# General Consideration over the Bauhaus Material Practice: The Case of Modern Monument; Siedlung Gropius Törten Estate at Dessau, Germany

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## Abstract

As a remarkable case of being modern monument of Bauhaus style and social functionalist housing, *Siedlung Gropius Törten* Estate of Dessau needs some reassessment in architectural material study, as those are rare in todays practice. The research problem is, it is not rational to bring back the original materials again. To find out both modern facilities and original appearance in alternative choices, would be challenge as well. To introduce sustainable material practice for preset day composite conservation oriented practice accordingly, would be the research question of this study. And it should be done without any maltreatment to the originals. An investigative survey, literature review and collaboration with building and finishing material experts, were adopted as method. To cope with the specifics of Dessau, some potentials of localization and substitutions of contemporary installation were advocated after such meticulous observation. Tentative recommendations based on results, might demonstrate the possible links for further maintainable remodeling regarding the distinct architectural expression in alternative, possible preservation material practice. Such results of explicit survey will also reveal the various potentials in building and finishing material conservation technique in the future. The study will determine and establish that the Bauhaus aesthetics and its authentic value are dependent over all these materials.

Keywords: Bauhaus architecture, Social Housing, Modern Monument, Material conservation, Sustainable alternatives.

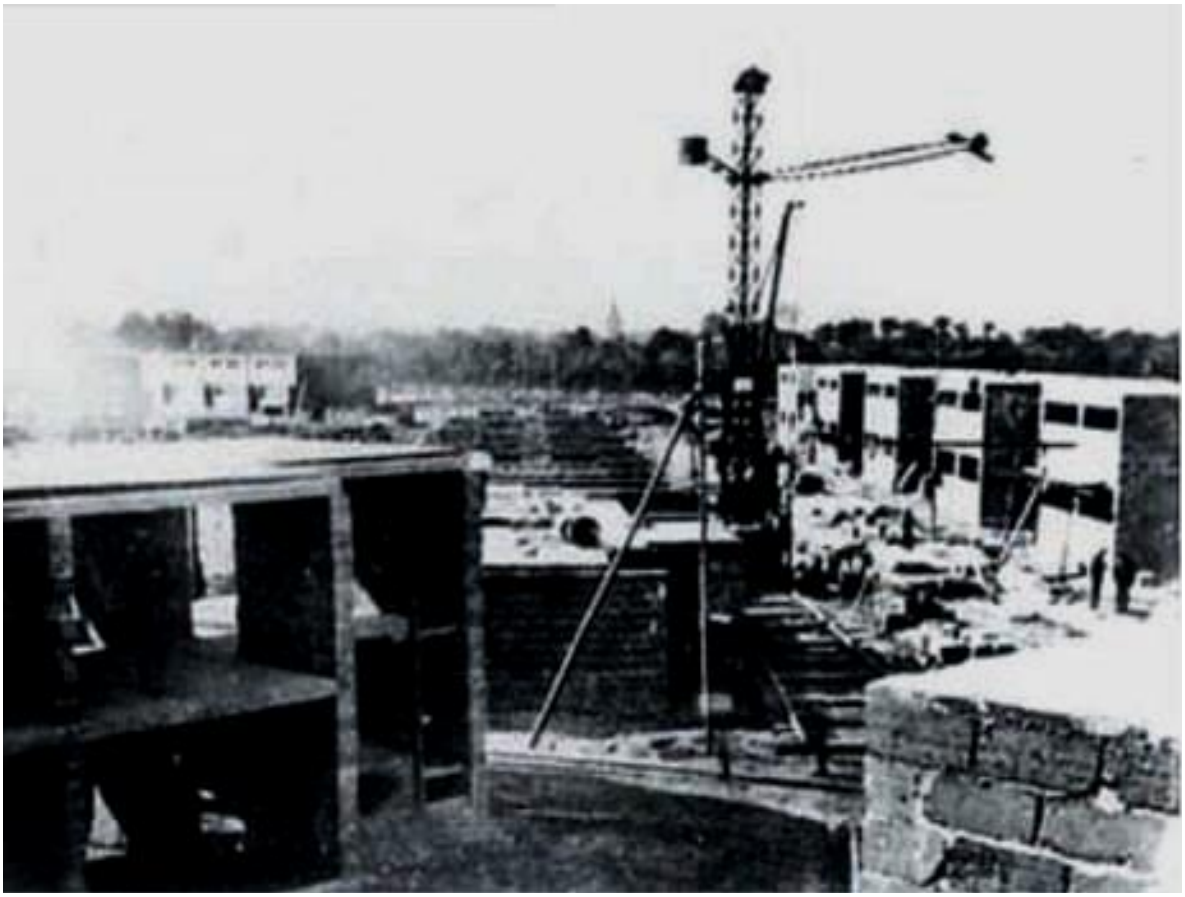

**Figure 1: Gropious Torten site surroundings during construction, after 1945. Source: Kowalski (http://efrat-kowalsky.co.il/files/from-torten-to-tlv.pdf)**

