

## ABSTRACT

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REIMAGINING THE PUBLIC LIBRAR

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The library and natural light have a unique relationship. The quantity and quality of light within a space is an essential component to one's overall experience. When libraries were initially established, they were directly dependent upon daylight to operate. Because of this dependency, the design of libraries relied heavily on providing adequate, but strategically placed openings for daylight to penetrate the space. Contemporary libraries should not abandon the idea of designing with daylight in mind. Furthermore, it can be used as an architectural medium to create a unique sense of place. The experience of the user is enhanced when natural light is used to manipulate the spatial quality of architecture. This thesis will explore how architecture can create a sense of place by using natural light to inform design.

BRINGING LIGHT TO THE COMMUNITY | REIMAGINING THE PUBLIC LIBRARY

by

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University of Maryland, College Park, in partial fulfillment  
of the requirements for the degree of  
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2017

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## Preface

As a young child, I vividly recall being enraptured in storytelling time and always wanting to sit on the mat closest to the window. It not only felt nice to be embraced by the sunlight, but it allowed me to gaze to the beyond as my imagination roamed. Often, the mood of the environment shaped my perception of what I read. The emotion of the environment and the literature became a codependent entity.

The older I became the more I began to frequent public libraries. I often found myself longing for an environment that had an undeniable sense of place. Somewhere that enhanced my conscience state of being and became analogous to the emotions of literature itself. Growing up in Baltimore, Maryland there was not a shortage of libraries. However, the libraries that were close in proximity to me were very standard, providing the necessities for a library but not necessarily pushing its architecture to limits beyond the expected. Presently, there is a surge of contemporary libraries currently being built; Baltimore City is a place that could greatly benefit from this movement.

The library is a building type that serves as a beneficial aspect to a community, providing a place to gather, explore, socialize, imagine, and learn. Depending on its collection and program, it also serves as a place that attracts individuals from an array of backgrounds that may normally not be in the same vicinity. The public library is a



building type that is capable of creating place within a community—a place that encourages exploration, imagination, and learning.

This thesis will explore how architecture can create a sense of place by using natural light to inform design. The idea of place making and what it entails is objective. This thesis will explore how a sense of place can be created in a public space by providing an environment that promotes well-being, inspiration, and exploration. I will explore how various qualities of light can be used to not only create mood, but also to be a guide in telling the story of the building, making the building itself metaphorical literature.

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[Existing Clifton Park Site Reading Room Solar Study](#)

[South Clifton Park Site | Solar Study of Proposed Interior 1](#)

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[Section Through Entry Sequence | Version 1](#)

[Adult Reading Area](#)

[Adult Reading Carrels](#)



## Chapter 1: Introduction

*The light from the pale white paper, powerless to dispel the heavy darkness of the alcove, is instead repelled by the darkness, creating a world of confusion where dark and light are indistinguishable. Have not you yourself sensed a difference in the light that suffuses such a room, a rare tranquility not found in ordinary light? Have you never felt a sort of fear in the face of the ageless, a fear that in that room you might lose all consciousness of the passage of time, that untold years might pass and upon emerging you should find you had grown old and gray?*<sup>1</sup> Jun'ichirō Tanizaki *In Praise of Shadows*

The beauty of literature is that it has the ability to create moments of mental escape or keen awareness. One's surroundings play a significant role in the perception of what is being read and how information is digested. A significant element that aids in creating perception is light, particularly natural light. Since the existence of libraries, an interdependent relationship has existed between natural light and the library.



**Figure 1 The Library of Alexandria ,Accessed March 22, 2016 from <http://atlas>**

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<sup>1</sup> Jun'ichirō Tanizaki. *In Praise of Shadows*. New Haven, CT: Leete's Island, 1977: 35-36.

Before the invention of electricity, libraries' operational hours were directly dependent upon the hours of sunlight in a day. Open flame and gas lighting methods were too precarious to use around library material.<sup>2</sup> Natural light has a connection to humans physiologically as well, allowing it to create a sense of place that is unique to individual spaces within a building, as well as a whole. Henry Plummer, an architecture professor, published writer, and photographer, studies the relationship of natural light and architecture. He stated, "Natural light carries the very inspiring energy—the vital spark—which is the mainstay of all life on earth...The sun's rays produce an illuminating earth into consciousness, opening flowers and setting birds to sing..."<sup>3</sup> Plummer's statement alludes to the importance that daylight plays on the stability and health of the mind and body. Daylight instinctively gives the cue to awaken. When intentionally incorporated in architecture, it communicates a place of importance or a desirable space for the user. The same space communicates something different just by changing the way in which the main source of light is incorporated. Natural light has the ability to create place and to define spaces within an enclosed environment that are unique, giving the space its own language and mood.

A main purpose of the library should be to create an optimal level of consciousness and connection to the medium that one is engaged with. The library should encompass an atmosphere that one cannot readily access at home—it should have a purpose that *it* can only fulfill, thus, sustaining its reason for being. There needs to be a well-defined sense of place and an atmosphere that draws people to it. By using natural light as form

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<sup>2</sup> Jeffrey Scherer, "Light and libraries," *Library Hi Tech* 17, no. 4 (1999): 358

<sup>3</sup> Henry Plummer. *Poetics of Light*. Tokyo: U Pub., 1987:13

to define space, architecture has the ability to create a sense of place and redefine the contemporary library.

When one thinks of form, often it is understood as something tangible or solid. In the case of using light as form, form becomes something that is experienced beyond physical touch. Form becomes something that is experienced or produced beyond the physical structure of a material. Rays from natural light change throughout the day. Its form has unique dynamics that require a preliminary level of understanding before it can be designed with intention. An investigation of precedent studies that use light as form, as well as theories by select architects will be dissected in order to understand its psychological effects and design implications. Conclusions from these investigations will be used to create architecture that uses light as a medium to captivate, stimulate thought and imagination, and create a haven for the public to escape to, creating a new outlook for what a contemporary library can be.

## Chapter 2: Using Light to Create Place

### **Daylight and the Library**

The public library is essentially a community center with various programmatic functions including allowing access to books and reading material, storing and protecting resources, and providing digital resources which all require different light conditions. Book stacks need adequate but not direct light to prevent accelerated deterioration. Reading areas require substantial light on horizontal planes, while

computer usage requires low, glare free light.<sup>4</sup> At the fundamental level, library spaces require unique light conditions that vary throughout the building. The light essentially aids in defining the function of the space. Due to the distinctive role of natural light within a library, special attention should be given to its design and how it penetrates interior spaces.

### **Daylight Design Techniques**

Various methods of daylight design techniques will be explored to determine the methods that work best for the desired programmatic spaces. Ultimately, daylight should be expressed purposefully and aid in telling the story of the building and program.

In order to understand how light can create place, one must understand the basic methods in which natural light can be introduced into a building. Aspects that become critical are window placement, angles, and transparency. Some basic design configurations will be discussed: light from above, light from vertical surfaces, surface reflectance, and varying degrees of transparency and opacity. The research concerning methods to control and manipulate daylight heavily rely on theory written by Nick Baker and Koen Steemers. Baker is the Joint Director of the Martin Centre for Architectural and Urban Studies at the University of Cambridge, and Director of Cambridge Architectural Research Ltd. Steemers is a professor of Sustainable Design at the University of Cambridge, an architect and environmental design specialist. Baker and Steemers collaborated to write *Daylight Design of Buildings*, a book that

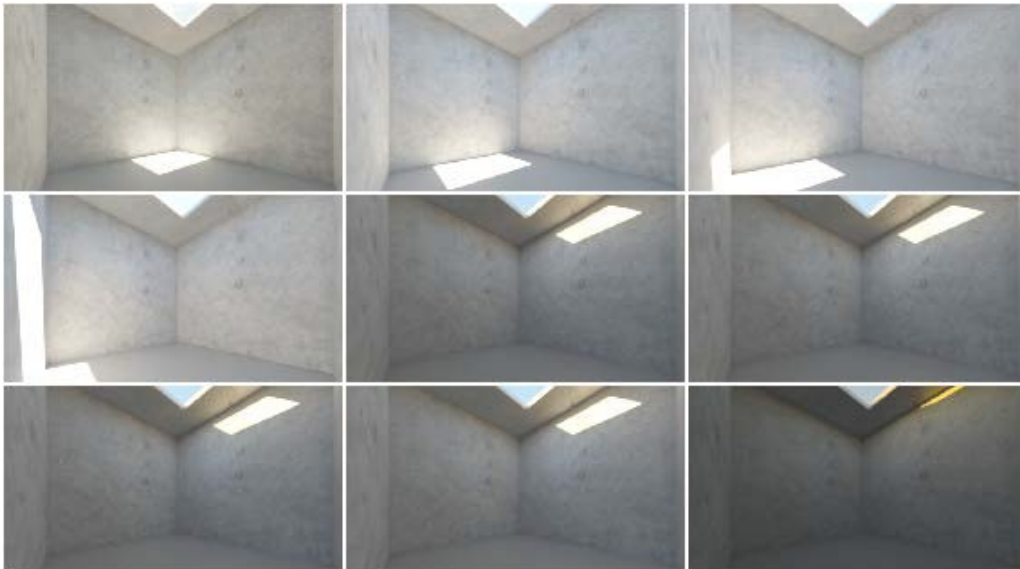
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<sup>4</sup> Nick Baker, and Koen Steemers. "The Daylight Design of Spaces." *Daylight Design of Buildings*. London: James & James, 2002: 56.

incorporates data gathered from an investigation of sixty buildings which functions as a design manual to provide a more systematic approach to the principles behind successful daylight design.

### **Light from Above**

Light from above is widely known to come from sources such as skylights. One has seen skylights since antiquity in buildings such as the Pantheon (known as an oculus during that time) which incorporated an uncovered opening that allowed in rain and sunlight. Skylights were important for large open spaces because it allowed natural light to illuminate the space during a time when artificial light did not exist. Prior to artificial light, the skylight was a prominent feature for library reading room design, and is still being used in practice today due to its ability to bring in an abundance of light into central spaces.



**Figure 2 Summer Solstice Study of Skylight, digital render by author, 9 April 2016.**

Roof-lighting can be configured in various way to distribute daylight in a specific manner.



**Figure 3 Summer Solstice Study of Sawtooth, digital render by author, 9 April 2016**

Some common variations are flat, shed, dome, north light, sawtooth and monitor. Aside from flat and dome, these configurations are orientation-sensitive. Flat and dome shaped skylights emit direct daylight from above, thus, additional shading is needed to minimize direct solar radiation.<sup>5</sup>

### **Light from Vertical Surfaces**

Vertical window openings are also commonly used to bring in light. The shape, position, and size of windows have a direct influence on the level of intensity and distribution of daylight. One type of window layout used often is side lighting. The most significant issue with this layout is daylighting is not distributed uniformly.

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<sup>5</sup> Baker 70.

