia, which passed through unsafe marshy terrain and had been destroyed by the Huns in the 5th century. The most important road was the Via Appia (or Appian road), which was the main link to the North, running from Rome southwards along the western coast to Gaeta, then turning east to Capua, from Capua to Benevento and finally, after passing through Venosa, to the ports of Taranto and Brindisi on the east coast. From Benevento to Brindisi there was also an alternative road, the Via Traiana (or Trajan's road), which passed through Canosa, Bitonto and Egnazia.³⁷ In order to reach the other coast, it was necessary to go along the Via Popilia, which connected Capua to Reggio (fig. 30).

33 Fontana 1604, fols. 25^r–27^r; Spampanato 1926, 241–348; Colletta 1989; Pessolano 1993; Rinaldi 1999, 45–82; Cámara Muñoz 2008; Lenzo 2011.

34 Fontana 1604, fols. 27^v–28^v.

35 Estienne 1552, 62–65; Giannetti 1985, 257.

36 De Rosa 1982.

37 Ashby 1916.

These ancient ways had been renamed *Strada di Roma* (the Rome road), *Strada delle Puglie* (the Puglian road) and *Strada delle Calabrie* (the Calabrian road). Besides these three, the other main road was the *Strada degli Abruzzi* (the ancient Via Valeria), which climbed over the Apennines further north, running from Isola del Liri to L'Aquila and Cittaducale, while a secondary alternative route separated from the main one at Popoli, then went as far as the coast and, passing through Chieti and Pescara, reached the borders of the Kingdom at the mouth of the Tronto river.³⁸ Capua was the main hub of the Kingdom's road network, and would remain so until the 16th century.

The first three Angevin kings tried to improve the road system. After the restitution (1266) of Benevento to the Pope, Charles I of Anjou opened up an alternative route to the Puglian ports passing through Avellino and Ariano. His son Charles II ordered the repair of the streets in the centres of Capua, Salerno, Cava, and Nocera, the road between Capua and Aversa and that from Nocera to Maiori. In the early 14th century King Robert repaired and maintained the streets of Benevento, Serra di Montuori, Atripalda, and Avellino, the road from Naples to Nola, and the road to Molise and Val Fortore.³⁹ Under Aragonese rule no major road improvements were carried out, apart from the works promoted in 1445 by Alfonso I to the *Crypta Neapolitana*, the Roman tunnel linking Naples to the Phlegraean Fields. This road was the object of notable humanist and antiquarian interest both from within Italy and elsewhere: the Slovenian humanist Agustinus Prygl Tyfernus even considered the *Crypta* to be one of the seven wonders of the world.⁴⁰ In 1466, as part of a determined effort to reshape state bureaucracy, Ferrante reorganized the ancient and complicated system of tolls and fees which operated throughout the Kingdom and which were a source of income for a multitude of feudal lords.⁴¹ In the same year, perhaps because of the need to improve the communications between Naples and the important long-distance roads which intersected in Capua, Ferrante ordered the drainage of the marshes in the Terra di Lavoro and the excavation of the channels known as Regi Lagni, or Lanyos, as they are called in the map of the *Ager Nolanus* published by Ambrogio Leone in 1514 (fig. 12).⁴²

The situation changed under viceregal rule throughout the 16th century. Aiming to relaunch the city of Pozzuoli after the eruption of Monte Nuovo

38 Brancaccio 1986; Ostuni 1993, 41.

39 Ceva Grimaldi 1839, 23–26.

40 D'Ovidio 2013; de Divitiis 2015, 207–210.

41 Iacovetti 1792; Vultaggio 1982; Vultaggio 2000; Dalena 2007; Dalena 2017.

42 Ceva Grimaldi 1839, 31; Fiengo 1988, 21–22. On the map of the *Ager Nolanus* see Lenzo 2018b.

(1538), in 1548 the viceroy Pedro de Toledo widened the *Crypta Neapolitana* and restored the ancient via Domiziana, which had linked Rome to Naples along the coastline, passing through Pozzuoli.⁴³ Until then travellers coming from Rome had approached Naples from the east, entering the city through the Porta Capuana, the area circumjacent to which was not by chance chosen by Alfonso II for his main residence of Castel Capuano and the villas of Poggioreale and La Duchesca.⁴⁴ But the reopening of the road from Pozzuoli inverted the traditional entrance to the Kingdom capital; now the garden of Castelnuovo, which had been so to speak in the city's backyard, was the first sight which travellers encountered on entering Naples. It was here that Pedro de Toledo ordered his architect Ferdinando Manlio (d. ca. 1570) to build the new viceregal palace; fifty years later, on the same site Domenico Fontana built a larger royal palace which can still be seen today.⁴⁵

