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Streets and streams : health conditions and city planning in the Graeco-Roman world

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I. CITY AND TRAFFIC

Traffic Policy and Circulation in Roman Cities

Context

In 2007, I published *Traffic and Congestion in the Roman Empire* (second edition 2012). This book was the reason for the CASA/KVSA (Classical Association of South Africa/Klassieke Vereniging van Suid-Afrika) to invite me to present a paper, entitled 'Traffic Policy in Roman Cities', at the biennial conference 'Aspects of Empire', 2-5 July 2007, held at the University of Cape Town. This paper was the basis of the following chapter.

Since then, more books and articles on this theme have been published.[1] However, the majority of these articles are restricted to the situation in Pompeii, the best preserved ancient Roman city. In 2011, however, a volume was published by R. Laurence and D.J. Newsome, in which – besides Pompeii – traffic aspects of Rome and Ostia are discussed.[2] For a positive review see R. Benefiel (2012): 'this is a beautifully produced book that moves its reader onto and through the streets of the Roman city'.[3] However, I agree with a more critical opinion by M. Anderson (2013). Anderson criticises amongst others the lack of attention to other topics than the urban contexts: 'Throughout the volume, the scale of analysis is exclusively that of the city as a whole and its infrastructure. Research dedicated to movement inside domestic structures or areas outside of the public or commercial environment is curiously absent, a lack felt all the more acutely given the particular cities under scrutiny […] The contributors generally appear not to have read one another's contributions, so that key points of argument are introduced multiple times'.[4]

1 Tilburg, C. van. 2005 (second revised edition 2014), Poehler, E. 2001, 2003, 2005, 2006, 2011a and b, Laurence, R. 2008, Newsome, D. 2009, Kaiser, A. 2011a and b (see Bibliography).

2 Laurence, R. & Newsome, D.J. (eds). 2011. *Rome, Ostia, Pompeii: Movement and space*. Oxford.

3 Benefiel, R. 2012. *Sehepunkte* 12, 7-8, http://www.sehepunkte.de/2012/07/21065.html.

4 Anderson, M. 2013. *American Journal of Archaeology* 117, 4, http://www.ajaonline.org/online-review-book/1683.

Traffic Policy and Circulation in Roman Cities

Abstract [149]
The Roman road-system (including urban street systems) is one of the most famous features of the Roman Empire. In cities, especially the older and smaller ones such as Pompeii, streets were narrower and not always suitable for (wheeled) two-way traffic or (wheeled) traffic at all; in later Hippodamic *coloniae* – as found in Western Europe like Xanten and Trier – streets were wide enough to cope with traffic. Local governments tried to keep traffic flow under control by means of legislation and creating fixed traffic circulation, including zigzag and parallel routes, and routes around the forum. The forum itself was never accessible for wheeled traffic, only for pedestrians.

Introduction

Throughout history, research into ancient Roman traffic circulation was an 'untrodden path'. The famous stepping stones and wheel ruts in Pompeii, now typical touristic features, were for a long time not considered worthy of more detailed research. In 1991, the Japanese author Tsujimura published an article 'Ruts in Pompeii', but only after 2000 more information on this theme became available, when Poehler,[1] Van Tilburg,[2] Laurence,[3] Newsome[4] and Kaiser,[5] among others, published books and articles concerning traffic in this well preserved city.

Nowadays there is a growing interest in traffic, traffic circulation and congestion and even blocked arteries in other ancient, less well preserved Roman cities. Was the [150] traffic circulation here comparable with that of Pompeii or was it quite different? New

1 Poehler 2001, 2003, 2005, 2006, 2011a and b.
2 Van Tilburg 2005 (second revised edition 2014), 2007 and 2008.
3 Laurence 2008.
4 Newsome 2009.
5 Kaiser 2011a and b.

research shows evidence that here, too, fixed traffic routes, which road users were encouraged to follow, were quite usual.

Two cities in particular will be discussed: Pompeii and Xanten. These are both Roman cities, but their identities and features differ, as well as their infrastructures and traffic circulation. However, there are also similarities. In this chapter, I shall attempt to demonstrate the similarities and differences, and their backgrounds. The chapter will conclude with some aspects of town planning and traffic, particularly the infrastructure around fora and their corresponding traffic flow.

1. Pompeii: an old city built against the slope of a volcano

When Pompeii was destroyed in AD 79, the city was already six centuries old. Pompeii was probably founded in the 6th century BC as an Oscan settlement. This settlement (*Altstadt*) is still visible in the regions VII and VIII. In the 5th century, the city was extended to the north, region VI today. In the 4th century, the final and largest extension was built: the Samnitic extension east of the new *cardo* between Porta del Vesuvio and Porta di Stabia. The Forum, the centre of the Oscan settlement, remained in its original situation; a new Forum was not built at the intersection of the new *cardo* and *decumanus.* A reason for this is perhaps that the existing Forum was situated on a running-down slope, facilitating drainage. This street-plan remained unaltered right up until Pompeii's destruction in AD 79.

1a. The street system of Pompeii

The three above-mentioned extension phases correspond with the street system. The oldest Oscan region, regions VII and VIII today, had a relatively irregular street pattern. Some streets were even winding, such as Via degli Augustali and Vicolo del Lupanare. Region VI has straight streets, running parallel with each other (apart from Via Consolare), but the corners are not at right angles; there are sharp as well as obtuse corners, and the *insulae* are diamond-shaped. Only the section to the east of the *cardo* (the Samnitic extension) shows the typical Graeco-Roman Hippodamic grid with right-angled corners and parallel-running streets. Only this part of the city
[151] incorporated thoroughfares, wide enough for two-way traffic: Via dell'Abbondanza, Via di Nola and Via di Stabia.[6] Via Consolare could also, partially, function as a two-way street.[7]

1b. Traffic circulation in Pompeii

Tsujimura and Wallace-Hadrill have mapped the street system with the varying depths of street ruts: deep, shallow, faint or none at all **(fig. 1a and 1b)**.[8] According to

6 Tsujimura 1991, 62; Van Tilburg 2012, 137.
7 Tsujimura 1991, 62.
8 Tsujimura 1991, 64; Wallace-Hadrill 1995, 49; Van Tilburg 2012, 141; Laurence 2008, 92.

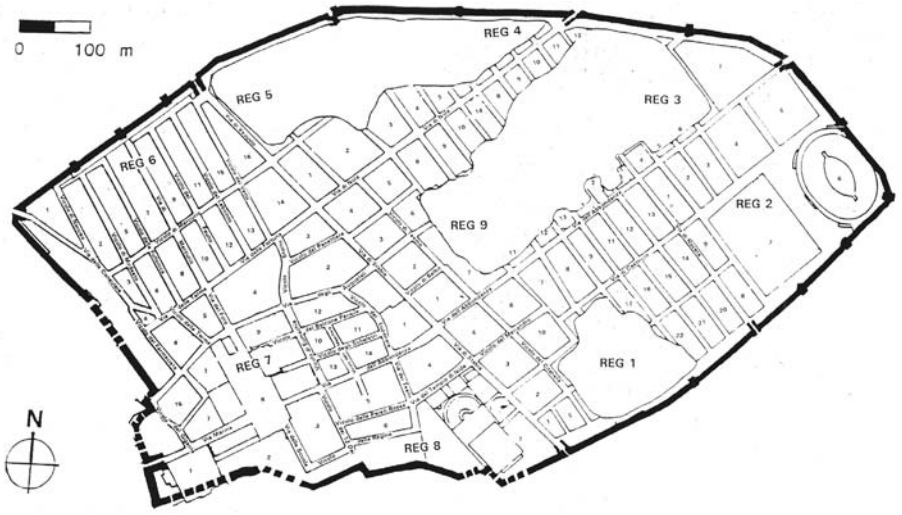

Fig. 1a. *Pompeii: streets,* regiones *and* insulae *(Laurence 1994/1996, 2).*

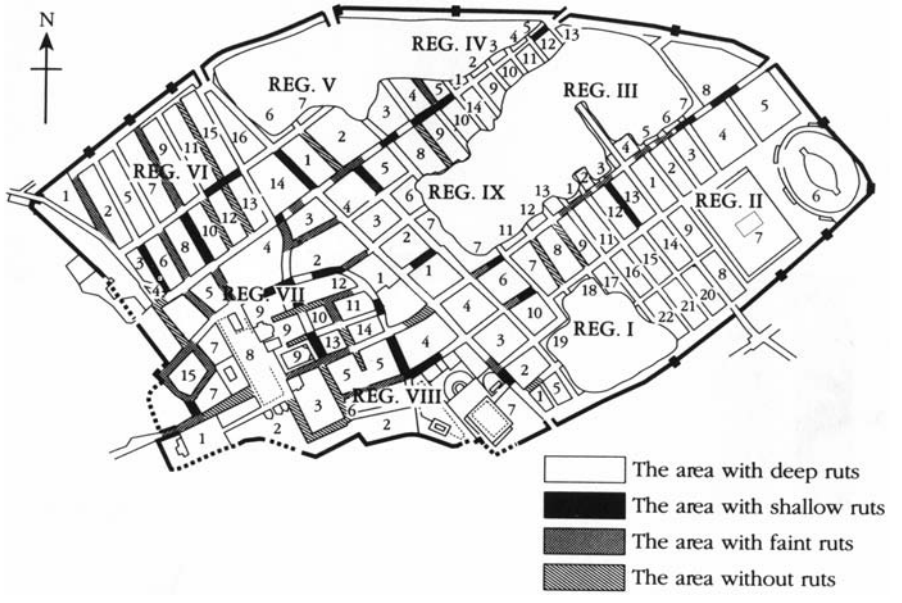

Fig. 1b. *Pompeii, plan with ruts (Wallace-Hadrill 1995, 49, referring to Tsujimura 1991, 64).*

present-day knowledge on this theme, it can be stated that east of the *cardo* the majority of streets have deep ruts; west of the *cardo* the street ruts have varying depths and sometimes no ruts at all.

The entire system of mainly one-way streets, blocked streets, closed streets, deep and/or shallow ruts show that traffic flow was not unrestricted, but that it followed fixed routes. These routes, however, could be altered by the local government or a

[152] group of civilians.[9] An example of a completely blocked street is Vicolo di Tesmo.[10]

At the time of the volcanic eruption there were many building and restoration activities going on; not only in the Forum, but also along the pavements of certain streets. A lot of research has been done over the last few years concerning traffic flow, particularly in the regions VI and VII.[11] At the corner of Via Consolare and Vicolo del Farmacista, a road section was repaved. Also along other streets in region VI, for instance Vicolo del Fauno to the west of the House of the Faun, there do not appear to be any ruts at all; here also it is evident that part of the street had been repaved.[12] In other sections of region VI, traces of wear on stepping-stones, curb stones and corners indicate that the driving direction along Vicolo di Mercurio had been changed from eastbound to westbound (according to Poehler)[13] – this street was a one-way street. More evidence that the street was planned for eastbound traffic is the street profile: every section of the street between two intersections has been widened slightly to the east; the widest part of the street section is the point just before the intersection, where the view was the best. Directly east of the intersection, the street section was narrowed again.[14]

[153] So traces of wear on stepping-stones and curb stones do not only indicate traffic intensity on the spot, but also the direction of the traffic. According to this information, traffic flow in the end-phase on the street section Porta di Ercolano – Via delle Terme (also region VI) can be determined: entering traffic, coming from Porta di Ercolano, drove along the route Via Consolare – Via delle Terme, but exiting traffic was able to use the route Via delle Terme – Vicolo di Modesto – Vicolo di Mercurio – Via Consolare. Unfortunately, it is uncertain whether this route was used frequently: one had to take a sharp bend to the left at the intersection Vicolo di Modesto-Vicolo di Mercurio, and the cornerstones at the south-west and south-east side of this intersection have disappeared. Sharp bends were unpopular, as will be discussed below.[15] In region VII, the street system west of the Forum changed from a clearly-structured one into a chaotic one.[16]

The depths of the ruts were not only created by the volume of traffic. Rainshowers and the constant flow of fountain water wore out the ruts further. Very remarkable are the ruts in Via degli Augustali; one can speak here of a 'railway' (**fig. 2**). It would be almost impossible for carts driving along a street to cause a rut with such sharp edges by wearing down the pavement; two carts could never follow the same track exactly. When passing stepping-stones they would do so, but in this situation there is in my opinion only one explanation: the ruts here must have been created by road

9 Van Tilburg 2012, 142; Kaiser 2011a, 95; 2011b, 179-180; 189-190.
10 Van Tilburg 2012, 139; Laurence 2008, 90; Poehler 2011a, 161.
11 Region VI: Poehler 2006, 53-74 and further his internet publications. Region VII: Newsome 2009, 121-142; Kaiser 2011a, 96; Kaiser 2011b, 180 for both regions.
12 Poehler 2005.
13 Poehler 2005.
14 Poehler 2005.
15 Poehler 2003; Kaiser 2011b, 177; 181.
16 Newsome 2009, 124-126.

Fig. 2. *Pompeii, 'railway' in Via degli Augustali (photo C. van Tilburg).*

menders. This hypothesis also dispels the problem of the extremely dense and also extremely orderly traffic flow; the depth has not been caused by carts, but by pick-axes. It must also have been more comfortable for the cart drivers while passing the stepping-stones. Such a 'railway' has also been found in Eleusis (Greece), where tracks in the road surface were cut out in order to prevent the jostling of the statues of the gods during processions. More evidence that these ruts were cut out manually is their sudden interruption some metres past the stepping stone; maybe the 'cutting-out' project along this street was not yet finished when the eruption took place. [154]

The ruts and worn cornerstones prove that wheeled traffic in Pompeii must have been intensive; in combination with the mainly one-way streets, there must have been a lot of conflict going on among road-users. At present nothing is known about rights of way.[17] According to Poehler, road users drove on the right in Pompeii. However, in Britain road users seem to have driven on the left, as proved by worn ruts in a quarry mine in the neighbourhood of Blunsdon Ridge, Swindon, between Oxford and Bristol.[18]

17 Van Tilburg 2012, 137; Kaiser 2011a, 73, 96 and 221 note 33.

18 Right-hand driving in Pompeii: Poehler 2005; left-hand driving in Britain: Van Tilburg 2012, 124 and 206 (n. 862).

Fig. 3. *Parking place at Via di Lupanare (photo C. van Tilburg).*

Another theme not yet mentioned is the parking problem. Poehler, having researched parking facilities in Pompeii, identified 36 ramps, for instance at Vicolo del Lupanare **(fig. 3),** mainly giving access to a stable for parking cart(s) and animals; most of them are constructed for commercial destinations. Among them are a lot of inns, mainly situated in the neighbourhood of the city gates. The number of ramps in front of private houses is far lower, indicating that wheeled transport was mainly used for cargo transport.[19] Another parking place, for building material transport on behalf of the reconstruction of the Forum, was at the end of Vicolo del Balcone Pensile, south of the Macellum.[20]

[155]

Due to the fact that it was almost impossible for an animal to walk backwards

19 Poehler 2011b, 197-202; 210-211.
20 Poehler 2011a, 154.

Fig. 4. *Pompeii, barricade (Wallace-Hadrill 1995, 48).*

when facing oncoming traffic, fixed routes had to be followed, or someone had to precede the animal and/or cart, giving a sign (at a side street) that the street was clear.[21] Illegally blocking a road or street could cause big problems. We do not have any information concerning the blocking of streets or the hindering of traffic in Pompeii outside legal rights, but in the southern Spanish city of Urso, there was a fine of 1000 sesterces for doing so.[22]

1c. Obtuse corners in Pompeii

The aforementioned information tells us that Pompeii had a very dynamic traffic flow. Streets were regularly maintained, barricades were common and wheeled traffic was mainly one-way. The presence of traffic signs is doubtful; as far as we know, no [156] traffic sign has been found. However, as shown by the (worn) ruts and curb stones, we can see that traffic made significantly more use of obtuse corners than sharp ones.[23] A significant example of an 'obtuse cornered-route' is the detour which traffic was forced to take because of the barricade at the intersection of Via dell'Abbondanza and Via di Stabia (**fig. 4**).

