Paving Towns

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Introduction

It appears that by the late fourteenth century, most urban sites, be they towns or cities, anywhere with a population upwards of 2,000 people had its main thorough-fares paved in some manner. The road to this achievement was not a smooth one however, and complete with many small turning off points unique to each community. This essay and its accompanying chart will seek to lay out both the broad strikes and the particulars of the progressive laying of pavement across the face of urban Europe in the medieval period.

All roads begin in Rome

In the areas of Europe formerly dominated by the Roman Empire one is forced to grapple with an imperially paved past. The Romans were rightfully famous for the roads they built in every city they founded across the empire, levelled and graded with large paving stones placed in a bed of sand – they were designed to last. However, during the fifth and sixth centuries CE, when and after the Western Roman Empire had disintegrated politically, there was a major disruption within these urban units.[1] While the continuation of many aspects of Roman culture can be demonstrated, the maintenance and building of roadways within cities is not among them. From the fifth century there was a serious decline in urban paving technique as new roads built using Roman methods ceased to be constructed, although those already in place continued to be used.[2] Evidence shows that while travel on these old Roman roads continued across the countryside, within cities they often fell out of use surprisingly quickly. The reason for this, however, is easily explained. Within an urban environment, Roman roads were abandoned within a century or two as settlement patterns

[1] For a nice introduction to ancient Roman roads see Ray Laurence, *The Roads of Roman Italy: Mobility and Cultural Change* (London: Routledge, 1999).

[2] Indeed, in many places across the former Empire the old Roman roads continued to be used, in some places down to the modern period, the *Via Appia* in Italy standing as one of many visible proofs.

shifted or they were buried under cultural deposits and could no longer be seen.[3] Without significant cleaning and maintenance, roadways quickly became covered in dirt and refuse to the point they were lost. Some modern streets of Rome, for example, lie between 4.1 and 7.1 meters above their ancient forerunners.[4] The detritus of human occupation, broken pots, animal droppings, or building debris, quickly led to the first floors of buildings becoming cellars and roadways needing to be levelled and re-laid.[5] During the later medieval period, the institution of cleaning efforts that soon followed large scale paving projects led in most cases to a slowing of the buildup of cultural deposits but even then it did not stop it completely.[6]

This paper looks only at "medieval" paving which was set in place after the sixth century and leaves aside any earlier Roman works. In some cases the roadways followed the same course as earlier Roman routes but were separated from them by layers of dirt and time and, in their design, did not carry on in the ancient tradition. The scope of this study also extends to areas beyond the former Roman Empire where the question of earlier ancient examples is entirely a non-issue.

Medieval Paving

During the medieval period the paving of urban sites took a number of different forms. The type of paving laid down and its comprehensiveness

[3] In some places, the original Roman street pattern persisted into the medieval era but the stones set by the Romans themselves were quickly lost. For the abandonment of Roman roads see Jeffery R. Wigelsworth, *Science and Technology in Medieval European Life* (Westport, Conn: Greenwood Press, 2006), 47-48; Marizio Levak, "Public and Private Space in Early Medieval Towns: Istrian cases," in *Towns and Cities of the Croatian Middle Ages: Authority and Property*, ed. Irena Benyovsky Latin and Zrinka Pešorda Vardić (Zagreb: Croatian Institute of History, 2014), 39.

[4] Jon Coulston, and Hazel Dodge, "Introduction: the archaeology and topography of Rome," in *Ancient Rome: The Archaeology of the Eternal City*, ed. J. Coulston and H. Dodge (Oxford: Oxford University School of Archaeology, 2000), 5 note 13. The church of S. Vito on the Via del Corso, now entered from a long flight of stairs also stands as a wonderful testament to this effect.

[5] Adding to the normal debris created by human occupation would be the charred remains of buildings from the frequent fires that swept through pre-modern towns and cities.

[6] A comparison between the cities of Krakow, Prague, and Wrocław showed a significant slowing in the accumulation of cultural deposits in Prague and Wrocław; Krakow during the same period saw build-up continued unabated. The reasons for this are unclear as theoretically Krakow's streets were better paved in large limestone blocks, whereas Prague and Wrocław had for the most part gravel streets. It may be that the city fathers in Prague and Wrocław inaugurated a better cleaning program alongside their investments in the roadways while Krakow did not. I hope to answer this question in a forthcoming study. Piekalski, *Prague, Wrocław and Krakow: Public and Private Space at the Time of the Medieval Transition* (Wrocław: University of Wrocław, Institute of Archaeology, 2014), 148-52.

throughout a settlement was conditioned by a number of factors: First, the topographical conditions of each site, second, the resources locally available, and third and most critically, the political organization of the urban community. Interestingly, as the chart following demonstrates, population size does not appear to have been a primary determinate for paving, although certainly the density of a population put more pressure to encourage its introduction. Rather than population, the local availability of materials was an important factor and weather conditions may also have played a role with rainier sites being paved earlier than others. The key element, however, appears to have been the level of political organization within the urban unit. Sites which had a strongly centralized communal structure and executive leadership were the first to have their streets paved. This makes complete sense when one considers the time, expense, and organization of manpower required. It was also only through robust municipal governmental control that sites could overcome the common goods paradox and the "urban tragedy of the commons" identified by Ulf Christian Ewert.[7] The common good paradox applied to streets ran like this: everyone used the city's streets and therefore had a motivation to see them well maintained but simultaneously, because streets were open to all and could be easily abused, individuals had a strong incentive to free-load. Only a developed municipal government was able to provide sufficient enticements and apply enough coercive force to make street paving a reality. Population in regards to paving appears to be correlative rather than causative, as by the time a sufficient number of people grouped together in an urban unit a governmental apparatus had developed which was capable of seeing the city streets surfaced. Thus, it appears that by the late fourteenth century, most urban sites, be they towns or cities, anywhere with a population upwards of 2,000 people had its main roadways paved in some manner.[8]

Once an urban site had developed enough that paved roads were wanted, communities were then constrained in their ambitions by the materials available to them. The main materials used for street surfacing during the medieval period were: gravel or flints, wood, stone in the form of cobbles or slabs, and, at times, brick.[9] In broad strokes, medieval streets can be broken down into four basic types.

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[7] Ulf Christian Ewert, "Water, Public Hygiene and Fire Control in Medieval Towns: Facing Collective Goods Problems While Ensuring the Quality of Life". *Historical Social Research* / Historische Sozialforschung 32 (2007): 222-51.

[8] See the chart for details. – More data will be required to see if this assertion holds true.

[9] A Sienese document states that "in this year [1241] they began to make the paving stones out of brick, something that had never been done before." Later, in 1290, other parts of the town which had previously been paved in stone were ripped up and replaced with brick to improve the cleanliness and look of the town. Chiara and Arsenio Frugoni, *A Day in a Medieval City*, 38 note 38. The Teutonic Knights were very fond of brick architecture and appear to have replaced earlier wooden paving in some of the cities in their Prussian

Dirt

Most villages and small settlements continued to have dirt roads throughout the medieval period. Tracks through such places would be cut into the earth by foot traffic and cart wheels. In some cases these roadways might be graded to help keep them from being washed out. At other times they might be strewn with a bit of rock to make the surface more even but in many cases they were simply pounded hard by use and turned into muddy swamps after a rainstorm. Mud was the perennial problem of early medieval roadways and at times could be so bad that it presented a public danger. An illustrative story of the dangers of muddy byways comes to us from the life of Emperor Frederick III (1415-1493). The emperor wished to pay a visit to the town of Tutlingen but had been warned by the town council not to attempt a visit during the rainy season.[10] The intrepid emperor ignored their advice and for his folly found himself and his horse sunk waist deep in muck along the way. The emperor did not learn his lesson, however, and on a similarly ill-advised journey to the town of Reutlingen he and his horse nearly drowned in another sink-hole. Mud was a serious problem. When comparing communal forces, walls were considered far more important and built before the issue of street surfacing was addressed.[11] It should also be noted that in places where camels rather than horses and carts were commonly used for transportation, dirt roads were considered superior as they were easier on camel feet.[12]

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domains. Alexander Pluskowski, *The Archaeology of the Prussian Crusade: Holy War and Colonisation* (London: Routledge, 2013), 201-11.

[10] Jan Ptasnik, "Towns in Medieval Poland," in *History of Polish Civilization: Essays and Studies,* ed. Mieczysław Giergielewicz (New York: New York University Press, 1978), 28.

[11] An example of this would be English town records showing sites applying first for "murage" the right to collect taxes on goods coming through the city in order to fund the building of a town wall before they asked for "pavage" the same right to tax in order to pave their streets. See Edward Harvey. "Pavage grants and urban street paving in medieval England, 1249-1462," *The Journal of Transport History* 31, no. 2 (2010): 152. Evidence from the continent shows a similar trend. Examples which appear on the chart include: Florence – 1073, Bruges – 1090, sites which were paved only 2-300 years later. See David Nicholas, *The Growth of the Medieval City: From Late Antiquity to the Early Fourteenth Century* (London: Longman, 1997), 92-95.

[12] The camel is usually associated with Islamic societies in medieval Europe and further research into Muslim urban sites, in particular on the Iberian Peninsula and in the Balkans, might prove telling if this assessment is accurate, but such a study falls beyond the scope of this study. For more on this topic and a discussion of the use and benefits of camel vs. wheeled transportation see Faroqhi Suraiya, "Camels, Wagons, and the Ottoman State in the Sixteenth and Seventeenth Centuries," *International Journal of Middle East Studies* 14 (1982): 523-39; Richard W. Bulliet, *The Camel and the Wheel* (New York: Columbia University Press, 1990).

Gravel or Flint

Gravel was often the first form of surfacing a city's streets received and usually preceded later efforts to lay down larger cobbles or stone. Still, while gravel might be an inferior paving material, paving a community's streets with crushed rock constituted a significant effort and can be viewed as a major achievement of civic governments. To make a gravel street, a dirt road first had to be levelled and graded. A gutter then needed to be dug either running down the center of the street, as was most common during the period, or along the sides as is the common practice today. Flint chips or gravel then had to be procured in large amounts. All of this rock had to be somehow transported to the city and evenly distributed to make a level road surface. Flint chips were used where they were available and gravel might have been taken from nearby open pits as was the case in London, but was most commonly procured from local riverbeds.[13] It is unclear how these large amounts of rock were moved but one assumes by hand, in carts, or with wheel barrows upon their invention in the early thirteenth century.[14] All of these efforts would have required numerous individuals working in co-operation who, one assumes, were offered some sort of recompense for their labor.[15] Only a more fully developed municipal governing body could have funded and organized such an effort. Undoubtedly, some individual homeowners might have worked to improve the road surface in front of their own house but the dilemma of communal goods would have offered them a disincentive to do so. Gravel had the advantage over cobble or cut stone in that it was to get faster, cheaper, required less skill, and could be repaired with greater ease as a fresh street surface could be lain down every few years.

Stone

Cut stone slabs and cobbles used for street paving were taken from riverbeds, surrounding agricultural land, or brought in from a local quarry. Thus, cities with access to good building stone were privileged and might have acquired such advanced paving even earlier than some of their more developed neighbors who had to bring it in from further afield. Facing the expense and

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[13] Concrete examples of gravel being taken from riverbeds are demonstrated in the cases of Buda and Krakow in which archaeological excavations have shown that street gravel was taken from the Danube and Vistula respectively. See Magdolna Szilagyi, *On the Road: The history and archaeology of medieval communication networks in East Central Europe* (Budapest: Archaeolingua Alapitvany, 2014), 34-35; Piekalski, *Prague, Wrocław, and Krakow,* 148-152. For London see P. Hinton (ed.), *Excavations in Southwark 1973-76, Lambeth 1973-79* (London: Museum of London: 1988), 19-30.

