

Duikers' Open Air School: Re-Use or Contin-Use?

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Even more than eighty years after its inauguration in 1930, Jan Duiker's 'First Open Air School for the Healthy Child' in Amsterdam remains in use as an elementary school for the education of children between 6 and 12 years old. The building has recently undergone substantial restoration works, including some changes that were necessary to keep up with current regulations. Some 1950s interventions have been retained which posed particular challenges regarding the colors and finishes. The clear cut appearance of the building seems to ignore the complexity of the design decisions that had to be made to grant this building a second lease of life. Restoration architect Sander Nelissen (Wessel de Jonge architects, Rotterdam) and architectural paint researcher Mariël Polman (Cultural Heritage Agency) worked closely together on the restoration of the building and its interior.

By Sander Nelissen and Mariël Polman¹

Building Restoration

The Open Air School is actually accommodated in two buildings: a main building is located in a yard enclosed by some housing blocks of Berlage's famous 1915 urban plan for Amsterdam Zuid, and another building along the street (Cliostraat) bridging the entrance gate. The restoration of these buildings is even more special because the original function as an open air school is maintained. As both buildings were designed by Jan Duiker (1890–1935) as tailor-made suits, relying on his characteristic functional design approach, their continued use has been a great advantage. At the same time, 80 years on, the school has quite different demands on the buildings in terms of teaching methods, comfort, sustainability, fire safety and so on. Our challenge as restoration architects was therefore to integrate all these aspects as well as possible into the school building while maintaining the original design principles of Duiker.

The brief given to us by the school board was primarily focused on the very necessary major maintenance, the improvement of the indoor environment and the reduction of running costs. Not only the interior was worn out and sometimes downright dirty, the buildings' casco also showed defects: cracks in the concrete construction, poor water drains, heavily corroded steel windows. For the children and teachers it was too hot during the summer and sometimes they had to wear their coats in the classroom in the winter. Services were outdated and consuming too much energy.

The main building had only one staircase for seven classrooms, a gymnasium and facilities, spread over four floors. Under the current rules and regulations this no longer meets the required level of fire safety.

The functioning of the school had to be improved on several points. Separate rooms were requested for the staff, for the administration office and for coaching individual pupils. All of these functions were crammed in the ground floor classroom. For the education, there was a need for a mediatheque and individual study spaces for each classroom.

In addition, the school had the desire for a full or partial restoration make visible and tangible the schools' monumental qualities.

We started with workshops with the client, users, consultants, municipal authorities and the National Department for Conservation to examine what different solutions there were for each subproblem. Thus we were able to weigh all interests (functional, technical, cultural) from the start. Based on the results of the workshop we made a design for renovation and restoration of the school. After approval by all parties, the works started in the autumn of 2009 and they were completed in December 2010.

We were able to solve the functional and spatial needs within the existing building volumes. Financially as well as monumentally additional structures were not an option. So, in order to provide the necessary space it was required to relocate the existing kindergarten group to elsewhere in the neighborhood. Further the decision was made to teach crafts in each classroom instead of having a dedicated crafts classroom. This has created space for a staff room, an administration office and a private space for coaching individual pupils. As a result the classroom on the ground floor became available for a library/mediatheque. On the outdoor loggias, next to the toilet units, we have projected small glazed study cells. Here, two pupils per classroom work independently under the supervision of the teacher via the open connection to the classroom. The subtle glazed spaces are situated as far back from the façade as possible and, as seen from the schoolyard, do not interfere with the school's

< The Hoofdgebouw (main building), Jan Duiker, 1930.

