

# Transforming water infrastructures in Amsterdam and Utrecht, 1860-2000: power relations, social functions and urban identities

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## Abstract

*The paper analyses how the canal infrastructures in Amsterdam and Utrecht, in size the first and the fourth city of The Netherlands, were transformed under the influence of changing preferences and values of the actors involved against the background of the industrialisation and rapid growth these cities experienced after 1860.*

*An important element in the transformation process was the rising concern on public health in these cities; especially the cholera epidemics were very instrumental in this respect. From the 1850s on in both municipalities the flushing of the systems was improved and gradually parts of the urban water infrastructure were covered. Requests by well-to-off residents to fill in the canals at their doorsteps were occasionally honoured. Overland gutters, ditches and minor and sometimes even main canals were replaced by sewers and in Amsterdam a new outlet with steam-driven pumping station at the edge of the estuary IJ was constructed. Also measures were taken to lessen the pollution of the canal water. Instead of sharpen the existing regulations the authorities had new systems installed to transport faeces and household waste out of town. Amsterdam was the only city worldwide where the pneumatic Liernur system was put into place on large scale.*

*These systems operated separately of the sewer - canal system, aimed to transport surplus water out of the city. Only after 1900 systems conjoined in Utrecht and Amsterdam, but without many consequences for the structure of the canal system. Due the construction of integrated sewer was so much delayed, canals could not be missed as means to transport wastewater.*

*The rise of the overland traffic with the extensions of the cities, the growing importance of railway transport and from the twenties on the growth of the volume of motorcars put much stress on the existing canal system. Canals seemed for urban engineers and others space that could relatively easy turned into a location for tramway tracks or traffic lanes. It was especially the construction of the municipal electrical tramway from 1900 on and the rise of motorcar in the 1920s that put the survival of the canal system at risk.*

*Interesting, in reaction to this threat old and newly established cultural organisations stressed the linkage of the canals to the identity of the city and advocated their conservation. The growing leisure and tourist function of the inner city underlined their point of view as the marvel of the population at the lighting of the canals in 1930 during the so-called Edison-week and the success of canal cruises showed.*

*The blockade of the 1954 Kaasjager proposals and the consternation about the scheme published in Utrecht to transform the canals bordering the inner city into a ring shaped highway, was evidence the view that canals were important carriers of the urban identity became dominant.*

## Introduction

The canal structures in Dutch cities and the changes they went through the nineteenth century and twentieth century can be viewed in this way. Functional aspects, power and cultural values are all mirrored through these canals. Canals were multi-functional infrastructures meant for transportation, water supply and many other functions. In the nineteenth and twentieth century under the influence of industrialisation, urbanisation and the laying-out of new fresh water supply facilities, integrated sewers systems and new rail and road infrastructures their functions changed and their appearance transformed. Functions got mixed up or separated and infrastructures of different kinds got conjoined. In some cases they disappeared all together and were replaced by overland connections.

## Urban infrastructures

In the nineteenth and early twentieth cities were provided with new infrastructures like fresh water systems, sewers, streetcar networks, telegraph and telephone systems and electricity and gas networks. The networked city seems a side-product of the Industrial Revolution (Dupuy and Tarr, 1988, xiii). The functioning of these systems in close proximity of each other, lead in some occasions to a certain conjunction of systems and functions. The stimulant of the emerging fresh water systems to decide to build a water-carriage sewer system for example is well documented. (Tarr, 1996, 116-117; Houwaart, 1993, 91; Van Zon, 1987, 113-125). This article strives to build upon this insight. It will analyse the development of existed canal systems in Amsterdam and Utrecht in relation to the development of relevant sanitation and transport networks and will pay special attention to the degree the canals and the new systems and networks got conjoined.

The inspiration for this focus is derives partly from the intern logic of the character of the canals and partly from the notion 'Innovation Junction' used by different scholars of the Dutch project Technology in the Netherlands in the twentieth century (De Wit et al, 2001).

