



# **Historic Buildings and Contemporary Additions:**

The Elements of a Cohesive Design Relationship

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## ABSTRACT

Title of Document: HISTORIC BUILDINGS AND  
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THE ELEMENTS OF A COHESIVE DESIGN  
RELATIONSHIP

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With the rapid evolution of our lifestyles and the development of new technologies, it is important to find a way where old and new elements of the built environment can be represented in the future in a balanced way. Because the relationship between historic buildings and contemporary additions has always been a tension in the historic preservation field, this essay will analyze the relationship between old and new and seek to identify the proper balance between the two and explore its value for architecture and preservation. Key elements that allows historic buildings and contemporary additions to work cohesively, respecting and promoting each other's architectural and cultural significance, are carefully examined. Historic research, surveys, and case study analysis are utilized to seek out specific design elements and patterns that can lead to the success or failure of the union between old and new.



HISTORIC BUILDINGS AND CONTEMPORARY ADDITIONS:  
THE ELEMENTS OF A COHESIVE DESIGN RELATIONSHIP

By

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Advisory Committee:  
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Professor Garth Rockcastle



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## Dedication

To Luis.

For all your love, help, patience, and unconditional support.





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*“Architectural order is created when the organization of parts makes visible their relationships to each other and the structure as a whole. When these relationships are perceived as mutually reinforcing and contributing to the singular nature of the whole, then a conceptual order exists – an order that may well be more enduring than transient perceptual visions”.*

Frank Ching



## **Introduction**

The intention of this project is to take a closer look at the use of contemporary styles for new additions to historic buildings. The use of a new and different style for additions on historic buildings, also known as contrasting styles, is one of the most typical approaches in the field, yet observing the variation in the results obtained when architects use contrasting additions in historic buildings, causes one to question this approach. What is it that makes projects like this succeed or fail? This research, will explore the key elements that allow historic buildings and contemporary additions to work cohesively, respecting and promoting each other's architectural significance. Using the results, I will consider the feasibility of establishing design guidelines to promote the use of specific design elements for the expansion of historic buildings.

New architectural styles can actually reinforce the significance and architectural value of historic buildings. By labeling architecture as an old or new style, we are recognizing a timeframe for the use of unique and symbolic details that have value and meaning for a specific group. These symbolic details are the language that helps to illustrate or convey the evolution of our society. The styles expressed on historic buildings represent the language of the past and the new styles will represent our present in the future. For this reason, it is important to create an environment where both can

coexist and correlate with each other, building additions to historic buildings using contemporary architecture styles with an honest representation of current social situations, while protecting the historic structure which represents the social situations of our past.

Additions to historic buildings have always been a big issue in the preservation field. There have been many discussions about the proper way to approach a historic building when it is in need of expansion to create more usable space for a new or expanding use. These discussions have addressed subjects from the use of materials and building techniques that should be employed, to the architectural style in which the new addition is going to be designed. The issue of style is perhaps the biggest question asked at the moment of intervening with a historic structure. Although, these questions are revisited when intervening in a historic building with a new addition, one aspect has always been emphasized by experts in the field; the importance of making clear what is part of the original fabric and what is not in order to avoid misrepresentation. One of the simplest and most honest ways to comply with this recommendation is by using a contemporary style for new additions on historic buildings.

While using contemporary styles seems to be a good response to the issue of misrepresentation, it is important to take a closer look and analyze the way contemporary additions are designed because this relationship does not always work. There are many examples that can help to demonstrate how historic buildings and contemporary additions can work together, but there are also examples where that's not

necessarily the case. In many cases, contemporary additions have impacted the physical integrity of the historic building causing great consternation among professionals and the public. However, when we take a look at those examples where historic buildings have been successfully integrated with contemporary additions, it is clear that there are specific elements and parameters that make the relationship between historic and contemporary architecture work harmoniously.

One of the problems that could be causing confrontation when combining contemporary styles and historic buildings could be the lack of clear guidelines or recommendations for adding to a historic building using a contrasting style. Not even the best known and most established regulations for the treatment of historic buildings get into much detail on how to approach a historic building using new styles for new additions; the result is that the designer has relative freedom of intervention without guidance on detailed elements that should be given special consideration. This is not a problem when the designer has knowledge of the proper treatment for historic buildings, but what happens to those buildings treated by designers not familiar with the suitable way to intervene with a historic building? None of these regulations give suggestions on what should be the key elements to address, more than general indications of mass, scale and materials, in order to design something not just representative of its time but also cohesive with the historic fabric.

The issue of how to add to historic buildings using contemporary styles urgently needs to be addressed. The reuse of existing buildings is rapidly growing, as it seems to

be a way to deal with two of the biggest problems that our society is confronting right now: the *economic crisis* and *global warming*. By reusing existing buildings, not only we can preserve the history behind it, but also we can save resources required to build new; prevent pollution, generated by the extraction, manufacturing, and transportation of new materials; avoid unnecessary accumulation of solid waste; and prevent the growth of urban sprawl. Because of this, it is expected that in the near future, the practice of reusing existing buildings will continue to increase as a strategy to mitigate these problems. For this reason, it is important to promote the historic, economic, and sustainable contribution that historic buildings can offer toward a better future for our society without restraining the incorporation of present needs and development. Old buildings not only have a historic value but also a functional one, and both preservationists and architects need to demonstrate that both of these values can be preserved and enjoyed in a balanced way. The creation of a series of design guidelines or recommendations to guide the relationship between old and new could help to build more than just functional extensions of buildings. It could also be an opportunity to enhance the architectural and cultural significance and physical character of the historic structure.

In order to address research questions regarding the cohesiveness between contemporary additions on historic buildings, this study uses several different research methods including historic research, case study analysis, surveys and interviews. The following chapters present the compilation of information and results of this research. Chapter 1, *Additions in to Historic Building*, offers a brief history of the practice of

adding to historic buildings. The different approaches taken when adding to a historic building will be explored and compared, as will professional opinions of the leading organizations in the preservation field, particularly the Department of the Interior, the primary authority for historic preservation matters in the United States. Chapter 2, *The Good, The Bad, and The Ugly: Analyzing the Historic and Contemporary Style Relationship*, presents a group of five case studies selected to examine the relationship between historic buildings and contemporary additions using specific examples. The case studies are limited to a specific building typology, a mix of academic and public libraries, ranging from good to bad examples of interventions. This chapter, also present the results of a survey conducted among professionals in the field, including both architects and preservationists, that uses the case studies to study the elements of a successful relationship between historic buildings and contemporary additions. This survey will assist in identifying and analyzing a series of architectural elements on new additions, from the general: volume and materials, to surface articulation details that the participants understand to work cohesively with the historic building. Chapter 3, *Finding the Elements for a Cohesive Design Relationship*, present the general findings and conclusions, by identifying what makes the old and new relationship work cohesively, emphasizing the benefits of their use, and general recommendations.





# Chapter 1: Additions to Historic Buildings

## Theories of Additions in Historic Preservation

Additions have always been a common type of intervention to old buildings when they no longer meet the current space needs. Additions and reconstructions were traditionally designed based on the historical and physical context of the structure. According to Osmund Overby in *Old and New Architecture: A History*, before the preservation movement this type of work was based on an understanding of the architectural evidence of the building and on the old architectural context, but usually done in a new style.<sup>1</sup> However, adding to a building became an issue after the 18<sup>th</sup> century when old buildings started to be considered to have historic value and architectural significance that should be preserved for future generations. As the preservation movement coalesced at the beginning of the 19<sup>th</sup> century, the treatment of old buildings was approached with more caution. Any type of intervention to an old or historic building had to be done considering the effects to the historic fabric. Since then, different approaches have been developed by experts to address the issue of additions to historic buildings as the treatment of historic buildings has evolved from Ruskin and Leduc, two of the early pioneers in historic preservation theories in the 19<sup>th</sup> century, to current national and international organizations focused on the preservation of historic resources.

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<sup>1</sup> *Old & New Architecture*, p18.

The theories of John Ruskin and Viollet Leduc are among the first and most famous public approaches in historic preservation on how to treat a historic building. These theories, although well received at the time, represent the two extremes of treatment for a historic building. Ruskin believed in the conservation of buildings through regular maintenance and celebrated the natural process of decay, while Leduc believed in the aggressive restoration of buildings and promoted their improvement until reaching a perfect state of sorts. Although the theories of John Ruskin and Eugène Viollet-le-Duc refer mostly to preservation practices of a historic building in general, it can also be translated directly to the way they would suggest an addition to a historic building should be done.

John Ruskin's theories about historic preservation are presented in his book *The Seven Lamps of Architecture*, in particular the chapter, *The Lamp of Memory*. This book was written in 1849 as a basic manual of architectural principles.<sup>2</sup> The most famous statements from Ruskin's theories applicable to historic preservation are his support to the conservation of buildings versus their restoration, and the beauty of the ruin and the natural process of decay of a building. However, in *The Lamp of Memory* we can find other elements of his theories that could be used as a different way to approach the issue of adding to a historic building. With his rationalization of conservation practices versus restoration he exposes his concept of how architecture represents, as Michael Wheeler says, "our ideas of past and future in the challenging present" and its relationship to

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<sup>2</sup> Ruskin, *The Seven Lamps of Architecture*.

tradition and memory.<sup>3</sup> Ruskin strongly believed in the maintenance and evolution of buildings through time, rather than the idea of a building representing a perfect final state. He postulates that buildings could be read as books, where the structure's evolution is clearly expressed by its physical changes, and the users, or builders, could contribute to the writing of its history through time, adding their own character to it. Ruskin does not directly address the practice of adding to a historic building as a particular intervention but he postulates that the growth of the structure should be part of a continuous process rather than a particular radical event.

The French architect Eugène Viollet-le-Duc, on the other hand, believed in a completely different approach to preservation. He declared that “to restore a building is not to preserve it, to repair, or rebuild it; it is to reinstate it in a condition of completeness that could never have existed at any given time.”<sup>4</sup> As an architect, le-Duc was commissioned to undertake a series of restorations to medieval buildings including Paris' Notre Dame in 1844.<sup>5</sup> Because of his understanding of what a restoration should be, at Notre Dame he altered original details and added new ones in order to create a perfect and unified style that fundamentally altered the original building. Le-Duc's intention in most of these restorations was to update the structure, transforming it into his ideal of the perfect style. Most of his restoration projects included the improvement of structural systems and altering the building by incorporating new decorative details

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<sup>3</sup> Wheeler & Whiteley, *The Lamp of Memory*, p.1.

<sup>4</sup> Hearn, *The Architectural Theory*, p.269.

<sup>5</sup> Britannica Online, *Eugène-Emmanuel Viollet-le-Duc*.

and the addition of new elements such as towers, pointed roofs and stained glass windows.

In addition to the ideas about interventions to historic buildings at the beginning of the preservation movement offered by Ruskin and le-Duc, other approaches have also been explored. In the preservation field, we have developed other procedures that have also generated concerns about the proper application of an addition to a historic building. One of these approaches was to use the same style and materials as the original building, or, to build in the original style. At some point, experts determined that the best and easiest way to avoid the physical alteration of a historic building was by making the existing building and the new addition look as one structure, or of a singular style. But this approach, as Keith Ray says in his book *Contextual Architecture*, was not necessarily the easiest or the best. Before this practice is employed, the designer must understand the original style very well in order to obtain good results, otherwise it is likely to result in a “parody” of the original style instead of a reproduction.<sup>6</sup> This approach also raises the question of misrepresentation. By adding to a historic building using the same style and design elements it could affect the later interpretation of the building and the understanding of what is really historic and what is not.

Another approach calls for using a similar or slightly different style. This approach, also known as abstraction,<sup>7</sup> looks for the essence of the original building that can be used in a new addition and details that can be translated into a new but related

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<sup>6</sup> Ray, *Contextual Architecture*, p.65.

<sup>7</sup> Ibid.

style. This approach should be used with the same or more in depth understanding of the original style as when using it literally, because to recreate the “essence” of the building and selecting the details to be refurbished could be very complicated and, although it could avoid misrepresentation it could also affect the physical integrity of the historic building by drastically changing its original character if not done properly.

The latest approach used in the field when adding to a historic building is called contrasting. Contrasting is when a completely different and contemporary style is used for the addition. This is the most recent practice and the most recommended approach by the experts. The contrasting approach is considered the one that really avoids potential misrepresentation by making clear what is original and what is new, plus it adds to the historic building an element that truly speaks for the present. This is the approach recommended today by leading organizations in the preservation field when an addition needs to be done.

## **Present Position of Lead Organizations**

The position of the world’s leading preservation organizations is very similar in terms of the issue of adding to a historic building. Organizations such as the United Nations Educational, Scientific and Cultural Organization (UNESCO), the International Council of Monuments and Sites (ICOMOS), and the U.S. National Park Service (NPS), although they all oppose any type of addition altogether, have embraced the importance and necessity of adapting historic buildings to present needs for the benefit of the users and the building’s life, as long as it does not affect the historic fabric. This maintains

the continuous use of the historic building necessary to ensure the place retains its livability and utility. They also agree that new additions have to be compatible with the historic building and must respect its historic character, using a distinctive and original style representative of the present time and culture.

UNESCO is an international organization created in 1945 by the United Nations to promote peace, education and culture around the world.<sup>8</sup> Although UNESCO is not an organization created specifically to protect historic resources, as part of their cultural mission, they promote the protection of tangible heritage, which includes architectural resources, as an important part of any culture.<sup>9</sup> UNESCO's position on the issue of additions to historic buildings can be found in the Vienna Memorandum of 2003; the subject of this memorandum was *World Heritage and Contemporary Architecture: Managing the Historic Urban Landscape*. This memorandum discusses the protection of world heritage and contemporary needs in historic areas experiencing economic and structural changes caused by the inevitable adaptation of buildings to suit present needs. In Article 21 of this Memorandum UNESCO, states that:

“urban planning, contemporary architecture and preservation of the historic urban landscape should avoid all forms of pseudo-historical design, as they constitute a denial of both the historical and the contemporary alike. One historical view should not supplant others, as history must remain readable, while continuity of culture through quality interventions is the ultimate goal.”<sup>10</sup>

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<sup>8</sup> UNESCO, *The Organization*, [http://portal.unesco.org/en/ev.php-URL\\_ID=3328&URL\\_DO=DO\\_TOPIC&URL\\_SECTION=201.html](http://portal.unesco.org/en/ev.php-URL_ID=3328&URL_DO=DO_TOPIC&URL_SECTION=201.html).

<sup>9</sup> UNESCO, *Major Fields of Action*, [http://portal.unesco.org/en/ev.php-URL\\_ID=6406&URL\\_DO=DO\\_TOPIC&URL\\_SECTION=201.html](http://portal.unesco.org/en/ev.php-URL_ID=6406&URL_DO=DO_TOPIC&URL_SECTION=201.html).

<sup>10</sup> UNESCO, *Vienna Memorandum*, <http://whc.unesco.org/archive/2005/whc05-15ga-inf7e.pdf>.

This statement, although it expresses their position in a general urban landscape, clearly reflects the organization's inclination to the use of contemporary styles when additions have to be made to individual historic buildings.

ICOMOS is an international association created in 1964 by the Second Congress of Architects and Specialists of Historic Buildings to promote the conservation and protection of cultural heritage.<sup>11</sup> Unlike UNESCO, ICOMOS was created specifically for the protection of architectural and archeological resources. There are different treaties where ICOMOS states their position on additions to historic buildings including: the *International Charter for the Conservation and Restoration of Monuments and Sites (The Venice Charter)*, adopted in 1965; the *Resolutions of the Symposium on the Introduction of Contemporary Architecture into Ancient Groups of Buildings*, adopted in 1972; the *Australia ICOMOS Charter for the Conservation of Places of Cultural Significance (The Burra Charter)*, adopted Australia ICOMOS in 1999; and, the *Charter for the Conservation of Places of Cultural Heritage Value*, adopted from ICOMOS New Zealand in 1992. All of these treaties include the topic of the treatment of additions to historic buildings, but it is in Article 13 of the Venice Charter where it is officially stated for the first time, establishing that:

“Additions (to historic monuments) cannot be allowed except in so far as they do not detract from the interesting parts of the building, its traditional setting, the balance of its composition and its relation with its surroundings.”<sup>12</sup>

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<sup>11</sup> ICOMOS, *About ICOMOS, Historic Background*, [http://www.international.icomos.org/hist\\_eng.htm](http://www.international.icomos.org/hist_eng.htm).

<sup>12</sup> ICOMOS, Venice Charter, Art. 13.



This represents the ICOMOS main position regarding the incorporation of additions to historic buildings. Other treaties basically reinforce this position and adapt it to present concerns while others get into more details on specific aspects of adding to historic buildings. The *Resolutions of the Symposium on the Introduction of Contemporary Architecture into Ancient Groups of Buildings* is one of the more detailed treaties in terms of the issue of adding to a historic building. In this resolution, ICOMOS recognizes the importance of incorporating historic monuments into contemporary life, the importance of their harmony and the value of the new addition. The conclusions from this resolution were established in four main points that give more direction on how to proceed with this kind of interventions:

1. “The introduction of contemporary architecture into ancient groups of buildings is feasible in so far as the town-planning scheme of which it is a part involves acceptance of the existing fabric as the framework for its own future development.”
2. “Such contemporary architecture, making deliberate use of present-day techniques and materials, will fit itself into an ancient setting without affecting the structural and aesthetic qualities of the latter only in so far as due allowance is made for the appropriate use of mass, scale, rhythm and appearance.”
3. “The authenticity of historical monuments or groups of buildings must be taken as a basic criterion and there must be avoidance of any imitations which would affect their artistic and historical value.”
4. “The revitalization of monuments and groups of buildings by the finding of new uses for them is legitimate and recommendable provided such uses affect, whether externally or internally, neither their structure nor their character as complete entities.”<sup>13</sup>

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<sup>13</sup> ICOMOS, *Resolutions of the Symposium*, [http://www.icomos.org/docs/contemporary\\_architecture.html](http://www.icomos.org/docs/contemporary_architecture.html).

In these four points ICOMOS represents their latest position on additions to historic buildings. With them, ICOMOS recognizes the importance of the continuous use of historic buildings and the importance of its adaptation to present day needs for the development of societies by openly accepting new additions to historic buildings. Although additions have become a more acceptable practice to this organization, they still have to be done with the same parameters of respect that was established during the foundation of the organization.