It was especially after the middle of the century that the scale of the interventions began to take on greater importance. In 1559 the viceroy Pedro Enriquez y Afán de Ribera duke of Alcalà (1509–1571) not only engaged in a campaign against brigands across the whole Kingdom but also invested heavily in long distance connections and also reorganized the toll system. In order to combat the famines which regularly occurred in Naples, good transport facilities were needed to connect the capital to the rest of the Kingdom. He ordered the roads from Capua to Abruzzi, from Fondi to Rome, and from Avelino to Puglia, to be rebuilt. Three years later also the *Strada delle Calabrie*, i.e. the ancient Via Popilia, which ran from Portici to Salerno and then on to Cosenza and Reggio, was included in this large-scale programme of improvements. The works continued for more than twenty years, including the reinforcement of the road slopes, and the building of new bridges. The overall plan entailed a reorganization of the administrative structure with the creation of two viceregal commissioners—one with responsibility for the roads to Puglia and Calabria, the other for those to Rome and to Abruzzi—who headed a complex bureaucratic apparatus including accountants (a *credenziere* and a *percettore* for each road), as well as many engineers and several minor surveyors (*misuratori*).⁴⁶

43 Giannetti 1985, 264–272; Ostuni 1993, 45. The restoration of the *Crypta Neapolitana* promoted by Pedro de Toledo began on 4 January 1548; see Di Catania (ed. Pelliccia) 1780, 45; De la Ville sur Yllon 1900; Pane 1975, 91.

44 de Divitiis 2013.

45 For the change of the principal entrance to the city, see Brancaccio 1986. For the viceregal palace, see Fiadino 2016. For the royal palace see Verde 2007; De Cavi 2009.

46 Strazzullo 1969, 126–135; Giannetti 1985, 278–279.

Initially, in 1559, the architect in charge of the entire project was Francisco de Aghilera (documented 1559–1573). However, in 1562, when it became clear that it was impossible for one man to oversee the works which were going on throughout the whole of southern Italy, the Viceroy Alcalà divided up the tasks: the financing of the *Strada di Roma* and *Strada d'Abruzzo* was supervised by Bernardino Moccia, and the architects Francisco de Aghilera and Pietro Antonio Lettieri (d. 1562) worked under his control; the latter, however, died shortly after being appointed and in 1566 his place was taken by the Capuan architect Ambrogio Attendolo (1505–1585). The work on the roads to Puglia and Calabria was instead controlled by Ascanio Capece; under him another pair of architects worked, Giovan Francesco De Palma Mormando (d. 1572) and Jacopo Lantari (d. ca. 1570), replaced after their deaths, respectively by Andrea Sinisio Mormando (d. 1577) and by Pietro Antonio De Sanctis (d. 1589). The work on these roads needed more attention, and so as a result from 1572 to 1579, the two architects were supported by a third, Benvenuto Tortelli (1533–1594).⁴⁷ The architects became an active part of the bureaucracy of a modern state and were paid in relation to their position within the administrative hierarchy.

The provinces which would be served by the renewed road system contributed to the expenses thanks to a specific tax created to finance the work. During the 1560s and 1570s the amount of work increased, with work focusing particularly on the road to Puglia. In 1560 Philip II ordered the viceroy Alcalà to re-establish and make safe the overland connections between Naples and Puglia to ensure that there would be an uninterrupted supply of wheat for the capital.⁴⁸ In addition to serving Naples's need for food, the road to Puglia also connected the main ports on the Tyrrhenian Sea to those on the Adriatic, enabling advantage to be taken of southern Italy's position at the centre of the Mediterranean. Given this background it is easy to understand why, while he was occupied on the works for rebuilding the port of Naples, Domenico Fontana was also commissioned to come up with a plan for the port of Bari, located at the other end of the *Strada di Puglia* and closer to Naples than the ports of Taranto or Brindisi.

In 1564 the two principal guidebooks on European roads, by Giovanni Herba and by Cherubino Stella, indicated as the main road the one leading from Rome to Naples and from Naples to Messina and also mentioned it was divided in forty-eight stopping points; at the twelfth of these travellers arrived at the

47 Strazzullo 1969, 131–132; Birra 2015, 126–162.

48 The king ordered to “adereçar los caminos que vienen de Pulla cerca de Asculi [Satriano] ... de manera que pudiendose carretear como se hace en Alemania y otras partes, se trayga el trigo por ellos à Napoles”. See Braudel (1949) 1995, I, 283.