A second layer of the article is the relation between these types of infrastructure and formulated urban identities. The introduction of new sanitary systems should be seen in the light of the discussions on public health and ways to avoid cholera and typhoid epidemics in the second half of the nineteenth century (Tarr, 1996; Melosi, 2000). Values about cleanness and tastefulness played important roles in the development of canal systems as well. The transformation process the canals underwent, is related to the growing critique at the traditional means to transport faeces, waste water, street- and house hold waste out of the city, but can be understood as a part of a drive for more beautiful and respectable public space as well. At the other hand these canals also element to construct values of urban identity.

## Canal cities at 1860

Canals do have a strong obduracy and a strong image. Foreign visitors of the Dutch cities round 1860/1870 were fascinated by the Amsterdam with its broad and narrow canals bordered with narrow three to five floors high houses and steep stone and wooden bridges (Wagenaar, 1998; Kooy, 2004). Apart from some relatively minor changes, its urban structures still strongly bore the imprint of its medieval and

seventeenth century main structure of canals, bridges, quays and market squares. Due to demographic and economic stagnation Amsterdam hadn't expanded beyond its former seventeenth century city walls up to 1865; the inner city was all there was. In Utrecht in size the fourth city of the country the same situation existed.

The canals were the backbone of the urban infrastructure and had a strong multi-functional character. They were not only used to transport staple food; fuel and commercial goods of high value into the city, but also to transport refuse water out of the city.

The first canals were dug in Amsterdam in the fourteenth century; the main canal in Utrecht – Oudegracht – is even two centuries older. In the seventeenth and eighteenth century the construction of canals was practiced to structure urban extensions with the half moon-shaped canal-zone of Amsterdam as its most famous example (Taverne, 1978). City building structured by canals could also be found in parts of Belgium, Northern Germany and Northern Italy, but it was in the Netherlands the method was developed most fully. The canal structure of St. Petersburg was based on the Amsterdam prototype, as were for example Dutch colonial cities as Batavia (Jakarta) and New Amsterdam (New York).

The Amsterdam canals got their water from a fine maze of ditches, small streams and the river Amstel. This river formed the core of the Amsterdam canal system, flows through the centre under the names Damrak and Rokin. The city could regulate the level of the canals by operating locks up-stream at the Amstel of and down-stream towards the harbour estuary the IJ (Heinemeijer, 1987, 65). Utrecht was able to control the water masses in its canals in a same mode: it owned locks at the twelfth-century canal between the city and the Rhine and owned several locks downstream the river Vecht as well (Van der Lugt, 1939). Part of the canal systems in both cities were also the existing gutters at street surface and underground sewers leading from houses meant to transport the refuse water into the canals.

The canal water was used for different household functions, – in poorer areas it was even used as drinking water – and for industrial purposes. Most of the urban drinking water came from wells; also rainwater was collected for human consumption. Sugar refineries, breweries and other industries used the canal water for their production process.

With the rise of the population since the middle of the nineteenth century many pumps were constructed, and big quantities of drinking water were transported from outside the city. Much of the well water in Amsterdam was brackish due to the proximity of the Zuiderzee. The quality of the drinking water of the wells and pumps in Utrecht was slightly better due their location on higher lying sand grounds and exported to Amsterdam as well by barge. In 1851 and 1852 a private firm constructed with British knowledge and capital a pipeline to bring in water pumped up at the Kennemer Dunes to the city, which came into operation in 1853.

In Utrecht where the available drinking water was much better, a system for the supply of piped-in water was only started in 1883. The construction of these drinking-water systems did not have many consequences for the canal system; its network was laid out beneath the street surface beside the infrastructure of the urban gas works existed since 1842, and the amount of water consumed stayed modest.

## Canal system under stress, 1860-1890

Up to 1851, when a new law on municipalities became effective, the maintenance of the canals and its quaysides had been the responsibility of the people living along the canals and using them. In the fifties this responsibility shifted to the municipality (Otten, 1851). In 1850s municipal apparatus for public works came into being and the city government started to look after the canals and quays itself.

In October 1856 the Amsterdam City council approved a proposal to fill in the Goudbloemgracht in the Jordaan, a poor seventeenth neighbourhood in Amsterdam consisting eleven canals and their side streets. When the filling in was completed a year later the inhabitants of the new street that was constructed at the spot of the filled-in canal celebrated the event with flags hanging from every house and a big party with music and speeches (Van Rooijen, 1995, 14). In word and song they expressed satisfaction with the disappearance of the canal with its ill maintained camp shot and smelly water. They praised the disappearance of the smell of the canal. For the inhabitants of Goudsbloem canal the smell was not only a nuisance, but a danger to their health as well.