The lead organization on preservation issues in the United States is the National Park Service (NPS), a bureau within the United States Department of the Interior created in 1916 and, “dedicated to preserving the natural and cultural resources and values of the national park system for the enjoyment, education, and inspiration of this and future generations.”<sup>14</sup> The NPS, the federal agency in charge of the National Register of Historic Places, is not necessarily in favor of adding to historic buildings. As might be expected, they favor maintaining the pure integrity of the historic building for as long as possible. According to Kay D. Weeks writing in *Preservation Brief No. 14*, the position of the National Park Service regarding additions to historic buildings is that:

“a new addition to a historic building has the potential to damage and destroy significant historic material and features and to change its historic character. A new addition also has the potential to change how one perceives what is genuinely historic and thus to diminish those qualities that make the building eligible for listing in the National Register of Historic Places.”<sup>15</sup>

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<sup>14</sup> NPS, *Mission*, <http://www.nps.gov/aboutus/mission.htm>.

<sup>15</sup> Weeks, *Preservation Brief No.14*, p.1.

If an addition has to be done because the available space of the structure no longer meets the new needs, it has to be done according to the Secretary of the Interior's Standards for the Treatment of Historic Properties, and other requirements of the National Park Service.

The three main requirements of the NPS for additions to historic buildings are: (1) preserve significant historic materials and features; (2) preserve the historic character, and; (3) protect the historical significance by making a visual distinction between old and new.<sup>16</sup> Once these are addressed, they leave all other aspects of the design and construction of the addition to the architect's judgment. The primary recommendations of the Secretary of the Interior, from the Standards for Rehabilitation, for additions to historic buildings are more specific: (1) the locations of the addition should be at the rear, or on another secondary (less noticeable) elevation; (2) its size and scale should be limited and appropriate for the historic building; (3) the new addition should not obscure the defining features of the historic building, and (4) the new addition should be designed in such a way that clearly differentiates the new from the old.<sup>17</sup>

These recommendations, although providing general guidance, do not guarantee the success of the new intervention or the protection of the historic materials and the historic character of the structure. These recommendations are useful tools that should

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<sup>16</sup> Ibid, p.2.

<sup>17</sup> Grimmer, Interpreting the Secretary of the Interior's Standards, p.1.

be a starting point for adding to a historic building, but they should be used with more specific directions on how to achieve the goals of the NPS.

As discussed above, each of these organizations support the use of a contemporary style when an addition needs to be done on a historic building because it is the approach that protects the historic fabric. All the organizations clearly define the reasons to follow this approach and provide suggestions on what should be taken into consideration when this type of intervention has to be done.

## **Variants When Using Contemporary Styles: Good and Bad**

### **Approaches**

As can be seen from the different approaches used throughout history when adding to a historic building, the use of a contemporary style is the choice that works best for the historic building and benefits the public by respecting and protecting the original character of the building while incorporating new elements to the physical history of the building. The use of a contemporary style clearly avoids misrepresentation and it adds to the historic building an element that truly speaks for the present. Although this approach seems to be accepted and recommended by most professionals, it does not automatically assure the full protection of the historic fabric. The incorporation of a new style to a historic building brings other concerns, particularly the visual and physical impact that the new style can cause.

For as long as the use of contemporary styles for additions to historic buildings has been supported by leading organizations and professionals in the field a series of basic criteria have been recommended to follow when this type of approach is used. These commonly suggested criteria include the control of the general volume, mass and proportions; avoiding competition between the addition and the original building; the use of compatible materials, colors and texture, and; placing the addition on a secondary side to avoid drastic changes in the historic view of the structure. Unfortunately, although these general suggestions have been provided to designers, the relationship between old and new hasn't always been successful. In fact, very mixed results, have been obtained from this approach.

It is clear that the assessment of the aesthetics of architectural styles and buildings in general, depends heavily on personal taste. Throughout history, architectural designers have created a vast range of buildings, classified by the public as good or bad, or beautiful or ugly. This is a natural and inevitable condition of architecture that will continue as long as the profession exists because the creation of a single style that meets everybody's idea of the perfect architectural style is impossible. When it comes to the judgment of contemporary additions to historic buildings, it should not depend on the beauty or likability of the new style, but to the balanced relationship between each other.

There are additions that are clearly compatible with the historic structure they are a part of while others are clearly not. There are also examples that are difficult to

classify as good or bad because some of its architectural elements are in relationship with the historic structure, but still doesn't result in an absolute cohesiveness between the old and new. Usually, when an addition completely meets or completely avoids a full level of cohesiveness, it is because the criteria recommended were either used or not as part of the design process. But, when an addition does not quite meet a good or bad relationship, the design used for the new addition becomes questionable. In order to avoid questionable or bad relationships between old and new, and create a better cohesiveness between historic buildings and their future contemporary additions it is important to clearly identify the reasons for this situation.

In the following chapter, the good, the bad and the ugly, relationships between historic buildings and contemporary additions is analyzed through means of two different methods: (1) the analysis of five case studies, and (2) a survey that studies the cohesiveness of old and new architectural elements on each of the case studies to be analyzed. The main intention is to be able to identify specific architectural elements that are directly related to a successful cohesiveness between historic buildings and their contemporary additions that through their proper use could lead to more compatible additions in future interventions.



## **Chapter 2: The Good, the Bad, and the Ugly:**

### **Analyzing the Historic and Contemporary Style Relationship**

#### **Case Studies**

As part of this research project, a group of case studies will be used to analyze the relationship between historic buildings and contemporary additions. These case studies were selected by establishing a few basic parameters that could help in choosing adequate examples for studying the design elements and patterns that can lead to the success or failure of contemporary additions in historic buildings. The first parameter was that the case example had to be a public building. Because opinions about architectural styles are subject to personal taste, I sought a building type that was visible and subject to public opinion; a building type where any form of intervention, either preservation or alteration, could affect many people and could generate a range of different reactions and consequences. Although interventions to historic private properties could also generate many reactions, in the end it is usually the owner's decision that matters. The second parameter was the selection of a building type exposed to constant change, one in which new additions are a common form of intervention. Finally, the group of buildings needed to be a single building type located, in the United States. Based on these parameters, five examples were selected to represent good and bad interventions.



After considering several building categories, libraries, including academic and civic were selected, as the building typology to be analyzed. Libraries are buildings that collect different types of media (books, magazines, recordings, etc.) related to a vast range of topics for the benefit of the public. Its recognition as a specific building type took place in the eighteenth century, emerging with its own nomenclature. That nomenclature was based on the use of specific forms (mostly classical), functions and architectural details that became a very strict and specific language for library design.<sup>18</sup> With the constant grow of collections, the use of new research practices, new technologies and the changing culture of users, the traditional library has been forced to change. Libraries must grow in order to better accommodate the new resources and the necessities of contemporary library services. Since many American libraries are considered historic, it is important to find a balance between the outright protection of original structures and their adaptation to meet present requirements. This should be accomplished without affecting the architectural integrity of the original building, yet providing the opportunity for new styles and typologies for the additions, ones that represent contemporary cultural needs.

While there are many examples around the nation where the balance between a historic library and a new addition was achieved successfully, there are many others where this balance was never achieved. The selection of the specific buildings for this study was not easy, as not all interventions to historic libraries are published, and information availability for the research was an important factor. The five case studies

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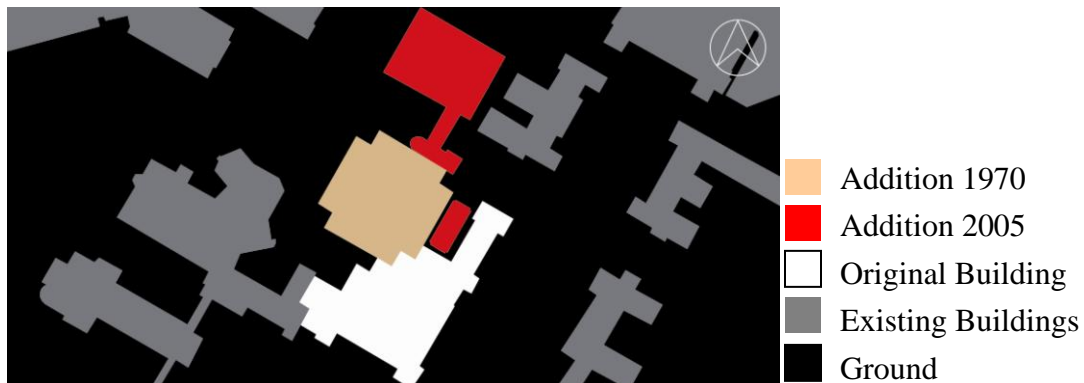
<sup>18</sup> Brian Edwards, *Libraries and Learning Resources Centers*, p.3.

are presented below; each of them provides significant details on the original buildings and their additions, and a brief analysis of their architectural relationship followed by images of their original and existing conditions. Additional information about the building's history is provided in Appendix B.

## Historic Libraries with Contemporary Additions:

### **Building No. 1: William R. Perkin Library:**

*Duke University, 104 Chapel Drive, Durham, NC 27708*



**Fig. 1.** Site Map, Perkin Library (not to scale).

### Significant Details:

- **Original Building:** Built in 1928, in Gothic Revival style, by Horace Trumbauer
- **First Addition:** Built in 1970, architect unknown
- **Second Addition:** Built in 2005, by Shepley Bulfinch Richardson and Abbott

### Building Analysis:

- **Volume/Mass:** Because of the “organic” development of the Perkin Library complex it is hard to define a specific volumetric form for the entire structure

(Fig. 1). Looking at the structures individually, the first addition seems to be a square volume, which corners are subtracted from the main volume (Fig. 5), located on the left side of the original building. This addition maintains the same height as the original building. The second addition is composed by two parts: (1) a building located between the original building and the first addition, and; (2) a new library (Bostock Library) located at the north side of the original building considerably separated from the other buildings but connected by a passageway (Fig. 1) (because this section is technically a new building not completely attached to the Perkins Library it will not be incorporated as a significant part for this research). The general shape of the second addition is a noticeably smaller rectangular cube (in comparison with the rest of the buildings) (Fig. 6).

- **Materials:** The materials used for the first addition were the same as the original building: limestone for details and a multicolor stone with a squared rubble stone pattern (fig. 3). For the second addition new and more modern materials were incorporated. For the pavilion between the original building and the first addition, the architect used a glass and aluminum shell with a steel structure and roof (Fig. 6). On the new library section, the architect used brick with a mix of different tones for the walls, as in the original building and first addition, and; aluminum and glass for doors and windows, and limestone for some details.
- **Surface Articulations:** The neo-gothic characteristics of the original building were transformed into modern details on the first addition. These new details

were simplified and enlarged creating a contemporary feeling that can be clearly perceived as an abstraction of the original building (Fig.3). The main elements of the first addition are the windows: vertical linear elements that go from the top to bottom of the structure. These windows are separated by thin vertical walls keeping the same rhythm all around the structure. Horizontal elements break the strong verticality of the windows in a subtle way. They divide the windows in three main sections: (1) the top glass windows resembling front gable dormers but in a flat roof; the shape simulates the pointed arched windows of the gothic style; (2) a wide three-over-three bay window covering the second and third story of the building (four stories total), offers a contemporary version of a gothic tracery, and; (3) the base of height windows (floor to ceiling) that in some areas turn into entry doors (Fig. 5). These horizontal articulations make the floor levels readable from the exterior. The small glass pavilion of the second addition is a see through single two story space building, articulated with vertical and horizontal linear metal elements all the way around. The vertical elements continue a similar rhythm as the first addition. The horizontal elements define the difference between the first and second level of the building which follows the same floor levels as the first addition; after the second level, the horizontal elements are more articulated. Some gothic influence can be seen in the inside structural elements (because of its glass surface); the structural beams are designed with a pointed arch shape which simulates the pointed arched windows of the original building (Fig. 6). The new library is more articulated than the

first addition, following the architectural elements of the original building, in particular the elements of the gothic towers.

**Fig. 2.** William R. Perkin Library, Duke University. The Main Quad, West, on May 3, 1930. Historic view of original building. Image property Duke University. <http://library.duke.edu/uarchives/exhibits/construction/index.html>.

**Fig. 3.** William R. Perkin Library, Duke University. Original building, existing condition. Image by Cindiann, <http://www.flickr.com/photos/trucolorsfly/438067731/in/set-72157600033375202/>.



**Fig. 4.** William R. Perkin Library, Duke University, South Side. First addition on the right, and second addition on the lower left. Digital photo by Cindy Frank, April 6, 2009.





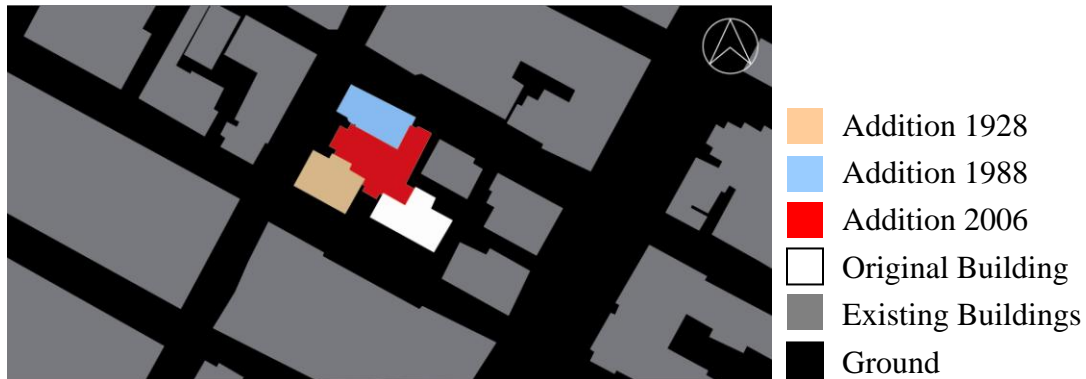
**Fig. 5.** William R. Perkin Library, Duke University. First Addition. Digital photo by Cindy Frank, April 6, 2009.



**Fig. 6.** William R. Perkin Library, Duke University. The von der Heyden Pavilion (Second Addition). Digital photo by Cindy Frank, April 6, 2009.

## **Building No. 2: Morgan Library & Museum:**

225 Madison Avenue, New York, NY 10016



**Fig. 7.** Site map, Morgan Library (not to scale).

### **Significant Details:**

- **Original Building:** Built in 1906 as a private library in the Renaissance style, designed by Charles Follen McKim of McKim, Mead & White. It became a public institution in 1924.
- **First Addition:** Built in 1928 in Renaissance style, design by Benjamin Morris.
- **Second Addition:** In 1988, the mid-nineteenth-century brownstone on Madison Avenue and 37th Street was added to the complex.<sup>19</sup>
- **Third Addition:** Built in 2006, designed by Renzo Piano.

### **Building Analysis:**

- **Volume/Mass:** The first addition of the Morgan Library complex was a similar structure to the original building located on the same block but not originally attached. The general shape for this addition is similar to the original building

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<sup>19</sup> The Morgan Library, *Architectural History*, <http://www.themorgan.org/about/historyArchitecture.asp>.

although with different proportions (height is the same) (Fig. 10). The second addition is an existing building from the same block that was incorporated into the complex later on. This addition is generally a rectangular volume, three and a half stories tall, also separate from the other two structures (Fig. 10). The 2005 addition unifies the complex by filling out the voids between the three existing buildings, bringing it together as a single structure and making it hard to define it as a single specific shape (Fig. 7). The three main rectangular volumes from the third addition project out in between the existing structures which height varies according to its location and the adjacent buildings.

- **Materials:** The material used for the first addition was the same limestone, with the same treatment as in the original building. The material of the second addition was brownstone (Triassic Sandstone) which contrasted with the light color of the other structures. In the latest addition the architect used contemporary materials: glass and metal (Fig. 11). The glass is completely clear, making the interior visible from the outside and the metal panels are painted white to match the color of the first two buildings. These two materials are kept minimalistic; no texture was applied to them.
- **Surface Articulations:** The surface articulations of this complex are very simple. The first addition follows the general articulation from the original building, including its symmetry, window levels, beltcourse, cornice and height. This addition breaks the established rhythm of the original building, and simplifies it as well as it does with the ornamentation (Fig. 12). The second addition, because it was an existing structure built before the original library,



does not follow any element of the existing library. The latest addition is articulated by no more than vertical and horizontal linear elements that at first impression seem to follow its own rules without incorporating elements from the existing buildings, but upon further observation, it does in a subtle way. On the south side, the architect recognizes the existing buildings by respecting this side of the addition to the beltcourse level that exists on both buildings (fig. 14). The second level on this side of the building is articulated with multiple vertical lines of windows which go along with the general context. On the west section (new main entrance) the height of the building responds to the second addition of the complex (the brownstone building). The articulations on this side are predominantly vertical, different from the first two buildings (Fig. 13). This makes the new volume look as if it is rejecting the first two buildings (located on the right), but the few horizontal elements of the façade actually create a connection: the first glass level relates to the window level of the first addition and the second level (middle of the white metal volume on the top) relates to the height of the first addition. A thin glass volume on each side of the adjacent buildings helps the new addition create an illusion of separation from the existing buildings. On the north side the simple linear articulations are arranged in a way that refers to the defining elements of the brownstone building (on the right) but also to stand out as an individual building. On this side, the first level is solid while the upper floors are clear glass, opposite from the main façade, and a wider glass volume is used to “separate” the new addition from the existing building.

**Fig. 8.** Pierpont Morgan Library, main façade original building, 1906. Image: The Making of the Morgan fig. 4, property of The Pierpont Morgan Library, New York.

**Fig. 9.** Pierpont Morgan Library, “The Annex” (first addition), 1928. View from Madison Avenue. Image: The Making of the Morgan fig. 5, property of the Museum of the City of New York, Underhill Collection.

**Fig. 10.** Pierpont Morgan Library, The Morgan campus, 1991: Morgan House on the left (second addition), linking Garden Court at the center, and first addition on the right. Image: The Making of the Morgan fig. 7, property of David A. Loggie.



**Fig. 11.** The Morgan Library & Museum, New York. North-West View. Far left: the Morgan House, second addition on the center and first addition on the right. Digital Photo by Zasha N. Guzmán Torres, March 20, 2009.



**Fig. 12.** The Morgan Library & Museum, New York. South-West View. Original building on the right, first addition on the left. Digital Photo by Zasha N. Guzmán Torres, March 20, 2009.