This intersection must have been, in its original situation, the busiest point in the

21 Van Tilburg 2005, 141; Kaiser 2011b, 191.

22 *Lex Coloniae Genetivae Juliae* CIIII (*CIL* I² 594) *ne quis limites decumanos opsaeptos* […] *sestertios mille*, 'no person shall have the said boundary roads or cross roads blocked up […] 1,000 sesterces'; Van Tilburg 2012, 131-132.

23 Van Tilburg 2012, 138-141; Kaiser 2011a, 94.

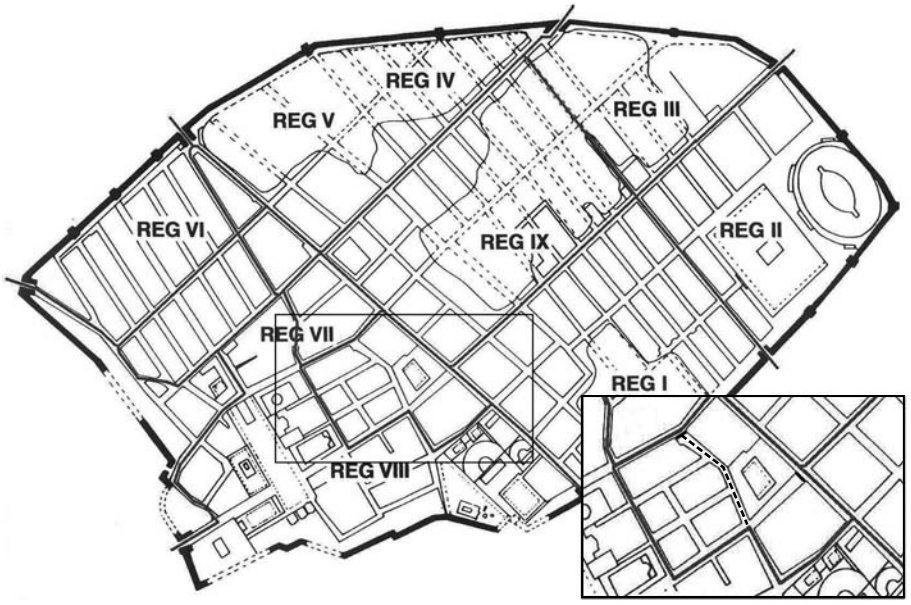

Fig. 5. *Pompeii, detour (Coarelli 2002, 28, modified by C. van Tilburg; Van Tilburg 2012, 142).*

city. Via dell'Abbondanza widens between Vicolo del Lupanare and Via di Stabia; east of the intersection the street narrows as far as Porta di Sarno. Instead of building a new forum, the government chose to erect a barricade and to close off Via dell'Abbondanza for wheeled traffic. Wheeled traffic coming from Porta di Stabia with Porta di Nola as destination was able to turn right into Via dell'Abbondanza, but the detour past obtuse corners – although it took considerably longer – was preferred.[24] Traffic was also able to use Via di Lupanare, but after the closing of this street, this route was no longer in use (**fig. 5**).

[157] In region VI, too, obtuse corners have been found showing considerable wear on the curb stones. However, some sharp corners with worn sidewalk cornerstones have also been found, but the majority of them at obtuse corners.[25] Presumably there was a fixed route system in use which the road-users kept to.

2. Xanten: a new city in a flat region

The city Colonia Ulpia Traiana (further named simply 'Xanten'), which is situated today next to the mediaeval city of Xanten, close to the Dutch frontier, is a completely different city. The region was conquered by Julius Caesar, but it was during the

24 According to the map of Tsujimura (1991, 64); Van Tilburg 2005, 141; Poehler 2011b, 194-195.

25 Via Consolare – Vicolo di Mercurio (north east), Vicolo di Modesto – Vicolo di Mercurio (north west), Via di Mercurio – Vicolo di Mercurio (north west and south east), Vicolo di Vettii – Vicolo di Mercurio (north west) etc. For an overview of all corners in Vicolo di Mercurio see Poehler 2005 and 2006, *passim*.

reign of Emperor Augustus that the first Roman settlements were founded here: the military settlements Castra Vetera and Vetera II. There was no Roman city yet; it was in AD 98 that the city was founded by Emperor Trajan and acquired the status of *colonia*. It is the most northerly *colonia* of the continent. The city was planned and designed as a complete entity and did not have the history and gradual development of Pompeii in the form of extensions and lengthening of streets. Due to the fact that the city was built in a flat region, differences in height did not play a significant role; [158] drinking-water was supplied by an aqueduct coming from a nearby hill, and waste water drained away into the Rhine.

2a. The street system of Xanten

At first sight, Xanten has the typical features of a Roman *colonia*: a chessboard grid plan, a striking *cardo* and *decumanus* including a forum at their intersection, a city wall equipped with towers at regular distances from each other, as well as the usual facilities of a normal Roman city: temples, baths and an amphitheatre (**fig. 6**).

However, looking more meticulously at the map, some discrepancies are visible. To the south-west of the *cardo*, the *colonia* seems, indeed, perfectly symmetrical: the *insulae* are absolutely square and the corners where the streets intersect are all right-angled. To the north-east of the *cardo*, however, such *insulae* are less commonplace: except for the *insulae* 24, 25 (Forum), 26 (Capitol) and 27, all *insulae* are rectangular or irregular. These irregularities are caused by the following factors: firstly, the city wall between Vetera-Tor and the amphitheatre shows a slight deviation in relation to the city wall south-west of Vetera-Tor; [159] secondly, the street between the *insulae* 35 and 40 (amphitheatre) runs at a diagonal; thirdly, the Rhine bank also runs diagonally in relation to the *cardo*, so inevitably, sharp and obtuse corners were created; and fourthly, in the northern region between the *insulae* 22, 23, 29 and 30, there are also streets running diagonally. What is the reason for such irregularities in this *colonia*, which was otherwise designed as a complete entity?

The reason is the pre-colonial infrastructure. During the 1st century AD a civilian settlement arose to the north-west of the *castellum* Vetera I (*vicus*).[26] Excavations inside the *colonia* have shown that this *vicus* consisted of at least two streets: the *limes*-road itself, running north-west towards the *castellum* Burginatium, was situated more to the south-west, showing a slight bend inside the colonial *insulae* 19, 20 and 21; and a second road running roughly parallel to it, closer to the Rhine. For the construction of the *colonia* this street was retained; it became the street between the *insulae* 31, 36, 32, 37, 33, 38, 34, 39, 35 and 40. Other pre-colonial streets which were retained are situated between the *insulae* 29 and 30; between 24, 25, 31 and 32 and between 39 and 40. Strikingly, the main thoroughfare, the *limes* road, was *not* retained; immediately north-west of Vetera-Tor, this thoroughfare was straightened out as the new *cardo,* redirected towards the north-east and the former thoroughfare was built over by the new *insulae*. Road sections in *insulae* 37 and 38 were also occupied by *insulae*.

26 Heimberg & Rieche 1998, 27.

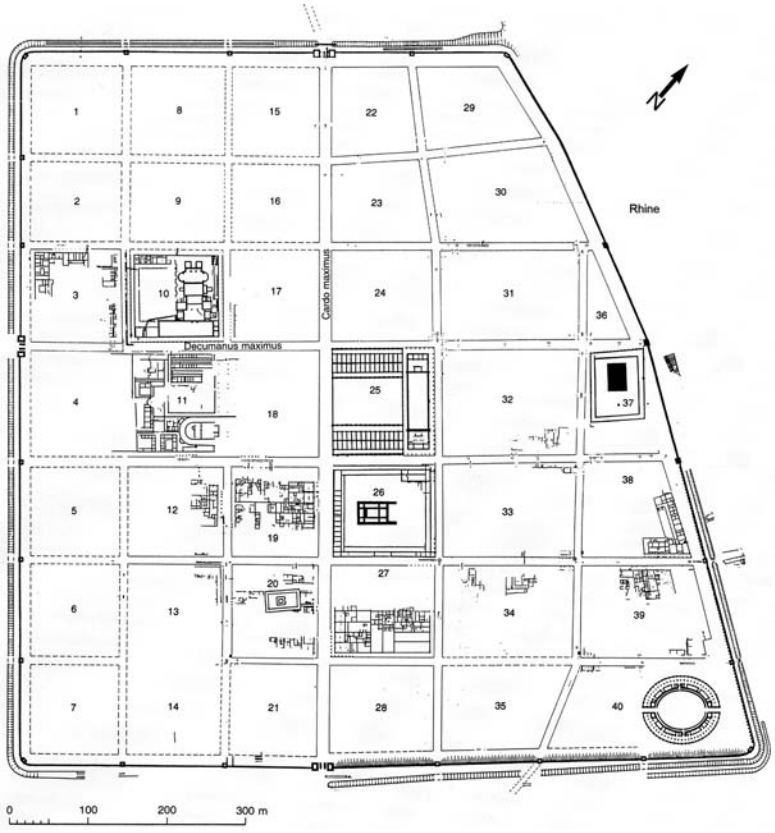

Fig. 6. *Xanten, plan (Heimberg & Rieche 1998, 7, referring to H. Stelter; modified by C. van Tilburg).*

However, it is still unclear why the pre-colonial streets in the north-east part of the colonia were retained. It should have been easy to break up or straighten them out, which was done with the original *limes* road. A possible explanation will be discussed below.

2b. Traffic circulation in Xanten

Just as in Pompeii, the streets in Xanten occupy a considerable part of the city area. In Xanten, however, the streets are extremely wide: a width of 10-12 metres, excluding the roofed sidewalks, which have a width of about 4 metres. The harbour gates, however, were single gates suitable for one-way traffic; the imposing land gates were double gates or three-passage-gates.[27] Did the planners and architects of Xanten intend to avoid any type of traffic congestion and the inconvenience of one-way traffic?

[160]

27 The reconstructed Burginatiumtor was a double gate; the south western Maastor was a three passage gate. The number of passages of the south eastern Veterator is unknown; Van Tilburg 2008, 141-142.

In the case of Xanten, there was enough space to construct a city with all the usual facilities and services, without the discomfort of an *Altstadt* which was the case in Pompeii. Nevertheless, the pre-colonial infrastructure was, at least partly, retained and made to conform. It is still unclear why the *limes*-road was not retained but built over; straightening it out was perhaps done for aesthetical reasons[28] and maybe only a few buildings had to be demolished.[29]

2c. Obtuse corners in Xanten

The soil structure of Xanten was quite different to that of Pompeii: not volcanic soil but river clay. Xanten was not suddenly destroyed by a catastrophe, but abandoned in Late Antiquity. So wheel ruts and worn down stepping-stones and pavements, indicating the flow of the traffic and the direction it took, are not found here.[30] Looking at the widths of the streets – not only suitable for two-way traffic but also wide enough for parking carts and stabling animals – traffic congestion was not really a problem and driving seems to have been permitted everywhere. Inside the city, parallel to the city wall, ran a street which could also function as a ring road. This ring road, following the *pomerium*, was interrupted twice: at the amphitheatre area and at the 'Hafentempel' (Harbour Temple).

Traffic entering from the Rhine side – probably mainly cargo traffic – had to go one way, however: the gates along the quays were all narrow single gates, suitable for only one vehicle or animal to pass through. After passing through the gates one could turn right going round an obtuse corner, or left, a sharp corner. While excavating and researching the so-called Kleine Hafentor (Small Harbour Gate), archaeologists discovered that the northern cornerstone on the city side of the gate – on the obtuse corner – shows the same wear as the worn cornerstones in Pompeii. The corresponding southern cornerstone of this gate does not show any wear at all. So the evidence shows that in the traffic-friendly Xanten, too – in the case of one-way traffic – drivers were following fixed routes, by using obtuse corners (**fig. 7**). [161]

Is there more evidence of the use of obtuse corners? It has been mentioned above that certain parts of the pre-colonial settlement were retained after the founding of the *colonia*, around AD 100. After the creation of the new *cardo*, a second north-west south-east route could be constructed in this way, where traffic could make use of obtuse corners (**fig. 8**). So the *cardo* and *decumanus* both had an alternative route with obtuse corners. [162]

What was the advantage of such an alternative route? Ring roads around the cities were unknown, so through traffic was forced to go through the gates when crossing a city. To avoid the busy centre, an alternative route could relieve this inconvenience. In his recent PhD thesis concerning Forum Hadriani (Voorburg, today a suburb of

28 The change of infrastructure for aesthetic and embellishment purposes was not unknown; e.g. the reconstruction of Rome to Neropolis after the Great Fire in AD 64.

29 Traces of buildings which had to be demolished for the straightening of the *limes* road are found between the *insulae* 15 and 22, and between 16 and 23; Heimberg & Rieche 1998, 29.

30 Stepping-stones were scarce in Antiquity; Kaiser 2011a, 50.

Fig. 7. *Xanten, Kleine Hafentor, with worn cornerstone (photo C. van Tilburg; Van Tilburg 2012, 145).*

The Hague) Buijtendorp argues that in this small town there were two *decumani*, connecting the gates. The most northerly was the widest, functioning as a thoroughfare. The most southerly, situated along the Forum, was a shopping avenue. If the wide, northerly *decumanus* was connected with the east gate (gate 5) **(fig. 13a and 13b)**,[31] the situation should have been the same as it was in Xanten, although the (obtuse) splitting of the traffic here in Voorburg would have already taken place outside the city walls, instead of within (as in Xanten). The extreme width of the northerly *decumanus*, partly paved, made it possible to drive herds through the city; thus relieving the southerly *decumanus* which was more suitable for pedestrians (and able to
[163] be narrowed easily). More examples of parallel routes are to be found in Tongeren (Belgium), Avenches and Oberwinterthur (Switzerland).[32] In Voorburg, only the centre of the northerly *decumanus* was paved. It was also possible to walk over the unpaved sections, which facilitated parking and stabling generously. Such a situation has also been discovered in Cologne.[33]

31 Buijtendorp 2010, 350, fig. 4.2.
32 Tongeren: Van Tilburg 2012, 119; Avenches and Oberwinterthur: Buijtendorp 2010, 640.
33 Buijtendorp 2010, 640.