Garigliano, “a wide river which can only be crossed by boat”.⁴⁹ A secondary road from Rome to Naples passed through Valmontone and Selva di Saglieri, with a total of sixteen stopping points, while the road from Naples to Puglia had twenty-two.⁵⁰ Not many years later the result of this massive campaign of road rebuilding promoted by the Spanish Viceroy was evident. The architect Vincenzo Scamozzi (1548–1616), who travelled from Vicenza to Naples in 1579, wrote that he had seen in the Terra di Lavoro “several public roads of great length and admirable width; they are worth close examination: since they are so straight and smooth and slope at the edges. It is obvious that they have been built with skill by a regal hand”.⁵¹ Technical skill and astute politics seem to link Scamozzi’s times to the glories of ancient Rome; this connection between the present and the past appears even more strongly in the case of aqueducts.

Living in the City: Water Supply

In the cities of southern Italy water supply was for centuries a significant problem, which perhaps explains why even in medieval times the techniques for ensuring water supply were not forgotten. The bridged aqueduct built in Salerno during the Lombard period (10th century), with pointed arches resting on slim pillars testifies how Roman infrastructures were still imitated.⁵² Attitudes to the problems of water supply in southern Italy were given new life by the contact with Islamic culture.⁵³ The system of ‘Qanat’ or ‘ngruttati’ of Palermo, built between the 9th and 10th centuries, was one of the most sophisticated water supply systems in medieval Europe.⁵⁴ The argument for Arabic influence has been convincingly made for the many private baths documented in the palaces of Amalfi and Ravello, as well as in the castles of Frederick II at Caserta and Lagopesole.⁵⁵

49 Herba 1564, fols. 16^r–17^r; Stella 1568, fols. 9^r–10^r.

50 Herba 1564, fols. 17^v–18^v; Stella 1568, fols. 10^r–11^r.

51 Scamozzi 1615, bk. VIII, ch. xxvii, 360: “alcune strade pubbliche di molta lunghezza e di bellissima larghezza, le quali sono degne di essere osservate: poichè sono dirittissime e piane, quanto pendenti da’ lati, e invero si conosce che furono fatte con giudicio e da regia mano”. See Giannetti 1985, 252.

52 Schiavo 1935; Castellucci 1955; Bocchi 2013, 291–293. The aqueduct was praised in Leone 1525, ch. XLII, fol. Hiii^v; see Miletto in de Divitiis 2016, 178.

53 Bruun and Saastamoinen 2003.

54 Todaro 1989; Bocchi 2013, 293–295.

55 Calò Mariani 1992; Caskey 1999.

If the continuity with antiquity in the matter of water supply through medieval practical knowledge was enriched by contact with other Mediterranean cultures, it was later further enhanced by the rediscovery of ancient techniques thanks to new studies on Roman aqueducts and by the reading of ancient texts. Obviously, the authorities were the *De architectura* of Vitruvius and the *De aquaeductis* of Frontinus, but useful information could also be extracted from other classical literary sources. For instance, when Alfonso of Aragon conquered Naples by entering the city through its aqueduct at the beginning of June 1442,⁵⁶ humanist scholars soon associated this plot with the episode told in Procopius's *Gothic War* about the Byzantine general Belisarius, who in 536 had conquered Naples in the same way.⁵⁷ The Aragonese army entered into Naples through one of the two Roman aqueducts of the city, that of the Bolla, still in use at the time. The late medieval *Cronaca di Partenope* had praised the underground channels of the aqueduct as a miracle wrought by the "magus" Virgil, while Pontano later described in detail this subterranean network of tunnels and praised it for being an "extraordinary document of a certain ancient magnificence".⁵⁸ The other Roman aqueduct of Naples, the *Aquaeductus Claudius* or Serino aqueduct, had been abandoned for a long time, but it would play a more central role in the humanistic debate. It ran from the source of the Serino in the Apennines as far as the port of Miseno, covering a distance of more than 100 kilometres; it passed through several towns in Campania, such as Sarno, Pompei, Palma, Nola, Naples, Pozzuoli, and Cuma, ending in the *Piscina mirabilis* at Capo Miseno (fig. 35). The route of this complex system was almost entirely hidden, but its importance was recognized, and the investigation into the aqueduct involved humanists and architects, both local and from elsewhere, over a period of eighty years. As early as the 1480s, Giovanni Pontano and Jacopo Sannazaro had studied and visited the aqueduct trying to understand its ancient route. They were probably accompanied by the antiquarians and architects Fra Giocondo (1433–1515) and Francesco di Giorgio (1439–1502).⁵⁹ Francesco di Giorgio was at the time regarded as the leading expert on systems of water supply, having worked to improve the underground

