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Where Do We Go from Here? Best Practices for Adapting Historic Buildings for Climate Resiliency in Newport, Rhode Island

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Where Do We Go from Here?

*Best Practices for Adapting Historic Buildings for Climate Resiliency in Newport, Rhode Island.*

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Title: Where Do We Go from Here?: Best Practices for Adapting Historic Buildings for Climate Resiliency in Newport, Rhode Island.

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I dedicate this capstone, my degree, and everything I create to my older sister Michele. To whom I would not be who I am, or where I am. To whose unwavering support in my dreams allowed me to explore all my options and to find the-off-the-beaten-path career that has become my greatest passion in life. She gave me to confidence to be myself, to grow as a person, as a student, and has always believed in my ability to obtain my big crazy dreams. Her support in me finding my way to preservation and her confidence that I would not only achieve but achieve greatness, provided me the courage to use my career to follow my heart. I am so grateful for all your love, support, and belief that I would find my way.

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ABSTRACT

When looking to the future, it is hard to ignore the significant effects climate change will have on our historic built environment. Roughly 2,459.32 acres of land throughout the historic City of Newport, Rhode Island fall within the hundred-year floodplain associated with sea level rise. Through examination of precedents in Louisiana and Charleston, South Carolina, this study analyzes best practices and government policies for adapting historic structures to be more climate-change resilient. The goal is to identify best practices from the precedent areas and use them as guidance for the creation of new initiatives to protect historic structures in Newport. Finally, this study analyzes Newport, Louisiana, and Charleston’s current resiliency practices for historic structures and makes recommendations for how Newport can improve its resiliency planning for historic resources.
1.1 INTRODUCTION

1.1 PROBLEM

Climate change and the impact that water and rising seas is having on our built environment is going to decimate our way of living; through the new edge boundaries, increase in severity and frequency of storms. Historic resources are often important indicators of culture, history, and pride within communities. With the imminent threat of climate change impacting how we design new construction, what can be done to existing historic structures to insure that the future impacts of climate change will not take away all of our costal historic properties.

This study looks at the impact that water will, and is, having on historic resources in the port city of Newport, Rhode Island. Currently, Newport has not yet begun to fully address the issues that climate change will have on its built, and historic, environment. After understanding the history of Newport, and the importance of Newport’s build environment, two precedent cities with similarities to Newport, Louisiana and Charleston, are examined. After looking at the existing approaches or, best practices, by Louisiana and Charleston the study then is able to look at how Newport can implement some of the current practices into an action plan for resiliency of historic structures within the historic Point Neighborhood.

Resiliency is defined by the Rockefeller Foundation as: “the capacity of individuals, communities, institutions, businesses, and systems within a city to survive, adapt, and grow no matter what kinds of chronic stresses and acute shocks they experience.”\(^1\) Looking at areas, such as Louisiana and Charleston, who are understanding and dealing with the impact that climate change is currently having on their urban landscapes allows for a better precedent for how

Newport can approach resiliency throughout the city. The approaches used by Louisiana and Charleston are centered around the impact the climate change is having on the historic building stock throughout each of the historic cities. If Newport has a well-rounded understanding of what practices are being used by other cities, and working well within each city, the ideologies used by Louisiana and Charleston can be adapted to address the issues of water that are currently impacting Newport.

When approaching resiliency for a city there are two separate approaches that should be taken; a macro and a micro approach. A macro approach involves the local government, or state government, putting into place larger community-based planning. This approach allows for the entire community to benefit through the advancement, or creation, of policies that will protect the area from water-based threats. In addition to a macro, or community-based approach, there should be a micro approach. A micro approach guides an individual homeowner in making changes to their own property or within their own neighborhood to foster resiliency. Currently there is a lack of recommendations and guidance on how to approach climate resiliency of historic structures in Newport. When approaching climate resiliency within the City of Newport, it is important to consider the macro approach of government intervention, and the micro approach for initiatives for individual property owners. Together, using both of these approaches can have a positive impact on how Newport is able to aid its citizens for the future of water-based threats. After witnessing, speaking with, and noticing that the gaps in literature surrounding the issue of historic structure resiliency in Newport, it became inherently clear that there is a need for a study done on the best practices for adapting historic buildings in the City of Newport.
Newport was chosen as the main area of focus because of this study because of its architectural history, coastal location, current issues with flooding, and the future predictions of climate change impacts on the city. The National Oceanic and Atmospheric Administration (NOAA), Figure 1-1, has made predictions about the future sea level rise in Newport. According to NOAA’s data, over the past several decades Newport has experienced a steady increase in sea level height. With predictions that sea level will continue to rise, water will increase in damage done to the built environment of Newport.

![Figure 1-1: Newport Sea Level Rise Predictions. NOAA Newport Sea Level Rise Predictions: Ch2m. “Drainage Investigation and Flooding Analysis Wellington Avenue and Bridge Street (Project No. 15-037),” March 2017. http://www.newportdrainageinvestigation.com/_pdfs/NDI_FINAL_REP_Component_RB.pdf.](image)

Although data on the future impact of climate change is continuously changing, from 1930 to the present, sea level has risen over nine inches in Newport and is continuing to rise an average of 2.5 millimeters per year since 1930.² The amount that sea level has risen in Newport may not

seem substantial, but when compared to the global average of 1.7 millimeters per year, Newport has had a substantial rise. As predictions for the amount that sea level will rise continuously increase, Newport is running a risk for flooding and intensity of storm surge during hurricanes and nor’easters. It is predicted that Newport’s sea level will rise around 3 to 5 feet by the year 2100.

1.0.2 LITERATURE REVIEW

There are numerous sources, organizations, and publications surrounding the problems that climate change is having on the built environment. Although not all publications pertain to the topic of historic preservation, resiliency, or climate change, they are still indicative to the overall narrative surrounding how the build environment has, and will, be impacted due to water-based threats.

One of the most influential and informative pieces of literature surrounding the impact that climate change is having on our built environment was created by John Englander; his publication is entitled *High Tide on Main Street: Sea Level and the Coming Coastal Crisis*. The book goes through different situations where a super storm will impact areas across the United States, like Hurricane Sandy did in 2012. The book goes through the history of sea level rise, and why it is beginning to rise again for the first time in 6,000 years. The book does an excellent job of explaining the science behind sea level rise and how climate change will impact our society and our economy. This book is a good resource because of its ability to breakdown how climate changes has and will continue to impacts the urban form. Although the book is a good resource,

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4 Ibid.
it does not specifically speak to the issues facing Newport Rhode Island; through the research and information conclusions can still be inferred. Englander does well in explaining what climate change is but neglects how historic properties specifically will suffer due to the future events.

Judith Rodin is commonly referred to for her work with the Rockefeller Foundation and through her definition of what it means to be a resilient community. She published a book in 2014 that addresses what it means for a community to establish resilience entitled *The Resilience Dividend: Being Strong in a World Where Things Go Wrong*. The book defines issues and why communities have an inability to bounce back efficiently to a stressor. Rodin takes people, businesses, communities from cities across the world and uses them to explain her definition on the Resilience Dividend. This book is a useful source in understanding what resilience is, how it impacts a community, and what a community is able to do in response to a stressor. However, since the book covers a large range of topics and uses a variety of examples from across the globe, there is no unifying case study or example that the author uses to explain resiliency in a particular area. Rodin also neglects to relate resilience to the preservation of historic structures in her analysis.

After looking into Judith Rodin and her work within *The Resilience Dividend*, research needed to be done on the Rockefeller Foundation and their role in creating resilient cities. In partnership with ARUP, the Rockefeller Foundation created a document entitled “City Resilience Framework” in 2015. The document addresses the who, what, where, when, and how of resiliency in cities. It looks at the different factors that go into making a city resilient; from a governmental to a human scale. The report provides a strategy for how to address and create a

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resilient city through their analysis and “framework” that they are providing. This report would is useful because it looks at resiliency through a variety of different angles. The report is comprehensive and gives an overall holistic approach to understanding and interpreting resiliency. The report is helpful to give a full understanding of urban planning, historic preservation, or architecture in the modern city.

Another piece of literature that addressed sustainability and urbanism is the book Sustainable Urbanism and Beyond: Rethinking Cities for the Future, by Tigran Hass. This book is a collection of different editorials on particular subjects related to sustainability and urbanism. The content is broken down into eight separate parts, all pertaining to different subjects within the overall topic. This book gives an overall view of different topics by different authors, from all over the world, within the field of sustainability and urbanism. This book is useful because it gives a variety of different opinions, on the subject for sustainability within urban environments. However, this book does not go into any one subject deeply, but rather skims several larger topics. This is publication was useful in understanding a variety of approaches to sustainability and urbanism with examples from all over the world.

After looking into the large-scale literature on climate resilience, it was important to then narrow the scope and look into are directly impacted by climate change. Federal Emergency Management Agency (FEMA) is well known for created guidelines to inform about the different techniques and practices that should be used. In FEMA’s “Integrating Historic Property and Cultural Resource Considerations into Hazard Mitigation Planning: State and Local Mitigation Planning How-to Guide”, the comprehensive report gives an extensive background how

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preservation can be applied to hazard mitigation of historic structures.\textsuperscript{10} This was able be used as a resource for local historic districts; creating a how-to guide in understanding the proper mitigation for historic properties and the impacts of climate change. The report breaks down mitigation into four phases; organizing resources, assessing risk, developing a mitigation plan, and implementation of the plan as well as monitoring the process. Although this is a great comprehensive report, it was created a decade ago; rendering sections of the document out of date.

Upon narrowing the search for literature that links preservation and resiliency urban planning, a document created Richard Longstreth in 2011 entitled \textit{Sustainability \& Historic Preservation} was researched.\textsuperscript{11} This book is a collection of different facets of sustainability from different preservationist perspectives. The book comes together with the central theme of integrating historic preservation into the bigger context of sustainability. Previously a topic only spoken about by the scientific community, the preservationists are relating the issues of sustainability into the historic context. Within the nine chapters of the book are different approaches to how sustainability within historic preservation is viewed; going deeper into topics such as architectural landscape and climate change. This book interpreted the impact that sustainability has on the physical environment within the scope of historic preservation, as well as its impact on the post-World War II suburb. However, this book does not provide detailed information the impact that climate change is having through water biased threats.

1.2 METHODS

The approach to this study is twofold, first the existing conditions for Newport were established through research on the historic development and the development Newport’s urban environment. Then the study looked outside Newport into what other cities are doing to accomplish climate resiliency for their historic resources.

To establish existing conditions for Newport an in-depth research into the history and development of Newport was done. Although this research is not clearly stated within this study, it was used to gain greater insight into understanding the current issues that Newport is experiencing. After understanding the history of Newport, site visits were then conducted in Newport to look at the current urban context, the different historic resources, and how inefficient the mitigation of storm water is within the city. Once it was understood how Newport developed and how it is unable to control the impact of water-based threats, research into how climate change is going to further increase the current issue of flooding was done. After understanding all the working parts of the past and existing conditions, during a site visit it was discovered that in the Point Neighborhood, which is suffering the most from flooding within Newport, had a historic building elevated. It was then decided that research into the decision to elevate the building and using it as an example of how preservation efforts have changed in Newport became evident. The final section of research, in understanding Newport, was looking into the different planning documents and local efforts to fight the effects of flooding. It became apparent through research that although the city places importance on its historic resources, there is no clear defined plan surrounding how to create more resilient historic structures. In conjunction with literature research, it became apparent that there is a gap in guidelines for creating resilient historic structures that are exposed to the particular threats that Newport is facing.
The second section of research started with the literature review, learning what information is out there and gaining an understanding on what it means to be climate resilient for a historic structure. Upon researching other historic areas throughout the United States and Europe, it became clear that the issue of creating resilient historic structures was a topic that needed to be further researched. After looking at cities such as Boston Massachusetts, New York, New York, Miami, Florida, and Annapolis, Maryland, the best examples of approaches that could yield recommendations for Newport were identified as Louisiana and Charleston, South Carolina.