The local elite and the city council, up to 1896 only well-to-do inhabitants could vote for it, shared this feeling. The fear of miasma's spread by dirt and waste especially was widespread. The doctor J.A. Kool warned in a pamphlet titled *Goten en riolen* (Gutters and sewers) against for the miasma's hanging round the canals at summer. (Kool, 1859) J.G. van Niftrik reported in 1864 when he moved to Amsterdam to become the head of the urban Public Work department on the dirty state of the Amsterdam street, canals, sewers and gutters and complained that it was hardly possible for him to go around in some parts of the inner-city due to the heavy smell that almost made him unconscious (Van Niftrik, 1901). When one examines the local newspapers of the time and the requests sent by burghers to the city council, one gets the impression that the discontent of Kool and Van Niftrik was shared at least among the educated layers of the population.

In the decades after 1860 the quality of the water in the canals was quickly deteriorating due to the increase of population and industrialisation, and the existing systems of transport household waste and human faeces collected in cesspool pits out of town by scavengers were under stress under the influence of the increase of the population within the existing city.

But I would argue that a sharpened consciousness about the sanitary conditions in the city was the most important factor in the process. Physicians as Kool and engineers like Van Niftrik were well aware of the theories formulated by the British sanitary movement, stressing the relation between the condition of the urban environment and the poor health and low life expectation of big parts of the population. With their reports and publications they introduced these insights in the Netherlands. (Houwaart, 1991)

In every bigger Dutch city doctors, lawyers, engineers of layman asked attention for the alarming sanitary situation, in Utrecht also the likes of Kool and Van Niftrik could be heard. Gremials of their discussions were national journals as *De Economist*, but a lot of energy was focussed on local organisations. They established local associations and became key-members in the municipal committees for public health established in Utrecht, Amsterdam and most big cities from the 1850s on. Data were collected on the relation of the public health and state of the urban environment (Houwaart, 1991).

Cholera epidemics opened the eyes of many. Illnesses like typhoid or TB occurring on a regular base did not spread the shock felt by contemporaries when a cholera epidemic struck. The irregular appearance and the sudden and cruel death of its victims struck the imagination. Especially the epidemic of 1866 with its

extraordinary high number of deaths made the urban elites and city officials willing to invest to solve the urban sanitary problems. A report of the Amsterdam cholera committee in 1867 pointed to shortcomings in the organisation of the waste collection and the untidy streets and extremely dirty canals (Report Municipal Cholera Committee, 1867). Under the influence of this type of reports, the Amsterdam city council decided in the seventies to organise a municipal slaughterhouse, to start a municipal sanitation department (instead of letting commercial firms do this task) and many more, to prevent the environment and the canal water of getting polluted more severely (Van Zon, 1993). In Utrecht the same development could be seen.

## Collection of faeces

The transportation of faeces out of town was of the highest importance in the eyes of the city officials. Following the local boards of public health, the officials started to look for alternatives for the cesspools, they suspected to pollute the soil and the canals.

In 1869 the Amsterdam Public Works engineer Van Niftrik travelled to London to get firsthand information on the London Main Drainage that was operating in the British capital to transport rain, wastewater and faeces downstream into the river Thames constructed since 1858. Van Niftrik was informed by responsible engineer J.W. Bazalgette and was impressed very much by the London system (Van Niftrik, 1901; Jager, 2002). Great Britain was the example for Dutch engineers looking for concepts on the field of sewer and fresh water systems. The periodical *Bouwkundige Mededelingen* published in the late 1860s several articles on systems operating in London, Cheltenham, Coventry and other British cities.

The London system inspired Van Niftrik immediately to draw an integrated sewer system for Amsterdam with egg shaped sewers and steam driven pumps. In 1870 he published a proposal to construct such a system to replace the existing cesspool, gutter and canal network, part of his proposals was also the filling in of ten central located canals (Van Niftrik, 1869).