56 The main sources on the episode are: Duca di Monteleone (ed. Manfredi) 1960, XXI/5, 177–180; Facio (ed. Pietragalla) 2004, 292–300; Pellegrino (ed. Delle Donne) 2007, 295–299. Important information derived from now lost documents can be found in Faraglia 1908, 279–292. See also Senatore 2010.

57 Procopius's *Gothic War* (I, 10). See Polara 2015. For the reception of Procopius in the 15th century, see Ianziti 2012, 278–299; Miletto 2015.

58 Kelly 2011, ch. XVII, 184 (ll. 9–15); Pontano 1509, book VI, fols. A3^v–A4^r. See de Divitiis 2015, 197.

59 De Divitiis 2015, 199–202.

late medieval aqueduct of Siena, the 'Bottini', while Giocondo, who would go on to publish in Florence a revised edition of Frontinus's treatise, had transcribed in Naples some inscriptions carved on lead pipes which named the emperors Claudius and Hadrian.⁶⁰ The portion nearer to Naples was depicted in the 1514 map of *Ager Nolanus* engraved by Girolamo Mocetto for the *De Nola* of Ambrogio Leone.⁶¹ Here the Serino aqueduct is wrongly identified as the Sebeto, and represented as an overground river, but with the series of intermediate outlets typical of underground water conduits known as *spiraculi* (fig. 33).⁶² Leone described the route of the Serino aqueduct when he wrote about the nobility of architecture in his *De nobilitate rerum*, posthumously printed in Venice in 1525.⁶³

Material remains of ancient aqueducts were studied also in order to acquire a better understanding of literary questions. For instance, a matter of important concern in the humanistic debate centred on the aqueduct of Nola, because of a late antique legend linked to Virgil. According to his annotator Aulus Gellius, the poet erased the name of Nola in a passage of his *Georgics* in order to condemn the city for denying him the concession of public water for a farm he possessed in the nearby countryside.⁶⁴ At the end of the 15th century Giovanni Pontano tried to disprove this tradition, and his example was enthusiastically followed in 1514 by Ambrogio Leone. He asserted that in ancient times Nola had only one small aqueduct used mainly for ornamental purposes—in other words for public fountains—and therefore would not have been able to supply water to private citizens.⁶⁵ However, Jacopo Sannazaro was of a different opinion. In about 1528 he wrote a poem accusing the Nolans of having denied hospitality to Pontano during an outbreak of plague in Naples in 1493 and, recalling the anecdote about Virgil, declared Nola to be a town which was known to be hostile to poets.⁶⁶ We do not know the origin of this sourness against the Nolans, or why Sannazaro referred to an episode which had as its protagonist Pontano, who, as we have seen, did not himself believe the story about Virgil and the water from Nola. Sannazaro had an expert knowledge of ancient aqueducts. He certainly knew those of Naples and according to later witnesses he had also found some remains of the Roman aqueduct which went through

60 CIL X, 1496; CIL X, 1900. See de Divitiis 2015, 200.

61 Lenzo 2018b.

62 For the *spiraculi* or *sfiatatoi* see Fontana 1604, fols. 23^{r-v}; Magnusson 2001, 84–91.

63 Leone 1525, ch. XLII, fol. Hiiiiv; see de Divitiis and Miletta 2016, 178.

64 Miletta 2016.

65 Leone 1514, fols. viiv–viiiir. The debate reached the ears of Erasmus of Rotterdam, who was in correspondence with Ambrogio Leone. See Defilippis 1991; Vecce 2000; Miletta 2016.