**Fig. 13.** The Morgan Library & Museum, New York. Main entrance. On the left, the Morgan House, center, second addition, and first addition on the right. Digital Photo by Zasha N. Guzmán Torres, March 20, 2009.





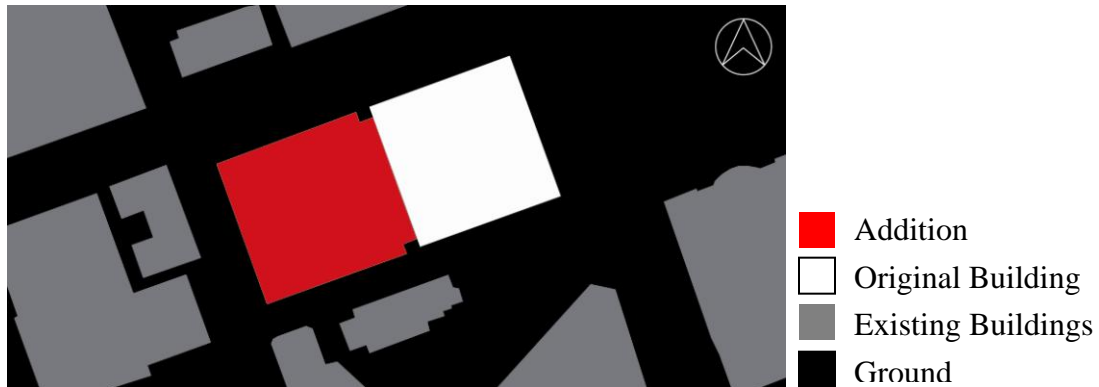
**Fig. 14.** The Morgan Library & Museum, New York. New Addition, South Side. First addition on the left, second addition on the center, Original building on the right. Digital Photo by Zasha N. Guzmán Torres, March 20, 2009.

**Fig. 15.** The Morgan Library & Museum, New York. Model (NW View). Photo: © 2002 Renzo Piano Building Workshop and the Morgan Library, [http://www.arcspace.com/architects/piano/morgan\\_library/](http://www.arcspace.com/architects/piano/morgan_library/).

**Fig. 16.** The Morgan Library & Museum, New York. Model (SW View). Photo: © 2002 Renzo Piano Building Workshop and the Morgan Library, [http://www.arcspace.com/architects/piano/morgan\\_library/](http://www.arcspace.com/architects/piano/morgan_library/).

### **Building No. 3: Boston Public Library:**

*700 Boylston St., Boston MA 02116*



**Fig. 17.** Site map, Boston Public Library (not to scale).

#### **Significant Details:**

- **Original Building:** Built in 1892 in an Italian Renaissance style, designed by McKim, Mead & White.
- **Addition:** Built in 1972, by Philip Johnson & John Burgee.

#### **Building Analysis:**

- **Volume/Mass:** The Boston Public Library's addition is located on the west side of the original building, slightly separated from it by a solid connecting strip. Its general shape is a square cube proportionally similar to the original building (Fig. 17). Although, it can't be perceived from the ground, the roof of the addition has the same pitched style roof as the original building, providing a binding element and continuation.

- **Materials:** The addition was built using the same white granite<sup>20</sup> as the original but with a different coursing; the irregular coursed ashlar uses a wide and narrow alternating course rather than the regular coursed ashlar of the original building (Fig. 21). In the addition the same coursing type is used for the entire surface, while on the original building the coursing changes according to the elevation level. The main material used for doors and windows in the addition was bronze glass with dark framing similar to the original building.
- **Surface Articulations:** The surface articulations of the original building were greatly simplified for the addition. The architects transformed the narrow-spaced arches of the original building into three wide arches on each side of the new building, rejecting any type of detailed decoration elements (Fig. 20). As a gesture to unify the original building with the addition, the architects, continued the cornice line around the addition, but in a modern way and the horizontal string courses of the original building. With the simplification and enlarging of distinctive elements of the original building, the addition lost a sense of human scale that the original building reflects and the horizontality that the original articulations provide. Interior levels or articulations are not clearly perceivable from the exterior of the addition (Fig. 21).

**Fig. 18.** Boston Public Library, Original Building, 1887.

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<sup>20</sup> BPL: *History*,  
<http://www.designlaboratory.com/courses/96.2/studios/a584.s96.matthews/library/history.html>.



**Fig. 19.** Boston Public Library, original building existing condition. Original entrance, view from Copley Square. Image property of R. L. Vann.



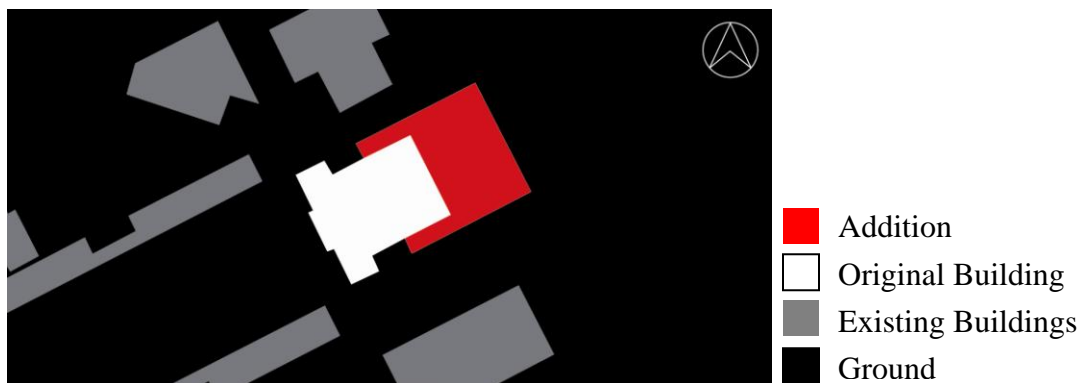
**Fig. 20.** Boston Public Library Addition. View of corner with Hancock Bldg. Image property of R. L. Vann.

**Fig. 21.** Boston Public Library Addition, North-West View with original building on the left. <http://www.designlaboratory.com/courses/96.2/studios/a584.s96.matthews/library/history.html>.

**Fig. 22.** Boston Public Library, South –East View. Original building with addition on the left. Image property of Anatole Senkevitch.

**Building No. 4: Rush Rhees Library:**

*University of Rochester, 500 Joseph C. Wilson Blvd., Rochester, NY 14627*



**Fig. 23.** Site Map, Rush Rhees Library, University of Rochester (not to scale).

**Significant Details:**

- **Original Building:** Built in 1930 in a Greek Revival style, designed by Gordon & Kaelber Architects.
- **Addition:** Built in 1966, designed by Murphy and Mackey Architects.

**Building Analysis:**



- **Volume/Mass:** The addition to the Rush Rhees Library is located at the rear side (East side) of the original building. Its general shape can be described as a “u”, the same width as the front volume of the original building which connects to the original building from the back, going around the library’s tower (Fig. 23). The addition’s roof keeps the same shape and proportions as the original building and becomes a unifying element.
- **Materials:** The materials used for the addition were the same as the original building: red brick and limestone with a slate roof.<sup>21</sup> For the fenestrations, aluminum door and window frames were used<sup>22</sup> contrasting the white wood frame fenestrations of the original building (Figs. 24 & 27).
- **Surface Articulations:** The addition is articulated by subtracting vertical elements all around the main volume. A continuous and strict rhythm of vertical elements, such as narrow lines of columns, narrow windows and wide brick walls, going top to bottom, articulates the general volume. These vertical lines give the addition a sense of verticality that breaks with the massiveness of the structure. These vertical elements are organized following the same rhythm of windows of the original building. The addition also follows the horizontal details of the original building: (1) the rusticated level, that maintains the same color scheme as the original building; (2) the beltcourse, that is transformed to a structural element behind the vertical elements of the addition, and; (3) the cornice, by incorporating a wide band that goes around the structure at the same

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<sup>21</sup> Rush Rhees Library: *Building Data* (1972), <http://www.library.rochester.edu/index.cfm?PAGE=753>.

<sup>22</sup> Ibid.

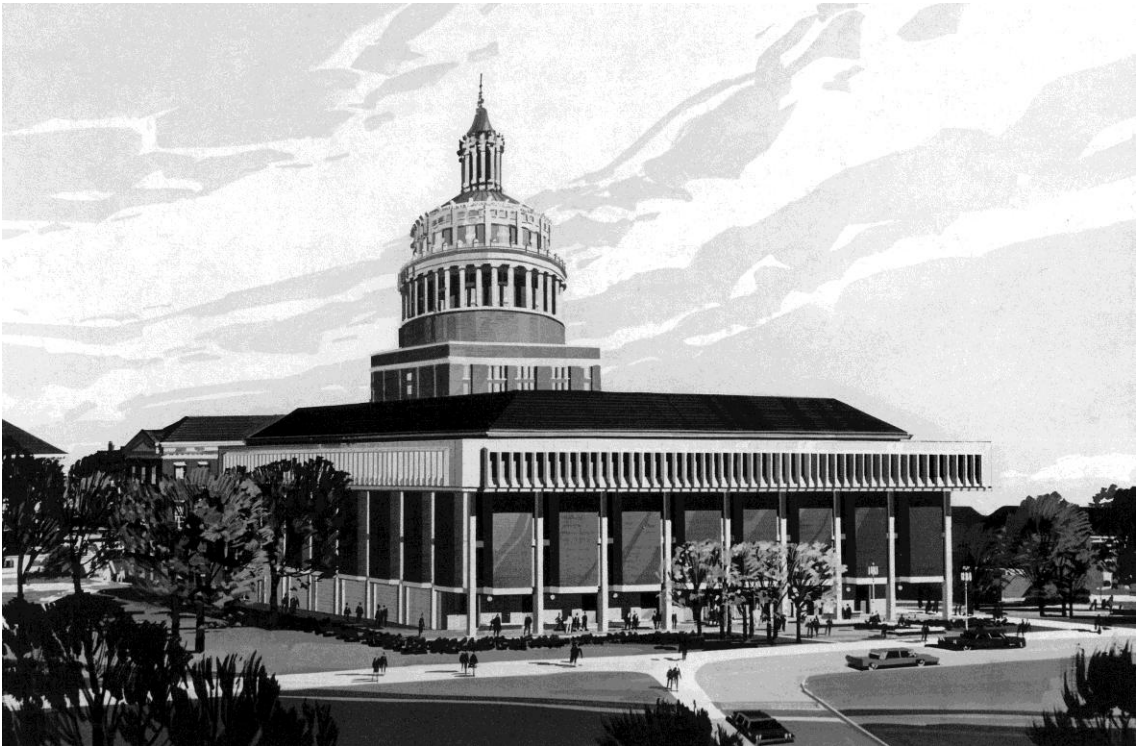
level as the top level of the original building. This top level is articulated with vertical elements spaces similarly to the spacing of the columns from the bell tower. Although the vertical elements dominate the general view of the addition, there is a sense of scale due to the horizontal details (Fig. 26).



**Fig. 24.** Rush Rhees Library, University of Rochester. Main Façade, original building.  
Image property of University of Rochester.  
<http://chem.rochester.edu/~jpdgrp/photogal.htm>.



**Fig. 25.** Rush Rhees Library, University of Rochester. Rear elevation, original view (before addition). Image property of University of Rochester Library.

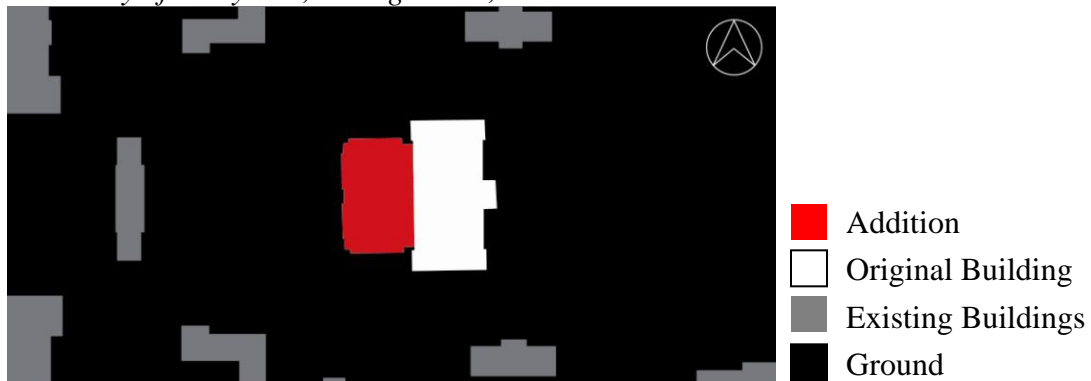


**Fig. 26.** Rush Rhees Library, University of Rochester. Perspective: addition proposal. Image property of University of Rochester Library.

**Fig. 27.** Rush Rhees Library, University of Rochester. East View, addition existing condition. <http://www.waymarking.com/waymarks/WM5RNX>.

**Building No. 5: Theodore R. McKeldin Library:**

*University of Maryland, College Park, MD 20742-7011*



**Fig. 28.** Site map, McKeldin Library (not to scale).

**Significant Details:**

- **Original Building:** Built in 1958 in a neoclassical style, designed by Hopkins & Burton Architects.
- **Addition:** Built in 1982, designed by McLeod Ferrara Ensign & NCP Incorporated Architects.

**Building Analysis:**

- **Volume/Mass:** McKeldin Library's addition is located on the rear elevation (west side) of the original building, between two small vertical projections on each side of the building. The overall shape of the addition can be described as a rectangular cube. Its size is proportionally similar to the inner section of the

original building, which can only be perceived in plan (Fig. 28); in elevation the addition seems to be proportionally smaller than the original building because of the two projecting volumes on the side (Fig. 34), although in perspective seems to be much larger than the original building. The addition has a hipped roof that surrounds the addition and unifies it with the original building by keeping the same pitch across the entire building (Fig. 31).

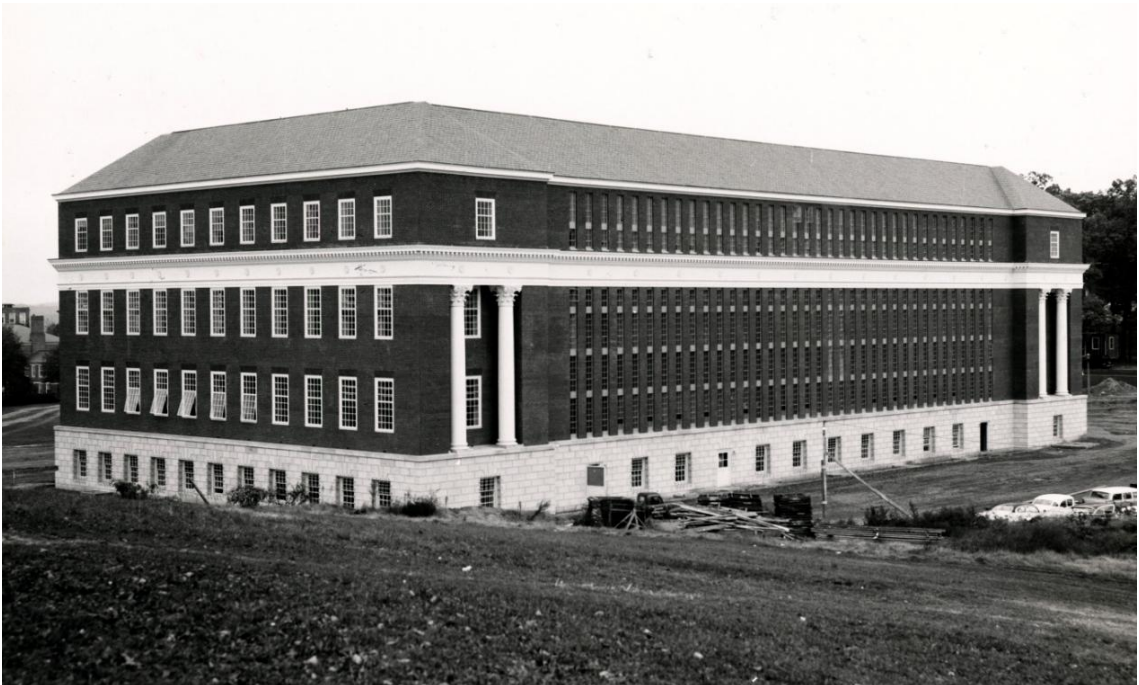
- **Materials:** The exterior materials of the McKeldin addition are red brick, white limestone and concrete. The main material is brick, used as a continuation of the material on the original building but with a different bond type; a Flemish bond was used for the original building while a running or stretcher bond was used for the addition. Concrete is used for structure and some decorative elements. The roof has the same grey slates as the original building (Fig. 33).
- **Surface Articulations:** The main volume of the addition is articulated with the subtraction of rectangular volumes all around. The main articulations occurred at the connection between the original building and the addition as an act of recognition between the two sections, and at the north-west and south-west corners of the cube which break the general cube shape of the addition (Fig. 33). Although not easily recognizable from the exterior, continuous narrow lines of black aluminum and glass windows, going top to floor, break the horizontality of the original building and the general shape of the addition. The vertical lines of windows are located on each of the three exposed elevations, forming the illusion of vertical brick volumes projecting out of the elevation (Fig. 34). These

vertical elements are organized in a specific rhythm but different from the rhythm of windows of the original building. The continuous vertical elements on each elevation of the addition eliminate a clear sense of scale or floor level distinction; floor levels are easily readable in the original building. The addition is surrounded by two horizontal limestone bands that continue the cornice line and the rusticated level of the original building as a binding element to the original design. On the south side of the addition the rusticated level turns into an entrance to the building and service area becoming the only element with human scale properties on the addition. This area is enclosed by simple round concrete columns (*Fig. 34*). At this level, a void band surrounds the volume forming a brick base that follows the rusticated level of the original building; this brick base is articulated with a series of dark openings (doors) not easily identifiable from the exterior (*Fig. 33*).