## Introduction

Any social housing project can follow two basic conditions. Firstly, it is located in a better suburban area, within the network of the city. Secondly, its evading community segregation neither allows any formation of ghettoes nor any uncontrolled urban expansion in outskirts. Such projects form an opportunity of urban renewal for the underprivileged municipal areas. Following the trend, Törten estate was the pre-industrial core for Dessau and starting point for the *Stadtrandsiedlung* (suburban settlement plan) during 1920s. [1] The edge of pre-industrial core and settlement is made by trough of banks. After that, surrounding settlements and Alt-Törten were renewed continuously and fragmented to their existing plots by redeveloping adjacent streets. The postwar situation of 1948 showed the full development of low-storey housing modules in the surrounding areas between *Heidestraße* (the road of estate) and dump bank. The transitions to *Heidestraße* are used to form dense buffer zones strategically for such development. After reunification of Germany, *Bebbaung* (name of adjacent area) area along the *Heidestraße* street showed vacancy and partial decay. It was due to the low standard of construction and unsound insulation of building structures and the less traffic load. All of these are now the challenge to conserve in initial state. The design of the houses of Gropius Torten, completed around 1925-26; followed Bauhaus principles: basically cubic with flat roofs and with strip windows with metal frames. Thus, they were quite radical compared to their time period. As in the UK, at the garden city of Letchworth; village houses for workers' were of Arts and Crafts influenced vernacular styles. The Dessau Torten's phase 1 houses entirely have the distinctive strip windows and steel front doors. Prismatic glass blocks have been used at one side and above the front door to allow light into hallway. For phase 2 houses, glass blocks have been used to provide light to the staircase, just like the large staircase windows in Masters Houses. These were slightly smaller to phase 1, but had a separate bathroom on the first floor. Phase 3 houses were smaller than the houses from

the earlier two phases. It has a 'split level' design with some of the living rooms in the basement. That is why the strip of windows at the bottom of the facade is actually high up in the room on the lower level. They include the boiler and the earth closet toilet. [3] But all the materials was used had been replaced over various time periods in all above mentioned functions. The alternative materials are needed to be introduced to facilitate these houses. As prof. Dr. Omar Akber, former Bauhaus director (from 1998 to 2009) once said: "Today, Gropius would surely choose vinyl" [4] Now, based on above-mentioned quote, this study will identify the "To Do's and Not To Do's" in a far advanced society than the 1940's.

## Methodology

A simplified seven-stepped methodology of the research is developed as shown here:

1. Investigation over previous literatures by the scholars in order to define the critical phases of development and inherent material practice of Bauhaus style.
2. Conduct a survey in the whole housing area and identify problems. Communicating with local people will give decent information of present state.
3. Identifying some original materials from the museum of Dessau Bauhaus building and segregate them according to their sort of usage and Exchanging idea or gather information about original materials from experts.
4. To find the relationships; comparisons and generalization of their functionality and how they lost, Bauhaus architectural features and original building and finishing materials will also be analyzed.
5. Site history analysis in the suburban construction context of Dessau through scrutiny of available cheap materials with various dimensions
6. To search the conceivable congruencies, if any; between the category and scheme of particular housing and its possible impacts over material selection at that time and Based on the findings from conducted survey, some possible contemporary solutions with cutting edge technologies or alternative modern materials with the same aesthetical appearance .
7. Preservation characteristics will be suggested for refitting the affordable dwelling units of social, functional and productive, for the upcoming days regarding sustainability concept. Analysis of opportunities and challenges will be presented in strategic slots to derive possible results.


**Figure 2: The surroundings and the Gropious Torten site, after 1945. Source: prof. Andrea Hasse (http://www.cloud-cuckoo.net/openarchive/wolke/deu/Themen/031/Haase/haase.htm)**