Rooms with this configuration must place tasks that require a greater amount of light closer to the window, such as reading, while other program features that require a lower level of light may be placed further away, such as storage or circulation.<sup>6</sup>

Positioning windows higher provides a more even distribution of daylight. Thus, building plans that have more depth benefit from window openings that are placed higher on a vertical surface. This also leads to the idea of utilizing higher ceilings. According to Baker, a simple rule of thumb is “the depth of useful levels of daylight penetration is approximately twice the distance from the floor to the top of the window opening, unless special daylighting devices are used.”<sup>7</sup> For this reason, clerestory windows are used for spaces that require deep daylight penetration because they are placed at the highest level on a wall.<sup>8</sup>

The size of window openings introduces another element of control to consider. Appropriate window size should relate to the internal illuminance required and typical sky conditions for the area. It is also important to take into account the building’s surroundings and the overall environment. The larger the window opening, the more that heat loss, solar gain, and views outward become primary factors. It is important to note that verticality is preferred over horizontality. Ribbon windows, for example, will produce a poorer quality of light distribution than tall windows.<sup>9</sup>

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<sup>6</sup> Ibid 63.

<sup>7</sup> Ibid 64.

<sup>8</sup> Ibid 65.

<sup>9</sup> Ibid 65-6.

### **Light from Reflectance**

Reflecting surfaces are beneficial in spaces where limited window openings are available. Vertical walls that are light in color are a good source for reflecting light. Ceiling surfaces mainly reflect light that comes from below the horizon or indirect reflectance from the ground, which branches into landscape design working cohesively with the building's surfaces and window openings.<sup>10</sup> Internal surfaces also play a role in light reflectance. Depending on the materiality of table tops and floors, sufficient light reflectance from these surfaces bouncing to vertical wall surfaces can occur within a room to illuminate the space. It is important to ensure that reflectance on interior furniture and surfaces are not from direct sunlight because this will cause significant glare.<sup>11</sup>

When roof-lighting is taken into account, the angle of the skylight opening has a direct correlation to how light is reflected internally. For flat, shed and dome skylights the thickness of the roof structure plays a direct role in bouncing the otherwise predominately downward direction of daylight. The length of the reflective surface or reflective reveal can be extended below or above the ceiling/roof surface for a higher distribution of angled light reflectance. Furthermore, when a reflective reveal incorporates a surface with intermediate luminance between the sky and the ceiling soffit, it reduces contrast and glare.<sup>12</sup>

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<sup>10</sup> Ibid 68.

<sup>11</sup> Baker 69.

<sup>12</sup> Ibid 70-1.



### **Shading Design of Light Sources**

Window openings allow for daylight to penetrate the interior of a building and naturally light the space. However, there are control issues that should be taken into account for proper daylight design. The more windows within a structure, the more opportunities arise for solar heat gain in the summer and heat loss in the winter. Furthermore, shading devices should be incorporated in a way that does not sufficiently impair daylighting conditions, thus relying primarily on artificial light. Too often standard blinds are used to block sun rays and reduce heat gain, consequently causing a heavy reliance on artificial light. Shading a space is achieved in numerous ways such as tinted and reflective glass, fixed overhangs and light shelves, or retractable and adjustable louvres, for example. Each system having a wide variety of physical forms thus a wide variety in their visual impact.<sup>13</sup>

#### **Tinted and Opaque Windows**

In temperate climates, opaque screens and glazing is not very beneficial for optimum daylight design performance. It reduces useful daylight just as much as it reduces unwanted radiation. The benefits are equal to the obstructions, causing its use for daylight design to be ineffective.<sup>14</sup>

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<sup>13</sup> Baker 110.

<sup>14</sup> Ibid 116.



**Figure 4 Summer Solstice Study of Window with Overhang, digital render by author, 9 April 2016**



**Figure 5 Summer Solstice Study of Window with Light Shelf, digital render by author, 9 April 2016**

### Overhangs and Light shelves

Primary suitable and sufficient solely for south-facing or near south-facing windows (in the northern hemisphere), the overhang obstructs the direct sunlight from the high angle of the sun. When utilizing overhangs, it is important to remember in order to illuminate the area of a room furthest away from the window, there must be a strong

ground-reflected component to bounce light to the ceiling and underside of the overhang.<sup>15</sup>

Light shelves offer an additional reflective surface in conjunction with an overhang. They effectively eliminate direct sun and reduce the daylight factor near the window without reducing it towards the back of the room.<sup>16</sup>



**Figure 6 Reflection of light through clerestory with light shelf, courtesy of Inc, Building Media. Web. 18 Oct. 2016.**

This effect allows the room in its entirety to appear well lit due the decreased contrast of daylight near the window compared to the remaining space. In other words, lightshelves create a sense of daylight uniformity within the room. Light shelves should not be considered as an efficient shading device on its own, and work best in conjunction with other techniques.<sup>17</sup>

## Blinds and Louvers

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<sup>15</sup> Baker 114.

<sup>16</sup> Ibid 116.

<sup>17</sup> Ibid 152.



**Figure 7 Built in louver system with reflecting light shelf,**  
[http://mcgrawimages.buildingmedia.com/CE/CE\\_images/2010/Dec\\_ARedit\\_7.jpg](http://mcgrawimages.buildingmedia.com/CE/CE_images/2010/Dec_ARedit_7.jpg)

When using retractable blinds, shutters and louvres, color, size and material play a significant role. If using fabric blinds and curtains, light colors have a better performance because they reflect a large portion of light and do not absorb as much heat as darker colors. The issue arises with the absorption of non-visible radiation,

which will result in heat being conveyed internally. Despite this

setback, light colors are still preferable to dark.<sup>18</sup>

Louvred shutters effectively block direct sunlight and allow ground-reflected light as well as light reflected from the louver surfaces to penetrate within. The issue with glare from the louver surface is solved by using darker colors on the shutters. Also, most of the ground-reflected light bounces from the ceiling surface prior to illuminating the work surface, further reducing glare.<sup>19</sup>

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<sup>18</sup> Ibid 112.

<sup>19</sup>Ibid 113.

## Light as Form

Natural light can be used as a medium to help define a space and create place. "For centuries, architects have tried to grasp—and better control—the elusive ability of natural light to create its own spirit of place when imbuing a building with mood,"<sup>20</sup> according to Plummer. When this quality of light is achieved, it creates an atmosphere that is unique to the space.

Materiality is an important aspect in creating mood and atmosphere with light. Light and materials have a mutual dependency. Directly affecting the quantity and quality of light through reflection and absorption, materials are a key component to understanding light in architecture.<sup>21</sup> Materials such as glossy finishes reflect light similarly to a mirror. Surfaces such as wood, stone and plaster, or matte surfaces, reflect light equally.<sup>22</sup> The texture and color of a surface becomes important because certain materials and tones reflect light differently and emit different moods. Simplistic architectural forms and muted tones tend to give a uniform reflectance, thus, allowing the *light* to clarify form and not the actual materials.<sup>23</sup> Architects such as Louis Kahn and Tadao Ando are known for using limited palettes of unadorned materials. This technique allows the light and shadow to be the focus of the space.

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<sup>20</sup> Henry Plummer. *The Architecture of Natural Light*. New York: Monacelli, 2009:180.

<sup>21</sup> Catherine Jean. Barrett and Marietta S. Millet. "Light and Material." *Light Revealing Architecture*. New York: Van Nostrand Reinhold, 1996. 67.

<sup>22</sup> Ibid.

<sup>23</sup> Plummer 180.



**Figure 8 Shiba Ryotaro Memorial Museum by Tadao Ando**

Along the same lines of materiality and daylight mechanisms, various types of screens or patterns may be used to reflect and cast light in a particular manner. The Seattle Public Library by Rem Koolhaas, for example, uses a diagonal hatch pattern for its structural glazing support to cast natural light in a way that gives the open space character and a unique identity. An abundance of natural light is emitted, but the use of the pattern allows the light to be muted in a distinctive way to make the space bright yet comfortable.

The Nembro Library in Nembro Bergamo, Italy designed by the firm Archea, uses a terracotta sunscreen to diffuse the direct sunlight into the space, giving it a unique

interior character. Interestingly, the red terracotta pieces are free rotating books, which symbolically speaks of the space within.<sup>24</sup>



**Figure 9 Nembro Library by Archea Associati, Accessed March 30, 2016 from <https://cfileonline.org/architecture-archea-associatis-municipal-library-nembro-italy/>**

The exterior and interior of a building must work cohesively when designing with daylight. A close study of proper shading mechanisms and materiality (interior and exterior) is necessary because the characteristics of these features depend on factors such as solar orientation, building height, and the desired amount of illumination for each interior space.

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<sup>24</sup> "Nembro Library / Archea." ArchDaily. N.p., 12 June 2013. Web. 20 Mar. 2016. <http://www.archdaily.com/383360/nembro-library-archea>.



## Psychological Implications

Light plays a large role in creating the mood of a space. Exposure to natural light also has positive effects on one's health and mental well-being. The mood of a public library is important—it dictates the comfort of the user. There should be a sense of place that is inviting, calming, and thought provoking which promotes the user's well-being.

Lack of exposure to natural light has a direct correlation to Seasonal Affective Disorder (SAD). According to Dr. Mohamed Boubekri, a published author and professor at The Illinois School of Architecture, "Daylight suppresses the production of melatonin and fosters an alert state of mind by secreting serotonin...The less serotonin available in the brain, the more severe is the depression and related symptoms."<sup>25</sup> When individuals work in environments that are deprived of natural light and rely largely on artificial light, they are more likely to feel stressed and tired. The issue of providing adequate natural light into a space go beyond including large windows—the effectiveness of light from a window reduces the further you move away from the light source. Dr. Boubekri goes further to state:

*The high levels of daylight that people require are confined to the peripheral area that is barely a few feet deep, normally not exceeding one and half times the height of the window. Daylight levels drop precipitously as one moves away from the window. Other more innovative solutions are needed to bring high levels of daylight to the central areas of the building and to the area where the majority of workers are located most of the day...[the solution] falls, therefore, on architects*

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<sup>25</sup> Mohamed Boubekri. Daylighting, Architecture, and Health: Building Design Strategies. Amsterdam: Elsevier Architectural, 2008:54-5.

*to design buildings where daylight is plentiful throughout the building interior, not just the periphery.*<sup>26</sup>

Techniques for reflecting daylight to incorporate deeper penetration, strategically placed skylights, and placement of furniture become important when attempting to provide users with adequate interior sunlight exposure, without providing light that is too intense.

A series of studies incorporating each method of providing daylight, as well as various combinations of these methods will be explored. Depending on the function of the space and the quality of light that are required within it, proper shading mechanisms become important. The goal is to provide thoughtful, strategic light into a library, while maintaining proper quality control as well as incorporating poetic elements of light as a catalyst to creating a sense of place.

