

# Fire alleys in Finnish urban design

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**Abstract.** *Until the late-nineteenth century fire safety was considered the greatest problem in Finnish wooden towns. At first, masonry buildings were believed to be the solution and greater spaciousness was emphasized for aesthetic reasons. Later, spaciousness was recognized as improving fire safety. The practical goal was to extinguish fires; only later came fire protection through the creation of openings in the urban fabric that were wide enough to prevent fire from spreading. In the first phase streets were widened. In the late-eighteenth century there arose a need to diminish the likelihood of fires and also for experimentation with new methods of making urban structures more spacious. The first fire alleys were planned in the new town of Kuopio. They were an attempt to create in the street-block interior public or semi-public space. In old towns the only feasible solution was narrow fire alleys. They could not prevent fire from spreading, but they made it possible to penetrate into seats of fire in the street-block interior. A new street-block type emerged when the idea of fire alleys was combined with the awareness that deciduous trees could slow down or even stop a fire: one side of the plot was left without buildings to make it possible to plant deciduous trees. In its final form the street block was proposed by the inhabitants and can be regarded as a Finnish invention.*

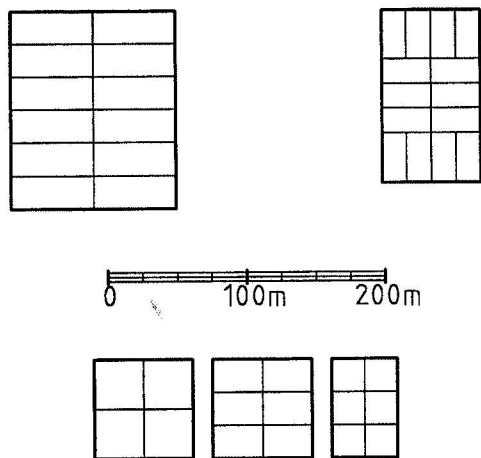
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There is a tradition in Finland of towns built of wood and, from the early-seventeenth century onwards, planned towns. Over a period of 250 years a total of 170 town plans were prepared for 40 towns. The concept of Renaissance ideal cities travelled north through France and the Netherlands. In Finland, orthogonal urban structures resulted: straight streets and rectangular street blocks<sup>1</sup> (Figure 1). The space inside the block was private. The public space outside the street blocks consisted of streets and squares – in small towns usually only one square.

In earlier centuries, urban design and building in Finland developed through trial and error. An architectural idea was turned

into a plan drawing which then was staked out on the site. However, the practical execution often did not meet goals: building practices, materials and building density repeatedly resulted in extensive town fires. These were followed by demands for greater precautions against fires, which were met initially by favouring masonry houses and later by using more spacious urban structures. Spaciousness was sought after at first by regulating street and street block dimensions and distances between buildings, and finally by new planning principles of which the most important was the introduction of planted fire alleys or fire streets.



**Figure 1. Street-block types used in the seventeenth and eighteenth centuries, without fire alleys.**

The terms fire alley and fire street were originally synonymous. Fire alley derives from Finnish *palokuja* and Swedish *brandgång* and fire street from Swedish *brandgata*. The Swedish term *brandgata* is older and was used in Finnish legislation throughout the nineteenth century. It is used regardless of the width of the area. The term *öppen plats* (open place or open area) also appears. The Finnish term most commonly used is *palokuja* (fire alley), though even *palokatu* (fire street) is sometimes used. The narrow fire alleys were without trees whereas the wide ones had trees planted along them. As they were arguably not 'streets' or 'alleys' in the most commonly understood sense of those words, but divided street blocks into smaller areas, a better term in English would probably be 'fire break'. In Finland, the term 'fire alley' or 'fire street' is never used for a wide tree-lined 'normal' street.<sup>2</sup> In this paper 'fire alley' denotes a narrow fire break and 'fire street' a wider one.

Building on a town plot was regulated by the town plan, in which plot boundaries were defined, and by building ordinances. These restricted private building within the plot boundaries, the main building having to be along the street side of the plot with the roof sloping towards the street. Control was concentrated on the street side of the plot – it was concerned with the relation between the street block and the street.

Towards the end of the eighteenth century, the total volume of building was small enough to preclude any general need to restrict building by a single owner. The town controlled common interests and the restrictions were defined case by case, starting with practical factors: functions with a high risk of fire were restricted or prohibited, as was building in such a way as to cause damage to a neighbour. Functional needs determined the amount of free space on a plot. In the latter half of the eighteenth century, when the cultivation of various herbs, shrubs and vegetables began to be encouraged, plot sizes tended to increase.

Fire alleys, to reduce the spread of fire and to help extinguish fires, were introduced in Finland in the late-eighteenth century. Their adoption had been only a question of time. However, certain preconditions were necessary. There was the need for the structural planning of whole towns, a need to diminish the often occurring town fires and the will to experiment with new methods in making towns more spacious. All these existed during the late-eighteenth century. Recognition that a chronic problem had become an acute one, calling for an immediate solution was probably spurred, in 1775, by a fire in the Aningais area in Turku, then the largest city in Finland.

As houses were built of wood, including the roofs, they were extremely inflammable. Fires, which destroyed whole cities once in every generation, were a constant threat in Finnish cities.<sup>3</sup> Well into the nineteenth century, the fire extinguishing equipment was very inefficient. It was nearly impossible to extinguish a fire with the equipment of the time. There were only two solutions: to prevent the outbreak of fire or, through cleverly planned urban structure, prevent a fire from spreading.