The majority of the Amsterdam city council did not accept the arguments of Van Niftrik and others to follow the London example. The council considered an integrated sewer system as too expensive and unnecessary. For the majority of Amsterdam people water closets, a necessary element of the water carriage system would be too expensive in use due of the amounts of water needed. The officials decided to maintain the canal structure and to build a new outlet to the estuary Zuiderzee with a steam driven pumping station to refresh the whole content of the system every night.

To transport faeces out of the city, the council instead decided to apply different systems. In the inner city cesspools were maintained and to prevent inhabitants in poor neighbourhoods as the Jordaan throwing their faeces in ditches or canals, 'fosses mobiles' were introduced, in the new quarters the Liernur system would be introduced.

Charles Liernur, a Dutch born military engineer who served during the American Civil War in the Confederate Army, proposed his concept the Amsterdam officials in the late 1860s. His system contained the construction of a pneumatic system to transport the faeces to stations, from where it would be transported to processing factories. There after it could be sold as fertilizer to farmers and market gardeners. Liernur predicted the municipality could make profit in this way. Besides this pneumatic system for the collection of dung, Liernur proposed the construction of separate underground sewers to transport wastewater (Liernur, 1873 Liernur, 1876).

The Amsterdam city council decided to experiment with his system in 1872 in a district in the inner city – around the Looiergracht - where a small canal was filled in. At the spot a sewer for rain- and wastewater was constructed next to the pneumatic pipes of the core of the Liernur system. The experiment drew visitors from all over Europe, especially from Germany. The experiment was successful enough to be continued and a few years later the council decided to introduce this system in most of the new parts of Amsterdam (Buiter, 2004).

From 1874 on the Liernur system was step-by-step expanded, until in 1900 more than 120.000 people were connected to the network in a broad ring round the inner city.

That it was constructed outside the inner city was not odd. The old part of town was so densely built that it would have been impossible to find space for the pipes of the Liernur system. In most parts of the inner city the privy-cesspools remained operational, although the city council regulated the use of these cesspools more strictly than before and the use of the water closet was strictly forbidden (Siewertsz van Reesema, 1902).

In Utrecht where the possibilities to flush the canals were better than in Amsterdam due its location on the river Vecht, the discussion on the building of a sewer system only started seriously in the 1890s when the industrialisation and population growth increased. In 1876 just like in Amsterdam fosses mobiles were introduced, and in the inner city cesspools were maintained. Proposals by the head of the Public Works department to introduce the Liernur system and a separate water removal were not approved by the city council that considered them too costly (Tempelman van der Hoeven, 1889). The council also considered the existing privately owned medieval quay – canal structure in the inner city as a too big obstacle for the implementation of the system. The politicians decided to improve the capacity of the locks regulating the Vecht instead (Van der Lugt, 1939).

## Highdays of the filling in

The introduction of the new sanitary systems was not having consequences for the canals per se. In Utrecht only ditches and a few side-canals were filled-in and street gutter replace by sewers leading to the nearest canal. Stronger even, the introduction of these new systems to collect human was partly meant to avoid this substance entering the canal system.

Meanwhile from 1856 on in Amsterdam gradually tens of canals were filled in. Most were filled in on the requests of people living at the canals complaining about the dirt and the smell round the water. The council rewarded not every request. So was for example the proposal to fill in the Prinsengracht, one of the major and now famous canals of the seventeenth-century extension of Amsterdam, was halted by the middlemen who convinced the officials successfully that they needed the canal for their trade.

There was no grand scheme behind these fillings in, at least not in the beginning. Only in the 1870s two plans of filling in a big number inner city canals were drafted, one on the refreshment of the Amsterdam canal water, the other one on the ways to improve the municipal street system. But the decision-making continued to seem ad hoc and its outcome depended on available coalitions or coincidental circumstances.