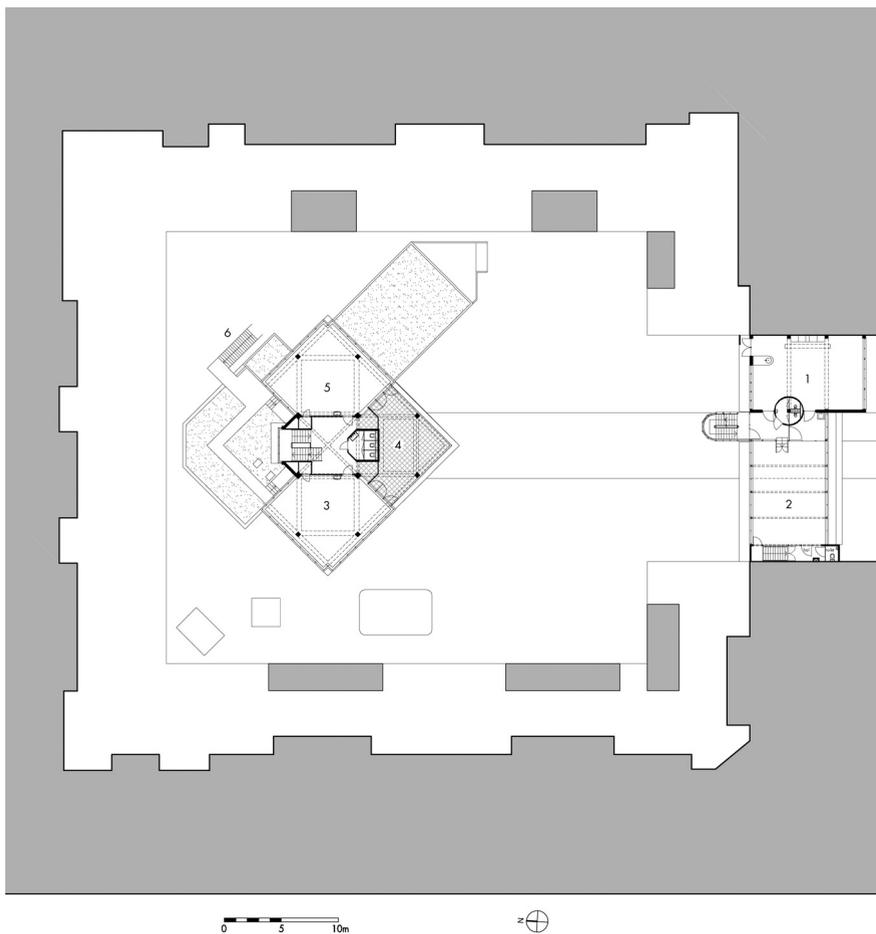


Figure 1. Situation. The first Open Air School for ordinary children consists of two buildings fit in a housing block in South Amsterdam. "It is entirely fit to let in light and fresh air, by means of south-pointing loggia's, roof terraces and [vertical pivoting] windows for all classrooms in glazed curtain walls [...]" Duiker used a minimum of materials by precise calculation of the concrete construction—with tapered cantilevering beams, narrowing columns—and a maximal attention to practical details. Because of its clear functionalist architecture the "two buildings of the school [...] had a compulsory backward location within the perimeter block of brick-work houses." (Sharp & Cooke ed., *The Modern Movement in Architecture. Selections from the docomomo registers*, Rotterdam, O10 publishers, 2000).

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Poortgebouw (gate building)

- 1 classroom
- 2 crafts classroom

Hoofdgebouw (main building)

- 3 classroom
- 4 open-air classroom
- 5 classroom
- 6 emergency staircase

architecture, both day and night.

To meet the fire safety requirements for the main building we have created an independent fire escape from the two rooms on the first floor. In case of an emergency pupils and teachers can escape via two new exterior doors to the roof of the 1939 extension at the backside of the school. From there a new flight of stairs leads to ground level. For the other classrooms, the existing staircase supplies adequate capacity for escaping.

Frisse Scholen (Fresh Schools)

In the Open Air school also in the winter the windows had to be opened as much as possible so that the sunlight and fresh air could come in. The UV radiation stimulated the production of vitamin D. Duiker thought the best choice for heating at such an amount of ventilation was to apply radiation heating from the ceiling. His system consisted of steel heating tubes in the poured concrete floors in which warm water was circulated. The disadvantage of such a system is that it responds very slow and cannot adjust fast enough to the changing weather conditions in The Netherlands. In the winter, the entire construction of the (unisolated!) buildings had to be heated. And in

case of sudden sunshine the rooms warm up very quickly through the large glass façades. Indeed, shortly after the opening roller blinds were installed on the inside of the glass façades.

During World War II the heating system was put out of order for lack of fuel, and drained. Heating stoves were then installed per classroom. During a major renovation of the buildings in 1955 (to solve a variety of structural problems) the concrete floors had to be repaired due to cracks caused by the corrosion of the steel heating tubes. Simultaneously a central heating system was installed for each building with radiators along the parapets and partly on the ceilings (i.e. the gymnasium).

In The Netherlands since 2009 all schools are included in the so-called "Frisse Scholen" project (fresh schools), aiming at a lower use of energy (lower cost, more sustainability) and at improving the indoor environment (better educational performance, well-being). This standard has also been applied in the renovation of the Open Air School. To improve air quality and energy performance we have chosen to install mechanical ventilation with heat recovery. From the heat recovery units on the roofs the conditioned air is led to the classrooms by



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Figure 2. The Hoofdgebouw in 2010. / Figure 3. Street façade of the Poortgebouw (gate building) in 2010. © Photos by T. van Elst.

ducts in the existing closets. An air duct on the “work-wall” above the (digital) blackboard distributes the air, causing overpressure in the classrooms. Simultaneously under pressure is created in the central staircase. The air thus flows from the classrooms through an open space above the closets and soundproof ventilation grilles to the staircase and from there back to the heat recovery-units. The ventilation system is CO₂-controlled per classroom. And when, as originally intended, the windows are opened for fresh air, the system shuts off.