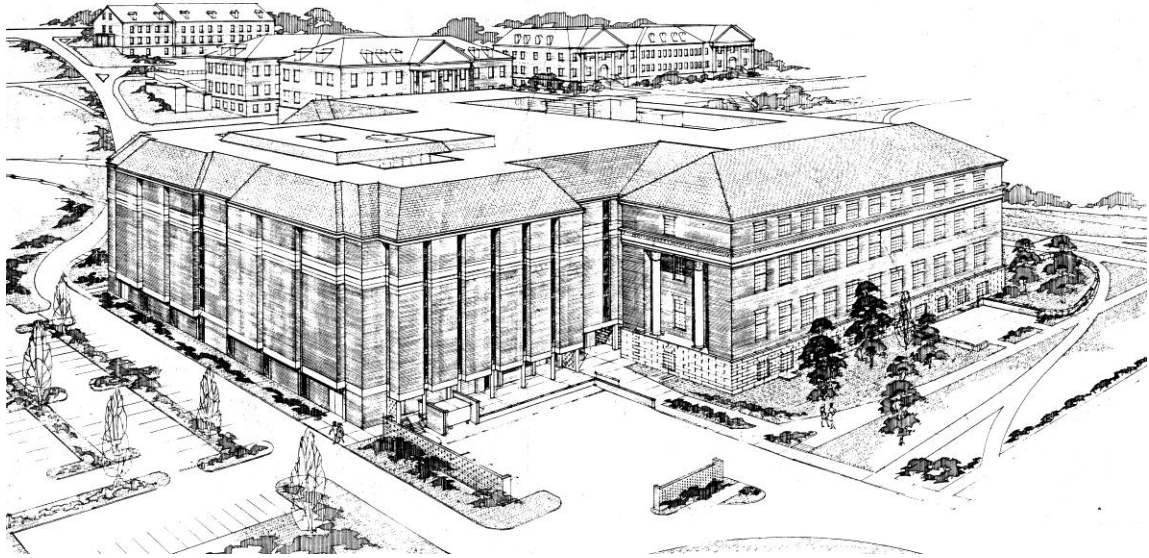




**Fig. 29.** McKeldin Library, University of Maryland. Original Building. Image by University of Maryland.



**Fig. 30.** McKeldin Library, University of Maryland. Original Building, North-West View. Image by University of Maryland, 1957.



**Fig. 31.** McKeldin Library, University of Maryland. Bird View, Proposed Addition. Image property of the University of Maryland.



**Fig. 32.** McKeldin Library, University of Maryland. Existing condition, original building with addition on the back. Digital Photo by Zasha N. Guzmán Torres, March 2, 2009.





**Fig. 33.** The McKeldin Library, University of Maryland, College Park. South-West View, Addition and original building on the left. Digital Photo by Zasha N. Guzmán Torres, March 20, 2009.



**Fig. 34.** The McKeldin Library, University of Maryland, College Park. South View. Digital Photo by Zasha N. Guzmán Torres, March 20, 2009.

## Survey

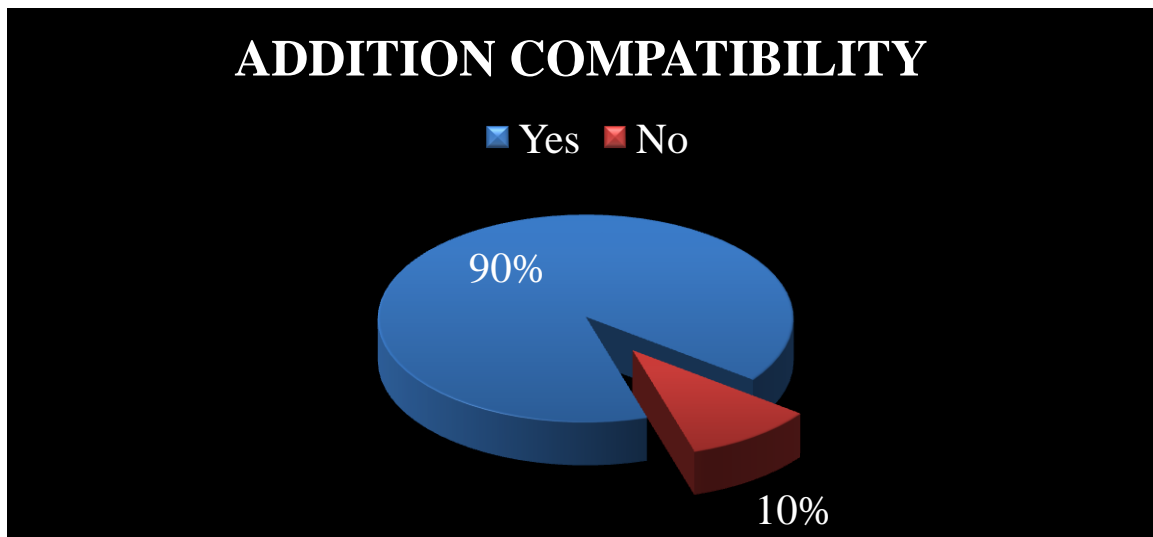
Drawing on the case studies, a survey was conducted to help identify specific design elements and patterns that can lead to the success or failure of contemporary additions on historic buildings. The survey was conducted mostly among professionals in the field, including both architects and preservationists. The survey asked the participants two main questions for each of the five case studies. The first one was a yes or no question, asking about their first thoughts on compatibility of the addition with the historic structure while, the second set of questions asked the participants about the cohesiveness with the historic building of specific architectural details such as volume/mass, materials and surface articulations. For these questions, a chart was provided to the participants so that they could rank their answers from: not applicable (N/A), strongly agree (SA), agree (A), disagree (D), to strongly disagree (SD). The survey form also included an extra sheet for additional comments, images and brief information of each of the case studies and a definition of the terms used on the chart (Appendix A).

Thirty-one surveys were sent out, and ten were received back, a 32% response rate. Although it was a smaller response than initially expected, the returned surveys provided data to analyze the case studies as intended, resulting in some interesting results.

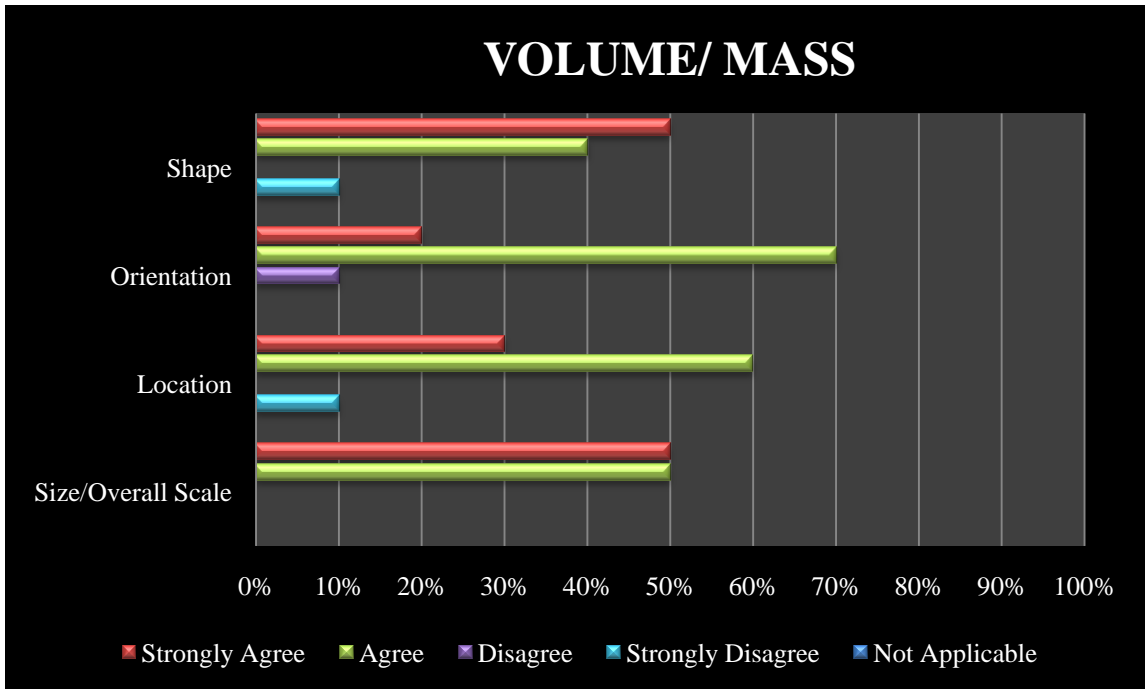
## Survey Results by Building:

### Building No. 1: Perkins Library, Duke University:

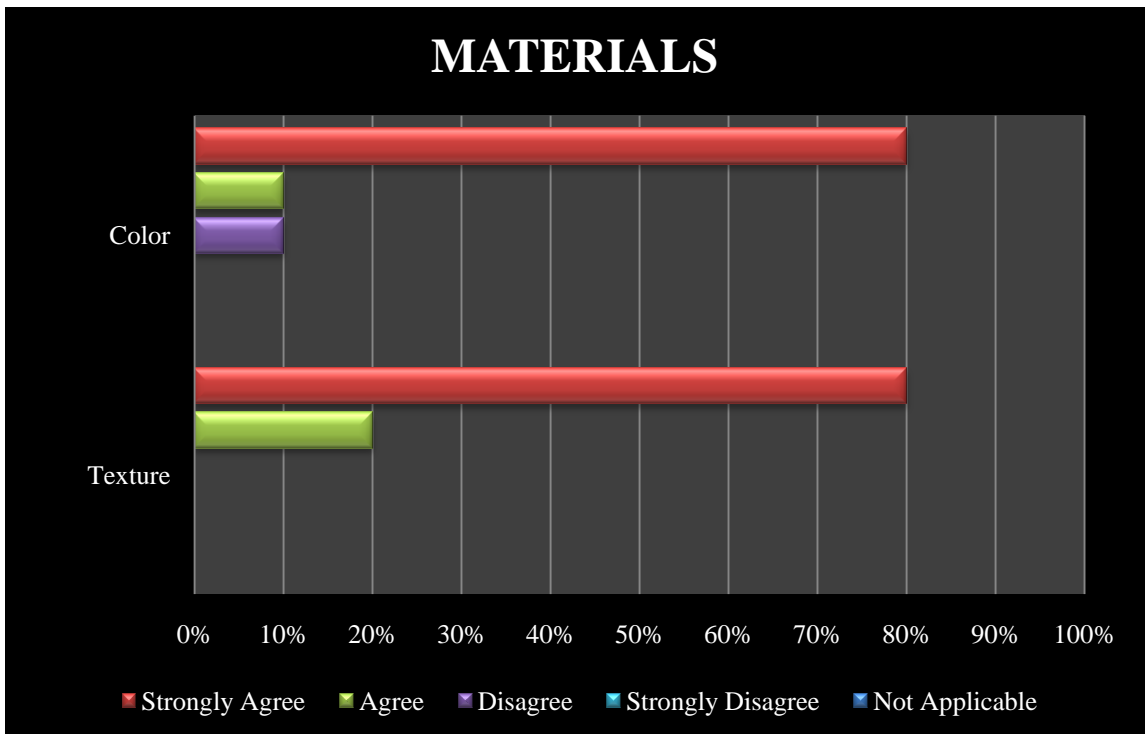
The Perkins Library was one of the most favorite buildings among the surveyed professionals. Approximately 90% of the people responded yes to the question of first impressions on compatibility of the addition with the original building (Fig. 35). When analyzing specific elements of the additions, about 90% strongly agreed or agreed with the compatibility of the new elements of both additions (according to their comments) with the existing ones, including its volume and massing, materials and surface articulations (Figs. 36 & 37). Some of the elements that people identified as not cohesive with the original building include the location and shape of the addition(s), the color of the materials used, and some of the surface articulations such as, openings, linear elements and rhythm (Fig. 38). According to the comments, some people liked the modern references to the original Gothic style, while others thought is too literal.



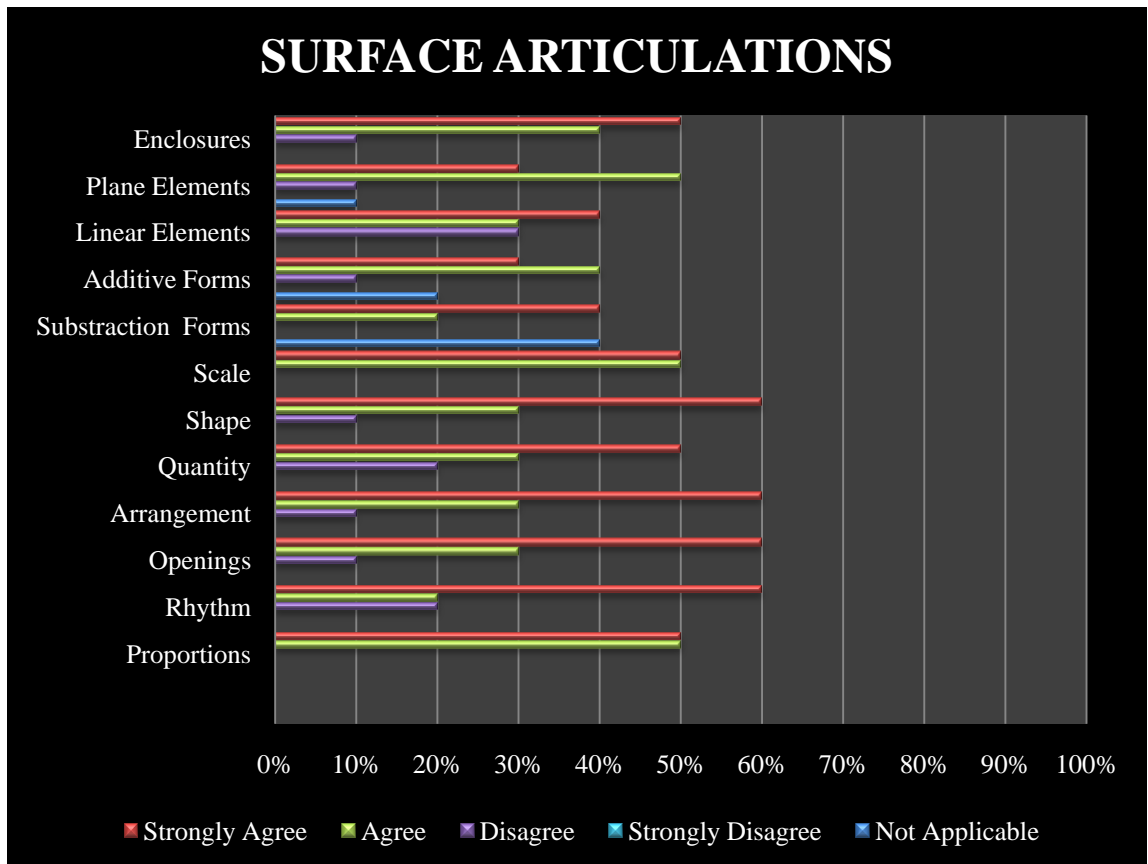
**Fig. 35.** Perkin Library, Duke University. Results for first question of survey: Addition Compatibility. A total of 90% of the participants agreed with the compatibility between the addition and the original building.



**Fig. 36.** Perkin Library, Duke University. Results for second question of survey: Volume/Mass section. Most of the participants found that the volume and massing of the additions worked cohesively with the original building.



**Fig. 37.** Perkin Library, Duke University. Results for second question of survey: Materials section. Most of the participants found that the materials of the additions worked cohesively with the original building's materials.

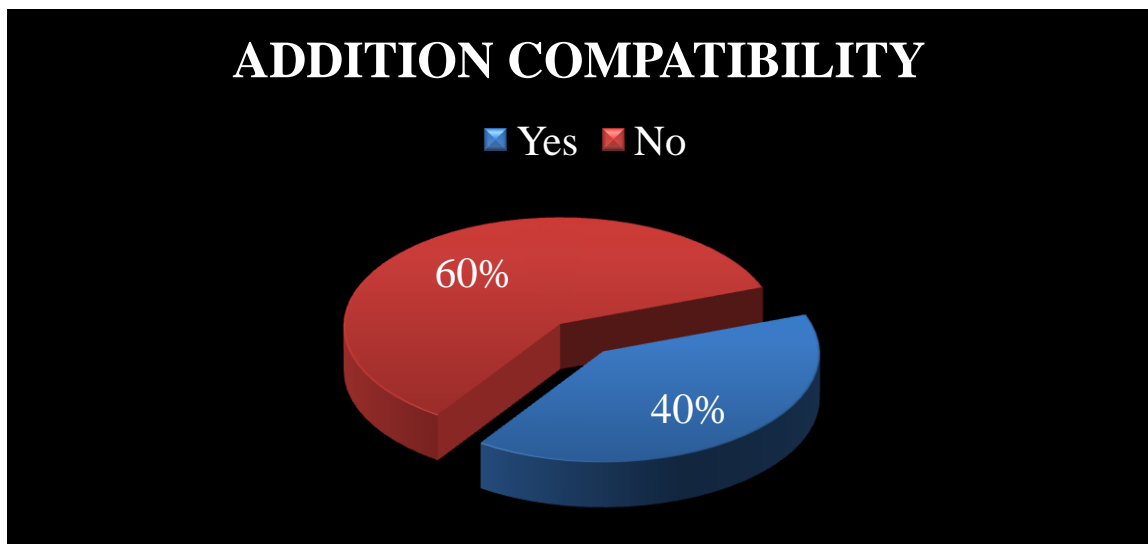


**Fig. 38.** Perkins Library, Duke University. Results for second question of survey: Surface Articulations section. The participants found that most of the surface articulations worked cohesively with the original building’s materials.