66 Miletta 2016.

Palma and Nola.⁶⁷ Besides, being a friend of Fra Giocondo, he must have been aware of an ancient inscription in Nola which had been copied by Giocondo and which named the local aqueduct precisely in connection with the concession of part of the public water supply.⁶⁸ The information about aqueducts he accumulated would inspire Sannazaro to set some episodes of his *Arcadia* in the mysterious underground caves and tunnels which crisscross the soil of Campania stretching from Vesuvius as far as Pozzuoli.⁶⁹

Around 1549 the viceroy Pedro de Toledo gave an order that the Serino aqueduct for the water supply to Naples should be restored and entrusted the responsibility for the project to the architect Pirro Antonio Lettieri.⁷⁰ This was just one part of a greater plan for the improvement of the capital city and its surroundings.⁷¹ The historian Benedetto di Falco, in his *Descrittione di Naples* published in 1549, ascribes the merit for the revival of good architecture to the viceroy, as well as re-opening ancient water conduits, converting barren land for cultivation and having marshes drained and thus enabling the inhabitants to breathe fresh air.⁷² The project to restore the Serino aqueduct was never carried out, but even its failure was celebrated in literature by Luigi Tansillo in his poem *Il podere* (1560).⁷³ The final report completed by the architect Pirro Antonio Lettieri in 1560 provided the most detailed description of the ancient aqueduct there had ever been and, even though it remained unpublished for almost over two centuries, its findings must very soon have been known about, since the entire route of the Serino aqueduct is clearly shown in the map of Campania engraved in 1616 by Alessandro Baratta for the *Panegyricus* of Garcia Barrionuevo (fig. 32).⁷⁴

The project undertaken by viceroy Toledo was not so unusual as it might appear at first glance, since we know from surviving documents that restora-

67 Naples, Biblioteca Nazionale, ms. *San Martino* 442, fol. 81^v; Lettieri 1803, 399. See de Divitiis and Lenzo in this volume.

68 The inscription is CIL X, 1285. See Remondini 1747–1757, I, 33; Lenzo 2014, 179.

69 Sannazaro (ed. Vecce) 2013; Prose 12, 289–306; de Divitiis 2015, 202–204.

70 The project by Toledo is cited for the first time in Di Falco 1549, fols. Cviir–v; see also Pane 1975, 90.

71 Strazzullo (1968) 1995, 3–27; Pane 1975.

72 Di Falco 1549, fols. K iir–v: “agli edifici le forme antiche si rendono, a le acqua gli usati antri chiusi ingegnosamente si appalesano, la terra già sterile si coltiva, le paludi ingorgate si spediscono, e l’aria agli abitanti sana e chiarissima si rende”.

73 Tansillo wrote: “Oh, se la Parca non avesse mozzo / il filo della vita del gran Pietro / che ebbe sì in odio il viver rude e sozzo / chiare onde e fredde più che ghiaccio e vetro / avrian forse e Paulisipo e Sant’Ermo.” The poet remembers also the “good [architect] Lettieri”, who “scoperse le vie meravigliose che da Serino a Napoli fea il fiume”. See Zazo 1977, 123.

74 Barrionuevo 1616; Lettieri 1803.

tion work was carried out in the 15th and 16th centuries on ancient and medieval aqueducts. In 1256 the otherwise unknown architect Durante built the new aqueduct of Sulmona, ending in a monumental series of arches resting on huge pillars, and the event was celebrated by the inscription which was placed on the aqueduct itself.⁷⁵ The medieval aqueduct, which probably reused and incorporated parts of ancient conduits, was extended in 1474 to provide water for the new Fontana del Vecchio.⁷⁶ Similarly, in 1334 an aqueduct was built in Taranto on the orders of the Princess Catherine of Valois (1301–1346), second wife of Philip of Anjou, and was later restored in 1460 by the Prince Giovanni Antonio Orsini Del Balzo.⁷⁷ Other Renaissance aqueducts probably corresponded to the reconstruction of Roman and medieval ones, as for example in Sessa Aurunca, where the work for the new aqueduct was authorised by Ferrante in 1480, but only begun in 1493 because of the opposition of the nearby town of Teano, which claimed rights to the same spring. Sessa won this controversy only after it was demonstrated that the town had been using water from the spring since 1170.⁷⁸ The underground aqueduct of Irsina, called the Bottini, may have had similar antecedents (fig. 34). The arched bridge of Vietri's aqueduct too, which in its present state apparently dates back to the late Renaissance period, was part of a system built in 1320 using mainly clay pipes ("tufolos creteos seu canellas vel cantras").⁷⁹ In Capua three successive aqueducts were built over the centuries. An infrastructure providing water to the Roman port of Casilinum—on whose site the town was built in the 10th century—had certainly existed since antiquity; the springs, described as medicinal waters by Marcus Velleius Paterculus, were located near the temple of Diana Tifatina.⁸⁰ After the fall of the Roman Empire the temple was transformed into the church of Sant'Angelo in Formis, whose name derived from the term *formali* which refers to water conduits.⁸¹ The aqueduct was repaired in 1273 by order of Charles I of Anjou, who specifically identified it as the "aqueductus veteres".⁸² In 1472 Ferrante

