Research the possibility of revitalizing Rochester by creating a Landmark Architecture – Redesign the abandoned subway bridge

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COMMITTEE APPROVAL

“Research the possibility of revitalizing Rochester by creating a Landmark Architecture – Redesign the abandoned subway bridge”

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Abstract

Located in upstate New York, Rochester is a city with a glorious history and rich culture. However, due to the changes in its internal and external environment, the city has slowly lost its vitality in the past few decades. Apart from the occasional holiday celebration and protest parade, it is difficult to find a bustling scene in downtown Rochester. This study proposes to create a reasonable possibility of revitalizing Rochester by designing a landmark architecture for the city. After field investigation and comparison, the abandoned subway bridge in the center of the city has become the main potential location for this reconstruction design due to its unique history and superior geographical location. This design aims to create a unique signature urban space that will help to increase the city's urban vitality.

Key words:

landmark architecture, reconstruction design, amenity design, urban vitality
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1. Introduction

Urban decline is not an uncommon problem. According to the 2018 book *Shrinking Cities* written by Weaver, Sharmistha, Jason, and Amy¹, the phenomenon of negative urban population growth and aging has been prevalent in so many countries around the world for a long time, especially in developed cities.

Shrinking cities have experienced huge social changes as a result of declining fertility, changes in life expectancy, an aging population, and a shrinking family structure. Another reason for this shift is job-related migration. This has led to different household needs, posing challenges to the urban housing market and the development of new land for urban planning. As large portions of the population moves out of cities to other states to obtain better economic opportunities and safer conditions, the exodus harms the productive potential and quality of life of these areas, with consequent declines in employment and productivity.

Although the problem of urban decline belongs to the category of social science and should be mainly improved by policies, architect Alejandro Aravena claims that focusing on projects of public interest and social impact, including housing, public space, infrastructure and transportation². Aravena used architectural design to improve people's livelihoods and promote the development of society. Although one building cannot be expected to completely change the status quo of a city, as a carrier of the city's history and culture, architecture is bound to inject vitality into the city and make a great contribution to improving its appearance.


2. Problem statement

2.1 About Rochester, NY

Rochester, NY is the 3rd largest city in New York (after New York City and Buffalo) and the 117th largest city in the United States\(^3\). It was dubbed as “Young Lion of the West”\(^4\) because of the Erie Canal and was one of the first boomtowns in the US. As lots of mills were located along the Genesee River in the past, it was also called “Flour City”\(^5\). So many famous companies were burned from this city including Cunningham Stage Coach, Bausch and Lamb, Eastman Kodak Co., and Xerox, and it hosts a high concentration of colleges and universities such as Rochester Institute of Technology, University of Rochester, and Eastman School of Music. Even though Rochester is a legacy city historically famous for its power, wealth, and new opportunities, this city faces a challenge during these decades – decline of urban vitality.

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2.2 Decline of population

The population of Rochester is 203,792 in 2020 including White (Non-Hispanic) (76.3%), Black or African American (Non-Hispanic) (10.7%), White (Hispanic) (4.5%), Asian (Non-Hispanic) (2.88%), and Two+ (Non-Hispanic) (2.1%)⁶

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“Back in the 1950s, the population had grown to just over 330,000 but with industrial restructuring in the later 20th century and the decline of industry and jobs, the city’s population fell to just 200,000 by 2018” said by Amy Velez.

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Rochester is currently declining at a rate of -0.61% annually and its population has decreased by -3.22% since the most recent census, which recorded a population of 210,565 reached its highest population of 332,488 in 1950. Spanning over 37 miles, Rochester has a population density of 5,698 people per square mile.

A decrease in the population can lead to a decrease in the labor force, which in turn leads to a decrease in social production activities and the decrease of economic activity. Weaker economic activity has led to a decline in government tax revenues and an outflow of migrants, leading to an overall economic downturn.

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2.3 Urban aging

A new study from AARP and a think-tank called the Center for an Urban Future says that Monroe County’s senior population surged in the last decade. The older adult population of Rochester is accounting for 12 percent of the city’s population which is increases up to 36 percent over the past decade and becomes the highest rate of any major city in the state.

The rising dependency ratio will increase the economic pressure on the labor force and aggravate the problem of deflation. Less Young people means weak innovation, and the city becomes unattractive.


3. Literature Review

3.1 Urban Vitality

Urban vitality is a concept proposed by Jane Jacobs in the article “The Death and Life of Great American Cities.” It can be considered as “the intensity of people’s concentration” and be used to measure the level of a city’s livability. Kevin Lynch proposed measuring urban spatial form and value using five indicators: vitality, feeling, suitability, accessibility, and management. The definition of vitality is the level of support for life and requirements for ecology and human beings.

Shiwei Lu and Xiping Yang’s paper describing the impact of the building environment on a city's vitality argues that creating sustainable urban vitality can increase population density and facilitate the flow of information and capital to urban areas, which is essential for urban development. When the use of quality infrastructure and resources in cities is not maximized, urban space will become monotonous and undifferentiated, leading to the ghost town phenomenon. Moreover, areas with low urban vitality see an increase in the risk of nighttime

14 JACOBS, and JANE. 2020. DEATH AND LIFE OF GREAT AMERICAN CITIES. S.l.: THE BODLEY HEAD LTD.


crime\textsuperscript{18}. Therefore, Shiwei Lu and Xiping Yang tried to understand the dynamics of urban vitality by evaluating the impact of the building environment on the vitality of the community, so as to improve the overall quality of urban space.

However, there is no consensus on the influence of the built environment. According to the research of different scholars, the architectural environment that affects the vitality of space can be divided into six aspects: spatial function and use, accessibility, intensity and density, shape and scale of space, landscape, and location environment in space and society\textsuperscript{19}.

Therefore, Shiwei Lu and Xiping Yang used urban spatial information data obtained from different platforms to measure the building environment of communities in central areas of Beijing and Chengdu. The purpose is to explore the quantitative relationship between the consistently built environment and the urban vitality of cities with different sizes and development conditions, so as to answer how the consistently built environment factors affect the urban vitality of different cities.