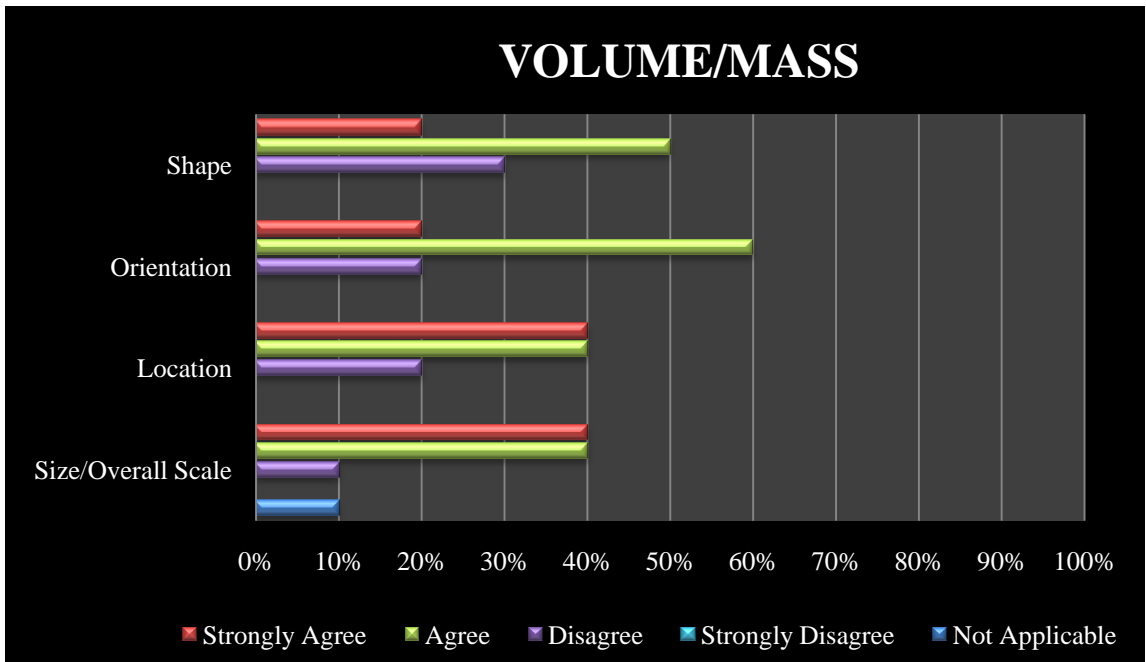
**Building No. 2: The Morgan Library:**

The results for the Morgan Library in terms of first impressions on compatibility of the additions to the original building received more mixed results. Although 60% of respondents didn’t think the additions were compatible with the original building, 40% did consider it a compatible intervention (Fig. 39). The results on the analysis of specific elements was also mixed; most people agree with the compatibility of the general volume and massing of the additions in relationship with the original building

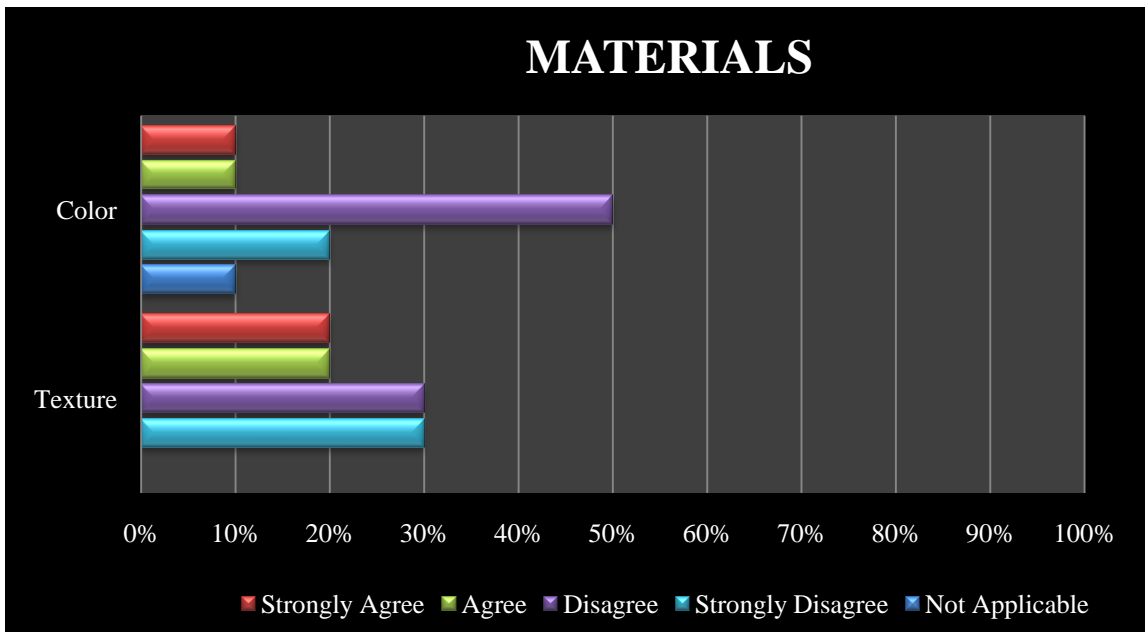
(Fig. 40), but they also disagreed with the compatibility between new and original materials (Fig. 41). In terms of the surface articulations, the survey participants felt that most elements were out of character. The only element of the surface articulations that people appreciated was the proportions (Fig. 42). Some of the participants thought that the additions were “disjointed” and “separate” from one another presenting no cohesion at all. One of the participants made an interesting observation saying that “at first glance, there appears to be no cohesion between the buildings. Upon closer study, the volumes are compatible, as are the surface articulations.” Other issues raised were the general orientation and not being consistent with the block face, and the change in orientation of the surface articulations from horizontal on original building to a vertical on addition. One participant noticed that the additions, although it has its own identity, doesn’t compete with either of the existing structures.



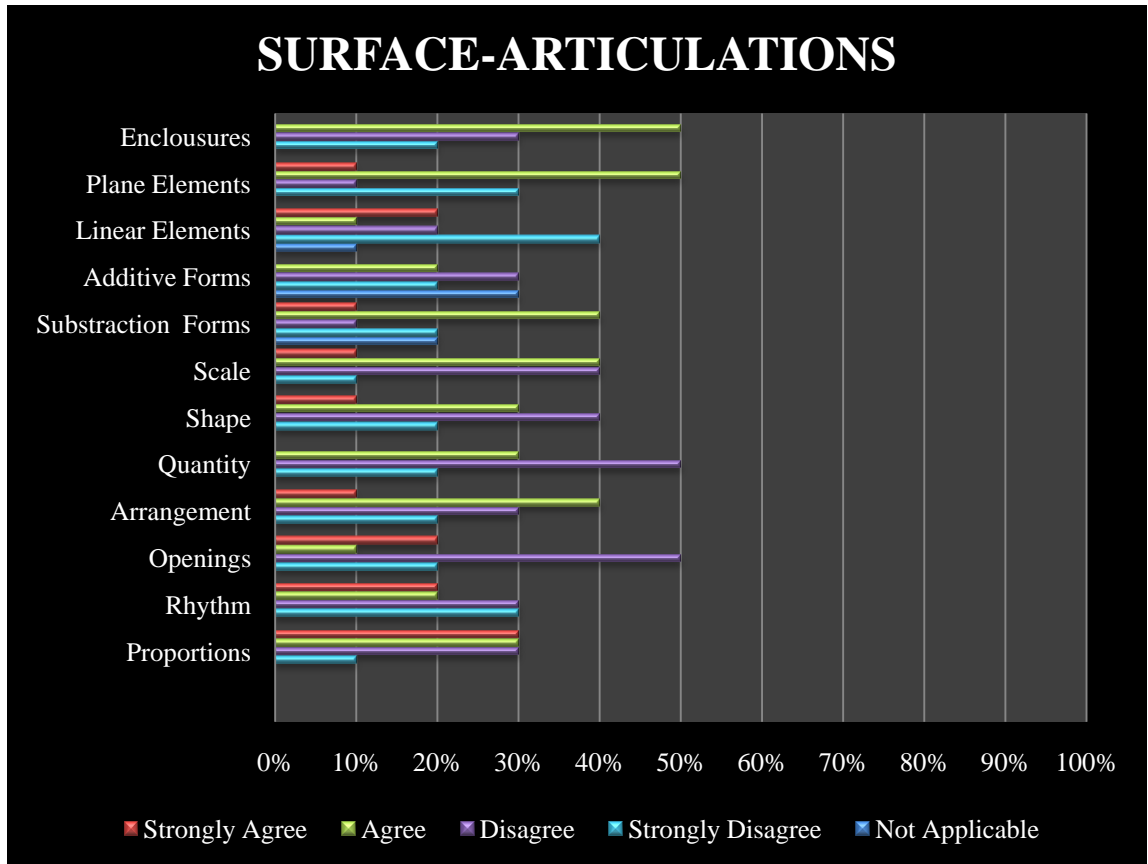
**Fig. 39.** The Morgan Library. Results for first question of survey. A total of 60% of the participants disagreed with the compatibility between the addition and the original building.



**Fig. 40.** The Morgan Library. Results for second question of survey: Volume/Mass section. Most of the participants found that the volume and massing of the additions worked cohesively with the original building.



**Fig. 41.** The Morgan Library. Results for second question of survey: Materials section. Most of the participants found that the materials of the additions did not work cohesively with the original building's materials.



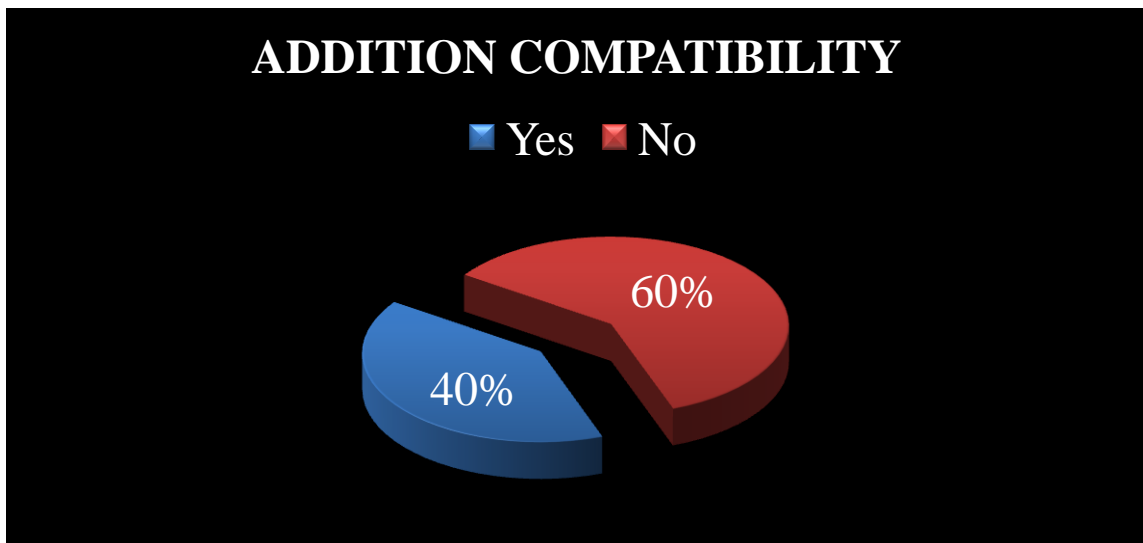
**Fig. 42.** The Morgan Library. Results for second question of survey: Surface Articulations section. According to the participants responses there were mixed results, not all of the surface articulations of the additions worked cohesively with the existing buildings.

### **Building No. 3: Boston Public Library:**

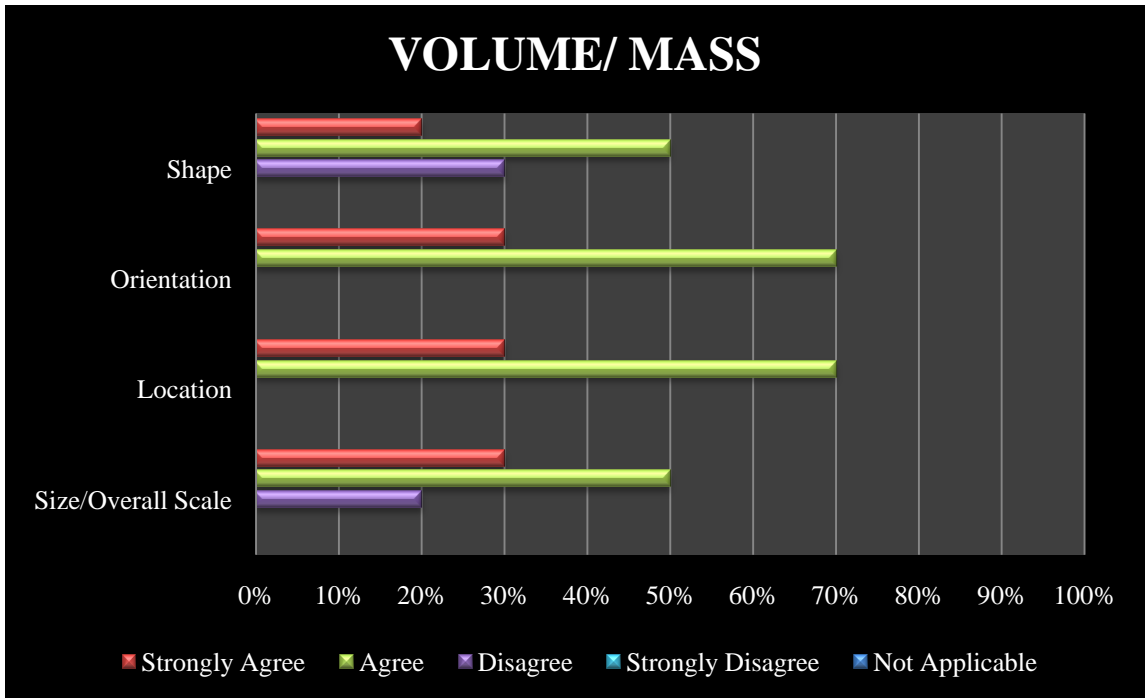
With the Boston Public Library addition, 60% of the respondents disagree with the compatibility of the addition with the original building (Fig. 43). In terms of specifics architectural elements, contrasting with the results obtained on the compatibility question, a significant amount of the people agreed with the relationship between general elements such as volume, massing and materials (Figs. 44 & 45). Respondents also felt that most of the surface articulations used were not compatible



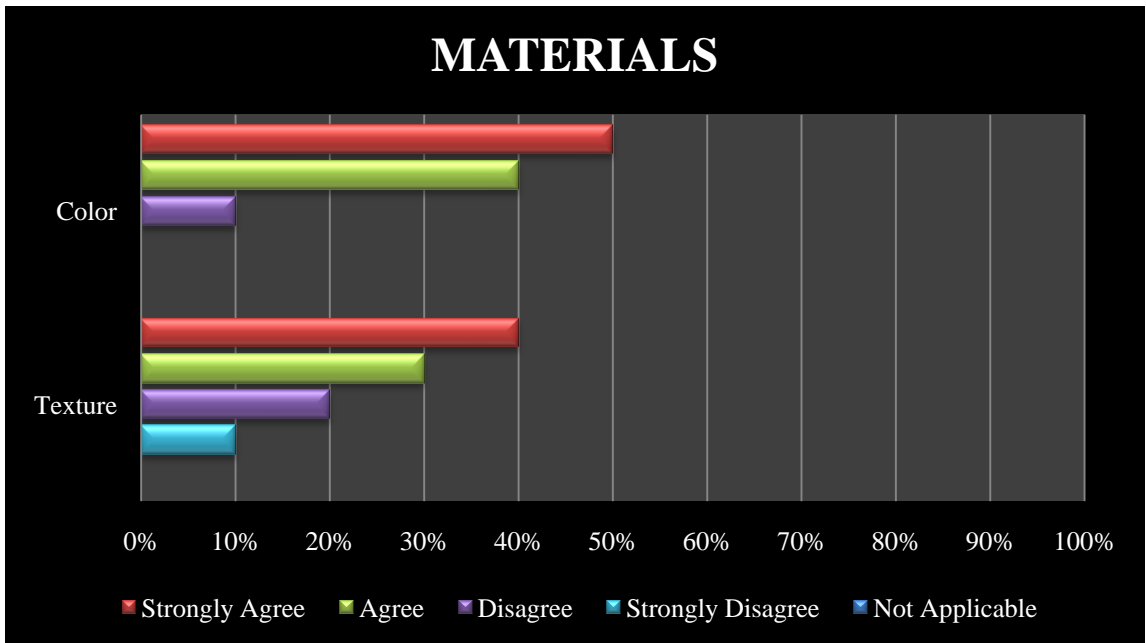
with the original building (Fig. 46). In general, the participants thought that the addition seems to be much more massive than the original building, changing the focal point to the much larger, newer building (the addition). Most of the comments were in reference to how the addition resembles the original work, but the rhythm of the original was lost in the addition, making it seem like a separate and unrelated building. Another observation was the lack of human scale in the addition.



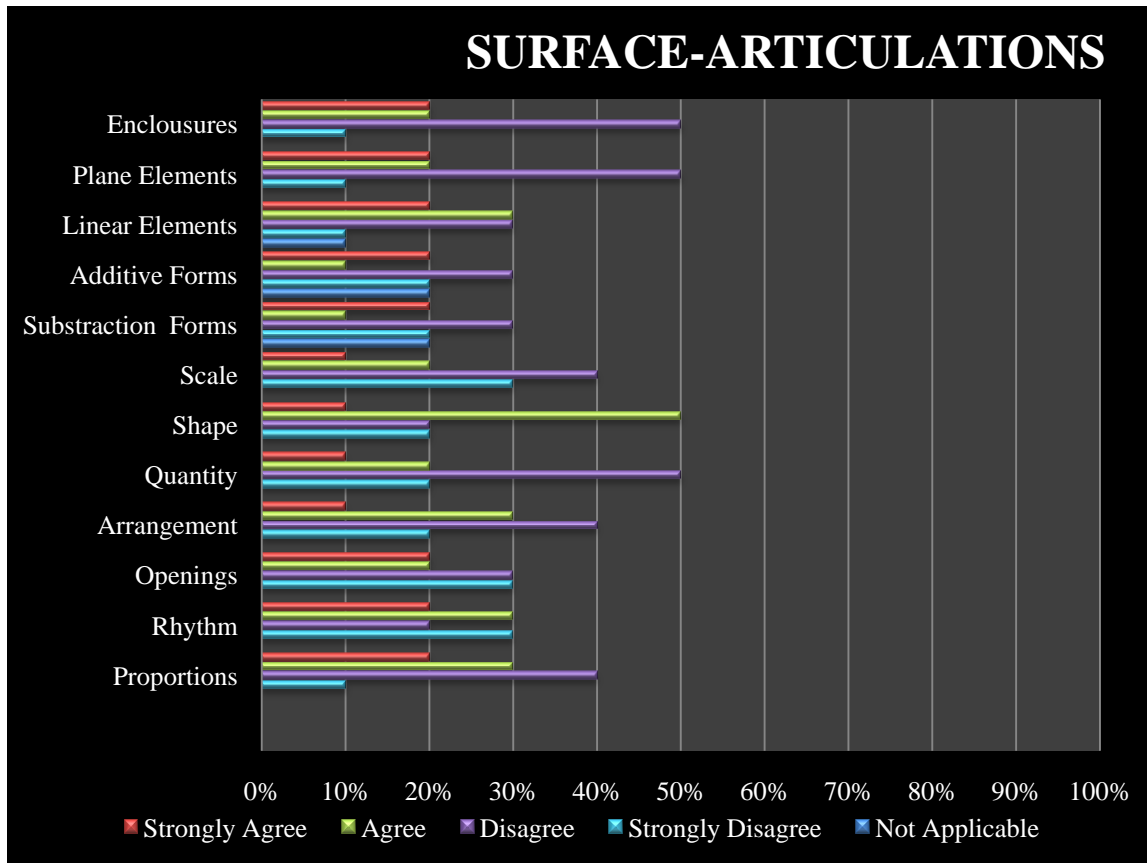
**Fig. 43.** Boston Public Library. Results for first question of survey: Addition Compatibility. Just a total of 40% of the participants agreed with the compatibility between the addition and the original building.