The sanitary argument was always around in discussions on the canals, but the rise of overland traffic was always another motivation. A major component of the economic take-off of Amsterdam was the completion of the North Sea Canal in 1876. This canal gave the city a direct link with the North Sea, a connection that made it possible for it to become the commercial trading centre for products from the

Dutch East Indies. The erection between 1876 and 1889 of a new central railway station on an artificial island in the harbour estuary IJ in front of the main entrances of the Amsterdam canal system made it more complicated for bigger ships to enter the canals. To accommodate the growing number of bigger and large ships, a new extension of the original harbour east of the city, the Oosterdok, was built in the same period. The construction of this dock was the first step in the process of the separation of city and harbour, which was completed in the following seventy years. In spite of the construction, market ships, fishing boats and barges carrying coal or staple food were still using the canals and quays in the inner city. (Wagenaar, 1990)

The number of handcars, horse-drawn wagons and coaches on the Amsterdam streets was increasing. In this respect the founding of an urban public transport company can be seen as a sign of things to come. In 1872 an omnibus firm (AOM) started to operate. The same firm experimented in 1875 with a horse-drawn tramway from the Leidseplein on the southern edge of the city via the Dam to the newly built plush residential quarter of the Plantage.

The extension of the tramways in the early eighties required the narrowing of the water of the Damrak and Rokin to make space for the tracks. That the company was willing to pay for the alterations in the urban structure, made it easier for the city government to go along with the proposals.

In the same period the city council discussed plans for filling in the Spui and the Nieuwe Zijds Voorburgwal to improve overland connections with new middle and working class areas west of the inner city and to better the connections with the planned central railway station. In the rhetoric the coming world exhibition hosted by Amsterdam in 1883, played also an important role. (Josephus Jitta, 1883) The advocates of filling in brought up the deteriorating water quality as well. They argued that the replacement of the canals by sewers would improve the sanitary situation. Businesses and individuals dependent on these canals for transportation objected, while artists and intellectuals argued that filling in these canals would ruin Amsterdam's cityscape. The proposals for the Nieuwe Zijds Voorburgwal were the marker of the emergence of aesthetic argues in this type of discussion. In an essay called Amsterdam and Venice the famous Dutch architect Hendrix Peter Berlage agitated against the proposals, he claimed that the canals were a major asset for Amsterdam and an important element of the identity of the city (Wagenaar, 1998).

Notwithstanding these arguments the Amsterdam city council voted 19 to 16 in favour of the proposal. An important reason was that the members of the council felt that filling in the canals would save a lot of money in the long run compared to the everlastingly costly process of maintaining the quaysides and bridges. (Municipal Publication Amsterdam 1883 II, 741)

## **Aesthetic argumentation and new functions, 1900 -1940**

Aesthetical arguments were also heard when the filling in of the Warmoesgracht and the Rozengracht were discussed. But these arguments were not strong enough to halt the transformation of both canals into a tramway route from urban core round the Dam to the western extensions. As a result in 1896 the Raadhuisstraat was opened, one of the very new traffic arteries in the Amsterdam inner city designed in a lavish way (De Groot, 1983).

Plans to create a similar route between the city centre and the new quarters south of the inner city by filling the Reguliergracht met stronger opposition. When in 1900 a draft plan on the structure of new municipal electrical tramway network was leaked the filling in of this canal was heavily attacked. Painter Jan Veth wrote a passionate defence that got much publicity and drew much support from the public

opinion and from several historical organisations established in this period (Meijer and Veth, 1901). According to Veth, the Reguliergracht was one of the most typical Amsterdam cityscapes.

The proposal was withdrawn, but was picked up again seven years later by two members of the city council looking for a possibility to locate a new main tramway route through the southern part of the inner city. Also this try was in vain. In fact it provoked the city council to decide that the canal with its old style seventeenth century, round brick bridges was a very valuable part of the cityscape. The council accepted a plan to restore its bridges and quays.

In the literature on the urban conservation movement in the Netherlands the case of the Reguliergracht is often assumed to be the turning point in the politics on historical cityscapes. (Meurs, 2001; Wagenaar, 1998) The discussions are significant at least in the respect of the emergence of a coalition of cultural and historical organisations advocating the historical and cultural value of the built-up environment of the Amsterdam inner city. The rise of the coalition can be seen as a reaction to the rapid modernisation process in the Amsterdam inner city under the influence of industrialisation and city forming.