[14] Robert E. Bjork, "Wheelbarrow," in *The Oxford Dictionary of the Middle Ages* (Oxford: Oxford University Press, 2010), 1726.

[15] The labor may also have been corvée and considered a form of tax, so no recompense would have been offered.

organizational difficulties inherent to a large paving project, many municipalities first required their citizens to pave the length of the area where their property touched the street.[16] Most communities, however, quickly moved on from this pattern due to the obvious problems of uneven workmanship it produced.[17]

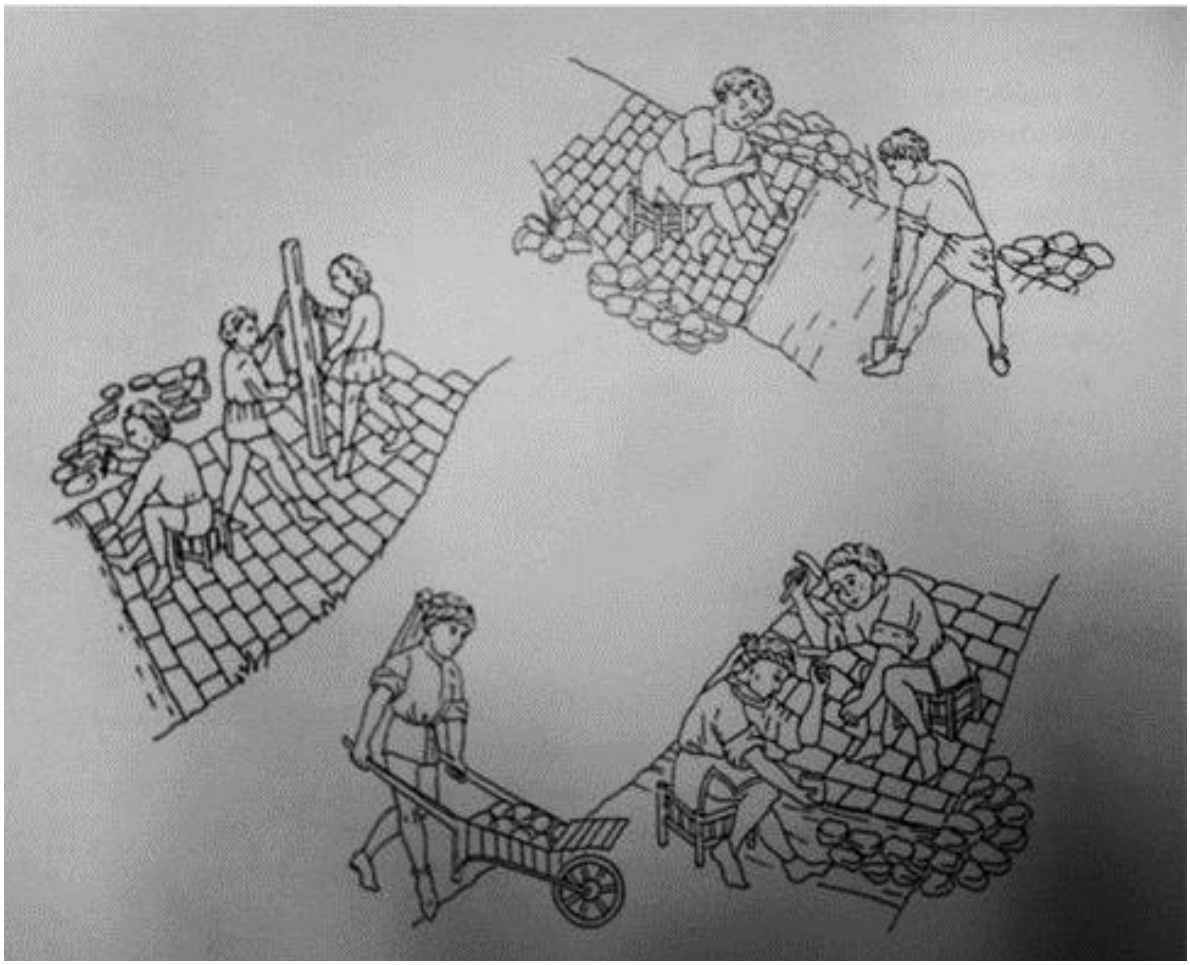


Fig. 1: Method of street building using a wheel barrow, hammer, pile driver, and movable stool. Brussels, Bibliothèque Royale, MS 9242, fol. 48v. Out of: Günther Binding, *Medieval Building Techniques*, trans. Alex Cameron (Stroud: Tempus, 2001), 41.

[16] The specific regulations varied between communities. In many places residents were required to pave along the entire length of their property frontage and then up to the middle of the street where their neighbour facing opposite would meet them. In Dubrovnik however, residents were responsible for only one third of the way across the street as the middle section containing the gutter was the responsibility of the commune. Robin Harris, *Dubrovnik: A History* (London: Saqi Books, 2006), 288.

[17] A beautiful example of this problem comes from Tartu where the excavation of a street revealed a layer where one half of the road had been paved in wood and the other in stone. At a later date the entire street paving was replaced with cobbles. Andres Tvauri. "Archaeological Investigations at the Courtyard of Jakobi Street 2/ Lossi Street 3. Tartu," *Archaeological Fieldwork in Estonia 2010*: 182.

Fig. 2: Use of a pile driver shown in a French manuscript; *Fleurs des Choniques* depicting King Philip Augustus directing the paving of Paris. Out of: André Chédeville and Georges Duby, *Histoire de la France urbaine. La ville médiévale* (Paris: Seuil, 1980), 572.

Professional *pavors* begin to appear on municipal account roles across Europe as instead of doing the work themselves citizens were required to pay to have it done for them.[18] Work done even by professionals would be of varying quality and shows great variation. One common method that is still used today was to lay a substrate of gravel topped by a layer of sand, which levelled the road surface and improved drainage. Wedge-shaped stones were then pounded into the closely packed substrate.[19] Depictions in medieval manuscripts show that *pavors* often worked in groups and sat on stool whilst pounding in the cobbles with hammers (figs. 1 and 2). Pile drivers appear also to have been a commonly used tool as multiple manuscripts depict this device. Communities invested in stone paving as both prestige projects and an effort to make their cities cleaner and more sanitary. Once stone paving had been laid down,

[18] David Nicholas, *The Later Medieval City: 1300-1500* (London: Longmam, 1997), 334. Very often it appears that the pavor himself was required to collect the payments directly from residents rather than from the municipality. This too could lead to problems as one can imagine.

[19] Piekalski, *Prague, Wrocław, and Krakow,* 148-52.

municipalities had a double incentive to implement sanitation regulations and street cleaning programs in order to protect their investment.[20]

Wood

Wooden streets appear in many urban sites in Northern Europe, including areas of modern Germany, Poland, Belarus, Scandinavia, sites occupied by the Vikings in the British Isles and, most famously, Russia. Wooden streets are particularly exciting for historians as dendrochronology allows for rather precise dating. The two types of wood regularly used for paving were oak and pine. Medieval wooden roads can be subdivided further into two types, half logs and planks. Half logs were simply tree trunks which had been split in half and were then laid down on runners or on the bare ground.[21] Planks, on the other-hand, were thinner and took more effort to cut but perhaps provided a more level surface. These too might have been laid on runners, directly on the ground, or on top of the previous roadway.[22] The level of community organization required to install wooden streets was perhaps even greater than that needed for stone and cobble. Trees had to be acquired, felled, and brought to the city, then logs split or boards made and laid down on runners. Archaeological records show that in large cities this was all done in a single construction season.[23] In Novgorod (figs. 3 and 4), fully 28 separate layers have been identified with a road being repaved on average every 18 years between 953 and 1462.[24]

[20] See, in conjunction with Bruni's praise of Florence which directly associated paved streets and a clean city, the study of environmental regulations in Northern Italy that demonstrates this trend beautifully: Ronald E. Zupki and Robert A. Laures. *Straws in the Wind – Medieval Urban Environmental Law: The Case of Northern Italy* (Oxford: Westview Press, 1996). At times, however, it appears not to have worked as the case of Krakow shows, where cultural deposits continued to build up and raise the street level even after the installation of limestone cobbles. Krakow stands in stark contrast to both Prague and Wrocław whose rates of cultural deposit build-up slowed dramatically once paving was introduced. See Piekalski, *Prague, Wrocław, and Krakow*, 141-45.

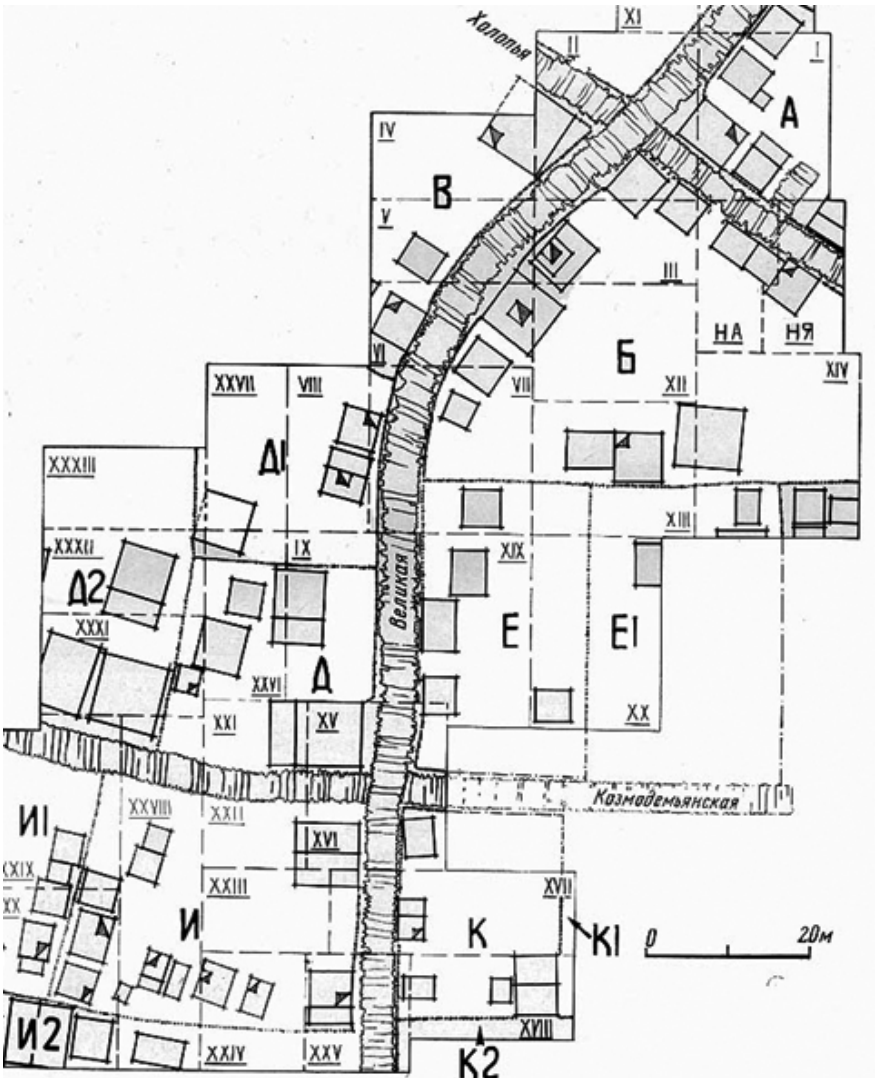
[21] Szilagyi, *On the Road*, 33-34.