**Fig. 44.** Boston Public Library. Results for second question of survey: Volume/Mass section. Most of the participants found that the volume and massing of the additions worked cohesively with the original building.



**Fig. 45.** Boston Public Library. Results for second question of survey: materials section. Most of the participants found that the materials of the additions worked cohesively with the original building's materials.

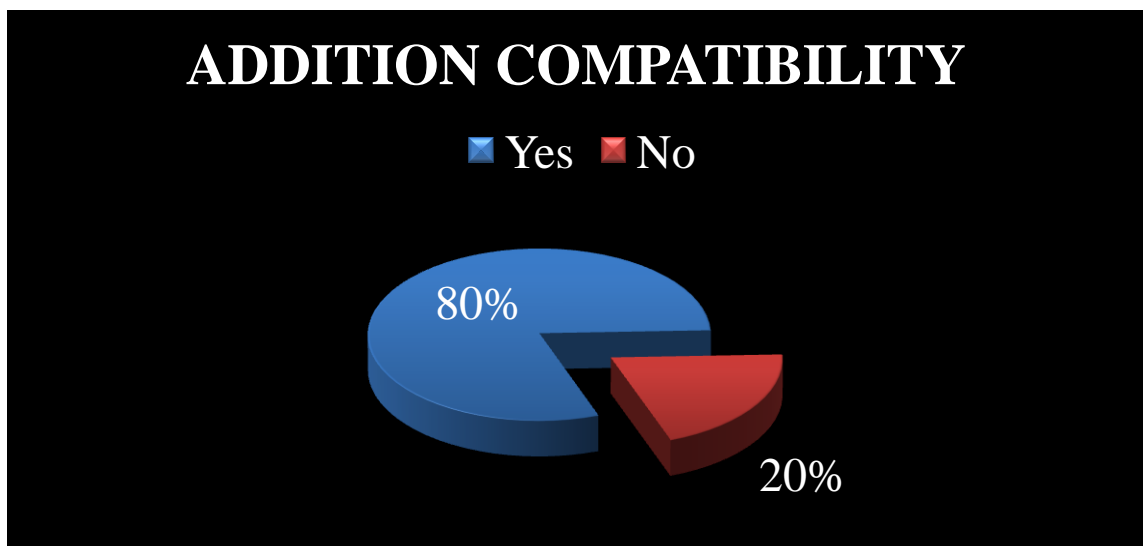


**Fig. 46.** Boston Public Library. Results for second question of survey: Surface Articulations section. According to the participants responses there were mixed results, not all of the surface articulations of the additions worked cohesively with the existing buildings.

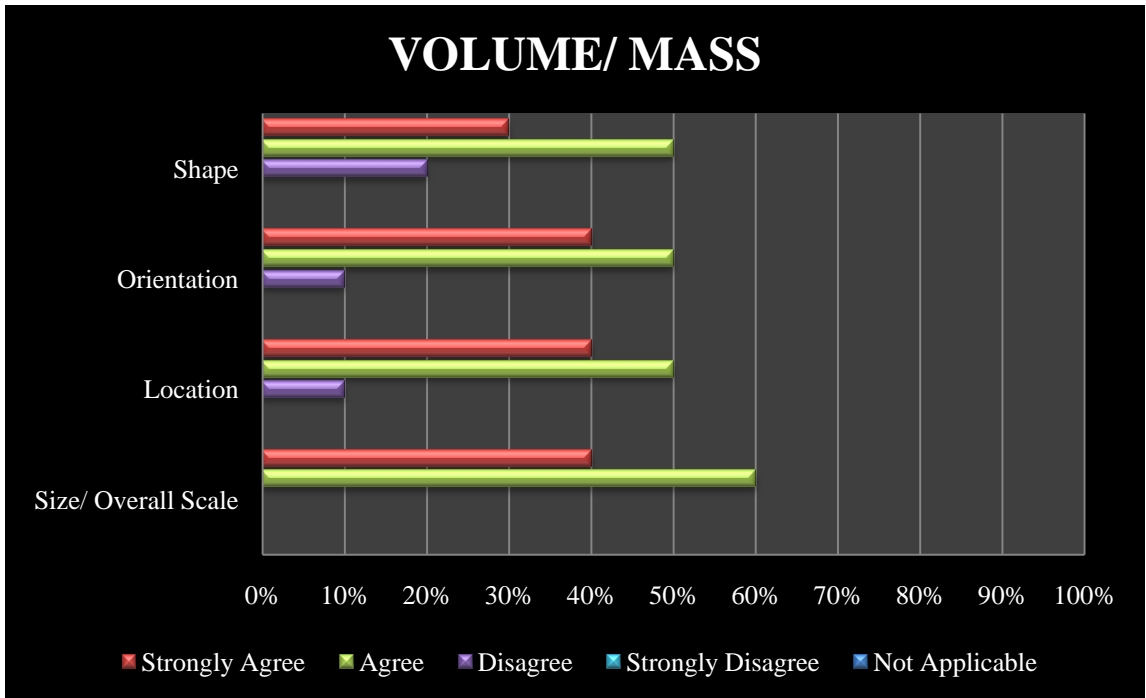
**Building No. 4: Rush Rhees Library, University of Rochester:**

The Rush Rhees Library was another favorite of the participants of the survey. On the first question, impressions of general compatibility, 80% of the participants answered yes (Fig. 47). Their response to the question on cohesiveness of specific architectural elements was more consistent than with other buildings. Most of the participants agreed that the elements for the new addition were cohesive with the

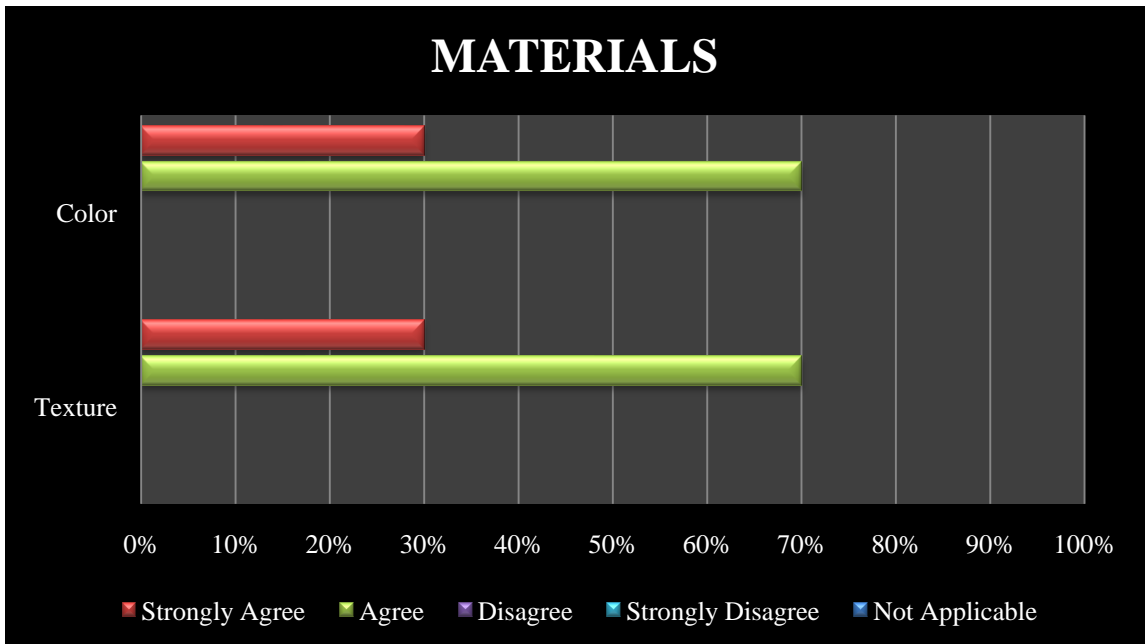
original building (Fig. 50). There was just one of the participants who consistently felt that the addition was not compatible or cohesive with the historic structure. A common opinion of the participants was how the addition was obvious but very contextual without imitating or detracting from the original building.



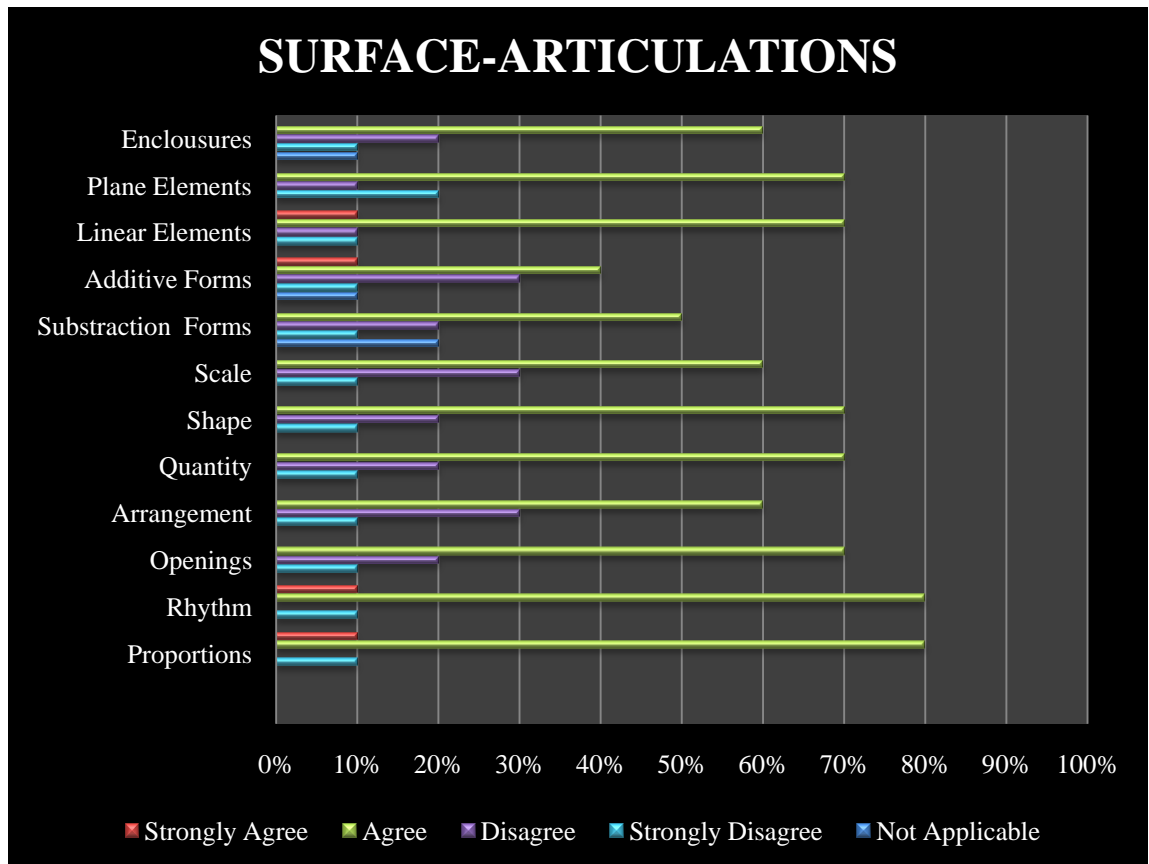
**Fig. 47.** Rush Rhees Library, University of Rochester. Results for first question of survey: Addition Compatibility.



**Fig. 48.** Ruch Rhees Library, University of Rochester. Results for second question of survey: Volume/Mass Section. Most of the participants agreed with the volume and massing relationship between the structures.



**Fig. 49.** Rush Rhees Library, University of Rochester. Results for second question of survey: Materials Section. Most of the participants agreed with the materials used on the addition.

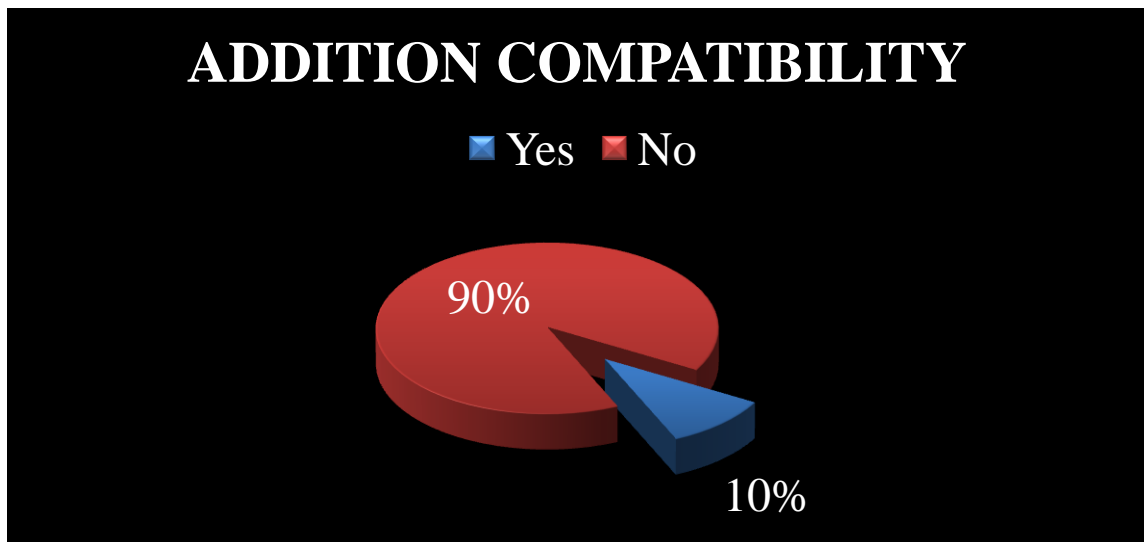


**Fig. 50.** Rush Rhees Library, University of Rochester. Results for second question of survey: Survey Articulations section. Most of the participants agreed there was a cohesive relationship between the addition and the original building’s surface articulations.

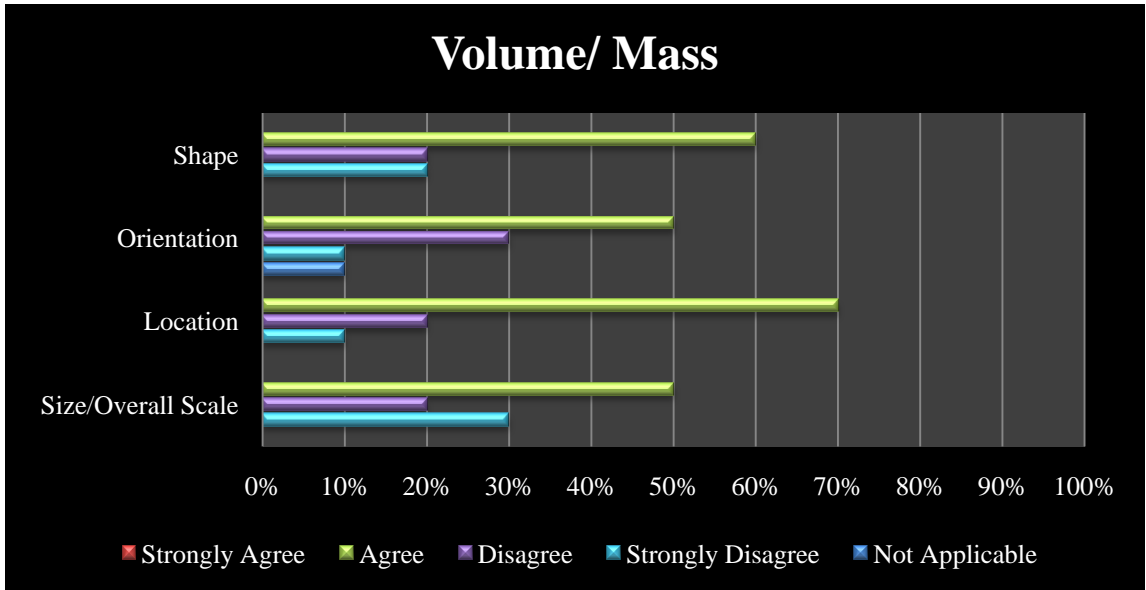
**Building No. 5: Theodore R. McKeldin Library, University of Maryland:**

The McKeldin Library addition was the least favorite of the participants. In contrast with the other buildings, 90% of the participants didn’t think the addition was compatible with the original building (Fig. 51). The participants agreed that in general the architectural elements of the addition were cohesive with the original building elements such as volume, massing, and the materials used (Figs. 52 & 53). Most of the

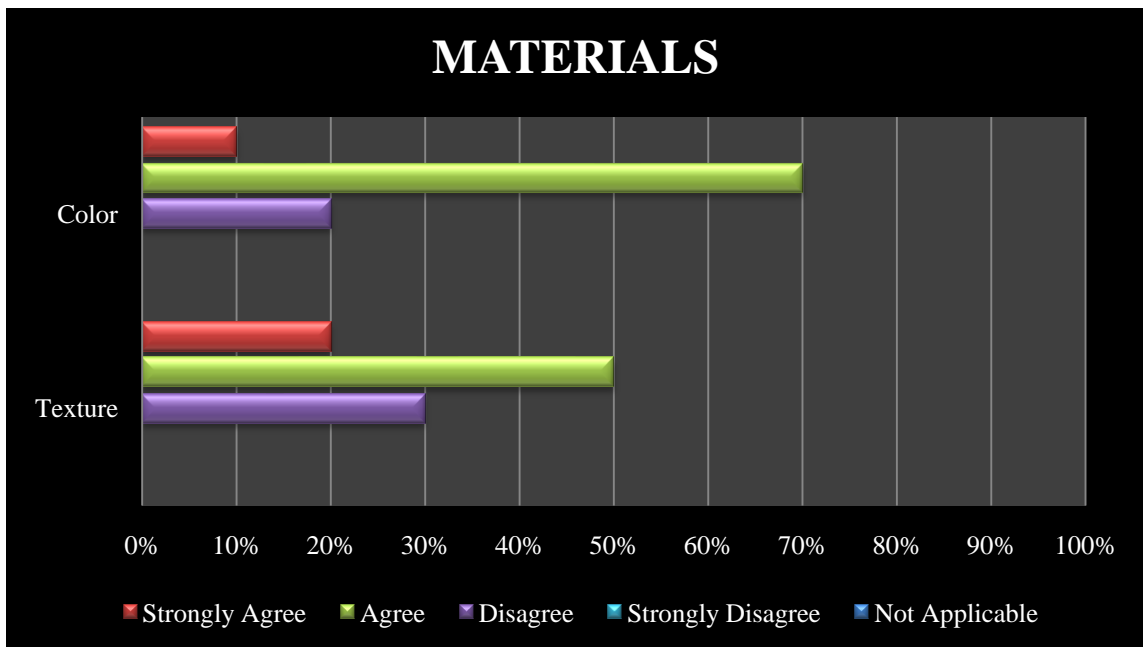
people answered negatively in terms of the surface articulations (Fig. 54). Some of the surface articulations that participants found problematic were the rhythm, the quality of openings, and linear and planar elements. The reactions towards this addition were also very similar and consistent with the answer to the survey questions. People thought that although its size and scale was compatible with the original building, the lack of openings, such as doors in the first level and windows, makes it feel heavier than it is. Many of the participants pointed out how its massiveness made it look more like a utilitarian structure, one person described it as a “prison,” instead of a place to learn.



