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Non-Staircase Multi-Family Houses

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Abstract

Multi-family houses are medium-size residential developments with stacking apartments. Due to the layout, multi-family houses can be divided into punctual, segmental, linear and planar developments. According to the way of providing access to the building, multi-family houses can be usually divided into: staircase buildings, corridor buildings, houses with gallery access or buildings with a mixed access system. Non-staircase buildings, without common staircases, corridors or galleries, should be also added.

The historical prototypes include primarily stacked up duplexes and four-plexes. Apartments in these houses generally had separate entrances from outside and gardens belonging to them.

The above-mentioned features of multi-family non-staircase houses are still valid. A small scale of the developments, functional independence of the apartments and the gardens assigned to them cause that comfort of living there is close to living in single-family developments. At the same time, the use of the area is much more effective. The compactness of the body facilitates energy saving.

In multi-family non-staircase houses it is possible to create an efficient, and at the same time, stiff, resistant and geometrically unchangeable construction system, which is of particular significance in the areas endangered by mining damages. Additional assets of non-staircase houses, from this point of view, include limited dimensions and compactness of the body, regular layout of crossing walls and the possibility to obtain multi-axis symmetry of the plan.

Key words: Non-staircase houses, multi-family houses, housing typology

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Introduction

Multi-family houses are medium-size residential developments with stacked apartments. The stacking of apartments requires usually one or bigger number of staircases, sometimes also corridors or galleries. This article discusses the non-staircase houses, i.e. such houses in which stacking of apartments does not require staircases, or all the more, corridors or galleries.

The stacking of apartments in such a manner occurred in the historical farm and working-class developments, with its basic systems in the following plans: punctual, segmental or linear plan. Its intensification consisted in the introduction of additional apartments on the first floor or attic, accessible via independent stairs. One of the oldest solutions of this type was the linear development of the Fuggerei housing estate in Augsburg¹. In the working-class colonies of Upper Silesia punctual or segmental systems of multi-family developments were often used. They consisted of multi-family houses: stacked semi-detached houses and four-plex houses.

Evolution of Historical Solutions

The multi-family non-staircase houses originate from historical prototypes of single-family developments: farmhouses and suburban houses that in the version for farm workers and industrial workers were joined into semi-detached houses, four-plex and eight-plex houses.

Using the efficient "four-plex" solutions in farm and working-class developments, modeled on the earlier constructed development for farm workers, occurred in many European countries until the 30s of the twentieth century. An example would be "four-plexes" of Agnetapark Estate in Delft² or four-plexes in the Krupp Works Factory colonies, for example Alfredshof and Am Brandenbusch.

Agnetapark residential houses have four entrances, two on the north and south side, at the corner of the building. Houses were made of brick, covered with gable roofs with the pediments. Four-plexes of workers' colonies of the Krupp Factory became different in size, functional plans and architectural form. Entrances to the dwellings were usually in the north and south side of the building. The houses were usually made of brick and wrapped in ceramic brick, covered by roofs in different shapes, usually gabled, often with pediments and dormers in different sizes. Around the houses there were gardens assigned to the apartments.

The next stage of intensification of this kind of development was adaptation of the attics for dwellings or construction of multi-storey houses, with independent access to each of the apartments located above the ground

¹In the Fuggerei housing estate of the Jacob Fugger Foundation of 1516-1525, the specially assigned stairs lead to apartments located on the floor [Koch 2006, p. 417].

²ibidem, p. 379

floor¹. Such solutions made it possible to maintain the autonomy of dwellings. The apartments still had separate entrances from the outside (or from a common hallway) and often the assigned site formed a front or side garden. This solution helped to avoid inconvenient exploitation of the common spaces: staircases and corridors. Those buildings were usually characterized by a compact form and concentration of chimney shafts.