At the other hand the case of the Reguliergracht did not mean that the municipality established a policy to safeguard the canals. After the rejection of the Reguliergracht plan in 1913, a proposal was put forward to transform a parallel canal, the Leidsegracht, into a main route for overland traffic. When also this plan was turned down, the adjoining Vijzelgracht became the target for the urban engineers (Meurs, 2001).

In the twenties the impulse to create a new broader traffic artery in southern direction through the fringe in the inner city was felt. Up to the First World War facilitation of the municipal tramway was the main objective for proposals to fill in central canals, from the twenties on the motivation for these kinds of projects was based on the rise of the urban automobile traffic.

In the middle of the twenties the department of public works came forward with a scheme to construct a new traffic artery by filling the Vijzelgracht and the Rokin, to connect the new southern quarters with the Dam. Opposition from trade- and businessmen depended on water transport, and a coalition of cultural and historical organisations led the city council to order the engineers of Public Works to draft a traffic plan to underpin their scheme.

In 1930 the newly established urbanistic department organised Amsterdam's first comprehensive traffic survey. On the basis of the gathered numbers the department sketched a new traffic plan, in which the proposed traffic lane Vijzelgracht – Rokin figured prominently. The scheme – the first integral traffic plan in Amsterdam since 1873 - stated that it would be not possible and not advisable to adapt the whole inner city to the needs of the motorised traffic, but advocated the reconstructing of a selection of the streets and canals to build a so called city-ring to guarantee the accessibility of the modern centre city developing around the Dam (Meurs, 2001).

When the council made its first decision on the future of the Rokin in 1931, a demonstration of trucks organised by the association of truck-owners advocated the filling in of the canal. Also the association of the shop-owners of the posh Rokin was a loud propagandist of the proposal. It was since its foundation in 1895 a strong supporter of the idea to abolish the canal and to construct a boulevard at the spot instead. It offered the municipality in 1913 even to subsidise a filling-in (Veertig jaar buurt en stadsbelang, 1935). The Amsterdam historical associations and numberless cultural organisations approached the city council trying to convince it, not to support the proposals. Notwithstanding this, the city council decided in 1936 to fill the biggest part of the canal. For reason of water management and to accommodate the opponents

of the filling in a third of the canal remained unaltered (Municipal Reports Amsterdam 1930, 1931 and 1936).

The reclaimed space was used to widen the traffic lanes at the spot and to construct a big parking lot. Although making space for the private automobiles was the main motive for transforming the Rokin, another argument was the poor water quality. The poor water quality was partly due to the stagnation of the Rokin water as a result of the partial filling in and narrowing of the Damrak earlier.

In the same period a water carriage sewer system was introduced in the inner city; the cesspools and the fosses mobiles still in use were gradually abolished. The laying of sewers did not force the engineers to fill in all canals. To fill in was optional, not coerced, in this respect.

When the Amsterdam city council decided in 1906 to replace the Lierneur system by a water-carriage sewer system under the influence of the rinsing consumption of drinking water and the spread of the water closet, it maintained the Singels the half moon shaped set of canals bordering the inner city. The main sewers to transport the wastewater and faeces of the new city-parts to the Zuiderzee were placed in these canals (Bos, 1915). When the municipality decided to construct an integrated sewer in the inner city also, it maintained the big majority of the inner city canals where it located the sewers. Just like in Utrecht integrated sewer systems were not completed until the late 1980s.

The Philips concern initiated in 1929 in Amsterdam a so-called 'Edison week', to promote modern electric street lighting and illumination in American fashion. At the dazzling amount of lamps and lights operated during the festival week stressed the centrality of the axis Central Railway Station – Damrak – Dam. During these festivities organised by the Municipal Power Company to commemorate the development of the incandescent lamp fifty years earlier, the Damrak was the brightest lit of all public places. The event resembled the 'Great White Ways' constructed in cities in the United States. The aim of this manifestation was to stimulate the consumption of electric light. It was modelled on the same type of manifestations organised in the United States earlier that year. On the Dam an electrical lit Edison monument was erected that drew many spectators.

Canals were lit as well and canal tours were organised to marvel at the historical beauty of Amsterdam. Surprisingly enough it was the lighted canals that got most publicity. The event highlighted the presence of the historic canals, bridges and seventeenth century canal houses and underlined the identity of Amsterdam as a historic, water orientated town.