Louisiana and Charleston were chosen as precedent areas because they each have specific commonalities to Newport. The State of Louisiana was chosen as an example because of the approach that the state has taken toward preservation. Louisiana places the importance of preservation on maintaining an owner within their home, instead of forced relocation due to unlivable conditions. Louisiana has a long history of flooding throughout the state; from annual flooding from the Mississippi River and sections of the state on the Gulf that are exposed increased storm surge, such as New Orleans. The state responded to frequent flooding by creating “Elevation Design Guidelines for Historic Buildings in the Louisiana Go Zone” in 2014. This study uses the guidelines created by the State of Louisiana as a primary example of how Newport can adapt other practices to suit their specific needs. Aside from the creation of guidelines and the preservation tactic of Louisiana, the approach of preservation through a macro and micro approach within the guidelines is what made Louisiana an interesting place to compare to Newport.

Charleston, South Carolina was chosen as the antithesis of preservation practices used in Louisiana. Throughout Charleston has a long history with preservation, it also has a history with
frequent flooding. Although Charleston has maintained an example of how to preserve, there have been several severe flooding events in the past decade that have left the city devastated. As climate change continues to impact Charleston, the preservationists within the city are becoming more understanding to elevation and alterations to historic structures in order to keep the buildings from destruction during flooding events. Due to the recent change in Charleston’s preservation ideology, the city has become an interesting area to compare to Newport; due to the change in preservation ideology out necessity.

Finally, after all of the information was collected, the study was able to create educated recommendations for the City of Newport. Using the background historic of Newport and what Louisiana and Charleston have accomplished guided the recommendations made towards Newport.

1.3 CHAPTER OUTLINES

Chapter 2: Newport Rhode Island Background and Existing Conditions, outlines general information on Newport to orient the reader. The chapter then goes into the existing conditions for Newport Rhode Island by outlining resiliency planning efforts done by the City of Newport; see through macro-based planning of the Comprehensive Land Use Plan and Hazard Mitigation Plan. The analysis and synthesis of each document is done from the perspective of protecting the historic resources throughout the city. The chapter then examines a precedent study of 70 Bridge Street. The single-family resilience is owned by Charles B. Bane and William E. Dane and is considered to be a contributing structure to the historic context of the Point Neighborhood. This building was chosen as an example because it is one of the first homes within the frequently flooded Point Neighborhood that has chosen elevation as a means to protect their home from the flooding in the area.
Chapter 3: Louisiana, outlines the strategies for adapting historic structures to become more resilient. The approach taken by Louisiana is considered to be a macro-based approach to preservation. The importance of preservation within Louisiana is placed on retention of communities within neighborhoods instead of the preservation of a particular building. The chapter examines what the State of Louisiana has published for architectural design guidelines for the elevation of historic buildings and how the document can be utilized by the City of Newport to further advance their resiliency efforts surrounding historic structures.

Chapter 4: Charleston, South Carolina, outlines the strategies for adapting historic buildings. The chapter examines a case study of 74 Rutledge Avenue. The single-family residential home is located in an area of the city that has a history of frequent flooding. The owner, Jack Margolies, submitted an application to the BAR in 2016 to elevate the home after a fire, and was denied. After another year, the BAR accepted a new application to elevate the property in 2017. The change application approval by the BAR shows a change in attitude towards elevation of historic significance and a new era of preservation within Charleston.

Chapter 5: Recommendations, looks at the macro and micro planning approaches to urban resiliency that can be taken in Newport. Recommendations include the creation of architectural design guidelines for each historic neighborhood in Newport as well as increasing green space to absorb runoff water.
CHAPTER 2: BACKGROUND AND EXISTING CONDITIONS OF NEWPORT, RHODE ISLAND
2.1 NEWPORT, RHODE ISLAND

2.1.1 LOCATION

Newport is a coastal city located on Aquidneck Island in Narragansett Bay, and is part of Newport County, Rhode Island. Newport is located at 41°29'17"N, 71°18'45"W and is the largest city on Aquidneck Island; consisting of 11.5 square miles in total.\(^\text{12}\) Newport is located roughly thirty miles south of Providence and is well known for being a summer resort town with a thriving heritage tourism industry. In addition to tourists, Newport is home to Salve Regina University, with approximately 2,500 students, and hosts a large US Navy presence; with the Naval Undersea Warfare Center, the United States Naval War College, and a large United States Navy training center.\(^\text{13}\) Today roughly 40 percent of Newport is part of a National Register Historic District and under the jurisdiction of the Historic District Commission.\(^\text{14}\)

2.1.2 BACKGROUND

The City of Newport is a seaside city with strong ties to its 375 years of history as a seaport, naval base, summer resort, and tourist destination. The drive to preserve in the city stems from Newport’s collection of important historic buildings. The city retains significant buildings from its colonial settlement in 1639. The historic architectural stock within Newport ranges from Federal and Georgian-style homes to extravagant nineteenth-and early twentieth-century Guided Age mansions.\(^\text{15}\) Understanding the impact history has had on the built environment in Newport is imperative in the comprehension of the architectural significance of

\(^{14}\) Contributing: A structure, object, or building, that adds to the historic integrity of the historic district; a contributing element to the historic districts ability to be considered historic.
the buildings within the city, as well as the importance of the preservation movement in Newport.

The beginning of Newport and its prosperity as a port city allowed for prosperous merchants to construct substantial dwellings in the style of eighteenth-century Federalist and Georgian buildings. The influence that the Navy has had on Newport lead to the creation of Fort Adams, the influx of military during world wars, and creation of naval bases to the north of the city. During the mid-late-nineteenth century there was an influx of wealthy summer residents in Newport that lead to the creation of lavish summer mansions that attract millions of tourists each year.

Newport fell into an economic slump during the Great Depression. The vibrant summer life within the city no longer occurred as the wealthy summer vacationers lost a lot of their wealth during the stock market crash in 1929. Well preserved historic buildings were falling to decay due to the lack of maintenance. The demolitions of historic buildings within Newport neighborhoods, are the result of political and economic activity trying to revive the local economy and improve the urban landscape that occurred during the urban renewal movement in the 1940s and 1950s. After watching historic homes, and buildings throughout the city get demolished due to neglect, private citizens such as Doris Duke recognized the significance of Newport’s historic built environment stepped in to document and attempt to save historic buildings within the city. The determination of the private citizens in Newport sparked a preservation movement within the city, leading to the revitalization of the city through transforming its built environment back to its historic past. Doris Duke and other dedicated citizens rehabilitated historic buildings within Newport that needed maintenance. This lead to the rise of Newport again as a summer residence and tourist destination.
Newport has a vast amount of historic resources that vary in make, purpose, and materiality depending on the time period and use the building was constructed for. For example, a majority of the historic resources in Newport are eighteenth-century wood framed single-family residential homes; commonly seen in the Point Neighborhood. As Newport progressed throughout its history, the built environment reflected the different priorities, and practices of the people whom were inhabiting the city at the time of the buildings’ construction.

2.2 NEWPORT’S RISK

Today, the City of Newport is witnessing the impact that frequent flooding is having on the built environment throughout the city. As climate change continues to worsen, the severity of future impacts will leave a majority of the historic resources throughout the city at risk. FEMA predictions for new floodplains within Newport can be seen through Figure 1-1. FEMA shows that 54% of Newport’s overall parcels touch a dection of the FEMA VE, AE, and two percent change of annual flooding zones.
FEMA Predictions for Newport

54% of Newport’s Parcels touch a section of the FEMA VE Zone, AE Zone, and 2% Annual Flood Zone; leaving billions of dollars in property at risk.

Created by: Olivia K. Needham

Legend
- VE Zone
- AE Zone
- 2% Annual Flood
- Parcels

Sources: Tiger Line Shape Files, RIGIS, The City of Newport, and Melissa Barker.

Figure 2-1 FEMA Predictions for Newport
Within the different areas of flooding outlined by FEMA, there is billions of dollars of property and infrastructure at risk as well as countless historic properties fall within the floodplain.

The following are few individually listed historic sites on the National Register of Historic Places that are at risk in Newport: Army and Navy YMCA, Brick Market, Castle Hill Lighthouse, Clark (Sherman) House, Clarke St. Meeting House, Cotton (Dr. Charles) House, Covell (William King III) House, Hunter House, Newport Steam Factory, Perry Mill, Rose Island Lighthouse, Seamen’s Church Institute Market Square, Trinity Church, and Whitehorne (Samuel) House.\footnote{“National Register of Historic Places: RHODE ISLAND- Newport County”, accessed May 30, 2018, www.nationalregisterofhistoricplaces.com/ri/newport/state.html.} The properties listed each have their own individual nominations, meaning that there are several other properties at risk that fall within a National Register District nomination; such as the residential houses located in the Point Neighborhood and the mansions on Bellevue Drive.

2.3 NEWPORT’S INITIATIVES

The municipal government for the City of Newport is essential in guiding the city in resiliency. The importance that preservation has throughout the city, its history, and legacy goes without saying and the incorporation of a Preservation Planner for Newport shows how significant preservation is to the city. As Newport tries to continue its legacy through the collection of historic buildings that significantly contribute to the built environment, the local government is trying to be proactive by creating initiatives to mitigate the future climate related challenges for the city.

The City of Newport has been approving and creating documents in efforts to provide stability as the impacts of climate change and flooding begin. Two of the most important
documents created that show the climate biased initiatives of Newport are the updated 2017
Comprehensive Land Use Plan and the 2016 Natural Hazard Mitigation Plan; each outline goals
and policies that they city deems to be important in an effort to create a more resilient city. While
the Comprehensive Land Use Plan discusses the different polities that the municipal government
is going to follow moving forward, the Natural Hazard Mitigation Plan discusses what aspects of
the built environment are going to be physically altered; and how Newport must adapt its
resources moving forward.

2.3.1 2016 COMPREHENSIVE LAND USE PLAN

The purpose of a Comprehensive Land Use Plan is to provide clear and defined goals for
the future planning of a city. The plan produced by Newport gives greater insight into what the
city considers to be areas of weakness and how they want to improve upon the weakness in an
effort to create a better city. The analysis of the Comprehensive Land Use Plan will not be
presented in chronological order, nor the order in which the chapters are presented within the
plan, but rather presented from a macro to a micro approach. This approach to understanding the
document will allow for a greater analysis of how Newport is trying to create urban resilience
through the Newport 2036 imitate. The document explains that the future of Newport should
look like if all the policies and goals are enacted. The macro approaches being used by the city
are the overarching goals, and desires, of the city to create a Newport 2036 that is a happy,
healthy, prosperous city. To accomplish this, the city lists different goals and policies that are
initiated, such as the mitigation of climate change impacts and the treatment of historic, or
cultural, resources.

2.3.1.1 NEWPORT 2036
The goals set by the city are intended to create a prosperous city, a beautiful city, a happy city, a destination city, a collaborative city, a smart city, a healthy city, and a resilient city. To achieve these goals the city created a list of objectives that, if completed, will establish a better Newport by 2036. One of the goals stated in the document is to create “A Resilient City...”; “Where proactive planning and action on the issue of sea level rise has helped to ensure the community and its historic and public assets remain safe”. This is the first mention throughout the document of preservation and the historic assets that Newport has; placing importance on preservation for the well-being of the city.

The first priority listed is “Managing Sea Level Rise”; described as: “Empirical physical evidence shows that the oceans levels are rising and that costal environments are already experiencing the impacts of seal level rise. Newport’s geology, topography, cardinal orientation and location at the end of the peninsula all have relevance to how this issue should be evaluated and managed”. This shows that the city is aware that the change in sea level is impacting the built environment and that the local government needs to intervene to aid in the preservation of the urban environment.

Another goal for Newport 2036 is the continuation of “Community Preservation”; defined as: “The city’s unique character, landscape, and community shape help make Newport a desirable place to live. A balance will need to be struck on shaping the future and preserving the past”. The rhetoric states that there is a need for “balance”. The theme of balance can be seen throughout each of the precedent areas; Louisiana, Charleston, and Newport. When looking

20 Ibid.
toward the future of climate change, and the field of historic preservation, there is a need for interdisciplinary understanding that there is not one right way to evolve; such as there is no one right way to adapt. Moving forward, Newport can use try and strike a balance between adapting to the future and preserving its history.