**Fig. 51.** McKeldin Library, University of Maryland. Results for first question of survey: Addition Compatibility. Most of the participants disagreed with the compatibility between the original building and its addition.

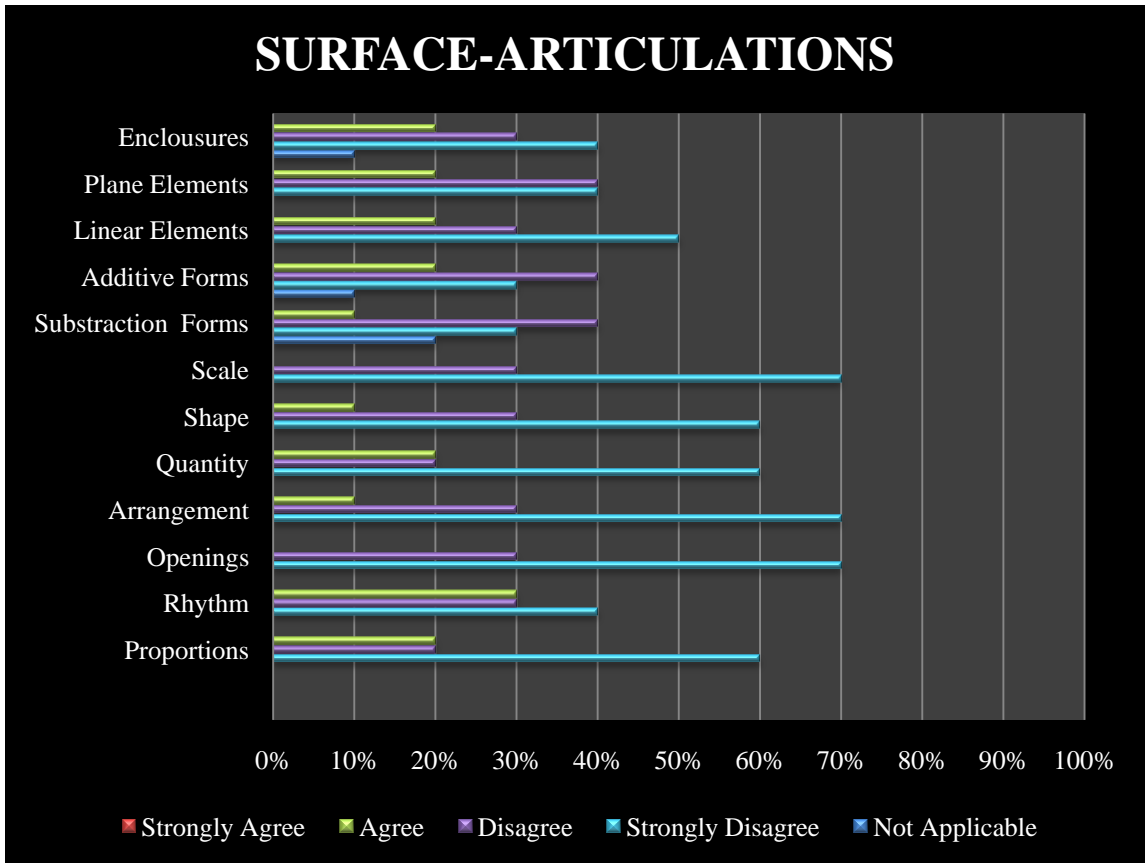


**Fig. 52.** McKeldin Library, University of Maryland. Results for second question of survey: Volume/Mass section. Most of the participants agreed with the volumetric relationship between the original building and the addition.



**Fig. 53.** McKeldin Library, University of Maryland. Results for second question of survey: Materials section. Most of the participants agreed with the materials used.





**Fig. 54.** McKeldin Library, University of Maryland. Results for second question of survey: Surface Articulations section. Most of the participants disagreed with the relationship between the original building and the addition's surface articulations.

### General Observations:

Interesting and significant details were obtained from the overview and comparison of the results. The most relevant of those details is the relationship between the responses given to the first question, the first impression of the compatibility between the contemporary addition and the historic building, and the answers given in the second one, the cohesiveness of specific architectural elements.

For the buildings where the participants felt the additions were compatible with the historic structure, they also reported that most of the architectural elements worked cohesively with the original building. On the buildings with mixed responses to the first question their answers were proportionally mixed in the second. On the buildings where the participants viewed the addition as not compatible with the original building the participants also agreed that most of the architectural elements were not cohesive with the original building. These results seem very predictable at first sight, but when we look at the details of their answers we can see an interesting pattern.

For all the buildings surveyed, the majority of the participants agreed that the volume and massing of the additions worked cohesively with the original building, even on those buildings where the addition was thought to be incompatible with the original. This fact could demonstrate how the recommendations about the control of volume, mass, and scale given by the professionals in the field were well applied and noticeable in these cases. The addition materials were also found to work in a cohesive relationship with the original building, although this was not as strongly correlated as with the volume and massing. The situation becomes more interesting when we compare the first question with the responses regarding surface articulations. The responses were significantly correlated to one another. The people who agreed with the compatibility between the addition and the original building, usually agreed with the cohesiveness of the surface articulations of the addition in relationship to the original building. When

people disagreed with the compatibility between the two, they usually also disagreed with their surface articulations.

According to the results from the survey, surface articulations are critical for a good relationship between contemporary additions and historic buildings. It seems that in order to successfully conceive a contemporary addition that works cohesively with the historic building, not only elements such as volume, massing, scale and the location have to be designed proportionally and with respect, but also each of the architectural elements that are going to be incorporated to the new structure. This research made me realize that special attention needs to be paid to the small elements of the new addition. This was an area that the participants also pointed out in some of their comments. On some of the additions that participants felt lack of cohesion, they mentioned details that they thought were missing, and would be important for a better relationship from defining elements of human scale such as doors and windows, to the relation to details from the original building such as floor or roof levels.



## **Chapter 3: Finding the Elements of a Cohesive Design**

### **Relationship**

As discussed in the first chapters, the use of contemporary architecture for additions to historic buildings is the best way to contribute to the historic fabric. By using a contemporary style, we respect the original fabric by avoiding misrepresentation and add to the historic building elements that truly speak for the present. But what is most important is to conceive a relationship between the two, historic building and contemporary addition, in a cohesive way. In order to achieve this goal, it is important to clearly define the specific elements that make for a successful relationship. Through this research, I was able to investigate more in depth those elements that determine the success or failure of the new and old relationship.

According to my findings, the defining element in a successful cohesive relationship between a historic building and its contemporary addition is the proper use of all architectural elements, in particular the surface articulations, in a way that, first: relates directly with the original building or architectural context and, second that relates to the human scale.

Apparently, the control of the general volumes, mass and proportions, avoiding competition between the addition and the original building; the use of compatible materials, colors and texture, and; to place the new addition on a secondary location to avoid drastic changes in the historic view of the structure alone, are not enough to achieve cohesion between a historic building and a contemporary addition. Although,

these are very important elements to take into consideration when adding to a historic building, it is clear that, the way these volumes are articulated plays a major part in the overall success. Surface articulations are significant elements in architecture that define the characteristics of a structure on a smaller scale (volume and massing define it as a whole). These include the arrangement, quantity, shape and scale of openings, linear and planar elements, enclosures, additive and subtractive forms, and their proportions, rhythm and arrangement, individually and as a group. Through the use of these elements designers can relate to the architectural, historical, human, and urban, context of the project. In this case, as a historic preservation issue, it is important to create a close relationship with the immediate context: the historic building. It is crucial that all the historic building elements are taken into consideration to design the new contemporary addition; not just as a separate building to be used as a casual reference but as a starting point for the continuation of the existing building, treating it as an important part a single structure.

Surface articulations should also be used in contemporary additions to give a sense of scale. As mentioned above, participants of the survey felt disconnected to structures that lacked defining elements of scale. The monumentality of some of the case studies presented was not well received by the participants. Based on this, it seems that the presence of scale elements such as doors, windows and floor levels were a way to establish a more close relationship between the building and the spectator. This is an important detail to take into consideration, because it helps to maintain a connection between the building (contemporary addition) and the public.

One thing that I personally experienced through this research, that definitely helped me understand the good and bad in the relationship between historic buildings and contemporary additions, was learning more about elements in architecture. Looking for that specific vocabulary and trying to define these in a contrasting architectural composition and their relevance for a cohesive relationship helped me to look deeper and understand it more profoundly, leaving behind the ambiguousness of personal taste. By not classifying resources by what I considered as architecturally beautiful or not, I ended reclassifying them to what really worked cohesively and was respectful of the historic structure. This was a phenomenon that I read about in one of my sources, which helped me realize that one of the main problems with this issue was education. During this research I was able to train myself to look, interpret and then conclude based on the details rather than some vague and general perception.

In order to achieve a cohesive relationship between historic buildings and their contemporary additions, I recommend first, that more specific recommendations should be create on the elements that should be taken into consideration when adding to a historic building, recommendations that not only mention that volume, massing, scale, materials and location should be taken into consideration, but also its details. These recommendations should include how these elements can be used and incorporate reasons for their specific use, examples of different ways to approach it and good and bad examples, to give the designer some sort of basic guidance on how to approach the problem and avoiding limiting or forcing the design of the addition to a specify style.

My second recommendation is education. According to this research, it is crucial to clearly understand what makes a good relationship between historic buildings and contemporary additions. Special training should be offered to professionals in the field both architects and preservationists, to help them understand the importance of compatibility and a cohesive relationship by giving them tools and techniques to create a good balance between old and new. This type of education should also be extended to the general public, to teach them how to observe, analyze, and understand the meaning of architectural elements and their relationship in an old and new relationship leaving behind judgments based only on personal taste of architecture. It is very important to educate the public because they are the people who look after, fight, and make the difference for the protection of our historic resources. If the people who have the capability to decide what is good or not for a historic building do not have a complete understanding of what this means, it could lead to wrong decisions for interventions to historic buildings. Finally, more research and analysis on contemporary style additions to historic buildings is strongly recommended to better understand the process of adding and learn how each of those elements work in different contexts and situations, to be able to have effective guidelines and recommendations.



## **Appendices**



# Appendix A: Survey Package

## Survey Form

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**HISTORIC BUILDINGS AND CONTEMPORARY ADDITIONS: LOOKING FOR THE ELEMENTS THAT CREATE A COHESIVE DESIGN RELATIONSHIP | SURVEY**

- BUILDING No. \_\_\_\_\_**
- 1. AT FIRST IMPRESSION, DO YOU THINK THE NEW ADDITION IS COMPATIBLE WITH THE HISTORIC STRUCTURE? \_\_\_\_\_ YES \_\_\_\_\_ NO**
- 2. THE FOLLOWING ARCHITECTURAL ELEMENTS FROM THE NEW ADDITION WORK COHESIVELY WITH THE HISTORIC STRUCTURE:**

	N/A	SA	A	D	SD	COMMENTS (use additional sheet for more comments)
<b>VOLUME/MASS</b>						
• SIZE/OVERALL SCALE						
• LOCATION						
• ORIENTATION						
• SHAPE						
<b>MATERIALS</b>						
• TEXTURE						
• COLOR						
<b>SURFACE ARTICULATIONS</b>						
PROPORTIONS						
RHYTHM						
• OPENINGS						
- ARRANGEMENT						
- QUANTITY						
- SHAPE						
- SCALE						
• SUBTRACTION FORMS						
• ADDITIVE FORMS						
• LINEAR ELEMENTS						
• PLANE ELEMENTS						
• ENCLOSURES						

N/A: not applicable | SA: strongly agree | A: agree | D: disagree | SD: strongly disagree

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**ADDITIONAL COMMENTS SHEET**

# Case Studies Section

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**HISTORIC BUILDINGS AND CONTEMPORARY ADDITIONS: LOOKING FOR THE ELEMENTS THAT CREATE A COHESIVE DESIGN RELATIONSHIP | SURVEY**

## **BUILDING No. 1**

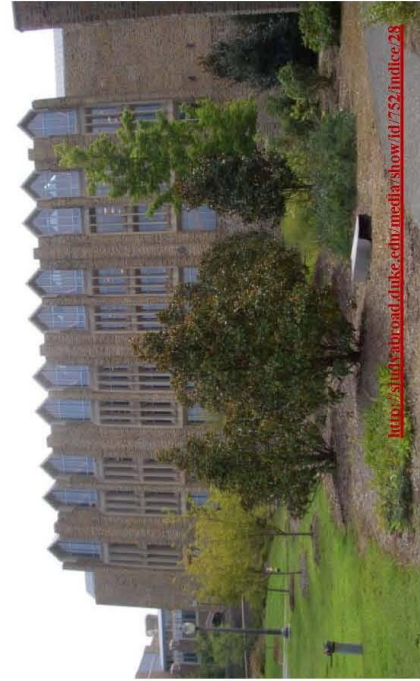
**William R. Perkin Library, Duke University**  
Duke University 104 Chapel Drive, Durham, NC 27708



**ORIGINAL BUILDING**  
1927

**FIRST ADDITION**  
1970

**SECOND ADDITION**  
2005

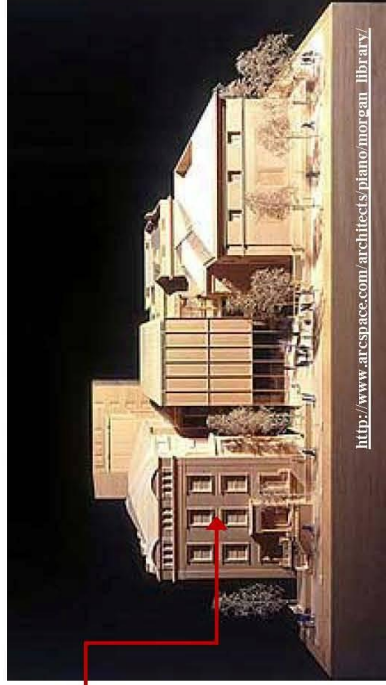


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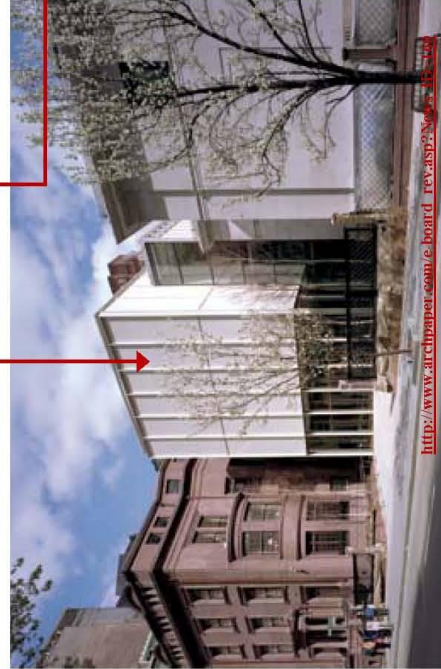
**BUILDING No. 2**

**Morgan Library & Museum, New York**  
225 Madison Avenue, New York, NY 10016

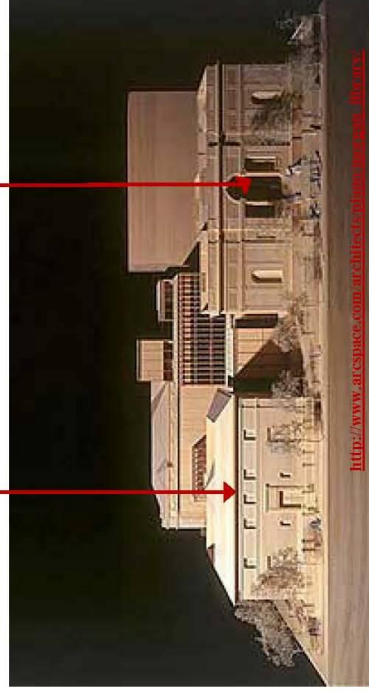
**ORIGINAL BUILDINGS**  
19<sup>th</sup> century  
1906



**FIRST ADDITION**  
1928



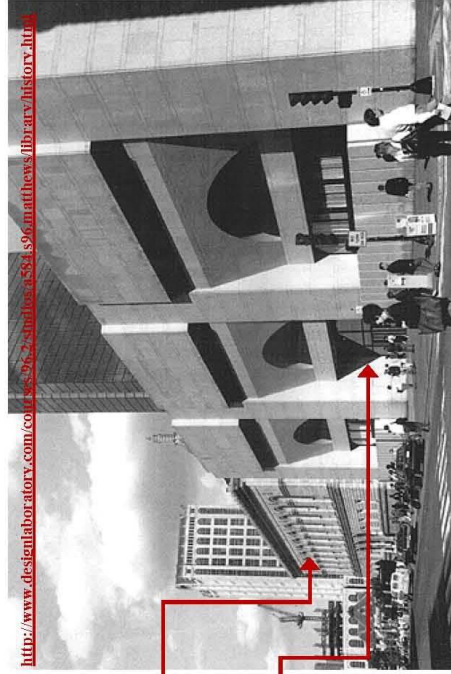
**SECOND ADDITION**  
2006





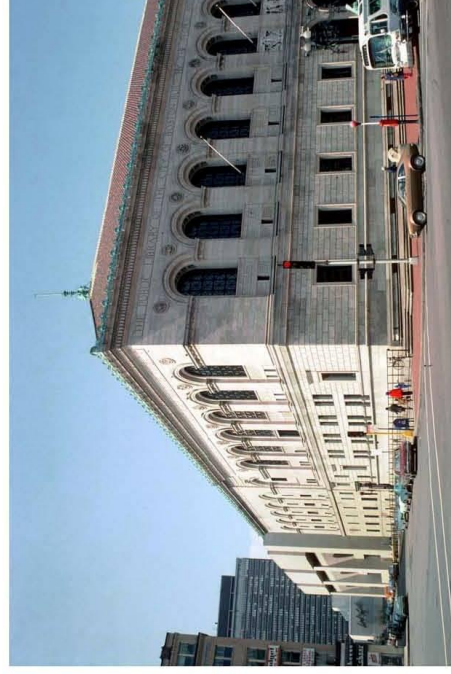
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**BUILDING No. 3**  
**Boston Public Library, MA**  
700 Boylston St., Boston MA 02116