Both the inhabitants and those in power considered fire safety the greatest problem in wooden towns. The rulers were also concerned that most towns were poorly built and were insignificant in appearance. They also believed that masonry buildings would be the solution to both problems. However, masonry houses did not become commonplace until the

twentieth century. Bricks were expensive and craftsmen with bricklaying skills were few, whereas wood was available everywhere and nearly every man could build a house of wood. It was necessary to find other means to improve fire safety.

In wooden towns the most important means was to make the streets wider. Supervising the street area was relatively easy and a certain minimum area was left unbuilt, even if the plots became largely built over. However, wide street space was considered too open to conform with prevailing aesthetic values. The alternative of large plots and narrow streets, though spacious in the beginning, was ultimately liable to be far from spacious, since the number of buildings on a plot was not restricted, and building density could eventually become very high. As the division of plots was not prohibited, or the prohibition was not supervised, the result was in fact small plots, which were often fully built over. In such cases fire could spread easily across the narrow streets.

For centuries there had been different types of alleys in Finnish towns, but they were a result of practical needs, opened as shortcuts across street blocks. In the seventeenth and eighteenth centuries there was a judicial difference between 'streets' and 'alleys'. A street was completely public domain but an alley can be compared with an easement. Alleys were created within existing plots. As they were part of the plot, the plot owners could close them at will – which again could prove disastrous when a fire broke out. Alleys were not a part of the planned town structure in the seventeenth and early eighteenth centuries.<sup>4</sup> Only the alleys leading to the shoreline were public rights of way, and had been from the Middle Ages, in order to allow water to be transported.

The late-seventeenth century proposal for a general Building Ordinance did not recognize the concept of the 'fire alley'.<sup>5</sup> Its requirements consisted of 24-ell-wide (14.3 m) main streets and secondary streets or alleys at least 16 ells (9.5 m) wide. If the blocks in an existing town were not orthogonal and the streets were not wide enough, on a suitable occasion, for example after a town fire, they

had to be corrected according to the regulations.

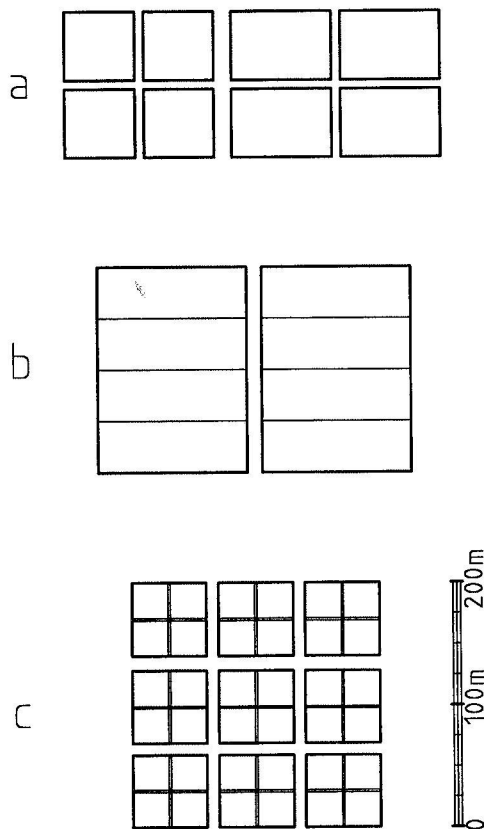
The rules for Stockholm were also occasionally applied in Finland, which until 1809 was the eastern half of the kingdom of Sweden. But the Stockholm Building Ordinances of the eighteenth century did not recognize fire alleys. In cases of fire, streets so narrow that there was not enough room for two carriages to pass each other or to turn around reduced the chances of extinguishing the fire and salvaging property. To correct this, alleys were to be widened, turning places were to be built and new places opened around public buildings. Narrow alleys were regarded as crowded, dark, untidy and generally unsatisfactory. Fires were mentioned only insofar as they were incidents after which plots could be bought so that it became possible to widen alleys. The Stockholm ordinances also stated that it was permissible to open new streets across existing blocks and to form turning places according to need. The rules did not mention at all that the widening of streets or the opening of new alleys would help in extinguishing fires.<sup>6</sup>

### The first fire alleys: Kuopio and Joensuu

The background of urban design in the seventeenth century was in the first place aesthetic, and an important part of the aesthetic character was 'order'. A clearly-structured street network made transporting water easier and thus promoted fire safety. It seems that the importance of spaciousness in improving fire safety was not recognized before the mid-eighteenth century. The dimensions of urban components would hardly have varied as much as they did from town to town, if spaciousness had been the prime aim.

At the beginning of the 1770s it became recognized that it was much easier to supervise the maintenance of public space than to supervise private space. Fire alleys were an attempt to create, in the block interior, such public or at least semi-public space.

The great fire on Aningais Hill in Turku in August 1775 resulted in several regulations concerning the improvement of building practices and the spaciousness of town



**Figure 2. The street-block types of (a) Kuopio, 1775, (b) Joensuu, 1785 and (c) Pori, 1801.**

structure. In this connection the most interesting is the demand by the Chief Architect, Adelcrantz, that main streets should be 24 ells (14.3 m) wide and the alleys 18 ells (10.7 m) wide, 'so that during fires people have enough room to use the extinguishing equipment and that the fire would not so easily spread from one block to another'.<sup>7</sup>

The Turku fire obviously had an effect on the town plans under preparation or designed immediately after the fire. This was the case with Kuopio, where the letter formalizing the town's foundation specified that 'the town should be spacious and its plots regular... [and] the advantages of the site should be used as much as possible'.<sup>8</sup> The Kuopio plan differed from the earlier town plans especially in its dimensions: it was spacious, as demanded by the king. In Finland, Kuopio was the first civilian town where streets of 24 ells (14.3 m) were built. Previously, such a

width had been adopted only in two fortified towns. Even the plots were exceptionally large: at 10 000 sq. ells and 14 000 sq. ells (3526.0 m<sup>2</sup> and 4936.4 m<sup>2</sup>) they exceeded in size all plots planned earlier.