2.3.1.2 CHAPTER 13: NATURAL HAZARDS & CLIMATE CHANGE

This chapter is the foundation for understanding the risk of natural hazards that Newport facing with the increasing impact of climate change. Although data on the future impact of climate change is continuously changing, from 1930 to the present, sea level has risen over nine inches in Newport and is continuing to rise an average of 2.5 millimeters per year since 1930.\textsuperscript{21} The amount that sea level has risen in Newport may not seem substantial, but when compared to the global average of 1.7 millimeters per year, Newport has had a substantial rise.\textsuperscript{22} As predictions for the amount that sea level will rise continuously increase, Newport is running a large risk for flooding and intensity of storm surge during hurricanes and nor’easters.\textsuperscript{23} It is predicted that Newport’s sea level will rise around 3 to 5 feet by the year 2100.\textsuperscript{24} The predictions of how water will impact Newport cause concern due to the age and materiality of the building stock within the city; a majority of the historic buildings throughout Newport are wood-framed buildings.\textsuperscript{25} If flooding continues in Newport without intervention, the damage that can be done to the housing stock within the city is irreparable.

Aside from the impact that sea level rise is having on Newport, there are other climate change indicators which have begun, or will begin, to impact Newport. Since 1930, Rhode Island

\begin{itemize}
\item \textsuperscript{21} The City of Newport. \textit{Newport Comprehensive Land Use Plan}. Newport: February 2017, 13-2.
\item \textsuperscript{22} The City of Newport. \textit{Newport Comprehensive Land Use Plan}. Newport: February 2017, 13-8.
\item \textsuperscript{23} Ibid.
\item \textsuperscript{24} The City of Newport. \textit{Newport Comprehensive Land Use Plan}. Newport: February 2017, 13-8.
\item \textsuperscript{25} Foley, 13.
\end{itemize}
has seen a steady increase in temperatures averaging one degree Fahrenheit every 33 years. The average rainfall has also begun to increase at a rate of one inch every ten years. While it has been noted that Newport has an issue with storm water management and mitigation, another impact that water can have on the city is soil saturation which can lead to lesser absorption of water and greater flooding during rainy seasons.\footnote{The City of Newport. \textit{Newport Comprehensive Land Use Plan}. Newport: February 2017, 13-8.} The magnitude of hazard flooding in Newport is best shown through the following 2015 statistics:

- Nearly 54\% of Newport’s parcels are in or touch the floodplain.
- Nearly 20\% of all the buildings in Newport are in a floodplain.
- Property in the 500-year floodplain is valued at $3.8 billion.
- There are 968 historic properties in the 500-year floodplain, valued at $559 million.
- Over 55\% of the city’s hotel and guest rooms are in areas prone to flooding, as are 585 private businesses, together accounting for about half of the city’s accommodation industry business.\footnote{The City of Newport. \textit{Newport Comprehensive Land Use Plan}. Newport: February 2017, 13-2.}
- Along with the issue of climate change, Newport is experiencing increased coastal erosion due to changing tide velocity, wave action, littoral currents, seasonal changes affecting water movement, rising sea levels, coastal flooding, storms, and human impacts. Rhode Island as a whole is experiencing an average coastal erosion rate of 1.6 feet per year. This means that waterfront homes, businesses, infrastructure, recreation areas, parking areas, storm water drainage systems, and all other aspects of public infrastructure are susceptible to coastal erosion.
- To combat increased erosion, Newport has seawalls to protect the coastline. Although the seawalls are a mitigation effort used to try and protect the coastlines, they are still susceptible to damage caused by storm surge and need repairs overtime. Newport has already completed repairs to the Newport Cliffwalk, using federal funding, and has initiatives set in place through the fiscal year 2016-2020 Capital Improvement Program, which is focused on repairing and upgrading the seawall at Stone Pier, Storer Park, and Thames Street. Seawalls cannot fully protect from storm surge, wind, or other impacts are included with the increase in storm intensity.\footnote{The City of Newport. \textit{Newport Comprehensive Land Use Plan}. Newport: February 2017, 13-2.}

\subsection*{2.3.1.3 CHAPTER 12: WATER}

Currently, the storm water management system is unable to handle the capacity of water from everyday use and from increase due to storm water. The city defines storm water as being...
“comprised of rainwater that has picked up debris, chemicals, dirt and other pollutants as it runs along the building environment.” In 2015, without storm water, the average daily flow is 8.40; when the system is only able to handle the capacity of a 10.70 flow. While on a normal day storm water pipes are able to function well, the inability to mitigate rainwater or storm water within the city is a problem; with the amount of water being passed through the pipes is overwhelming the system and not allowing for the pipes remove water efficiently. On heavy rain days, the city’s storm water systems can become overwhelmed, “resulting in environmental damage and increased erosion.” The City of Newport understands that there is a weakness in storm water management. The inability of the pipes to remove water from the streets, and to frequency overflow, there is a greater risk being posted to the historic resources within the city. If there is a rise in precipitation due to the progression of sea level rise, the already overworked storm water management system in Newport will continue to be exhausted.

The policies set by the city to understand, and to mitigate wastewater, under Goal WA-7, are “To provide a resilient treatment system that can withstand extreme fluctuations in volume, weather conditions and sea level rise.” The following table shows the different policies and descriptions of policies that Newport is intending to implement through the comprehensive reuse plan:

Table 2-1: Goals and Policies to Provide Resilient Treatment Systems that can Withstand Extreme Fluctuations Due to Weather Conditions and Sea Level Rise.

<table>
<thead>
<tr>
<th>POLICY</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>WA 7.1</td>
<td>The City shall continue to investigate and deploy design and operational measures that allow for cost effective adjustments scaled to seasonal use variations, without a loss in performance or an increase in environmental impacts.</td>
</tr>
</tbody>
</table>

31 Ibid.
The City should fully integrate wastewater system plans, designs, improvements and operations into a comprehensive strategy to address sea level rise and its associated impacts, with particular emphasis on at risk facilities.32

2.3.1.4 CHAPTER 10: HISTORIC & CULTURAL RESOURCES

Newport has robust protections and planning goals set in place through local government and independent organization initiatives to protect the historic assets throughout the city. While identifying important resources, and organizations within Newport, the report subtly addresses the importance of resiliency for the historic structures; stating: “Impending sea level rise and climate change will impact the evolution of Newport’s historic and cultural resources going forward for the next generation of Newporters.”33

Before making recommendations for the city, knowing the goals for preservation are important. The first goal for preservation for Newport, Goal HC-1 “To identify, protect, and enhance the City’s cultural and historic resources” are as follows:

Table 2-2: Goals and Policies to Identify and Protect Historic and Cultural Resources

<table>
<thead>
<tr>
<th>POLICY</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>HC-1.1</td>
<td>The City shall maintain qualified professional staff to provide the highest possible level of service in supporting the protection of the city’s historic resources and in collaboration with other key stakeholders within government, non-profits, neighborhoods and other interested parties.</td>
</tr>
<tr>
<td>HC-1.2</td>
<td>The City should consider historic and cultural resources when making operational decisions to successfully enhance and protect historic and cultural resources.</td>
</tr>
<tr>
<td>HC-1.3</td>
<td>The City shall advocate for appropriate private sector actions which protect and enhance the community’s historic and cultural resources.</td>
</tr>
<tr>
<td>HC-1.4</td>
<td>The City Shall develop and adopt a comprehensive set of guidelines and related design expectations that promote suitable use of historic properties and structures.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HC-1.5</th>
<th>The City shall continue to develop and deploy a comprehensive program of Communication and educate, in collaboration with other key stakeholders within government, non-profits, neighborhoods and other interests.</th>
</tr>
</thead>
<tbody>
<tr>
<td>HC-1.6</td>
<td>The City Shall engage interested constituencies in historic and cultural resource planning and plan implementation and support efforts to integrate cultural literacy into programs. Educate residents and utilize community collaboration.</td>
</tr>
<tr>
<td>HC-1.7</td>
<td>The City shall work in tandem with cultural institutions to create economic benefit for the entire community, to promote cultural literacy among all ages.</td>
</tr>
<tr>
<td>HC-1.8</td>
<td>Create outreach programs, recognizing that cultural institutions create economic benefit for the entire community.</td>
</tr>
<tr>
<td>HC-1.9</td>
<td>The City shall create and implement innovative programs and practices to assure the equitable allocation of culture and arts resources throughout the City with respect to geography, income, age and other constituent attributes.</td>
</tr>
<tr>
<td>HC-1.10</td>
<td>The City shall utilize and capitalize on its architectural character and cultural heritage to promote economic growth.</td>
</tr>
</tbody>
</table>

Relevant themes throughout the goals and policies are:

- the protection of historic and cultural resources; comprehensive design guidelines for historic structures and properties; engagement in the community as well as education of the community through preservation; multi-disciplinary understanding and the tandem working of City Hall with the variety of other preservation organizations within Newport; the implementation of innovative programs and practices along with historic resources; and finally, using preservation and the architectural history of Newport as a continued economic stimulant for the city.³⁵

These different acknowledgements within the language used by the city further proves the importance of not only preservation within Newport, but the importance of preservation as a group effort for organizations; not a task that one organization is involved in nor can take on solely.

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³⁵ Ibid.
The second preservation goal for Newport, Goal HC-2 “To enhance the protection and survivability of historic resources from the impacts of climate change, sea level rise and storm hazards” are as follows:

Table 2-3: Goals and Policies to Enhance the Survival of Historic and Cultural Resources with the Impact of Climate Change, Sea Level Rise, and Storm Hazards.

<table>
<thead>
<tr>
<th>POLICY</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>HC-2.1</td>
<td>The City shall prioritize the protection of historic resources, their character, values and contributions to the community.</td>
</tr>
<tr>
<td>HC-2.1</td>
<td>The City shall work in collaboration with other levels of government (state and federal) to advocate for and secure design and development options to protect historic structures, buildings and landmarks from the effect of climate change impacts.</td>
</tr>
</tbody>
</table>

The third and final goals for Newport, Goal HC-3 “To foster a climate that supports the continuation of Newport as a home for the artisan and creative artist” are as follows:

Table 2-4: Goals and Policies to Foster Climate Change that Supports Artisan and Creative Artists

<table>
<thead>
<tr>
<th>POLICY</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>HC-3.1</td>
<td>The City Shall foster and work with other organizations in their efforts to enhance the city’s museums, libraries, art, theater, musical and cultural institutions.</td>
</tr>
<tr>
<td>HC-3.2</td>
<td>The City shall promote the development and growth of Newport’s arts and cultural resources.</td>
</tr>
<tr>
<td>HC-3.3</td>
<td>The City shall support efforts to retain and attract artists and craftspeople to live and work in Newport.</td>
</tr>
</tbody>
</table>

2.3.2 CONCLUDING REMARKS

Moving forward, Newport is going to see significant climate-related issues that have the potential to drastically alter the built environment through the destruction of historic resources; due to increase in sea level and increase in storm velocity. Understanding the risks, and what is


37 Ibid.
at risk, is important in determining the proper course of action. The framework created by the Comprehensive Land Use Plan addresses the main concerns, but there is no clear system of implementation attached to the ideas. The policies addressed throughout the document are not currently being addressed by the local government. There are no specific plans, or points of action taken by the city to address the impact that climate change and water is having on the historic resources throughout the city. The approach to planning the urban environment for the future will require more strategic planning by the city as well as stronger points of action for implementation.

### 2.4 NATURAL HAZARD MITIGATION PLAN; 2016 UPDATE

Newport updated its 2008 Natural Hazard Mitigation Plan (HMP) in 2016 and FEMA approved the plan on January 5, 2017. The purpose of a hazard mitigation plan for a city is defined as:

> The purpose of the Natural Hazard Mitigation Plan update is to identify local policies and actions that can be implemented over the long term to reduce risk and future losses from hazards. These mitigation policies and actions are identified based on an assessment of hazards, vulnerabilities, and risks and the participation of a wide range of stakeholders and the public in the planning process.  

The mitigation plan focuses on the reduction of the severity of storms or natural hazards through planning; addressing the different probabilities of environmental hazards on the build environment.

#### 2.4.1 EXISTING CONDITIONS

Within the Hazard Mitigation Plan, there are several instances where preservation and preparedness meet the mitigation plans. When assessing the existing condition of Newport, the

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plan formally recognizes the importance of the historic context in Newport through the statement: “that the preservation of cultural heritage protects the unique character of Newport and provides important environmental, economic, and educational benefits to the community.”  