### Chapter 3: Precedent Analysis

A series of precedent analyses will be examined that support the fundamental aspects of this project. Libraries that utilized the daylighting design techniques mentioned prior will be discussed. The Seattle Public Library will be analyzed for its unique use of exterior vertical and angular surfaces, the Mariners Harbor Branch Library for its roof-lighting and clerestory technique, and the Tenley-Friendship Library for its use of fixed louvres/fins.

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<sup>26</sup> Ibid. 62.

**Light from Vertical Surfaces**  
Seattle Public Library

Seattle, Washington | OMA and LMN | 2004



**Figure 10 Seattle Public Library Exterior by LMN Architects, Accessed March 24, 2016 from <https://lmnarchitects.com/project/seattle-central-library>**

The Seattle Public library is used as an example of how a patterned form of light is used to give a space character and place. The comprehensive angular curtain wall system is supported with a steel lattice structure while the vertical curtain wall system uses deep aluminum mullions. The depth of these mullions aid in creating a more prominent pattern of light and shadow.

The way in which the light penetrates the interior allows the users to simultaneously be in light and shadow. This technique allows the large *living room* area to be visually read as a single, large space. The absence of the patterned light acts of a threshold to adjacent spaces. The curtain wall that encloses the space and other heavily

trafficked public areas is a triple-layer glazing system by OMA/LMN. It was given the name of "metal glass" by OMA's partner Joshua Ramus because it is embedded with a curved aluminum mesh in the outer air cavity and filled with krypton gas in the inner. Custom-manufactured by the German firm Okalux, it covers approximately 50 percent of the building, while the other half uses a standard double-layer glazing system. This glazing minimizes glare and diffuses direct wavelengths of light into the reading spaces.<sup>27</sup>



**Figure 11 Seattle Public Library Reading Area by LMN Architects, Accessed March 24, 2016 from <https://lmnarchitects.com/project/seattle-central-library>**

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<sup>27</sup> "Light Reading." Architectural Lighting. N.p., 08 Mar. 2007. Web. 11 May 2016. [http://www.archlighting.com/products/light-reading\\_o](http://www.archlighting.com/products/light-reading_o).



**Figure 12 Seattle Public Library, facade structure, by LMN Architects, Accessed March 24, 2016 from <https://lmnarchitects.com/project/seattle-central-library>**

The structural support of the building is integrated with the curtain wall system. It is composed of load-bearing and seismic systems. The lattice system that encompasses the library connects the platforms of the interior providing bracing. Both systems create different means of support for the curtain wall. Because the glass within the glazing panels are comprised of vision glass, solar heat gain during the summer was combated by the use of an aluminum metal mesh interlayer for areas that received a lot

of sun. the mesh contained mini-louvers that worked to shield direct sunlight while still providing views to the outside. To maintain the appearance of bright glass on the exterior, clear low-iron glass was used in front of the mesh with a 2mm airspace.<sup>28</sup>

The overall composition of the building's envelope is to maximize daylighting opportunities in communal areas like the 'living room' and the reading room. Heavily used spaces such as meeting rooms, book stacks, and area with computers are more shaded, eliminating glare and direct sunlight. The library also includes a sky lit atrium to channel more daylight into the interior.<sup>29</sup>

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<sup>28</sup> LMN Architects. "Seattle Central Library Curtain Wall Design | LMN Architects." Seattle Central Library Curtain Wall Design. N.p., 2015. Web. 23 Sept. 2016. <https://lmnarchitects.com/case-study/seattle-central-library-curtain-wall-design>.

<sup>29</sup> Joseph Dennis Kelly III. "Light Reading." Architectural Lighting. N.p., 08 Mar. 2007. Web. 24 Sept. 2016. [http://www.archlighting.com/products/light-reading\\_o](http://www.archlighting.com/products/light-reading_o).



**Figure 13 Seattle Public Library Reading Area by LMN Architects, Accessed March 24, 2016 from <https://lmnarchitects.com/project/seattle-central-library>**

**Light From Above**  
Mariners Harbor Public Library

Mariners Harbor, Staten Island, NY | A\*PT Architecture | 2014



**Figure 14 Mariners Harbor Public Library Exterior**

Located in an area with rich maritime and oystering, the residents of Mariners Harbor have strived for a library for decades. They had a desperate need to a space that invited after-school support, job searching, computer and multimedia access and training, and a communal gathering space, as well as the traditional function of a library—to gain knowledge through read material. With the shell of the building referencing a cracked oyster, the library is surrounded by dense foliage and residential and industrial blocks. As another ode to the history of the area, the roof's exterior is said to conceal "the bright pearls of knowledge within."<sup>30</sup>

The large use of glass within a small library were not met without skepticism, however. Issues of too much daylight exposure and glare in the summer months were addressed by the architects through strategic daylighting design. The glass on the east and west elevations were patterned with frit and utilized Okalux's Okasolar S functional glass for the skylight glazing.<sup>31</sup> Okasolar glass modules incorporate fixed louvres in the cavity to direct daylight and protect against immediate solar radiation.<sup>32</sup> The louvres' function is to direct diffuse daylight well into the interior. The skylights are used to trace the central circulation of the building, illuminating the open space without producing glare and solar gain. The interior walls and floors are light in color, providing an additional daylighting source via reflective surfaces.

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<sup>30</sup> "Mariner Harbor Branch Library / A\*PT ARCHITECTURE" 18 Dec 2014. ArchDaily. Accessed 25 Sep 2016. <http://www.archdaily.com/576423/mariner-harbor-branch-library-a-pt-architecture/>.

<sup>31</sup> Hill, John. World-architects Profiles of Selected Architects. N.p., 26 Nov. 2014. Web. 25 Sept. 2016. [http://www.world-architects.com/architektur/news/products/Okasolar\\_S\\_at\\_Mariners\\_Branch\\_Library\\_2305](http://www.world-architects.com/architektur/news/products/Okasolar_S_at_Mariners_Branch_Library_2305).

<sup>32</sup> Okalu, ©. OKASOLAR (2015): n. pag. 2015. Web. 26 Sept. 2016. [http://www.okalux.de/fileadmin/img/images/Produkte/Marken/Prospekte/OKASOLAR\\_klein\\_2015.pdf](http://www.okalux.de/fileadmin/img/images/Produkte/Marken/Prospekte/OKASOLAR_klein_2015.pdf).



**Figure 15 Mariners Harbor Public Library, skylight and clerestory system**



**Figure 16 Mariners Harbor Public Library, exterior view of built-in louver skylight system**



## **Louvres and Other Shading Devices**

### Surry Hills Library and Community Centre

Surry Hills, Australia | Francis-Jones Morehen Thorp| 2009



**Figure 17 FJMT, Surry Hills Library Community Center, exterior louver system, Accessed March 20, 2016 from <http://inhabitat.com/surry-hills-library-australias-new-standard-of-sustainable-excellence/>**

The Surry Hills Library by FJMT is located in an inner-city suburb of Sydney, Australia. It is situated in a community with various ages, income and cultural backgrounds. Similar to inner cities of Maryland, the architectural context varies in scale, types of housing, shops and commercial/retail spaces.<sup>33</sup> The library is enclosed by three roads to the south, east, and west. Transparency became a primary architectural theme to invite and welcome the public—accessibility, openness and sustainability were key values as well.<sup>34</sup> The transparency and openness were achieved through specific daylighting design methods: an open space and platform, a prismatic glass

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<sup>33</sup> "Surry Hills Library and Community Centre / FJMT" 25 Apr 2010. ArchDaily. Accessed 28 Sep 2016. <http://www.archdaily.com/57339/surry-hills-library-and-community-centre-fjmt/>.

<sup>34</sup> Ibid.

environmental atrium, a suspended “U” shaped timber form, and a transitional foyer space.<sup>35</sup>



**Figure 18 FJMT, Surry Hills Library Community Center, louver details, Accessed March 20, 2016 from <http://inhabitat.com/surry-hills-library-australias-new-standard-of-sustainable-excellence/>**

The timber form is made from automated louvre systems that filter and control sunlight but still allow views to the outside. It is lifted above the ground plane to create transparency and accessibility below.<sup>36</sup> The louvres are responsive to the daylight and adjust accordingly in order to keep the interior daylight level comfortable.

Located in the environmental atrium is prismatic glass. Smooth on one side and ridged on the other, this type of glass reflects the light that passes through and allows sunlight to be directed towards the interior.<sup>37</sup> Because it is located on the south façade, the sunlight does not go directly through like a standard panel of glass, causing glare and heat gain. The prismatic glass reflects daylight instead. The plants

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<sup>35</sup> Ibid.

<sup>36</sup> Ibid.

<sup>37</sup> “Sustainability Goes Public” 15 Jan 2013. World News Architecture. Accessed 29 Sep 2016. [www.worldarchitecturenews.com/project/2013/21748/francis-jones-morehen-thorp-fjmt/surry-hills-library-community-centre-in-surry-hills.html](http://www.worldarchitecturenews.com/project/2013/21748/francis-jones-morehen-thorp-fjmt/surry-hills-library-community-centre-in-surry-hills.html).



**Figure 19 FJMT, Surry Hills Library Community Center, prismatic glazing system, Accessed March 20, 2016 from <http://inhabitat.com/surry-hills-library-australias-new-standard-of-sustainable-excellence/>**

located in the atrium also work as a buffer to obstruct direct sunlight from entering the space.

## Chapter 4: Site and Program

### **Site**

When selecting a site, the main factors of consideration were the surrounding urban fabric, neighborhood density, demographics concerning race, age, and gender (variables that dictate type of library usage), surrounding exposure to sunlight, and public accessibility. My initial investigation into the location of site started globally, however, because the library is a building type that relies on its immediate surrounding demographics for program, a decision to stay local became ideal. Sites that currently

have existing libraries were investigated, as well as empty sites within underserved communities. Two sites within Baltimore, Maryland were explored.

Baltimore has a rich history with libraries, particularly the Enoch Pratt Library system that dates back to the late 1800s. Being one of the oldest free public library systems in the United States, the first Enoch Pratt Library was erected on January 5, 1886.<sup>38</sup> Currently, there are twenty-one branches open throughout Baltimore. Site one is an existing Enoch Pratt branch that was established in 1916 within the South Clifton Park neighborhood of East Baltimore.