[22] Pluskowski, *The Archaeology of the Prussian Crusade*, 205.

[23] M. W. Thompson, *Novgorod: the Great Excavations at the Medieval City Directed by A.V. Artsikhovsky and B.A. Kolchin* (New York: Praeger, 1967), 13-14.

[24] Thompson, *Novgorod,* 14.

Figs. 3 and 4: The wooden streets of Novgorod.
From: "Novgorod: the Archaeology of Medieval Russia"
(http://benedante.blogspot.com/2011/12/novgorod-archaeology-of-medieval-Russia.html - last accessed August 1, 2016).



The Benefits of Paving

Within an urban environment, paved roads were useful for a number of reasons. First, paving served the economic interests of the citizen body at large. Bodies and objects could be moved through the city with greater ease. Carts, oxen, horses, mules, wheelbarrows, and feet could all progress more quickly along paved roads. As many medieval city streets were quite narrow, often due to illegal encroachment by residents, paving meant that things were less likely to be caught in a pot hole or mired in a rut and back up traffic.[25] Greater freedom of movement meant a larger volume of trade that could be conducted in the city per day in greater comfort. It is not surprising then to see that in many cases the first place within a city to be paved was the central market area followed by the main avenues of a town leading to the market from the city gates.

Another often ignored aspect of the economic benefit of paving has to do with cleanliness. With rain, an otherwise pleasant dirt road turned into a muddy wash; as we have seen, even emperors might have been imperiled by this muck. Commerce of course was too. The problem applied equally to commerce of all status and as it could constitute a real threat to trade, municipalities fought back relentlessly trying to combat it. The government of Siena issued an order in 1290 to pave even the alleyways of the city because those which had been left undone were "spilling filth and mud into the thoroughfares which were already (paved)."[26] The town of Atherston applied, in 1343, to the king of England to collect a pavage tax because, "in wet weather [the city] is dirty."[27] Paving helped cut down on this problem considerably and allowed the streets to be more easily swept clear of the dust, manure, and household refuse which inevitably found its way into them. With the rise of civic humanism beginning in Italy in the fourteenth century, the drive for a beautified city became even more acute:

> Everyone knows that a city wanting in beauty lacks the most precious gem. But Florence is clean and swept, so that nowhere can be found anything better tended. This city is certainly unique, a city which displays nothing offensive to the eyes, nothing to irritate the nostrils, nothing dirty thrown before the feet.[28]

This quote, from Leonardo Bruni's praise of the city of Florence in the year 1403, is no doubt full of exaggerations as to the perfected state of Florentine

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[25] As one scholar has put it, "In cities with ancient origins, the original network of streets remained in place for centuries to come but, under permanent "attack" by private buildings, its streets became narrower and more irregular." Levak, *Public and Private Space*, 39.

[26] Frugoni and Frugoni, *A Day in a Medieval City* (Chicago: University of Chicago Press, 2005), 38 note 37.

[27] Christopher Dyer, "Small towns 1270-1540," in *The Cambridge Urban History of Britain*, vol. I: *600-1540*, ed. D. M. Palliser (Cambridge: Cambridge University Press, 2000), 532.

[28] *In Praise of Florence; The Panegyric of the City of Florence and an Introduction to Bruni's Civic Humanism*, intr. and trans. Alfred Scheepers (Amsterdam: Olive Press, 2005), 80-81.

streets. Yet, while its author, a proud Florentine, may be somewhat carried away in his enthusiasm, the genre of panegyric rather requiring hyperbole, his remarks reflect the intention of Florence's street builders a hundred years before. For,

> The year of Christ 1237, *Messer Rubaconte da Mandella* of Milan being *Podesta* of Florence, …. during his government all the roads in Florence were paved; for before there was but little paving, save in certain particular places, master streets being paved with bricks; and through this convenience and work the city of Florence became more clean, and more beautiful and more healthy.[29]

Here we see that, indeed, the paving of Florence's streets was intended as a means to promote cleanliness and beautify the city. Bruni goes on in his panegyric to ask,

> For is there anything which more deserves our admiration than the fact that in a densely populated city never appears any dirt, and that even the worst shower cannot prevent walking through the town with dry feet, since the rainwater is drained right away by a well located gutter?[30]

While it is highly doubtful that in a rainstorm dry feet were possible no matter how perfectly situated the gutters, the very fact that Bruni praised the possibility is again telling. The difficult work having mainly begun in 1237 allowed Bruni more than a century later to credibly add to his panegyric the flourish that, "The result is that even the inner rooms of the most magnificent houses in other towns are not as hygienic and clean as the roads and streets of this city."[31]

Yet, Bruni was not the first, nor the most illustrious, to comment on the preferability of paved streets because they made the urban environment cleaner. According to Rigord's chronicle, the French King Philip Augustus ordered the paving of Paris's streets in 1189, after taking in the view of the city from his palace window, because "the horse-drawn carts that travelled through the city, churning up the mud, raised an intolerable stench."[32] To combat the problem of mud in the streets many cities turned to paving or at least the placement of sidewalks for pedestrian traffic as the answer. The horror experienced by a fine lady when she stepped into the streets of most cities which were, as Bruni tells, "so unclean, that all dirt produced by night, is displayed to the eye by day, cast by the feet of its inhabitants, and trodden into the roads," must have been

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[29] *Villani's Chronicle; being selections from the first nine books of the Croniche Fiorentine*, trans. Rose E. Selfe, ed. Philip H. Wicksteed (London: Archibald Constable, 1906), 140, book 6, § 26; John H. Mundy and Peter N. Riesenberg, *The Medieval Town* (Princeton: D. van Nostrand 1958), 110.

[30] *The Panegyric of the City of Florence*, 80-81.

[31] Ibidem.

[32] Jeffery L. Singman, *Daily Life in Medieval Europe* (London: Greenwood Press, 1999), 187.

considerable. Bruni again states, "It is most horrible to imagine!"[33] Paving which helped prevent the build-up of muck in the streets meant that not only was trade improved but that one's finery purchased with the profits from that trade was not immediately in peril out of doors.

The Cost of Paving

Paving a city was a costly enterprise. It is largely for this reason that municipalities had to develop to a certain level before they could afford to make a push to pave their town. Obviously, sites with a greater access to useful materials were privileged and might develop earlier than others. As communities drew on their local resources when paving, their typology reflected what was to be found in plenty. Thus, in northern regions, where forests were abundant and often in the midst of being felled to make room for farmland, wood was used. Stone paving was considered superior, however, and as communities developed wooden streets were often later overlaid with cobbled ones.[34] In places where resources were less available, as in the Low Countries, cities might have become quite large and prosperous before they were paved. Indeed, the expense could be enormous enough so that only a wealthy commune could afford it. The city of Bruges between 1332 and 1398 employed fifteen contractors who "shared the work of paving Bruges's streets at a cost of nearly 12,000 pounds par." [35] Ghent, meanwhile, spent on average 5%-25% of the municipal budget on paving yearly during the fifteenth century.[36] At this price, paving was seen not simply as a utilitarian measure but a prestige project. While Bruni is perhaps the most effulgent in his praise of stone streets, numerous other *panegyrics* mention paving as a point of pride. After praising the wealth of trade running through the city and great depth of its wine cellars, the *Nuremberg Chronicle* records of Vienna that, "The streets and avenues are paved with hard stones, and the pavement is not easily injured by the wheels of the heavily loaded wagons."[37] As well, among the accomplished deeds spoken of with pride by Lucchino Visconti, was that he paved the streets of Milan and, of course, Parisians were

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[33] *The Panegyric of the City of Florence*, 80-81.

[34] Examples of this include Thorn in Poland where under the Teutonic Knights the city's wooden streets were re-paved in brick, Wrocław, where they were replaced with cobbles, and numerous sites in Scandinavia. Pluskowski, *The Archaeology of the Prussian Crusade*, 201-11; Piekalski, *Prague, Wrocław, and Krakow*, 145-47; Dolly Jørgensen, "Cooperative Sanitation: Managing Streets and Gutters in Late Medieval England and Scandinavia," *Technology and Culture* 49 (3) (2008): 552-54.

[35] James M Murray, *Bruges, Cradle of Capitalism 1280-1390* (Cambridge: Cambridge University Press, 2005), 59.

[36] Nicholas, *The Later Medieval City: 1300-1500*, 334.

[37] *Hartmann Schedel*, *The Nuremberg chronicle*, trans. Walter W. Schmauch, ed. Kosta Hadavas (Madison, Wis.: University of Wisconsin, 2010), fol. XCIX recto (http://digicoll.library.wisc.edu/cgi/t/text/text-idx?c=nur;cc=nur;view=toc;idno=nur.001.0004 – accessed August 25, 2016).

thankful to Philip Augustus for seeking to alleviate the mire in the streets of the capital.[38] So, the ability to pave one's city stood as a mark of affluence and pride.

Given the high cost of paving and the difficulties caused by the common good paradox, municipalities went about financing their street surfacing in several ways. The first method attempted by most communities was to require people whose property joined the street to pave the area of the length of their properties's frontages.[39] This type of individual responsibility was used when laying down both stone and, as evidence from Scandinavian cities shows, wooden streets as well.[40] In most cases this meant paving half of the street up to the central gutter line while your neighbor across the way would pave the other. The city of Dubrovnik appears to have been somewhat unusual in that people were required to look after only one third of the roadway while the city managed the central one third with the gutter.[41] This method of paving, however, led as has been discussed before, to obvious quality problems.

A second method then applied was where instead of doing the work themselves, home-owners were required to pay for the services of a professional *pavor* to do it for them. As cities developed, this obligation became more common. A third method, which was widespread in both England, Ireland, and France *was* the collection of a "pavage" tax. This tax was levied on carts carrying goods coming into the city (justifiably as their wheels caused the most wear and tear) with the proceeds going to pay for improvement of the roadways.[42] The privilege to levy such a tax, however, had to be applied for to the king or local lord.[43] This form of money raising worked particularly well for cities which had a high volume of trade, occasionally even providing a surplus.[44]

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[38] Trevor Dean, *The Towns of Italy in the later Middle Ages* (Manchester: Manchester University Press, 2000), 235. Simone Roux. *Paris in the Middle Ages*, trans. Jo Ann McNamara (Philadelphia: University of Pennsylvania Press, 2009), 35-36.

[39] This appears to have been the general case in France, England, Italy, and Scandinavia and very likely other sites as well: Roux, *Paris in the Middle Ages*, 35-36; Jørgensen, "Cooperative Sanitation," 555-56; Dean, *The Towns of Italy in the later Middle Ages,* 52-53.

[40] Ibid.

[41] Further research will reveal, if this was a common policy in other communities. Robin Harris, *Dubrovnik: A History* (London: Saqi Books, 2006), 288; Irena Benyovsky Latin, "Dubrovnik's Burgus of St. Blasius in the 13th Century," in *Towns and Cities of the Croatian Middle Ages*, ed. Benyovsky Latin and Pešorda Vardić, 303-06.