Aside from the recognition that preservation is important to a multitude of assets in Newport, the report notes several buildings that are critical structures at risk; Fire Station 1, City Hall, Police Station, Martin Recreation Center (“The Hut”), Historic Cardines Baseball Field which all fall within the FEMA predicted floodplain. Although the plan recognizes important historic structures that fall within hazard areas, there is no clearly stated plan of action for historic buildings. This can be problematic because historic buildings require different techniques and face unique challenges that may not apply to new construction buildings.

2.4.2 ASSESSING RISK

One of the most significant sections of the HMP is the list of critical historic structures that fall within the FEMA flood zones; as well as all of Newport’s National Historic Landmarks. The National Historic Landmarks Program (NHLs) are distinguished as important because the property, or place, are designated by the Secretary of the Interior Standards for “exceptional value or quality in illustrating or interpreting the heritage of the United States.” A site being listed as an NHL is a more rigorous process than being on the National Register for Historic Places (NR). The report identifies seventeen individual resources, including NHL listings as being vulnerable to sea level rise, flooding, etc.

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40 VHB. “Natural Hazard Mitigation Plan: 2016 Update”, 83-84.
42 Ibid.
One important aspect that is not clearly stated within the document is the impact that loss of historic buildings within historic districts would have on the context of the district. In guidance on historic district listings to the National Register, the National Park Service, states that:

A district… is itself a historic resource. It is a coherent whole, consisting of a grouping of buildings, sites, structures and/or objects that convey a sense of time and place and/or that convey significant information because of the design and relationship of component parts. There may be buildings or features in a district that do not contribute to the significance of the district. However, each resource included within the boundary of a district is part of the National Register listing, not as an individual property, but as part of the grouping or the historic environment that constitutes the district.  

2.5 PRECEDENT STUDY

Elevation of historic buildings is seldom seen within Newport. Although a rarity, this precedent study examines the process that 70 Bridge street needed to take in order to elevate the historic structure. Located in the lowest lying section of the historic Point Neighborhood, 70 Bridge Street is subject to frequent flooding. The study looks at how the applicants were able to go through the application process to get the elevation approved as well as notes on the project stated by the standing Historic District Commission at the time. Looking into 70 Bridge Street can allow for other building owners to understand the process of elevation in Newport as well as use this application as a reference.

2.5.1 70 BRIDGE STREET “JOHN TOWNSEND HOUSE”

2.5.1.1 Background

70 Bridge Street, commonly referred to as the John Townsend House, is considered a contributing structure to the Newport National Historic Landmark District under Zoning Code

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Chapter 17.80. The building is a two story, four-bay, wood-framed, single-family dwelling, constructed ca. 1750 in an eighteenth-century Federal style. The single-family residence sits in the historic Point Neighborhood that has frequent nuisance flooding events. Figure 2-2 shows a map of where the building sits within the most current FEMA predictions for sea level rise or the Point Neighborhood. The Figure shows 70 Bridge Street in bright yellow with all other surrounding contributing historic buildings in maroon. Although within the projected floodplain there are other buildings that will be affected, they are not portrayed on this map because they are not considered to be contributing historic structures to the Newport National Landmarks District. It can be seen clearly through the map, that 70 Bridge Street is located in the FEMA AE Zone; meaning that the area is located within the one-hundred-year floodplain.
Figure 2-2: 70 Bridge Street GIS Map. Created by Olivia K. Needham. Sources: RIGIS and The City of Newport.
Due to its location, the owners of 70 Bridge Street, Charles B. Dane, Jr and William E. Dane, proposed to elevate the house to meet FEMA standards and decrease the amount of damage that water has been having on the building. In order to do this, the owners needed to submit an application to obtain a Certificate of Appropriateness through the Zoning Department at Newport City Hall before altering the building. 70 Bridge Street was one of the first buildings within Newport to use elevation as a preservation technique. Although seemingly radical, the elevation of 70 Bridge Street has allowed for the building to withstand the common flooding seen within the area. With FEMA predictions for the area looking grim, as seen through Figure 2-2, there is a need for greater intervention to occur preemptively.

The Point Neighborhood in Newport has some of the lowest areas in the city and frequently flood due to impermeable surface runoff, storm surge, and the inability to mitigate the municipal stormwater. The house located adjacent to 70 Bridge Street is 74 Bridge Street; a case study for the Newport Restoration Foundation and the preservation community. 74 Bridge street is considered to be the lowest lying section of the Point and has constant standing water in the basement the must be pumped out of the building using a continuous pumping system, Figure 2-3.
The minimal setbacks, impermeable surfaces, and inability to move water out of the area has continued to cause preservation concerns for the buildings without the neighborhood. As climate change progresses, the Point and houses such as 74 Bridge Street will continue to feel the impacts unless mitigation occurs. The effects of water on the historic building stock within the Point have already begun to impact the buildings and the neighborhood.

2.5.1.2 The Contents of the Application

In order to fulfill the application requirements to elevate 70 Bridge Street the owners, Charles B. Dane, Jr and William E. Dane, hired Kirby Perkins Architectural Firm to design the elevation of the home. At the time of the application process in January 2014, before elevation,
the home can be seen in Figure 2-4.

![Image of a house from Bridge Street](image)

**Figure 2-4** 70 Bridge Street Before Elevation: The City of Newport. Department of Zoning and Inspections. Application for Certificate of Appropriateness, COA-2014.004, Plat 16, Lot 78. Kirby Perkins. January 21, 2014.

The minimal setback and massing of the house are evident in the photograph, Figure 2-4. In order to raise the building, Kirby Perkins created a series of before and after architectural drawings. The architectural drawings, Figure 2-5 and Figure 2-6, that were attached to the initial application to show the Historic District Commission and Staff how the elevation was going to visual impact the historic structure.
The most recent photo of the building was taken on May 17, 2018 and shows what the building looks like post elevation; Figure 2-7. The photograph shows how different design elements, such as material, and landscaping, have been used to create a sensitive elevation. The addition of a fence and bushes to mask parts of the elevation and the change in material on the new foundation, from brick around the corners to stone, is a design technique to try and trick the
eye into thinking the massing isn’t as large as it is. In comparison to the building pre-elevation, Figure 2-4, the impact of the elevation and the mitigation tactics by the owners can be seen through the landscaping features as well as the addition of the front stair to enter the building.

\[\text{Figure 2-7 70 Bridge Street Current Condition: Needham, Olivia K. 70 Bridge Street Prospective. May 17, 2018. Newport, Rhode Island.}\]

### 2.5.1.3 Application Approval Process

Before starting work on the elevation, the applicant needed to first file an application with the Newport Planning and Preservation department, having hearing from the Historic District Commission on the matter. After the approval is had by the HDC, then the applicant applied for a Special Use Permit and a Regulatory (Dimensional) Variance from the Zoning Board of Review. Due to the elevation of the building, the significance of the building, and the location, there must be a two separate approvals that the applicant must gain in order to proceed
forward with the project. The application must first be heard, and voted on by the HDC before
the applicant can be heard by the Zoning Board of Review.

2.8.1.2.1 Certificate of Appropriateness

The application was received on January 21, 2014 and the application was heard by the
Historic District Commission on February 18, 2014. The application was submitted by owners
Charles B. Dane, Jr. and William E. Dane, along with the legal representation of Peter Brent
Regan, Esq., to elevate the building. Under the proposal of work, the applicants mention that the
building only sits four feet above sea level and that the first floor of the building, located one-
and-a-half-feet above grade was flooded during the 2012 Hurricane Sandy. Following the events
of the flooding from Hurricane Sandy, the owners preemptively wanted to elevate their building
five feet “in order to preserve the structure” from the presumed future flooding events in the
Point Neighborhood. The summary of proposed section, along with notes from staff, can be
seen in Figure 2-8.

The current structure consists of portions of three 1700's houses, including the John Townsend House, which were moved to the site in 1975 and combined into one residence. The site is approximately 4' above sea level and is prone to flooding. The first floor sits at 1½' above grade and was flooded during Hurricane Sandy. In order to preserve the structure, applicants seek to raise it 5' on a new foundation and to construct 4 sets of stairs/steps to grade. The foundation and stairs on the north elevation will be faced with fieldstone to match the existing foundation.


The application was approved pending that amendments be made to the proposal; “Elevation the existing building no more than 3.9 feet from existing grade. Include a visual element in the new stone foundation, such as a cornerstone inscribed with the historic and new construction date, which provides context for the change.”

2.8.1.2.2 Special Use Permit and Variance

An application for a Special Use Permit and Variance was received by the Zoning Department on January 24, 2014 and heard on February 24, 2014. Charles B. Bane and William E. Dane submitted the application for variance dimensional requirements associated with raising their building 3.9 feet and construction four sets of sets. The current lot coverage on the property is twenty-percent out of the allotted maximum for the zoning for the R-10 district which is twenty-percent. The new alterations to the building will increase the lot coverage by two-percent; making the new total twenty-two-percent. The current zoning requirements for an R-10 area mandate that there is at least fifteen-feet as a setback requirement. The application was asking for approval no not adhere to the fifteen-feet setback requirement and instead maintain their zero-foot setback since it is existing. The board saw the application without any objections from the public and voted in favor of the application; a 5-0 vote.

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46 Ibid.
2.6 CONCLUDING REMARKS

Although this plan notes the importance of preservation within Newport and the importance that the historic fabric has for Newport, there is no mitigation plan for historic buildings. The City of Newport should make a clearly stated resiliency plan that is tailored to the unique needs of the historic building stock throughout the city. Although the hazard mitigation plan is a substantial start to creating resiliency throughout Newport, the lack of attention to how historic buildings require different mitigation techniques than a new construction building should be clearly addressed. In understanding the inherit impacts that climate change will have on Newport, the local governments understanding that there needs to be compromise in order to move forward is important to discuss, understand, and appreciate. In comparison to the systems in place set by Louisiana and Charleston, Newport can learn from what initiatives are working well within these other areas and adopt resiliency programing for historic structures that is well suited for the type of historic structures located in the city.
3.1 LOUISIANA

Louisiana has been experiencing issues with flooding throughout its entire history. The state has adapted to the frequent flooding of the Mississippi River and storm surges through the elevation of buildings above the flood zone. The practice of elevation is widespread throughout the state of Louisiana and is seen as a common practice instead of an abnormality. In terms of historic preservation, often times, elevation is not seen as an appropriate what to mitigate water from a property; being that it alters the historic façade. The neighborhood wide elevation and acceptance of elevating historic properties across Louisiana is an interesting approach to solve the problem of flooding. When examining if neighborhood wide elevation is successful, or applicable to Newport, researching the techniques that Louisiana has been using provides a basis for how elevation can be used on historic buildings.

3.1.1 OVERVIEW

This chapter is studying and analyzing the common practices the State of Louisiana has been using for creating flood resistant historic structures. The topography of Louisiana has lead the state to be susceptible from frequent and devastating floods from the ocean and Mississippi River. Looking at the wide scale macro planning approach that is occurring in Louisiana is important in relation to Newport because it shows the importance of not necessarily preserving just one structure, but the compromise that is needed to maintain historic integrity within a neighborhood through a wider scope of preservation.
3.1.2 LOUISIANA AND NEWPORT

State, local, and private organizations within Louisiana have created a complex, but well-communicated standard on how to approach resiliency with historic structures to insure that they maintain their historic integrity. The State of Louisiana created “The Elevation Design Guidelines for Historic Buildings in the Louisiana GO Zone” after New Orleans saw the devastation that was caused by Hurricane Katrina in 2005. The guidelines offer a step-by-step guide to best practices for raising buildings out of the flood zone throughout the state. The power struggle between pure preservation, where a building is not physically altered, and the ability to the owner to maintain in their home. Louisiana established the Elevation Design Guidelines as a way to merge the preservation of the historic integrity of a neighborhood, while allowing for the owners to alter the building to better accommodate the flooding that occurs on their property.