Contemporary Solutions

The above-mentioned features of multi-family non-staircase houses are still valid. A small scale of the developments, functional independence of the apartments and the gardens assigned to them cause that the comfort of living there is close to living in single-family developments. At the same time the use of the area is much more effective. Non-staircase multi-family houses became, among other things, an alternative to the extensive single-family development in American suburbs. The estates, constructed in the spirit of New Urbanism in the late twentieth century in the United States, are often made up by non-staircase multi-family houses, mostly in the form of stacked terraced developments with small apartments available from the ground floor and large, two-level apartments taking up the first and second floor. A large internal staircase runs then to each apartment: as for example in Russellville Commons in Portland² or an external staircase as in Lakeview Commons in Chicago³. A quarter of non-staircase development of Cupertino Park in Cupertino (California)⁴ is very interesting, because of the house located in the middle of this quarter. It is a stacked four-plex.

The entrances to every four ground floor apartments lead directly from the outside, and to each of the apartments located on the first floor through external, two-way staircases. The characteristic features are biaxial symmetry of the plan and related cohesion of the form of this building. The rational grouping of bathrooms and kitchens in the middle of the building is reflected in the highly exposed silhouette of the house chimneys.

In the nineties of the twentieth century, among other places, in Europe, a number of interesting solutions of non-staircase houses was erected, such as "urban villas" at Haignitzhofweg⁵ in Graz or "double houses" in Biesdorf Süd in Berlin⁶.

Non-staircase houses are characterized by lack of common communication within the building. Each apartment has direct access from the ground level,

¹In Upper Silesia the impulse for the development of such solutions was given by the legal regulations of the second half of the nineteenth century obliging tenants of the houses belonging to the employer to accommodate the widows and orphans of victims of accidents.

²Architects: MCM (Crosbie 2003, p.60-65)

³Architects: Pappageorge/Haymes (ibidem, p. 82-85)

⁴Architects: Seidel/Holzman (ibidem, p. 72-75)

⁵Architects Szyszkowitz-Kowalski (Zhou 2005, p. 25-30)

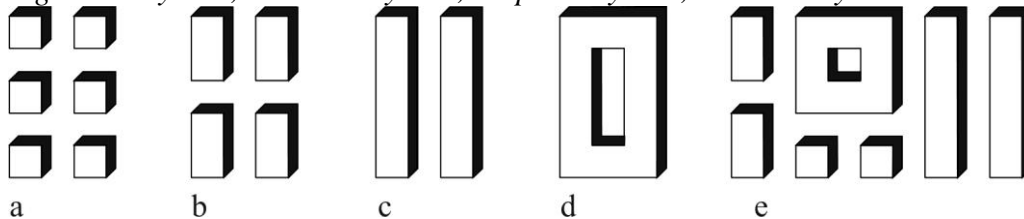
⁶Architekci Léon Wohlhage Wernik (French 2006, p. 30-33)

which allows the assignment of a garden to each apartment. Distances between the floor levels are covered only by stairs belonging to individual apartments. Body compactness of this kind of buildings is conducive to energy saving while the concentration of installation shafts reduces the costs of construction and usage.

Non-staircase multi-family development, usually punctual or segmental, is particularly useful in situations where the spatial context or urban planning guidelines require low height and width of the front facade of the building.

In multi-family non-staircase houses it is possible to achieve cost-effective, rigid, strong and geometrically permanent structure system, which is especially important in the areas with mining damages. From this point of view, additional advantages of non-staircase houses include a limited size and compactness of the body, a regular layout of intersecting walls and the ability to obtain a multi-axial symmetry line.

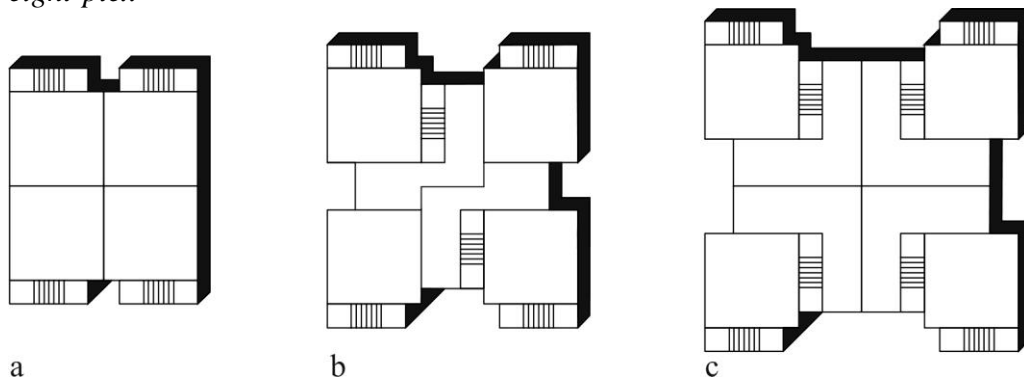
Figure 1. Systems of residential development, a - punctual system, b - segmental system, c - linear system, d - plane system, e - mixed system