[42] The most comprehensive overview of "pavage" taxes from medieval English records has been compiled by Edward Harvey, "Pavage grants and urban street paving in medieval England, 1249-1462," *The Journal of Transport History* 31, no. 2 (2010): 151-63.

[43] A similar "murage" tax to subsidize the building of city walls often preceded any paving levy: Chédeville and Duby, *Histoire de la France Urbaine*, vol. 2: *La ville médiévale*, 572. Nicholas, *The Growth of the Medieval City*, 68.

[44] As in the case of Kingston upon Hull which from 1317 was granted the rights of pavage for seven years. Accounts from 1321-1324 show that 16% of the city's annual receipts came

Aside from the tax, local lords or wealthy businessmen might also contributed to improve the city's streets out of a sense of duty, largesse, or civic pride.[45] Lastly, city governments could pay for paving out of the general municipal budget. Only large and wealthy cities could afford to go this route; as shown before, paving could constitute a significant line item. Direct financing was thus common only in the Low Countries, the Northern Italian Communes, and capital cities such as Paris whose municipalities could afford the expense. It also seems likely that in Novgorod and Moscow a similar direct financing must have been applied as archeological evidence shows that each new layer of planking was lain down in a single campaign. Once the frontages were paved, by whatever method, it was then usually up to the individual households to see to the cleaning and upkeep of their section of the street. In Uppsala, Sweden, the roads were laid out in such a way that individual areas of responsibility were clearly marked out by white stones.[46]

Fig, 5: Medieval Paving – Uppsala, Sweden.
Out of: Jørgensen, "Cooperative Sanitation," 556.

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from pavage and murage taxes while the costs of road and wall improvements came to only 44% of the amount collected for such repairs. Harvey. "Pavage grants", 154-55.

[45] In both Hamburg and Lübeck, some wealthy burghers left bequests for the upkeep of city streets. In the case of Lübeck, although records point to an earlier paving date – it is only from 1310 that it is secure that stone was used. In the Papal States, meanwhile, local notables were requested and required to see to the upkeep of the roads. Classen, "Roads, Streets, Bridges, and Travelers". in *Handbook of Medieval Culture: Fundamental aspects and conditions of the European Middle Ages*, ed. Albrecht Classen (Berlin and New York: de Gruyter, 2015), vol. 3, 1517: The Ordinances of Cardinal Albornoz for the Papal States, 1357. Mundy and Riesenberg, *The Medieval Town*, 167-68.

[46] Jørgensen, "Cooperative Sanitation," 556.

Paving Across Europe – some general trends

Looking at the chart below some very general and preliminary arguments can be made. In the area where formally the Roman Empire had held sway, medieval paving began to reappear on a large scale in the early thirteenth century. The caveat here would be the British Isles where Anglo-Saxon sites have signs of some limited paving, mostly gravel, as well as some Viking settlements where wooden walkways have been observed. The strength of the Anglo-Saxon kingdoms, each with its own civic center, may have contributed to this early development. The notorious raininess of British weather may also have played a role as the problem of constantly muddy streets would have increased incentives to pave. Back on the continent, the Italian communes were nearly all paved during the thirteenth and early part of the fourteenth century while the great cities of the Low Countries engaged in surfacing campaigns in the mid-fourteenth century. Unfortunately, I have not yet been able to collect enough data to say much on the state of things in France and Germany.[47] Beyond the reaches of the former Western Roman Empire, communities in the north of Russia and Scandinavia began to pave their cities very early, beginning in the tenth century. These first wooden streets were often later replaced with stone. This replacement was likely driven by both the better surfacing stone provided and the deforestation of the northern zone which made wood more scarce and increased its cost to prohibitive levels. The chart also shows that more "eastern" areas including the lands of the modern Czech Republic, Poland, and Hungary were paved at roughly the same time as their western counterparts despite the traditional narrative that the east urbanized later and was less developed. Further research will allow for more comments to be made.

[47] I have been very disappointed in my inability to find much on this region despite searching in both English and French materials. During the course of research I discovered a particularly interesting form of rammed medieval cobble-stone street known in French as *calades*, common in hill towns throughout the Provence and along the Mediterranean coast, but solid dates for these sites have been impossible to nail down and so they have been left out of the current chart. That these streets appear in form very similar to small hill towns in Italy which present similar dating difficulties makes them all the more interesting. Unfortunately, my knowledge of German is severely limited. Some information I have found available in English dealing with German towns but given the many large cities that arose in that part of the world during the Middle Ages I feel that the data I have been able to compile so far will not do the area justice. Further research will be necessary in order to bring these sites into the fold. For some information on the *calades* see René Sette, Fabienne Pavia, François-Xavier Emery, and Joseph Marando, *Calades: les sols de pierre en Provence*. Manosque (Alpes de Haute Provence): Le Bec en l'air, 2002.

Notes on the Chart

The following chart includes 77 urban units across Europe and seeks to show the date at which they were first paved during the medieval period, the type of material used to pave them and the approximate population of the site at the time. A few things should be immediately stated, firstly, that this chart offers but the smallest fraction of urban sites which were active during the medieval period and so while some general trends might be seen the number of data points is not really enough to make concrete assertions. I hope to improve upon it with further research. In particular, a few key regions of Europe have been left out entirely, namely the Iberian Peninsula and the lands once occupied by the Byzantine Empire. I was sadly unable to find much data on Iberian paving practices although given that cities in that region were amongst the largest in Europe during the period and information on their paving would be most interesting. I hope to rectify this omission in the future. I have also excluded the Byzantine lands as it is assumed that they continued to follow much of the ancient Roman paving practices and fall outside of the interest of this study. You will also notice that in many cases information relating to the urban population is missing. Medieval demographics are a notoriously tricky business. Where possible, I have taken information from monograph studies dealing directly with the site in question, where these were not available I have relied on Josiah Russell's 1972 study, *Medieval Regions and their Cities*[48] and Bairoch's, Batou's, and Chèvre's *La population des villes Européennes*[49], for much of the data. In all too many cases, however, I was unable to find any population information for the medieval period at all and even for those which I was able to find some, much of the information related to an earlier or later period than that in which paving was first installed. Lastly, for some sites where the type of paving is not entirely clear from the sources, it has been marked with an asterisk. The chart follows the alphabetical order of modern states, in which the communities are situated.

[48] Josiah Cox Russell, *Medieval Regions and their Cities* (Newton Abbot: David and Charles, 1972).

[49] Paul Bairoch, Jean Batou, and Pierre Chèvre, *La population des villes Européennes: Banque de données et analyse sommaire des résultats, 800-1850* (Geneva: Librairie Droz, 1988).

Chart of early urban paving evidence[50]

Country	City	Year	Paving type	Population at time of paving
Austria				
	Vienna[51]	>1438	stone	20,000 in the 13th c.[52]
Belarus				
	Brest[53]	13th c.	wooden planks	?
Belgium				
	Brussels[54]	1265	stone	18,000 in 1374[55]
	Bruges[56]	1332	stone	36,738 - 45,921 in 14th c.[57]

[50] An asterisk (*)marks where the material listed is highly likely but is not explicitly stated in the sources or has been confirmed by archaeological evidence.

[51] The description of Vienna by Enea Silvio Piccolomini praises the beauty of its paved streets. Ferdinand Opll, *Nachrichten aus dem mittelalterlichen Wien. Zeitgenossen berichten* (Vienna, Cologne, and Weimar: Böhlau, 1995), 134.

[52] Russell. *Medieval Regions and their Cities*, 100-01.

[53] http://brokm.vbreste.by/filial-arheologicheskii-muzei-bereste.html - accessed August 2, 2016): Berestye Archaeological Museum.

[54] The main streets of Brussels were paved from this year but most of the smaller roads were left as dirt. Both Brussels and Louvain, beginning before 1300 and fully formed by 1326, however, had a dedicated crew of street cleaners and professional pavers forming a group known as *Chaussees* whom they paid. These men were chosen by the local e*chevins* and they were directed by certain "masters" while a *chef-de chantier*, who was usually a contractor or a mason, was in charge of the pavers. Nicholas, *The Later Medieval City*, 334.

[55] Russell, *Medieval Regions and their Cities*, 115-17. Russell states that at the beginning of the 13th century likely none of the cities in the Lowlands had a population above 20,000 and most were around 10,000; these sites, however, grew rapidly over the next hundred and fifty years. Thus, the city's population as it was being paved was likely closer to 10,000 than 18,000.

[56] Over the 14th century the city paved nearly all of its major streets. "This was accomplished with large quantities of imported paving stones of four different types and proveniences. Brabant stone seems to have been the preferred as a rule, but paving stones from Artois, the Tournaisis, and the upper Landenian (Leau) were purchased as well. Between 1332 and 1398 fifteen contractors shared the work of paving Bruges's streets at a cost of nearly 12,000 pounds par." Maintenance of city infrastructure continued to be a major line item for the city throughout the 14th century totalling between 13%-16% in a normal year and up to 33% in an extraordinarily ambitious one. Likely, the tides of war and tax collection greatly influenced the amount the city spent in a given cycle. James M Murray, *Bruges, Cradle of Capitalism 1280-1390* (Cambridge: Cambridge University Press, 2005), 59 and 61.

	Ghent[58]	>1360	wood/stone	56,000 in 1346[59]
	Louvain[60]	>1300	stone	20,000; 18,000 in 1374[61]
Croatia				
	Dubrovnik[62]	1272	stone*	2,000-3,500[63]
Czech Republic				
	Prague[64]	10th-11th c.	oak wood planks	30,000 pre-

[57] According to Walter Prevenier's "classic article on Flemish demography" Bruges's population in the mid-14th century was between 36,738 and 45,921. Murray, *Bruges*, 85.

[58] It appears that prior to the major stone paving project initiated by the city administration in 1360, many of the streets were paved with wood. "Profile samples at the crossing of the Botermarkt and Hoogpoort gave evidence of a medieval street made of small timber posts, similar to the ones found earlier beneath the former Korte Ridderstraat (now Emile Braunplein) and the small square called Te Putte (now Goudenleeuwplein). Along with these, the timber road of the Hoogpoort was identified as a major traffic artery in medieval Gent. The road was built on top of a black layer made of organic material, typical for this area located just outside the oldest part of the medieval city." Portico, "Medieval stone houses and wooden streets in Gent revealed," last modified, 24 May 2011 (http://www.portico.nu/about/news/archive/article/archaeological-research-at-botermarkt-and-belfortstraat-reveal-remnants-of-medieval-stone-houses-and.html - accessed August 2, 2016). In the 19 years after 1360 the city administration spent a huge amount on improvements to the city pavements. David Nicholas, *The Metamorphosis of a Medieval City: Ghent in the Age of the Arteveldes 1302-1390* (Leiden: Brill, 1987), 9. In fact, between 5%-25% of the municipal budget could go towards street maintenance during the 15th century depending on whether the city was at war at the time. Nicholas, T*he Later Medieval City*, 334.

[59] Russell, *Medieval Regions and their Cities*, 1972, 116-17;

[60] Louvain followed a similar formation as Brussels. Nicholas, T*he Later Medieval City*, 334.

[61] Bairoch, Batou, and Chèvre, *La population des villes Européennes*, 20,000; Russell, *Medieval Regions and their Cities*, 115-117.