In comparison to Newport, there is no document, or literature, dictating how to sensitively elevate a historic building within the scope of building stock for Newport. Although the document created by the State of Louisiana is useful for Newport to understand what type of information should be included within an elevation guideline, not all of the techniques can be applied to Newport. For example, Newport and Louisiana although costal areas, do not have the same type of vegetation, architecture, and topography. If Newport is going to use the Elevation Design Guideline documents as an example, the architectural features discussed as well as the environmental concerns that are addressed are not applicable to the type of architecture and threats seen in Newport.

Louisiana GO Zone: The area of New Orleans that was considered to be the “Core Disaster Area”. “What is the GO Zone? Part 1”, accessed June 30, 2018, www.gozonegateway.com/articles/what-is-the-go-zone-part1.
The Elevation Design Guidelines created by Louisiana showcase three common styles of architecture located within the state and, the state’s understanding, of the best way to elevation those structures sensitively within the historic context. One of the issues within the urban settings throughout Louisiana is the inability to set the elevated building far enough back on the lot to be able to add landscaping and stair designs to minimize the visual impact of the elevation. The issue of space within the urban environment relates heavily to the visual impacts that elevation can have on buildings within Newport with little setback; such as the Point Neighborhood. The creative ways to disguise an elevation on a small lot can lead to useful recommendations in Newport.

Overall the approach taken by State of Louisiana is one of that provides accessibility and clear expectations for property owners. The accessibility of knowledge to a property owner for best practices when elevating their building is something that Newport should consider creating.

3.2 CLIMATE BAISED THREATS IN LOUISIANA; NEW ORLEANS

Located 100 miles from the mouth of the Mississippi River, the City of New Orleans has been an influential port city since the early 1700s. A melting pot of culture within the city originates from its founding by the French, rule by the Spanish for forty years, and then purchase by the United States in 1803. One of the biggest attractions to the city is its vernacular practices, culture, and variety of architecture stemming from different influences and the distinct character of the city. The impact that the different cultural influences have had throughout New Orleans’s history has created a rich and unique Creole culture. Influenced by geography, climate, as well as the foreign influences of the French and Spanish rule, New Orleans has its own distinctive vernacular architecture.
Over the past hundred years, New Orleans has faced social issues of poverty and increasing damage of natural impacts such as hurricanes, floods, and slowly sinking land. An example of the damage that can occur from a hurricane can be seen through Hurricane Katrina’s lasting impact on New Orleans. The Category 5 hurricane hit New Orleans on August 29, 2015. Hurricane Katrina’s storm surge caused four levees to break and flooded 80 percent of the city. After the water receded, it took a year for half of the residents of New Orleans to return to the city, and another five years before 80 percent were back in the city.49

Although climate change sceptics believe that Katrina was a once in a lifetime storm, the impacts of hurricanes on the United States since have proven that climate change is leading to a progression of storms and storm intensity. Another example of a massive flooding event in New Orleans happened in August 2016.50 A “1,000-year rain” event occurred within just two days, dropping 7.1 trillion gallons of water in New Orleans within two days, compared to the 2.3 trillion Hurricane Katrina dropped. Although the National Weather Service forecasters reported the severity of the storm with accuracy, the effects of the storm occurred so quickly that residents were caught off guard; twenty-one people perished during the storm.51 With the progression of sea level rise and storm intensity, the impact that flooding and storms will have throughout Louisiana have the potential to cause substantial damage to the built environment.

3.3 STATE GOVERNMENT

The State Louisiana created an Elevation Design Guideline for Historic Buildings to document for best practices for elevating historic buildings. The document was created in the

51 Ibid.
wake of the devastating impacts of Hurricane Katrina in New Orleans. The purpose of the
document is to provide uniformity to elevation of historic buildings throughout the state. The
Elevation Design Guideline is a comprehensive document that is essential to understanding the
preservation principles and philosophy for adapting historic buildings for flooding in Louisiana.
The document illustrates a variety of different environmental situations that a homeowner could
be facing throughout the state and makes recommendations biased on the topography and climate
based threats that the building is subjected to; from landscaping options to physical elevation of
the structure. The guidelines also place an importance of how an elevated building can take away
from the historic context of the neighborhood; making suggestions on how to minimize the
visual impact of elevation.

3.3.1 ELEVATION DESIGN GUIDELINES FOR HISTORIC BUILDINGS IN THE
LOUISIANA GO ZONE, 2014.

In 2014, the State of Louisiana Office of Cultural Development created a comprehensive
document for the elevation of historic buildings entitled “Elevation Design Guidelines for
Historic Buildings in the Louisiana GO Zone.” The purpose of the document was to create a
comprehensive resource of architectural guidelines and best practices to “conserve the historic
character of Louisiana’s cities, towns, neighborhoods and buildings, where possible, by
integrating both traditional and innovative elevation design approaches in a sensitive manner.”

The document identifies and outlines how a property owner can elevate a historic building while
being sensitive to the historic fabric of the neighborhood. The State of Louisiana defines
elevating a structure as: “a technical process in which a house is elevated to a required or desired

52 Louisiana Division of Historic Preservation, “Elevation Design Guidelines For Historic Buildings in the
Louisiana GO Zone” (State of Louisiana Office of Cultural Development, 2014) 1.
flood protection elevation. When properly elevated, the living area of a house will be above all but the most severe floods.”

The document goes on to acknowledge the three most common building types in Louisiana; which are: Creole Cottages, 3-Bay Shotgun, and Bungalow. After the building type is established, the following recommendations made by the state surround these three specific building types.

3.3.1.1 Preservation Standards

The guidance in the document is rooted in the belief that there is an importance of preserving a neighborhoods context through urban design. When making decisions for the urban environment, or approving altering a historic building, the plan placed great importance on how an individual building contributes to the overall historic context of the urban environment that the building is located in. The Design Guidelines advise property owners in fully understanding how elevation of a structure can impact the surrounding neighborhood. The property owner must fully understand the surrounding historic context, where the building falls in the historic district, and how their specific property should approach elevation, “paying close attention to the type, scale, location, and pattern of adjoining history property create the overall character of a neighborhood”.

The key to creating a sensitive elevation design is to first “identify local neighborhood character elements and integrate these elements into your design”, then acknowledge those elements within the project. Throughout the document there are different preservation goals, design guidelines, and recommendations for the best practices for elevation of a historic building while retaining some historic context of the neighborhood in Louisiana.

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53 Louisiana Division of Historic Preservation, 6.
54 Louisiana Division of Historic Preservation, 14.
55 Ibid.
3.3.1.2 Approach to FEMA Regulations

Before elevating a historic building, there are a few precautionary steps that need to be taken if a property owner is deciding if elevation is an appropriate intervention. Elevating a building is considered to be “a technical process in which a house is elevated to a required or desired flood protection elevation. When properly elevated, the living area of a house will be above all but the most severe floods”. 56

Property owners, in addition to gaining background knowledge on the property before deciding to elevation, and before approaching a local historic district commission with an application to raise an existing historic building, must understand the Advisory Base Flood Elevation (ABFE) and effective Base Flood Elevation (BFE) standards set by FEMA for the property. The Advisory Base Flood Elevation (ABFE) and Base Flood Elevation (BFE) are zones of flooding created by FEMA to show the risk a property is in. Determining where a property lies within the FEMA recommendations for elevation in the area is important because the recommendations made by FEMA, for appropriate innervations, should be taken. FEMA standards can benefit property owners through an annual reduction in flood insurance, as well as the ability to remain in the neighborhood. Although the benefits of elevation can lead to salvaging a historic neighborhood, not all historic district commissions and zoning ordinances allow for significant elevation of a building. Before a property owner located within a high-risk area decides to elevate a building to FEMA standards.

FEMA can determine through the properties location if the owner should elevate the property or engage in other mitigation methods. For example, if the elevation height requirement for a specific parcel is minimal, adapting the foundation would make the property more resilient.

56 Louisiana Division of Historic Preservation, 6.
and save the property owner money. If the building is not in a designated FEMA high risk area, the property owner may not need to elevate the building to meet the requirements. Often times a reinforcement of the foundation could lead to a more resilient building if elevation is not required.

If the building falls within a FEMA high risk area, there are two different approaches that the State of Louisiana recommends for historic structures: limited elevation change and significant elevation change. Limited elevation change results in a nominal visual impact on the historic character of the property and neighborhood. In order to accomplish this, the designer and property owner elevate the existing ground level less than four feet, or the base of the home less than one-story. If FEMA recommends the building be raised a significant amount – per the guidelines above two-stories, then the historic context of the neighborhood is at risk; this is where architectural design elements should be considered more carefully in the elevation process.

According to the Architectural Design Guidelines, a historic building recommended for significant elevation change can use architectural detailing and other landscaping options to minimize the visual impact of the elevation. Even with the landscaping alterations, raising a historic building over a story is a drastic alteration to the property and the neighborhood. In response to the drastic change, the guidelines suggest detailing on the elevation as well as landscaping features on the property to deter from the visual impact of elevation.

3.3.1.3 Site Considerations

Site considerations are the different challenges that a property owner must go through before, and following, the decision to elevate a property. Some examples of site considerations are that a property owner must understand, research, and go through are as follows:
understanding the regulations of the zoning ordinance that they fall under, understanding the historic context of the neighborhood that their building is contributing to, how elevation of the property will impact the neighborhood visually, and what landscaping options are best for the topography of their site. Aside from the original historic structures considerations, the design must consider the historic context of the neighborhood, massing, scale, and setback that the other buildings located near the proposed elevation.57

Approaching a site from an ecological perspective, when introducing new landscaping features to the property to mask the elevation it is important to add vegetation that is native to the land. The Architectural Design Guidelines stress the importance of incorporating indigenous planning into the landscaping design for the elevation of a property. The addition of appropriate landscaping is also a cost-efficient way to mitigate the visual impact that elevation can have on the historic context of a neighborhood. It is strongly advised within the document that when elevating a historic building, that landscaping features are considered on the property as well. 58

The property owner must also take into consideration the local government levels through before elevating their building. When approaching a local government organization with plans to elevate, the State of Louisiana suggests that the property owner know the current elevation of the historic home and obtain the most current FEMA flood elevation data. The owner must also consider the local zoning ordinance, building codes, and historic district commission regulations that pertain to the particular property.59

After understanding the historic context that the building is in, the elevation design should consider setbacks; how far back the building is on a parcel from the public way. The ability to manipulate where the elevated building is on a parcel can have a great visual impact on

57 Louisiana Division of Historic Preservation, 4.
58 Louisiana Division of Historic Preservation, 16.
59 Louisiana Division of Historic Preservation, 11.
how the building is perceived from the street. Moving the building further back on the parcel can
be a tactic used by designers to lessen the impact of the elevation on the overall context of the
neighborhood. This can only occur if a parcel has enough room for the building to be pushed
backwards, or on an angle, to increase the setback on the parcel. Not all parcels have the ability
to set a building further back, but it can allow for the “parcels with limited area and width will
present greater design challenges than larger sites with ample from and side yard configurations
and setbacks”. 60 Although not directly discussed, the need to be creative throughout the design
process of the elevation is important. Site considerations can be researched, and know, but
finding the best practice for a specific building requires interdisciplinary compliance between the
property owner, architect, structural engineer, and the local historic district commission.

3.3.1.4 Design Considerations

The Elevation Design Guidelines shows different design options for best practices for the
particular historic building stock found in Louisiana. An example of how drastic elevation
changes can be, if a building falls within the AE FEMA flood zone, more commonly known as
the 100-year-floodplain, then for the structure to comply with FEMA standards it must be
elevated seven feet above the current grade. This means that from the current foundation the
building must be raised seven feet to comply. If the foundation is already sitting on a foundation
that is two feet high, then with the elevation of the building the new foundation will sit nine feet
high.

3.3.1.4.1 Stairs

An important part of masking the visual appearance of an elevation is through the
placement of the new staircase. Some common stair configurations that can be seen are as

60 Ibid.
follows: Straight Run Stair, Side/Linear Stair, Spit Stair, L-Plan Stair, Paired L-Plan Stair, Center/Linear Split Stair and Interior Stair. Each stair type has advantages and disadvantages.

The following chart outlines the different examples of stairs that can be added to elevated buildings, with this advantages and disadvantages.