Their study used different open data platforms to quantitatively measure neighborhood vibrations in central urban areas of Beijing and Chengdu, China. They found that community vitality in Beijing was significantly higher than in Chengdu. The neighborhood vigor of these two cities shows obvious spatial heterogeneity. The results of linear regression analysis show


that socio-economic indicators account for about 30% of a neighborhood’s vitality\textsuperscript{20}. High population density will inhibit residents' occupancy behavior. However, there is a strong positive correlation between housing prices and community vitality, especially in Chengdu. Housing is better located, and infrastructure is usually associated with higher prices. These places in the urban environment help to energize the city.

Overcrowding, however, may inhibit the creation of our study of urban vitality. Moreover, high density does not mean over-intensive and over-developed. The combination of low FAR (floor area ratio) and high ground building density or the combination of high FAR and low ground building density cannot effectively create good urban vitality. Therefore, consistently built environmental factors may conversely promote the vitality of cities at different stages of development. It is important to compare the built environment measurement systems of different cities to evaluate their vitality.

### 3.2 Contribution of Architecture to Urban

As the development of human society constantly changes, the construction of cities also needs to make corresponding adjustments and changes to meet people's different needs including work, daily life, and entertainment. As the main component of a city and the phased result of urban cultural development, architecture plays a vital role in urban construction. The cultural features of a city cannot be separated from architecture, and its cultural taste also depends on the overall quality of the built environment.

There are many successful urban renewal cases:

![Image](image-url)

*Figure 4 LaPaDu Panorama 2010-10-03*

In the context of shrinking traditional industries, the Ruhr industrial area in Germany uses its industrial heritage to create a characteristic environment and redesigns old buildings to attract the population and create high-quality urban space, so as to restore the vitality of the city.

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The renovation of Canary Wharf in the UK was also carried out against the background of the closure of the wharf and urban decay. It was one of the largest real estate projects in central London in the 1980s, including commercial, residential, office, and other composite functions. Project by the company on behalf of the government and the private developer cooperation, through the stage development of residential, industrial, commercial, office and other income gained by the rolling development, and introduce the subway lines, the new expansion of road traffic infrastructure construction, public housing, providing public space, the project after transforming the ascension for jobs available for three times, to accommodate the population more than doubled, resident population and area formed more than doubled.23

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The urban renewal of Barcelona focuses on the revitalization of public space and the cultural and knowledge-led redevelopment, which not only focuses on the material level improvement but also includes the social and economic level renewal. In Barcelona, for example, several measures have been updated: the inner courtyard of the occupied neighborhood has been transformed into a small square and a small park, so as to revitalize the old neighborhood; Encourage the transformation of existing buildings into new loft apartments through old factories; Build more kindergartens, education and training centers, community centers, libraries, and other cultural facilities, expand ports, strengthen commerce, and provide new hotel, office, and university space; Strengthen the walking activity area of the old city, increase the bicycle lane and so on.

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3.3 Bilbao effect

Bilbao is an industrial and port city, which is situated in the North part of Spain. In the 1980s, the city's industries, especially steel and shipbuilding, were in decline. At its worst, unemployment reached as high as 25%. Bilbao's government tried to develop tourism to revive the city, but the city's short history, strange customs, poor scenery, and lack of celebrity patronage made it difficult to attract tourists. As luck would have it, the Guggenheim Museum, one of the world's top "chain museums", was planning to expand to Europe.

Figure 7 Bilbao (Spain) 1980 vs 2018

The Guggenheim Museum in Bilbao was built in 1997 which cost about $90 million. In the first year, it attracted 1.3 million visitors and by the third year, the city had generated more than $450 million in economic benefits. This case of "one museum changing a city" is known as the Bilbao effect, also known as the "museum Miracle".

Today, the Museum, designed by Frank Gehry, has become a symbol of Bilbao, representing the capacity of cultural institutions to reinvent a region in decline. In the years since Guggenheim Museum opened its doors to visitants, the rewards have been enormous. The data shows it has attracted 20 million visitors (more than 60 percent from overseas) to a city of just 350,000

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residents. The project and its harvest effect have created more than 5,000 local jobs and brought in an additional $65 million to Basque wealth\textsuperscript{29}.

The Guggenheim in Bilbao changed not just how outsiders saw the city, but how the city saw itself, says Richard Armstrong, the Guggenheim's current curator. "Bilbao's great success lies in its comprehensive demonstration of how visual art can positively and positively transform a city's psychological setting while attracting cultural visitors."

Elena Raevskikh formulates three hypotheses including a landmark building attracts the new populations to the pre-existing urban cultural core; a landmark building induces social transformation of surrounding neighborhoods; landmark building induces the arrival of the “most talented and educated”. He concluded that a new landmark building can create new excitement and energy, and it can create jobs and attracts creative people as well.

The declining post-industrial cities such as Bilbao have gradually promoted the industrial transformation and infrastructure renovation in the surrounding areas through the involvement of expensive star projects, which have brought considerable economic returns and become examples to be followed by many cities. But the study by LEI Wei and HE Jie points out that this model is not suitable for all regions, and that most subsequent mimicry projects have not achieved the expected returns. So, simply mimicking the Bilbao effect across the board is not the best solution to the urban decline problem.

Bilbao, as a typical small and medium-sized City in Europe, enjoys the advantages of Basque county autonomy in policy and finance, and the art and cultural industry can be positioned as a pillar industry at the beginning of the urban depression. In the decades, no matter from the government or private side, the targeted development of the city, such as urban infrastructure construction, the consumption and sponsorship of art industry, the revival of museums, formation of art blocks, art education, and the cultivation of new generation of artists, have all been well catered, which made Bilbao a global city in art and culture. In comparison, such support is not available in many of the city in the world.


4. Theory and Method

4.1 Landmark Architecture

A piece of landmark architecture is usually a large, highly rated public structure that historically, has also been called a monumental structure. Trachtenberg and Heymann, authors of “Architecture: From Prehistory to Postmodernism,” called such buildings the most sensitive and powerful touchstones of cultural processes\(^{32}\). A landmark building is related to the public life of society, and its construction requires a huge concentration of manpower and material resources. On the other hand, such buildings also provide a platform for the application of the achievements of architectural science and technology.