[62] In Dubrovnik, in 1272, new city statutes were put in place detailing how all new streets were to be built: Streets were to be 9 palms wide (2.304m), while other more important thoroughfares were to be 14 palms wide, and "The responsibility for the upkeep of the streets was to be divided between the residents on either side (one third each), while the central third was the responsibility of the commune." While it is not precisely clear what the streets were made of; given the care taken to layout strict cleaning regulations it appears likely that some form of stone paving had been adopted. Harris, *Dubrovnik: A History*, 288; Benyovsky Latin, "Dubrovnik's Burgus of St. Blasius," 303-06.

[63] Harris, *Dubrovnik*, 290.

[64] During Prague's very early period archaeological evidence has turned up evidence for timber streets laid out within the proto-town below the castle on the city's left bank. "Here a junction of streets was discovered with five levels of street surfaces of oak wood… It consisted of solid sleepers and rough planks laid over them transversely to the direction of the traffic. Some of the sleepers rested on stakes driven into the ground. The whole structure thus formed a sort of a causeway over marshy ground". It is possible that the wooden streets were not often used, as prior to the town's incorporation, there is also

				1348[65]
	Brno[66]	13th c.	gravel/cobblestone	7,000 in 1300[67]
	Opava[68]	13th c.	gravel/cobblestone	?
England				
	Atherstone[69]	1343	stone	?
	Bedford[70]	14th c.	cobblestone	?
	Beverley[71]	1249	stone*	?
	Cirenchester[72]	1321	stone	1,420[73]
	Coventry[74]	13th c.	stone*	12,000 in 1377[75]
	Henley-on-Thames[76]	1205	stone*	?

evidence that many of the town's streets were laid using local stone during the 12th-13th centuries. During the 14th century, after the town's incorporation, smaller streets continued to be laid with gravel and river stones but slowly the streets were paved over with more regular, closely packed cobbles set in a sand matrix. Piekalski, *Prague, Wrocław, and Krakow*, 141-45.

[65] Russell, *Medieval Regions and their Cities*, 100-101.

[66] Brno shows a similar progression as Prague, as over the 13th and 14th centuries its gravel streets were repaved with higher quality, more tightly packed cobbles. Piekalski, *Prague, Wrocław, and Krakow,* 145.

[67] Bairoch, Batou, and Chèvre, *La population des villes Européennes*, 68.

[68] Opava shows a similar progression as Prague as over the 13th and 14th centuries its gravel streets were re-paved with higher quality more tightly packed cobbles. Piekalski, *Prague, Wrocław, and Krakow,* 145.

[69] Atherstone, in 1343, was granted the right to collect pavage taxes because the citizens were upset that, "in wet weather [the city] is dirty". Dyer, "Small towns 1270-1540," 532.

[70] Colin Platt, *Medieval England: A Social History and Archaeology from the Conquest to 1600 AD* (London: Routledge, 1978), 191-92.

[71] The first recorded pavage rights from English Patent Rolls were granted to the town of Beverley in 1259 during the reign of Henry III. As pavage was required to fund major road restorations it seems likely that the streets laid down were built of stone. The city would go on to receive 30 more pavage grants between the years 1249-1450 coinciding with the hay day of the town's trade economy. Harvey, "Pavage grants,"152.

[72] In Cirenchester, in 1321, a grant to collect pavage taxes was given to the city. R.H. Hilton, "Medieval Market Towns and Simple Commodity Production," *Past & Present* 109 (1985): 8.

[73] Cirenchester is estimated to have had a population of 1,420 by 1377. Alan Dyer, ""Urban decline" in England 1377-1525", in: *Towns and Decline AD 100-1600*, ed. T.R. Slater (Aldershot: Ashgate, 2000), 278.

[74] Coventry was granted pavage rights for seven years by King Edward I in 1305. However, previous to this, the city had required citizens to pave in front of their property up to the central street gutter, thus the city was likely paved in large part prior to 1305. Jørgensen, "Cooperative Sanitation, 555 note 17.

[75] Russell, *Medieval Regions and their Cities*, 122-24.

King's Lynn[77]	13th c.	cobblestone	7,800 in 1377[78]
Kingston upon Hull[79]	1317	stone*	?
Leicester[80]	1316	stone*	3,000[81]
Lincoln[82]	1286	stone	3,600 in 1086,[83] 5,354 in 1377[84]
London[85]	1133	stone*	20,000[86]
Nuneaton[87]	1314	stone*	?
Oxford[88]	>1066/12th c.	gravel/stone	?

[76] Henley-on-Thames developed in the 12th century on a previous Anglo-Saxon site. Henry II purchased land for buildings in the town in 1179, the town and local manor were then granted to Robert of Harcourt in 1199, and the town received a pavage grant in 1205. John Dalton, *Waterman's Road, Henley-on-Thames,* (https://library.thehumanjourney.net/782/ - accessed August 2, 2016).

[77] King's Lynn was a town founded by the bishop of Norwich along the river Ouse in the 11th century. The site had grown up and expanded by the early 13th century into a small but prosperous little town. Excavations have revealed a cobblestone path near a set of early 13th-century tenements in the Northern Newland section of the town. John Schofield and Alan Vince, *Medieval Towns* (London: Leicester University Press, 1994), 60-61.

[78] Russell, *Medieval Regions and their Cities*, 122-24. Russell states that at the beginning of the 13th century likely none of the cities in the lowlands had a population above 20,000 and most were around 10,000, these sites however grew rapidly over the next hundred and fifty years.

[79] In 1317, the city received a pavage grant for 7 years. Harvey, "Pavage grants,"154.

[80] In 1316, Thomas, earl of Lancaster petitioned the king for a grant of pavage rights on behalf of the bailiffs of Leicester. Harvey, "Pavage grants,"154.

[81] Bairoch, Batou, and Chèvre, *La population des villes Européennes*, 33.

[82] Lincoln saw its main road paved in 1286 when a commission of four men were appointed to "arrange for the paving of the high road running through the said town, taking care that the better sort who have tenements on or abutting upon the said road contribute thereto in proportion to their tenements." Platt, *The English Medieval Town*, 48.

[83] Ibid.

[84] Russell, *Medieval Regions and their Cities*, 61.

[85] The city was granted the right to collect "pavage" taxes amongst its other rights by King Henry I in a charter granted to the city in 1133. E. A. Webb, "The founder: From the Royal Charter (1133)," in *The Records of St. Bartholomew's Priory and St. Bartholomew the Great, West Smithfield*, vol. 1 (Oxford: Oxford University Press, 1921), 55-75 (http://www.british-history.ac.uk/st-barts-records/vol1/pp55-75 - accessed August 26, 2016).

[86] Derek Keene. "London from the post-Roman period to 1300," in *The Cambridge Urban History of Britain*, ed. D. M. Palliser (Cambridge: Cambridge University Press, 2000), 196.

[87] "In 1314, John Devery, the king's clerk, requested a grant for the town of Nuneaton in Warwickshire, on behalf of the prioress of the town." Harvey. "Pavage grants", 154.

[88] Oxford presents a very interesting case in that during Anglo-Saxon times archaeological evidence has revealed that the city streets were paved in stone but that during the post-

Norwich[89]	13th c.	gravel	5,000 in12,000;[90] 5920 in 1377[91]
Nottingham[92]	>1501	stone	2,500[93]
Sandwich[94]	1321	stone	?
Southampton[95]	>1482	stone	2,500[96]

conquest period they were overlaid with successive layers of gravel. Platt, *The English Medieval Town,* 48-49.

[89] The city was a local power center as the site of the county court of Norfolk and Suffolk and located in one of the most densely populated rural areas in England leading to its rapid expansion during the 11th century. In 1086, it was the third largest city in England with a population of around 4,600. By 1377, it had slipped to sixth place amongst other English cities with an expanded population of around 5,700. For population density by region see: Russell, *Medieval Regions and their Cities*, 52, 61. Nicholas, *The Growth of the Medieval City*, 68. "The earliest archaeological evidence for metalling of streets in Norwich has been dated to the thirteenth century in the Friary precinct; in this case, the first surface was gravel, which was later replaced by flint rubble." Jørgenson, "Cooperative Sanitation", 553.

[90] Jørgensen, "Cooperative Sanitation", 550.

[91] Russell, *Medieval Regions and their Cities*, 122-24.

[92] Nottingham appointed an official city pavor in 1501, paying him, as his yearly earnings, 33s 4d and a gown. He acquired his stone from the city chamberlains and was to set about repairing any damage to the town thoroughfares. As the pavor was instructed to make repairs, we must then suppose that most of the city's streets had been preciously paved. Colin Platt, *The English Medieval Town,* 48-50.

[93] In 1377 Nottingham is calculated to have had a population of 2,750 and in 1524/5 its population was around 2,220. I have thus averaged the two to estimate around 2,500.Dyer, ""Urban decline"," 278; Bairoch, Batou, and Chèvre, *La population des villes Européennes*, 34 (1500 – 3,000)l

[94] The city was granted pavage rites during the years 1321-28, 1385-87, 1387-89, 1402-12, and 1412-19. Charles Coulson, "Battlements and the Bourgeoisie: Municipal Status and the Apparatus of Urban Defence in Later-Medieval England," in *Medieval Knighthood V: Papers from the Sixth Strawberry Hill Conference 1994*, ed. Stephen Church and Ruth Harvey (Woodbridge: Boydell, 1995), 126 note 30.

[95] Southampton appointed an official pavor in 1482 to see to the repair of the city streets. The pavor was also in charge of gathering the funds to finance the repair from householders abutting the street. As the pavor was instructed to make repairs, we must then suppose that most of the city's streets had been preciously paved. Platt, *The English Medieval Town*, 50.

[96] In 1377, Southampton is calculated to have had a population of 2,190 and in 1524/5 its population was around 2,700. I have thus averaged the two to estimate around 2,500. Dyer, ""Urban decline"," 279.

	Winchester[97]	12th c.	flinting	2,160 in 1377[98]
	York[99]	12th c.	cobblestone	5,000-10,000[100]
France				
	Avignon[101]	1243	stone	>15,000[102]
	Nantes[103]	> 1467	stone	12,000 in the 15th c.[104]
	Paris[105]	1198	stone	>50,000[106]

[97] Winchester's streets were "spread with small flints over chalk", upon which cultural deposits quickly formed. Platt, *The English Medieval Town,* 48-49.

[98] Russell, *Medieval Regions and their Cities*, 61; Bairoch, Batou, and Chèvre, *La population des villes Européennes*, 35 (1200 – 20,000!).

[99] Jørgenson points out that in the case of York even small streets were being paved with cobbles as early as the 12th century, that archaeological evidence points to back-alleys having at least limestone graveling by the year 1300 and at least some had central gutter channels. The city was further granted the right to collect pavage-tax for five years by King Edward III in 1329. Jørgensen, "Cooperative Sanitation," 553-55, and note 17.

[100] By the year 1300, York was one of the largest cities in England with a grand total of about 10,000 inhabitants. Nicholas, *The Growth of the Medieval City*, 178-80.

[101] "In Avignon, a set of customs laid down in 1243 stated that, "Likewise we decree that all public streets outside the city be widened and repaired so that they all shall be at least two *cannae* in width, and if anywhere the roads or bridges of a lesser breadth are found they shall be brought to the aforesaid measurement. The construction shall be done of the roads leading to the Rhone river from the episcopal tower, from St. Ruffo, from the tannery, from St. Verano and from St. Michael and from other places situated at a like distance…and if, perhaps, beyond these limits, there are found to be roads which are very narrow or offer difficult passage, then these roads too shall be widened if the good wise men, described below, should see fit." M.A.R. de Maulde, *Coutumes et règlements de la Republique d'Avignon* (Paris: Larose, 1879), 167, 170-71, 200; Mundy and Riesenberg. *The Medieval Town*, 157.