### **Site Option A**

Clifton Branch Library | 2001 N. Wolfe Street | Baltimore, MD 21213

The Clifton Branch library is currently open, and serving the community. However, it has not been updated since the early 20th century; thus, its interior does not offer the community the best light quality due to its old brick construction with limited windows. The library is located on a residential block, with a church located across the street of the south elevation. According to City Data statistics, the community has a relatively low income with the median being \$36,447 and 43.2% of residents below the poverty level.<sup>39</sup> There is no question that having a free public library is beneficial to this community. Having up-to-date technology and constructing a contemporary library to

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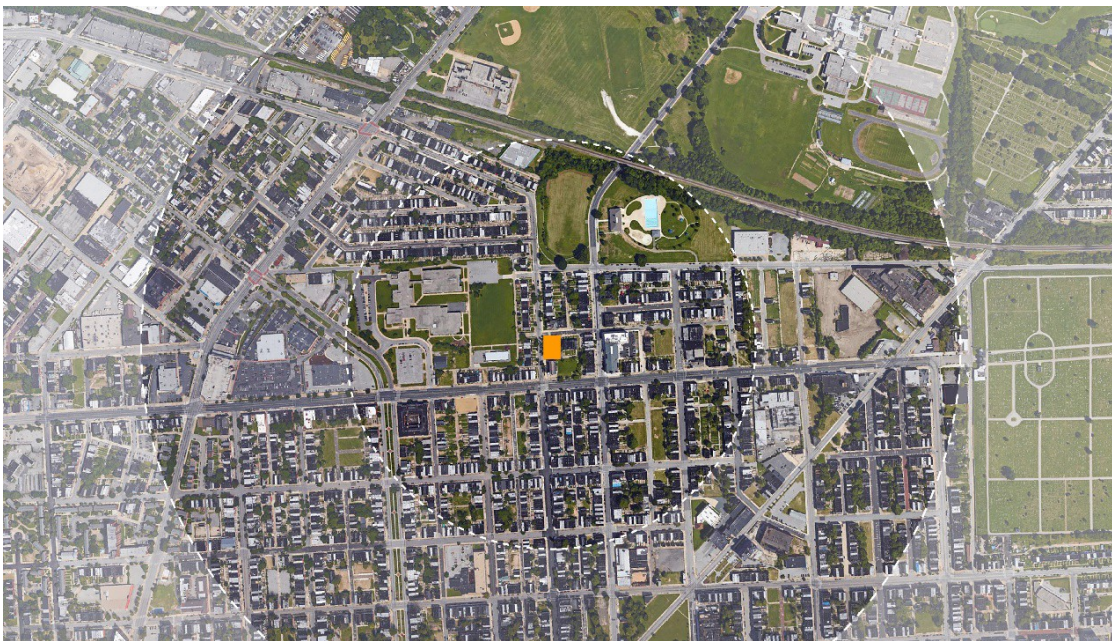
<sup>38</sup> "History of the Library." Enoch Pratt Free Library. N.p., Feb. 2016. Web. 14 May 2016.  
<http://www.prattlibrary.org/history/>.

<sup>39</sup> "South Clifton Park Neighborhood in Baltimore, Maryland (MD), 21213 Detailed Profile." N.p., 2016. Web. Apr. 2016. <http://www.city-data.com/neighborhood/South-Clifton-Park-Baltimore-MD.html>.

give the neighborhood a new outlook would reinforce the importance of the community.

The current atmosphere of the Clifton Library's main reading space delivers a subpar quality of natural light. The existing windows do not offer an abundance of daylight into the space, causing the facility to rely heavily on artificial light. If this site were chosen, new construction would be proposed—demolishing the existing structure.

Demolishing a building that is part of a historical branch system of libraries is an issue of concern. This branch in particular was also funded and able to be constructed due to Andrew Carnegie, further adding to its historical background.



**Figure 20 Figure Ground with Quarter Mile and Half Mile Radius, by author, 23 April 2016**

The Clifton Branch Library is immersed within a dense urban fabric, with a residential neighborhood in its immediate surroundings. There is also a middle school and elementary school nearby. Another observation of the site's surroundings is the common building heights. The library, the adjacent church, and the apartment building



westward of the library are the tallest buildings and relatively the same height at approximately twenty feet floor to ceiling. When a solar study was completed, it was noticed that the library did not receive any casted shadow from the surrounding buildings, which was seen as a positive attribute towards designing to maximize daylight exposure within the building.

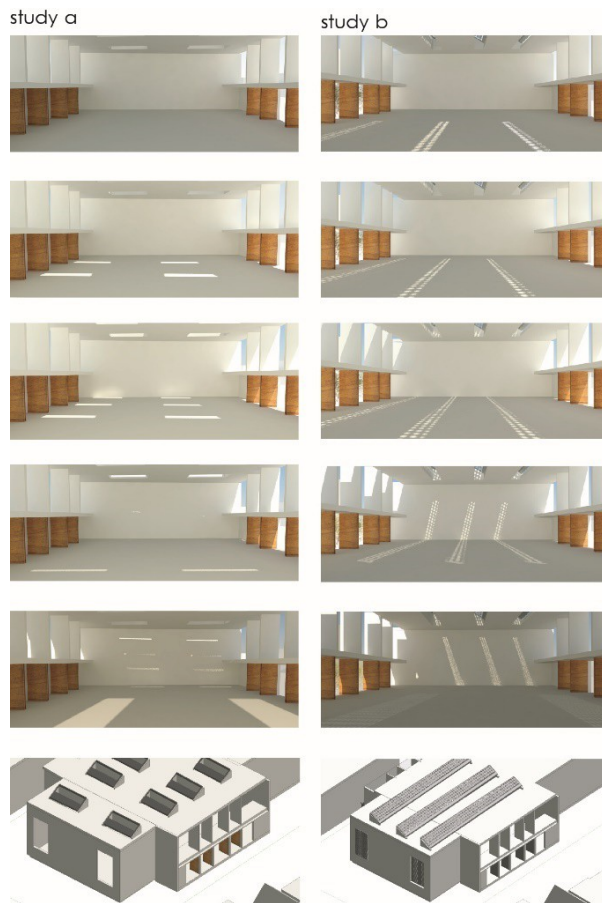


**Figure 21 Clifton Branch Library exterior, photograph by author, 8 May 2016**



**Figure 22 Clifton Branch Library exterior, photograph by author, 8 May 2016**

Upon initial investigation, the west facade of the building was the most beneficial area for daylight exposure. Upon further solar studies of the interior using digital modeling, bringing light from the roof structure above seemed to be the most plausible method. The window configurations within the study models were taken from a precedent study of the Ingleside Branch Library's reading room. Located in San Francisco and built in



**Figure 23 Solar Study of Proposed Window Configurations, by author, 9 May 2016. Studies were taken at 10am, noon, 2pm, 4pm, and 6pm.**

2009 by Fougerson Architecture/ Group 4 Architecture, the library uses wooden partition walls to segment the individual reading spaces. The skylights are strategically sloped and placed for maximum admission of sunlight with an even distribution.<sup>40</sup> It is important to note, the skylights used in Ingleside are facing south-west, while the ones used in *study a* are facing west. Sun direction, as well as location, were two factors which contributed greatly to the outcome of

the different qualities of light produced by similar window apertures. For *study b*, the skylight configuration was completely changed in size, orientation, and window type. The new configuration runs longitudinal with the glass portion of the window, which is fritted to create a subtle pattern. The southern facing window configuration remained the same. By changing these simple elements alone, the overall quality of daylight within the space improved from the existing. However, due to the history of the current Clifton Park Branch Library, and the lack of neighborhood building type diversity, this site was ultimately not chosen.

<sup>40</sup> "Ingleside Branch Library / Fougerson Architecture." Arch Daily. N.p., 22 Dec. 2009. Web. 24 Apr. 2016. <http://www.archdaily.com/44167/ingleside-branch-library-fougerson-architecture>.



## Site Option B

940 West Baltimore St | Baltimore, MD 21223 | 27,300 sq ft lot area



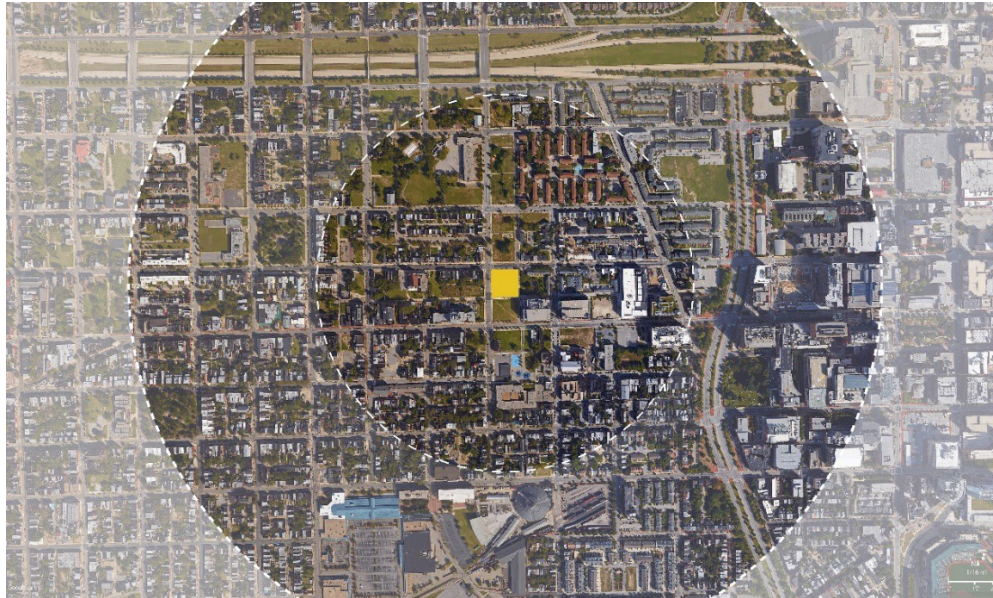
Figure 24 Map outline of Baltimore, Md, image by author, February 2017



Figure 25 Map outline of West Baltimore, Md, image by author, February 2017



The area chosen in west Baltimore is a multifaceted site with recent development from the University of Maryland Baltimore as well as dense urban fabric comprised of townhomes, rowhomes, churches and small retail spaces. Directly north of the site are open plots of land void of development. Directly south of the site lies an elementary school, while a high school is located north-west, just three blocks up.



**Figure 26 Half Mile and Quarter Mile Site Radius, image by author, February 2017**



**Figure 27 Half Mile and Quarter Mile Site Radius with important context, image by author, February 2017**

The site is also in close proximity to downtown Baltimore as well as historical buildings and museum attractions. The surrounding context has potential to bring visitors of the city to the library, become a meeting grounds for locals and tourists. The site itself is relatively flat with no existing structure. It is adjacent to the recently developed Maryland Forensic Medical Center which is part of the University of Maryland BioPark. Although at the intersection on West Baltimore St and North Schroeder St, traffic is not overwhelming or problematic. On weekdays from late afternoon to early evening are the heaviest moments of traffic. The site is on the brink of bustling downtown as well as a quieter residential area. It has the potential to symbolically link the residential community of Poppleton and the surrounding neighborhoods to the newly developed west Baltimore downtown region.

