

# A Theoretical Review on Design Guidelines of New Architectural Additions to Protected Historic and Heritage Buildings, Concerning to the Adaptation Process

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## Abstract

The design process of new additions to historic buildings out of the adaptive reuse process is a complex task. The designer of new additions needs to act in accordance with international agreements, charters and regulations in the field of preservation and conservation in all interventions. The aim of the paper is to highlight and summarize the design principles and guidelines of new contemporary additions to historic building, through the adaptive reuse process of historic and heritage buildings. The method used in this research is an in-depth study and review of various literature related to the topic, by analyzing various researches concentrate on adaptive reuse process of historic buildings and the design process of new architectural additions. The results of the research is to summarize and highlight specific design principles of new addition to historic and heritage building, and produce a clear review of the research subject.

**Keywords:** New additions; Contemporary Addition; Adaptive Reuse; Heritage; Design Principles

## Introduction

It is essential to implement certain interventions to adapt historic buildings to the needs of today's users. These interventions aim to strengthen the structures, ensure their active use, and appropriately pass them on to future generations. Many historic buildings that require preservation in line with modern standards and have undergone restoration feature various interventions from different periods. To protect and revitalize historic buildings that no longer meet contemporary needs, it is important to make thoughtful, modern additions. A new addition to a historic building, whether tra-

ditional, contemporary, or a simplified version of the original, should meet the necessary standards. However, it's crucial to strike a balance between differentiation and compatibility to preserve the building's historic character and identity [1].

There is no a specific formula about the type and form of the addition, such that it can be traditionalist, contemporary or a simplified version of the historic building, as long as it preserves a balance between the differentiation and compatibility [2].

Though there are some recommendations, there are not certain basis on scale (height and width), form, massing, setback, orientation, alignment, rhythm, spacing, and proportion of a new addition [3].

It can be as small as a lobby, or as large as an entire building mass, but it is encouraged that it should be smaller than and not submerge the original building and should be less visible from the street side [4].

It is more appropriate to position a new addition at the rear or side elevation of the existing building, and front additions are to be avoided as much as possible [3].

A new addition could alter the perception of what is truly historic, potentially diminishing the qualities that qualify the building for the National Register of Historic Places. After addressing these fundamental preservation concerns, the creative expertise of the architect determines the design and construction of the addition to extend the historic building's useful life [5].

The aim of the research is to summarize and highlight general design principles and guidance of new additions to historic building through the adaptive reuse process of historic and heritage buildings. By review and study available literature related to the research topic.

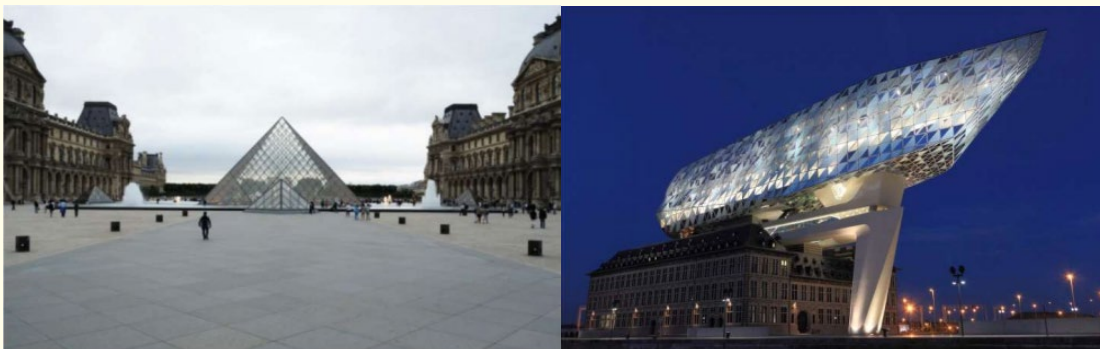
## Literature Review

### *Design Approaches of New Additions to Historic Buildings*

White categorizes the varied recommended and discouraged methodologies toward additions to historic buildings in three groups: standard, contrasting, and identical (Figure 1, 2, 3, 4). Standard approach is explained as compatible but differentiated from the old, thus ensuring that it subordinates to the historic building [6].