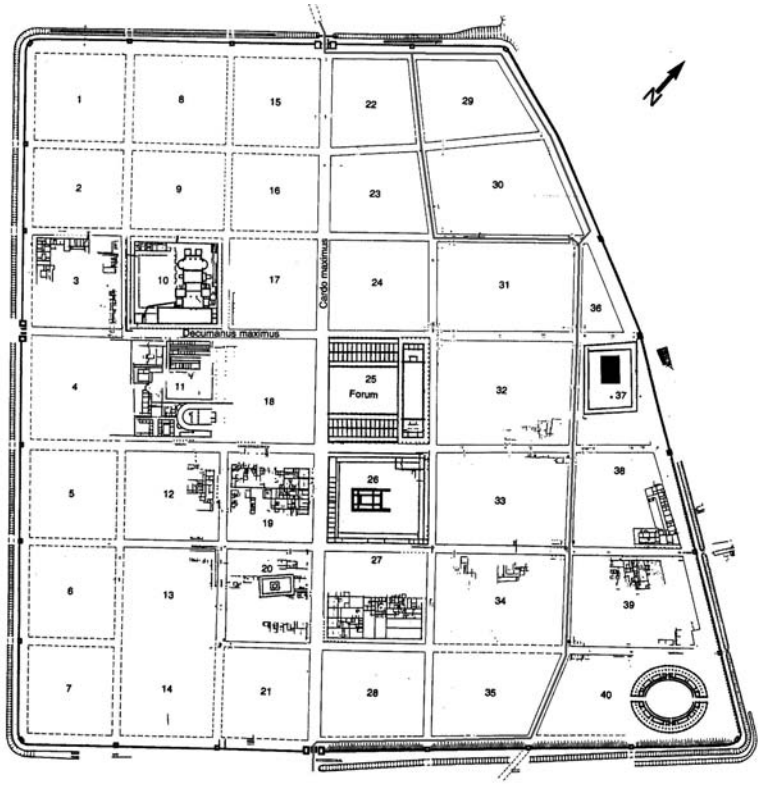

Fig. 8. *Xanten, plan with parallel route (Heimberg & Rieche 1998, 7, referring to H. Stelter; modified by C. van Tilburg; Van Tilburg 2012, 164).*

3. Traffic circulation and the forum

Usually, the forum was located at the intersection of *cardo* and *decumanus*. A forum was square or rectangular, surrounded by colonnades or walls, and always strictly prohibited for wheeled traffic **(fig. 9)**.[34] This forum was often, but not always, situated in the centre of the city: in Pompeii, Cologne and Colchester, the forum was located on the periphery.

In contrast to the planned cities in northern Europe, in Pompeii wheeled traffic could not drive around the Forum. Traffic with the Forum as destination (there was a lot of building-traffic for the rebuilding of the Forum after the earthquake of AD 62) was forced to use several culs-de-sac, finishing as dead ends against the Forum area. [164]
Recent research has provided evidence that for the reconstruction of the Forum new buildings were erected and streets to the Forum, like Vicolo del Balcone Pensile, were

34 In the first instance, however, the Forum in Ostia (a town more suitable for wheeled traffic than Pompeii) was open for cart traffic, but blocked in a later period; Kaiser 2011a, 131-132.

Fig. 9. *Forum with barricade (Giuntoli 1989, 35).*

narrowed.[35] The one and only street running along the Forum was the short road section south of the Terme del Foro. Wheeled traffic was completely closed off here. The imperial fora in Rome show the same design.[36]

In *coloniae* like Xanten, Cologne and Colchester, their fora were also closed off, but surrounded by streets suitable for wheeled traffic. There were two types of traffic design. Firstly, the intersection of *cardo* and *decumanus* was a single intersection, from where traffic could drive in four directions. The Forum was situated beside this intersection. An example is Xanten (**fig. 10**). Secondly, there was no real intersection between *cardo* and *decumanus*. One main route ran along the Forum; the other partly encircled it by means of a zigzag route. An example of this is Cologne (**fig. 11**).

Both Cologne and Xanten were designed as a complete entity, so there was no question here of an alteration in design and traffic circulation. Both designs have advantages and disadvantages. The advantage of the Xanten model was that traffic could cross the city via the shortest, straightest route. The disadvantage was that this design caused a dangerous intersection – even more dangerous in the absence of traffic signs or officials. The Cologne model had the advantage that travellers were forced to reduce their speed and the local authorities could then create an imposing view of the Forum for passing travellers to admire. This was not the case in a city such as

35 For the reconstruction of the Forum and the development of the infrastructure see Poehler 2011a, 149-163; the situation of the Vicolo del Balcone Pensile is mentioned on p. 153. See also Kaiser 2011a, 97.
36 Lanciani 1990, fig. 22.

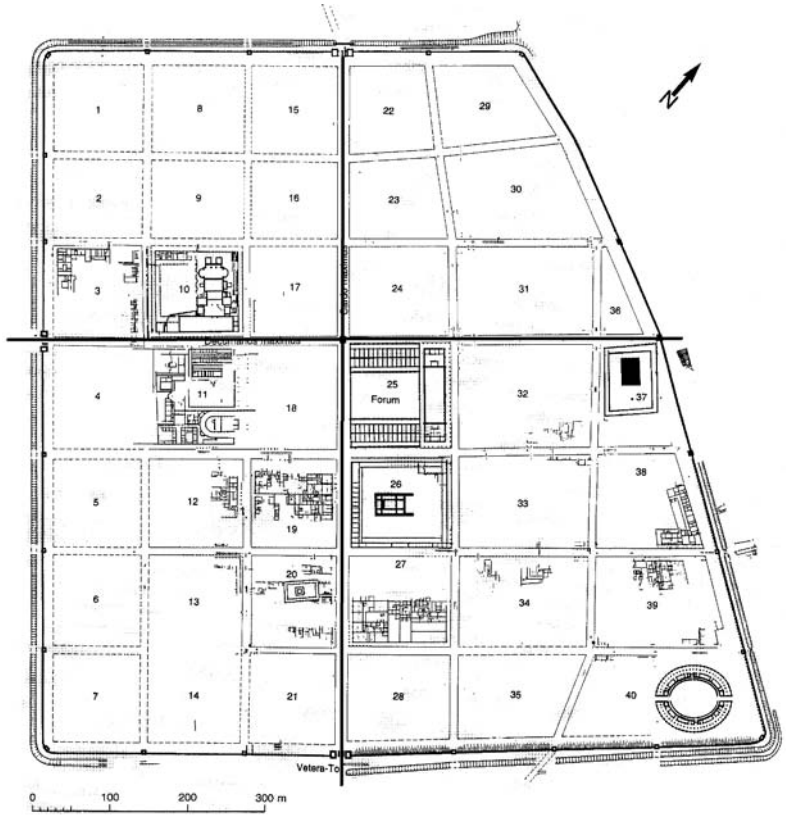

Fig. 10. *Xanten, plan with intersection (Heimberg & Rieche 1998, 7, referring to H. Stelter; modified by C. van Tilburg).*

[165]

Caerwent (south-west Britain), where the zigzag route encircled the entire Forum and the approach road did not lead straight to the axis of the Forum, as in Cologne.

In the case of the Cologne model there was one zigzag route; the other route was straight. In Cologne, the *decumanus* was the zigzag route and the *cardo* the straight one; in contrast, in Caerwent the *cardo* was the zigzag route and the *decumanus* the straight one.

Another *colonia*, Trier, was not designed as an entity. Up until the end of the 2nd century AD it was an open city. Due to the instability caused by the first Germanic invasions and the struggle between Pescennius Niger and Clodius Albinus in 193, the [166]
local authority decided to construct city walls and gates. The location of the gates obviously determined the course of the north-south and east-west routes. The route of the *decumanus* was already fixed: this formed the connection between the bridge over the Mosel river and the Forum. The route of the *cardo* could, however, be modified: the city authorities could either place the southern gate (facing Porta Nigra, the northern gate) as a direct continuation of the *cardo* coming from Porta Nigra, creating an intersection as in the Xanten model, or construct the southern gate elsewhere,

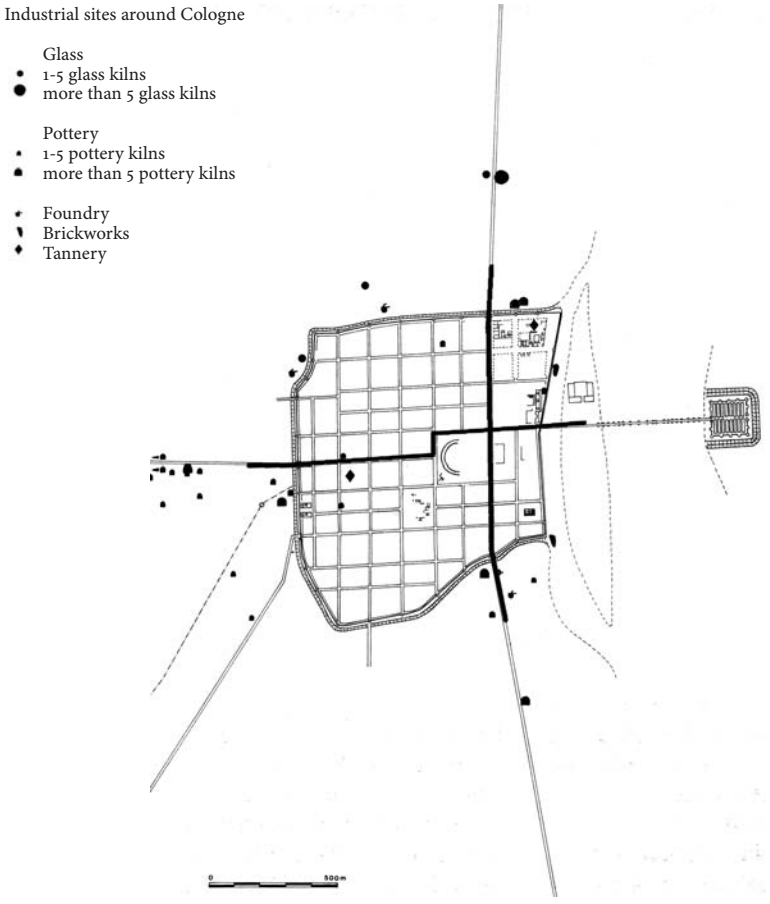

Fig. 11. *Cologne with zigzag route (Stuart & De Grooth 1987, 41; modified by C. van Tilburg).*

creating a zigzag route, as in the Cologne model. The city authorities chose the Cologne model; the Forum was partially, and not entirely, encircled **(fig. 12).** An argument for the city authorities to choose the Cologne model could have been the policy of reducing speed – traffic accidents took also place in antiquity, so laws were established[37] – but another factor could have been the existing economic importance of the street running from the Forum to the south-west.

[167] In some cities it is unclear whether the Xanten or the Cologne model was chosen. It is assumed that Voorburg followed the Xanten model, with no zigzag route **(fig. 13a)**. However, it is not certain, because we do not know the number of gates in the east wall. Buijtendorp argues that the east wall probably had gates which correspond-

37 E.g. the *Lex Julia Municipalis* or *Tabula Heracleensis* (CIL 1^2 593, 56-67) and other laws; Van Tilburg 2012, 127-130; 132-136; Kaiser 2011b, 187; 189. Cf. Iuv. 3.259-260 *quid superest de corporibus? quis membra, quis ossa invenit? obtritum volgi perit omne cadaver.* Accidents with children: Laes 2004, 163; Drexhage 1986, 19; 22; Robert 1955, 280-282.

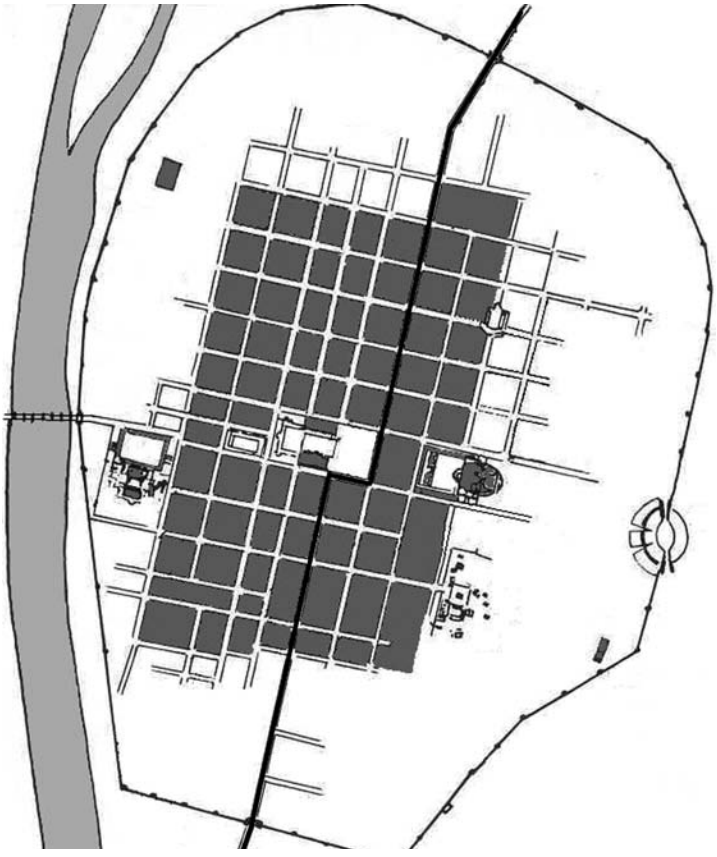

Fig. 12. *Trier with forum route (Oude Essink [1983] 104; modified by C. van Tilburg).*

ed with the gates which have been excavated in the west wall. So we can logically expect that there must have been a gate in the east wall, connecting with the wide thoroughfare *decumanus* (gate 5). However, it is not certain that there was a gate connecting the more southerly *decumanus* (gate 6); it is also possible that entering traffic passed through a gate more to the south, which in this case would have been a main gate (gate 7).[38] In that case, a zigzag route could have been possible in Voorburg (**fig. 13b**), although the Xanten model looks more likely. A parallel route in a city with a zigzag route has also been found in Cologne itself; here, too, it was the *decumanus*.[39] (**fig. 14**).