Through induction and analysis, landmark buildings can be roughly divided into five categories:

i. Cultural Symbols.

Such buildings are endowed with elements that have more cultural meanings than functions, such as statues or monuments and almost all of these kinds of buildings are used as tourist attractions. Christ the Redeemer, the symbol of the Brazilian people's warm acceptance and wide heart which is located at the top of Corcovado Mountain in Rio de Janeiro Brazil, and the Washington Monument, located in Washington D.C. are both typical representatives of this type of building that has become one of the cultural symbols of their cities.

ii. Functional Landmark Buildings.

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This kind of architecture is a conventional type of building that stands out from its surroundings because of its distinctive design. Large shopping malls, office buildings, gymnasiums, libraries, museums, residential buildings, villas, and even bridges are common examples of this type of building and are sometimes even considered works of art, such as the Zaha Hadid’s Bergisel ski jump in the Austrian Alps and Le Corbusier’s Unité d'Habitation in Marseille, France.

iii. Historic Landmark Buildings

Landscapes intentionally designed and built by humans, including gardens and parks built for aesthetic reasons, are often associated with religious or other monumental buildings or complexes. These landscapes soften evolve organically from the initial social, economic, administrative, and religious needs of a city’s residents and develop into their present form through interaction and connection with the surrounding natural environment, showing the physical evidence of its evolution and development in history. Typical examples are Khufu's Pyramid in Cairo, Egypt, and Himeji City in Hyogo Prefecture, Japan.

iv. Record-breaking Landmarks

Many buildings, such as the Burj Khalifa in Dubai, which is now the world's tallest man-made structure, are not necessarily exceptional in design but have become famous and iconic because they have broken some kind of record.

v. Innovative Landmarks

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Some buildings are famous because they were built using advanced technology or because they break the conventional wisdom on design. Although this innovative status may change over time, these buildings are usually still considered masterpieces because of their profound impact and great significance to society at that time. Typical examples are the Eiffel Tower and the Pompidou National Center for Art and Culture, both in Paris, France.

4.2 Design Principles

As the main means for people to know a city, landmark buildings must be designed in a way that is unique and impressive. The site of our project is on an old bridge in Rochester, so I plan to make it a functional landmark building while also including aspects of a cultural symbol building and a historic landmark building. Given these intentions, I have summarized some design principles and guidelines as follows:

a. Aesthetics

Colin Ellard, who studies the psychological impact of design at the University of Waterloo in Canada, has found that people are strongly influenced by how buildings look. Complex, interesting looks are generally positive for a person, while simple, monotonous looks are more likely to have a negative impact. Therefore, the appearance of the building, including color collocation and material selection, should be harmonious and interesting without excessive decoration.

b. Symbolic

Clarity is an aesthetic concept, and is the design element emphasized by modernist architecture represented by Luce and Le Corbusier. The structure of the building is understandable, the proportion of architecture is easy to be read, and it is symbolical because its form is clear. The best way to verify this is by confirming if a few simple strokes of line can accurately represent the features of the building.

c. Historical Inheritance

The design of landmark buildings should reflect the historical process and cultural characteristics of a city's development from the past to the present and integrate into the city's vision of future urban development at the present stage.

d. Functional Practicality

No matter what kind of building, functional practicality is always the first consideration. In particular, the purpose of this design is to revitalize the declining city, so whether the architecture better serves the people should be the first consideration. Therefore, functional zoning, spatial arrangement, and security design should be as logical as possible to maximize benefits.
The best example for me is the Sydney Opera House, which was constructed and built in such a way that it broke through its budget\textsuperscript{36}. But years later, when its image captured the imagination, a consensus was reached: the value of the generation.


John Utzon, the third-generation modernist architect, is the designer of this masterpiece. Utzon's description of Sydney is as follows: In the 1960s, Sydney was full of low small dwellings mostly built with red brick, which established the whole tone of Sydney at that time. For this project, he preferred to set a white large-span architecture in these red-brick residential buildings, just like a huge white sail showing its light and shadow changes in the sunset. It needs to connect with the parabola of The Sydney Harbour Bridge to form an integral urban landscape so that the bridge does not look too abrupt.

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The Opera House is located in the Bennelong Area, which is actually a rather harsh site. One side of Bennelong Point is too narrow, while the opening on the side facing the city is huge. This makes the design and construction of this project extremely difficult.

The Sydney Opera House is made up of three organic forms: a shell roof filled with public memorials -- a folding roof that represents a large span space -- and a pedestal shaped like a ship.

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The general shape of the Sydney Opera House is an optimal solution to the harsh site conditions. The undulating form of the shell echoes the shape of the Sydney Harbour Bridge. Utzon's love for the sea and ships led him to define his plan from the very beginning that he hoped the building to be looks like a white sail float on the sea in the dark Sydney, whose curved surface reflected the natural beauty of changing light and shadow. This definition imbues the project with romanticism, which is generally adapted to the public aesthetic and is too important for a large public building. The large-scale repetition of units and courtyards reflects a Moroccan eastern style. Utzon is more concerned with organic forms, that is why he used folding plates and

shell roofs as a structure to create large column-free Spaces\textsuperscript{41}, and this design frees the building to a certain extent from its dependence on vertical support.

Sydney Opera House is a great breakthrough for modern architecture. Its huge shell and roof make people completely ignore the feeling of vertical support from the senses. First of all, Utzon successfully connected the huge horizontal public space, lounge hall, restaurant space, the large platform connecting the city and the soaring roof into a whole, and weakened the huge volume sense of the single roof through the repetition and gradual reduction of the unit, and became an impressive whole with the Sydney Bridge. It is also very light and graceful, fully integrated into the urban environment and the natural environment of the sea\textsuperscript{42}.

For landmark architecture, the function and aesthetics always need to strive to be perfect, but it is often difficult to cater to the masses. However, the Sydney Opera House is an excellent building with a high degree of conformity between the aesthetic of the public and it of the architects, so it is regarded as a symbol of Sydney and even a symbol of Australia.