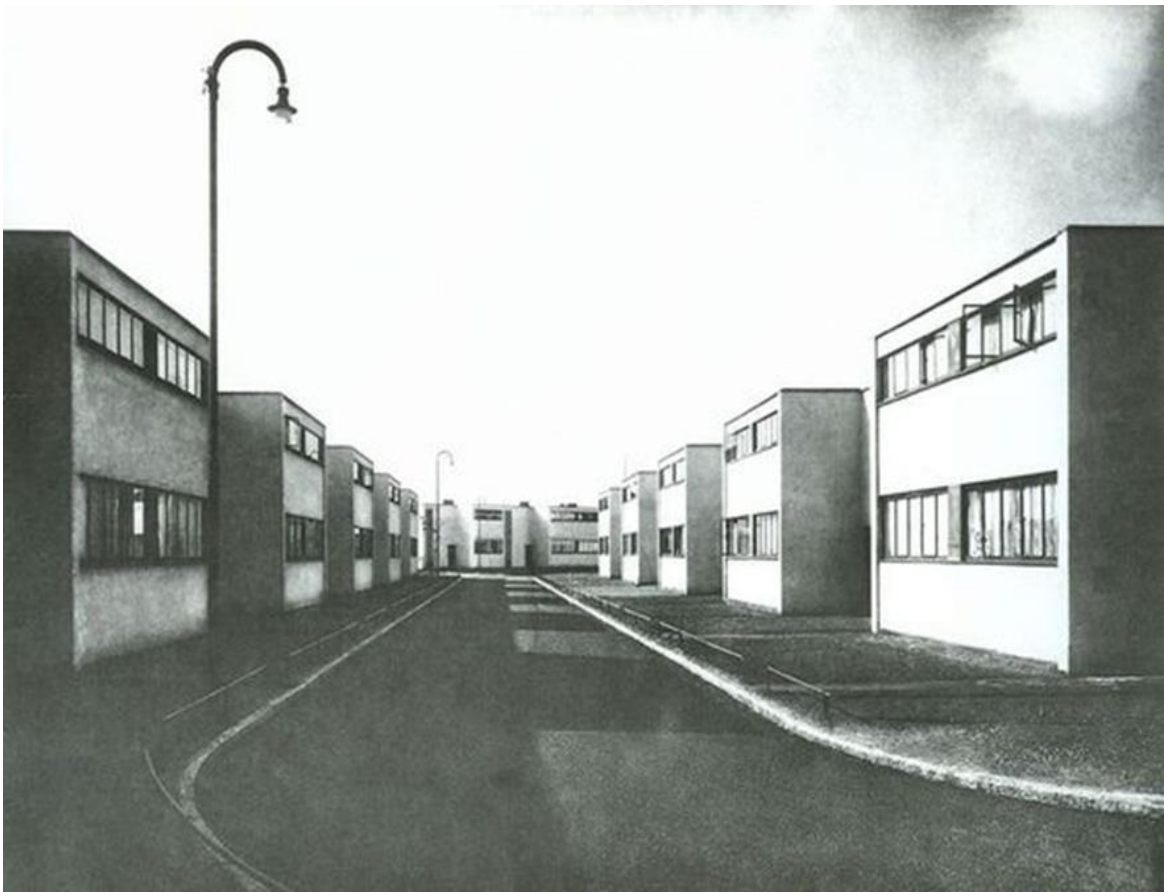

**Figure 3: Gropius Torten in 1926, after completion. Source: Uncube (https://en.wikiarquitectura.com/building/torten-estate/)**

## Literature review

Previous Literature study from scholars establishes that the structure, architectural style, program manifestation, site location and background- all are closely connected with the development of social housing. Thus, Dessau bears the trends of the modernism in the Bauhaus style architecture throughout the 20th and 21st centuries. Such development of the social housing is correlated with the industrial revolution and its outcomes.

We know that the very first worth mentioning illustrations corresponding to the perception of social housing were the so called "idealistic" or 'showcase' projects. Its formation was mainly evolved in Western Europe. Some basic features are distinct here: masses with relatively small or minimum sized rooms where one can ensure basic amenities. In Master plan, it contains abundant green spaces and several service facilities including laundries, kindergartens, doctor's office, etc. Various notable examples of such architectural expression in interwar practice are Großsiedlung Britz Hufeisensiedlung (Horseshoe Estate) in Berlin by Bruno Taut and Martin Wagner from 1925 to 1930; Karl Marx-Hof in Vienna by Karl Ehn during the years of 1927–1930 and Siemensstadt (name of Housing Estate) in Berlin by architects like Hans Scharoun, Martin Wagner, Walter Gropius, Otto, Bartning, Fred Forbat, Hugo Haring and Paul Rudolf Henning, during the time period of 1929–1934. ([5], pp 17-28) There are eight distinguished trends from the point of architectural expression and social organization of housing practice as specialists suggested till present. These most prominent housing trends are –

1. Idealistic showcase model,

2. Functionalist concept,

3. Large housing unit concept,

4. Regionalist concept,

5. Concept of structuralism,

6. Postmodernist or individualist concept,

7. Ecological concept and

8. Realistic concept or “slum upgrading”.

The Törten housing estate in Dessau could be a perfect example of functionalist mass-production attitude towards the affordable living space. That the time when governments acquired vast parts of "substandard' housing, built new-fangled highways and connected them with chunks [6]The ideas of the proponents of industrially prefabricated affordable housing and expressed in the condensed manner in the iconic quote by Le Corbusier published in 1923-“The spirit of conceiving mass-production houses” at his famous book toward a new architecture. However, there are numerous less successful examples like the universally known and the most quoted as well as notorious Pruitt-Igoe case in St. Louis, Missouri, USA. This housing well embodied the gap between the good intentions of functionalist design and the inhumane environments it can create. (Melvin J., et al. 2008. p. 159) After the 1st World War, from 1926 to 1928; the Weimar Republic wanted to escalate public participation in private housing construction industry, ([7], page 42) inspired by Ebenezer Howard's English garden city concept. The suburban Estate was imagined within the framework of ‘Reichsheimstättengesetz’ (State Home Law), meaning that the houses could be kept by the residents from the onset. [8]The main theme of building these houses were, to make housing affordable and to enable people with low income for owning or occupying houses. This project was Walter Gropius' first prospect to execute his concept of Haus-bau-fabrik (home-building-factory) which he already adopted as main architectural idea during 1916. ([9], p. 120) Meanwhile, Mies van der Rohe’s exhibition on rational housing in Stuttgart showed the solution for the smallest cubage possible. This estate is therefore considered as an extendable ‘growing house’ with Bauhaus style. ([10], Pp. 37-39) Two hundred years after the first Gartenreich (garden kingdom) of prince Leopold of Anhalt-Dessau, it would hardly inaugurate a new paradisiacal landscape, but merely a landscape of hope with unusual beauty. Gropius told, "A landscape which is based upon a new understanding of work and labor, which accepts the cultural heritage of its ancestors, which carefully removes the ecological burden”. The garden is emblem of Mendelssohn’s enlightening movement during 18th century. Later, German landscape architect, Leberecht Migge’s contribution to Dessau Anhaltische Siedlungsverband (Anhalt settlement Association) reinterpreted the traditional garden design as a self-sufficient Siedlung (settlement) concept. The 91 double floored houses of Dessau-Siebigk (another place) were also built far from the city, like a social ‘cestrum’ on a grid of parallel streets for Migge's vision of "German inner colonization." ([11], Pp. 112-116) Expressive architecture was the genuine veneration for the dignity of working class, while the “Ring-road of the proletariat” was a symbol of the united relation between the working class inhabitants. ([12], Pp. 389-412) In Tel Aviv, during the 1930's; Dessau’s such housing concept with its Bauhaus style was hired by private property-owners and real estate developers, who constructed affluent apartment buildings and labor union workers’ housing projects. [13]