North of the site previously had townhome development. The current green spaces were never as densely developed as the surrounding urban fabric, however. Over the years, it appears that the buildings were progressively demolished along the east side of Schroeder St, while the underdeveloped areas along West Baltimore St were developed by the University of Maryland. Thus, the new development in this area has not been for the community. The children of the elementary and high school do not have a library to go to after school or the weekends that is in walkable distance. The elderly do not have a pleasant place outside of their home to enjoy their favorite literature. The struggling resident who has no computer has to find other means of searching for employment. The neighborhood could greatly benefit from a public library.



Site option B does not seem to have a preferred architectural aesthetic, other than the use of red brick. The commercial and retail buildings did not follow specific geometric



**Figure 28 Site View, looking North, accompanied by diagram, images by author, March 2017**



**Figure 29 Site View, looking West, accompanied by diagram, images by author, March 2017**



**Figure 30 Site View, looking North, accompanied by diagram, images by author, March 2017**





Figure 31 Site View, looking East, accompanied by diagram, images by author, March 2017

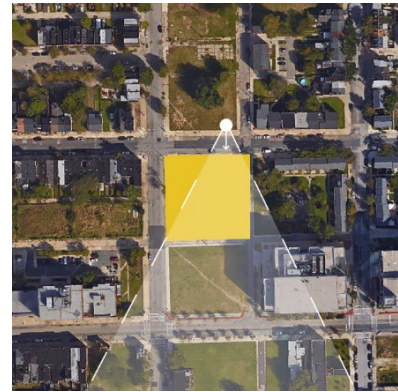


Figure 32 Site View, looking South, accompanied by diagram, images by author, March 2017

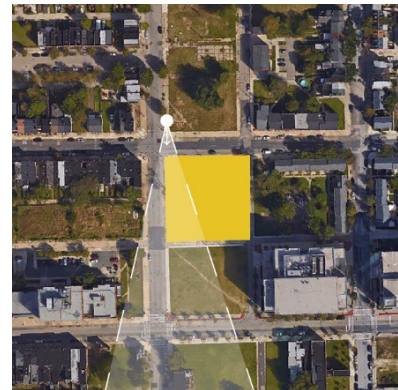


Figure 33 Site View, looking South, accompanied by diagram, images by author, March 2017

rules concerning the façade, nor did there seem to be a regulated height. The only uniform attribute amongst the non-residential buildings were a clearly defined building base. The context of this sites allows one to either follow the traditional red brick aesthetic with a well-defined base or to create a unique aesthetic to the neighborhood that adds additional character. Due to its dense urban surroundings, utilizing the open green space south of the site to create pleasing landscape will be investigated as well. The overall site allows various building forms and outdoor spaces that work cohesively with the interior.

## **Program**

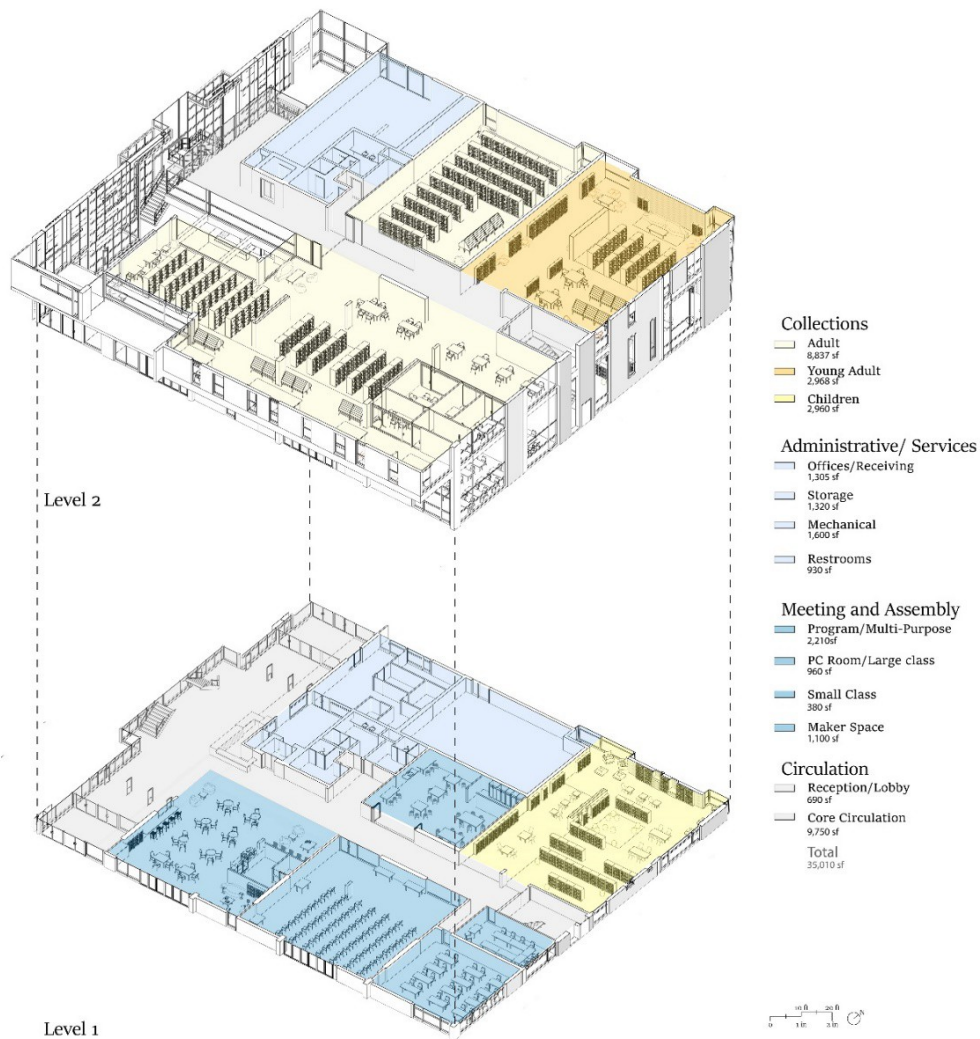
The program of this branch library will combine the programmatic features of a typical branch library with community spaces on the lower level. According to *Planning the Modern Public Library Building* by McCabe and Kennedy, a five-step approach may be taken to determine community needs as well as the time span in which the program should be planned. An initial step would be to determine if the new library space is an interim solution or a more long-term one.<sup>41</sup> Space requirements have a crucial reliance on that factor. Since this library is envisioned to have longevity, there will need to be room for collection growth. Also, a way to accommodate changes in technology (computers, multimedia stations) will be taken into account. It is also possible that the book collection may shrink overtime to accommodate more digital references.

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<sup>41</sup> Gerard B. McCabe, and James R. Kennedy. "Early Planning for a New Library." *Planning the Modern Public Library Building*. Westport, CT: Libraries Unlimited, 2003. 9-10. Print.

Another step is determining the library's plan of service and the supporting spaces.<sup>42</sup>

How large will the meeting room be? How many meeting rooms will be included? Will they need additional storage? These are examples of supporting service spaces within the program that need to be taken into account. Although this thesis will not delve into



**Figure 34 Axon diagram highlighting library program, image by author, April 2017**

the minor technical spaces of program, these questions still need to be taken into account when appropriating the most logical total square footage of program.

<sup>42</sup> McCabe 10.

Relationships of adjacencies is another aspect to note. After the above programmatic issues were considered, the final building resulted in two levels. Level one consists of the following programmatic spaces: a public café, multi-purpose community room, computer lab, a small class/meeting room, a makerspace, the children's collection, and administrative services. The second level consists of: storage/archive space, the adult collection, and the young adult collection. All program areas as well as the core circulation comprise 35,010 square feet.

## **Design Conclusions**

Each collection and major circulation corridor within the library will contain unique qualities and typologies of light that will give each space a unique identity, while creating the overall story of the building. Based on how each space will be used, and the primary users of them, the typologies selected will aid in creating a sense of place within the library as a whole.





**Figure 35 Level One of plan showing site context, rendered by author, May 2017**



**Figure 36 Level Two of plan showing site context, rendered by author, May 2017**



## Entry Sequence

As previously mentioned, the quality of light within each space is viewed as parts of the building's story. Because the entry sequence is the beginning and end, a dynamic quality of light was chosen. Patterned light is a focal accent that is not only dynamic, but has the ability to enhance spatial perception and awareness. This library has a main entrance at the south façade, and a secondary entrance at the north façade. Both entries utilize diffuse patterned light. This is achieved through a two-part building

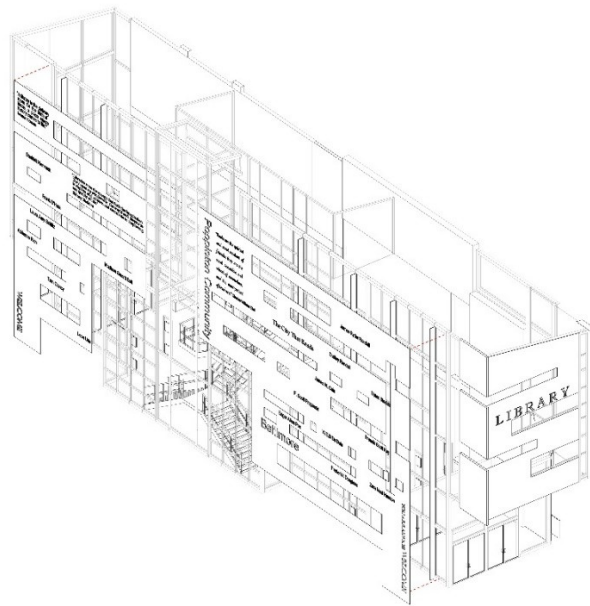


Figure 37 Axon showing west facade envelope system, rendered by author, May 2017

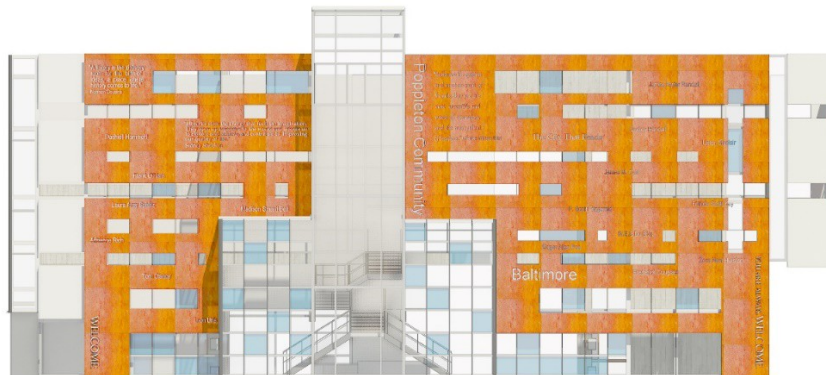
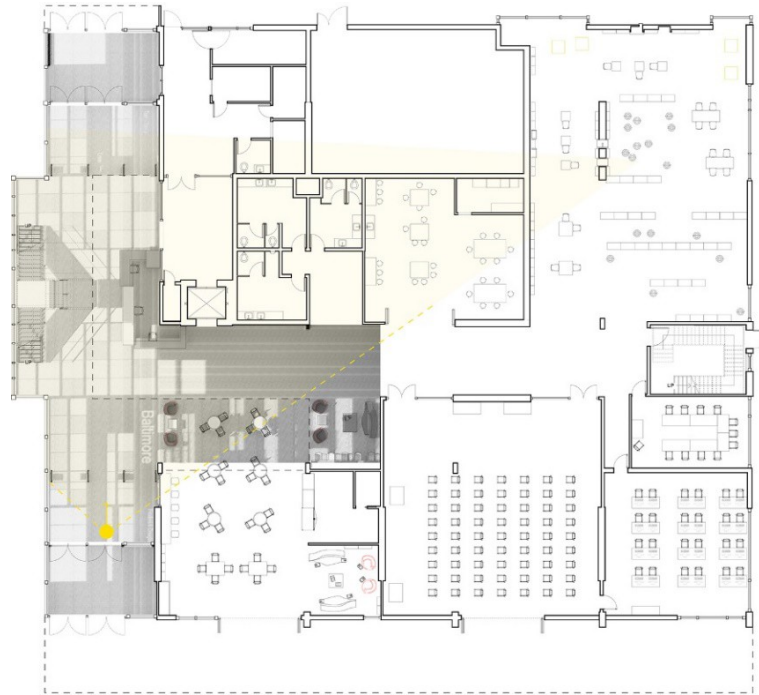