5. Methodology

This chapter aims to provide the design idea of a landmark building through a specific design scheme. Some examples could be design references in the case study part, and a site analysis helps to study the context and climate and help to decide what kind of function could be adopted for the new architecture. The final design proposal is evaluated by how much public activity space be added in this area and whether the design follows the design guidelines of the landmark building mentioned above.

5.1 Criteria and evaluation

The proposed design focuses on but is not limit to, transform the abandoned subway bridge into a unique landmark architecture for the city of Rochester, maintain the historical and cultural appearance of the existing structure, create a high quality of the indoor and outdoor space, and make the function of the new architecture suitable for a different type of people around this area. It is hard to judge how attractive is a building by specific data or formula, so the design proposal could be only evaluated by how much public activity space be added in this area and whether the design follows the design guidelines of the landmark building mentioned above.
5.2 Case study

5.2.1 Grand Avenue Park Bridge, Everett, WA

The Avenue Park Bridge elevates utilitarian infrastructure into a well-designed community asset, demonstrating the value of rethinking the design of the public realm. The bridge transformed Everett's waterfront, creating a new connection between the historic Grand Avenue Park and the city's growing waterfront.

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The new bridge addresses complex slope changes and utility needs in an unlikely new form that weaves sidewalk ramps and staircases around and inside the sloping trusses, an attractive new junction from Grand Boulevard Park to the waterfront. The bridge spans 257 feet across major utilities while navigating the existing power network, five-lane freeways, and BNSF train tracks at the bottom of an 80-foot steep slope while retaining a park from above. A unique entrance at the top of the bridge preserves some of the stunning views, allowing most of the bridge structure to be located below the Grand Boulevard Park. Scissor liked design not only to overcome the large terrain difference but also cleverly uses the difference between the height of the terrain to shape the unique form of the bridge, ensure both aesthetic and practical.

5.2.2 Empire Stores, Brooklyn, NY

Empire Stores in Brooklyn is a great example of an old building being transformed. A four-story open-air courtyard excavated from the center of the building serves as an immersive public space for the building's tenants, community members, and park visitors. A glass facade wraps around the courtyard, blending the modern with the historical, making the building's lines visible: the shopping and public dining hall, the Brooklyn Historical Society gallery on the second floor, and the multi-story open-plan office space above.

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The architects transformed the massive building, which had been a barrier between the community and the park, into a public gateway that reconnects that two areas. The carved passageway of the masonry structure forms a pedestrian passage between Water Street and the waterfront.

Brooklyn Bridge Park was extended organically into the building by converting the roof into a landscaped public terrace accessible from the courtyard. The 7,000-square-foot space offers

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iconic views of the bridge and the Manhattan skyline and enhances the park's recreational facilities with a restaurant and beer garden.

5.2.3 Park ‘n’ Play

The project aimed to transform the existing parking building, create an attractive building facade, and conceive a concept that encourages people to use the roof. A grid of plant boxes on the facade is traversed by two large public staircases with continuous balustrades that become a dreamlike playground on the roof. From simple railings to swings, ball cages, jungle gyms, and more. Viewed from the street, the railing leads visitors, invites them to visit the rooftop landscape, and enjoy spectacular views of Copenhagen's harbor.

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The design highlights the decorative aspect of the staircase element, adding value to the monotonous facade of the building and visually guiding the upward path. The continuous extension of the balustrade to the roof as the main functional structure adds interest to the whole space.

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The High Line Park, built from an abandoned elevated railway on the west side of Manhattan, is a successful example of transforming urban industrial waste into an urban green community. It is known as the linear hanging garden on the west side of Midtown Manhattan.

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The concept of the design was to respect the character of the site itself: to discover the beauty of the elevated railway, its eerie and linear form; Its simplicity and pragmatism; Its privacy and openness at the same time; And its naturally formed properties—wild plants (meadows, shrubs, vines, mosses, flowers) mixed with gravel, steel, and concrete. Local wild plants are used to combine with hard railway tracks and provide a place for relaxation and recreation by providing a variety of rest options.

The designers of the High Line have set up different seating areas on each section of the bridge, and each area has different seats to match the different pavement designs, so that people can experience different fun without getting bored on the long single linear route.

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5.2.5 Conclusion from case studies

To make the building attractive, there are many design ideas to choose from. The Grand Avenue Park Bridge is not unique in its form but also makes good use of the terrain, turning its limitations into advantages. Empire Stores skillfully combine the new elements of modern style with the existing classical style, endows the old buildings with a new life. Park 'n' Play has the unique idea of using the stair shape as the main visual language. The baluster continues to the roof uninterruptedly, making the otherwise dull building full of vitality and interest. The success of the High Line Park is a good example of adaptive reuse design. Through laying well-designed walkways, planting carefully selected vegetation, designing unique landscape elements according to the shape of each area, adding a walkway for people to walk quietly in the crowded urban buildings, giving new vitality to an abandoned railway bridge, and becoming a unique name card indispensable for the city.

The above projects provide some ideas that could be considered in the architecture design process:

1. Give full consideration to terrain features.
2. Use unique and clear shapes for design expression.
3. The exterior aspect should retain the cultural characteristics of the original building as far as possible, and reasonably increase new design elements.
4. Make full use of the roof space, as much as possible to increase the outdoor space.
5. The new architecture needed to harmonize with the existing neighborhood buildings.
6. Try to make every detail of the architecture carefully designed.
7. The functional selection of the building tries to meet the needs of a variety of different people.
5.3 Site analysis

5.3.1 Site condition

An aqueduct to carry the canal over the Genesee River was constructed with Onondaga limestone in 1842. This location was partly based on the need to alleviate a ninety-degree bend in the canal on the east side of the river and to accommodate Hervy Ely’s existing mill operation, which predated the construction of the canal.

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The Second Genesee Aqueduct, also known as the Broad Street Aqueduct or Broad Street Bridge, is a historic stone Aqueduct located in Rochester, Monroe County, New York. Built between 1836 and 1842, it originally carried the Erie Canal on the Genesee River. The aqueduct is 800 feet (240 meters) long and 70 feet (21 meters) wide and is flanked by huge parapets. It was one of the four major aqueducts of the Erie Canal system in the mid-19th century. In 1927, a roadbed was used to transport cars and named Broad Street.