According to Gropius, the initial motto for this housing was 'People's need instead of luxury needs'. [14]The row houses were built in assembly-line fashion as an effective way to reduce costs. With such combination of row and plotting housing, he solved the problem in a unique way while the inhabitants were mostly the workers of Junkers Steel. ([15], p. 189)

**Figure 4: Gropious Torten today, Source: Sayed Ahmed during survey in 2015**

Putting back-to-back, the order formed semi-detached households and united them in the clusters that varied from four to twelve units. There were three stages of overall construction phase; nearly 314 terraced houses were assembled comprised of variations in floor space ranging between 57 sqm to 70 sqm or 75 sqm. These terraced houses had kitchen gardens (350 and 400 sqm) to grow vegetables and to practice small-scaled poultry husbandry like hen and rabbit. [16] Outdoor toilet is another distinct feature of such housing. Washing and drying of clothes and cooking area of kitchen were offered in split level. The façades were separated by vertical and horizontal rows of openings; uniform steel windows and doors were positioned in the facades with irregular composition. Such impression was strengthened by revealing light colors like: grey, black and white; while the interiors are decorated in light tenors. The furniture designed specifically for the projects in the Bauhaus workshops, which were unsold to the buyers for long days, were brought here. [17]

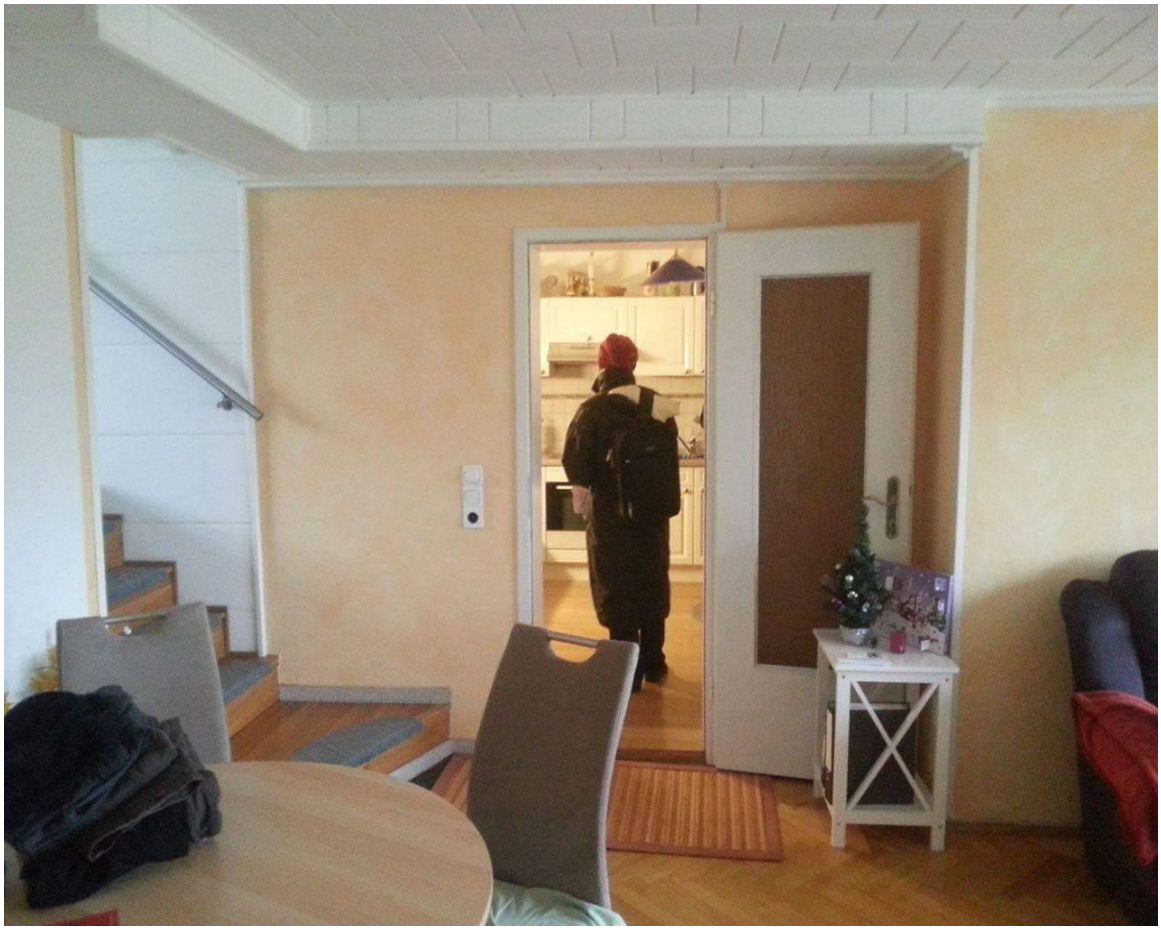

**Figure 5: Interior today at 43 Mittlering, Gropius Torten**

When it came under the direct direction of Hannes Meyer and some other teachers such as Hans Wittwer and Ludwig Hilberseimer in 1930, their motto was to optimize light, air and sun, the so proclaimed dictum of the then modernist practice which Corbusier called: 'sun, space, and greenery' as the three essential elements to feel the 'joys of urbanism' ([5], Pp. 17-28) However, Meyer and his 12 students built only five Balcony Access Houses here for a mixed development of single-family and rental properties. Each of the three-storey buildings housed 18 flats; all with 2.5 rooms lay out within 47 square meters, were completed with central heating and fitted kitchens and bathrooms. Access to the flats was by staircase towers which link balconies running along the north facade. The house at Mittelring 38 (middle ring) was the first to be restored to its original condition in 1992. [18]

Today, it is used by the Moses Mendelssohn Society and considered to be outstanding amongst the perverted buildings. Designed by Walter Gropius in 1928, Konsum (Consumption) Building was commissioned for the consumers' cooperative and was erected as a landmark for the Dessau Torten Settlement. It is currently an information center and has been restored in 1990. At last, Haus Anton (name of house) is owned by the Bauhaus Foundation, one of the only houses preserved in its original condition. It belonged to an elderly lady since 1920. Many original features, including the kitchen with its stove and built-in tiled washtub, backyard stall for poultry in the garden are still present there. [19]