Model Solutions

In my book in 2007 I presented a comprehensive set of such solutions¹. Due to the number of flats on each floor and the similarity to the historical four-plexes, six-plexes and eight-plexes, I named them as follows: stacked four-plex, stacked six-plex and stacked eight-plex (Fig. 2).

Figure 2. Non-staircase multi-family houses for point development system, architect: Jan Pallado, a - stacked four-plex, b - stacked six-plex, c - stacked eight-plex



¹Pallado 2007, p. 60-66

The smallest and most compact plan is in the simplest building, i.e. a stacked four-plex with four corner apartments on the ground floor and four on the first floor. A stacked six-plex has, like the four-plex, four corner apartments on the ground floor and four on the first floor. However, between them, in the middle of the plan, there are two apartments on the ground floor and two on the first floor, on an L-shaped plan. A stacked eight-plex, like the stacked four-plex and six-plex, has shaped corners. However, between them there are four apartments similar in shape to the letter "L" both on the ground floor and the first floor. The increased number of apartments in the stacked six-plex and eight-plex, when compared to the number of apartments in the stacked four-plex, as well as increased plan dimensions require shortening the central parts in order to insolate rooms in the back of the buildings. The problem is solved by the characteristic notches of their outlines.

The presented non-staircase buildings have compact plans similar in shape to a square and symmetrical arrangement of the walls. In the stacked four- and eight-plexes, these walls are crossed in the middle of the plan. All of that is conducive to the effective protection of non-staircase buildings against mining damage. A similar effect is achieved by the disc disposition of structural walls and slabs running without faults and displacements along the whole length, width and height of the building. These divisions form a very rigid arrangement limiting the need for further reinforcement and stiffening the structure against mining damage. The symmetry of the plan is multi-axial, which in the case of mining damage hazard means equal resistance to damage whatever the direction of terrain's deformation. The roof and floor of the ground floor are independent from the rest of the building structure. Therefore, they do not take part in opposing the mining damage, nor do they receive potential damage from other structural elements. This is especially serious in the case of the roof which protects the whole building from weather conditions.

Providing the described structural system with proper rigidity, strength and geometric invariability, especially if exposed to mining damage, requires using appropriate materials and technological solutions guaranteeing the achievement of required parameters for the individual elements of the structure and their interconnections. Such a solution determines proper functioning of the entire structural system.

The above-described arrangement of apartments in non-staircase houses and characteristics of the structural system of this kind of buildings are reflected in the manner of shaping their architectural form. Compactness and multi-axial symmetry of their plans result in their compact shape and cohesive architectural form with symmetric facades, centrally located recess caused by shortening of the central parts as well as by the stairs emphasizing the corners. A characteristic feature of the non-staircase houses is the growth of their forms toward the center. This is advantageous because of the reduction of shading of the surroundings and the possibility of significant approximation of buildings and, consequently, the effective use of the site.

Projects and Results

The aforementioned features have been implemented in the projects of non-staircase buildings realized under the supervision of the author. These include stacked four-plexes and six-plexes constructed in the town of Mikołów and stacked eight-plexes constructed in the town of Ruda Śląska.

The houses on Stolarska Street in Mikołów (Fig. 3) have three stories. An external staircase leads to duplex apartments located on the first and second floors.