[102] Stefan Weiß, Versorgung des päpstlichen Hofes in Avignon mit Lebensmitteln (1316-1378): Studien zur Sozial- und Wirtschaftsgeschichte eines mittelalterlichen Hofes (Berlin: Akademie Verlag, 2002), 106 note 7; ; Bairoch, Batou, and Chèvre, *La population des villes Européennes*, 23 (1200 – 13,000, 1300 – 6,000).

[103] 9% of the city budget went towards maintaining the roadways in 1467. Nicholas, *The Later Medieval City*, 334.

[104] Katherine A. Lynch, *Individuals, families, and communities in Europe, 1200-1800: the urban foundations of western society* (Cambridge: Cambridge University Press, 2003), 92.

[105] "The chronicler Rigord reported that Phillip Augustus ordered the streets paved so that they could be more effectively cleaned, thus reducing the stench from the filth that accumulated there. In reality only the main cross streets were paved as a result of these orders." Using toll fees collected by the city *echevin* (magistrates) on incoming commercial

	Rennes[107]	>1483	stone	12,000 in 1400[108]
	S. Vaison la Romaine[109]	14th c.	cobblestone – *calades*	?
Germany				
	Augsburg[110]	1416	stone	18,000 in 1475[111]
	Duisburg[112]	1250	stone*	>4,000[113]
	Hamburg[114]	>1398	stone*	16,000 in 1430[115]

goods at the city gates, the city took care of these two main thoroughfares, the N/S/ rue Saint-Denis and rue Saint-Jacques running along the right bank of the Siene and the E/W Saint Antoine and rue Saint Honore. Otherwise, citizens were to lay paving before the façade of their abodes and see to its maintenance and repair under the order of *etalage* individually. Fines were levied on those who failed to pave the street by the royal or seigniorial *voyer* (supervisor). Questions of jurisdiction between the king and seigniorial voyers and the hands off approach to local responsibility by noble families led to less than perfectly maintained roadways and numerous court cases and orders to deal with the problem as Paris continued to expand throughout the late medieval period. Roux. *Paris in the Middle Ages*, 35 -36 and note 17.

[106] Philippe Lorentz and Dany Sandron, *Atlas de Paris au Moyen Âge* (Patis: Éditions Parigramme, 2006), 37; Bairoch, Batou, and Chèvre, *La population des villes Européennes*, 28 (1200 – 110,000!).

[107] 18% of Rennes's city budget went to street maintenance in 1483. During this period even some of the city's busiest streets, such as that linking the Old City to its main gate, was only 2 meters wide. Nicholas, *The Later Medieval City*, 334 and 336.

[108] Bairoch, Batou, and Chèvre, *La population des villes Européennes*, 29.

[109] The town of Vaison la *Romain* grew up around hill-top fortification built in the twelfth century. Examples of a particularly interesting form of rammed medieval cobble-stone street known in French as *calades* laid down in the fourteenth century survive to this day. This style of paving which provided better traction on steep roadways were common in hill towns throughout Provence and along the Mediterranean coast. Similar streets can be found in many Italian hill towns. Vaison la Romain, "Au coeur de la haute-ville" (http://www.vaison-la-romaine.com/spip.php?article431 (accessed August 2, 2016).

[110] Gerhard Jaritz, *Zwischen Augenblick und Ewigkeit. Einführung in die Alltagsgeschichte des Mittelalters.* (Vienna and Cologne: Böhlau, 1989), 104.

[111] http://u01151612502.user.hosting-agency.de/malexwiki/index.php/Bev%C3%B6lkerungs-_und_Einwohnerzahlen (accessed August 26, 2016).

[112] Classen gives the date as 1250 but provides no reasoning or information as to the roadways surfacing. Classen, "Roads, Streets, Bridges, and Travelers," 1517.

[113] https://de.wikipedia.org/wiki/Einwohnerentwicklung_von_Duisburg (accessed August 26, 2016)

[114] In 1398, some wealthy town burghers left bequests for the upkeep of city streets. Classen, "Roads, Streets, Bridges, and Travelers," 1517.

[115] https://de.wikipedia.org/wiki/Einwohnerentwicklung_von_Hamburg#Von_950_bis_1870 (accessed August 26, 2016).

	Hannover[116]	12th-13th c.	gravel/wood	c. 1,500 in 1190[117]
	Landshut[118]	1494	stone*	9.000 in 1400[119]
	Lübeck[120]	1289	stone	17,881 in 1217,[121] 25,000 in 1400[122]
	Nuremberg[123]	1368	stone	20,000 in 1400[124]
Hungary				
	Buda[125]	13th c.	gravel	8000[126]
	Györ[127]	17th c.	gravel/wood	7000 in 1700[128]
	Köszeg[129]	16th c.	gravel/wood	3,000 in 1700[130]

[116] Heiko Steuer, "Urban archaeology in Germany and the study of topographic, functional and social structures," in *Urban Historical Geography: Recent Progress in Britain and Germany*, ed. Dietrich Denecke and Gareth Shaw (Cambridge: Cambridge University Press, 1988), 87.

[117] https://de.wikipedia.org/wiki/Einwohnerentwicklung_von_Hannover#Von_1190_bis_1870 (accessed August 26, 2016).

[118] Nathan Glazer and Mark Lilla. *The Public Face of Architecture: Civic Culture and Public Spaces* (New York: Free Press, 1987), 71.

[119] Bairoch, Batou, and Chèvre, *La population des villes Européennes*, 7.

[120] There is some evidence for the earlier date of 1289 when some wealthy town burghers left bequests for the upkeep of city streets. However, the surfacing material of these streets is unknown until further evidence from 1310, when stone was used. Classen, "Roads, Streets, Bridges, and Travelers," 99.

[121] Russell, *Medieval Regions and their Cities*, 62.

[122] Fritz Rörig, *The Medieval Town* (Berkeley: University of California Press, 1967), 112.

[123] In Nuremberg, textual references to paving first appear in 1368. Ptasnik, "Towns in Medieval Poland," 28.

[124] Rörig, *The Medieval Town*, 112.

[125] In Buda, the earliest roadways uncovered near Buda castle were made with gravel taken from the Danube River. Later on, during the 15th and 16th centuries cobblestone roads were laid down with their banks formed by large pieces of stone. Szilagyi, *On the Road*, 34-35.

[126] Paul Bairoch, Jean Batou, and Pierre Chèvre, *La population des villes Européennes: Banque de données et analyse sommaire des résultats, 800-1850* (Geneva: Librairie Droz, 1988), 37; Richard Perger, "Der organisatorische und wirtschaftliche Rahmen," in *Wien: Von den Anfängen bis zur ersten Wiener Türkenbelagerung (1529)*, ed. Peter Csendes andFerdinand Opll (Vienna: Böhlau, 2001), 208.

[127] In Györ, a 17th-century log and stone roadway was uncovered, similar in design to those found in Sopon dating from the same period. Szilagyi, *On the Road*, 33-35.

[128] Bairoch, Batou, and Chèvre, *La population des villes Européennes*, 37.

[129] In Köszeg, excavations in 2006 revealed a 16th-c. log and stone roadway. Szilagyi, *On the Road*, 33 and note 32.

[130] Bairoch, Batou, and Chèvre, *La population des villes Européennes*, 37.

	Simontornya[131]	1629	oak wood planks	?
	Sopron[132]	17th	gravel/wood	c. 9,000?[133]
	Visegrad[134]	14th c.	cobblestone	?
Ireland				
	Dublin[135]	>1329	stone	11,000 in 1200[136]
	Fethard[137]	1468	stone	1,000-1,500[138]
Italy				
	Bassano[139]	1259	gravel/stone	2,000 in

[131] Dendochronological analysis allows for a very precise dating for this find. Szilagyi, *On the Road*, 34.

[132] The roads uncovered in Sopron were, "made from 10-20 cm thick logs laid perpendicular to the direction of the road covered with a layer of gravel." Szilagyi, *On the Road*, 33-35.

[133] http://www.oedenburgerland.de/index.php?option=com_content&view=article&id=533:die-gegenreformation-i&catid=116&Itemid=396 (accessed August 26, 2016); Bairoch, Batou, and Chèvre, *La population des villes Européennes*, 37 (1600 – 6000; 1700 – 5,000).

[134] Archaeological excavations revealed numerous medieval street surfaces from the Angevin-period. "The archeological observations confirmed two types of road surfaces, a wider one with small stones composed of layers, yielding a large number of finds, and a narrower type, covered with regular set stones." Historical mentions of streets in the town date generally 1338 and later. Orsolya Mészáros, "Topography and Urban Property Transactions," in *The Medieval Royal Town at Visegrad: Royal Centre, Urban Settlement, Churches*, vol. 2, ed. Gergely Buzás, Jozsef Laszlovszky, and Orsolya Mészáros (Budapest: Archeolingua Alapitvany, 2014), 149-50.

[135] During the 14th century the king granted the city pavage rights so that by the end of the century all the main streets of the city were paved, while many of the lesser ones remained unpaved. In 1329, Nicholas Fastoff was permitted to bring a supply of water to his home and all the other houses of St. Nicholas parish as long as he agreed to repair and re-pave the roads afterwards. Howard B. Clarke,"Lines of Communication in Medieval Dublin," in *Towns and Communication: Communication in Towns,* vol. 1, ed. Neven Budak, Finn-Einar Eliassen, and Katalin Szende (Ashland, OH: University of Akron Press, 2011), 23; John T. Gilbert and Rosa M. Gilbert, *Calendar of Ancient Records of Dublin, in the Possession of the Municipal Corporation of the City*, vol. 1 (Dublin: Joseph Dollard, 1889), 119. There is also some evidence that early Viking Dublin had wooden plank street paving similar to many other Scandinavian settlements.

[136] Russell, *Medieval Regions and their Cities*, 136-37; Bairoch, Batou, and Chèvre, *La population des villes Européennes*, 39 (1300 – 11,000; 1400 – 15,000).

[137] Any money left over from a murage tax granted in 1468 was specifically designated to be spent on paving the town. Tadhg O'Keeffe, *Medieval Ireland: An Archaeology* (Stroud: Tempus 2001), 100.

[138] The modern population of Fethard which remains within the confines of its medieval walls was 1,541 in the most recently conducted census in 2011. It seems unlikely that the medieval population was ever much higher than this figure and was likely even lower. "Fethard (Tipperary)" (http://www.citypopulation.de/php/ireland.php?cityid=0439 – accessed August 2, 2016).

			1200[140]
Bologna[141]	1211	stone	60-70,000?[142]
Ferrara[143]	>1287	stone	>30,000[144]
Florence[145]	1235	stone	15-20,000?[146]
Milan[147]	1339	stone	75,000 in 1288[148]
Naples[149]	late 13th c.	stone*	25,000 in

[139] Bassano's city statutes of 1259 include a requirement for streets to be constructed so that "two wagons, while passing one another, cannot become mired there; the person who destroyed the roadway or raised it too little is obliged to level the road…" Only roadways made of some other material than dirt, either gravel or cut stone would prevent wagons from become so mired. The earlier date is confirmed in the Bassano statues of 1295 which include provisions for regrading the street level. The surfaces of streets tended to build-up over-time due to cultural deposits and the continuous reapplication of gravel raised the road level high enough that overtime it rose above the houses lining either side and caused run-off to inundate the homes leading to complaints and resurfacing of the roads. Such complaints occurred only after considerable build-up of the roadway and it is thus likely that the roads in question had been laid with gravel or stone a number of years before the statute was issued. Zupki and Laures, *Straws in the Wind*, 54, note 58 and 55, notes 60 and 61.