Also known as, abstraction, in this approach, a new addition should be similar, but slightly different from the original building. Contrasting style is defined as in extreme contrast to the old, in order to avoid potential misunderstanding of what is original and what is new. In identical approach, new additions are almost the same with the old, in terms of style, design elements, material, scale, and detail [7].

- Examples of contrasting style of new addition [8]:



**Figure 1:** Louvre, I.M. Pei Pyramid Addition. **Figure 2:** Antwerp Port House by Zaha Hadid.

- Example of standard approach of new additions and Example of identical approach of new additions [8]:



**Figure 3:** Neues Museum Berlin. **Figure 4:** The Jewish Museum. New York.

In addition to above mentioned design approaches, there are also some criteria that should bear in mind in designing new additions. Tanaç-Zeren explains the criterion in new additions constituting the esthetic impression as follows [2]:

- Environmental impact: the historic neighborhood in which the building is located and the building plot affects the location, material, and style of new addition.
- Impact of scale: horizontal and vertical dimensions of the new addition and its impact on human scale and its proportions affect the esthetic factors.  
Impact of contrast: contrast can be set up by means of material, color, and scale.
- Impact of mass: selection of form in a new addition affects the sense of massing and builds its compatibility or contrast with the historic building.
- Impact of the rhythm: while designing new additions, it is possible to use rhythmic adaptation with the historic building by means of repeating the original material, proportion, or component.
- Impact of the material: material selection in new additions is an important criterion in determining quality of the addition.

### ***Design Strategies of Using New Architectural Additions***

Brooker & Stone, Developed three strategies of building reuse based on the extent of integration between the host building and the new elements of addition. These strategies are intervention, insertion, and installation [9]:

- Installation (wrap, parasite, juxtaposition) the old and new buildings exist independently. The existing building may influence the new elements design but they are not necessarily compatible with it.



**Figure 5, 6:** Are examples of installation strategy.

- Insertion is a new, independent element that is suited exactly to the existing envelope. It is constructed to fit and is located within the boundaries of the existing building.



**Figure 7:** Are examples of insertion strategy.

- Intervention (weaving) the existing structure undergoes major transformations so that it can no longer exist independently. The old and the new additions are completely integrated.



**Figure 8:** Example of intervention strategy.

While Bollack divides adaptive reuse, projects design into five strategies, which are wraps, weavings, juxtapositions, parasites, and insertions [10].

Seems defines four possible strategies in designing new construction in a historic setting and calls them as the following; (1) literal replication, (2) invention within the same or a related style, (3) abstract reference, and (4) intentional opposition.

#### ***Recommended Guidelines for New Exterior Additions to Historic Buildings***

To meet National Park Service preservation standards, a new addition must be “compatible with the size, scale, color, material, and character” of the building to which it is attached or its particular neighborhood or district. A new addition will always change the size or actual volume of the historic building. Nevertheless, an addition that bears no relationship to the proportions and massing of the

historic building, in other words, one that overpowers the historic form and changes the scale will usually compromise the historic character as well. In summary, any new addition is proposed, correctly assessing the relationship between actual size and relative scale will be a key to preserving the character of the historic building [5].

The National Park Service policy on new additions, espoused in 1967 states, “a modern addition should be readily distinguishable from the older work; however, the new work should be harmonious with the old in scale, proportion, materials, and color [5].

An addition should be designed to be compatible with the historic character of the building and, thus, meet the Standards for Rehabilitation. Standards 9 and 10 apply specifically to new additions [1]:

(9) “New additions, exterior alterations, or related new construction shall not destroy historic materials that characterize the property. The new work shall be differentiated from the old and shall be compatible with the massing, size, scale, and architectural features to protect the historic integrity of the property and its environment.”

(10) “New additions and adjacent or related new construction shall be undertaken in such a manner that if removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired.” To meet the Secretary of the Interior’s Standards for Rehabilitation, a new addition should [1]:

- Preserve significant historic materials, features and form
- Be compatible
- Be differentiated from the historic building

Three important preservation questions to ask when planning a new exterior addition to a historic resource [5]:

1. Does the proposed addition preserve significant historic materials and features?
2. Does the proposed addition preserve the historic character?
3. Does the proposed addition protect the historical significance by making a visual distinction between old and new?

If the answer is YES to all three questions, then the new addition will protect significant historic materials and the historic character and, in doing so, will have satisfactorily addressed those concerns generally held to be fundamental to historic preservation.