Figure 38 West facade elevation, rendered by author, May 2017

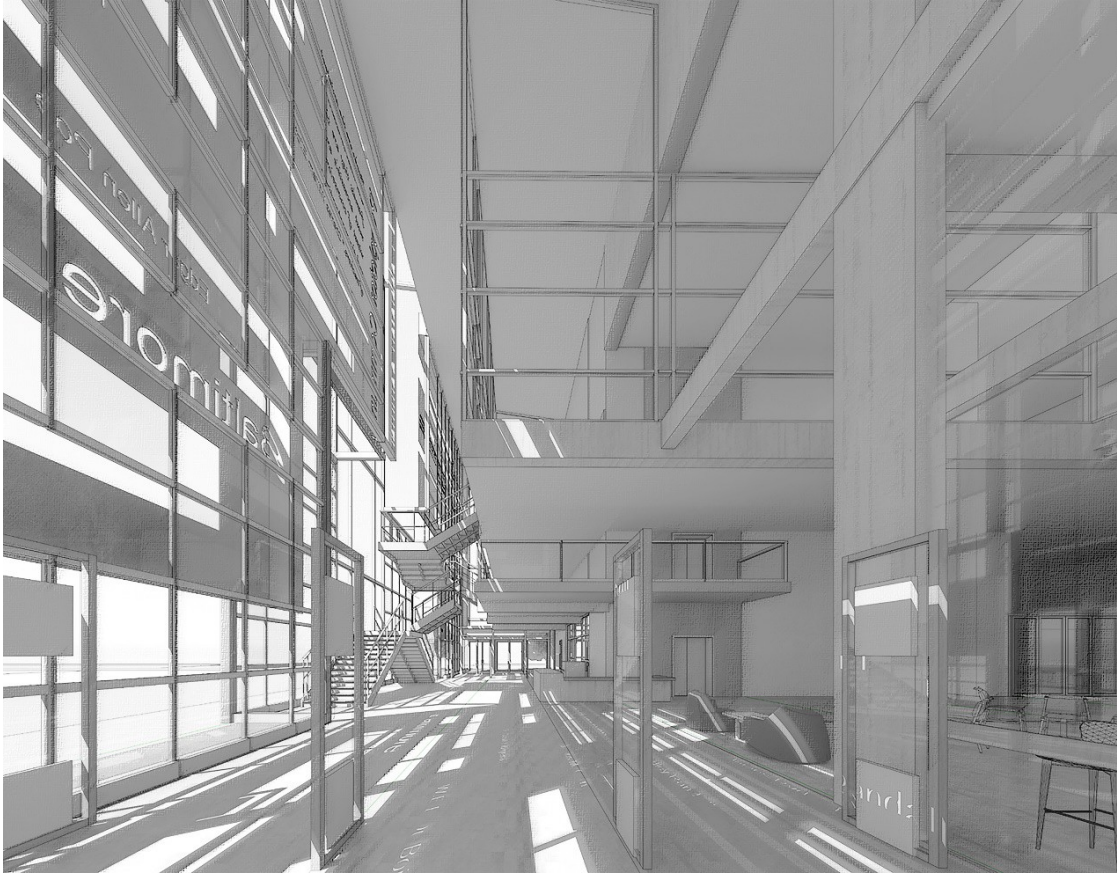


**Figure 39 Level One plan view highlighting entry sequence and perspective view, rendered by author, May 2017**

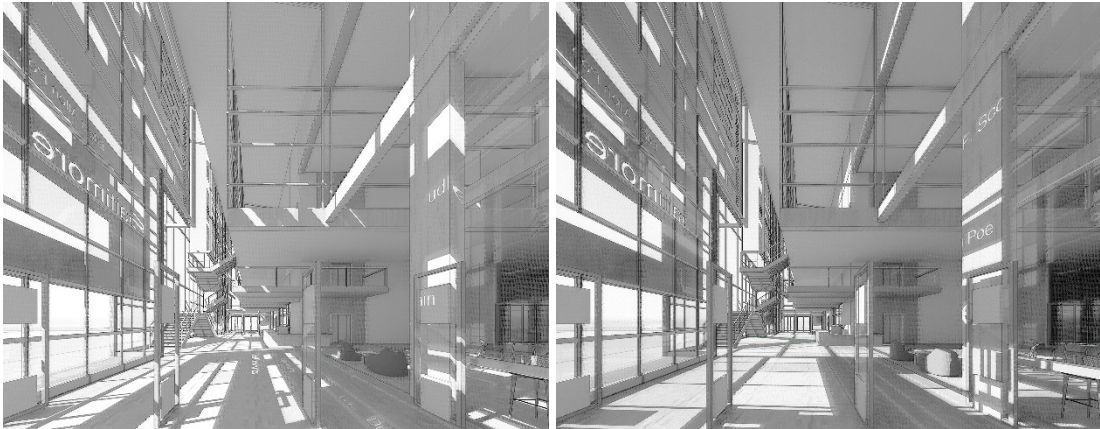


**Figure 40 Perspective of main/south entrance, June 4pm, rendered by author, May 2017**





**Figure 41 Perspective of main/south entrance, June 2pm, rendered by author, May 2017**



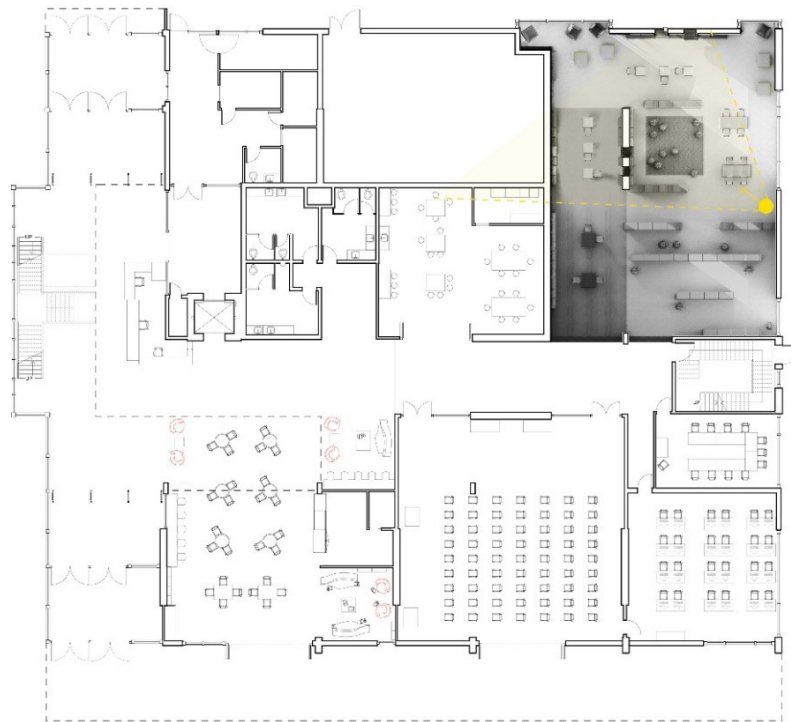
**Figure 42 Perspective of main/south entrance, June 3pm and 5pm, rendered by author, May 2017**

envelope. The west façade is composed of a curtain wall system with diffuse panels of varying degrees. There are also panels with shades of blue (color tinted glazing is used

sparingly and strategically in select areas of the library). The second layer to this system is a series of Corten steel panels that have two functions: to block much of the harsh, glaring western sun, and to create a second pattern layer. The Corten steel consists of strategic cut outs to let sunlight in, as well as quotes and names of authors who were either born in Baltimore or practiced literature in Baltimore. As the day progresses, these quotes and patterns of light dance up walls and floors, spilling into the café area as well as the second level corridor.

### **Children's Collection**

The children's collection utilizes partially direct and indirect diffuse daylighting. This combination allows the space to get adequate light without producing too much contrast which could become too stimulating or distracting for the users of the space.