38 Buijtendorp 2010, 350, fig. 4.2.
39 Wolff 2003, fig. 1.

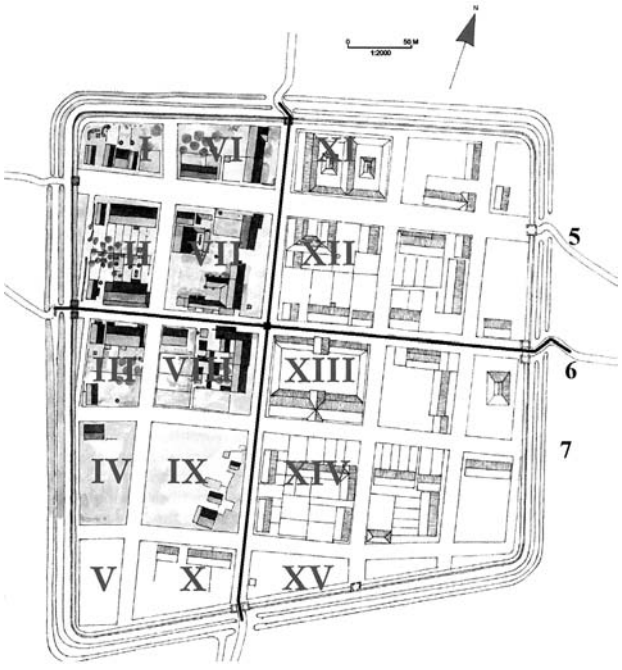

Fig. 13a. *Voorburg, plan with intersection and gate numbers (Buijtendorp 2006, 97; modified by C. van Tilburg).*

[168]

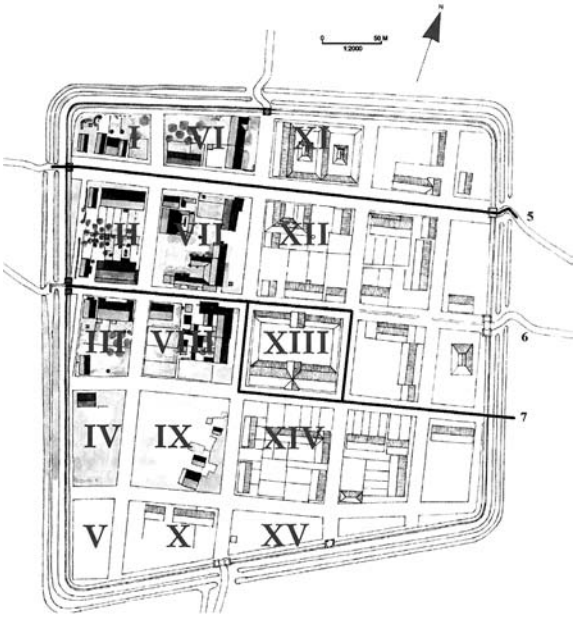

Fig. 13b. *Voorburg, plan with zigzag, parallel route and gate numbers (Buijtendorp 2006, 97; modified by C. van Tilburg).*

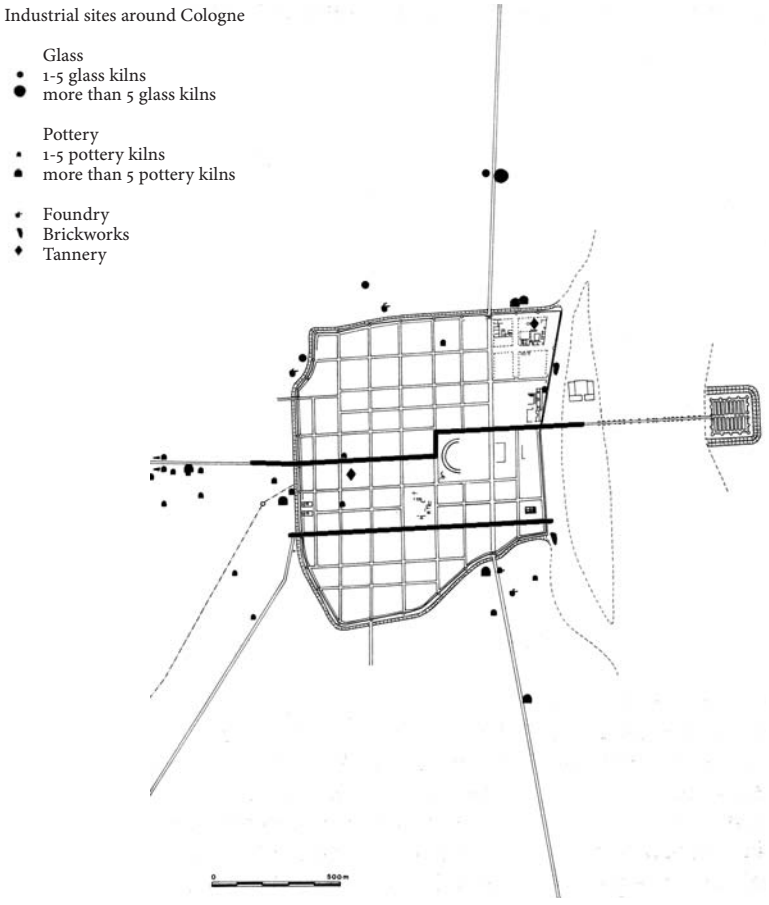

Fig. 14. *Cologne, plan with zigzag and parallel route (Stuart & De Grooth 1987, 41; modified by C. van Tilburg).*

Summary and conclusion

[169]

All through history, there has hardly been any research into traffic circulation and blocked arterial roads in the ancient Roman world. Only in recent years have eroded ruts and curb stones in Pompeii been more meticulously investigated and they give us a picture of a dynamic flow of traffic. Some streets were under reconstruction at the time of the Vesuvius eruption; other streets show deep ruts. The city authorities could block or unblock streets and alter routes at will. In many cases traffic was forced to follow fixed routes, with obtuse rather than sharp corners being preferred.

It also seems that in cities with enough room for infrastructure, like Xanten, certain fixed routes were common; also here, there was a preference for obtuse corners. Unfortunately, it is unclear whether streets were closed or opened by the city authorities; the clay soil does not permit the indication of routes by showing evidence of ruts. However, the worn northern cornerstone of 'Kleine Hafentor' clearly proves that in

the case of one-way streets, traffic passing the single harbour gates preferred obtuse corners. The local authorities probably encouraged this traffic direction.

The city government could also stimulate the use of certain traffic routes by the positioning of gates to correspond to the entry and exit roads. One could choose an intersection model or a zigzag route model, encircling the forum either completely or partially. In the latter case, one zigzag route was enough; up to now a city with two zigzag routes has not been found.

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Gates, Suburbs and Traffic in the Roman Empire

Context

Literature concerning ancient Roman city gates is scarce. The most important article on this topic (as far as I know) was published as long ago as 1909.[1] Apart from this, there is a number of publications that discuss gates. The majority of these publications, however, usually describe one particular gate from an art historical and archaeological point of view, whereas the urban and military-technical contexts are not mentioned. Due to the fact that city gates play an important role in traffic congestion, traffic circulation and city planning – discussed in Chapter 3 in my book – I had aimed to conduct more elaborate research on gates in relation to their urban contexts.[2] In 2004, I published a Dutch article discussing traffic and city gates[3] and in 2005 a Dutch book discussing traffic.[4] In 2014, N. Tuinman, student at Universiteit Leiden, wrote a (hitherto unpublished) MA thesis.[5]

The following chapter focuses on gates in relation to traffic. Presently, I am preparing an article discussing other aspects of gates: their role in the supply of drinking water, in the discharge of sewer water and in regulating social traffic.

1 Schultze, R. 1909 (see Bibliography).

2 Tilburg, C. van. 2012. *Traffic and Congestion in the Roman Empire* (see Bibliography).

3 Tilburg, C. van. 2004. 'Stadspoorten in het Romeinse Rijk' (= 'City Gates in the Roman Empire'), *Spiegel Historiael* 39, 9: 391-396.

4 Tilburg, C. van. 2005. *Romeins Verkeer: Weggebruik en verkeersdrukte in het Romeinse Rijk* (= *Roman Traffic: Road use and traffic congestion in the Roman Empire*), Amsterdam (second revised edition Leiden, see Bibliography).

5 Tuinman, N. *City gates: A gateway into Roman Society: Examining the city gates of Roman Ostia through an analysis of the city plan.*

Gates, Suburbs and Traffic in the Roman Empire

Abstract
Walled cities in the Roman Empire were inevitably accommodated with city gates which had one, two, three or four passages, depending on era, place and status. From the 1st century BC onwards, particularly in the so-called *coloniae*, monumental gate complexes were erected with two or more passages, where driving traffic was separated from pedestrian traffic. Where gates are designed with special passages exclusively for pedestrians in the cases discussed in this chapter (Pompeii, Cologne, Xanten and Trier), extramural buildings are found. Where special pedestrian passages are absent, extramural buildings are not usually found.

Introduction

Looking at the following city gates – Porta di Nola and Porta di Ercolano in Pompeii, Burginatiumtor in Xanten, Porta Nigra in Trier and Porta Appia in Rome – a spectator will see that they have all been part of a (former) city wall and constructed to allow for entering and exiting traffic. Nevertheless, the differences are considerable. On the one hand, Porta di Nola is a small, simple gate, in fact no more than a door in the wall; on the other hand, there are the monumental gate complexes of Cologne and Trier, large-scaled gate buildings flanked by towers and with more than one passage.

These gates were built in different periods; in some cases – Porta di Nola (Pompeii, built in Archaic period) and Porta Appia (Rome, built in Late Antiquity) – the defence function was of more importance; Porta di Ercolano and Burginatiumtor were constructed in a period of peace and relative stability, when it was possible to give higher priority to traffic. The construction of Porta Nigra at Trier (erected in the last years of the 2nd century AD) can be considered as a transitional type.

The most significant aspect, however, in which the gates differ is in the number of passages. Porta di Nola has one single passage (a gate type that is called 'single gate' in this chapter), Porta di Ercolano three, Burginatiumtor two, Porta Nigra two and Porta

Appia, originally, two – and finally, from the beginning of the 5th century AD, one. One can conclude that gates – in the beginning – were accommodated with one passage; in later periods there came gates containing several passages and, finally, in Late Antiquity, one went back to single gates because of the growing insecurity of society.

Excavations show that the situation could occur that one city (particularly a *colonia* founded in the 1st century BC and the first two centuries AD) had gates or gate complexes which differed from each other in the number of passages. For example in
[134] Pompeii we find, – apart from the single Porta di Nola – Porta di Ercolano with three passages and the double gate Porta Marina, with a broad passage for driving traffic and a smaller one for pedestrians. Cologne, Xanten and other cities were also accommodated with single gates and gates containing two, three or four passages. Possibly, Lincoln had all of these types of gates: a single gate, a double gate, a gate with three passages and a gate with four passages.

What is the origin of such a variety of gates? Is it a matter of coincidence or did the local government have special reasons for constructing a gate with one or more passages at a fixed place, taking care of traffic flow?

In this chapter, an attempt will be made to show that there is a definite connection between the number of passages in a city gate (or gate complex) and extramural buildings, situated on the land side of a city wall; these extramural buildings or 'suburbs' were meant for living, working or – in the case of a temple – religious purposes. Cemeteries and 'Gräberstraßen', always situated outside the boundaries of the city, were fully independent of the number of gate passages; they are found in the case of all types of gates. For establishing this number in a gate or gate complex, other aspects also played an important role: in some cases an existing city was accommodated with new walls and gates, in other cases a city was completely planned and built as a whole – including its walls and gates – at one and the same time.

In comparison with other utilitarian buildings, Roman gates are scarcely mentioned – or not at all – in ancient literature. Our most important author of architecture, Vitruvius, does not pay any attention to gates at all. Our knowledge of the building and functioning of city gates is almost completely based on archaeological evidence and here also our knowledge is limited, because most gates have disappeared. Another remarkable fact is that not all cities in the Roman Empire were surrounded by a wall; in vast regions, walls were rather the exception than the rule. There are only a few cases which give an impression of the interaction between city and countryside, entering and exiting traffic and the role of city gates in this matter.

After the construction of a gate, the number of passages remained the same during the whole period of Antiquity; changes in the plan and/or the number of passages to give more space to traffic flow did not take place.[1] Only in case of damage or destruction of a gate (in wartime or natural disasters), where it was necessary to build

1 According to Gros, Porta Esquilina (Arcus Gallieni) was built in the Augustan era as a three-passage-gate (so replacing an older one, probably a single gate); Gros 2002, 29-30. If so, this should be a city gate without a closing wall; the Servian Wall was interrupted. The gate could have been designed as a triumphal arch with three passages; Platner & Ashby 1929, 39; Rodríguez Almeida 1993, 93-94.

a completely new gate, could the number of passages be adapted. In Late Antiquity, sometimes the number of gate passages would decrease when city defence was of more importance and traffic of less; passages could also be narrowed or bricked up. To keep traffic flow under control in a certain way, passing traffic had to be restricted and suburbs had to be limited as much as possible to places where the gates had space enough to sustain traffic flow.

In this chapter, four cities – Pompeii, Cologne, Xanten and Trier – will be discussed, where we have enough information on their urban infrastructure (including the situation of gates and suburbs) to set up a more detailed survey of the planning of gates and extramural buildings:

- in Cologne and Xanten, there is an integral plan of city and city wall;
- in Pompeii, the existing city was extended twice and accommodated with new walls; here the exceptional situation occurred that an old gate was replaced by a new one in an existing city wall;
- in Trier, an existing city acquired a completely new wall.

In Pompeii and Trier, the walls were in the first instance erected for city defence, but in Cologne and Xanten they were built to indicate the city boundaries. In the latter cases, the city government was able to assign certain locations for setting up extramural buildings as part of the city. So in this case, extramural buildings were part of a policy, undertaken with a specific intention.

In Pompeii, in the case of two gates, there were extramural buildings in front of the gates with side passages for pedestrians. This situation also occurs in Cologne and Xanten. In Trier and also in Rome there were neither extramural buildings of any importance, nor gates with side passages for pedestrians.

This chapter focuses on aspects of the planning, defence and traffic functions of gates; strictly architectural and art-historical aspects like columns and sculptures (a gate as a city's visiting card) are not a point of study here.

1. Pompeii

Pompeii started in the 6th century BC or earlier[2] as an Oscan settlement. Its defence wall was of great importance in the city-state society of that time and surrounded in the beginning the *regiones* VII and VIII. Later on, the city underwent two extensions: *regio* VI in the period 474-424 BC and the Samnitic extension in the 4th century. In this phase the city took its final shape (**fig. 1**). The former *cardo*, Via di Mercurio, lost its function in this extension; the city gate, situated in the wall at the north side of the *cardo,* was demolished and replaced by a wall tower, nowadays Torre XI.[3] The thoroughfare road, that ran its course outside the city along the wall prior to the extension, now came into the city and took over the function of the *cardo*; the former *de-*

[135]

2 Etienne 1966, 86.
3 Etienne 1966, 91-95.

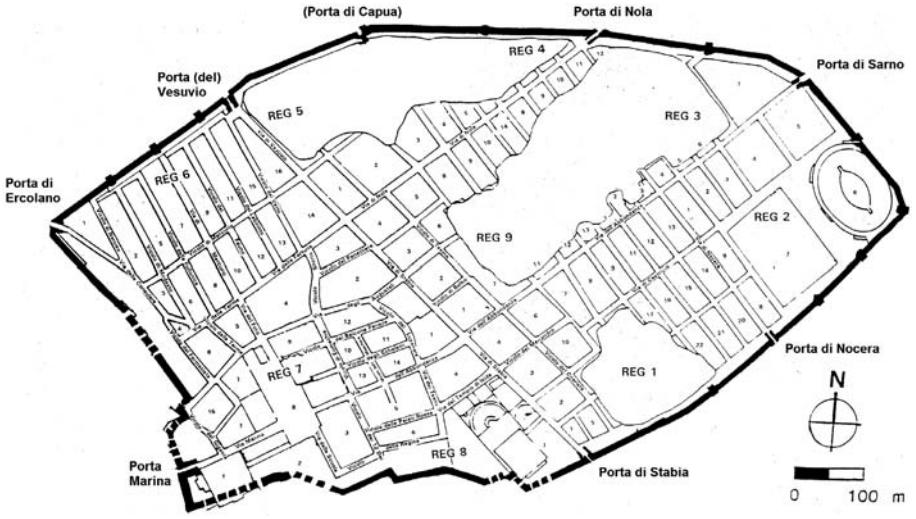

Fig. 1. *Pompeii, plan (Laurence 1994/96, 2; modified by C. van Tilburg; Van Tilburg 2012, xvii).*

cumanus was lengthened to arrive at Porta di Sarno. In the end, after this extension, Pompeii had seven gates: Porta Marina, Porta di Ercolano, Porta del Vesuvio, Porta di Nola, Porta di Sarno, Porta di Nocera and Porta di Stabia.[4] This situation continued until the volcanic eruption of Vesuvius in 79 AD.

Porta del Vesuvio, Porta di Nola, Porta di Sarno, Porta di Nocera and Porta di Stabia all have only one passage, whereas Porta Marina has two passages and Porta di Ercolano even three. Can an explanation be found here?