75 Mattiocco 1994. The inscription reads: "A.D. MCCLVI / + LABITVR HIN FLVMEN P(RE)CEL-SVM CACVME / HVS STRVCTVRE MVRALIS NON RVITERE / SVLMONTINORVM LAVS EST INDVSTRIA QVORVM / HOC FIERI IVSSIT FORMEQ(VE) REDVXIT / VRBIS ADORNATVM / DVRANTIS ET ARTE LEVATVM".

76 Mattiocco 1994, 131.

77 Alaggio 2004, doc. 7, 14–16; Alaggio 2014, 279, n. 107.

78 Pellegrino (ed. Pratilli) 1750, 273–276; Masi Del Pezzo 1761, 187, 262–266; Tommasino 1997, 149 and 155.

79 Schiavo 1935, 69–80.

80 Velleio Patercolo (*Hist. Rom.*, II, 25): "aquas salubritates in medendis corporibus nobiles".

81 De Franciscis 1956; Di Resta 1985.

82 Faraglia 1883, 50–51.

authorised the rebuilding of the aqueduct, which, as we know from later documents, was carried out using clay pipes.

Completely new water supply systems could be difficult and very expensive to build. An interesting example of the difficulties faced in building a new aqueduct is the one on Ischia, which was begun by order of the Spanish governor Orazio Tuttavilla in about 1571–1575.⁸³ Two miles of the bridged conduit were built, and the arches are clearly shown in the map of Ischia engraved by Mario Cartaro in 1586.⁸⁴ However, it proved too costly and after some years had passed the work stopped. Almost a century elapsed before the Bishop Girolamo Rocca (1623–1691) decided to restart the work, thanks to a special and exorbitant tax on wheat; the fountain at the end of the aqueduct has an inscription which reads that drought has taught the inhabitants of the island to tolerate starvation.⁸⁵

In addition to the expense, the many technical problems connected to the supply of water were not easily solved; as a consequence, therefore, more than any other architectural construction, ancient or modern, aqueducts seemed fascinating and mysterious. As was the case with the aqueduct of the Bolla in Naples, which the *Cronaca di Partenope* said had been magically built by Virgil, also in Salerno the medieval aqueduct was believed to have been built by the legendary local magician Pietro Barliaro in a single night thanks to help from the Devil.⁸⁶ In the town of Corigliano, in Calabria, an aqueduct provided with an arched bridge was built in about 1480, and soon after it was completed a legend began to circulate according to which it had been built through the miraculous intervention of St Francis of Paola (1416–1507) (fig. 31).⁸⁷

When a city could not rely on saints or wizards, it was compelled to look for someone who possessed the rare skill of finding and transporting water. The transmission of knowledge travelled together with the migrations of workers, masters, and architects. In 1437 the architect from Cava, Onofrio di Giordano (d. ca. 1463), was asked to journey across the Adriatic to Ragusa (present-day Dubrovnik) in order to build a new aqueduct and two fountains. Having suc-

83 Iasolino 1588, 45; D'Ascia 1867, 62; Monti 1980, 425–430.

84 The map is signed “Marius Cartarius F[ecit]” and dated “Neapoli, xv Cale[n]das Sextilis salutis anno [M]DLXXXVI”; the aqueduct is indicated by the number 112, which corresponds to the caption “Aquaeductus novus”. See Iasolino 1588; Vannereau 1961; Lenzo 2018a, 87.

85 Ughelli (ed. Coleti) 1720, VI, 237: “HAS SUDAVIT AQUAS CERERIS PATIENTIA CURTAE, / EDOUITQUE FAMEN FERRE MAGISTRA SITIS”.