## Construction materials and methods

The State Research Association for Building and Housing Economy was founded in Germany to ensure the usage of experimental industry products and building materials in 1927. Since the plan was to build affordable housing for the mass people, inexpensive construction methods and materials were chosen for this experiment. Constructions were done with cheap materials like prefabricated slag concrete, cavity

bricks, reinforced concrete girders, etc.

Structural components like slab and beams were produced on-site, which could be regarded as an attempt for the 'Tailorization' of building sites with manufacture. The structural joists of precast concrete, so-called Rapidbalken (Rapid beams) were prefabricated on-site, transported via small carriages, and moved by the cranes. Sand and granite for concrete grout were collected on-site as well. The load bearing walls were prepared from prefabricated and inexpensive hollow slag-concrete slabs with a dimension measuring of 22.5 x 25 x 50cm [20]. The roofs were made using different techniques, ceilings with reinforced concrete joists were tightly bolted together side by side. Floors spanning between load bearing walls and external walls were sealed with light concrete blocks. The longitudinal walls were made of non-load bearing filling walls consisting of two 6cm thick cinder concrete and blocked with an air pocket of 1cm in-between them. Again, building processes were also planned with a short time activity which resulted in several activities overlapping at the same time. The overall onstruction followed the principles of standardization and cost-efficient work routines, which were modeled from the assembly line mass productions of the United States [20]. After the completion of housing project, defects in design and construction became notable. Consequently, residents made numerous alterations to deal with the new problems. The first change was noticed in 1934 to make a reposition for too-high windows. [18]

The plans were altered to suit their tastes, and insulation was added. This was due to the tight construction schedule which did not allow the endurance of better quality for certain materials, for example, bricks did not attain maximum strength and thus caused cracks in the walls. In fact, the tenants were very unresponsive and showed negligence about the Bauhaus Movement and criticized the construction defects due to cheap labor and materials which were triggering the overall building cost to increase in another way. Apart from the bad heating insulation, there was too much glass area in steel frames and the interior rain pipes did not have any repair options. [21]