The National Park Service (NPS) has published guidelines, which provides a sort of checklist to help achieve successful new additions to historic Buildings [4]:

- A new addition should be simple and indistinct in design, and should be distinguished from the historic building in a manner that makes clear what is historic and what is new.
- A new addition should be constructed in a way that there is the least possible loss of historic materials and so that character-defining features are not obscured, damaged, or destroyed.
- A new addition should not be highly visible from the public right of way; a rear or other secondary elevation is usually the best location for a new addition.
- The construction materials and the color of the new addition should be harmonious with the historic building materials.
- The new addition should be smaller than the historic building; it should be subordinate in both size and design to the historic building.

There are recommended advices related to new additions [11]:

- Placing functions and services required for the new use in non-character-defining interior spaces rather than installing a new addition.
- Constructing a new addition so that there is the least possible loss of historic materials and so that character-defining features are not obscured, damaged, or destroyed.



- Locating the attached exterior addition at the rear or on an inconspicuous side of a historic building; and limiting its size and scale in relationship to the historic building.
- Designing new additions in a manner that makes clear what is historic and what is new.
- Considering the attached exterior addition in terms of both the new use and the appearance of other buildings in the historic district or neighborhood. Design for the new work may be contemporary or may reference design motifs from the historic building.
- In either case, it should always be clearly differentiated from the historic building and be compatible in terms of mass, materials, relationship of solids to voids, and color.
- Placing new additions such as balconies and greenhouses on non-character-defining elevations, limiting, size, and scale in relationship to the historic building.
- Designing additional stories, when required for the new use, which are set back from the wall plane and are as inconspicuous as possible when viewed from the street.

### ***Designing Process of New Additions***

Two hypotheses are relevant to the design of additions: first, the design should be derived from the historic building's physical appearance after identifying its essential values, which should remain evident; and second, any addition, irrespective of its scale or size, inevitably changes the historic building. Therefore, the premise is that the intervention should be considered during the planning process [12].

Sharon Park, FAIA, formerly Chief of Technical Preservation Services at the National Park Service, and Robert Miklos, FAIA, present a four-step methodology for good design at significant resources [13]:

- Research and analyze (know the building and site)
- Restore the idea (uncover hidden features; protect features; repair features; use the "idea" of the building to guide what should be saved or altered)
- Achieve mission and function (integrate the new program so as to manage impacts on historic character, including new additions that provide program uses in order to protect integrity of historic features)
- Create a new identify (create an integrated, unified composition that respects the old yet recognizes the new as part of the cohesive design; integrate a substantive change of appearance without a loss of character of the historic buildings).

### ***Design Guidance for Compatible New Additions to Historic Buildings***

New additions that too closely resemble the historic building or are in extreme contrast to it fall short of this balance. Inherent in all of the guidance is the concept that an addition needs to be subordinate to the historic building [1].

A new addition must preserve significant historic materials, features and form, and it must be compatible but differentiated from the historic building. To achieve this, it is necessary to carefully consider the placement or location of the new addition, and its size, scale and massing when planning a new addition. To preserve a property's historic character, a new addition must be visually distinguishable from the historic building. This does not mean that the addition and the historic building should be glaringly different in terms of design, materials and other visual qualities. Instead, the new addition should take its design cues from, but not as a copy of the historic building. Variety of design techniques can be effective ways to differentiate the new construction from the old, while respecting the architectural qualities and vocabulary of the historic building, including the following [1]:

- Incorporate a simple, recessed, small-scale hyphen to physically separate the old and the new volumes or set the addition back from the wall plane(s) of the historic building.
- Avoid designs that unify the two volumes into a single architectural whole. The new addition may include simplified architectural features that reflect, but do not duplicate, similar features on the historic building. This approach will not impair the existing building's historic character as long as the new structure is subordinate in size and clearly differentiated and distinguishable so

that the identity of the historic structure is not lost in a new and larger composition. The historic building must be clearly identifiable and its physical integrity must not be compromised by the new addition.