Originally, immediately after the third extension, all gates were designed as single gates. They made up part of the surrounding wall erected for city defence against attacks of enemies from outside. The gates, the weakest points of the wall, had to be as narrow as possible and relatively easy to defend. There were still no extended gate complexes like those discussed below in this chapter. Also from a traffic point of view, Pompeii did not need wide gates; the city population did not yet have such a volume to cause busy traffic flow and lack of space.[5] During the time that Pompeii was part of the Roman Empire, the city government decided to maintain the surrounding wall for the most part; only on the south-west and west side between Porta Marina and Porta di Stabia was the wall finally pulled down and built over by the 'Hanghäuser', but the small gates were maintained.

Porta Marina is a remarkably deep gate (with a depth of 22.63 metres);[6] it is perhaps rather more a tunnel than a gate passage. The main passage or carriageway is wide enough to give space for a wagon or a horseman, but for a pedestrian the gate

4 An eighth gate, Porta di Capua, for a long time doubtful, is now definitely rejected in Sakai's article.

5 Schoonhoven 2003, [285].

6 Overbeck & Mau 1884, 54.

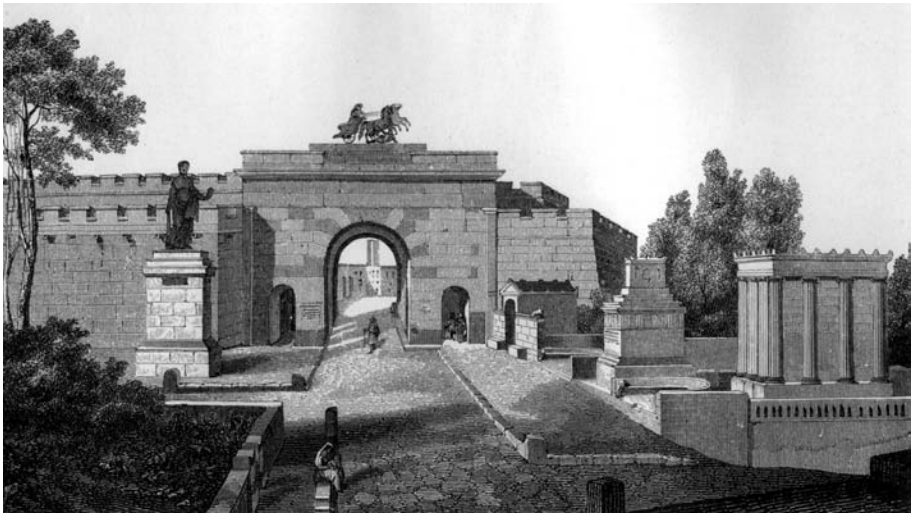

Fig. 2. *Pompeii, Porta di Ercolano (Overbeck 1884, opposite p. 42).*

is difficult to pass; because of the length of the tunnel he has to wait longer until the gate is free. So Porta Marina had a special parallel side passage for pedestrians, built against the broader carriageway at the north side. According to Mau and Overbeck, the gate dates from the period between the Second Punic War and the Social War, roughly the 2nd century BC.[7] Overbeck and Mau are doubtful as to whether Porta Marina was suitable for military functions; they state that during the construction of this gate Pompeii had no walls at all on this side.[8] In fact, Porta Marina may be seen as a forerunner of a gate where traffic is more important than defence.

Porta di Ercolano (in Roman times this gate was named Porta Salis, Salt Gate)[9] is also different from the other (single) gates. At the time of the eruption of Vesuvius, it had three passages: one main carriageway for wheeled traffic and people on horseback in the centre of the gate building and on the left and right side two smaller side passages for pedestrians (**fig. 2**). The gate replaced a former one, situated a little bit more to the southwest; a reconstruction picture by W. Gell shows older wheel ruts running to the former gate, but after the construction of the new gate they ended against the pillar between the central carriageway and the western side passage. The road surface also ends against this pillar; on the east side of the carriageway, the pillar is not placed in the road surface but in the edge of the sidewalk[10] and can be dated after 80 BC as a *terminus post quem*, when Pompeii was given its status of *colonia* by Sulla.[11]

7 Overbeck & Mau 1884, 53; Mau 1899, 238.
8 Overbeck & Mau 1884, 53.
9 Coarelli 2002, 53; Etienne 1966, 113.
10 Coarelli 2002, 32. More traces of the course of the former road can be found by the positions of the fronts of the tombs Sud 3 and Nord 3, 4 and 6 (the tombs Sud 2 and Nord 1 are erected in a later period); Fröhlich 1993, 153-156.
11 Coarelli 2002, 52. According to Fröhlich, the common view is Late Republic or Augustan period

What is the reason for the design of this gate, which is different from the other gates? The reason for this is to be found in the siege and capture of Pompeii in 89 BC by the troops of Sulla during the Social War. During the siege, the attack was concentrated on the north western part of the city between Porta di Ercolano and Porta del Vesuvio. In this attack, stone bullets were shot into the city[12] resulting in the city wall (including Porta di Ercolano) being damaged; possibly the gate was completely destroyed. It was later reconstructed but with an altered shape, with three passages.[13] Another reason why a gate was built with three passages is that, as well as increased traffic flow, extramural buildings had been developed over the course of time.[14] At the time of the eruption of Vesuvius there was a suburb outside Porta di Ercolano, the so-called Pagus
[136] Augustus: a necropolis and some large villas such as Villa dei Misteri, at first all dating to the 2nd century BC.[15] A second important necropolis was situated outside Porta di Nocera, whilst outside Porta Marina the Terme Suburbane were constructed during the time of the Emperors. This was an excellent location owing to the presence of a gate with a side passage for pedestrians and sea water, used in these baths.[16]

Incidentally, the local government followed a restrictive policy pertaining to extramural buildings. Private individuals occupied public space outside four gates – Porta Marina, Porta di Ercolano, Porta del Vesuvio and Porta di Nocera – while the city government considered these as public spaces where dwellings were undesirable.[17] Maybe traffic aspects also played a role here; in this way, the quantity of entering and exiting traffic could be restricted as much as possible to interurban traffic. Pompeii was a densely populated city and in order to cope with the housing problem, the choice was made to construct buildings in the south-west corner of the city, at the place of the former wall.[18]

One can conclude that Pompeii – in spite of an increasing population in the city itself and the surrounding region in Campania[19] and the consequently increasing traffic flow – maintained the small gates in the wall, for the most part dating from the Samnitic period. The city government chose a compact, densely crowded city inside its traditional boundaries. Extramural buildings were restricted as much as possible, probably to keep traffic congestion under control in front of the gates; the presence of a suburb in front of Porta di Ercolano caused a bottleneck, in combination with traffic going to Herculaneum and Naples. After destroying this deficient gate, the city government took the opportunity of replacing it with a new one with three passages: a central carriageway with two side passages for pedestrians.

(p. 153), like Porta di Stabia (p. 156); according to Fröhlich himself, the gate is constructed after the earthquake in 62 AD (p. 157-158); he does not mention Sulla. Cf. Chiaramonte Treré 1986, 14.

12 Coarelli 2002, 52; Etienne 1966, 114.

13 Coarelli 2002, 52.

14 Before Sulla, there was already a concentration of villas on the western side of Pompeii: Oettel 1996, 169.

15 Coarelli 2002, 346.

16 Coarelli 2002, 192.

17 Van Binnebeke 1997, 142-144.

18 Etienne 1966, 116.

19 According to Prof. Luuk de Ligt (oral communication).

2. Characteristics of a three-passage-gate

A symmetrical city gate with three passages like Porta di Ercolano in Pompeii is a typically-Roman phenomenon, occurring in many planned Roman cities in the western part of the Roman Empire. During the course of the 1st century BC, this type of gate was developed – in this chapter, I will call this a 'three-passage-gate' – and around 25 BC, when Porta Praetoria in Aosta was built, we can speak of a gate complex with the following features:

- the gate building itself, with three passages (a high carriageway in the centre, for wheeled traffic and people on horseback, and two side passages for pedestrians) and a courtyard;
- a floor for the use of the portcullis;
- two flanking towers.

This revolutionary architecture is, according to Schultze, derived from the cities in the Hellenistic areas, particularly Alexandria, where Rome made its first connections in the second half of the 1st century BC.[20] Some Hellenistic cities were open cities; other ones were accommodated with stone walls.[21]

It is clear that these large-scaled gate complexes are constructed especially, in the first instance, for traffic volume and not for city defence. In this period there were no competing city states or enemies; cities took their chances to construct imposing gate complexes not only for traffic but also to exhibit their power and wealth with much display of decoration and as a status symbol. This was especially suitable for new cities, the so-called *coloniae*, set up for housing veterans and colonists. Many *coloniae* were accommodated with a surrounding wall; in this case, however, it was initially meant to indicate the boundary of the built-up area, and not as a city defence. The aim of the gate complexes was also to impress the approaching visitors to the city and not to frighten them off. This did not mean that it was impossible to close the gate. In times of danger, the central carriageway could be closed by means of a portcullis, which made necessary the construction of a floor above the passage. Porta di Ercolano, too, already had a portcullis at its disposal.[22]

3. Cologne

One of the new *coloniae* where this type of city gate was introduced was Cologne, which received its status of *colonia* in AD 50. Before that time, there was already a local Germanic settlement, Oppidum Ubiorum. From 50 onwards, the wall was erected in a wide circle, indicating the contours of the final Roman city. Inside the wall, the

20 Schultze 1909, 296.

21 Cities without walls: e.g. Termessos (Akurgal 1973, 326) and Aspendos (Akurgal 1973, 334). Cities with walls: e.g. Priene (Hellmann 2010, 326) and Pergamum (Hellmann 2010, 337).

22 Schultze 1909, 287.

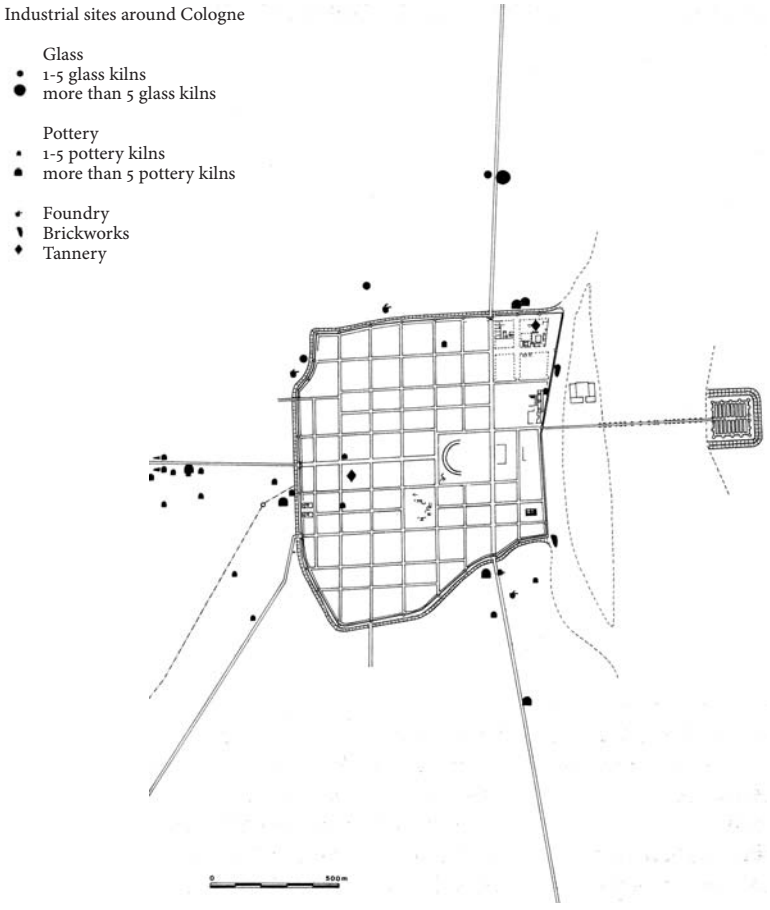

Fig. 3. *Cologne, plan (Stuart & De Grooth 1987, 41).*

city was designed according to the usual and typical Roman form of planning: streets following the form of a chessboard pattern, *cardo* and *decumanus* as main axes and the central forum situated at their intersection **(fig. 3)**. The three main land gates, completely integrated in the city wall, were constructed at the points where *cardo* and *decumanus* crossed the wall on the northern, western and southern side. The eastern side was formed by the left bank of the river Rhine where smaller harbour gates were situated.[23]

[137] The planning of these city gates, in combination with the indication of certain areas outside the boundaries of the wall – where extramural buildings were not only desirable but even necessary – created the opportunity for designing the gates with such a number of passages that traffic flow could be sustained effectively. In the case of the three main land gates, three-passage-gates were opted for, with a high carriageway in the centre, flanked by two smaller side passages for pedestrians.

23 Klinkenberg 1906, 179-197.

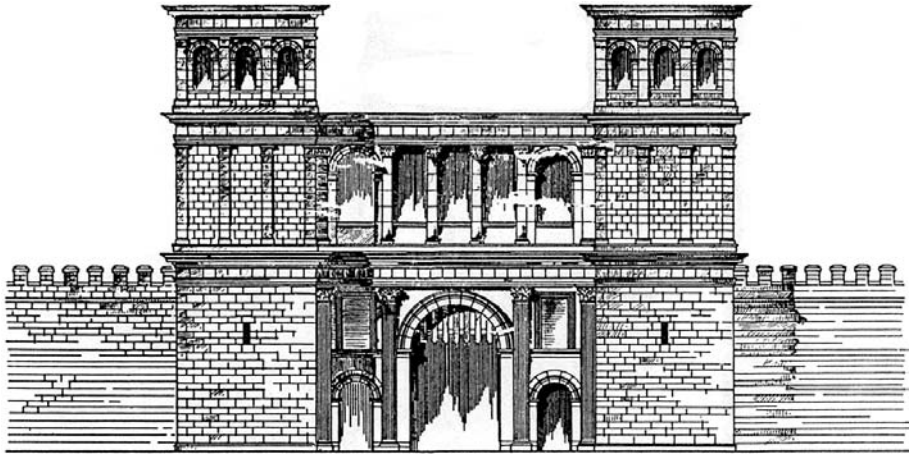

Fig. 4. *Cologne, Porta Paphia (Schultze 1909, Taf. XV).*

Cologne had nine gates in total: as well as the three main land gates there was a double gate and a single gate on the western side, a single gate on the southern side and three harbour gates on the eastern river side. One of them, the middle one, known as Porta Martis, had perhaps two passages[24] and gave access to an island in the Rhine, an industrial area.

The best-known gate is the main gate on the northern side, with its medieval name Porta Paphia (**fig. 4**). In respect to design and dimensions, this gate was roughly the same as Porta Praetoria in Aosta, but differed from it by the fact that the side passages were separated from the main central carriageway by means of a wall.[25] Presumably the other main gates had the same plan and dimensions. The adaptation of three-passage-gates created the possibility of developing suburbs; a development that was not only desirable, but also – in some cases – necessary. Immediately outside the gates was the suburb area, consisting of dwellings, workshops, cemeteries and – in front of the southern main gate (Hohenpforte)[26] – a *statio* for the *beneficiarii*, security watchers, responsible for watching the roads.[27] The presence of side passages created an optimal interaction of pedestrian traffic between city and countryside. We can assume that in the case of suburbs, the majority of traffic consisted of pedestrians; even in a relatively big city like Cologne, the distances were, in general, no longer than a few hundred metres and the distances between the suburbs and the city itself were no shorter. Furthermore, wagons were expensive; according to the *Edictum Diocletiani de pretiis*, one had to pay thousands of denaries for them[28] – excluding the costs for track animals and food.