[140] Bairoch, Batou, and Chèvre, *La population des villes Européennes*, 41.

[141] Bologna's city legislation included rules on both street width and paving requirements. Nicholas, *The Later Medieval City*, 335.

[142] Russell, *Medieval Regions and their Cities*, 64; Bairoch, Batou, and Chèvre, *La population des villes Européennes*, 41 (1200 – 35,000).

[143] Ferrara's statutes from the year 1287 read, "We decree and ordain that roads made of squared blocks should be repaired at the expense of the local districts in which they are located if they should in any way be damaged." The point is also made by Zupki and Laures, however, that such statutory provisions applied in very particular cases and that in general throughout Ferrara and other Northern Italian cities it was more common for the individual householders along a roadway to pay directly for paving efforts. Other roadways were to be raised, levelled and surfaced with gravel. Zupki and Laures, *Straws in the Wind*, 54.

[144] Bairoch, Batou, and Chèvre, *La population des villes Européennes*, 43 (1300 – 36,000).

[145] Paving began in 1235 and the entire city had been paved by 1339. Nicholas, *The Later Medieval City*, 334.

[146] Russell, *Medieval Regions and their Cities*, 42-43; Bairoch, Batou, and Chèvre, *La population des villes Européennes*, 43 (1300 – 95,000!),

[147] In Milan, in 1339, it was recorded among the many deeds of Lucchino Visconti during his time ruling the city that he had the streets paved. The records of deeds also contain just before and after the mention of paving that he severely punished adulterers and in a time of want, fed 40,000 people at public expense. The register of deeds, thus, should perhaps be taken with a grain of salt, but given the late date and Milan's size compared to similar Italian cities it seems likely that the city's streets already had some form of paving by the year in question. Dean, *The Towns of Italy*, 235.

[148] Russell, *Medieval Regions and their Cities*, 68; Bairoch, Batou, and Chèvre, *La population des villes Européennes*, 45 (1300 – 100,000).

[149] Dean, *The Towns of Italy*, 8.

			1277[150]
Orvieto[151]	>1334	gravel/stone	7,000[152]
Perugia[153]	1253	stone	>10,000[154]
Rome[155]	1452	stone	17-40,000[156]
The Papal States[157]	>1241	stone	?
Siena[158]	1296	stone/brick	20,000 in

[150] Russell, *Medieval Regions and their Cities*, 54-56; Bairoch, Batou, and Chèvre, *La population des villes Européennes*, 45 (1300 – 60,000).

[151] Orvieto's city statutes for the year 1334 include provisions for the re-grading of street level and surfaces as cultural build-up and continuous reapplication of gravel raised the road level high enough that overtime it rose above the houses lining either side and caused run-off to inundate the homes leading to complaints and resurfacing of the roads. Such complaints occurred only after considerable build-up of the roadway and it is thus likely that the roads in question had been laid with gravel or stone, a number of years before the statute was issued. Zupki and Laures, *Straws in the Wind,* 54, note 58.

[152] Russell, *Medieval Regions and their Cities*, 42-43; Bairoch, Batou, and Chèvre, *La population des villes Européennes*, 46 (1300 – 12,000).

[153] The paving began in 1253 in the market square, had spread to the major streets by 1268, and expanded to the entire city by 1294. The government took responsibility to pave the streets but delegated responsibility for cleaning them to the inhabitants of dwellings running along the thoroughfares. Nicholas, *The Later Medieval City*, 334.

[154] Russell, *Medieval Regions and their Cities*, 42-43; Bairoch, Batou, and Chèvre, *La population des villes Européennes*, 46 (1200 – 12,000; 1300 – 34,000).

[155] Rome above all others retained in some sections much of its ancient paving through the early medieval period and fell as well under the general papal state proviso to see to the upkeep of roads. This being said, however, in 1452 a new statute was issued creating the post of "maestro di strade" who were men responsible for seeing to the paving and upkeep of city streets. They were to collect their payment directly from the street's inhabitants. As late as 1588, the *via Lungaretta*, running near the Tiber in the populous medieval district of *Trastevere* was still in the process of being paved. Deborah Robins, "Via della Lungaretta: The Making of a Medieval Street," in *Streets: Critical Perspectives on Public Space*, ed. Çelik Zeynep, Diane Favro, and Richard Ingersoll (Berkeley: University of California Press, 1994), 173, note 24.

[156] Russell, *Medieval Regions and their Cities*, 52; Bairoch, Batou, and Chèvre, *La population des villes Européennes*, 47 (1400: 33,000; 1500 – 55,000).

[157] This unit marks a very special case where a "country-wide" ordinance existed. By 1357, Ordinances issued within the papal states penalized, "each city, commune, stronghold, town or corporation, and each baron, count or noble" who did not within two months make "diligent effort to reconstruct or repair all bridges, fountains, roads or highways intended for public use," and further, "where none have been to build new ones throughout their territories, so that men and animals and vehicles can freely come and go." (Ordinances of Cardinal Albornoz for the Papal States, 1357). Mundy and Riesenberg. *The Medieval Town*, 167-68.

[158] Paving is first mentioned in the *Cronaca Senese* of Paolo di Tommaso Montauri in 1241: "In questo anno si cominciò a silicare e mattonare le strade di Siena a spino." The Records of the Biccherna from 1226-1246 and others after show that this was performed at public expense for those works within the city of Siena. Donatella Ciampoli and Thomas Szabó, *Lo Statuto dei Viarî di Siena: viabilità e legislazione di uno stato cittadino del*

				1300[159]
	Spoleto[160]	1276	stone	6,000 in 1300[161]
	Verona[162]	1224	gravel/ stone	30,000[163]
	Venice[164]		stone*	100,000 in 1338[165]
Poland				
	Elbing[166]	1255	oak wood planks	5,000 in 14th c.[167]
	Gdansk[168]	>1354	wooden planks/brick	>8,000[169]

Duecento (Siena: Accademia degli Intronati, 1993), 57. The government of Siena also issued a famous set of statues in 1262, included in which was that all roadways throughout the city including alleys must be paved so as to prevent muck from entering the more prestigious thoroughfares. "Siena was justly proud of her paving; the glories of her cathedral floor were a fitting climax to the care which she bestowed upon her streets. Even the side alleys must be paved in order that mud might not be carried on to the pavement of the main arteries; every householder must sweep the portion abutting on his house." Edward Armstrong, "The Sienese Statutes of 1262," *The English Historical Review* 15 (57): 1–19. Later, in 1290, other parts of the town which had previously been paved in stone were ripped up and replaced with brick to improve the cleanliness and look of the town. Frugoni and Frugoni, *A Day in a Medieval City*, 38, note 38. To protect these investments, Siena had six official city street cleaners on the municipal pay-role by 1265. Nicholas, *The Later Medieval City*, 334.

[159] Russell, *Medieval Regions and their Cities*, 110; Bairoch, Batou, and Chèvre, *La population des villes Européennes*, 48 (1200 – 12,000; 1300 – 50,000!).

[160] Spoleto's city statutes of 1296 include a call for the city's less important roadways to be raised and levelled and then surfaced with crushed local rock or gravel while the main streets to be surfaced with cut stone or cobbles. Zupki and Laures, *Straws in the Wind*, 54, note 60.

[161] Bairoch, Batou, and Chèvre, *La population des villes Européennes*, 48.

[162] Veronese statues of 1276 include a call for the city's less important roadways to be raised and levelled and then surfaced with crushed local rock or gravel while the main streets to be surfaced with cut stone or cobbles. Zupki and Laures, *Straws in the Windy*, 54, notes 57 and 59.

[163] Bairoch, Batou, and Chèvre, *La population des villes Européennes*, 49 (1300 – 30,000).

[164] The city of Venice had public officials designated to keep watch over city streets and waterways by 1224 that was organized into an official body of judges by 1282. Nicholas, *The Later Medieval City*, 335.

[165] Russell, *Medieval Regions and their Cities*, 65.

[166] "In the old Market two levels of wooden paving were uncovered, the first dated by dendrochronology to 1255 and the second to 1257-1265. The street was 19.05m wide (representing four new Kulm perches') and paved with oak boards placed on foundation beams. In contrast on Murna [street] the paving logs were placed directly on the sandy bedrock. Excavations revealed that a number of inner streets ran between buildings, dated by dendrochronology to the later decades of the thirteenth century." Pluskowski, *The Archaeology of the Prussian Crusade*, 205.

[167] The city had an estimated 5,000 people at its medieval height. Ibid., 199.

Krakow[170]	12th c.	limestone	>5,000[171]
Pultusk[172]	13th c.	wooden planks	?
Thorn[173]	13th c.	wooden planks/brick	12,000 in 14th c.[174]
Wrocław[175]	first half of	oak wood planks	>5000; 10,000

[168] It is very likely that Gdansk had paving before this date, but the only solid evidence I've yet found comes from when the Teutonic knights captured the city in 1354. The knights greatly improved parts of the city's infrastructure including a new gutter and road system. The gutters were paved in brick with wooden planks placed over them to serve as walkways. Piotr Kowalik and Ziemowit Suligowski. "Comparison of water supply and sewerage in Gdansk (Poland) in three different periods." *AMBIO: A Journal of the Human Environment* 30, no. 4 (2001): 320.

[169] Ibid.; Bairoch, Batou, and Chèvre, *La population des villes Européennes*, 55 (1300 – 9,000; 1400 – 20,000).

[170] Krakow had access to excellent limestone quarries and so used stone to pave its streets from an early period. Archaeological excavations point to ever more sophisticated manners of paving. Macademization, was the first step and, "involved spreading the road surface with finely broken limestone rubble and then compacting it. Individual stones were not laid in any planned way only pressed into the ground by the wheels while the road was in use." Beginning around 1300 after the town's incorporation pavement styles changed and "selected lumps of limestone were dressed to a roughly triangular form. They were set in a sub base of sand to form a compact, stable surface." By the later 14th century, limestone wedged cobbles set in a base of sand were the norm throughout the city. While stone was predominant in Krakow, it was not the exclusive material used and evidence also points to the use of pine wood logs as surfacing in some parts of the city during the 12th-14th centuries. Piekalski, *Prague, Wrocław, and Krakow,* 148-52.

[171] Francis W. Carter, *Trade and urban development in Poland: an economic geography of Cracow, from its origins to 1795* (New York : Cambridge University Press, 1994), 56; Bairoch, Batou, and Chèvre, *La population des villes Européennes*, 55 (1200 – 10,000),

[172] Wooden streets were estimated to last between 7-9 years before needing to be replaced, although those in Novgorod appear to have been re-laid on average about every 18 years. Andrezj Buka, *The Archaeology of Early Medieval Poland: Discoveries – Hypotheses-Interpretations* (Leiden: Brill, 2008), 325-27.

[173] Archaeological excavations in Thorn have uncovered narrow wood paving laid out on streets leading down to the Vistula River and across the main market place. The market's timber paving was replaced with brick under the auspices of the Teutonic Knights in the 14th century. Pluskowski, *The Archaeology of the Prussian Crusade*, 201-11.