- Use building materials in the same color range or value as those of the historic building. The materials need not be the same as those on the historic building, but they should be harmonious; they should not be so different that they stand out or distract from the historic building. (Even clear glass can be as prominent as a less transparent material. Generally, glass may be most appropriate for small-scale additions, such as an entrance on a secondary elevation or a connector between an addition and the historic building.)
- Base the size, rhythm and alignment of the new addition's window and door openings on those of the historic building.
- Respect the architectural expression of the historic building type. For example, an addition to an institutional building should maintain the architectural character associated with this building type rather than using details and elements typical of residential or other building types.

The following guidance should be applied to help in designing a compatible new addition that will meet the Secretary of the Interior's Standards for Rehabilitation [1]:

- A new addition should be simple and unobtrusive in design, and should be distinguished from the historic building—a recessed connector can help to differentiate the new from the old.
- A new addition should not be highly visible from the public right of way; a rear or other secondary elevation is usually the best location for a new addition.
- The construction materials and the color of the new addition should be harmonious with the historic building materials.
- The new addition should be smaller than the historic building, it should be subordinate in both size and design to the historic building.

The same guidance should be applied when designing a compatible rooftop addition, plus the following [1]:

- A rooftop addition is generally not appropriate for a one, two or three-story building—and often is not appropriate for taller buildings.
- A rooftop addition should be minimally visible.
- Generally, a rooftop addition must be set back at least one full bay from the primary elevation of the building, as well as from the other elevations if the building is freestanding or highly visible.
- Generally, a rooftop addition should not be more than one story in height.
- Generally, a rooftop addition is more likely to be compatible on a building that is adjacent to similarly sized or taller buildings.

A rooftop addition should preserve the character of a historic building by preserving historic materials, features and form. It should be compatible but differentiated from the historic building. Number of methods may be used to help evaluate the effect of a proposed rooftop addition on a historic building and district, including pedestrian sight lines, three-dimensional schematics and computer generated design. However, drawings generally do not provide a true “picture” of the appearance and visibility of a proposed rooftop addition. For this reason, it is often necessary to construct a rough, temporary, full-size or skeletal mockup of a portion of the proposed addition, which can then be photographed and evaluated from critical vantage points on surrounding streets [1].

### ***Design Principles for New Additions***

An addition to a historic building should be designed to be compatible with the existing building. At the same time, the design of the addition should be distinct enough so that it does not appear to have always existed. Compatibility, without exact duplication, ensures that the evolution of the building can be seen, and that a false sense of the building's history is not created. Similarly, the design of an addition should not make it look older than the original building. The compatibility of an addition is dependent on the design of the original building, its site, and neighborhood. Thus, it is not possible to define exactly what will be compatible, and what will not, in the

abstract. Rather, it is important to understand how compatibility can be achieved through the thoughtful application of the following design principles [14]:

### ***Setback***

In addition to complying with legal setback requirements, a new addition should respect the setbacks established by the existing buildings on a street. For example, extend beyond the line created by other front porches, even if allowed to by the zoning code. On the other hand, respecting the alignment of rear additions is generally not as critical because they usually cannot be seen from the public street or alley.

### ***Orientation***

The orientation of an addition should respect the existing orientation of the building to which it is attached as well as the orientation of neighboring buildings.

### ***Scale***

Scale is the relative or apparent size of a building in relationship to its neighbors. Scale is also the relative or apparent size of building elements, such as windows, doors, cornices and other features, to each other and to the building as a whole. Scale can be achieved in many ways. Facades can be heavily “rusticated,” usually using stone cut in large blocks with deep joints to give a bold, rich texture to the wall and contribute to the sense of monumentality. The scale of a new addition should usually correspond to the scale of the existing building.

### ***Proportion***

Proportion is the relationship of the dimensions of building elements, such as windows and doors, to each other and to the elevations. Often, proportions are expressed as mathematical ratios, particularly in buildings based on Greek, Roman or Renaissance architecture. Many historic buildings designed in the nineteenth and early twentieth century use mathematical proportions to locate and size windows, doors, details and ornamentation. The design of an addition should respect existing proportions of a building and those of neighboring buildings.

### ***Rhythm***

The spacing of repetitive facade elements, such as projecting bays, storefronts, windows, doors, belt courses and the like give an elevation its rhythm. The overall width and height of row houses and other party-wall buildings gives an entire street its rhythm. The rhythm of a street is also achieved through the use of towers, roof projections, porches, steps, fences, trees, paths and other repetitive landscape and building elements. An addition should respect the rhythm of a building, its neighbors, and that of the street.