Table 3-1: Stair Configurations for Elevation

<table>
<thead>
<tr>
<th>Image</th>
<th>Location</th>
<th>Stair Style</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
</table>
| ![Image](image1.jpg) | Bywater Historic District, New Orleans; 2014. | Straight Run Stair | - Simplicity of the design may allow for it to be less expensive to build than other staircases.  
- The person moving up, or down, the stairs have a clear view of the entire staircase.  
- It is easy to accommodate extensions and modifications on this type of stair. | - Straight Run Staircases require more space and are better suited for buildings with sizable front yards with less restrictive setback requirements.  
- The staircase can have a substantial visual impact on the façade of a historic building; which could complete with the character defining features of the building. |
| ![Image](image2.jpg) | Algiers Point Historic District, New Orleans; 2014. | Side/Linear Stair | - Can be less expensive than other stairs; such as L-or U-Plan stairs.  
- Compact design can have a lessened impact on the historic façade.  
- Works well in urban environments with limited lot sizes and shallow setbacks. | - Is attached to the structure, so there is no cover on the stair leading it to be exposed to the weather.  
- If the building has multiple tenants, sharing a single stair can be an inconvenience; especially if the building is a duplex or multi-family dwelling.  
- In order to keep with the main body of the house, the stairs cannot typically exceed 3 or 4 feet in width; this causes the stairs to be... |
|---|---|---|
| Faubourg Marigny Historic District, New Orleans; 2014. | Split Stair | - The stair can be a less expensive option to build compared to other types of stairs.  
- It serves two separate entrances on the façade.  
- It has a compact design that can have a lesser visual impact on the historic character of the façade.  
- Compact design can be well suited for urban lots with smaller setbacks.  
- The Split Stair is typically not covered and is exposed to the elements.  
- Due to the compactness of the stair, it width does not typically exceed 3 to 4 feet leaving the stair to be narrow.  
- This type of stair is not suited for medium to high-elevations.  
- Two sets of steps may not be needed if the duplex is converted to a single-family residence. |
| Algiers Point Historic District, New Orleans; 2014. | L-Plan Stair | - Alternative to a straight run stair when space is not available.  
- Ability to locate this stair in a corner; providing an option for intermediate landings.  
- Offers a greater amount of design configurations than a straight run stair.  
- Due to the construction of the stair, it is often expensive to design and construct.  
- This stair is typically not covered, or only partially covered, from the elements.  
- Configuration of the stair creates limited width options viable for construction.  
- The amount of turns, and rises, increase depending on the elevation of the building |

<table>
<thead>
<tr>
<th>Location</th>
<th>Stair Type</th>
<th>Pros</th>
<th>Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Esplanade Ridge Historic District, New Orleans; 2014.</td>
<td>Pair L-Plan Stair</td>
<td>- Provides a wider variety of architectural treatments than the Straight Run Stair.</td>
<td>- Grand appearance and design is not well suited for rural, vernacular, or asymmetrical architectural styles.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Well suited for large residential lots with lawns or urban lots with enough setback.</td>
<td>- It is more expensive to design and construct; in comparison to a Straight Run Stair.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Stair wall design allowed for opportunities to integrate planning beds and landscaping elements into the design.</td>
<td>- It cannot be applied to low-level elevations.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Top level of the staircase is typically the only section of the staircase that is covered; while the rest remain exposed to the elements.</td>
<td>- Due to its design, the staircase is typically narrow and does not exceed 3 or 4 feet in width.</td>
</tr>
<tr>
<td>Garden District, New Orleans; 2014.</td>
<td>Center/Linear Split Stair</td>
<td>- Provides a greater architectural element to the façade, in comparison to the Straight Stair, through the use of stair walls.</td>
<td>- It is not well suited for rural, vernacular, or asymmetrical architectural styles.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- This stair works well in urban lots with small yards and setback limitations.</td>
<td>- It is more expensive to design and construct; in comparison to a Straight Run Stair.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Stair walls offer the opportunity to incorporate plantings and landscape elements.</td>
<td>- Due to its design, the stair is typically narrow and does not exceed 3 or 4 feet in width.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Cannot be applicable to low-level elevations.</td>
</tr>
</tbody>
</table>
Interior Plan Stair, Baton Rouge; 2014.

Interior Stair

- Due to the simplicity of design, the stair may be less expensive to design and construct.
- Due to its location, the stair allows for an uninterrupted façade composition.
- If a building undergoing an elevation change, it is easier to install an interior stair; possibly in more than one location.
- The interior stair is contained within the footprint of the building; allowing for it to not encroach on the yard or setback requirements.
- Incorporating this stair requires a minimum of eight feet of a deep porch or gallery.
- This type of stair is best suited for monumental architectural buildings.
- In cooperating an interior stair may interrupt the circulation of the building, as well as the windows, doors, and columns.

Elevating a commercial building, the grade change can inhibit those who are disabled from being able to entire the building; creating another layer of complexity because the building must comply with the Americans with Disabilities Act of 1990 (ADA) which allows equal accessibility for all. The State of Louisiana suggests that “A three-step approach is recommended to identify and implement accessibility modifications that will protect the integrity and historic character of historic properties.”61 The three-step approach by the state suggests that the property should have its historically significant character-defining features intact, and address accessibility of a commercial site by maintaining a preservation mindset.62 The elevation guidelines make a note that it is important to pay “… close attention to the type, scale, location,

62 Louisiana Division of Historic Preservation, 14.
and pattern of adjoining historic property create the overall character of a neighborhood”, when looking at creating accessibility for an elevated historic structure.\(^{63}\)

### 3.3.1.4.2 Foundation Types

When elevating a building there are two types of foundations found within the Gulf Coast region; open and closed foundations. Underneath the elevated foundation can be used as storage space but, the space underneath the elevated house cannot be considered livable space for house. This means that the elevation of a house does not add additional square footage to the property. The main differences between open and closed foundations, although seemingly self-explanatory, are determined by wither a foundation has a perimeter of masonry constructed that encloses the foundation, or the foundation is a flow through foundation; allowing for water and debris to flow through during times of flooding.

Closed foundations, as seen in Figure 3-1, created by FEMA, are distinguishable through their perimeter walls constructed using masonry and the enclosed footprint of the residence.

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\(^{63}\) Louisiana Division of Historic Preservation, 15.
Although close foundations are often masonry, they can be seen constructed using concrete slab-on-grade construction within this region. When considering a closed foundation, it is important to consider that the maximum limit for the foundation height is eight feet above the adjoining grade. Historic buildings within the Gulf Coast may not be well suited for a closed foundation because of the local flooding hazards, wave velocity, water pressure, and wind hazards that are inherent to the area.\textsuperscript{64} Closed foundations are best suited for residential foundation types that have foundations not higher than eight feet above grade, are located in generally inland areas, and have reinforced masonry for a crawl space. Although the option for a closed foundation may not be the best option for historic properties located in New Orleans, due to natural hazards for the area, it does not rule out the possibility of using this style within Newport.\textsuperscript{65}

Open foundations as seen in Figure 3-2, created by FEMA, are distinguished by their raised piers or piles that have open air flow underneath the elevated structure.

\textsuperscript{64} Louisiana Division of Historic Preservation, 40.
\textsuperscript{65} Louisiana Division of Historic Preservation, 40.
Some buildings with open foundations have screening panels to keep debris from getting caught under the foundation as water flows through freely during times of flooding. Often, open foundations are the most appropriate foundation choice for elevations in this region; due to the ability of an open foundation to have a height greater than eight feet above grade and withstand natural hazards such as high wind and eater levels associated with storm surges. Open foundations are appropriate for historic buildings that need to go 15 feet above grade, and are located within a coastal area the frequents storm surge.\textsuperscript{66} An example of a 3-Bay Shotgun house

\textsuperscript{66} Louisiana Division of Historic Preservation, 41.
that has been elevated, using an open foundation, and has proper landscaping to minimize the impact of the elevation is shown through figure 3-3.

Figure 3-3: Landscaping and Elevated Building. Source: Louisiana Division of Historic Preservation, “Elevation Design Guidelines for Historic Buildings in the Louisiana GO Zone” (State of Louisiana Office of Cultural Development, 2014) 50.

3.3.1.4.3 Foundation Details

Once a property owner has taken the architectural constraints into consideration, the owner must then take into account foundation detailing to fit within the historic context of a neighborhood. The designer must identify architectural and landscape screening alternatives, such as foundation screening. The document states that if “… the appropriate foundation for the property is an open foundation, then the addition of foundation screening systems and landscaping approaches for the new foundation can be used to mitigate the adverse visual impact that elevation has on the historic building.”67 Foundation screen systems recommended by the State of Louisiana, seen through figure 3-4, have the additional beneficial functions to the

67 Louisiana Division of Historic Preservation, 45-46.
foundation such as: adding a flexible perimeter to the historic property, managing run off debris, and limiting the visual impact of the foundation through detailing.

Figure 3-4. Elevated Buildings with Decorative Screens. Louisiana Division of Historic Preservation, “Elevation Design Guidelines for Historic Buildings in the Louisiana GO Zone” (State of Louisiana Office of Cultural Development, 2014) 46.

Architectural screening systems are prohibited in the highest hazard zones (FEMA V-Zone) so property owners and designers must understand the proper foundation detailing permissible within their FEMA zone.68

3.3.2 CONCLUDING REMARKS

The Elevation Design Guidelines for Historic Buildings in the Louisiana GO Zone created by the Louisiana Office of Cultural Development in 2014 provides a step-by-step and

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68 Louisiana Division of Historic Preservation, 46-47.
cohesive explanation of when it is considered appropriate when elevating a historic building, how elevation impacts the surrounding context, and how to elevate a historic building sensitively. This document, aside from its ability to breakdown a complex and controversial topic, has the ability to be a model for best practices for historic buildings in FEMA flood zones. In relation to Newport, this document has the potential to aid in the creation of a set of architectural design guidelines for common historic housing stock in Newport. As more property owners seeking to elevate their buildings to remain in Newport, local organizations and government alike will need to work together to create guidelines to aid in the adaptation of historic structures.

3.4 LESSONS FROM LOUISIANA

The State of Louisiana is approaching climate resiliency through the use of both macro and micro approaches. The creation and implementation of Elevation Design Guidelines by the state allowed for a greater education, understanding, and uniformity towards the elevation of historic buildings throughout the state. The City of Newport has some documentation and guidance through its Hazard Mitigation Plan and Comprehensive Land Use Plan, there is a lack of clear guidelines for what historic property should do in effort to create a more resilient structure. Newport has the opportunity to look at the organization and information provided within the architectural guidelines created by Louisiana. In turn, Newport can create their own architectural design guidelines that are applicable to the style of architecture that is vernacular to the area.
CHAPTER 4: CHARLESTON, SOUTH CAROLINA
4.1 CHARLESTON, SOUTH CAROLINA

Charleston, South Carolina has been experiencing problems with frequent flooding throughout its entire history. The city has tried to adapt to the flooding by creating hurricane barriers and seawalls throughout the city. Although Charleston has made alterations to the urban environment to try and protect its historic assets, they have and are continuing to fail; allowing water from storm surges to flood the city. The practice of elevation, while common in Louisiana, is not commonly seen within Charleston. The city is well known for its conservative take on preservation efforts and over the past several years has begun to change its prospective on the elevation of historic buildings; which can be seen through the Board of Architectural Review (BAR) decision to raise 42 Rutledge Avenue in 2017. Understanding the strong elite ties to preservation in Charleston, Newport is able to learn from the techniques used in Charleston to adapt one of their historic properties.

4.1.1 OVERVIEW

This chapter will analyze the resilient approach used by Charleston, South Carolina for historic buildings. Nuisance flooding, storm surge, and the impact of sea level rise have already begun to negatively impact the historic fabric of Charleston. In addition to the negative impacts that water and storm water management have had on the City of Charleston, the seventeenth-century housing stock and inability to mitigate water effectively away from the historic buildings is a reason why Newport is able to relate well with Charleston. Well known for its strict Board of Architectural Review (BAR), and its historic preservation-minded initiatives, Charleston is going against its preservation norms due to the severity that flooding has caused on historic structures throughout the city. This chapter will discuss the a resilient strategy created by the City of
Charleston to prepare its residents as well as the built environment for the current and future impacts of climate change. The chapter will then highlight a particular building in Charleston that has taken on the new preservation initiative, 42 Rutledge Avenue, through its elevation of two feet and five inches from its original grade.