24 Klinkenberg 1906, 196-197.
25 Schultze 1909, Taf. XV.
26 Klinkenberg 1906, 193-194.
27 Hellenkemper 1975, 157.
28 *Edictum Diocletiani de pretiis* 15.33 [*raeda cum arcuatis rotis sine fer*]*ro tribus milibus*, 'a wagon with curved wheel parts without iron-mounting costs 3,000 denaries'. This is a relatively plain wagon. The symbol must be read as *denarii*, denaries.

For relatively short distances, no longer than a few hundred metres, carriages were not only expensive but also unnecessary when everything was close enough to walk. So we can say that in the case of three-passage-gates the side passage (for pedestrians) was mainly meant for local traffic, including the interaction between the city and the extramural buildings; the high carriageway in the centre, designed for wheeled traffic and people on horseback was initially intended for interurban traffic.

Looking at figure 3 we see that the majority of workshops (indicated as larger symbols) were situated around the wall and the northern, western and southern approach-roads. Before the nomination of the status of *colonia*, there was already industry in Oppidum Ubiorum, especially on the western side, but after the realisation of the built-up area inside the wall, these workshops – not only producing goods, but also noise, smell and fire-hazard – were removed to the areas outside the wall. So potteries were removed and banished to the west, outside the western main gate, along the western approach-road. The need to transfer workshops because of the danger of fire from the walled city to the countryside is stressed again in AD 58, when the city was stricken by fire.[29] In the Flavian era, this transfer was completed successfully. The houses of the owners or managers of these workshops were removed to the suburbs, outside the city.[30] Other branches of industry, transferred to the countryside, were glass-works, metal-foundries and smithies.[31] These workshops were not only fire-hazardous, but also produced smoke, noise and nuisance.

[138]

Further, the plans of Hellenkemper (1975, 157) and Stuart show that the extramural buildings along the approach-roads outside the city are scarcer when there are fewer passages in the corresponding gates. Most extramural buildings are to be found along the suburban stretches of the *cardines* and *decumanus*, as well as the approach-roads on the northern, western and southern sides of the city, where the three-passage-gates are also situated. The road to the harbour island[32] passed a gate containing one or two passages; the southern gate of the west side of the city was a double gate like Porta Marina in Pompeii: a broad carriageway with a width of 3.70 m. and a smaller passage for pedestrians of 2.60 m.[33] The other two land gates, the northern one on the western side and the western one on the southern side, gave access to less important roads with scarcely any – or no – extramural buildings immediately outside the city. The number of tombs was also smaller.

The design and number of passages in a gate depended, at any rate in the case of Cologne, on the quantity and quality of planning and construction of extramural

29 Tac. *Ann.* 13.57 *sed civitas Ubiorum socia nobis malo improviso adflicta est. nam ignes terra editi villas arva vicos passim corripiebant ferebanturque in ipsa conditae nuper coloniae moenia*, 'But the federate Ubian community was visited by an unforeseen catastrophe. Fires, breaking from the ground, fastened onto farm-houses, crops, and villages, in all quarters, and soon were sweeping towards the very walls of the recently founded colony'.

30 Hellenkemper 1975, 157; Stuart & De Grooth 1987, 41; Höpken 1999, *passim*; Thomas 1990, 408.

31 Hellenkemper 1975, 157.

32 Hellenkemper's plan (1975, 157) shows a bridge. In the 4th century, a bridge was to be constructed over the Rhine, connecting with Porta Martis; Stuart & De Grooth 1987, 41. A reconstruction painting used by Böcking (1987, 102) even shows two bridges, and three single gates at the river front.

33 Klinkenberg 1906, 193-194.

buildings in the form of dwellings and workshops in the close environment of the city. Cemeteries depended less on the presence of main roads and gates. Stuart's plan shows two concentrations of cemeteries, situated a bit further away from the wall: one on the north western side of the city and one on the southern side. The latter field was approachable by use of the southern approach-road, but the largest concentration was situated off the road. Neither did the other main cemetery, have its location close to a main road[34] on the north western side. Settlements and farms situated further away from the city did not play a role at all in this matter; Hellenkemper's plan indicates that there were scattered dwellings in the whole hinterland and no concentration along certain roads. So we can conclude that the other two gates in the western wall could also have been designed as three-passage-gates, so that extramural buildings could be developed here.[35] *Cardines* and *decumanus*, however, had priority.

So the situation in Cologne is in fact opposite to that of Pompeii: there Porta di Ercolano (a three-passage-gate), was replaced in an existing built-up area as part of an existing wall between city buildings and extramural buildings, by a new design, because the changed situation made it not only possible, but even necessary. In Cologne, on the other hand, a start was made with the erection of a wall and gates as *tabula rasa*, in an area that was scarcely built upon – or not at all. Suburbs were not developed along every road and from every gate, but only in those places where the city government gave permission; although the industrial activities encircled practically the entire wall, the majority of the workshops developed along the three major approach-roads and the island, and not along secondary roads. So we can conclude that the city government, when planning and constructing the wall and gates, had already appointed these concentration areas. The wall of a *colonia* indicates the boundary of the city itself, the sanctified area, encircled by its *pomerium*, but the authorities of the city government (in this case the *aediles*) extended the *pomerium* up to one mile behind this boundary.[36] Therefore, the workshops outside the wall and, maybe, the cemeteries further away, were subject to the jurisdiction of the city government.

4. Double gates, three-passage-gates and four-passage-gates

A significant aspect of a gate is the fact that that it is not easy to alter during its existence. Should extramural buildings be constructed next to a gate with one or two passages – for whatever reason – the gate maintained its former physiognomy. Only in the case of destruction – by a natural disaster or during war – was the possibility created for the erection of a new gate, such as Porta di Ercolano. When a city government wished to keep the city as approachable as possible, taking into account the presence of suburbs, the possibility arose of building these suburbs on the land side of the gates with multiple passages, to sustain the interaction between city and countryside,

34 Stuart & De Grooth 1987, 41.

35 Hellenkemper 1975, 156.

36 *Lex Julia Municipalis* 68-70 *Quae loca publica* […] *procuratio est*; Van Binnebeke 1987, 124. *Contra* Liv. 27.37.9 *aedilium curulium* […] *intraque decimum lapidem ab urbe* and Pekáry 1968, 55-56, stating that there was a limit of 10 miles from the city.

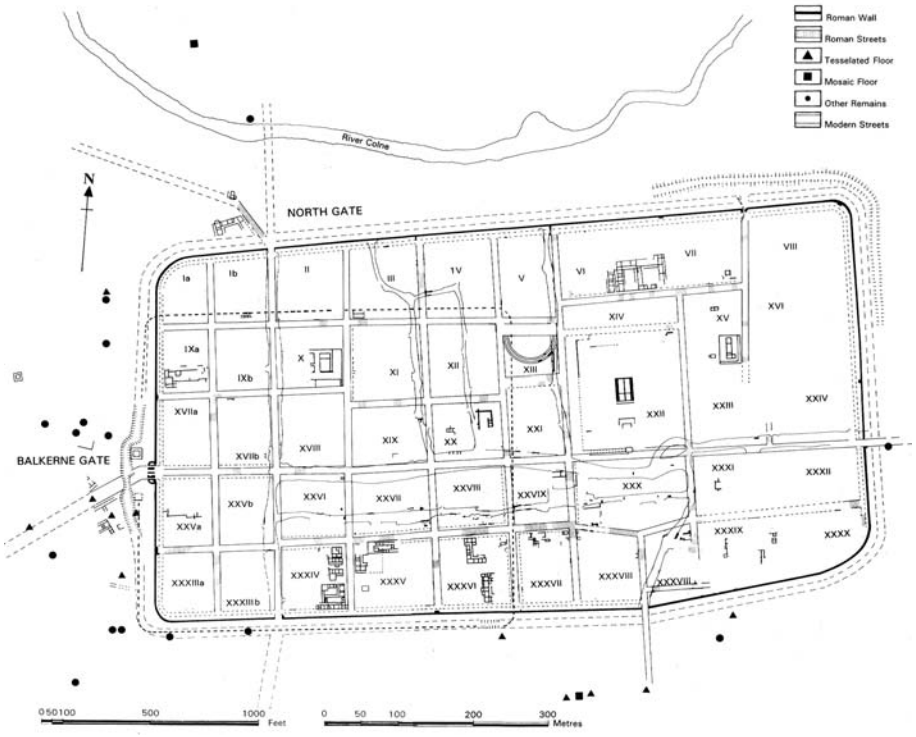

Fig. 5. *Colchester, plan (Wacher 1997, 115; modified by C. van Tilburg).*

avoiding traffic congestion in front of and inside the gate passages. The majority of the distances were relatively short and easy to walk, so the use, particularly, of special side passages for pedestrians could be helpful in keeping pedestrian traffic moving and vice versa.

[139] Apart from the above mentioned single gates, double gates of the Porta Marina-type and three-passage-gates,[37] there were two other types of gate: double gates with passages of equal height and both suitable for wheeled (interurban) traffic and even four-passage-gates, with two carriageways in the centre of the gate building of equal height, flanked by smaller side passages of equal height for pedestrians. This last gate type is scarce and only found in north western Italy, the adjacent south eastern Gaul and Britain.[38]

It was possible for a city government to choose one single type of gate, used in

37 The combination of three-passage-gates (Porta Venere and Porta Consolare) and extramural buildings is also to be found in Spello. Unfortunately, I could not find information on whether the three-passage-gates were older than the extramural buildings or later. In front of Porta Urbica, a single gate, there have not yet been found any extramural buildings up to the present; see Brands 1988, 131-132 and ill. 98-111, and the maps V and VIIb in Manconi, Camerieri & Cruciani 1996.

38 Nîmes, Autun, Turin (Schultze 1909, Taf. XIII, XIV, XVI); Colchester, St. Albans, Cirencester (Wacher 1997, 72) and maybe Lincoln.

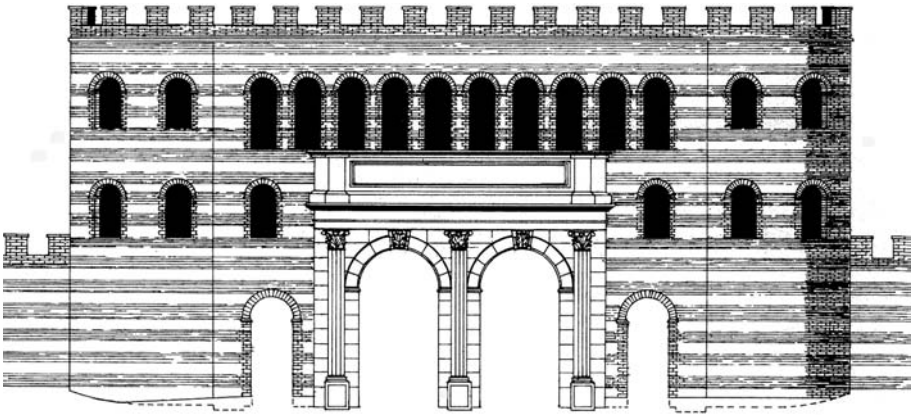

Fig. 6. *Colchester, Balkerne Gate (Van Tilburg 2005, 128).*

all cases. An example of such a policy is Autun, where four four-passage-gates were realised over all four approach-roads.[39] Nevertheless, in most cases a *colonia* had various types of gate, like Cologne. Nîmes, acquiring the right to erect a wall in 16 BC from Augustus, built a four-passage-gate. At another place in the wall a single gate was built (Porte de France); both gates had portcullises and were flanked by towers. In the upper city of Lincoln, every gate possibly had a different number of passages: a single gate on the western side, a three-passage-gate on the northern side, a double gate on the eastern side and probably a four-passage-gate on the southern side.[40] The plans of Lincoln and Colchester show the same development as in Cologne: more extramural buildings when there are more passages in the connecting gates. In Colchester, a concentration of extramural buildings is found on the land side of Balkerne Gate, a four-passage-gate on the western side, and a supposed three-passage-gate on the north western side of the city **(figs 5-6)**.[41] There was no courtyard in these British gates; they were merely passages in the wall and the passages themselves were separated by walls, flanked by towers. Finally, Timgad (Africa) shows the same situation: a three-passage-gate was built on the side where many large-scaled, extramural buildings have been found, and narrower gates where extramural buildings are scarcer.[42]

39 Schultze 1909, 305.

40 Jones 2002, 59-61. Whether on the southern side a four-passage-gate was really situated, is not completely certain, but considering the fact that a suburb (the 'lower city') was developed here which was eventually larger than the former 'upper' city, a four-passage-gate is to be expected here and I agree with Jones, together with Wacher (1997, 135). Furthermore, a four-passage-gate was not an unknown phenomenon in Britain see n. 38.

41 Lincoln: Jones 2002, 55; Colchester: Wacher 1997, 115, 127 and 129 (three-passage-gate).

42 Van Tilburg 2012, 30 and 103; Goodman 2007, 70.

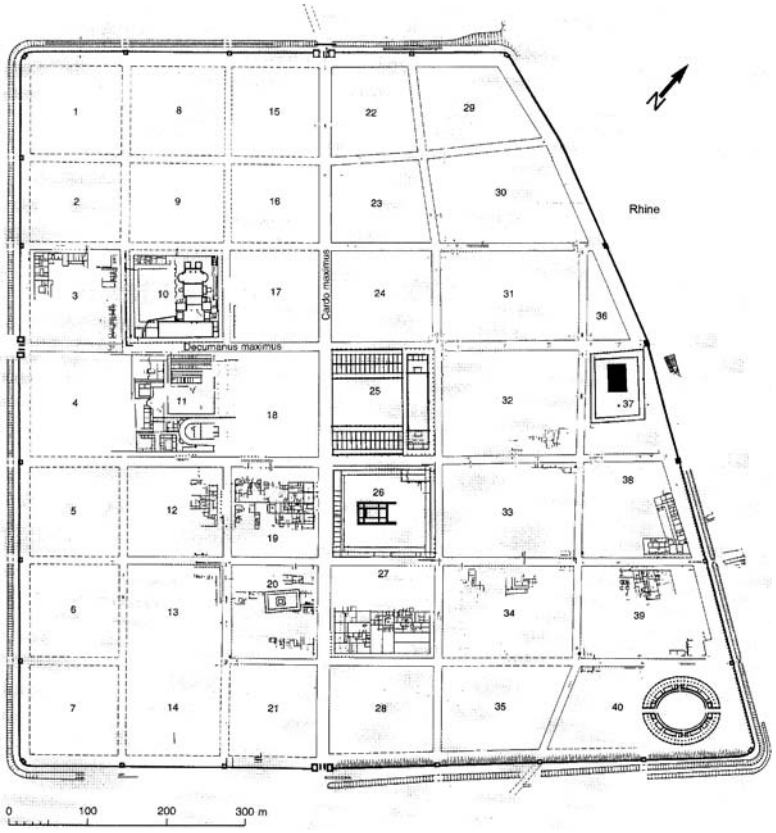

Fig. 7. *Xanten, plan (Heimberg & Rieche 7, referring to H. Stelter; modified by C. van Tilburg).*

5. Xanten

Roughly fifty years after the founding of Cologne, Xanten was the second city in the province Germania Inferior to acquire the status of *colonia* which was bestowed by Emperor Trajan under the name of Colonia Ulpia Traiana. We see here the same development in the construction of the city area: a former Germanic settlement was
[140] first surrounded by a new city wall, after which the area inside this wall was built up and accommodated with the usual chess-board street pattern – *cardines* and *decumanus* – and the typical Roman institutions such as a forum, an amphitheatre, temples and public baths (**fig. 7**).