### ***Massing***

Massing is derived from the articulation of building facades through the use of towers, bays, porches, steps and other projections. Massing significantly contributes to the character of a facade and a street and should be respected in any addition.

### ***Height***

The height of walls, cornices, roofs, chimneys, towers and other projections contributes to the character of a building and street. While an addition does not necessarily need to be exactly the same height as the existing building, it should be designed to be compatible with the height of the existing building and its neighbors. Compatible height depends, in part, on the location of the addition. For example, a side addition with the same setback as the existing building should typically not be more than one story higher or lower than the original building, while a rear addition may vary in height by two or more stories.



### **Materials**

The materials used for walls, windows, sloping roofs, details and other visible elements of historic buildings should be respected in the design of an addition. If the existing building consists of one predominant material, the new addition may use the same or a visually compatible material.

If the existing building uses a number of different exterior materials, the addition may use a range of compatible facade materials. Using compatible exterior materials is particularly important for a new addition visible from a public street. The size, texture, surface finish and other defining characteristics of existing materials are as important as the type of material itself.

### **Colors**

A building's colors are often derived from the materials used in its construction. For example, brick, stone, terra cotta, slate, asphalt shingle, copper, lead and other materials that are typically left unpainted, give color to a building. In other cases, color is applied to a material by painting or staining. This is typical for materials such as wood, stucco, some metals and sometimes concrete. The colors of an addition should be compatible with those of the existing building.

### **Roof Shape**

The roof shape of an addition should relate to the roof shape of the existing building. For example, if the building has a gable roof, a new side addition should probably have a gable roof. Introducing a different roof shape, such as a flat roof, would probably not be compatible.

### **Details and Ornamentation**

Existing details and ornamentation may be used as the basis for those on an addition, but they should not be copied exactly. Where possible, existing details and or ornamentation should not be obscured by an addition nor should they be removed or damaged.

### **Reversibility**

An addition should be designed so that if it is removed in the future, the features, materials, surfaces and other character-defining elements of the original building are unimpaired.

### **Rooftop Additions**

Any rooftop addition should be located far enough behind the existing cornice so that it is hidden from view by pedestrians on the street. If this is not possible, the design of the addition or its screening should be compatible with the character of the building.

It is difficult to lay down hard and fast rules for new work when much will depend upon the site, the landscape, the scale and form both of the existing building and of the addition or extension proposed. The following basic principles will, however, apply [15]:

- An addition or extension should play a subordinate role. It should not dominate the original building as a result of its scale, materials or location, and should not overlay principal elevations.
- Where an extension is built beside a principal elevation it should generally be lower than, and set back behind, that facade.
- An extension that would unbalance a symmetrical elevation and threaten the original design concept should be avoided.
- An extension should be modestly scaled and skillfully sited.
- Fire escape routes may be internal wherever space can be created without damaging important interior work. Where an external escape stair is necessary, it should be located as reversibly and inconspicuously as possible, and not on principal elevations.

## Methodology

The aim of the research paper is to explore and discover the design principles and regulations regarding of the new construction additions to protected historical and heritage buildings, even it is a contemporary style or any other architectural style. Through the adaptively reuse process of historic building. The research question are what are the general guidance of designing new additions to historic buildings? Which are the design principles of new architectural additions to historic buildings? Which are the design approaches and principles of new additions to historic buildings? Hypotheses of the research are design process of new additions to historic building is a complex process and distinguished from the regular architectural design principles, And must be done in accordance to international charters and regulations. A qualitative research method used in this paper, based on an in-depth review and analyze of literature related to the topic, wide range of books, research papers have been reviewed, and analyses to provide a clear summary and results related to the new constructed additions to historic buildings as an aspect of adaptation process.

## Discussion

Attaching a new exterior addition usually involves some degree of material loss to an external wall of a historic building, but it should be minimized. Preservation of historic buildings inherently implies minimal change to primary or “public” elevations and, of course, interior features as well [1].