[174] Thorn was a large city for its time, and at its height under the Teutonic knights had an estimated population of 12,000. Ibid. 199.

[175] "In the early medieval castle on Ostrów Tumski and the left bank settlement ad sanctum Adalbertum at least some thoroughfares were surfaced with timber…. The material used in road construction was oak from dismantled and rebuilt ramparts. In addition to durable structures of heavy oak logs, there is evidence also of lighter and more perishable surfaces lined with brushwood. In the proto-urban settlement on the left bank, timber was used in surfacing the streets, but also footpaths, less than a metre wide." By the end of the 13th century the main market had been paved in cobbles set in a sand matrix and only during the 14th and 15th centuries did cobbling become the dominant form of paving used throughout the city. Piekalski, *Prague, Wrocław, and Krakow,* 145-47.

		13th c.		in 1403[176]
Romania				
	Bistrita[177]	1403	stone/wood	3,000[178]
	Brasov[179]	13th c.	stone/wood	?
	Cluj[180]	14th c.	gravel	10,000 in 1300[181]
	Sibiu[182]	13th c.	stone/ wood	?
	Targu Mures[183]	17th c.	tone	3,000 in 1700[184]
	Timisoara[185]	15th c.	wood	?
Russia				
	Moscow[186]	11th c.	wooden planks	30,000 in 1300[187]

[176] Bairoch, Batou, and Chèvre, *La population des villes Européennes*, 56 (1200 – 5,000); Russell, *Medieval Regions and their Cities*, 100-01.

[177] "A charter from 1403 mentions a road connecting the marketplace to the Holy Virgin church in Bistriţa and calls it via lapidea. For the same town the account registers specify the amount of money given to the residents Toda, living in one street (platea Crotten/Krotten) in exchange for paving it. The building technique and material were also revealed, as the register notation underlines that a layer of clay was deposited for levelling the surface on which the stones were later placed." There is also evidence for the continued laying of wooden street throughout the fifteenth and sixteenth centuries. Oana Toda, "Evidence on the Engineering and Upkeep of Roads in Late-medieval Transylvania," *Annals of the University of Alba Iulia*, *History* (Annales Universitatis Apulensis Series Historica 17/II (2013): 181-83.

[178] Bairoch, Batou, and Chèvre, *La population des villes Européennes*, 59.

[179] While city financial records point to some roads being paved in stone during the 13th century, there is also evidence for the continued laying of wooden street throughout the 15th and 16th centuries. Toda, "Evidence," 181-83.

[180] Ibid.

[181] Bairoch, Batou, and Chèvre, *La population des villes Européennes*, 59.

[182] While city financial records point to some roads being paved in stone during the 13th century, there is also evidence for the continued laying of wooden street paving throughout the fifteenth and sixteenth centuries. Toda, "Evidence," 181-83.

[183] Toda, "Evidence," 181-83.

[184] Bairoch, Batou, and Chèvre, *La population des villes Européennes*, 59.

[185] Toda, "Evidence," 181-83. Wooden roads appear to have been popular for centuries in Timisoara, as excavations done in 2007 revealed a road estimated to be from the 17th century, "constructed from oak beams laid side by side across longitudinal beams (with a cross-section 10x15 cm). The transverse beams were secured in position with the help of wooden pegs. In addition, the longitudinal beams were grooved, which helped level the road surface and kept the parts of the construction in place." Szilagyi, *On the Road,* 33-34.

[186] G. M. Scherbo "Wooden pavements of Moscow (XI-XIX centuries)", *History and Technology* 8/2 (1992): 119-25.

[187] Bairoch, Batou, and Chèvre, *La population des villes Européennes*, 62.

	Novgorod[188]	953	wooden planks	17,200 in 1200[189]
Scandinavia				
	Bergen[190]	1332	wooden planks	7,000 in 1300[191]
	Oslo[192]	13th c.	wooden planks	2,000 -2,400[193]
	Ribe[194]	13th c.	wooden planks	5,000-12,000[195]
	Tartu[196]	late 13th-early 14th c.	wooden planks	6,000[197]
	Trondheim[198]	12th c.	wooden planks	3,000 in 1300[199]
	Uppsala[200]	1170s	cobblestone	1,000 in

[188] M. W. Thompson, *Novgorod: The Great Excavations at the Medieval City Directed by A.V. Artsikhovsky and B.A. Kolchin*. New York: Praeger, 1967, 6.

[189] Russell, *Medieval Regions and their Cities,* 100.

[190] "In Bergen's wharf district, part of the planked surface of a 3.6-meter-wide public thoroughfare in Bugarden has been dated to immediately after the city fire of 1332. In another Bergen tenement area, Engelgarden, the tenement passage from the 1300s has survived in almost the full length of the site". The Bugarden main street was paved with "flat untrimmed stones" by 1400 and often had central gutters. After a fire in 1476 a smaller, previously wooden planked street in Bergen's s Sostergarde district was overlaid and replaced with gravel. It appears obvious that municipal paving programs focused on main streets first and only slowly expanded to less trafficked areas. Jørgensen, "Cooperative Sanitation," 552-54.

[191] Bairoch, Batou, and Chèvre, *La population des villes Européennes*, 52.

[192] As evidence has shown difference in the styles and laying of wooden slats, it appears likely that individual residents were responsible for sections of the street close to the property. Jørgensen, "Cooperative Sanitation," 552 and 556.

[193] Using data from payments of Peter's pence, Russell estimates that the population of Oslo just before the Black Death was around 2,400, 1.5 percent of Norway's total population at the time. Russell, *Medieval Regions and their Cities*, 55.

[194] Ribe's wooden-planked streets were paved in stone during the 14th century and had central v-shape gutters. Jørgensen, "Cooperative Sanitation," 553-54.

[195] Jørgensen, "Cooperative Sanitation," 550.

[196] Tartu was taken over by crusading Germans in 1224, damaged in a Russian raid in 1262 and rebuilt with wooden paving that was overtime replaced by cobblestones throughout the 15th c. An unpeeled pine log roadway measuring 1.5m across was excavated in Tartu and dated to the second half of the 13th c. or early 14th c. Andres Tvauri. "Archaeological Investigations at the Courtyard of Jakobi Street 2/ Lossi Street 3. Tartu," *Archaeological Fieldwork in Estonia 2010*: 182; Rivo Bernotas, "New insights on the changes of townscape in 14th-c. Tartu," *Estonian Journal of Archaeology (Eesti Arheoloogia Aja-kiri)* 16/2 (2012): 153-68.

[197] http://eeo.uni-klu.ac.at/index.php?title=Tartu_(Stadt) – accessed August 26, 2016.

[198] Clifford D. Long, "Excavations in the Medieval City of Trondheim, Norway," *Medieval Archaeology* 19 (1975): 18-19.

[199] Bairoch, Batou, and Chèvre, *La population des villes Européennes*, 52.

				1300[201]
	Viborg[202]	1020	wooden planks	1,000-4,000[203]
Slovakia				
	Bratislava[204]	13th c.	gravel	c. 5,100 in mid-15th c.[205]
Slovenia				
	Piran[206]	1307	gravel/stone	?
Switzerland				
	Bern[207]	1368	stone	3,000 in 1399; 5,000 in 1448[208]

[200] Jørgensen, "Cooperative Sanitation," 553.

[201] Bairoch, Batou, and Chèvre, *La population des villes Européennes*, 66.

[202] In Viborg, dendrochronological analysis done on wooden paving found at the water-logged site point to 1020 as the road's date of construction during the reign of King Cnut. Timothy Bolton, *The Empire of Cnut the Great: Conquest and the Consolidation of Power in Northern Europe in the Early Eleventh Century* (Leiden: Brill, 2009), 166-67.

[203] Plausible statistics for very early medieval populations are hard to come by, but using information gathered from a medieval cemetery in use between 1100 and 1523 give an indication that the city at its height contained 4,000 individuals. Viborg was larger than average cities of medieval Scandinavia but it can be safely assumed that around 1020 when its first wooden streets were recorded its population was likely not more than 1,000. Hans Christian Petersen, Jesper L. Boldsen, and Richard R. Paine, "Population Relationships in and around Medieval Danish Towns, in *Urbanism in the Preindustrial World: Cross-Cultural Approaches*, ed. Glenn R. Storey (Tuscaloosa: University of Alabama Press, 2006), 112-14.

[204] Baxa, Peter, ed. *Bratislava mešťana Wocha: 1242-1291 – Katalog expozície* (Bratislava: Pallas, 1991), 14, 54.

[205] *Das Pressburger Protocollum Testamentorum, 1410(1427)-1529*, vol. 1, ed. Judit Majorossy andKatalin Szende (Vienna: Böhlau, 2010), 29.

[206] Piran's city statutes of the year 1307 include provisions for the regrading of street level and surfaces as cultural build-up and continuous reapplication of gravel raised the road level high enough that overtime it rose above the houses's lining either side and caused run-off to inundate the homes leading to complaints and resurfacing of the roads. Such complaints occurred only after considerable build-up of the roadway and it is thus likely that the roads in question had been laid with gravel or stone a number of years before the statute was issued. Zupki and Laures, *Straws in the Wind*, 54, note 58.

[207] In Bern, textual references to paving first appear in 1368. Ptasnik, "Towns in Medieval Poland," 28.

[208] Bairoch, Batou, and Chèvre, *La population des villes Européennes*, Russell, *Medieval Regions and their Cities*, 62.

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M E D I U M A E V U M

Q U O T I D I A N U M

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KREMS 2016

HERAUSGEGEBEN
VON GERHARD JARITZ

GEDRUCKT MIT UNTERSTÜTZUNG DER KULTURABTEILUNG
DES AMTES DER NIEDERÖSTERREICHISCHEN LANDESREGIERUNG

niederösterreich kultur

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Inhaltsverzeichnis

Vorwort

Das vorliegende Heft von *Medium Aevum Quotidianum* enthält zwei umfangreichere Aufsätze, welche sich mit verschiedenen Themenkreisen auseinandersetzen, die für den Alltag mittelalterlicher und frühneuzeitlicher Menschen ausgesprochene Wichtigkeit besaßen. Beide Beiträge beschäftigen sich mit Lebensverhältnissen im urbanen Raum, welche eine entscheidende Rolle für die Ausgestaltung des Lebens der städtischen Einwohner spielten.

Leslie Carr-Riegel untersucht die Entwicklung der verschiedenen Formen von Straßenpflasterung und kommt dabei zu Ergebnissen, welche deutliche regionale und kommunitätsgebundene Unterschiede zeigen. Dagegen widmet sich Helmut Bräuer der Edition und Analyse einer Quelle, welche eine Station des Lebenslaufes der Menschen im frühneuzeitlichen sächsischen Zwickau entscheidend beeinflusst haben dürfte: der städtischen Hochzeitsordnung von 1541.

Beide Untersuchungen vermitteln hiermit Einblicke in das Verhältnis von Norm und Praxis sowie in die Möglichkeiten, welche sich für städtische Kommunitäten ergaben, um den urbanen Raum in einer Weise zu gestalten, welche positive Auswirkungen auf die Lebensgestaltung hatte oder haben sollte. Dadurch sollte auch das Bild der Stadt für die eigenen Bewohner und für Fremde zum Guten hin beeinflusst und die Verwirklichung des Leben in der Gemeinschaft angenehmer, reibungsloser und „schöner“ werden.

Gerhard Jaritz