Apart from the harbour gates, Xanten acquired three main gates on the land side, where *cardo* and *decumanus* entered the city: Burginatiumtor on the north western side (its name is modern and derived from the *castellum* Burginatium, situated northwest of Xanten along the river Rhine), Maastor (on the south western side) and Veterator (on the south eastern side, with the name of the military settlements Vetera I and II). These gate names are modern. The start of the erection of the city

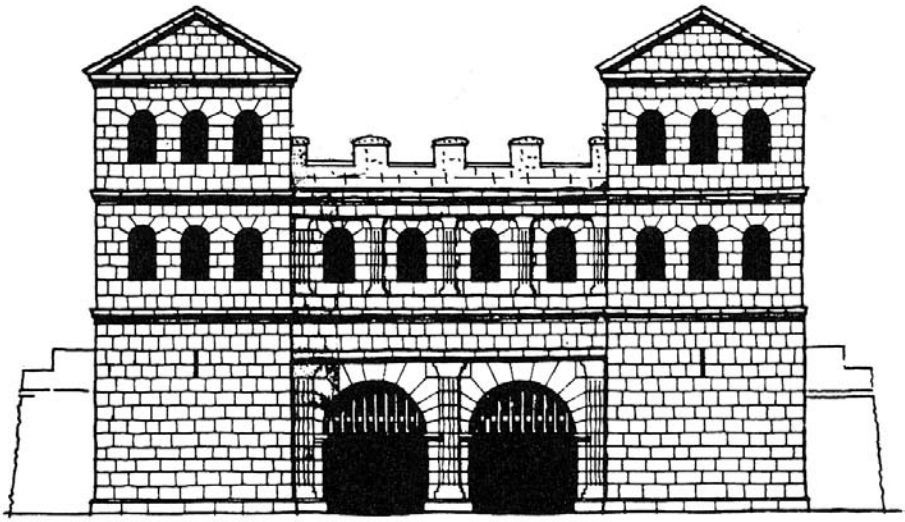

Fig. 8. *Xanten, Burginatiumtor (Böcking 1987, 274).*

wall is, by means of dendrochronological research, dated in 106[43] but the building of Burginatiumtor started later; according to coin discoveries, this is dated to around 115.[44]

Burginatiumtor has not only been excavated, but also completely reconstructed in its original situation and nowadays it is one of the most important attractions for visitors to the Archäologisches Park Xanten (APX; **figs 8-9**). The gate is designed as a double one with two carriageways for wheeled traffic and horsemen, without side passages. Like the British gate complexes, the gate does not have a courtyard; this phenomenon disappears in the second half of the 1st century AD.

Why is Burginatiumtor designed as a double gate without special side passages for pedestrians? Looking at the situation in cities like Cologne, Lincoln and Colchester, one reason may be that there were scarcely any extramural buildings or none at all. Outside the gate, some traces of a building[45] are found. If we assume that there were no further buildings,[46] this could explain why Burginatiumtor is a double gate and not a three- or four-passage-gate. The absence of a suburb of any importance did not necessitate the construction of special side-passages in the gate. So traffic crossing the gate must have been as good as completely interurban. There is also the possibility that the built-up area on the city-side of the gate was scarcer or more open than in other places in the city;[47] assigning a place for a suburb outside Burginatiumtor by the city government was not an urgent matter.

43 Schmidt 1987, *passim*; Liesen 1994, 238 n. 6; Kühlborn 1987, 486, 491.

44 Böcking 1987, 273.

45 Heimberg & Rieche 1998, 7 (plan).

46 According to H.J. Schalles (APX), not much has been found outside Burginatiumtor, but extended excavations have not yet taken place.

47 Excavations in 1968, 2000 and 2001 in *insulae* 15 and 22 (the *insulae* immediately south of Burgi-

Fig. 9. *Xanten, Burginatiumtor (photo C. van Tilburg; Van Tilburg 2012, 101).*

Another point of view is the following: extramural buildings outside the city – north of Burginatiumtor in the direction of the Rhine – would be situated in a place which was not attractive to live in. The gate did not only have the carriageways
[140] for traffic, but also the main sewer leaving the city through the eastern carriageway. The polluted waste water ran further to the Rhine whose course ran parallel to the wall. In and in front of the gate the sewer was closed, but from the point where the gate had its connection to the wall there was an open sewer.[48] Nowadays, tourists enjoy the fine view of Burginatiumtor and, climbing the towers, the magnificent panorama of the Roman city and the skyline of medieval Xanten, but in Antiquity, the smell must have been quite offensive here. Because of this, extramural buildings must have been scarce or completely absent. According to Böcking, however, there was an important cemetery.[49]

If there is scarcely any suburb outside this gate – or none at all – what about the other two main gates of Xanten? Maastor, situated on the south western side of the city, was already partially excavated, researched and described by H. Lehner around 1900, but our knowledge is still scant (**fig. 10**). It is certain that we have to do here with a three-passage-gate, at a later stage flanked by two towers. The fact that the towers are built over the former wall indicates that there were two building-phases; the sec-

natiumtor) gave evidence of the presence of an auxiliary camp in pre-colonial time; Leih 2002, 149-154. We may conclude that there were no soil disturbances during the *colonia*. Leih (2002, 152) assumes, on the basis of that, that there was fallow land: a farm farmyard or garden. In Nijmegen, also, there was scarcely any built-up or fallow land inside the wall: Willems 1990, 69.

48 Böcking 1987, 272; Heimberg & Rieche 1998, 60-61 (plan).

49 Böcking 1987, 273.

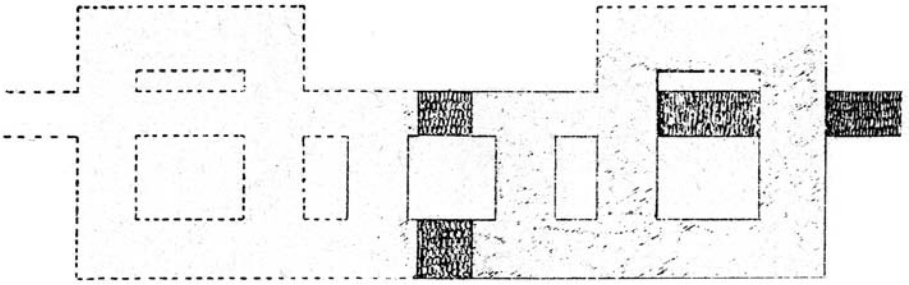

Fig. 10. *Xanten, Maastor (Lehner 1903, 182; modified by C. van Tilburg; Van Tilburg 2012, 115).*

ond phase dates from the second half of the 2nd century, after a fire.[50] This fire may be a consequence of an invasion of a Germanic tribe, the Chauci, in Belgica in the years 172-174; Didius Julianus, Emperor in 193, expelled these invaders.[51] After the fire, the former gate without towers was then accommodated with towers.

Although in the case of Maastor, there is again no detailed archaeological information which can give evidence of extramural buildings,[52] the chance of the existence of suburbs seems to be greater than in the case of Burginatiumtor. First, here was a three-passage-gate: we have to assume that there was entering and exiting pedestrian traffic as interaction between city and the countryside southwest of the city. The road over which Maastor was built entered the city as *decumanus* and ran outside the wall, in a south westerly direction, to the peaceful hinterland, making it a more attractive road for private houses than the frontier road along the Rhine. Furthermore, Maastor was not, as far as we know, part of the sewage system.

Xanten had a third land gate, situated on the south eastern side and built over the *cardo*. Apart from its location, in fact we know hardly anything of this gate which was given the name Veterator (**fig. 11**). In the years 1934-1936 excavations have shown that the gate was designed with towers, with a connection to the city wall. We also know that the supply of fresh water from the mountains southwest of Xanten ran into the city through this gate by means of an aqueduct.[53]

The most important question in the context of this chapter, i.e. how many passages Veterator must have had, cannot, therefore, be answered definitively yet. It is not plausible that Veterator was a single gate and the plausibility of a four-passage-gate

50 Lehner 1903, 182-187; Bechert 1971, 258-259 with a second reconstruction proposal of the three-passage-gate, after the fire. The fact that Maastor was not initially flanked by towers is remarkable; the gate must have had, in the first building phase, roughly the design of Porta di Ercolano.

51 *Historia Augusta, Didius Julianus* 1.7 *Belgicam sancte ac diu rexit. Ibi Chaucis, Germaniae populis qui Albim fluvium adcolebant, erumpentibus restitit tumultuariis auxiliis provincialium*, 'he ruled Belgium long and well. Here, with auxiliaries hastily levied from the provinces, he held out against the Chauci (a people of Germany who dwelt on the river Elbe) as they attempted to burst through the border'.

52 According to Mrs. J. Obladen (LVR, Landschaftverband Rheinland) foundations of buildings are found on the western side of the city in the neighbourhood of Maastor. They have, however, not yet been researched or published.

53 Heimberg & Rieche 1998, 57-58; Berkel 2002, 133 (plan).

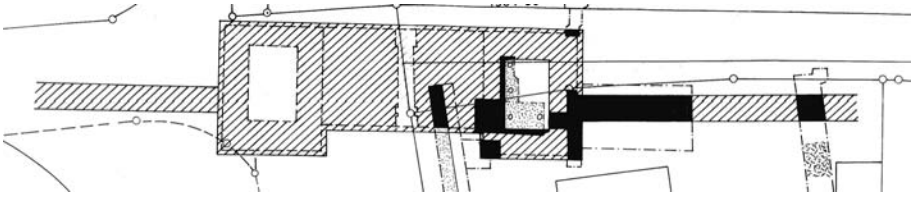

Fig. 11. *Xanten, Veterator (Böcking, APX; modified by C. van Tilburg).*

is also minimal; this gate type did not occur in this part of the Roman Empire. So the possibilities of a double gate like Burginatiumtor and a three-passage-gate like Maastor remain.

In spite of this lack of knowledge about the outlook of Veterator, the APX (Archäologischer Park Xanten) has launched the idea of reconstructing Veterator, as a pendant of the (also reconstructed) Burginatiumtor.[54] When a complete reconstruction has taken place, the question must be answered what the design and physiognomy of the gate were. At the moment APX is confirming the design – in respect of costs, building material and physiognomy – of a double gate like Burginatiumtor. In fact this is not an unreasonable idea. As far as I know there is one reconstruction plan of Veterator, following the excavation results,[55] which is indeed a plan of a double gate with equal carriageways. The reconstruction plan shows, however, that the majority of the plan is imaginary, based on hypotheses and no real evidence has been found concerning the number of passages and their sustaining walls (pillars).

What we do not know is how many passages there were in Veterator, and this is also a problem in the case of publications of city maps of the Roman city. Burginatiumtor and Maastor have one and two central pillars respectively; Veterator has sometimes one and sometimes two pillars.[56] The reason for this is simple: the designer is forced to make a choice.

[142] That Burginatiumtor was designed as a double gate with equal carriageways is confirmed by the fact that the sewer was found relatively close to the tower;[57] a pillar straight above the sewer was improbable. A subterranean pipe also ran into the city through Veterator: the aqueduct supplying fresh water coming from the surrounding mountains. Whether we can state that for this reason Veterator was also designed as a double gate is doubtful, because a pipe can also be constructed under the surface of the central carriageway of a three-passage-gate. So it is still not clear – using the

54 Schalles 2002, 262.

55 This plan was given to me by APX.

56 Veterator as double gate: in *Xantener Berichte* 12, 2002, 85, 231 and 239; Böcking 1987, 265. Veterator as three-passages-gate: in *Xantener Berichte* 13, 2003, 118 and 308, Kühlborn 1987, 489, Böcking 1987, 246 and Precht 1983, 67, in which the reconstruction plan is integrated; Heimberg & Rieche 1998, *passim*. Böcking (1987, 283) refers to an older and no longer valid plan of Ch.B. Rüger, where not only Maastor and Veterator but also Burginatiumtor and even the harbour gate connecting the *decumanus* are designed as three-passage-gates.

57 Gerlach 1983, 105; Precht 1983, 66.

scarce information about the design of Veterator – whether there is a double gate or a three-passage-gate. Nevertheless, I will try to set up a hypothesis.

It has already been shown that in Cologne, Lincoln and Colchester three- and four-passage-gates are found in relation to suburbs; in the case of Lincoln, even a completely new city was developed outside the southern gate (and extramural buildings south of the new city).[58] When we compare this situation to the south eastern gate of Xanten, we can conclude – if we refer to extramural buildings – whether a double gate or a three-passage-gate was present.

South-east of Xanten, relatively close to the *colonia*, there were two legionary settlements: the important *castra* Vetera I (with space for two complete legions) and the smaller settlement Vetera II. Here thousands of soldiers and their staff were housed. They were still in use around the year 110,[59] when the realisation of the city was in full swing or even almost completed. Furthermore, between the military settlements and the city, approx. 300 metres south of Veterator, there was a smaller settlement (*vicus*) west of the medieval cathedral church. Traces of this *vicus* were found in 1971 by the excavations of H. Borger. The *vicus* was situated along the *limes* road and included – besides private houses – potteries and iron workshops: fire-hazardous industry. When we consider the short distance between this *vicus* and the city, we can state that this *vicus* still belongs to the territory of the *colonia* where the authority of the *aediles* was still valid and we can also assume that the workshops were placed here on behalf of the city government. These workshops were still in use in the 3rd century.[60] New excavations are difficult to carry out because the area has been built over by the medieval city of Xanten.

On the sections of road between the *colonia*, the *vicus* and the military settlements, there must have been – apart from interurban traffic – a large amount of local traffic. Part of this traffic will have been people on horseback and wheeled traffic: cavalry and officers on horseback and transport of pottery and (raw) building materials, but there must also have been a huge crowd of pedestrians. To sustain such traffic, the city needed a gate with side passages for pedestrians. However, the traffic situation around Veterator was quite different from that of Burginatiumtor, where there were considerably less extramural (and probably, also intramural) buildings and suburbs. It is not completely impossible that Veterator would have been a double gate, but as long as definitive archaeological evidence is not yet available, I assume that – following the information above – Veterator was a three-passage-gate.

The history of the development of the *colonia* Xanten is comparable to that of Cologne: a Roman city wall around a former Germanic settlement; after that time the area inside the wall was built up. If the city government of Xanten followed the same policy concerning city planning and traffic policy as that of Cologne, we can assume that both Maastor and Veterator were examples of three-passage-gates with suburbs,

58 Cleary 1987, 106-113; ill. 42-43.

59 Böcking 1987, 157.

60 Hinz 1975, 154-155; Böcking 1987, 206-208. For a detailed report on the excavations see Heimberg & Rüger 1972, 84-118.

comparable with the three main gates of Cologne. Burginatiumtor, however, had a more interurban-oriented function: less built-up area inside and outside the wall did not create the need for the design of a gate with special side passages for pedestrians and therefore the city government chose the design of a double gate, which functioned well for interurban traffic.