86 D'Ancora 1883; Giardullo 2005; Senatore 2005.

87 Perrimezzi 1707, 217; Amato 1884, 83–87. An 18th-century engraving of the aqueduct is published in Saint-Non 1783, vol. III, plate 51 (after 94).

ceeded in providing water to the city, he was granted the citizenship of the maritime Republic, his work was praised in the *Laudatio urbis* (1440) by the humanist Philippo de Diversis, and his name was celebrated in the elegant inscription composed by Ciriaco d'Ancona (1391–1452) and carved in Roman capitals on the main fountain of Ragusa.⁸⁸ In 1514 the city of Capua sought to engage the services of an unnamed “Lombard master” who was skilled in finding water and constructing aqueducts and was then living in Abruzzo, in the fiefdom of the Conte of Popoli.⁸⁹ However, he never managed to travel to Capua so in 1518 the *Eletti* commissioned the work from the “Florentine master Romolo”, who can be identified as Romolo Balsimelli (born 1479, documented until 1519), at the time working in Naples. The works, which as we have seen started after 1472, went on for almost a century and a half, involving many architects, both local and from outside the Kingdom, such as Tommaso Martirano, Vincenzo Casale (1539–1593), Ambrogio Attendolo, Benvenuto Tortelli, and Domenico Fontana. Soon after its completion, the aqueduct was mentioned by the Capuan poet Carlo Morello in a sonnet published in 1613.⁹⁰ The text is not in fact a celebration of the achievement, since Morelli emphasises the huge expense (*immenso sumptu*) incurred in having to bore through the mountains; in addition, he complains that the water from the spring would if left in its natural state be eternal, but once transformed into a human artefact is condemned to run dry and perish, as all human things do. What is interesting is that the collection of poems in which this sonnet is included is dedicated to the ancient monuments of Capua (*Veteris Capuae monumenta*): from this it is possible to infer that an aqueduct, even of recent construction, was regarded as so great an achievement that it could be considered on a par with monuments from antiquity.

88 de Diversis (ed. Brunelli) 1882, 47–54; Seferović and Stojan 2007; Ghisetti Giavarina 2007; Grujić 2008; Gudelij 2014, 448–451.

89 Manna 1588, fols. 103^r–105^v; Fontana 1604, fols. 23^r–^v; Di Resta 1985, 59–61; De Rosa 2002; Robotti 2002; Robotti 2007; Senatore 2018, 340, 834–835.

90 Morelli 1613, 202: “In aquae ductum forati montis. / Ne gelidam Campanus aquam desideret Urbi, / Quae Tiphatorum terga rigabat aqua, / Immenso sumptu montem forat, inde reducit / In faciem, domus haec ampla fovebat aquam. / Laeta per euripos videntur moenia ductam, / est ea nunc nusquam, quae ante perennis erat. / Urbs omni si digna perit, cui ducitur, aevo, / Debuit ipse etiam iure perire latex”.

Conclusion: The Pride of the Architect

That the urban and territorial infrastructures constructed in southern Italy in the Renaissance were seen in the terms used by Leon Battista Alberti quoted at the beginning of this essay is proved by the fact, unusual for this region during this period, that we know many of the names of the master masons and architects involved in such works. As we have seen, information about the building of ports, roads and aqueducts, comes not only from archival documents, but also from literary sources such as those written by Pontano, Galateo, Sannazaro, Tyferno, de Diversis, Leone, Tansillo, Beatillo, and Morello, as well as from architectural treatises such as those by Palladio, Scamozzi, and Domenico Fontana. To these printed and manuscript texts can be added the inscriptions carved on marble and stone. From these it is evident that architects wanted their names to be associated with such great feats of construction.

Inscriptions naming and praising architects and included in their masterpieces are a frequent occurrence, and in the Kingdom of Naples ancient models for this practice were probably known to them.⁹¹ Architects also used the tombs they designed, their own or those of other people, to advertise their merits, as Antonio Baboccio da Piperno did in the Aldomorisco tomb (1421) or Pietro di Martino da Milano in his own tomb (1470).⁹² In the following century, Ferdinando Manlio commended his own achievements as a architect in the tomb of his son Timoteo (d. 1553). Manlio was the favourite architect of the Viceroy Pedro de Toledo, whose great but only partially completed programme of architectural and urban improvement has long been praised by modern as well as contemporary historians, starting, as we have seen, with Benedetto di Falco.⁹³ In the text he composed, Manlio declares he has built royal palaces, opened tunnels, constructed roads and bridges, and drained marshes in order to provide safe routes for travellers and clean air for the inhabitants.⁹⁴ Here he

91 Beltramini 2009a; de Divitiis 2012.

92 Baboccio claimed that he was a painter and sculptor in 'every kind of stone and metal': "ABBAS ANTONIVS BAMBOCCIUS DE PIPERNO PICTOR, ET IN OMNIBVS LAPIDIBVS, ATQVE METALLORVM SCVLTOR, ANNO SETTVAGENARIO AETATIS FECIT 1421"; see Bock 2001, 11, 329; Bock 2009. The epitaph carved on the no longer surviving tomb of Pietro da Milano praised him as the creator of the triumphal arch of Castel Nuovo: "Petrus de Martino Mediolanensis, ob triumphalem arcis novae arcum solerter structum, et multa statuariae artis suo munere huic aedi piaae oblata, a divo Alphonso rege in equestrem adscribi ordinem et ab ecclesia hoc sepulcro pro se, ac posteris suis donari meruit, MCCCCLXX". See Summonte 1675, III, 14 s.