It also carried a section of the Rochester subway, which was operated from 1927 to 1956, however, the pressures of the Great Depression caused financial difficulties in operation and capital maintenance was abandoned. With the subway out of service, the lower part of the bridge has been shelved for years as a gathering place for homeless, adventurous teenagers looking for a place to hang out. The graffiti, both inside and outside the walls, is a unique sight, but it always gives people a sense of insecurity that the place is not suitable for staying.
The site is in the center of Rochester Downtown there are many shops, bars, restaurants, and parks in the city center, with the greatest concentration on the East End, near the Eastman School of Music. In recent years, the St. Paul area, near the new RTS transit hub between St. Paul Street and Clinton Avenue, has also seen a growing number of nightclubs. Midtown Manhattan Square Park changes with the seasons. Since most of the surrounding areas of the site are working offices and commercial use areas, the project is suitable for the placement of retail streets and public entertainment facilities, which can be used as the location of different event activities.
Each year, Rochester hosts more than 100 festivals spanning food, music, art, and culture, and the major festivals include the Lilac Festival (May), Rochester International Jazz Festival (June), Corn Hill Arts Festival (July) Park Avenue Festival (August), Clothesline Festival (September), KeyBank Rochester Fringe Festival (September) and Image Out Film Festival (October.)

Four of Rochester's ten most famous festival sites are within a half-mile radius of the subway bridge, meaning that this area is not only the geographical center of the city but also the cultural center of Rochester. So, a square or park that could provide a place for holding the festival event is suitable for the site area.
Central Business District, also called Washington Square or Main, which is the location of several major businesses including Xerox, Chase Bank, Bausch and Lomb, Washington Square Park, the Riverside Convention Center. In addition, there are multiple cultural attractions like the Rundel Memorial Library and commercial areas like Blue Cross Arena around the subway bridge. As the link between the east and west of this district, the site could receive a steady stream of visitors.
According to statistics from ApartmentGuide, Rochester is the fourth-best city in the United States for foodies and offers up some of the best dishes from around the state, including beef on

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weck and wings (Buffalo), tomato pie (Utica), salt potatoes (Syracuse) and one of Upstate's iconic Dinosaur Bar-B-Que's four locations\textsuperscript{57}.

Rochester has its unique food culture, and the restaurant density is not low. According to the restaurant distribution map in this area, the catering industry has not reached saturation, meaning that it is suitable for more catering-related activities.

Music and film can be said to be the best cultural symbol of Rochester as it is the birthplace of the famous brand Kodak and it has a world-renowned institution - Eastman School of Music.


There are about 15 different theatres in Rochester, a third of which are located near the subway bridge, so this area has a strong artistic and cultural atmosphere and is suitable for the development of an arts district. Since the Eastman School of Music is located in the heart of the city and has a large number of musical talents, a non-profit theater could be built to provide a place for students to show their talents to the public and to rehearse after school. The Rochester Institute of Technology also has arts and film programs, and a film hall could be built to screen students' graduation work, as well as to host exhibitions to attract students to come and take a visit and interact with city residents.
Monroe County is one of the most educated counties in New York state, and the percentage of people with diplomas is about 4% higher than the state average for education. There are many different types of schools near the subway bridge, including primary school, middle school, community college, conservatory of music, etc., which can be inferred that there is a large student population in this area.

However, the number of bookstores around this area is relatively small, and because the surrounding schools are mostly primary and secondary, the campus scale is generally small as well, meaning that there are few libraries in the school. Therefore, it is helpful to build bookstores, study rooms, and other places for students to study in their spare time.

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5.3.2 Climate analysis

<table>
<thead>
<tr>
<th></th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
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<th>Sep</th>
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<tr>
<td><strong>Average high in ºF</strong></td>
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<tr>
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<td>0</td>
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<td>22</td>
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</tbody>
</table>

Rochester has a rather humid continental climate, strongly influenced by Lake Ontario. Precipitation in the region is relatively uniform throughout the year, with heavy snowfall and more overcast days in winter than in summer. Due to the influence of Lake Ontario, winter snowfall ranges from 70 inches south of the city to more than 120 inches east of the city on the lakeshore.

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The subway bridge is in the center of the city and receives approximately 90 inches of snow. Sunny day increases significantly in May, and summer temperatures across the region average between 70 and 72 degrees, with 90 degrees on nine of those days. Autumn is pleasant but short, and the climate is relatively dry through most of September and October.
5.3.3 Conclusion

Based on the site condition analysis, it can be concluded that the geographical location of the subway bridge is particularly good for culturally relevant functions. Besides its unique view on the Genesee River, there are many different tourist attractions around it. In addition, as Rochester is a famous food city and has Kodak Company and Eastman School of Music, the city has a strong cultural atmosphere and holds a variety of festival activities every year. Therefore, the reconstruction design of the bridge will take enriching the cultural life of citizens as the theme, and create a cultural center with theatres, cinemas, parks, commercial streets, bookstores, and other activities.
5.4 Design Proposal

The first step of landmark building design is to conceive a concept and determine the graphic symbols that accord with its connotation to represent the image design language of the whole building.

Interweave and inheritance can be said to be the most consistent concept of this project. The goal of the design is to retain and present the cultural character of Rochester while incorporating new elements to enhance the vitality of this city. The interweave represents the interweaving of different cultures and different ethnic lives, as well as the interesting interweaving of physical spaces; Inheritance means the inheritance of the cultural gene of the city, and it also means the alternation and integration of the old and new cultures. Therefore, the pattern similar to the combination of woven texture and DNA spiral structure is selected as the structural style of the whole building which can be seen in the plan and elevation of the designed architecture in this project.
The main planning scheme transforms the wide street corridor from a vehicular corridor into a collection of water, open space and enhanced streetscapes that reintroduce the memory of the Erie Canal into Rochester’s urban form.

The whole site is roughly divided into three parts, including the west courtyard, the main building, and the east courtyard.
The west courtyard contains a pedestrian street, fountain pond, temporary parking platform and bicycle storage. As the west side is close to the Blue Cross Arena, the commercial atmosphere is strong, which is suitable for the facade of the whole site and a variety of festival activities can be held here.