In the thirties canal cruises on the Amsterdam canals started to operate regularly in boats modelled on touring cars introduced in the same period. Cruises in this type of boats were a big success and drew large number of visitors. In the middle of the 1990s every year two million people made a canal cruise. The flourishing existence of the cruise boats gave a new stimulus to keep the canals in Amsterdam open.

## Lords of the ring roads

Questioned by the Amsterdam city officials in 1954, how to accommodate the rising amount of motorised traffic after the Second World War, the police constable H.A.J.G. Kaasjager suggested to fill in most of Amsterdam's canals. When Kaasjager's ideas were leaked to the press, a gulf of protests emerged and the Amsterdam newspapers were full with angry complaints. The social-democratic paper *Vrije Volk* organised a demonstration with canal cruise boats in which six thousand people participated (Banning, newspaper cuttings; Rooijendijk, 2004). In this climate the city officials withdrew their support for the

police constable and published a report on the future of inner city in 1955 that stated that no major adaptations to the inner city structure could be made without damaging the valuable historical cityscape.

Amsterdam was the only Dutch city where plans to offer canals for road building were resolutely rejected in the 1950s, by public opinion and urban politicians. It not a wild guess that the unusual strong reaction towards the ideas of Mr. Kaasjager was provoked by the experiences with the filling in of canals in 1880 – 1940, and was influenced by the building up of the cultural valuation of these canals in this period.

Amsterdam was not the only city where the problem how to adept the existing urban infrastructure, leads to a somewhat painful discussion. In Amersfoort, Alkmaar en Woerden proposals were put forward to fill in central canals, as parts of urban centre and traffic plans that were drawn in reaction to the rising tide of automobiles after World War Two. In all three cities these plans provoked fierce debates and strong opposition (Buiter, 1992).

In Woerden in 1961 the central canal (part of an old course of the Rhine) was filled in. In Alkmaar and Amersfoort the core of these schemes was to fill in the canals bordering the inner cities, to create ring road at the spot. The concept of ring roads to distribute the urban traffic was already part of the process of drafting urban plans since the twenties.

In the fifties many municipalities started to implement these artefacts. The ANWB (the Dutch tourist organisation) played an important role in this process. In Amersfoort in the late fifties a ring road was constructed half built at the spot of the filled-in urban moat, the other half of the moat – where its medieval walls and towers bordered it, was spared. In Alkmaar in the sixties the city council scraped after opposition from parts of the population, the proposal of urbanist Wiecher Bruin to replace the city moat by a ring road.

Also in Utrecht the urban officials asked the ANBW an advise on how to adapt their city to the expected increase of motorised traffic (Buiter, 1992). The ANWB advised the mayor of Utrecht to contract the German traffic engineer M.E. Feuchtinger. The city council followed this recommendation. Feuchtinger studied the existing urban traffic plans, organised a comprehensive traffic survey in the city – the first ever in Utrecht – and delivered in October 1958 a set of proposals. Traffic engineering was at the time in the Netherlands a still unknown specialisation and Feuchtinger was one the leading international experts in the field. According to the municipal PR office his work had an ‘American flavour and quality’. The fact was that the German traffic engineers, who rose to prominence in the fifties against the background of the reconstruction of the bombed German cities, were heavy influenced by American traffic engineering, a specialisation flourishing in the states since 1930 (McShane, 1999).

When the Utrecht traffic plan of Feuchtinger was published in November 1958, it drew much attention of the national press and caused a shock in Utrecht. Many of its inhabitants were horrified that Feuchtinger advocated the construction of a ring road in highway style at the spot of the urban moat and that the urban officials agreed. Within a few days a protest committee was established with the Dutch writer Jan Engelman at its head and painters, a sculptor and a notary in its board. The committee collected a few thousands signatures against the proposal, organised a protest meeting and published a booklet. Student associations organised a protest demonstration attended by a few thousand students along the to be filled-in urban moat. At the canal in front of the city hall they placed dolls with the faces of Feuchtinger and the mayor – responsible in the city council for the traffic politics – at the gallows.