Duiker-Komter-de Jonge

After completion in 1930 the Open Air School has known a number of modifications and adjustments. As a result, at the start of the restoration design in 2009 Duikers’ original design and the associated use of materials and detailing were no longer clearly recognizable throughout the building. In 1939 the main building was extended by architects Jos and Pierre Cuypers with an office for the headmaster and a classroom for crafts. In 1944 and 1975, the two original residences in the gate building were already converted into three classrooms. In a subsequent renovation in 1986, a staircase was added in the courtyard.

For the façades of both buildings, the renovation of 1955 by one of Duikers’ former employees, architect Auke Komter (1904–1982) had a big impact. The huge steel-framed vertical pivot windows (without central mullions!) that Duiker had designed for the main building had proven to be very critical in use. Operating the windows was quite difficult and gradually the windows did not close properly anymore, resulting in regular leaks and serious drafts. In the gate building had sliding windows for which the steel original profile system was not really suitable. As a result, similar problems occurred. So in 1955 all steel window frames were replaced, after a thorough study since 1951 and with great respect for Duikers’ original design and detailing. However, Komter



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completely changed the subdivision and detailing of the windows. This is most visible in the façades of the classrooms that were originally fitted with three double sets of vertical pivot windows over the full height, with only two mullions when fully opened. These six units were replaced by eight single vertical pivot frames of just three quarters of the original height, with seven bulkier mullions, over a lower section of fixed lights. Much heavier profiles

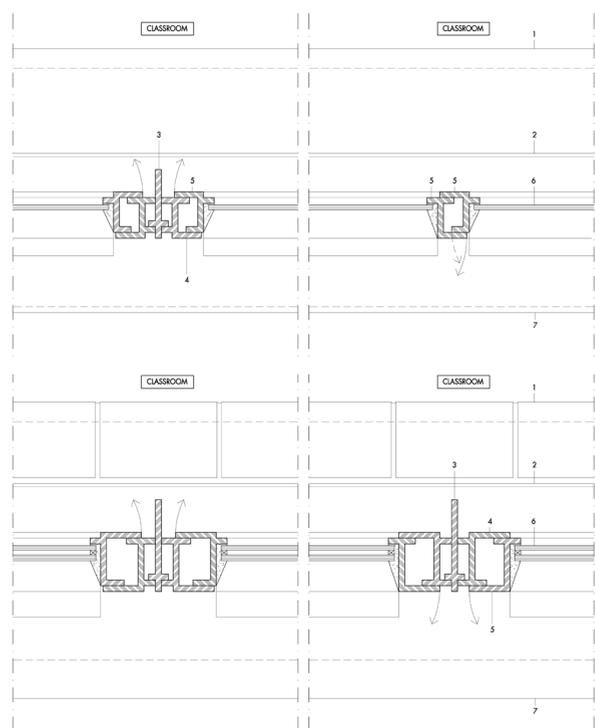
Figure 4. Comparison of southwest façades: on the left **Duiker** 1930, on the right **Komter** 1955.

Figure 5. Horizontal façade details

Original condition (1930)	Current condition (1955/2010)
1 oak windowsill	1 ceramic tiles windowsill (1955)
2 steel condensation gutter	2 steel condensation gutter (2010)
3 steel fin	3 steel fin (1955)
4 steel window frame	4 steel window frame (1955)
5 steel vertical pivoting window	5 steel vertical pivoting window (1955)
6 drawn single glass	6 double glazing 2x Float Glass (2010)
7 steel ledge	7 steel ledge (1955/2010)

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Figure 6. Classroom in 1930 seen from the outdoor class.



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than before were used and in the upper and lower details teak glazing beads were added. At the same time Komter adopted a different color scheme for the façade. The plaster façade and columns, painted aluminum in Duikers' design, and the unpolished black granite plinth, were painted white respectively black. The blue windows and frames were painted a darker blue color.

The restoration confronted us with the question of what to do with the façades and in particular the window frames: 'maintaining Komter' or 'back to Duiker'? For a proper comparison, we had a mockup built with an original window unit. The present series of steel profiles were used for this, which are similar but a bit heavier than the profiles from 1930, and the vents were slightly reinforced without losing their slender image. This turned out to be very convincing as far as the outstanding transparency of Duiker's original was concerned. However, it appeared that the usability was just as difficult as in 1930 and in time the same problems with leaks and drafts were to be expected. As new window units were also estimated about twice the price compared to re-using the existing ones, and because of the good condition and functioning of the 1955 window frames, it was decided to maintain the existing frames.