In the freehand sketch plan for Kuopio the street network, the blocks and the fire alleys were shown (Figure 2a). In the final plan the blocks were drawn with a ruler, but the fire alleys were not included. The street width in Kuopio was greater than in the other plans (24 ells compared with 8-20 ells) and could be related to the fact that Kuopio was to have the residence of the provincial governor, but the idea of the alleys must have been a response to the quest for better fire safety, which had become acute because of the Turku fire.

The fact that the fire alleys first appear in the sketch plan and not in the approved plan suggests that it was an idea of the planner. In verbal form the concept was still unknown, as shown by the regulations concerning town structure and town building from the period preceding fire alleys. As the idea was still in the development stage the planner did not want to apply for official approval for it. The fire alley was a designer's idea and needed development before general rules for it could be given. The opportunity came only in the first half of the nineteenth century.

Though fire alleys were originally a part of the plot, they were not closed at their ends with a fence as were the later fire alleys beginning from the 1810s. The 12-ell fire alley made communications easier and thus helped the extinguishing and salvage work in the event of a fire. With open ends, the alleys were probably changed into public passages. Thus the block interiors were 'opened', which made it possible to divide the original plots into smaller parts, and led to a markedly higher building density than originally planned. Consequently, the idea of a more spacious structure was lost.

The next time fire alleys were used in a plan was 10 years later in the new town of Joensuu. As the subdivision of plots had, in the designer's view, become a problem in Kuopio, an attempt was made in Joensuu to avoid this by using a different plot form and block structure (Figure 2b). The deep and

narrow plots (70 x 200 ells or 41.5 x 118.7 m) had their short sides along the fire alley, and the middle plots could thus be divided into only two parts. Dividing plots into smaller parts could be accomplished only along the ordinary streets, assuming that a plot had to have one side or a part of it along a public street or road.<sup>9</sup>

In the Joensuu plan, fire alleys were wider than in Kuopio (20 ells compared with 12 ells), which together with the 40-ell streets would have made the urban structure still more spacious. It is evident that in Joensuu it was intended to use the fire alleys as normal streets from the very beginning. This is further substantiated by the fact that fire alleys were also drawn in the final plan prepared for official approval. In this respect the Joensuu plan was different from that of Kuopio. As the founding of Joensuu was postponed for several decades, these new structural inventions remained untested, and Kuopio remained for a long time the only town with fire alleys.

#### **The narrow fire alleys: Pori and Raahe<sup>10</sup>**

An established custom in renewing urban structure was that a complete renewal was begun only after a town fire, and the possibilities for restructuring in old towns were limited to building ordinances. The scope for widening an existing compact structure through town planning was also limited. For example, the opening of a new street or the widening of an old one, not to mention more extensive changes, usually required the purchase of property. The purchases could be turned down if the inhabitants opposed it or if the necessary compensation was considered to be too great a burden on the town's economy.<sup>11</sup> So structural methods usually met with success only where a town plan could be designed to be spacious enough from the very beginning.

In the renewal plan for Pori in 1801, the square blocks were divided into four plots with a double line (Figure 2c). According to the scale marked on the plan, the distance between the lines was about two ells, and represents a new narrow type of fire alley,

different from those used before. When considering protection against fires, the narrow fire alleys made it possible to penetrate into seats of fire in the street block interior and thus facilitated the task of fire extinguishing. However, it took a long time before they became common. Such fire alleys were primarily introduced into written orders, which were applied when revising old town plans. The 2- to 3-ell (1.2-1.8 m) wide fire alleys were the only feasible solution to the introduction of fire alleys in old towns.

Introduction of the narrow fire alleys is first documented when planning the rebuilding of Raahe in 1810.<sup>12</sup> There is an even earlier mention of a space which could perhaps also be interpreted as a fire alley: the 1807 Building Ordinance proposal for Kajaani prohibits building less than 1.5 ells (0.9 m) from the neighbour's border.<sup>13</sup> Next an order of an obligatory 2-ell (1.2 m) fire alley was included in the proposal for a general Building Ordinance in 1814. Finally, general acceptance of the 2-ell fire alley occurred when it was included in the 1823 Building Ordinance.<sup>14</sup>

From these building ordinances onwards, the ends of fire alleys were ordered to be closed with fences. Without doubt the motive was to prevent everyday use of fire alleys as shortcuts, to avoid them becoming public streets, as had happened in Kuopio. This also made it possible to prevent the formation of new plots in street block interiors, which was contrary to the approved town plan.

The building ordinances prohibited the division of any plot whose boundaries were certified in the approved town plan. However, the prohibition was not absolute, as the town council was allowed to decide case by case. The instruction was that 'both parts of the street front of the divided plot had to be long enough, so that the size of the building built on each of the new plots was in accordance with the site'.<sup>15</sup> As it was generally presupposed that larger houses could be built along wide streets than along narrow streets, the instruction provided reasonable plot sizes, whatever was regarded as reasonable at different times. If fire alleys had become public streets, the plots lining them could have

been divided into smaller parts than plots lining the original wider streets, as the buildings along narrow streets could be small. Thus, by preventing fire alleys from changing into totally public rights of way the division of plots into 'dangerously small' parts was also indirectly prevented. It seems that the specification in the 1823 Building Ordinance that 'between buildings on any specific plot a fire alley of at least two ells (1.2 m) should be provided'<sup>16</sup> applied to all plot boundaries in the street block interior.