Figure 3. Stacked four-plex in Mikołów, Stolarska Street, architects: Jan Pallado (chief designer) and Aleksander Skupin, a - ground floor, b - first floor, c - second floor, d - section, e - photo (S.Polański)

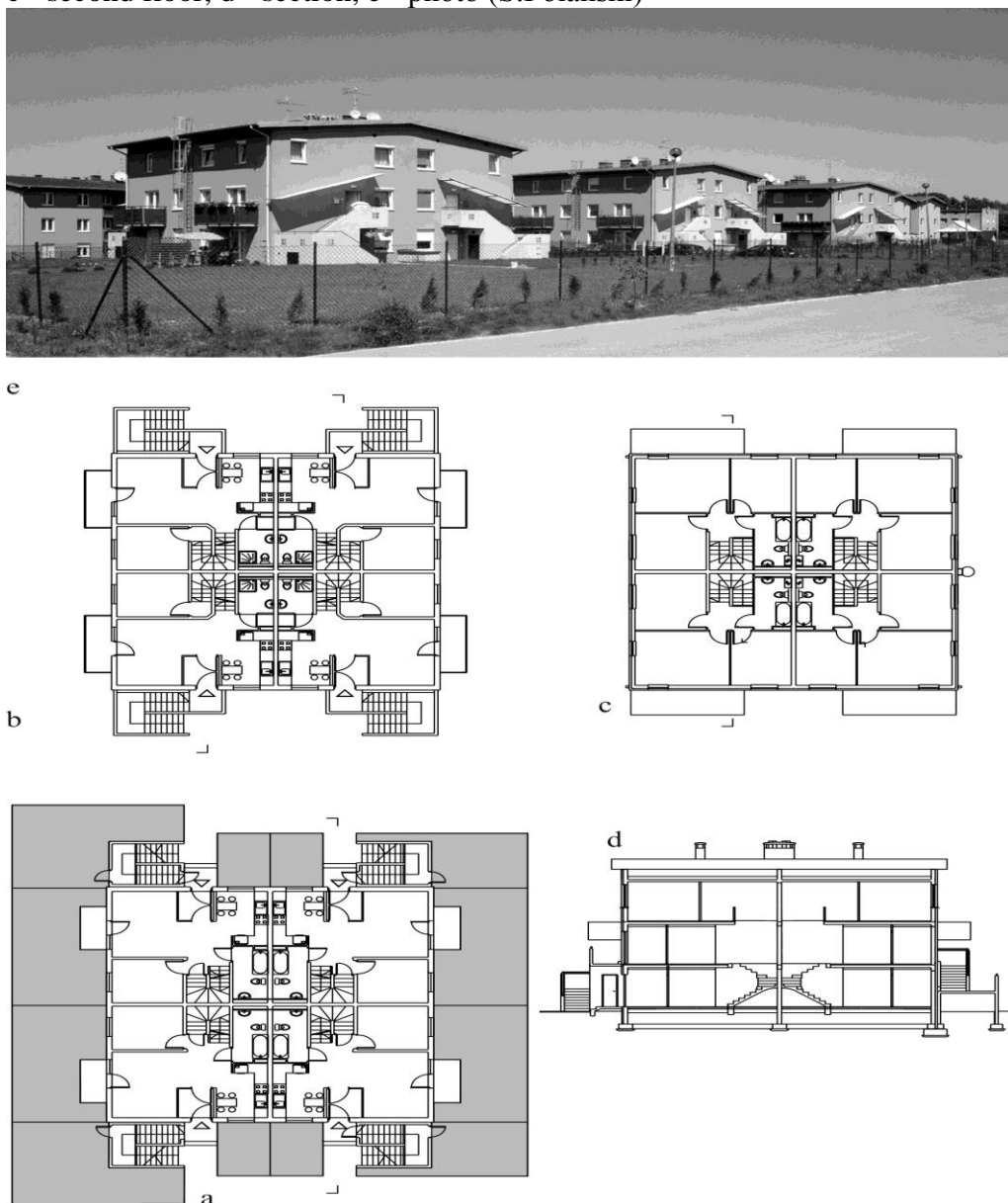
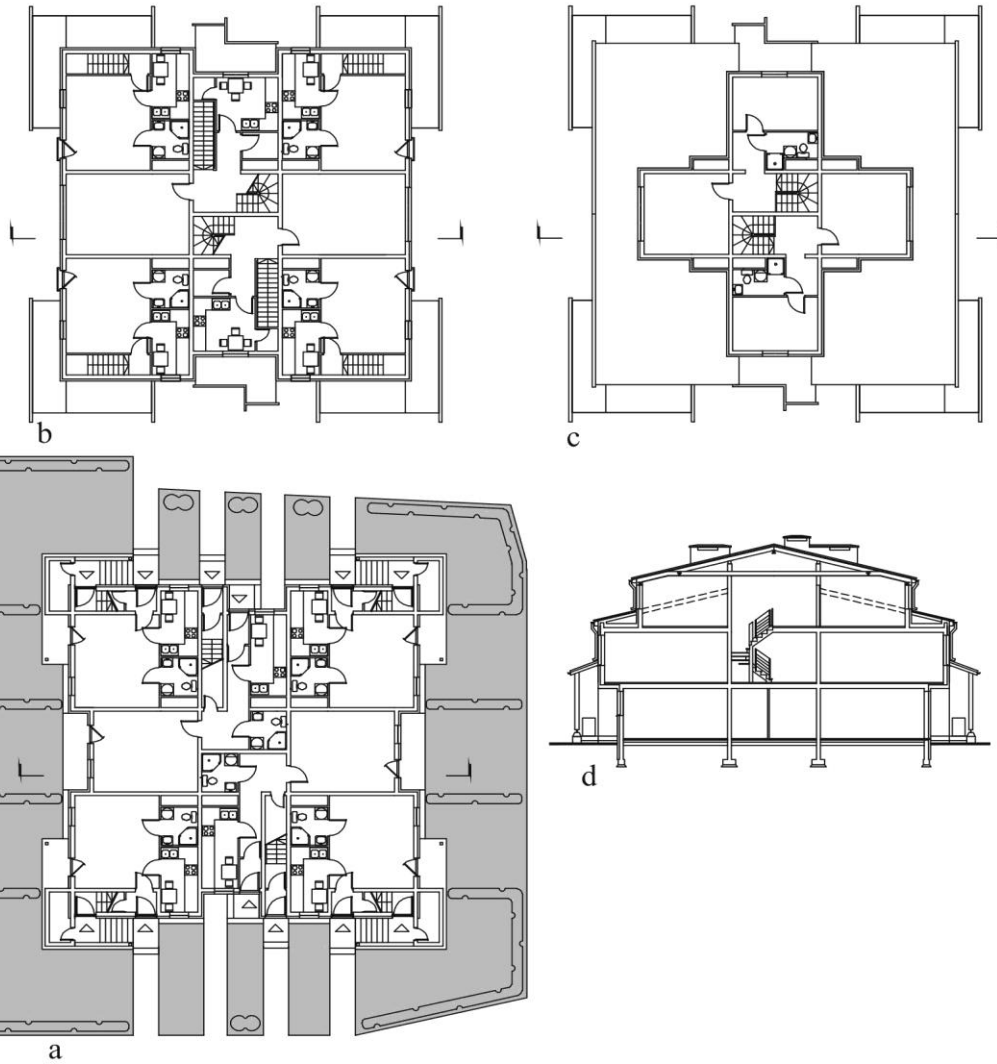