**Figure 43 Level One plan view highlighting children's area, rendered by author, May 2017**





**Figure 44 Perspective of children's collection, Jan 8am, rendered by author, May 2017**

During the morning hours, the story-time area is spatially defined by the yellow and blue tinted light reflecting from the east. As the day goes on, the indirect diffuse light



**Figure 45 Perspective of children's collection, Jan 830am, rendered by author, May 2017**

gives the overall space an atmospheric glow. The quality of light in the children's collection was meant to mimic the spirit of a child. Playful and active in the morning,



**Figure 46** Perspective of children's collection, Jan 930am and 1030am, rendered by author, May 2017

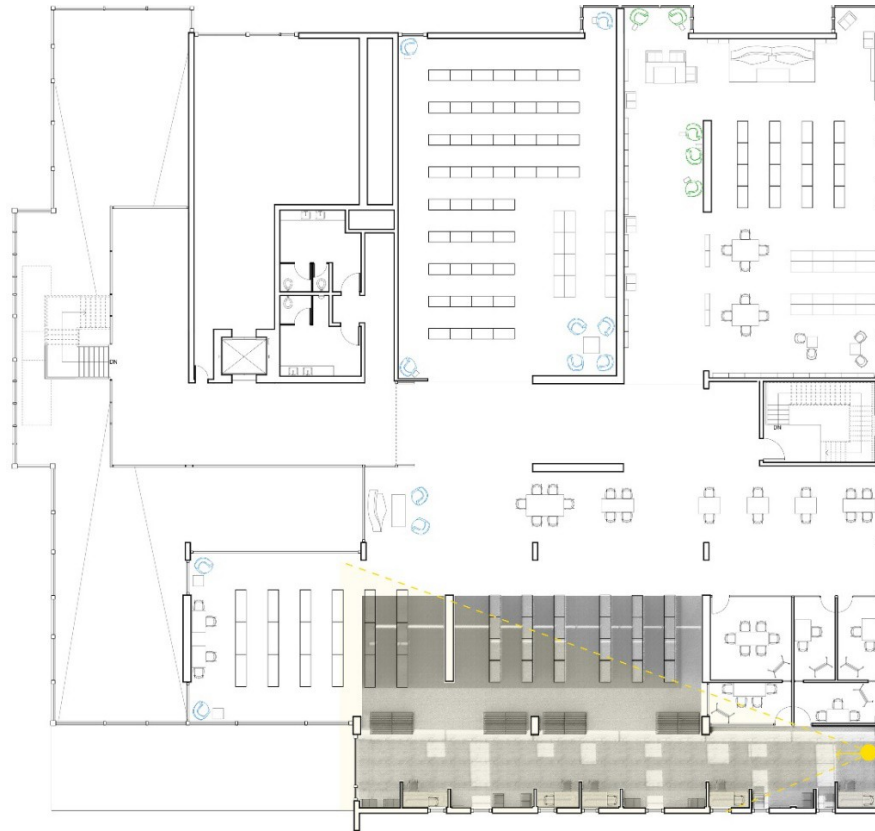
and as the day goes on, and high levels of energy become exhaustive, the calm happens before rest.

The quality of light is achieved in this space through large, floor to ceiling windows, with varying degrees of diffusion and color. Some window panels are translucent to allow the afternoon light from the north to become atmospheric. The windows located on the north façade also cant outward to invite intimate slithers of light from the east and west within the reading nooks.

## **Adult Collection**

The adult collection takes a different approach. Catering to the needs of adult, particularly in a place meant for reading, special attention must be paid to the quantity of light in task related spaces. This space uses partially direct and spatially direct light. The partially direct light is used to highlight circulation spaces. Within the reading



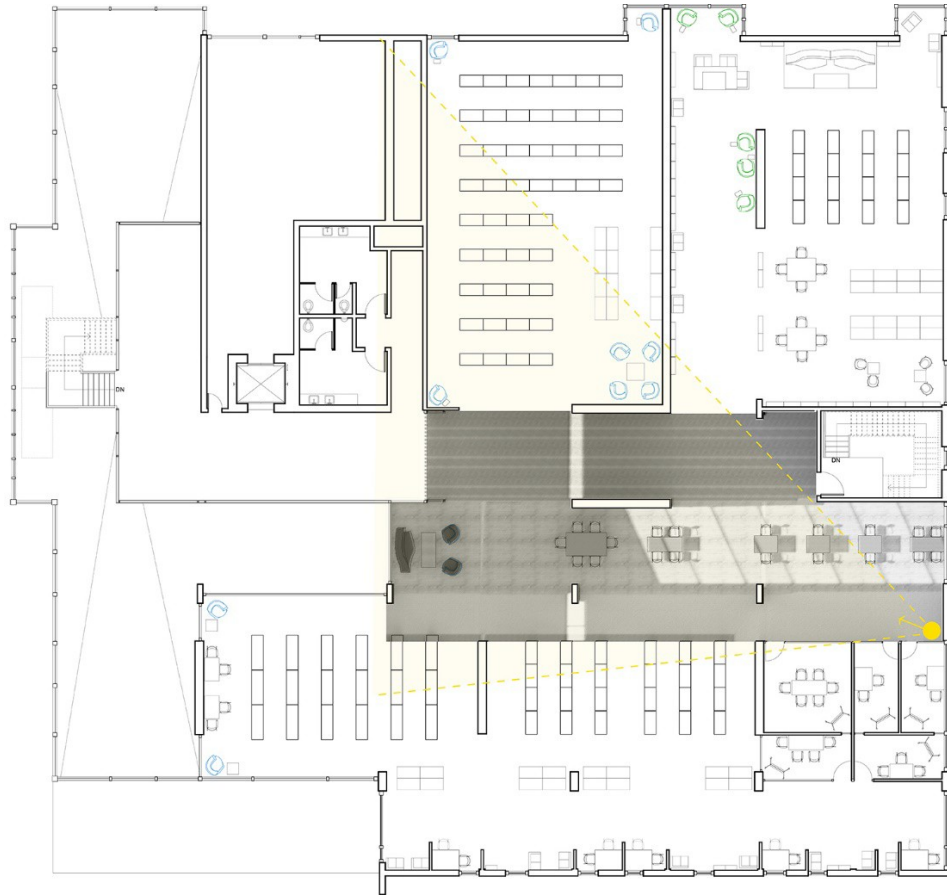


**Figure 47 Level Two plan view highlighting adult carrel area, rendered by author, May 2017**



**Figure 48 Perspective of adult carrel area, 12pm, rendered by author, May 2017**

carrels, the light is controlled through repetitive façade elements that allow light to reflect onto the floor, but not directly onto the reading surface. This ensures that the users of the space do not experience unpleasant glare or become uncomfortable due to heat gain. Users also have a personal view to the outside from lower windows, while higher windows are used to daylight the entire area.



**Figure 49 Level Two plan view highlighting adult reading area, rendered by author, May 2017**





**Figure 50 Perspective of adult reading area, June 4pm, rendered by author, May 2017**



**Figure 51 Perspective of adult reading area, June 1pm, rendered by author, May 2017**



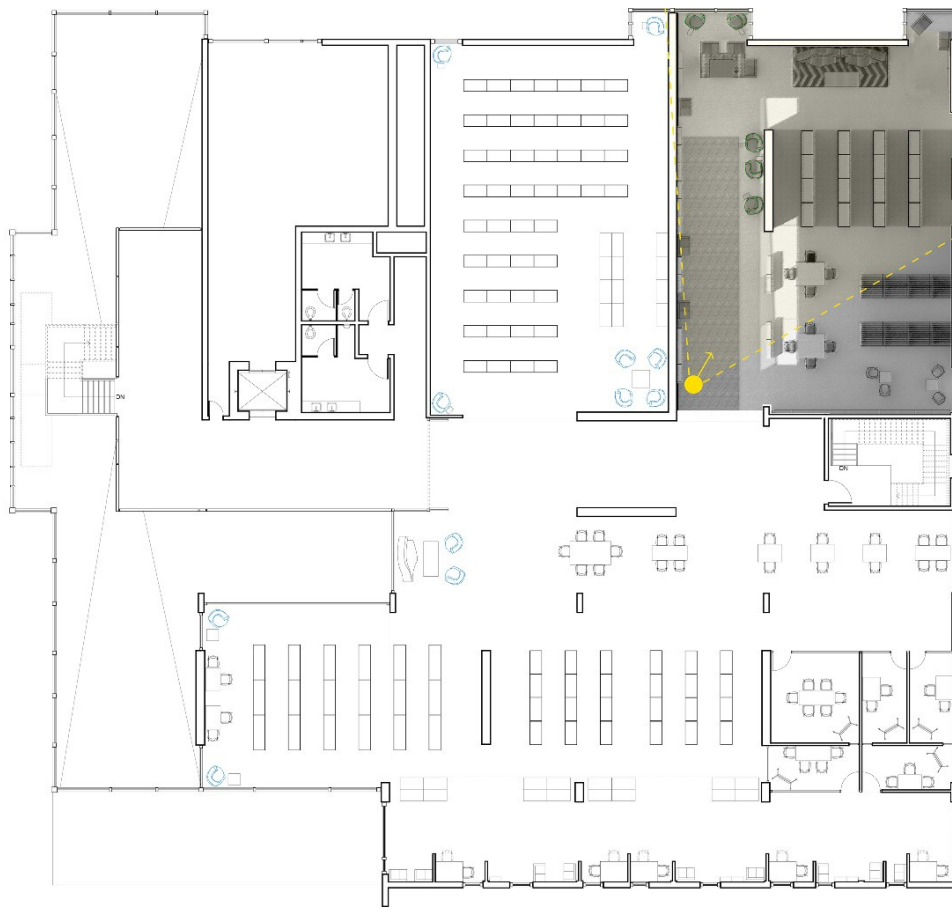
**Figure 52 Perspective of adult reading area, June 3pm and 5pm, rendered by author, May 2017**

The spatially direct light comes into place within the open reading area. A large skylight is located above this zone, letting in diffuse shades of soft blue and white light. To alleviate discomfort during and after noon, the skylight includes a double diffusion system. The panels within the skylight are diffused. This diffused northern light reflects off the interior surface within the depth of the roof, which then reflects through an additional diffused panel, before entering into the space. The light from this skylight remained contained within the circulation corridor and the reading space. Essentially, the light acts of a threshold and spatial definer.

## **Young Adult Collection**

The young adult space also utilizes spatially indirect light. This light is introduced into the space through a primary skylight placed along the entry corridor, as well as a smaller, hidden skylight located above the visible brick wall. The main skylight functions to highlight the main circulation space as well as function as a clock. Depending on the time of day, the light will highlight specific areas of the corridor. This skylight also uses a double diffing system and color tinted panels.

The hidden skylight above the brick one is realized only due to the yellow hue of light that splashes down the wall. The more intimate spaces are daylit from side windows, which, similar to the children's collection, have varying degrees of diffused panels and tinted glass. The windows along the north façade always cant outwards and are a continuation of the windows on the lower level within the children's area.



**Figure 53 Level Two plan view highlighting young adult collection, rendered by author, May 2017**





Figure 54 Perspective of young adult area, June 2pm, rendered by author, May 2017

## Conclusion

Together, the library works in harmony to create its own unique story and sense of place. It becomes a beacon to the community, and an amenity that currently does not exist. On a typical spring afternoon, upon arriving, one would be greeted by the welcoming entrance that speaks to the user with light, reminding them that they are entering a place of creativity, knowledge, and exploration. The patterned light from the entry way will seep into the open café where one can read and enjoy a bite to eat, before exploring the upper level. Once upstairs, the space pulls the user in before opening them back out into the space. The spatial light from above acts as a pathfinder to the reading space, the stacks, or the carrels. The light guides one's experience, creating a place that encourages reflection. Through the use of natural light, this public library gives this community the sense of place it once lost.