### **The growing densities of urban structure**

A plot owner was assumed to have the right to build on his own plot all the structures he needed for his dwelling and for his livelihood. Plot size thus depended on the inhabitant's need for space. Buildings (the dwelling and buildings for livestock and storage) enclosed the yard on at least two, often on all four, sides. If the owner could not fit the required space into one-storey buildings, an approved custom was either to enlarge the plot or to build two-storey buildings. Although a two-storey house increased the scope to exhibit stateliness, a two-storey economy building was the result of a lack of space.

The general population increase in Finland between 1750 and 1800 included a doubling of the urban population. As densities grew, the risk of calamities increased. At the beginning of the nineteenth century, town fires became more commonplace than in the previous century. Plots built up too fully, as shown by several descriptions of the towns of the period, high building densities together with prevailing building practices and materials, and poor means for extinguishing fires were reasons for the great town fires in the early- and mid-nineteenth century. Furthermore, the street width was too small in the towns where the 20 ells already required in the seventeenth century had not been reached or had not been observed. This street width would probably have been enough for fire safety, if the plots had not been filled with so many buildings.<sup>17</sup>

From the beginning the new towns offered better possibilities to build more spaciouly

than in the old towns. Attempts were made to make town structure more spacious by having wider streets and larger plot sizes. This was not always successful. A solution which was both acceptable aesthetically and, at the same time, offered safety against fires was found only after the means were discovered to make the street block structure more spacious – to reduce the total number of buildings on a plot and thus within each street block. This was implemented during the late 1820s, influenced perhaps by the occurrence of a disastrous town fire.

### **The great fire of Turku in 1827 and a new type of fire alley**

During the first quarter of the nineteenth century, significant urban renewal occurred in only eight towns. Towards the end of the 1820s there were still several towns of dangerous configuration: Hämeenlinna, Porvoo, Vaasa, Uusikaupunki, Uusikaar-lepyy, and Turku, the densest of all. Narrow fire alleys were not a sufficient response to the need for the renewal of the urban fabric, which the fires in the beginning of the nineteenth century had proved to be indispensable. The final incentive was the great fire of Turku in 1827.

On the evening of 4 September, 1827, after a lengthy drought, a spark escaped on Aningais Hill, the most densely built area in Turku. Before midnight, several blocks were on fire and the extreme heat gave rise to strong currents of air which developed into a storm wind and, with the help of windmills, blew the fire in several directions. The fire spread across the river and soon the whole town was in flames. The fire lasted nearly two days and destroyed over 2500 buildings. When it was finally over, Turku lay in smoking ruins.<sup>18</sup>

The catastrophe was so total and its reasons so obvious that, quite naturally, fire safety became the most important practical goal of urban design. Reforms were begun immediately. The fire of Oulu, 5 years earlier, was a cautionary example of what could happen if renewal was delayed. The Russian imperial administration had gained experience of how to organize extensive rebuilding after

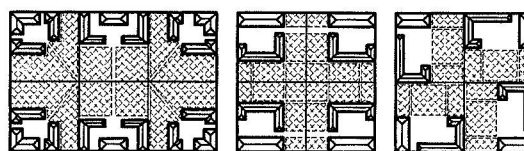
the great fire of Moscow in 1812.<sup>19</sup>

The proposal of the Governor-General for altering urban structure was radical by Finnish standards. The main streets of the re-built Turku were to be 45 ells wide and the side streets 30 ells (26.7 m and 17.8 m). Both were widths almost unprecedented in Finnish towns. The blocks were allowed to be divided into at most four plots, spacious enough to plant gardens between houses.<sup>20</sup>

The most difficult terrain of the Turku area, however, forced the architect C.L. Engel to apply the regulations rather freely. As a result, the apparently simple orthogonal plan actually included a variety of aesthetic features. The structure was based on 30-ell-wide streets (17.8 m) and four-plot blocks close to rectangular shape.

The block typical of the nineteenth-century wooden towns, with one plot side left unbuilt at least 25 ells (14.8 m) wide and planted with trees, was developed during the planning process in Turku, and partly in error. A more spacious structure was naturally the most important goal of the renewal, but the exceptionally large 10 000 sq. ells (3526 m<sup>2</sup>) plot size of the final town plan was a result of an error of 20 per cent in the scale. The explanation for the error is not to be found in the official documents. As winter was approaching and most of the inhabitants had no dwellings, there was no time to lose. So instead of replanning, Engel only corrected the incorrect scale. As the urban structure and the street width of 30 ells remained unchanged, the six largest plot sizes grew 1.5-fold on average and the smallest plots nearly twofold. Already in his original plan description, Engel considered the plots large enough, so that 'a considerable part of them could be reserved for gardens which would ensure that nearly all houses become in a way isolated'.<sup>21</sup>

When making their statement on the proposal, the burghers used the error of scale to make the urban structure still more spacious: 'As the plots are in fact larger than this map shows, we consider that they should be built only on three sides, so that every built-up plot can be reached on all sides. Because of that every plot owner is prohibited from building along the plot line in the block



0 100m 200m 300m

**Figure 3. The model street blocks of Turku (1828). Building a house along a plot boundary was allowed only on the street front. Towards the neighbour's garden a space of three ells (1.8 m) was to be left for digging the foundation, for the falling of rain water etc. Even in the garden, trees were not allowed to be planted closer to the plot boundaries than three ells. The distance of buildings from the other boundaries of the plot had to be at least 12.5 ells (7.4 m). The grey area shows the proposed gardens.**

interior where his neighbour has constructed a building, large or small. The garden which separates every plot should be at least 25 ells (14.8 m) wide or deep'.<sup>22</sup> In the plan proposal Engel had drawn only the division of blocks into plots. The model blocks, with suggestions on how to place the gardens in the block interior, were included only in the final approved plan (Figure 3).