6. Trier

The promotion of a settlement or city to the status of *colonia* did not inevitably lead to the erection of walls and gates, although this was usual in certain parts of the Empire. Trier became a *colonia* during the reign of Emperor Augustus; but for a long time the city remained an open city like many other cities in Gaul.[61]

For a long time, the date of Porta Nigra, the famous city gate of Trier (**figs 12-13**), was uncertain. Lehner dated the building of the gate to the second half of the 3rd century (the reign of the usurper-emperor Postumus, 259-268). However, other dating suggestions refer to the 4th century, but nowadays it is assumed that the gate was constructed during the last quarter of the 2nd century AD, as was the connecting city wall. Confirmations of this date, in fact, are that the gate is built partially over a cemetery which was in use from the 1st century until the third quarter of the 2nd century AD. Besides that (according to Cüppers) there is a historical indication: the gate was not yet finished when Trier was besieged by the Germans – during the struggle between Septimius Severus and Clodius Albinus – in the years 196-197.[62]

[143]

Contrary to Cologne and Xanten, the wall was added to an existing city without following the contours of that city. In the new city wall there were five gates: apart from the already-existing and imposing Porta Nigra (in Antiquity known as Porta Martis)[63] there were Porta Media, Porta Alba and Porta Inclyta. A fifth gate was formed by one of the main entrances of the amphitheatre and had, indeed, three passages – one in the centre, giving entrance to the arena, suitable for wheeled traffic and horsemen, and two for pedestrians, giving entrance to the spectators' part (*cavea*) – but in this respect the name of three-passage-gate is, in fact, not correct here.[64]

The wall was not constructed to indicate the boundaries of the city, but to protect the city against enemies. In the last decades of the 2nd century the first Germanic invasions began in the northern frontier regions of the Rhine and Danube; in this context, the invasion of the Chauci and their attack on Xanten should also be remembered. The city government of Trier decided to surround the city yet again – after two centuries – with a wall and gates. The military aspect of Porta Nigra is remarkable in its design: a high massive gate complex with two floors, flanked by heavy towers, semi-circular to the countryside and – reverting to gate building history – a court-

61 Cf. Van Es 1981, 143; Grénier 1931, 282-284; Drinkwater 1983, 151.
62 Schultze 1909, 337; Cüppers 1980, 25-26; Dahm 1991, 30.
63 Heinen 1985, 110-111.
64 Dahm 1991, 12, 13, 30 and 31.

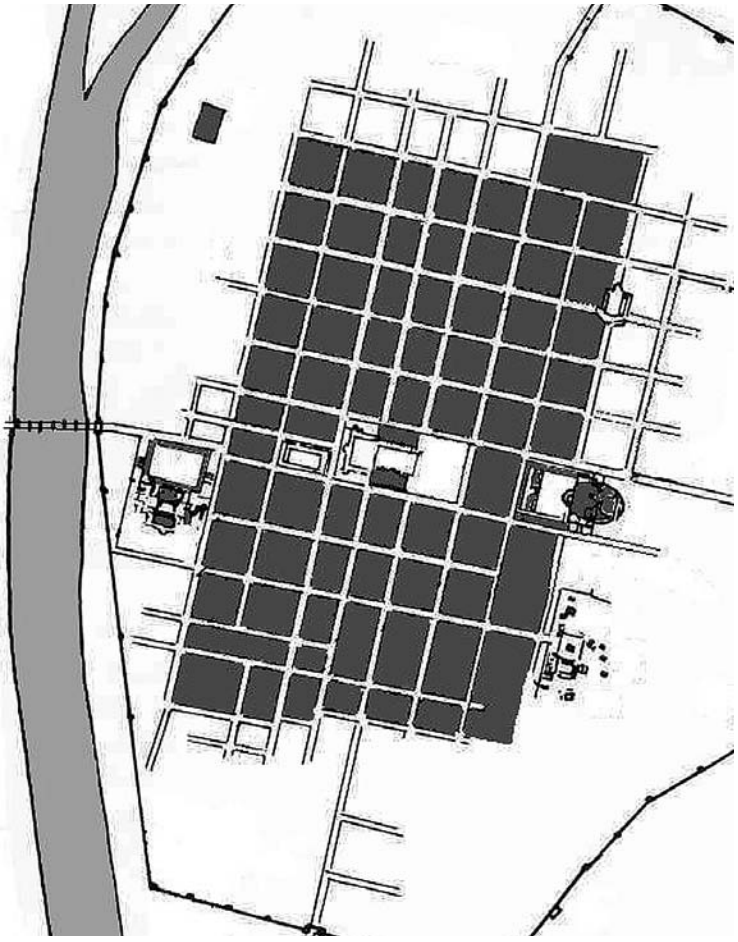

Fig. 12. *Trier, plan (Oude Essink [1983] 104; modified by C. van Tilburg; Van Tilburg 2012, 116).*

yard. The gate is an example of a new generation of gates realised in the course of the 3rd century. The gates of the Aurelian Wall in Rome also belong to this type, viz. as part of a structure meant for the city's defence. The military-defence interest of these gates is far more important than the traffic aspect; this limits the number of passages to one or, in some cases, two.

In Trier, the city government's choice was for at least two double gates: Porta Nigra and Porta Media. Information on the two other newly-built gates – Porta Alba and Porta Inclyta – is lacking, but we can assume that they were also double gates.[65]

Taking a look at Trier's plan in Late Antiquity, we see that the wall surrounds the city in a wide arc. A wall following the boundaries of the existing built-up area would be shorter, cheaper and easier to defend. Eventually, the circus (probably situated north of the amphitheatre) would be incorporated into the city wall.

65 See *infra*.

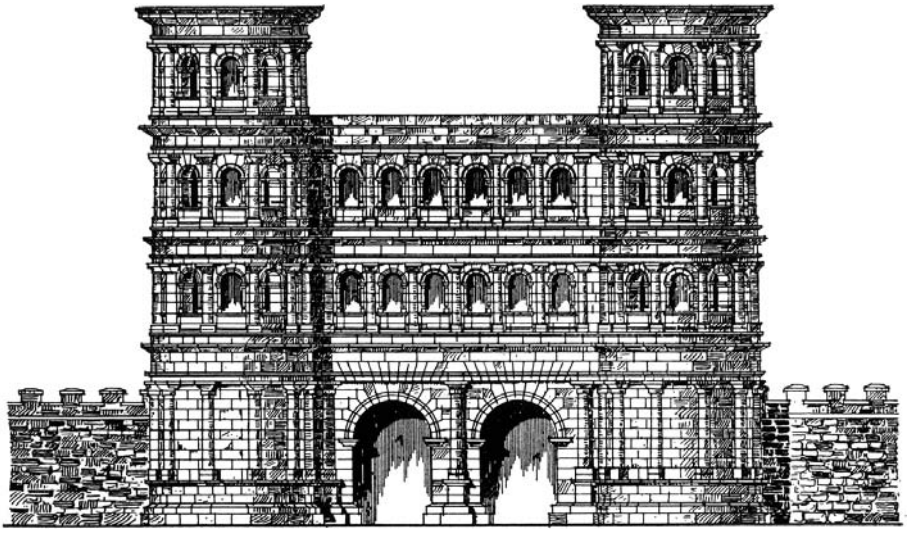

Fig. 13. *Trier, Porta Nigra (Schultze 1909, Taf. XVI).*

Why, then, did the city government prefer a long wall with a wide arc? One possibility could be to create gardens and parks inside the wall. In times of siege one could grow food; so the danger of starvation would be considerably decreased. A second reason could have been to create space for city enlargements inside the wall without the necessity of the construction of new walls – the same situation as in Pompeii. If
[144] this was the reason, the city government was very optimistic; this would involve filling up the whole area inside the wall, roughly doubling the built-up area of the existing city. Besides that, walls making wide arcs around cities were not unusual; we see the same development in Augst and Avenches.[66]

A third possibility could be that the gates were intentionally placed at those places where the last ribbon-development of the city ended and the countryside began. So all buildings were within the surrounding wall and there were no longer any extramural buildings.[67] Because the choice was made for double gates, passing traffic (especially pedestrians) had to be limited as much as possible. Furthermore, the gates were deeper, with longer passages, making the passing time for traffic longer.

At the same time (3rd century AD), London was also surrounded by a wall.[68] Unfortunately our information on the gates is scarce, but in any case two of the six main land gates – Newgate and Aldersgate – seem to have been double gates like Porta Nigra.[69] Outside Newgate – in other words outside the new wall – there was a temple.[70] Hence, we can state that there was, in this case, an extramural building outside a double gate. However, it should be noted that according to Marsden, Newgate was already

66 Heimberg & Rieche 1998, 36.
67 In the 4th century, there is some building of churches outside the wall; Dahm 1991, 12-13.
68 Wacher 1997, 97.
69 Wacher 1997, 76.
70 Wacher 1997, 89.

been built as an independent gate before the construction of the wall. In planning the wall, the city government decided to incorporate the gate into the wall as a new city gate. [71] A logical choice, which created the situation that the temple remained outside the walled city area, in front of Newgate, in the countryside.

Another example of a wall with double gates is the long and imposing Aurelian Wall in Rome. This wall – including fourteen[72] gates – surrounds the city, including some green areas like Horti Sallustiani. Four gates were designed as double gates: Porta Ostiensis, Porta Appia (**fig. 14**),[73] Porta Flaminia and Porta Portuensis;[74] besides them Porta Praenestina in combination with Porta Labicana can be considered as a double gate, although here there are two separate gates, built over two different approach-roads.[75] Furthermore, the wall contained some small gates (the so-called *posterulae)* of lesser importance and probably only meant for pedestrian traffic.[76] Immediately outside the Aurelian Wall there was the countryside; buildings were very scarce or even absent.[77] Firstly, suburbs – if they existed – were situated outside the protecting wall of the city and at this time, it was not attractive to plan them or to live there. Secondly, they offered an unobstructed view of the surroundings of the wall to approaching, attacking and besieging enemies and, thirdly, the absence of suburbs meant following the policy of reducing as much as possible passing (pedestrian) traffic through single and double gates. But there were numerous funereal monuments along the principal roads.

Former open cities like Trier, London and Rome, still surrounded by a wall in the last years of the 2nd century and in the 3rd century, were accommodated with double gates just as Porta Nigra: gates with two equally high carriageways, suitable for wheeled traffic and people on horseback, mainly meant for interurban traffic. There were no side passages for pedestrians. Local traffic was restricted and had to function as much as possible within the contours of the new wall. In the cases discussed above – Trier, London and Rome – there were in fact no extramural buildings. A period of unrest began, in which it was not attractive to live or to work outside the safe wall of a city. Furthermore, an unobstructed view from the wall to the surrounding countryside was necessary.

71 Wacher 1997, 89 and 100; Marsden 1980, 124.

72 According to Lugli & Gismondi, Lanciani and Van Tilburg. Steinby 1993-2006 (*LTUR* IV, 113) mentions twenty gates.

73 This gate was later connected with the Arco di Druso. So an imposing gate complex was created; Schultze 1909, 343 and Taf. XVII. A combination of a city gate and a triumphal arch also occurs in Pula (Istria); Von Hesberg 1992, 283-284.

74 Lugli & Gismondi 1949; Giovagnoli 1973, 42 and 101; Platner & Ashby 1929, 412. *Contra* Schultze 1909, 343 (single gate). Emperor Honorius bricked up these double gates to single gates: Giovagnoli 1973, 42-44; Richardson 1992, 300 (Porta Appia), 303 (Porta Flaminia), 305 (Porta Ostiensis) and 306 (Porta Portuensis).

75 Platner & Ashby 1929, 413.

76 Giovagnoli 1973, 44-45.

77 As in Trier, later some churches arose outside the Aurelian wall, e.g. San Paolo fuori le Mura (4th century).

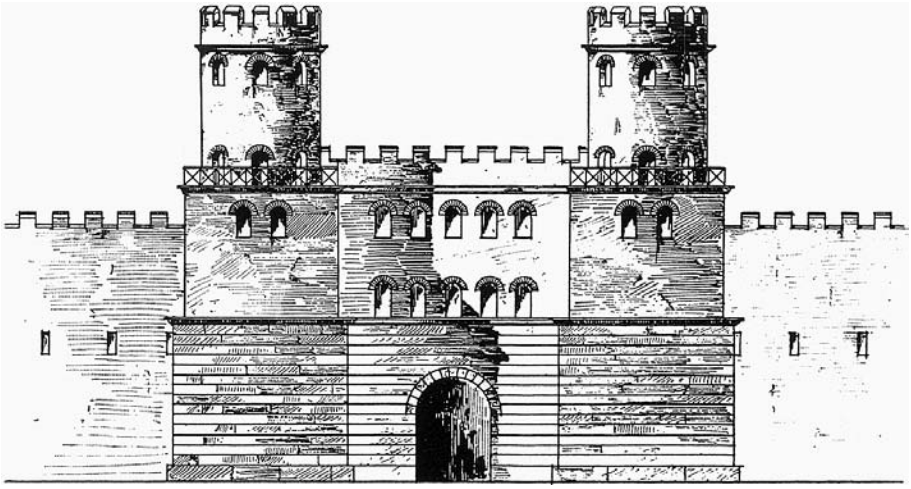

Fig. 14. *Rome, Porta Appia (Schultze 1909, Taf. XVII), a single gate from Honorius' reign onwards.*

Conclusion

City gates are part of the wall of a city and have two important functions: being part of the city defence structure (or indication structure) and allowing traffic to enter and leave the city. Because gates were not easy to alter, the city government had to take measures to keep traffic flow under control when it passed the gates, or in any case to try to do so.

Usually, gates maintained their original physiognomy. In Pompeii, the majority of the gates retained their initial design until the eruption of Vesuvius in 79, many centuries later, despite increasing traffic flow, like Porta di Stabia. Only when a gate was destroyed or badly damaged, was the city government forced to construct a new one; this
[145] new gate could be adapted to new traffic demands or to other incentives; this was the case with Porta di Ercolano. Nevertheless, a new gate must have been a rare occurrence.

The gate as an unchangeable artefact forced the city government to follow a certain policy concerning city planning. Firstly, in the case of a newly-founded city, one had immediately to decide how to design the gates, how many passages, and whether – and if so, where – extramural buildings were to be developed to keep traffic flow under control. In the case of Cologne and Xanten (two *coloniae* in Germania Inferior) the walls were part of the city plan. The wall was built around a former Germanic settlement, the area within the walls was divided according to the usual chessboard pattern and then built up. We see a development of suburbs, usually in the form of polluting and nuisance-creating workshops, along the approach- (main) roads. Gates crossing these roads needed three or four passages: one or two high carriageways in the centre of the gate complex, flanked by two smaller passages for pedestrians. We see examples of this type of gate in Cologne, Colchester and Lincoln. There are indications that Xanten also followed this pattern, although there is on the one hand a three-passage-gate (Maastor) with little information on extramural buildings and,

on the other hand, extramural buildings with little information on the number of passages of the connecting gate (Veterator).

In the case of double gates with two equally high carriageways, suitable for wheeled traffic and people on horseback, up until now no suburbs of any importance have been found in the *coloniae* discussed in this chapter (Xanten and Trier). In Xanten, however, traces of a building have been found outside Burginatiumtor, but considering the presence of an open sewer it must have been an unattractive place to be in. Maybe it was a stable, a *statio* for *beneficiarii* (road watchers) or a barn.

We can assume that there is a connection between side passages for pedestrians and suburbs. This is also the case in Trier, London and Rome, where the walls were built after they had long functioned as open cities. The city governments chose double and single gates. They also decided to concentrate the entire built-up area inside the wall without any suburbs. The only exceptions were formed by churches, erected in cemeteries. The situation of cemeteries was fully independent of the number of passages of each type of gate; they were planned in front of both single gates and gates with several passages.

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