ORIGINAL BUILDING  
1892

ADDITION  
1972

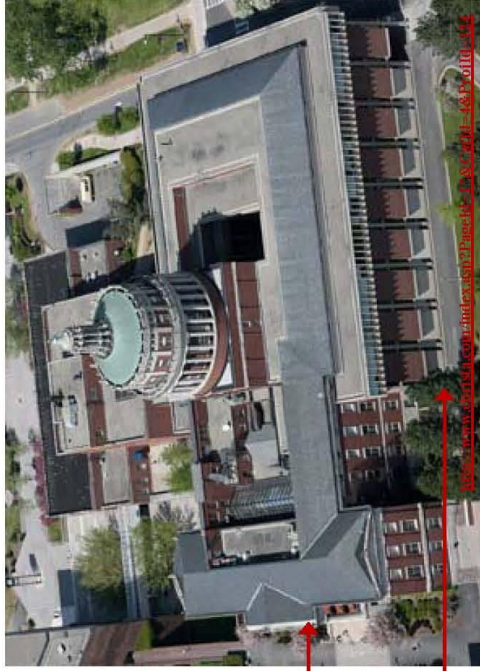


**BUILDING No. 4**

**Rush Rhees Library, University of Rochester**  
500 Joseph C. Wilson Blvd., Rochester, NY 14627

**ORIGINAL BUILDING**  
1930

**ADDITION**  
1956

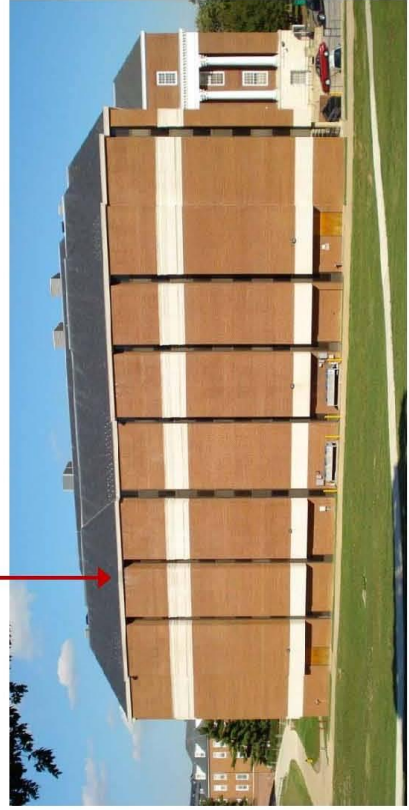




**BUILDING No. 5**  
**McKeldin Library, University of Maryland**  
College Park, MD 20742-7011



ORIGINAL BUILDING  
1956



ADDITION  
1982



# Vocabulary Section

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## VOCABULARY:

**ADDITIVE FORMS:** the attached elements to the initial volume.

**ARRANGEMENT:** the order and organization of specific elements.

**COLOR:** a phenomenon of light and visual perception that may be described in terms of an individual's perception of hue, saturation, and tonal value. Color is the attribute the most clearly distinguishes a form from its environment. It also affects the visual weight of a form.

**ENCLOSURES:** a plane or combination of planes that encloses, as a overhead, wall, and/or base.

**LINEAR ELEMENTS:** vertical elements such as columns, obelisks and towers, that posse's property of length, direction and position.

**LOCATION:** the position of a form relative to its environment or the visual field within which it is seen.

**MASS:** the physical volume or bulk of a solid body

**MASSING:** a unified composition of two-dimensional shapes of three dimensional volumes, especially one that has or gives the impression of weight, density, and bulk.

**OPENINGS:** a hole in something solid such as doors or windows.

**ORIENTATION:** the direction of a form relative to the ground plane, the compass points, other forms, or to the person viewing the form.

**PLANE ELEMENTS:** a line extended in a direction other than its intrinsic direction with properties of length and width, shape, surface, orientation and position that can be manipulated in three types: overhead plane, wall plane or base plane.

**PROPORTION:** the comparative, proper, or harmonious relation of one part to another or to the whole with respect to magnitude, quantity, or degree. Also, the quality between two ratios in which the first of the four terms divided by the second equals the third divided by the fourth.

**SCALE:** a proportion determining the relationship of a representation to that which it represents. Also, a certain proportionate size, extent, or degree, usually judge in relation to same standard or point of reference

**SHAPE:** the characteristic outline or surface configuration of a particular form. Shape is the principal aspect by which we identify and categorize forms.

**SIZE:** the physical dimensions of length, with, and depth of a form. While these dimensions determine the proportions of a form, its scale is determined by its size relative to other forms in its context.

**SUBTRACTION FORMS:** a portion removed from the initial volume while retaining its initial identity.

**SURFACE ARTICULATIONS:** the surface forms or elements which clearly reveal the precise nature of its parts and their relationships to each other and to the whole.

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**RHYTHM:** movement characterized by a patterned repetition or alteration of formal elements or motifs in the same or a modified form.

**TEXTURE:** the visual and especially tactile quality given to a surface by the size, shape, arrangement, and proportions of other parts. Texture also determines the degree to which the surfaces of a form reflect or absorb incident light.

**VOLUME:** the size or extend of a three-dimensional object or region of space, measured in cubic units.

## Appendix B: Buildings History

### Building No. 1: William R. Perkin Library, Duke University

“The history of the Duke University Library started in 1887. As part of the campus literary societies’ efforts various collections were merged to create the new Trinity College. In 1892 when Trinity College was moved to Durham, the library occupied a large single room in the Washington Duke Building, the main building of the campus. In 1900, James B. Duke donated funds for a library building. Ground was broken in 1901, and the building was completed in December 1902. The formal opening took place the following February.

In December 1924, a new building was constructed, seventy-five yards northwest from the old library, to serve as the institution's library during the transformation of Trinity College into Duke University. The building was completed in 1927.

In 1949, the General Library on West Campus doubled its size. The expansion included a new stack area, entry and the Treasure Room, now known as the Rare Book Room. Even with this expansion, the library quickly grew past its capacity due to its expanding acquisitions program.

A second expansion project was undertaken in 1966, and the General Library was named for William R. Perkins, a trustee of the Duke Endowment. When the project was completed in 1970, the newly enlarged Perkins Library had the capacity for two and a half million volumes. By the late 1990s it was clear that the library needed to expand again. In August 2000 the Perkins Library Renovation Committee began thinking creatively about the nature of library services and making recommendations regarding the design and function of Perkins Library. A new addition named after Duke Graduates Roy and Merilee Bostock and their three children opened on October 12, 2005. The Bostock Library housed most of the library's services while the 1960s Perkins addition was renovated to house the newly created Information Commons.”<sup>23</sup>

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<sup>23</sup> DL, *About Us: Origins of the Duke University Library*, <http://library.duke.edu/about/history.html>.

## **Building No. 2: Morgan Library & Museum, New York**

“The Morgan Library started in 1906 as a private library for Pierpont Morgan. The building was located at the east of his New York residence at Madison Avenue and 36th Street, designed in an Italian palazzo style by Charles Follen McKim (from McKim, Mead, & White). McKim used the Renaissance ideal as an expression of the unity of all the arts, integrating architecture, sculpture, and painting, and utilizing the finest materials and craftsmanship, important elements for Mr. Morgan.

By 1924, eleven years after Mr. Morgan’s death, his son the ownership of the Morgan Library to a board of trustees that turned into a public institution. In 1928, Mr. Morgan’s home was demolished and an exhibition room and reading room was designed and constructed by Benjamin Morris, connected to the original building by a connecting gallery called the cloister. This first addition, was became known as The Annex. Morris's additions were similar in layout and materials to the original library and were designed to integrate the two buildings as closely as possible. The new addition not only doubled the size of the original structure, but it also changed the main entrance from the original building to the addition.

In 1988, J. P. Morgan, Jr.’ mid-nineteenth-century brownstone house on Madison Avenue and 37th Street was also added to the library complex.

In 1991, a garden court (a glass enclosed conservatory) was built between the three buildings as an act to bring all of them together into a single complex.

In 2000, the Morgan Trustees studied the future development and physical expansion of the Library complex engaging the Renzo Piano Building Workshop to develop an architectural plan for expansion and enhancement of the complex. The new addition by Renzo Piano was finished in 2006. His design integrates the three landmark buildings with three intimately scaled new pavilions constructed of steel-and-glass panels to create an accessible, inviting setting.”<sup>24</sup>

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<sup>24</sup> The Morgan Library, *About the Morgan*, <http://www.themorgan.org/about/historyArchitecture.asp>.

### **Building No. 3: Boston Public Library, MA**

“The Boston Public Library was founded in 1848, and it was the first free municipal library in the United States. In December of 1954 the Library's Commissioners were authorized to build a new building given that from the beginning the original one was too small<sup>25</sup>.

In 1887, the architecture firm of McKim, Mead and White was selected to design the new library. The building was located on the south side of Copley Square, opposite Richardson's Trinity Church in the Back Bay area of Boston<sup>26</sup>. The style selected for the design of the library was based on the Renaissance style which marked the resurgence of American Classicism. The use of an Italian Renaissance palazzo for the library created a civic building considered to be "a palace for the people". This building exterior was built using light granite that strongly contrasted with the dark stone from other buildings in the area.<sup>27</sup> The building included elements never seen before in other libraries such as a children's room and a sculpture garden in its central courtyard surrounded by an arcaded gallery in the manner of a Renaissance cloister. The levels of detail that the building presented created a timeless and well fitting building among the public.

In 1972 the Boston Public Library opened its new addition located at the square block directly behind the original library, designed by Philip Johnson and John Burgee. Philip Johnson's addition reflects similar massing, and is built of the same granite as the McKim building<sup>28</sup>. On the exterior, Johnson and Burgee designed for the addition just nine bay divisions to contrast the elaborate detail found on the facade of the original library. Also, there is no open, interior courtyard. Last, the new entrance is no longer facing a prominent public square, but has been shifted off the square to a side street.”

### **Building No. 4: Rush Rhees Library, University of Rochester**

“In 1850 The University of Rochester Library was initially established as part of the early beginnings of the University of Rochester in the former United States Hotel,

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<sup>25</sup> BPL: *A Brief History*, <http://www.bpl.org/general/history.htm>.

<sup>26</sup> BPL: *History*,

<http://www.designlaboratory.com/courses/96.2/studios/a584.s96.matthews/library/history.html>.

<sup>27</sup> Ibid.

<sup>28</sup> Ibid.

New York. In 1861 the library was moved to Anderson Hall, the first building on the new University campus. By the end of the 1860s its single room at Anderson Hall became couldn't hold anymore the growing capacity of the library. In 1870 promises for a new building for the library arise. In the 1877, the library was moved to a new and better structure known as Sibley Hall. As the time when on the library collection continued to grow significantly, particularly with the specialized collections such as periodicals, music, medicine, etc. These special collections were started to be separated from the main collection as the library's materials and the university's curriculum grew. Around 1920s the responsibility of planning a new main library was given to the University Librarian Donald Bean Gilchrist as part of the University's transformation into a formal university campus.

The preparation for the new library started promptly. The sketches for the new building were prepared as early as 1921, and later developed in accordance with the general design for the River Campus. The University president Rush Rhees and the trustees finally approved the plan for the new library building. The library was intended to provide space for a million volumes or even twice that number with the construction of future additions. The location of the library was planned so that it would be in close relationship to the teaching buildings and also have adequate space for the development of these anticipated additions.

The new university campus library for the men's college was formally dedicated on October 10-12 of 1930 as the Rush Rhees Library in honor to the president Rush Rhees, one of the first persons to remark the significant importance of the library for the benefit of the university's development.

All the architectural details of the new library features were very detailed and impressive, but from the beginning, the most compelling feature of the building has been the nineteen stories, 186 feet height, library tower. Its upper portion was surrounded by two graduated tiers of stone pillars, the lower of which constitutes an open colonnade, illuminated by almost 200 floodlights. In the summit of the tower is the Hopeman Memorial Chime of nineteen bells, weighing a total of 34,000 pounds.

In 1955 plans were made to merge the men's and women's colleges into a single University campus. As a result, the library's total book capacity was brought to more than 600,000 volumes. John Richmond Russell, the university librarian since 1940, initiated his plans to transfer all the books from the women's college library to Rush Rhees, and its expansion to accommodate approximately 100,000 books. By 1960 Russell told the university President de Kiewiet that a library addition would be necessary within five years from that date.

The University administration opted in favor of a building addition to Rush Rhees instead of an entirely new structure, and at last, in 1965, the firm of Murphy and Mackey of St. Louis, architects, was chosen for the addition and remodeling projects.

The addition to Rush Rhees library and remodeling project started in February, 1967 finishing works by 1969.”<sup>29</sup>

## **Building No. 5: McKeldin, Library, University of Maryland**

“The Maryland Agricultural College (now University of Maryland, College Park Campus) was officially open in 1859. Its first library was located in a building commonly known as “The Barracks”, which also housed classrooms, the dining hall, a chapel, kitchen facilities, and the living quarters for the students. The first free-standing building for the library was built in 1892-1893 and it was located somewhere around the south side of University Mall. The building was shared with the gymnasium (gymnasium on the first floor and library on the second floor). Later on the library was move to Shoemaker Hall.<sup>30</sup>

In January 1958, a neoclassical building was designed for the University of Maryland’s Library by Henry Powell Hopkins of Hopkins and Pfeiffer. The new building was located at the University Mall (now McKeldin Mall) facing east, between the Anne Arundel Building and the Main Administration Building. The materials used for the buildings were Alabama Rockwood limestone, red colonial brick, and gray slate.

By 1978 major problems with the capacity of the building initiated the planning for an addition and renovation of the McKeldin Library. From the beginning specific guidelines were established to assure the original building will maintain its physical predominance. The firm McLeod Ferrara Ensign was selected to design the new addition but it wasn’t until 1986 that the project break ground. By this time, because of lack of funds, the same design for the addition was used without any major changes. The addition remained empty for a year or so after completion, until the renovation of the original part of the building began in 1991. The renovation work was completed in 1993.”<sup>31</sup>

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<sup>29</sup> UR, *The History of the University of Rochester Libraries*, <http://www.library.rochester.edu/index.cfm?PAGE=737> .

<sup>30</sup> Turkos, April 22, 2009.

<sup>31</sup> A Program for the Renovation, p. 52.



## Glossary

**Additive Forms:** the attached elements to the initial volume.

**Arrangement:** the order and organization of specific elements.

**Color:** a phenomenon of light and visual perception that may be described in terms of an individual's perception of hue, saturation, and tonal value. Color is the attribute the most clearly distinguishes a form from its environment. It also affects the visual weight of a form.

**Enclosures:** a plane or combination of planes that encloses, as an overhead, wall, and/or base.

**Integrity:** is the ability of a property to convey its significance, or the authenticity of a property's historic identity, evidenced by the survival of physical characteristics that existed during the property's prehistoric or historic period.

**Linear Elements:** vertical elements such as columns, obelisks and towers, that possess property of length, direction and position.

**Location:** the position of a form relative to its environment or the visual field within which it is seen.

**Mass:** the physical volume or bulk of a solid body

**Massing:** a unified composition of two-dimensional shapes or three-dimensional volumes, especially one that has or gives the impression of weight, density, and bulk.

**Openings:** a hole in something solid such as doors or windows.

**Orientation:** the direction of a form relative to the ground plane, the compass points, other forms, or to the person viewing the form.

**Plane Elements:** a line extended in a direction other than its intrinsic direction with properties of length and width, shape, surface, orientation and position that can be manipulated in three types: overhead plane, wall plane or base plane.

**Preservation:** the retention of the greatest amount of historic fabric, along with the building's historic form, features and detailing as they have evolved over time.

**Proportion:** the comparative, proper, or harmonious relation of one part to another or to the whole with respect to magnitude, quantity, or degree. Also, the quality between two ratios in which the first of the four terms divided by the second equals the third divided by the fourth.

**Reconstruction:** the recreation of a vanished or a non-surviving building with new materials, primarily for interpretative purposes.

**Rehabilitation:** the alteration (including additions) to a historic building to meet continuing or new uses while retaining the building's historic character.

**Restoration:** the depiction of a building at a particular time in its history by preserving materials from the period of significance and removing materials from other periods.

**Scale:** a proportion determining the relationship of a representation to that which it represents. Also, a certain proportionate size, extent, or degree, usually judge in relation to same standard or point of reference

**Shape:** the characteristic outline or surface configuration of a particular form. Shape is the principal aspect by which we identify and categorize forms.

**Size:** the physical dimensions of length, width, and depth of a form. While these dimensions determine the proportions of a form, its scale is determined by its size relative to other forms in its context.

**Subtraction Forms:** a portion removed from the initial volume while retaining its initial identity.

**Surface Articulations:** the surface forms or elements which clearly reveal the precise nature of its parts and their relationships to each other, and to the whole.

**Rhythm:** movement characterized by a patterned repetition or alteration of formal elements or motifs in the same or a modified form.

**Texture:** the visual and especially tactile quality given to a surface by the size, shape, arrangement, and proportions of other parts. Texture also determines the degree to which the surfaces of a form reflect or absorbs incident light.

**Volume:** the size or extend of a three-dimensional object or region of space, measured in cubic units.

**World Heritage:** cultural and natural heritage around the world considered by The United Nations Educational, Scientific and Cultural Organization (UNESCO), to have outstanding value to humanity that belong to all the peoples of the world, irrespective of the territory on which they are located

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