When discussing the vegetation on the plots, both Engel and the burghers used the term 'garden'. 'Planted with trees', which was the description later used in the 1856 Ordinance when the unbuilt plot side was referred to, was proposed by the burghers of Turku as the primary method of treating the hills.<sup>23</sup> The Senate specified 'the vegetation' to be 'deciduous trees'. When discussing Engel's proposal, the Senate added to the plan specifications 'that the house owner is under all conditions obliged in these gardens to plant and to keep deciduous trees'.<sup>24</sup>

The new building ordinance specified the street block structure and the rebuilding committee was to order which one of the plot sides had to be planted. It was to be permanently left free of buildings. The orders were applied to all plots, built with both wooden and masonry houses.<sup>25</sup>

As the street block type introduced in Turku in its approved and executed form was in fact the burghers' proposal, it can be regarded as a

particularly Finnish idea for improving fire safety. Necessary pre-requisites were, however, knowledge and experience of how spacious urban structure and vegetation improved fire safety, and a creative use of opportunities.

The enlarging of plot size can be explained by the fact that wooden houses higher than one storey were prohibited. A similar explanation for enlarged plot size can be inferred in the case of the first plan, though Engel's description that 'the new plots are ... so much larger and more spacious than the old, giving an opportunity to build larger and more regular buildings, which can accommodate the same number of people with better comfort, order and security than the old irregular plan'<sup>26</sup> need not be interpreted quite in this way. The prohibition had little to do with the final plot size, as the correction of scale was done by multiplication. Furthermore, the proportion of two-storey buildings in the whole pre-fire building stock was presumably rather limited.

As the actual plot sizes created in regular street blocks in Turku varied from 10 000 sq. ells to about 6000 sq. ells (3526.0 to 2115.6 m<sup>2</sup>), in his later plans for smaller towns Engel preferred to use a smaller plot size. It is possible that the new townscape of Turku, built with limited funds, was even more dispersed, and more horizontal than Engel and perhaps even the Governor-General had been able to foresee during the planning process. The prevailing plot size became 5000-7800 sq. ells (1763.0-2750.3 m<sup>2</sup>) in approved plans for the other towns. The special small plots planned for some towns varied between 3400 and 4800 sq. ells (1198.8-1692.5 m<sup>2</sup>).

### **Deciduous trees and the new street block**<sup>27</sup>

In comparison with streets, street blocks and open spaces, planned vegetation was a rather late addition to the components of urban design. During the late-eighteenth and early-nineteenth centuries it was still relatively sparsely used. Moreover, as vegetation was placed according to aesthetic principles, it was usually an architectural emphasis with little impact on the total structure of a town.<sup>28</sup> Only

after protection against fires had become the dominant goal in planning in the late 1820s did the number of deciduous trees and gardens grow and take on structural importance.

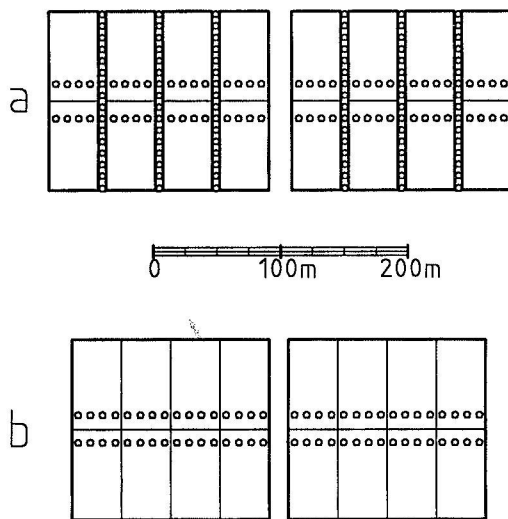
Until the 1830s vegetation on private plots consisted mainly of vegetable gardens. These were few and had little visible or permanent impact on the townscape. During these earlier planning periods vegetation on private plots was never part of the town plan.

The replanning of Turku was also the beginning of a period when a distinction was made between public vegetation (public parks and the rows of deciduous trees along streets and open places) and private vegetation (the planted fire streets). Although the primary function of public vegetation was fire safety, it also had an aesthetic function, which from the 1850s onwards grew in importance. The function of plot vegetation was almost exclusively to improve fire safety. Naturally, as the trees planted in the fire streets grew taller, they also gained in spatial, and aesthetic importance, as their foliage spread over the fences into the street space.

The new planning principles which were used in the post-fire planning of Turku also meant restructuring the block. A wide fire street planted with deciduous trees became an essential part of street block structure. Apart from the vegetation shown in the town plans, it was assumed that house gardens were to be planted. In some plans a row of trees was marked in the rear of the small plots bordering the town, part of their function being to delimit the town. In Porvoo, Engel anticipated that, on the small plots bordering the town, trees would be planted to fill the openings between the houses.<sup>29</sup>

In Hämeenlinna, Engel used the same block type as in Turku. The area allowed for buildings in every plot was separated from the corresponding area in another plot by a planted area or a garden. Some plots had a relatively wide garden on one side, others a narrower garden on two sides.