Away to reduce overall material loss when constructing a new addition is simply to keep the addition smaller in proportion to the size of the historic building. Limiting the size and number of openings between old and new by utilizing existing doors or enlarging windows also helps to minimize loss. An often successful way to accomplish this is to link the addition to the historic building by means of a hyphen or connector. A connector provides a physical link while visually separating the old and new and the connecting passage-way break through and removes only a small portion of the historic wall. A new addition that will border the historic building along an entire elevation or wrap around a side and rear elevation, will likely integrate the historic and the new interiors, and thus result in a high degree of loss of form and exterior walls, as well as significant alteration of interior spaces and features, and will not meet the Standards. In built-up urban areas, locating a new addition on a less visible elevation may not be possible simply because there is no available space. One approach when connecting a new addition to a historic building on a primary elevation is to use a hyphen to separate them. A subtle variation in material, detailing and color may also provide the degree of differentiation necessary to avoid changing the essential proportions and character of the historic building [1].

### *Compatible but Differentiated Design*

In accordance with the Standards, a new addition must preserve the building’s historic character and, it must be differentiated, but compatible, with the historic building. A new addition must retain the essential form and integrity of the historic property [16].

Rather than differentiating between old and new, it might seem more in keeping with the historic character simply to repeat the historic form, material, features and detailing in a new addition. However, when the new work is highly replicative and indistinguishable from the old in appearance, it may no longer be possible to identify the real historic building. Conversely, the treatment of the addition should not be so different that it becomes the primary focus. The difference may be subtle, but it must be clear Places [1].

It is important to identify the historic character before making decisions about the extent or limitations of change that can be made. A new addition should not compete in size, scale or design with the historic building. The appropriate size for a new addition varies from building to building; it could never be stated in a square or cubic footage ratio, but the historic building’s existing proportions, site and setting can help set some general parameters for enlargement. Although even a small addition that is poorly designed can have an adverse impact, to some extent, there is a predictable relationship between the size of the historic resource and what is an appropriate size for a compatible new addition [16].

Generally, constructing the new addition on a secondary side or rear elevation-in addition to material preservation- will also preserve the historic character. Despite the fact that in most cases it is recommended that the new addition be attached to a secondary elevation, sometimes this is not possible. There simply may not be a secondary elevation-some important freestanding buildings have significant materials and features on all sides. Such situations may best be handled by constructing a separate building in a location where it will not adversely affect the historic structure and its setting. Large new additions may sometimes be successful if they read as a separate volume, rather than as an extension of the historic structure, although the scale, massing and proportions of the addition still need to be compatible with the historic building [16].

## Results

There are several design guidelines that the designers of new additions have to take into consideration before and during the design process. Relations between the new addition and the host building, such as the location of new additions to host buildings, or the case of design elements like scale, rhythm, proportion and size. The new addition should not be bigger than the host building. Prevention of losing materials of historic building as much as possible. There are several design approaches of new addition, which mostly characterize the relation to the host building, such as standard, contrasting, and identical approaches.

The design process of new addition to historic and heritage buildings is more complicated than the regular design process. There are several principles that generally focus on the value of the historic and heritage buildings, as host buildings of new architectural additions. There is no clear or district criteria of such kind of design, but it have to be in accordance to several regulations and charters related to conservation and preservation process of heritage and historic buildings.

## Conclusion

Contemporary architectural additions considers as a preservation methods of historic and protected heritage buildings, it helps in transfer historic buildings to future generations, by applying new functions to historic buildings and create additional exterior or interior spaces for the purpose of expanding the building and creating new spaces. New exterior addition to protected heritage buildings should be considered in a rehabilitation project only after determining that requirements for the adaptive reuse cannot be successfully met by altering non- significant interior spaces. If the new use cannot be accommodated in this way, then an exterior addition may be an acceptable alternative.

New additions should be designed and constructed so that the character defining features of the historic building are not radically changed or destroyed in the process of rehabilitation. New design should always be clearly differentiated so that the addition does not appear to be part of the historic resource.

New contemporary additions to historic building should be designed in accordance to architectural regulations and design principles, which relay on conservation conferences and charters. New exterior addition could be constructed just in case if the adaptive reuse process of historic and heritage buildings in need for new spaces, furthermore the adaptation process could not be completed without the new addition. Design process of new addition, must take in consideration to respect and highlight the value of the historic building, considering the size and the location of the new addition up to the historic building. The new addition must be differenced from the original but compatible with the historic building, there should be a clear difference between old and new.

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