**Bauhaus materials**

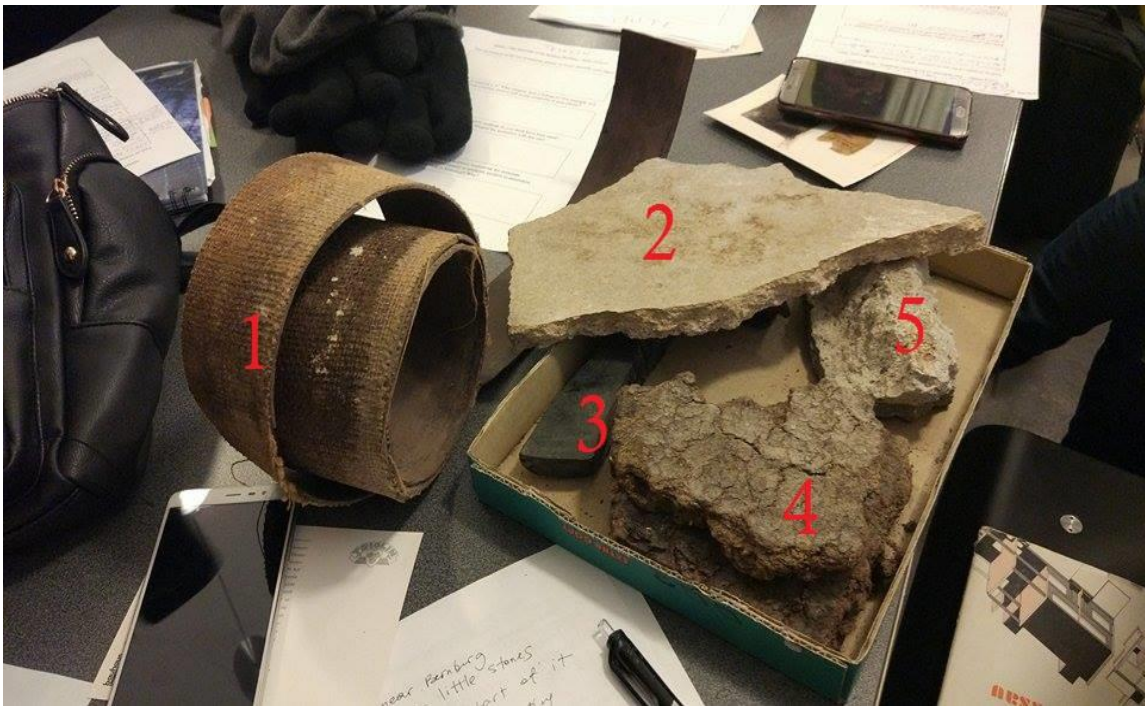


**Figure 6: Materials found in Bauhaus Dessau museum building, 1. Triolin, 2. Magnesian flooring, 3. Black opaque glass cladding, 4. Torfoleum and 5. Concrete. Source: Sayed Ahmed during survey in 2016**

## 1. Triolin

It is a plastic floor covering for Bauhaus Buildings and in the Masters' Houses as a substitute of linoleum. Optically, Triolin can hardly be distinguished from linoleum. It was industrialized in the years of 1920s for the exploration of a low cost substitute for linseed oil. It is mainly composed of nitrocellulose, fillers and gelling agents applied over a hemp fiber fabric [22] which is jute from Bengal (todays Bangladesh).

## 2. Magnesite flooring

Magnesite coating at the surface of the internal floor was regularly used in unit construction and Local Authority housing during the period between 1945 to the 1960's. This used to be installed predominantly as a leveling compound to afford an adequate level of surface to the additional floors. This is a specialized 'cementitious' product which is based on cements comprised with magnesium oxychloride, MgO-MgCl2-H2O or magnesium oxysulfate, MgSO4・5Mg (OH)2・3H2O. Yet the most popular form of magnesite comprises the reaction between magnesium and solution of magnesium chloride. They could be laid on anything between 15- 25mm thick. Generally, magnasite layer lay between 10mm to 25mm thick, but double coating application could result in a combined layer up to 50mm thick. This is a cork type material and provides a softer floor finishing. It is also extremely durable, resistant to oils and grease, of lightweight, and even noncombustible and acts like a cooler. But, problem is; it is an electrically conductor material. Its appearance is brick red by color, but straw yellow is also available. [23]

**Figure 7: The 1st master house, for Walter Gropius showing black glass cladding over column before WWII, Source: (http://www.uncubemagazine.com/blog/13113621)**

### 3. Black glass (opaque) cladding

A cladding material only for Gropius's Master house column was destroyed during the last days of WWII. It is a piece of glass with nearly 25 mm thick, was found during the survey in musuem. As well, unsupported claims found for the use of this material in Gropius Torten, but there are no traces have found for such claim today.

### 4. Torfoleum

The external walls in Bauhaus are usually cladded with insulation boards from so called Torfoleum. It is a saturated and highly pressed peat board made with jute fiber and cattle hair. Normally it is of 50 mm thick, as there are two boards of 25 mm which are fitted with an overlapping attachment. The buildings were insulated by this in the external walls, resulted in a thickness of roughly 330 mm. ([24], pp.74-80)

### 5. Concrete

The cement castoff in the construction was very porous, as it contained too much local gravel. Sand and stone were collected from the site. ([25], 2016)

**Figure 8: The cheap concrete construction of semi-basement kitchen and service roof, 43 Mittlering. Source: Sayed Ahmed during survey in 2015**

**Figure 9: Contemporary installation in progress, which is against the conservation rules.**
Source: Sayed Ahmed during survey in 2015