As in Turku and Hämeenlinna, Engel marked planted fire streets in the plans for Jyväskylä and Mikkeli. In both towns he suggested that the tails of plots should be planted. Each street block was divided into



**Figure 4. The modification of the street blocks of Jyväskylä from the sketch plan (1833, a) to the final plan (1837, b). The small circles show the obligatory rows of trees.**

two parts by a 2 by 25-ell wide (2 by 14.8 m) planted fire street. In Jyväskylä, the local surveyor had originally used, in addition to a wide fire street, 10-ell-wide (5.9 m) planted fire alleys along plot sides (Figure 4a). Although Engel approved the plan as a whole, he criticized the transverse narrow fire alleys. He considered the narrow fire alleys familiar in several Italian towns, but he also felt that the long fence for which the owner had to pay was too expensive and not necessary for fire safety. He did not specify any Italian town by name and we do not even know if he ever travelled in Italy. When Engel made the structure more compact by taking away the narrow fire alleys, he stated that, apart from the wide fire streets, there should be gardens on the plots (Figure 4b).

In the rebuilding instructions after the fire of Pietarsaari, the Senate specified that one side of a plot had to be left unbuilt and also required that each side of each plot should be in easy reach. 'In general private plots are not allowed to be built on more than three sides, and the fourth side lining the neighbour's plot must be left absolutely unbuilt on and used to plant deciduous trees, so that during occasional fires each plot can be reached on each side.' To interpret the instructions strictly, it was not allowed to combine fire alleys into one wide zone to divide the street block, but a

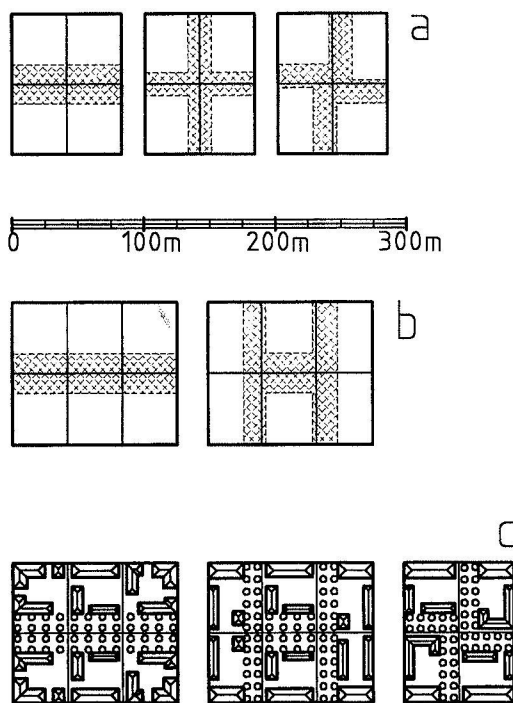
fire alley was to be placed on the plot side where on the neighbour's side there was a building (Figure 5a, right).

In the plans of the 1830s and 1840s varying types of street blocks were used. They can be classified into three groups, with the position of the fire street as the decisive factor: a wide planted fire street of either X or H shape dividing the block into four to six parts (Figure 5a-b, right); a wide planted fire street dividing the block into two halves, with two to three, sometimes four, plots in each half (Figure 5a-b, left); and a block in which a combination of a wide fire street and a narrow fire alley was used (Figure 6).

In the street block divided into separate plots by fire streets/alleys the plots were almost quadrangles (the ratio of plot sides being 1 : 1 or to a maximum of 1 : 1.2). This can be regarded as the 'basic type', as it was the model street block in the Turku plan of 1828 (Figure 3). Engel also used this street block type in Hämeenlinna. In 1852 the same block type was used in plans for Pori and for Vaasa.

The way in which a plot boundary is related to the fire street produces two variations in a street block of four plots: a cross block and a windmill block (Figure 5a, middle and right). Both street blocks were divided into four plots of equal size. In the first there was a half-width fire street along the two inner plot boundaries. In many plan drawings the actual plot boundaries were not shown. In the 'windmill' block there was a fire street on only one plot side, but it was of full width.

The second type was created as the fire streets of opposing plots were placed side by side in the block interior (Figure 5a-b, left). Thus a fire street of double width divided the street block into two halves. The basic street block was often a quadrangle or almost-quadrangular and it had 2 by 3 plots. The plots were rectangles (the ratio of plot sides being 1 : 1.0 to 1 : 1.5). Street block dimensions varied greatly, due to variations both in plot dimensions and their number. As the fire streets formed one united zone, block sides had a different appearance, the main front being formed of houses and fences and the sides having a wide planted zone in the middle

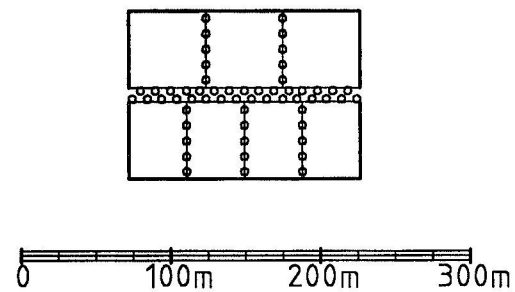


**Figure 5.** The 1856 ordinance block type with varying placing of plain and tree-lined fire streets: four-plot blocks with dividing double width fire street, a cross and a windmill (a, from left to right) and six-plot blocks with dividing double-width fire street and an H (b, from left to right). (c) the same blocks with buildings and rows of trees (circles).

(Figure 5c, left).

In the third type a wide planted fire street divided the block in two and running perpendicular to it was a narrow planted strip or a fire alley on each plot boundary. For example, the first plan for Jyväskylä, with blocks of 240 by 260 ells (142.5 by 154.4 m), belongs to this group (Figure 4a).