Under this pressure, the majority of the city council was not willing to accept the filling in to construct the projected ring road. After long discussions in December 1959 it decided to hire an urbanist to study

alternatives. The result was that in 1962 the council decided to fill in half of the moat as a compromise. A few years later under the influence of the minister of culture – who considered it as a A-classified monument - this was reduced to a quarter of the moat.

The municipality only got the permission of the national government to do so, due to an agreement it had reached earlier with a building and real estate development firm to develop a huge shopping mall annex office centre, between the ring-road and the central railway station. This real estate development was triggered by the design of the ring road in 1962, and was now in 1968 the main reason to get the green light to realise at least a part of this highway. But the linking parts were never built (Buiter, 1992).

## Recreating canals

In the 1970s neighbourhood activists, politicians and urban historians frequently advocated to re-introduced water in some of the filled-in canals. Activists striving for a renovation and gentrification of their quarter dug one smaller canal in the neighbourhood of the flea market Waterlooplein again. But there was no political will in the Amsterdam city council to finance the reconstruction of more former canals. Only very recently the council for the inner city promised in reaction to a campaign by the association *Vrienden van de Amsterdamse binnenstad* (Friends of the Amsterdam inner city), to recover one former canal in the Jordaan. Constructing a parking garage at the spot will compensate motorists. There is talk of recovering more former canals in the coming years. (De Vries, 1996)

In Utrecht the municipality financed in 2001 a reconstruction of a big part of the former outer moat of the city. A part of the contested ring road was given up; water is flowing again where during 25 years an urban highway had been functioning. The remaining part of the filled-in moat is yet to reconstruct, this is linked to (and depended on) a projected reconstruction of the adjoining shopping centre Hoog Catharijne.

In both cities the drive towards the reconstructing the once filled-in waterways was not inspired by the wish to reconstruct a lost cityscape, but mostly inspired by the wish to improve the urban environment or, in other words, push back the role of the private car in the city.

## Conclusion

The transformation of these canal systems was uneven in time and in scope. Under the influence of sanitary motivations from 1860 on well into the twentieth century part of the canal-systems in both cities were modified. The core of these systems survived, although feeding infrastructures as gutters, ditches and even many side-canals were covered or replaced by sewers.

In the case of the covering or filling in of the more peripheral links of the systems, the wish to improve the sanitary situation in the city was always the dominant motivation. The costs of maintenance also played an important role. When main canals were filled in, the motivation was mostly motivated by the wish to improve the flow of overland traffic as well, although the sanitary card was played in many cases as well. With the laying out of the municipal electrical tramway system and the rise of urbanites plying down the streets on bikes or in cars, the wish to offer canals to accommodate overland traffic can easily be understood.

The waning of the sanitary argument is perhaps more puzzling. Up to the beginning of the twentieth century the inhabitants living at canals continuously complained about the nuisance of the smell and dirt. The founding of neither the municipal cleansing department nor the introduction of the fosses mobiles or

the Liernur system seemed to have made a big difference in this respect. At the other hand, one got the impression that for urban technicians the sanitary argument was less pressing, after the implementation of the new sanitary waste removal systems and the start of the new system to flush the canals every night in the IJ.

The implementation of integrated sewer systems seemed not to have played an important role in the later waning of the sanitary discussion at all.

In the course of time the canals were esteemed by a growing part of the population as a valuable asset. I would argue that the memories of the struggles to keep canals as the Reguliergracht in Amsterdam and the Singels in Utrecht open, were instrumental in the articulating the values of these canals and creating a broad support for their safeguarding. The emerging canal cruise boats in the thirties (and their success) and the prominent place of the Amsterdam canals in the light of the Edison week in 1930 underlined this process, thus explaining the resolute reaction to the Kaasjager proposals. In Utrecht this valuation of canals came later. Here the same kind of collective awareness only emerged with the implementation of Feuchtinger traffic plan.

The design of water infrastructures was not only coloured by the existing preferences and values, but in the course of this period these canals got connected with notions of urban identity as well. They could even become a central focus point for urban politics as the case of the canals bordering the Utrecht inner city showed. The Amsterdam canals these days are even urban icons.

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