Figure 4. Stacked six-plex in Mikołów, Młyńska Street, architects: Jan Pallado (chief designer) and Aleksander Skupin, a - ground floor, b - first floor, c - second floor, d - section, e - photo (J.Pallado)



e



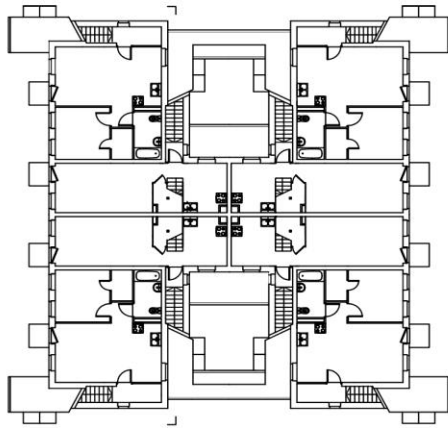
The stacked six-plex building on Młyńska Street in Mikołów (Fig. 4) was the first of seven non-staircase buildings planned on this street. The characteristic layout of apartments in the building is achieved by the corners which form a kind of a "split and moved apart" stacked four-plex and by the apartments located in between the corners on the L-like plan. The central parts of this building are adjacent to each other, forming the plan of a Greek cross. The external walls of the central apartments are recessed in relation to the corner apartments. This resulted from the necessity of shortening the central apartments' tracts in order to insolate rooms inside them. It also had a significant impact on the formation of the building shape. The building was covered by a steep pitched mansard roof, whose eastern and western slopes limit the shading of the gardens.