The wide site can accommodate several dining car sales points, which can increase the vitality of the whole area and attract tourists. Fountains and trees allow people to relax and play in the summer, and circular seats under the trees can provide pedestrians to rest and enjoy the cool.
Bicycle storage sites and barrier-free access encourage green travel, and the whole area is handicapped friendly.

The temporary parking platform not only provide more activity possibilities for pedestrians at ordinary times, but also provide an emergency parking space when emergency rescue or loading is needed.
The east courtyard consists of a promenade, a corridor, a parking lot, bike station, and a flank entrance garden to the library. Due to the elevation of the east side of the river, part of the bridge can be retained as an "above-ground bridge", with a garden walkway above and a pedestrian promenade below.
The corridor on the first floor has a total length of 405ft and 16ft in width. The combination of the arched bridge and the straight lines makes the whole corridor form a picture of beautiful composition. People can walk here, enjoy the scenery, or hold exhibitions as a gallery. During the festival, booths can also be set up here as farming market to sell goods.
The brick texture continues the original appearance of the bridge outside, allowing people to feel the history of the bridge up close.

On the south side of the corridor is the Central Library of Rochester and Monroe County. To connect the two public attractions, this side is designed as part of the circulation. In order to reflect the seriousness of the library, the front yard on this side is not designed to be too complicated, only two ponds and a sunken ramp entrance, giving the whole area a geometric beauty. The concave and convex cubic decoration is also consistent with the interior style of the bridge.
On the north side of the Corridor are parking lots and elevator shafts for the disabled. As this side faces the residential building, there are not too many play routes in order not to disturb the residents. At the east end of the bridge, there is a bicycle storage area, which can serve as a unified storage point for shared bikes and encourage people to come by sustainable way. There is also a platform parking area provides temporary parking spaces for emergency vehicles and unloading vehicles near the theater building.
Above Corridor is a promenade where people can roam after lunch and enjoy their afternoon. There are several seating areas along the route to provide resting space for visitors, and there are tables and benches for dining in the middle of the walkway. Each section has stairs up and down, and pedestrians can either walk along the path or leave to downstairs halfway.
An additional layer was added to the existing bridge, equivalent to a 50% increase in interior space. The first floor, which used to be a subway passage, contains a cafe, a bookstore, a central garden, a multi-purpose room and a promenade. The original driveway was transformed into a partially outdoor and partially indoor structure, which includes a swimming pool, seating area, shower, walking garden for outside space, and a central garden, cinema and theatre for inside space. The third floor is fully outdoor space, containing a central dining area and hanging gardens on either side.

On both sides of the bridge, there are two outdoor staircases facing the center. In the center of the bridge, there is a three-story tree as a mini natural landscape. There are also two groups of outdoor spiral staircases around the trunk. Two sets of vertical lifts in the garden could serve the disabled. The multifunctional room also has an elevator connected to the backstage of the theater, which is available for the use of the working cast and crew.
The first floor including the coffee shop, bookstore, multi-function room, corridor, and central square.
The ground floor is centered around a natural landscape tree, with three interior Spaces and a semi-open promenade at four corners. The entire central area is also semi-open, with elevators in the southwest and northeast corners, and two outdoor staircases spiraling up in the middle. Visitors can enjoy both indoor and outdoor views or walk directly through the central area. The central circular area is designed with a skylight without ceiling, allowing light and rainwater to enter directly, and the lush foliage can shade and absorb the incoming rainwater.
At the northwest corner of the ground floor is the cafe, where visitors can have meals and rest. The shape of the whole room is a long rectangle with a bar in the middle and two sunken dining areas on both sides.
The bar area in the middle is designed with the same wood strip texture as the central landscape area, which is the visual center of the whole cafe. The warm atmosphere of the bar gives visitors a warm feeling when they just enter the door. The walls of the dining area on both sides are designed with the same brick texture as the outside of the bridge, with black as the main color to make the whole space stylish. The arched glass Windows also provide a good view of the diner, and the overall space is concise but not simple.
Panoramic glass walls are placed at both ends of the cafe, ensuring ample daylight and views. On the east side, a couch is placed to meet the needs of a group dinner. Long tables and high stools are placed on the west side to meet the needs of individual dining. Meanwhile, the Windows face the West Courtyard, giving a good view to enjoy the beautiful scenery, and the water above can form a mini waterfall flowing down the outside of the wall.
The bookstore is oriented to the south for ensuring plenty of daylight and the interior has been carefully designed. In order to make the full use of the space, the whole room is divided into multiple functional areas by different heights. The checkout counter at the entrance is located at the bottom of the outdoor stairs. Next to the checkout counter are the children's book area, reading area, office and storage, which are dominated by warm colors. On the other side is the two-layer general book area and the independent study room by the window. The tone of this area comparatively cool reflecting the mature feeling in contrast with the childlike interest.
The north and east sides of the bookstore are covered with glass walls, which provide enough daylight and allow visitors to get a view of the interior, thus attracting people to come in. There are several different seating areas, providing ample reading space for customers.

Despite the fact that people can easily buy books online, brick-and-mortar bookstores still have their own unique charm. In order to meet the needs of different customers, the bookstore has a study room for quiet study, a sofa area for communication, and a stair seating area for children to calm down and read. Cultural activities held by the bookstore can attract residents to come here to study, communicate, make friends, and enhance the interaction and vitality of the community.
The spatial logical relationship of the bookstore can be clearly displayed through sections. One of the challenges of the design was to combine the elements of the existing classical arched windows with the modern architectural style to achieve visual harmony and unity, while at the same time making the space layout interesting and attractive.
The children's book area is located on the west side of the room, with a relatively low shelf level, ensuring that parents can see their children's every move from the adjacent reading area. The panoramic glass curtain wall also ensures plenty of light in this area, and the whole space is full of childlike interest owing to the stepped seating and bright colors.
The adult reading area is divided into two levels, the upper part of which is like a small bridge with a glass curtain wall separating it from the study room. The lounge deck area is located in the deepest part of the room, providing the reader with a space to relax and an atmosphere to enjoy reading without being disturbed by passers-by. The distance between the underground bookshelves and the dimensions of the walkways are deliberately compressed to give the rooms a precisely controlled visual density and a tighter spatial frame.
In order to cut off the noisy environment, there is a study room in the southwest corner of the bookstore, which can provide absolute quiet environment for those who want to concentrate on reading and students who need to concentrate on their homework. The study room consists of a walkway and 12 single cubicles based on the bridge's original arched windows. In contrast to the complex exterior decoration, the interior style is simple and geometric, allowing the focus to read and study.