## Analysis and discussion

The Venice Charter was approved by the International Congress of Architects and Technicians of Historic Monuments and Sites in 1964. Its Article number 3 states that the intention in conserving and restoring monuments is to safeguard them no less as works of art than as historical evidence. (Venice charter 2011) This statement shows us how important to conserve these materials could be. In fact, this housing inherent Criterion (ii), Criterion (iv) and Criterion (vi) according to ICOMOS evaluation benchmark. While its integrity lies over the worldwide impact by reflecting the development of Modernism and authenticity relies on preserving their original state in terms of form, design, material and substance of original Bauhaus style. (The Bauhaus and its Sites, ICOMOS, 2017) One may ask questions that alternative todays material might liquidity its authentic value. But it is also needed to be take into consideration that it is only the better option to help those outworn materials survive. Alternative solutions and installing modern materials with the same aesthetics and value could be practiced as preservation solution as prof. Dr. Omar Akber, former Bauhaus director (from 1998 to 2009) once said: "Today, Gropius would surely choose vinyl" (Debolon catalogue, 2008) now, based on above mentioned circumstances, this study will identify the „To Do's and propose some solutions over the basis of material study.

## Weakness

Low costs prototypes often remain as only the positive examples, but are not acquaint with the broader scale for the question of recurrent repair for future conservation.

## Opportunity

Need to follow the latest and sustainable solutions for hiding modern installation to avoid any harm to the aesthetics of the building. The approved new windows should be grouped with previous pattern. The façade color should be near the color of white and anthracite for frames. The modernist impression was

strengthened by revealing light colors: grey, black and white- now going fade and replaced with pink, blue, yellow and so on. Lime plaster should be introduced again.

**Figure 10: The GroBring (greater ring) buildings do not follow the original grey, black and white color schemes of Bauhaus style. Source Sayed Ahmed on survey, 2015**

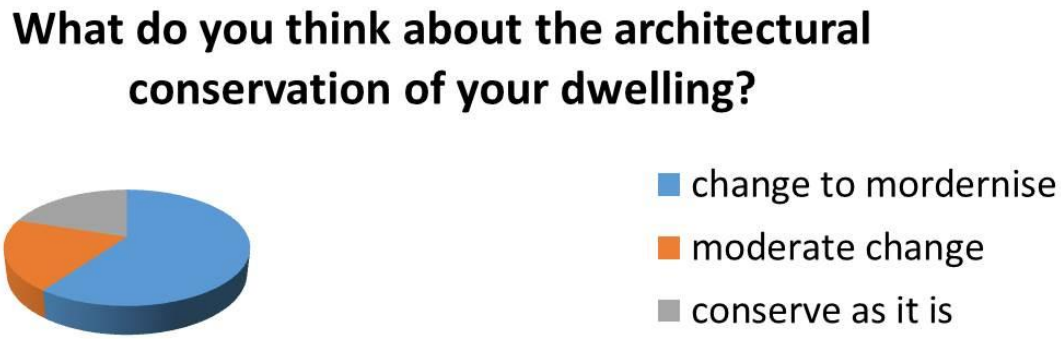


**Figure 11: The respond of inhabitants during the survey, majority wants to install new equipment**

**Figure 12: The additional heating insulation at semi-basement service area, 43 Mittlering. (Middle ring) Source: Sayed Ahmed during survey in 2016**

**Figure 13: Lime plastering by Hens Meyer's students when he was second director of the Bauhaus from 1928 to 1930. Source: Pinterest (https://www.pinterest.de/pin/171770173261239931/?lp=true)**

## Results

10 local people participated on survey, 2 from each house; were asked only one question regarding architectural conservation of Bauhaus materials. They were residents of different holding numbers over the three streets: number 25 in small ring road, number 43and number 48 in middle ring road and finally, number 59 and number 106 at outer greater ring road. 7 of them wanted to replace old materials with today's new provisions. 2 gave opinion to change moderately, and only 1 wanted to conserve as it is. It means 60% of respondent are not willing to conserve those materials, could also be true for overall population. . From figure 9 to figure 12 of this paper indicate the actual situation there. Thus, it's better to create an 'intermediate opportunity' to satisfy both conservation and replacing mindset. In interior; let's get some conservation solutions to be introduced regarding material reuse and adaption.