A group of ten stacked eight-plexes was constructed on Cynkowa and Wysoka Streets in the town of Ruda Śląska (Fig. 5). Each building consists of 16 apartments. In the corners, both on the ground and the first floor, there are two-bedroom apartments. In the central part of the ground floor there are four one-bedroom flats, and above, on the first and second floor, there are four two-level three-bedroom apartments. All apartments have separate entrances from the outside and assigned gardens. Half of the apartments have access from courtyards located on the north and south side of each building, half of them have entrances from the gable walls of its individual wings. These houses were constructed in very unfavorable geological-mining conditions, in the area of the old (nineteenth century) and currently performed mining activities. It required the protection of the buildings against continuous and discontinuous ground deformations and quakes. Under these conditions the structural advantages of the stacked eight-plex have been fully achieved. These include uniform foundation, square-like plans, symmetric multi-axial system of dividing intersecting walls and one-plane slabs. Disadvantageous fragmentation of the building mass in mining conditions has been eliminated by the closure of yards by the walls, being a continuation of the ground floor structural walls, belting the whole building by a continuous foundation wall and a ring beam on the level of the slab above the ground floor. Additional protection was provided by the slab foundation located under the entire building as well as under the courtyards. This slab, beyond the protection against mining damage, protects the building from the effects of non-uniform, partially bulk density of the ground.

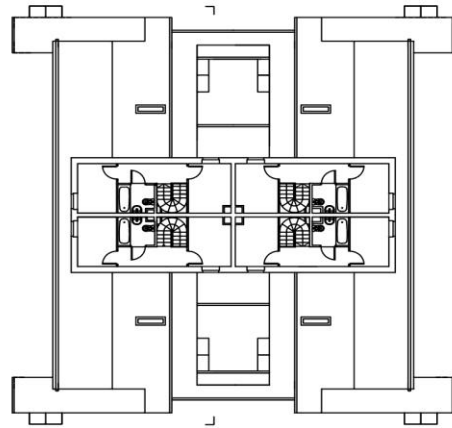
Figure 5. Stacked eight-plex in Ruda Śląska, Cynkowa Street, architects: Jan Pallado (chief designer) and Aleksander Skupin, a - ground floor, b - first floor, c - second floor, d - section, e - photo (S.Polański)



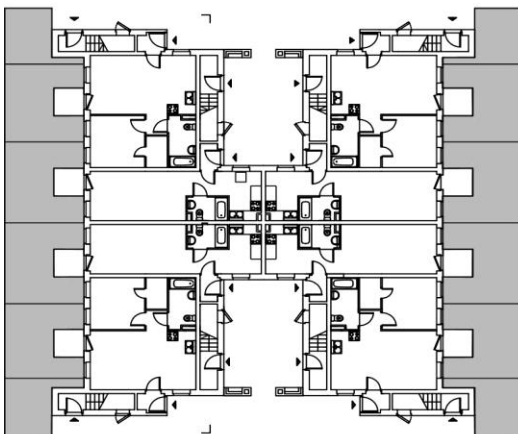
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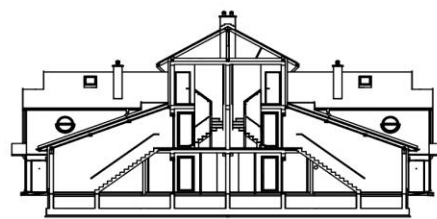
b



c



a



d

Conclusion

Multi-family non-staircase houses are a historically shaped low form of intense punctual development with high economic and commercial qualities. Non-staircase houses are characterized by high independence of the apartments and their contact with the greenery, resulting in lack of common areas in the building and reducing the area of land used together. They are characterized by compactness of shape - important from the point of view of energy saving, the symmetry of the structural walls - advantageous especially in difficult geodynamic conditions, including mining damage, and also an intimate scale of houses as well as the opportunity of shaping diverse architectural forms. The punctual character of the development is conducive to its airing and ventilation, and can adapt various houses to specific site conditions, including mining conditions.

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