93 Strazzullo (1968) 1995, 15, 17, 20; Strazzullo 1969, 208–212, 215; Capparelli 2007; Fiadino 2016, 637, 648–649, note 5.

94 "D.O.M. FERDINANDVS MANLIVS NEAP. / CAMP. ARCHITECTVS / QVI PETRI TOLETI

is clearly following the eulogy of Pietro de Toledo written by di Falco, but it is interesting that among the many buildings Manlio could have claimed he was proud to have built, he chose to cite only the royal palaces and the infrastructures he constructed. In 1585, composing the epitaph of his architect father Ambrogio, the Capuan humanist Giovanni Battista Attendolo praised him as the creator of the fortresses of Capua, Crotone, and Gaeta, and of the road from Naples to Rome via Pozzuoli.⁹⁵

Architects shared with their patrons the merit for the building of great works. A more arrogant man, such as Domenico Fontana, even had bronze medals cast with his portrait on one side and on the other the plan of his project for the new port of Naples (fig. 36).⁹⁶ Furthermore, in the second edition of his book, printed in Naples in 1604, he dedicated specific chapters to the ports of Naples and of Bari, and to his project for the aqueduct of Capua. In contrast, Fontana's severest detractor, the Nolan architect and philosopher Colantonio Stigliola, claimed that architects should be modest and pursue only public utility rather than personal glory.⁹⁷ However, he too had no doubt that the main tasks of architecture were to drain marshes, to build ports and to fortify cities.⁹⁸ If it was the duty of the king and his representatives to govern the state through political action and wisdom, it was architects who through their knowledge and understanding were able to conceive, plan and bring to fruition the physical conditions for an ideal state.

NEAPOLITAN. PRO R. / AVSPITIO / REGIJS ÆDIBVS EXTRVENDIS / PLATEIS STERNENDIS / CRYPTÆ APERIENDE VIJS, & PONTIBVS / IN AMPLIOREM FORMAM RESTITVENDIS / PALVSTRI BV SQ. AQVIS DEDVCENDIS / PRÆFVIT. / CVIVS ALABORATVM INDVSTRIA / VT TVTIVS VIATORIBVS ITER / LOCI COLONIS SALVBRIORES ESSENT / TIMOTHEO ENCICLICO MATHEMAT. / PIETATIS RARISSIMÆ FILIO. / QVI VIXIT AN. XIX.M.VI.D.V. SIBI, AC SVIS VIVENS FECIT. / A CHRISTO NATO M.D.L.III". See De Stefano 1560, 51; Engenio Caracciolo 1623, 404; Strazzullo 1969, 210; Fiadino 2016, 637, 648–649, n. 5.

95 "TO. BAPTISTA ATTENDOLO PAVLI FIL. COTIGNOLA ORTO / QVI SPORTIA DVM AVITA DOMO A LVD. GALL. REGE XII PENE VASTATA / CAPVAM CVM MARIA VICECOMITE MATRE CONFGIT SVAM SVORV(M)Q. FORTVNA(M) / ALTO ANIMO PERFERENS RESTITVTO MEDIOLA. DITIONI FRANCISCO II / DE REDITV AD SVOS COGITANS MORTE PRAEVENTVS EST / HIC SVOS CINERES SERVARI CVRAVIT / AMBROSIVS FILIVS / QVI OB INTEMERAT. FIDE PHILIPPO II HISP. REGI PRAECLARVS / EIVSQ. IN NEAPOLIT. REGNO SVM-MVS ARCHITECTVS / CAPVA CROTONE CAIETAQ. MATHEMATICA RATIONE MVNITIS / NEAPOLI ROMAM PVTEOLOSA STRATIS VII PIETATE CLARVS / HIC PARENTIS CINERIBVS CONTVMVLATVS EST / GASPAR PATRI AVOQ. P. / OBIIT AN. D. MDLXXXV. AET. S. LXXX".

96 De Cavi 2003; Lenzo 2011.

97 Rinaldi 1999, 25–31.

98 Ibid., 26.

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