In Vaasa, the architect Setterberg wanted to create a more compact urban structure than had been used in Turku. This resulted in a street block divided into two with a 20-ell-wide (11.9 m) planted fire street and a varying number of plots on each side of the block. In addition, on inner plot boundaries there was to be left a 10-ell-wide unbuilt strip planted with one row of deciduous trees. Along all unbuilt-up plot boundaries lining streets a row of deciduous trees was also required. The street block was completed with areas of lawns or



**Figure 6.** A block with dividing tree-lined fire street in the middle and one row of trees along other limits, Vaasa (1855).

low bushes and flowers, which were to be placed around all block fronts surrounding open spaces, *esplanades* and the 30-ell streets (Figure 6).<sup>30</sup>

### The 1856 Ordinance

Great fires, followed by demands for a more spacious town structure, better building practices and a renewed town plan became a continuous process. A fire in one town affected other towns. Gradually the need for a building ordinance for all towns was acknowledged. The final pressure was provided by the great fires of Pori and Vaasa in 1852. A committee was appointed and within six months it prepared proposals for a building and fire ordinance. In this ordinance of 1856,<sup>31</sup> the form and dimensions of the 'fireproof' block were codified.

The 1856 ordinance defined the plot and the fire street as follows: 'a plot, which is built with wooden houses, should have at least 25 ells on one side against the neighbour left unbuilt and used for planting deciduous trees'. The term 'fire street' was used also in connection with the obligatory minimum open distances between buildings: 'to lessen the danger of fire ...an open area or fire street of 10 ells at minimum must be left between each wooden or half-timbered house'. In the areas of small plots fire streets were not obligatory, but in other respects they had to obey the same minimum distances as between wooden houses in general, which usually meant a 10-ell unplanted fire street.

In defining the required plot dimensions and the width of fire streets, the 1856

ordinance specified the typical street block of the nineteenth-century Finnish orthogonal plan. According to the ordinance, plot size defined street-block dimensions, which were 180 by 140 or 210 ells (106.9 by 83.1 or 124.7 m). Variations could be formed by altering the place of the 25-ell-wide (14.8 m) planted fire street and the 5-ell-wide (3.0 m) unplanted strip. Along the plot boundaries in the block interior two fire streets/alleys were joined: 25 ells + 25 ells, 25 ells + 5 ells, or 5 ells + 5 ells, which formed either a 50-ell fire street with 4 rows of trees, a 30-ell fire street with 2 rows of trees, or a 10-ell unplanted fire alley (Figure 5a-c).

Planted fire streets were not obligatory in the small plot areas specified in the ordinance. The usual solution was a two-row one-axis street block, in which 10 to 15-ell-wide (5.9–8.9 m) fire alleys (on plot boundaries) separated the plots from each other. Certain architects strove to create a street block type with planted fire streets as an integral part. In the street block type used in Kemi, fire alleys divided a block into three to four groups of plots, in each of which there were two to four small plots (Figure 7a). In Kuopio and in Sortavala a street block with three plots on each side (i.e. a total of eight plots) was used and in the middle of the block there was an open place the size of one plot with a well in the centre (Figure 7b).

Planted fire streets were not obligatory if masonry houses were built – and they were the ultimate goal of the committee responsible for the renewal of building legislation.

## Conclusion

The definition of public interests on an 'abstract' level was actually an innovation of the nineteenth century. By abstract is meant the use of such orders whose usefulness could not be immediately seen. The 'regulated spaciousness' of a town plot, which in the form of planted fire streets was specified in the 1856 ordinance, was ultimately the result of neo-classicist planning. The idea that building on a private plot could be 'limited absolutely', i.e. more widely than only on that part which concerned damage to neighbours, rose from the understanding of the importance of fire safety. As the force of fire was

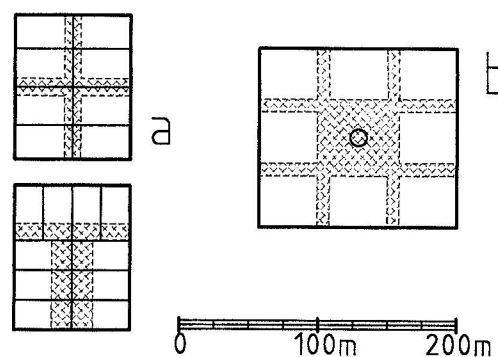


Figure 7. (a) Blocks of small plots with planted fire streets (Kemi, 1869); (b) a block of eight small plots and a central well (Sortavala, 1860).

experienced and also how fires came to a stop at a certain point, it was difficult to argue against the practical advantages of planted vegetation and spaciousness.

A street block structured with planted fire streets was a novelty when it was introduced in the late 1820s. An unplanted open fire alley had already been tested during the 1770s. In the form specified in the 1823 building ordinance it was only 2 ells (1.2 m) wide and thus could not prevent fire from spreading. A new street-block type appeared when the idea of fire alleys was combined with the experience that deciduous trees could slow down or even stop the fire.

It is obvious that this was noticed at the latest in connection with the great fire of Turku, as already among the earliest rebuilding instructions from the Governor-General there was an order that plots should be made spacious enough to have room for gardens. A precise form to this street-block type was given by the burghers of Turku as they proposed in their statement that 'one side of the plot should be left without buildings to make it possible to plant deciduous trees there'.<sup>32</sup>

As to the fire alleys, the 1856 ordinance did not introduce novelties, it only codified their dimensions. The street-block structure was completed with the introduction of tree-lined streets as the dominant street type. We can assume that, apart from the example of Uusikaupunki (replanned in 1855), the general trend to increase planted vegetation in towns, possibly together with the abundance of avenues in other towns of the Russian empire, influenced the fact that tree-lined streets also

became dominant in the ordinance for all towns (1856).