4.1 RELATION TO NEWPORT

Charleston and Newport are both facing similar issues with water in their cities. Water is impacting both cities through the increase in sea level, storm surge, downpour, and storm water management. The historical development of the city through infill has led to an increasing issue of flooding and storm water management problems within the city. As climate change progresses, the impact of flooding and storm surge in Charleston will, and has already begun, to impact the historic fabric of the city. The National Oceanic and Atmospheric Administration (NOAA) predicts that the conditions will only worsen over time. Since the early 2010s, tidal flooding in Charleston has risen to eleven instances per year and NOAA has predicted up to 180 times per year by 2045. In response to the predictions, the City of Charleston accepted a NOAA Regional Coastal Resilience Grant for $766,887 to create a greater community resilience and recovery efforts for the future of the city; the document created is called the Sea Level Rise Strategy. 69

Aside from similarities with climate change concerns, Charleston and Newport are similar in their reliance on historic housing stock to attract heritage tourism. Both cities are historic ports that contain remarkable collections of well-preserved residential and commercial architecture. Heritage tourism as well as water-related tourism are the main sources of economic activity for both cities. The historic context of the urban environment in both cities, as well as the

extraordinary architecture of the plantation owner town homes in Charleston and the historic building stock in Newport, such as the eighteenth-century residential homes, face significant water-related impacts from the imminent threat of climate change.

As climate change progresses, both Charleston and Newport are going to have to adapt their urban environment to incorporate resiliency while maintaining their historic fabric. The preservation of the seventeenth-century buildings and historic context in both Charleston and the eighteenth-century buildings in Newport is essential to the social and economic survival of the cities. Looking to Charleston, and their long history with preservation, Newport will be able to understand and emulate the best practices for adapting the particular historic building stock within the city.

4.2 BACKGROUND

The City of Charlestown is located on a peninsula off the coast of South Carolina and was founded as a port city in 1670 on low flat lying land next to the three major rivers. Throughout the history of Charleston there have been issues with water management due to storm surge and tidal flooding. As climate change has already begun to impact the urban environment within Charleston, the affects that water is having on the city will be exacerbated as the impact of climate change worsens. Aside from the history of flooding throughout Charleston, there is also a long-standing history of preservation and protection of historic and cultural resources throughout the city.

4.2.1 PRESERVATION IN CHARLESTON

Local government intervention in historic preservation efforts in Charleston date back to 1929 when a Special Committee on Zoning conducted a survey that identified a small area of extremely important eighteenth-century buildings. The Committee created a City Plan and
Zoning Ordinance that was adopted on October 13, 1931. The City Council also created the Board of Architecture Review (BAR) in 1931 that the BAR has purview over demolition requests within specific areas, the approval of the formal design proposal, and enacts review procedures for alterations within the BAR’s jurisdiction over historic properties located within historic districts in Charleston. The primary objective of the BAR is to negotiate with applicants to find acceptable solutions for design problems for their historic property. Throughout the past 86 years, Charleston has been setting the trend for urban designers and planners alike that operate within a historic preservation context. The unique individuals, organizations, and governing bodies have overseen and contributed to the preservation of Charleston’s historic fabric. When looking to adapt historic buildings to be more resilient to environmental factors, in the past, the BAR has not been accommodating to applications looking to elevate their historic properties of significance. It was not until 42 Rutledge Avenue that a historic building of high preservation concern was allowed to elevate in 2017.

4.2.2 INCREASING THREAT OF CLIMATE CHANGE

FEMA officials have announced that the progression, and severity, of climate change has only intensified, meaning that the storm surges, heat index, sea level rise, and downpour events are going to be more intense than originally anticipated, not only in Charleston but globally. An example of the intensification of climate changes impact on the City of Charleston is experiencing tidal flooding; which averages two times per year in 1970, but is up to eleven times per year in 2014 with a prediction that there will be nearly one-hundred-and-eighty tidal floods.

by 2045. The National Oceanic and Atmospheric Administration (NOAA) is estimating that, within Charleston, there will be a sea level rise of two-to-seven feet over the next 100 years.  

Along with the impact the sea level rise will have on Charleston, there is a predicted increased in rainfall within short durations. In October of 2015 a Category 4 hurricane with 135-knot winds (500 miles off the coast of Charleston) hit the City of Charleston with, reportedly, 11.50 inches of rain in twenty-four hours and over twenty inches of rain within three days. Dubbed the 1,000 year-flood, or Great Year Flood, Hurricane Matthew hit Charleston in the Fall or 2016. The storm caused the storm water management system and draining system to overload; allowing for the streets to flood. The outdated drainage system in the city, that was not updated or maintained properly, caused immense damage the built environment. Charleston had already had, and will have, an increase in storm events due to climate change. As seen in the past few years, storm water management and preparing for future flooding events is important for Charleston.

The historic, existing conditions, and current action plans set in place by Charleston are important in understanding how a city is able to adapt their current urban, and historic, environment to adapt to the new threats of climate change. Charleston has been a leader in the field of historic preservation in the United States for their early application of preservation techniques as well as their ability to understand the importance of their historic housing stock to support tourism. The impact that climate change is having on the urban fabric in the City of Charleston can be used an example as what is to come in the future in Newport.

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72 “Sea Level Rise Strategy.”
73 “Sea Level Rise Strategy.”
4.2.3 STORM WATER MANAGEMENT IN CHARLESTON

At the southernmost point of the peninsula of Charleston, where the Ashley and Cooper rivers merge to form the Charleston Harbor is a seawall called “The Battery.” This sea wall was originally constructed in 1730 using palmetto logs, and rebuilt using stone ballast in the early 1800s. In the late 1800’s and early 1900’s, The Battery was rebuilt and reshaped to accommodate the new urban form of the city, creating a 120-foot wall called “The Turn” that connects portions of the High and Low batteries.\(^\text{74}\) Due to the uneven amount of artificial infill throughout the city, certain areas are more susceptible to storm surge and flooding than other areas. Although the Battery had been effective in mitigating the issue of storm surge from the city the changes in storm velocity and sea level rise have rendered the Battery inefficient.

In October 2013, The Turn was replaced, demolishing the old concrete and pilings, and replaced the existing with new pilings and concrete.\(^\text{75}\) Although the renovations to The Turn were constructed relatively recently, occurring in 2013, the flooding due to storm surge and high tides is still causing nuisance flooding within the area. This is a huge concern for the City of Charleston, not just due to the impact that flooding in this area is having on the built environment, but The Turn and the High and Low batteries are major tourist attractions to the area; seen through Figure 4-1 a post card of the location dated between 1930 and 1950. The inability to mitigate water is not only impacting the historic buildings that are being flooding but

\(^{74}\) “Historic Charleston Battery Seawall Repairs,” I Build America (blog), April 7, 2016, https://www.ibuildamerica.com/industries/transportation/historic-charleston-battery-seawall-repairs/.

\(^{75}\)

the water is also a deterrent to tourism that can lead to an impact on the economy within Charleston.

An example of the inability of The Battery to contain flooding due to storm surge can be seen through Figure 4-2. The figure shows the impact that flooding of the battery can have on the surrounding neighborhoods and buildings. The photo was taken by the Coast Guard showing the effects the flooding from Hurricane Joaquin had on the areas surrounding Charleston on October 5, 2015. An example of the inability of The Battery to contain flooding due to storm surge can be seen through Figure 4-2. The figure shows the impact that flooding of the battery can have on the surrounding neighborhoods and buildings. The photo was taken by the Coast Guard showing the effects the flooding from Hurricane Joaquin had on the areas surrounding Charleston on October 5, 2015.

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76 U. S. Department of Agriculture, Coast Guard Overflight for Charleston Flooding, October 14, 2015, photo, October 14, 2015, https://www.flickr.com/photos/usdagov/21540578853/.
environment and the functionality of the city.

![Image of flooding in Charleston](https://www.flickr.com/photos/usdagov/21540578853/)

*Figure 4-2: Flooding in Charleston. U. S. Department of Agriculture, Coast Guard Overflight for Charleston Flooding, October 14, 2015, photo, October 14, 2015, https://www.flickr.com/photos/usdagov/21540578853/.*

The issue with storm water management in Charleston stated as early as 1837 when the city realized that there was a need for a better storm water management system mitigate the storm water throughout the city. In the early years of Charleston, the city experienced devastating spring floods called “freshets.” The freshets would infiltrate the city and devastate the low country for weeks at a time. The planters in Charleston, who were economically well off, would use slave labor to drain and dike the flood-prone areas of the city. 77

A large portion of the issue with flooding in Charleston stems from outdated drainage systems that are not functioning properly. The development of the urban environment in

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Charleston, as well as the heavy reliance on heritage tourism in the city is posing issues as climate change has begun to put stress on the outdated storm water management systems. Taxpayers have spent $238 million since 1990 to patch broken and outdated drainage systems. Although money has been put into the drainage system and the seawalls, the efforts have not been effective in keeping the city dry. The citywide issue of repairing storm water draining is a massive undertaking that will exceed one billion dollars to improve; along with seawall repairs. Moving forward, the City of Charleston local municipality is trying to use their resources to prepare the inhabitants as well as to create better storm water management systems.

4.3 THE CITY OF CHARLESTON’S SEA LEVEL RISE STRATEGY

The City of Charleston’s Sea Level Rise Strategy Understanding the new threats that are arising through the exacerbated impacts of climate change, the City of Charleston is making changes on the citywide level as well as for homeowners. The goal set by the City of Charleston, and in the creation of a Sea Level Rise Strategy guide, is to create a more resilent Charleston. To do this, the city is initiating a system that is stated use “resilience is the capacity of a system to maintain its core purpose and integrity in the face of dramatically changed circumstances.” Some of the circumstances that the city has accounted for are increase in hurricane intensity with a need to evacuate citizens, flash flooding due to storm surge, or increase in precipitation.

79 State Government Response: Currently, The State of South Carolina is moving forward with plans to produce a resiliency document for their historic building stock. Although the document is being produced, there is no ability to access this information; only being told that it exists. It is important to note that the creation of a guideline for owners of historic buildings.
80 “Sea Level Rise Strategy,” 5.
4.3.1 SEA LEVEL RISE STRATEGY

In 2015 the City of Charleston released the document entitled “Sea Level Rise Strategy” as part of an effort to combat the impact of climate change on the city. The document was produced by the City of Charleston in an effort to create recommendations for improving existing storm water drainage systems and seawalls. The strategy uses the latest NOAA data, meaning that the city is planning for a 15-foot to a 2.5-foot seal level increase over the next fifty years. The document is

enacting special building standards for flood hazards, steering or raising public facilities and infrastructure outside of hazard areas, acquiring wetlands and other open space, and writing ordinances to limit new development in flood-prone areas — a controversial proposition in pro-growth Charleston.  

The document breaks down how the City of Charleston can prevent and manage the issues of water within the city into three different strategies. The three-prong initiative includes reinvestment, response, and readiness.

4.3.1.1 Reinvestment

The first goal of the document is Reinvestment. The idea behind reinvestment is to use what was already created and better the systems, and programing, throughout the city as to lessen the impact that future events could have on the city. Reinvestment is a precursor movement to creating a resilient city. The goal of reinvestment into the first line of defense for when a disaster hit the city will improve the efficiency of the city when a natural hazard, such as a hurricane, hits Charleston. In order to make the city more resilient, there must be funding, time, and design put into the current infrastructure; so when there are future storms the infrastructure has been

\[81\] Tibbetts, “When a City Stops Arguing About Climate Change and Starts Planning.”

\[82\] Tibbetts.
updated and can withstand the impact of the future stressor. This means that the City of Charleston’s is allocating funding to fix and maintain their current failing storm water management systems. Through the continuation of pumping water, the integration of new infill to raise the streets, and the continuation of maintenance on the seawalls within the city, will aid in mitigating potential threats through large-scale city planning efforts.