All doors and also the steel fences have been removed and were treated and, where necessary, repaired in the workshop. Window frames, doors and fences then were but back in place and glazed with thin and extra bright double glazing float glass (Planibel Clear Vision). We did not choose for an outer pane of drawn glass, like at 'Zonnestraal', because the original and almost flat quality is no longer available. Also the available drawn glass showed a distortion that was unacceptable to the school. The glass is glued with sealant and then sealed with a plastic agent to replace the original putty finish. The window frames and fences are repaired and provided with a first coat of primer in the workshop. They are painted in-situ with the brush, because even such details are decisive for the final result.

Does Duiker follow Color?

The reconstruction of the original color schemes to strengthen the quality of the architecture was not easy. On the exterior, Komter's windows visually dominated. Furthermore, Komter's exterior with stucco and white painted walls, black painted plinth and dark blue windows gives a typical image of Modern Movement architecture after World War II.

On the other hand, the building's archeological research and the architectural paint research by Suzanne Fischer, Mariël Polman and Luc Megens, indicated that in the interior the original qualities of Duiker were intrinsic-

ly present. These qualities concerned both the architecture and the finishing. Therefore we chose to reconstruct the exterior color scheme by Komter and the interior color scheme by Duiker.

In the interior, the color and the application of materials by Duiker was varied. The colors included white, blue, yellow, green, red, orange, yellow beige, brown and black. The finishing included paint, tiling and Dermas.

The background color was white and the upper wall surfaces and ceilings were painted white, as well as the inside of the wall frames and the inner frames and internal doors. The expression of movement and silence was designed in the polychromy. The central hall contained almost all colors and materials. The hall and the entrance were tiled with white tiles and from there several steps covered with brownish yellow Dermas lead to the other levels: downwards to the sunken gym and to the basement and upwards to the higher level with the room of the director and a storeroom. The main stairs led up to the first, higher level classroom, and from there up through the light stairwell.

The doors and wall frames of the entrance, the gym and the enclosed porch were bright blue, like the dado with a black border, running up the staircase to the premises. Back to the gym and basement, the dado was yellow with a black border. The blue and yellow dados came together in the hall. The staircase railings were painted aluminum with a natural wooden railing. The coat hooks, connected to the heating, were also painted aluminum, marked with black stenciled numbers on the wall. The parapet beneath the outer windows was yellow beige with similar colored window tiles. The parapet ran in yellow beige through the classrooms, so the shell was independent of the arrangement which was followed. The room of the director had a soft orange dado, with a red border. In the basement and the toilets the windows were of a bright yellow! Duiker may have consciously applied bright yellow in these relatively dark rooms, opposite to the blue color in the central staircase and the interior space on each floor.

The classrooms also had color. Besides the yellow beige with the oak balustrade sill, there was the dado behind the blackboard, between the door and the closet door, painted in a grayish green and trimmed with a red-painted picture frame. The floors in the classrooms were finished with the same earthy brown and yellow Dermas like the stairs. As it was not possible to apply Dermas as flooring, linoleum was chosen in the same colors. These colors reinforced each other, but remained modest in tone. Moreover, the grey-green color gave a calming effect on the eyes of the pupils. The red color was repeated in the red-white striped sunblind. The outdoor premises were



Figure 7. Original coat rack with integrated heating. Color research (2009) at the position of class number "1". © Photo by wessel de jonge architecten.

< Figure 8. Entrance hall in 2010. © Photo by T. van Elst.

Notes

1. The first part of the text which includes "Building Restoration, *Frisse Scholen* (fresh schools) and Duiker-Komter-de Jonge" has been written by Sander Nelissen while the second part, "Does Duiker follow Color?", has been written by Mariël Polman.

covered with red tiles. Thus, all colors made up a whole.

The wholeness of Duikers color scheme turned out to be the drawback in the argument of our approach. In the columns, we were faced with the ingenious interplay between interior and exterior that is typical for Duiker. The columns were painted aluminum, creating a relationship with the exterior. That put us in a dilemma, because the exterior would not be painted aluminum. We decided to match the columns with Komter 's white façade.

In Duiker's color scheme though, white is a background color. This is to be recognized in the columns which have become less evident and expressive being white. It is also recognizable in the new digital white boards, making the rooms a bit too white and less expressive.

The architecture, including the polychromy, has been restored and reconstructed. The school is up and running again, full of life and colors, which is great. That's what we were after! Being architects we hope though, that now and then the school will be in a shipshape manner, in order to quietly enjoy the unexpected balance of the building itself.

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- www.wesseldejonge.nl
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Graduated from the Technical University of Delft in 1993. He is increasingly involved in the restoration and re-use of Modern Movement (and other) heritage, currently at Wessel de Jonge architects (Rotterdam, The Netherlands). Their work includes the Van Nelle Factory and Duikers' Zonnestraal and Open Air School.

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