| MATERIAL | PROBLEM | ALTERNATIVE SOLUTIONS |
|---|---|---|
| **1. Triolin** | The flammability and the development of new materials meant that the production of Triolin was soon abandoned. | Triolin floor in the office of Walter Gropius in Bauhaus Dessau is the only example left today. Instead of organic material like jute, some synthetic fibers like acrylic, nylon and polyamide could be tried to achieve sustainability. This is the only required alternative for the conservation of floors. But again, jute is ecofriendly and easily recyclable material and thus support sustainability concept. |
| **2. Magnesian flooring** | The problem occurs when water entry leaks, particularly around leaking windows or patio door units that the Gropius Torten Estate has. Problems appear when on top of magnesite any impervious material is installed. When it becomes damp, or wet, it sets up a chemical reaction with the steel which reinforces the main part of concrete structure with floor. This accelerates rust which outbreaks the structural core of the floor slab and building. In life-threatening cases, the floor in the damaged areas can remarkably lift or swell and might produce awful odors when the filler rots. They are very vulnerable to room air at humidity. As magnesite flooring is hydroscopic, therefore it absorbs dampness. | Polyurethane finishing and varnishing over it might help to make it durable.<br><br>The best method is to carry out an electrochemical assessment of the concrete slab which will disclose the level of chloride in the concrete and recognize the level of the corrosion of embedded reinforce bar, which generally has durability of 10 years.<br><br>Pigmented sand or cement screed is another option but asbestos flooring tile is more fire resistant and conservation friendly. Thus all sampling and testing should follow Asbestos Management Procedure by surveyors or analysts.<br><br>Another choice could be, not to cover magnesite flooring with DPM.<br><br>It should be checked that the Refurbishment Survey has included an investigation and sampling of floor screeds and laid toppings.<br><br>Works must be ceased if there is reddish color on the screed and obtain confirmation as to the nature of the material.<br><br>Magnesite needs to be removed when the unit is refurbished.<br><br>Today, material like EVIzero ([26], 2014) became an innovative, neutral, ecological |

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|---|---|---|
| | | binder. Produced with an advanced polyolefin mixture which uses polymer materials instead of bitumen thus it is ecofriendly. Pigments can also easily be added for desired surface color, so that original color of Bauhaus style could be found. |
| **4. Torfoleum** | Easy flammability. | It is a very ecofriendly material. So, can be used without any kind of confusion for conservation practice. |
| **5. Concrete** | Fly ash was real problem on that time. The cement castoff in the manufacture was very porous as it was confined by too many pebbles, while the cement layer that covering the frame of the building had too little thickness. That's why the iron frame got oxidized easily and ruptures starts. | Lime plasters over concrete façade will the best option. Hinnerk Scheper ([27], Pp 108-111) (figure 11) took such renovation project while the plastered surfaces of walls and ceilings of the Bauhaus buildings were mostly covered with a very thin layer of plaster. ([28], 2011. Pp.47-48) Its materiality was very close to the original lime plaster. Because, faults in the plaster become smoother and surface corresponds with the historical figure. This is inexpensive and beneath it the original remains of plaster and paint are secured and protected. Historical color conforming can be ensured. |

## Discussion

One might ask question that replacing original materials with today's measurement might diminish its authentic value. But it is also needed to be taken into profound consideration that it is the only remaining better option to help those outworn materials survive. Alternative solutions and installing modern materials with the same aesthetics and values could be practiced, as possible preservation technique.

| **Strength** | **Weakness** | **Opportunity** | **Threats** |
|---|---|---|---|
| In fact, this housing inherited Criterion (ii), Criterion (iv) and Criterion (vi); according to the ICOMOS's evaluation benchmark. While its integrity lies on the scope of worldwide impact by reflecting the development of Modernism, its authenticity relies on preserving their original state in terms of form, design, material and substance of the original Bauhaus style. (The Bauhaus and its Sites, ([28], 2011. Pp. 47-48). | Low costs prototypes often remain as the only positive examples, but are not acquaint with the broader scale for the question of recurrent repair for future conservation.<br><br>The modernist impression was strengthened by revealing light colors: grey, black and white, is now about to fade away and being replaced by colors like pink, blue, yellow, and so on. | It is imperative to follow the latest and most sustainable solutions for hiding modern installation to avoid any harm to the aesthetics of the building. The newly approved windows should be grouped with previous pattern or sealed in some cases. The façade color should be near the color of white and anthracite for frames. | Bad heat insulation, too much glass area in steel frames, cracks in wall; interior rain pipes which do not have any repair options, all these are damaging the buildings from deep into their foundation. The problem was evolved as to compromise with the cost. The fenestration treatment of Bauhaus style is no longer effective for the present users. Any changes even for the simplest installation; |

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|---|---|---|---|
| Again, Venice Charter was approved by the International Congress of Architects and Technicians of Historic Monuments and Sites in 1964. Article number 3 of this charter states that the intention in conserving and restoring monuments is to safeguard them no less as works of art than as historical evidence. [29] This statement shows us how important it is to conserve these materials as best as could be. | | Lime plaster should be introduced again to bring back the original Bauhaus scheme. | may cause harm to the initial aesthetics of these cube dwelling units. Again, one cannot deprive those people from modern insulation equipment either. |

## Conclusion

All the suggestions made in this study might need to follow the latest sustainable solutions for hiding modern installation to avoid any harm of the original material aesthetics of the building, both in interior and exterior. As it is known that, the concept of sustainability depends on three E's: Economic, Equity (social) and Environment; this should be followed in every step of conservation, which will again be appreciated by the public consents. This site has great opportunity for such material preservation experiment. This study suggests not diminishing any artistic significance of building and finishing materials, which bear the testimony of Bauhaus era. The meticulous knowledge of Bauhaus building materials– their composition, aging properties, physical and static coactions with other contemporary building and finishing ingredients available as alternative could be the most important concept for further preservation in order to continue its integrity and authenticity as an Bauhaus style modern monument, which this study mainly focused on

**Conflict of Interests.**

- There are no conflicts of interest.

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