4.3.1.1.1 New Construction Regulations

To combat the issue of flooding in Charleston, the city partnered with the National Flood Insurance Program (NFIP) to introduce new regulations and codes that hold construction up to a higher standard. This means that Charleston will “enforces regulations and building codes that require flood resistant construction and requirements for storm water quality and quantity control.” The significance in partnering with the NFIP is that Charleston will require all new construction and construction projects to comply with NFIP building code regulations. This means that the design of new buildings must comply with the height regulations that FEMA requires for the area. Aside from compliance with the NFIP, the City of Charleston requires that “new structures and those classified as substantial improvements to be built an additional one foot above the designated base flood elevation [BFE].” The requirement of an increase in elevation by one foot above the BFE will impact not only the height, massing, and scale of new construction but also the current urban context. The height of proposed new buildings can dwarf

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85 Ibid.
historic buildings and further impact the historic character of historic neighborhoods. In There
have not been a significant amount of historic buildings that are in need of elevation within
historic districts in Charleston.

4.3.1.2 Response

The second strategy that the City of Charleston is using to create a more resilient city is
Response. The strategy behind Response is to use existing within the city and to invest in the
people, processes, and tools, such as first responders and GIS specialists. The response to issues
of natural hazards, such as hurricanes, tidal flooding, and sea level rise, are important in allowing
for the inhabitants within the Charleston to have time to prepare for the hazard.

Charleston is approaching response through a multidisciplinary approach; through the use
of health care providers, educational facilities, and businesses. In partnership with the GIS staff
for the City of Charleston, the resiliency response will allow for real time information of road
closures, openings for shelters, and conditions will be updated in the event of a storm or hazard.
The city will also utilize first responders, with the Charleston Police and Fire Departments, to
coordinate with the GIS staff in creating a live network of updates across the city during an
emergency.86

4.3.1.3 Ready

The third strategy proposed by the City of Charleston is Ready. As of 2015, the City of
Charleston has been

working with a regional interagency, multidisciplinary group composed of public and
private sector stakeholder organizations within the Charleston metropolitan area that have a
collective interest in the resilience of communities, critical infrastructure, and socio-
economic continuity to episodic natural disasters and chronic coastal environmental
hazards.87

Throughout this section, the importance of Charleston’s involvement in collaborating with organizations and efforts outside of the city limits is emphasized. For example, the city worked with the Southeastern U.S. to create a handbook on Resilience.

4.3.1.4 Concluding Remarks

The three approaches Charleston created are a blend of traditional approaches to climate change and some modern adaptations. Charleston, in the traditional approach, will remain pumping water, using infill to raise the streets, and continue to maintain and raise seawalls within the city. Although these practices are considered to be traditional mitigation methods, the city is going to incorporate three newer approaches: purchasing properties that are in lowlands to absorb future waterways and developing clear immediate communication to ensure public safety; working beyond the civic boundaries to collaborate with the region on climate change approaches. Charleston created a document that was catered to creating a more resilient city, but the document is lacking guidance on how to sensitively elevate a historic building.

4.4 PRECEDENT STUDY

42 Rutledge Avenue is a considered, by the BAR, as a building of great significance. When is preserving a building in its historic context, form and massing, more important than saving the entire site from flooding? The debate over how to preserve for resilience has begun in Charleston, Newport and New Orleans. Within Charleston, there has been an increase in homeowners within Charleston’s historic district that are submitting application to elevate their homes out of the flood zone. The biggest issue for the homeowners who are looking to elevate their buildings it the resistance from the city’s preservation community; whose main concern is
to preserve the buildings within the historic district. The BAR has been taking the influx of elevation requests case by case; meaning that although 42 Rutledge Avenue was approved other buildings similar may not. The Director of Preservation, Planning and Sustainability in Charleston, Jacob Lindsey, stated in reference to the elevation of 42 Rutledge Avenue that “He was only asking for a few feet [2 feet 5 inches]. If he had asked for an additional 6 feet, we’d say forget it.” Even though the elevation to the building was minimal, it can potentially have great impacts on the sustainability of the property to flooding; as well as a decrease in flood insurance and allowing the property to remain marketable.

4.4.1 42 RUTLEDGE AVENUE

The precedent study of 42 Rutledge Avenue is an example of how flexibility within the BAR in Charleston has allowed for a ground-breaking elevation of a historic building in a historic district. Located within the Old and Historic District and directly across from Colonial Lake, the proposed elevation is to an 1859 home in Harleton Village that is classified by the City of Charleston as a Category 2 structure. A Category 2 structure, as defined by the City of Charleston, is an “Excellent” structure that is a

High style regional architecture—fine “Charleston Style”—well designed and proportioned, with good detail. These are spirited, dignified, frequently innovative, rare, and always attractive and interesting. Of irreplaceable important, to be preserved in situ at all costs.

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88 Brian Hicks, “Hicks Column: Charleston Can’t Stop Flooding, but There Are Ways to Ease It,” Post and Courier, September 13, 2017, https://www.postandcourier.com/columnists/hicks-column-charleston-can-t-stop-flooding-but-there-are/article_e5769bb6-97fd-11e7-a95b-fbd9bbd76aec.html.
89 Ibid.
90 Ibid.
The application was submitted to the BAR-Small by the architect of the project AJ Architects. The submitted application was a “Request conceptual approval to elevate and renovate existing historic residence.” The application was approved, with three votes in favor and no votes against, at the BAR-Small meeting on April 27, 2017. The meeting discusses that in order for the elevation to be made there must be changes to the design by comment of the council; “1) Foundation ventilation be clarified and 2) new foundation wall at front and back be flat with no visible piers; with final review by staff.”

Although the building was approved for elevation, the request to elevate this property was previously denied in an application that was submitted for approval on November 28, 2016. The application was submitted by a design professional Ashley Jennings on behalf of the owner, Jack Margolies. The conceptual review request included the approval to raise and restore the existing wood structure that had extensive fire damage; roughly fifty-percent of the house was damaged due to the fire. The application was approved for restoration to the fair damaged section of the building but did not approve the elevation of the building. The final verdict from the BAR, on December 08, 2016, stated that the approval for the application was to occur with the following conditions: “conceptual approval with conditions noted by Staff renovations; denial of elevating the building.”

Although the elevation application was denied, a petition was created and signed by twelve neighbors surrounding the proposed elevated structure. The petition stated that “We the

93 BAR-Small: Due to the large amount of applications to the BAR in Charleston, the BAR split into two different commissions to hear applications. The BAR-Small is for smaller projects such as residences and alterations. The BAR-Big is use for handling applications that are for large development projects through the city.
96 Ibid.
neighbors of Jack and Frieda Margolies of 42 Rutledge Ave, believe they should be able to raise their house two feet to comply with government regulations when a house is destroyed more than 50%.”97 The involvement of the neighbors through their own grassroots initiative is interesting, but the conflicting feelings of the BAR and the neighbors lead to an interesting question being posed; when is preservation enough?

4.5 WHAT CAN NEWPORT LEARN

After looking at the strategies that Charleston has implemented and the controversy over 42 Rutledge Avenue, it has become clear that there is no one solution nor is there an easy solution to the problems of flooding within Charleston. The debates over elevation, understanding the balance between preservation of a building and keeping the building from being flooded, and considerations of the neighborhood context, result in no solution that satisfies all stakeholders. Newport must understand and use the debate between preservationist and homeowners wishing to elevate as a way to find middle ground. The City of Charleston uses both macro and micro approaches to try and achieve resiliency for the unique challenges the city faces. From a macro approach, Charleston is following suit to New Orleans. The city has an overarching plan for resiliency and is trying to achieve it through fixing current infrastructure issues such as raising the Battery and increasing pumping stations.

CHAPTER 5: RECOMMENDATIONS
5.1 RECOMMENDATIONS

5.1.1 CREATION OF ARCHITECTURAL DESIGN GUIDELINES

One of the most useful recommendations for the City of Newport is the creation of Architecture Design Guidelines for the elevation and adaptation of historic properties for resiliency. Within this document there would be specific design considerations for the different type of architectural styles within Newport as well as recommendations for the property as a whole. It is recommended that the document would look at the architectural development of Newport, understand the different risks that properties have throughout the city, and make recommendations. The document would be created for property owners and designers to understand what the most appropriate alterations to a historic building. The document should be created using the recommendations from the Historic District Commission, Preservation Planner, Zoning Board, and City Planner. This group of individuals would be able to create appropriate, and sensitive recommendations for architectural design as well as landscape design.

5.1.1.1 Key Issues Newport Should Consider in the Creation of Design Guidelines

If Newport decides to create architectural guidelines to guide historic property owners in sensitive elevation practices, there are several issues that should be addressed in the creation of such document. The first issue that Newport should research and portray in the guidelines is a deep understanding of the type of architecture commonly found within Newport, the materiality commonly used, as well as the types of landscape topography in the area. In order to do this, it is advised that Newport breaks down the different sections of the city and creates different guidance tailored to the specific needs of each area. Newport and the different areas of development throughout its history has led to a substantial differentiation in setback, massing, and architectural style throughout the city. Another recommendation, expanding on separate
guides for the different areas throughout the city, is including the different threats that are impacting the specific areas. Although Newport is predicted to lose a significant amount of its urban environment due to climate change, there are specific areas of the city, such as large areas of the Ocean Drive Historic District, that are not impacted by the affected as severely to the impact of water from climate change. For example, the Point Neighborhood is located within the Newport Historic District and is in need of immediate intervention due to the frequent flooding that has been causing damage to the eighteenth-century single-family residences within the neighborhood. If there is an issue with time and funding to create an architectural design guideline for the historic resources in Newport. It is suggested that by breaking down the guidelines into separate sections the areas that are facing risk now, such as the Point Neighborhood, Newport should be able to create guidelines over that that allow for property owners in the diverse areas of Newport to better understand their options for creating a more resilient historic structure.

5.1.2 CREATION OF GREEN SPACE TO DETER WATER

Newport has a significant amount of “grey infrastructure” throughout the city-- large areas of impermeable surfaces such as sidewalks and street pavement. It is possible that areas where historic property owners would rather retreat their property than elevate it that the land is then bought by the city and made into a large rain garden. If the city was able to incorporate more green spaces that are naturally occurring, meaning that the plantings are native to the area and require less maintenance, then the runoff water that is causing flooding issues can be redirected and absorbed into the green spaces.

Another way to incorporate more green spaces into the city is through green roofs and roof gardens. Although the integration of this type of green space cannot be done on a majority
of the buildings in Newport, due to the slope of the roof and the ascetic regulation of properties located within a historic district, there it is possible that new construction buildings can take greater design liberties; incorporating green roofing systems.

5.2 CONCLUDING REMARKS

The City of Newport is in a pivotal era within its history. The effects of climate change are just beginning to impact the built environment and the time to make a change is upon the city. The adaption and elevation of historic buildings in Newport out of necessity should be an easy choice. A significant portion of the historic buildings located within the city were disassembled and relocated in Newport. The reason the buildings were relocated to Newport was because they had a clear and present them to the preservation of the building. Newport should approach climate change as a clear and present treat where retrofitting historic buildings throughout the city is a better option then losing a historic building. The preservation efforts within the city are going to have to change to understand, relate, and adapt with the impact that water is and will have on the historic buildings.

When looking toward the future, The City of Newport should place priority on keeping residents within the neighborhoods instead of allowing strict preservation efforts to keep the property owners from obtaining just compensation for the value of their property, or not allowing for the residents to remain in their properties due to the inability to maintain a historic house with frequent flooding. The preservation movement within Newport, with Doris Duke, stressed the importance of having a community and using preservation to keep the community within Newport. It should be noted that this style of preservation, and restoration of properties, as well as relocation of properties, has allowed for Newport to attract tourists from all over the world.
The beauty of Newport and its architectural history, is its ability to be able to adapt with the change in times.

The best practices used by Louisiana and Charleston should be taken seriously and used as guideposts for how Newport will approach the impacts of water with historic structures. If Newport is able to adapt its preservation efforts to support elevation of historic buildings and create community wide efforts to reduce flooding, then the city will have the ability to start initiatives that fight climate change instead of allowing for a hazard event to occur without planning. The more that the city is able to prepare property owners, organizations, and the public alike for the future, then Newport will be able to achieve resiliency for its historic structures.
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