In order to avoid the feeling of depression brought about by the enclosed space, the walls of the study room are also glass curtain walls. Outdoor people can get an indoor view, know whether there is a vacant position while indoor people can get outdoor lighting as well.
For purpose of increase the variety of uses, the northeast corner of the first floor of the bridge is a large multi-function hall. Various activities can be held here, such as dance classes, conferences, speeches, parties, exhibitions, weddings and so on. As the room is located directly below the theatre, there is an elevator to the backstage and a rolling door to allow large cargo to pass through the east side. The room can also be used as a part of the backstage, providing a place for the cast and crew to rehearse and rest. Two movable glass walls in the middle divide the space into three areas, including two large rooms and a walkway. The glass walls can also be moved so that the three areas can be combined into one large room to accommodate the needs of different activities.
When the movable glass wall in the middle is closed, different events can be held in the two rooms. One room is lower in height but wider in width, while the other room is narrower in width but higher in height. Users can reserve either of them according to different needs. Each room contains its own storage area for tables, chairs and other props. The room is adjacent to a toilet which is easily accessible.
The room is not over-decorated so that people can decorate the wall by themselves according to specific needs. The room has a mirror along the wall to provide convenience for dance practicing and to make the space look more spacious visually. There are a number of track lights on the top, which can be adjusted freely when holding exhibitions or other events. The side wall is also fitted with a projector and projection screen, allowing for lectures or teaching activities.
As shown above, the glass wall in the middle can be transformed and the whole space can be turned into a large room where people can host large events such as banquets, exhibitions and so on. Outside the rolling door is a temporary parking platform. Large objects such as musical instruments and sculptures can be moved in through this entrance.
The second floor is divided into indoor and outdoor activity spaces, including the cinema, theatre, outdoor pool, walking garden and central tree area.
The shape of the windows was also redesigned as the second floor was built on top of the original bridge. In order to ensure that new design elements are added without conflict with the original arched elements, the shape of the windows on the second floor adopts a rectangular pattern sandwiched between two semicircles of the same length and width as the three windows below, and the interior of the second floor is designed based on the shape of the new windows.
The central area of the second floor is a semi-open hall with irregular shape. In order to avoid too much confusion in the visual perception, bright wood grain is deliberately used to highlight the circular element in the center of the black space.

The tree, which extends from the first to the third floor, is enclosed by cylindrical glass walls to form a mini ecological garden with sliding doors that allow access to the area and a spiral staircase leading up and down. In rainy and snowy weather, this area can be closed and turned into an interior space, where people can observe the changes of the tree during the four seasons through the glass walls and enjoy the rain or snow scenery.

As the center of the whole building, this area acts as a transportation hub, which means visitors can access almost all functional areas of the building from here.
Upstairs of the bookstore is a small cinema that can seat 81 people. In addition to general commercial films, the studio can also be used as a showcase for RIT students' graduation work, allowing residents of Rochester to experience the learning results of this city’s college students. Since Rochester is the birthplace of the Kodak Company, the studio also represents a part of the city's famous culture, and although it cannot be built on a large scale due to site constraints, the overall design is sophisticated enough to integrate all the functions required.
One half of the cinema is a screening room and the other half is a waiting room. The height of the screening hall is raised to meet the needs of the screening room, and the seating area corresponds to the shape of the outdoor stairs to ensure the full use of all parts of the space as far as possible. The waiting room contains a sitting area, a ticket office and as the shower room and changing room is just near the cinema, there are just two bathrooms indoor. The windows of ticket office face to both inside and outside, which can help to sell tickets for the customer indoor while provide snacks for the users of the outdoor swimming pool.

The walls of the cinema are equipped with sound-proof glass windows and adjustable shutters, so that customers can get sufficient vision when entering and leaving the theatre and save part of the consumption of lighting energy as well.
The interior design of the waiting room was inspired by film. The combination of the curves of the ceiling and the windows, coupled with the lattice template decoration, makes the whole space seem to be wrapped by the filmstrip, which makes people plunge into the atmosphere of the movie world as soon as they enter the door.

The principle of unity of interior and exterior design elements is implemented while ensuring individuality, which makes the transition from the central tree landscape area to the cinema very smooth and harmonious.
Above the multipurpose room is a small theater. Rochester is a very artistic city, the center of where the famous Eastman School of Music is located in, and many large and small theaters are gathered around there, forming a unique cultural atmosphere. Although the theater is not so big, with only 94 seats, the small stage can bring the actors closer to the audience, suitable for holding small concerts or plays, as well as providing a stage for school students to show their talents and learning achievements.
The waiting room of the theatre is a three-section structure, which consists of seating area, aisle area and functional area. The functional area includes three bathrooms and a ticketing office. The main entrance to the waiting room is also adjacent to the entrance to the theatre, ensuring that the audience can be evacuated outdoors in times in case of an emergency. The stage of the theater is minimal in size, and although there is not much backstage space, the cast and crew can take the elevator to the lower waiting area to rehearse, or to rest, since the multi-purpose room is directly below. The backstage elevator can also be used to transport large form items or musical Instruments, as much as possible in a limited space to meet all needs.
The interior design of the theatre's waiting area was inspired by cassette tapes. Like the cinema, the interior of the theatre is also designed in a quasi-materialistic style, combining the shape of the cassette tape associated with the musical elements and the windows on the second floor to convey the artistic feel of the theatre. Circular glass windows on either side act as two rotating axes, and the red color of the central door both accentuates the position of the main entrance and reflects the characteristics of the cassette tape. The three areas are distinguished by different elements: the cassette tape - like functional area is full of fun; the middle corridor is pure black, which visually guides the route of circulation; the seating area is mainly colored with wood strip texture to increase the sense of comfort and warmth. And this space also achieves the unity of indoor and outdoor design elements.
The northwest of the second floor is an outdoor swimming pool designed to reflect the bridge's historical use as a ship path rather than a vehicle drive. The café wall below the swimming pool follows the arched window on the outside of the existing bridge, giving people a sense of a miniature version of the bridge, and the pool above just reverts the history, allowing people to understand the culture of this bridge. On the south side of the pool is the shower and the entrance to the cinema where people can buy snacks at the ticket window and change clothes in the bathroom.
The outdoor space on the southeast side of the second floor is the promenade mentioned above and a staircase leading to the third floor hanging garden with a seating area where visitors can relax and enjoy the view.
The third floor is a fully outdoor activity space, containing a central dining area and hanging gardens on either side. Visitors can ascend from a spiral staircase that wraps around the trees in the middle, or they can choose to take an elevator. The dining area and the elevator are covered by the ceiling to protect from the sun or rain. The design style of the area also follows the pattern of black and wood grain on the second floor. The tops of the trees protrude from below and become the focal point of the whole area, adding life and vitality to the space.
Roof garden areas on both sides add green space to the urban, the uncomplicated walking route provides visitors with a relaxing stroll after a meal, and large lawns provide space for pets to run and play. There are viewing platforms at both ends of the garden, allowing visitors to view the street and the east and west courtyards from high places. There are also flower bushes and seating areas on both sides of the road, and it is also a good choice to enjoy the sparkling river in the autumn breeze.
6. Result and Analysis