The new urban structure, with its tree-lined streets, single-storey wooden houses and its fire streets planted with deciduous trees, can be regarded as a 'Finnish solution', the natural end point of a line of development.

The goal, a town which would be safe from fire, was really achieved. The prominent Finnish town planner Otto-I. Meurman has recorded how during the Second World War a fire had broken out in Sortavala, which nobody was able to extinguish; but the fire stopped along one of the avenues planned in the 1860s. The fire had dried the leaves completely, the paint on the walls was damaged, but the wooden house itself had been preserved.

## Notes

1. Kirjakka, M. (2003) 'The concept of ideal city: the case of Finnish orthogonal towns', *Urban Morphology* 7, 87-98.
2. The terms used for different streets are thoroughly discussed in Hall, T. (1999) *Planning Europe's capital cities: aspects of nineteenth century urban development* (Spon, London) 299-301.
3. Dahlström, S. (1929) *Åbo brand 1827. Studier i Åbo stads byggnadshistoria intill år 1843 I*. Bidrag till Åbo stads historia. Andra serien XIV (Åbo stads historiska museum, Åbo).
4. Kirjakka, M. (1996) *The orthogonal Finnish town 1620-1860, its structure, components and dimensions* Centre for Urban and Regional Studies Series A 23 (Helsinki University of Technology, Espoo) 20-4.
5. Sjögren, W. (1902) *Förarbetena till Sveriges Rikes Lag 1686-1736 efter offentlig uppdrag utgifna af Wilhelm Sjögren. IV: Lagkommissionens förslag 1686-1697* (Almqvist & Wiksells Boktryckeri AB, Uppsala).
6. The role of building ordinances is discussed in Eriksson, K. (1998) 'Byggnadsordningar och stadsgestaltning' in Hall, T. and Dunér, K. (eds) *Den svenska staden, planering och gestaltning från medeltiden till industrialismen* (Sveriges Radios Förlag, Lund) 154-63.
7. Quoted in Dahlström, *op. cit.* (note 3) 160.
8. Quoted in Lappalainen, P. (1982) *Kuopion historia I* (Kustannuskiila Oy, Kuopio) 225.
9. Kirjakka, M. (1982) *Kaupunkirakentaminen Suomessa vuoteen 1875. Asemakaavoituksen sekä rakentamista ohjanneiden määräysten ja päätösten vaikutus kaupunkirakenteeseen*. Yhdyskuntasuunnittelun jatkokoulutuskeskus B 44 (Teknillinen korkeakoulu, Espoo) 135.
10. For a more detailed discussion on Pori and Raahe, see Kirjakka, *op. cit.* (note 4) 107-11.
11. See, for example, Dahlström, *op. cit.* (note 3) 160-2.
12. KD 5/198 1811. Papers of the Senate Economic Department in the Finnish National Archive (hereafter SED Papers). See also Lilius, H. (1967) *Der Pekkatori in Raahe. Studien über einen eckverschlossenen Platz und seine Gebäudetypen* Dissertation, Aikakauskirja 65 (Suomen muinaismuistoyhdistys, Helsinki) 33.
13. Kajaani 1807 Building Ordinance proposal § 1. KD 119/328 1812. SED Papers.
14. 1823 Building Ordinance, Art. V, § 11. SED Papers.
15. *Ibid.* Art. II, § 2.
16. *Ibid.* Art. V, § 11.
17. See, for example, Söderhjelm, A. (1911) *Brahestad 1649-1899* (Akademiska Bokhandeln, Helsingfors) 125.
18. Dahlström, *op. cit.* (note 3) 299-328.
19. Bunin, A.W. (1961) *Geschichte des russischen Städtebaues bis zum 19. Jahrhundert* (Deutsche Bauakademie, Berlin) 150-3.
20. Letter from the Governor-General to the Senate 11.9.1827. KD 284/29 1827. SED Papers. See also Dahlström, *op. cit.* (note 3) 374-5 and Lilius, H. (1969) 'Carl Ludvig Engelin Turun asemakaava' in *Vuosijulkaisu 1968-69* (Turun kaupungin historiallinen museo, Turku) 81.
21. Engel's plan description, 10.10.1827. KD 208/85 1827. SED Papers.
22. Burghers' statement, 25.10.1827. *Ibid.*
23. *Ibid.*
24. SED 23.1.1828. NA.
25. Turku Building Ordinance 1828, Art. I § 3., Art. II § 4., Art. IV § 2.
26. Engel's plan description, 10.10.1827. KD 208/85 1827. SED Papers.
27. For a more detailed discussion on deciduous trees, see Kirjakka, *op. cit.* (note 4) 28-9, 224-30.
28. Dahlström, *op. cit.* (note 3) 20-1; Lilius, *op. cit.* (note 20) 63-4.
29. Engel's memorandum, 18.8.1832. KD 97/139 1831. SED Papers.
30. Vaasa 1856 Building Ordinance, III:35, III:39, IV:52. For *esplanades*, see Hall, *op. cit.* (note 2) 299-301.
31. Appointing the Committee 1852. KD 354/35 1852. Memorandum, Proposals for Building and Fire Ordinances 7.3.1853. KD 34/495 1853. SED Papers. The ordinance was delayed from 1853 to 1856 evidently because of the Crimean war and the death of Tsar Nicholas I.
32. Burghers' statement 25.9.1827. KD 208/85 1827. SED Papers.