South Elevation



**Figure 55 South Elevation, rendered by author, May 2017**

North Elevation



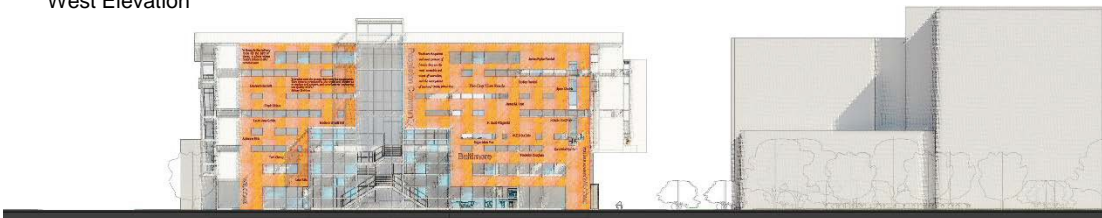
**Figure 56 North Elevation, rendered by author, May 2017**

East Elevation



**Figure 57 East Elevation, rendered by author, May 2017**

West Elevation



**Figure 58 West Elevation, rendered by author, May 2017**

## Presentation Boards

# Bringing Light to the Community Reimagining the Public Library

Brittini Adams

Exterior Perspective | South Entrance



Site Context

Baltimore, Maryland



West Baltimore, Maryland



Half Mile Radius



Site View | Northward



Site View | Southward



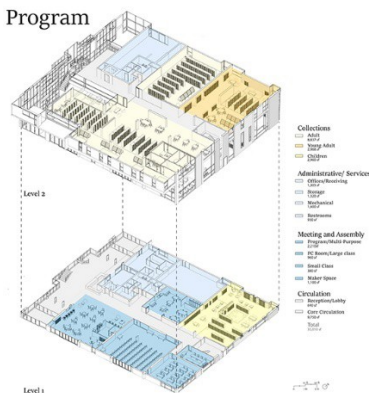
Site View | Eastward



Site View | Westward



Program



Section | July Afternoon

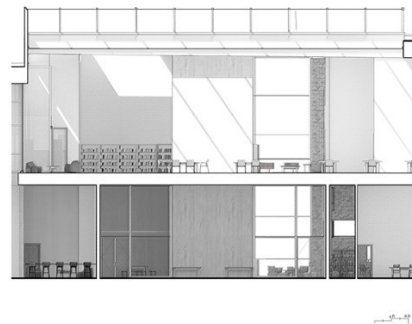


Figure 59 Thesis Presentation Board 1



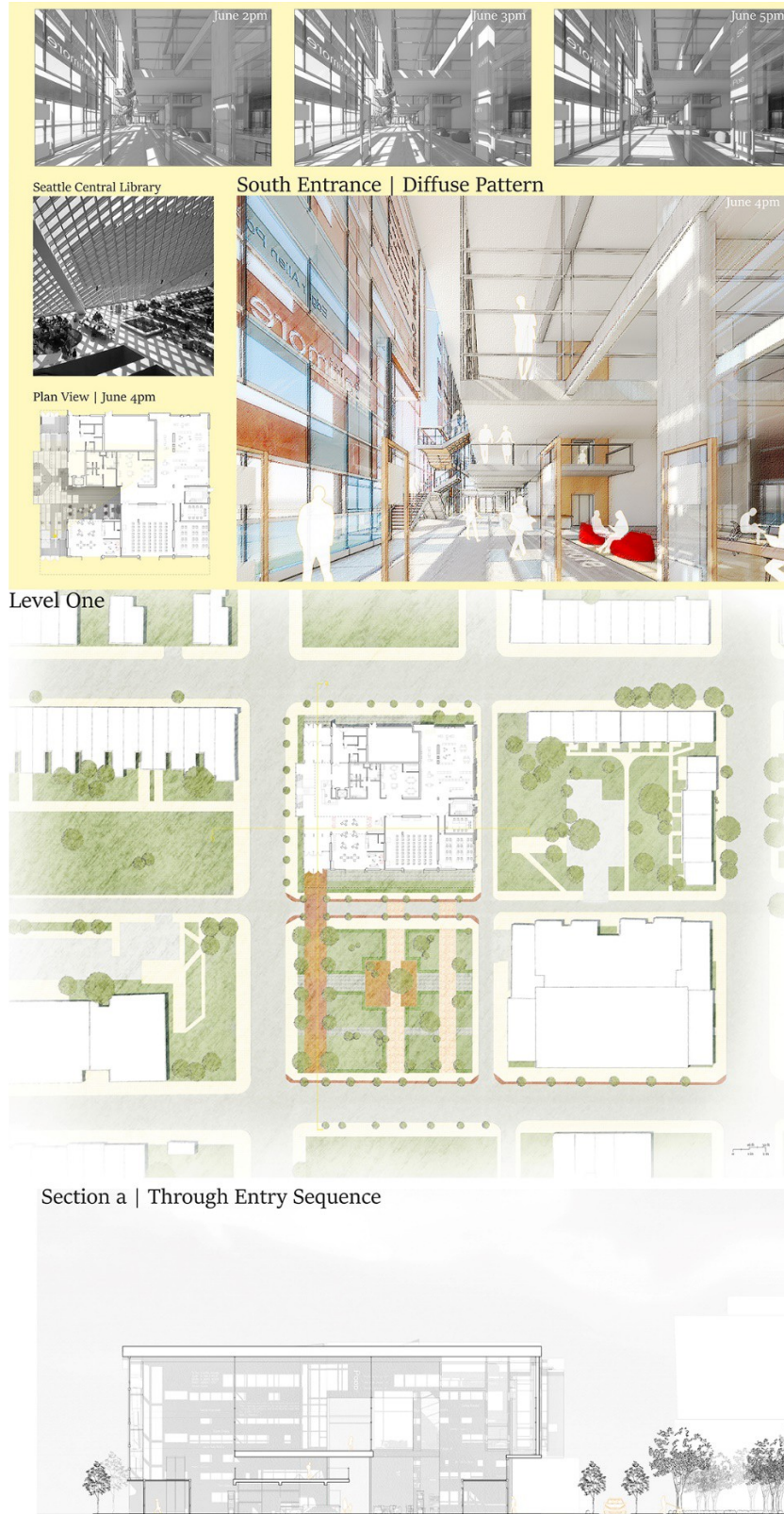


Figure 60 Thesis Presentation Board 2

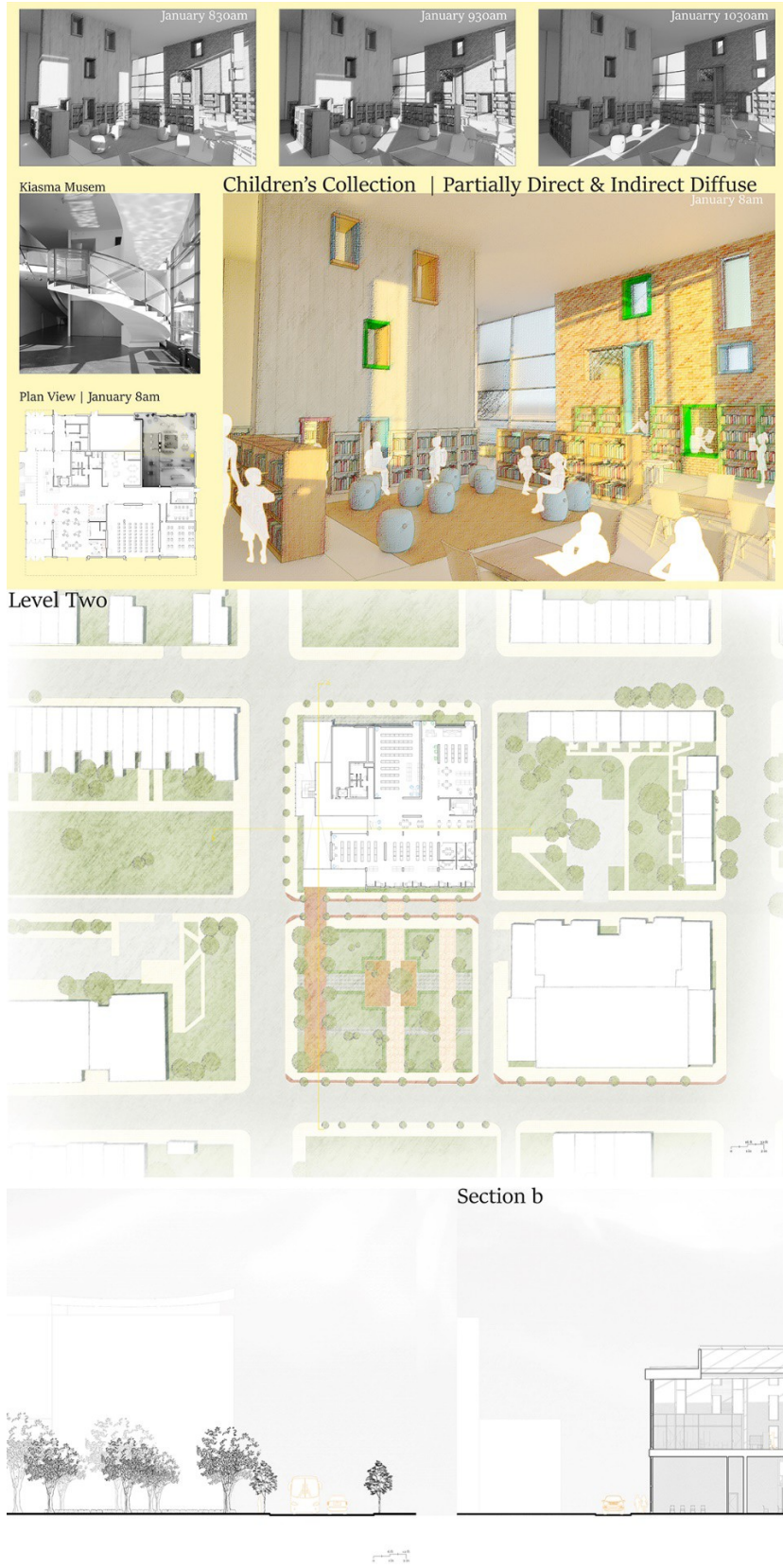


Figure 61 Thesis Presentation Board 3





Figure 62 Thesis Presentation Board 4



n

Section | October Late Morning

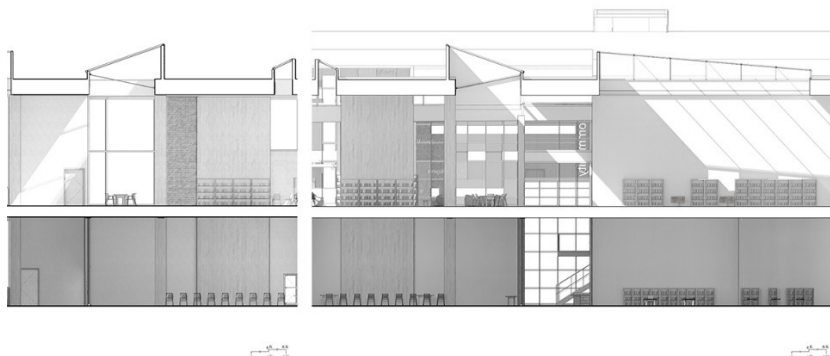


Figure 63 Thesis Presentation Board 5

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