This project aims to improve the vitality of the city through the design of landmark building, so there are two criteria to verify the success of the design. The first is whether the whole design conforms to the design principles of landmark buildings summarized above; the second is what aspects of the redesigned buildings can achieve the purpose of improving the city’s vitality.

The design principle of the landmark building includes aesthetics, symbolic, historical inheritance, and functional practicality.

1. Aesthetics is a very subjective concept, and everyone has different criteria for beauty. However, the comparison before and after the design clearly shows that the original bridge has changed from a single lane to a park on the bridge with rich contents. The interaction of vegetation, pool, and walkway connects the whole area better and adds vitality to the previously boring space. Besides the overall effect of the external improvement, the internal space has also been carefully designed. Each room maintains its own unique characteristics while being unified with the overall design style so that visitors will not feel disconnected or bored as they move from one scenic spot to another. In terms of aesthetic design, it can be said that this solution is unique and logical.
Figure 102 Existing view of the site

Figure 103 Bird view of the designed bridge
2. The newly designed master plan, though, is slightly more complex than the original structure, as the elevation and plan of the bridge all follow the design elements of the concept graphic, presenting obvious visual uniqueness and clearness. The layout of each floor is centered around the tree, with four corners for different functions, which is easy to read. Visitors can easily reach the central tree area from any point of view, and the central tree also acts as a transportation hub connecting the various rooms of the bridge.
3. Ninety percent of the bridge's facade has been left intact and some of the inner walls of the bridge are designed in the same way as the existing façade. There is an outdoor swimming pool that combines the history of the bridge with its function, allowing visitors to experience the history of the bridge while playing on it. The functional selection of each area also serves to carry forward the city's culture, which brings together the cultural characteristics of Rochester and presents them to visitors from all over the world. Each corner embodies the characteristics of the organic combination of
classical and modern elements and perfectly interprets the concept of interweaving and inheritance.

Figure 108 Existing view of the site

4. Practicality was a priority throughout the project. As can be seen from the picture above, two residential buildings near the bridge were blocked by the construction of its second-floor driveway, resulting in a complete lack of daylight in the two floors near the bridge side. Therefore, the harmonious coexistence with the surrounding buildings is also one of the design considerations. The solution is the demolition of part of the road that was added in the 1920s and 1970s and the addition of a new level of activity space which then becomes a multi-level park with multiple dimensions. To ensure compliance with the Americans with Disabilities Act, the elevator and the passageway for wheelchairs are evenly distributed along the bridge. Bicycle storage points have also been added at both ends of the bridge to encourage people to visit by a sustainable method of transportation.
The interior of each room also adopts the design concept of half-floor design, or adaptive design, to ensure the maximum space utilization.

In review, the new design simultaneously takes into account the aesthetics of the appearance, the practicality of the function, and the richness of the content, all of which are in line with the design principles of landmark buildings.

The change brought to the area by the new design is difficult to quantify but can be assessed from intuitive data – specifically the increase of activity in the area and the estimated number of visitors.

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<td>Total</td>
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<td>+69.0%</td>
</tr>
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Table 6 Comparison of activity spaces

By adding another floor and reusing the abandoned subway rail space, the area for activity increases by 69%. As most of the existing bridge is the driveway, the real activity space for pedestrians is approximately 17,000 square feet (23% of the overall area), while the real activity space of the design proposal is about 84% of the overall area.
Thanks to the increase of the active area, the richness of the space is also greatly improved. The bridge has changed from a vehicle opening function to a plaza that can meet the needs of tourists and citizens of different ages. Therefore, it is conservatively estimated that the number of tourists in this area can be increased up 15 times. Meanwhile, the development of economic and cultural activities in the surrounding area can also be promoted.
7. Conclusion

It is difficult to evaluate the increase in the urban vitality by specific data unless the redesign idea is actually built. Therefore, it can only be estimated from what contribution the design has made to enhancing the vitality of the city. First, the new design transforms the original single-purpose bridge into a multifunctional space for commercial, recreational and educational activities. It also increases the green area of the city and provides suitable venues for different festival celebrations. And the structure’s different functions will serve people of all ages.

In addition, the original abandoned space is reused to form a unique and interesting scenic spot which will greatly increase the attractiveness of the area, as well as the employment opportunities in and around the area. This should enhance the interaction and communication between the residents of the city and enrich their daily lives as compared to the existing driveway. The unique geographical location and historical culture of the bridge will also be fully utilized. While retaining the original characteristics of the bridge, the new elements currently lacking in the city will be integrated into the new design, creating a new excitement around and about Rochester, which can effectively improve the visibility of the city and inject it with a greater sense of youth.
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Bibliography


