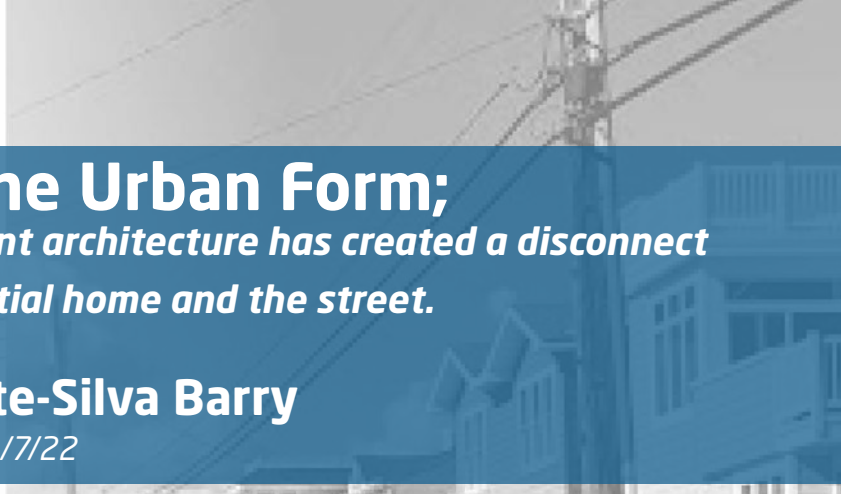
Post-Hurricane Urban Form;

An analysis on how hurricane resilient architecture has created a disconnect between the residential home and the street.

Luke Duarte-Silva Barry

4/7/22



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Acknowledgments

I want to thank my committee chair, **Brandon Anderson**. The real life experiences he has shared as a practicing architect have been invaluable to me. He has been a great mentor in this program and the field of architecture.

I would also like to thank my honors council member **Jota Samper**, for always providing useful feedback. His knowledge on interstitial urbanism was crucial for my thesis and will be a concept that I continue to use in my studies.

I also want to thank **Jerry Jacka**, for taking the time to be a part of my defense team.

To the **Beach Haven Community** – I want to thank my family and Beach Haven residents for their constant encouragement and support from the start of my research. A special thanks to Jim Spangler for his help documenting the existing architecture. My thesis would not have been possible without the previous work done by Jeanette Lloyd and her husband John Bailey Lloyd. The creation of the Beach Haven Historic Preservation Advisory Commission was crucial to the preservation of what used to exist on the island.

0.0 ABSTRACT

Catastrophic natural disasters, like hurricanes, have tested the resilience of humans for centuries. More specifically, coastal communities have endured recurring cycles of destruction and rebuilding due to hurricanes. I review scholarly literature on hurricane damage of coastal structures from Mehrshad Amini, Ali Memari and J. Patterson. I have also reviewed official and academic recommendations on hurricane resilient design from FEMA, ASCE and Amini and Memari.

After a natural disaster, there is a strong push to rebuild the community's infrastructure, businesses, and neighborhoods. However, much of what once defined the culture and aesthetic of a community is lost to decades of rebuilding and new construction. I evaluated the current debate between historic preservation and fake architecture, which is a style that tries to mimic historic architecture for economic gain. I continued to evaluate their economic impact on tourism attraction and the dislocation of local residents, and the concept of interstitial urbanism to revitalize unused space in an effort to build or rebuild the fabric of a community.

By examining my case study in Beach Haven, N.J., I can review the history of the island and its architecture resilience. Beach Haven is located on a low lying, barrier island and is particularly vulnerable to the destructive wind, wave, and storm surge flooding. I discuss how we can use architecture to recover traditional lifestyle and culture while maintaining hurricane resilience. The aim of my thesis is to evaluate how new standards of hurricane resilient architecture impacts social and cultural resilience. As a result, it has created a disconnect between the residential home and the street.

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1.0 Introduction

1.1 The Need for Community Resilience

In the past decade the US eastern seaboard has lost hundreds of billions of dollars to hurricane damage. As a result, many architects and designers have explored hurricane resilient designs to rebuild coastal communities. While, in this post-hurricane architecture, there has been a huge effort to adapt our coastal buildings to survive hurricane damage, there has been less concern for the preservation of community culture and traditions in most post-hurricane architectural designs. Yet, architectural design can incorporate not just structural resilience and innovative elements, but also represent the soul and values of a local community, preserving a sense of place rooted in the past without trying to recreate it (Lau 2012). In her thesis, Interstitial Space, Inhabiting the In-Between, Danica Lau explores interstitial urbanism for its transformational possibilities of the everyday urban realm (Lau 2012). By evoking interstitial urbanism principles, we will attempt to reconnect coastal architecture "to ordinary human and social meanings" (Lau 2012), and at the same time make design suggestions that might be considered "small interventions" in using unused space in building facades to "enhance pedestrian movement and create varied urban textures" that will revitalize the interaction between pedestrian and sidewalk (Lau 2012).

Coastal hurricane resilient design has inspired new priorities and lifestyle choices rather than fostering an appreciation for the history and lifestyle of its local communities. I believe it is important to call attention to this gradual disconnect between coastal architecture and the social networks of its community.

1.2 Community vs Individualistic lifestyle: The effect of new building heights.

Before Superstorm Sandy's landfall on LBI in 2012, there was a clear range of architectural styles in Beach Haven (Georgian, Mediterranean, Mission and Moorish Revival, Queen Anne, Spanish Colonial Revival and Tudor) and a variety of sizes of homes, from the traditional small cape to large Victorian homes. There were coastal dunes running the length of the island that gave the residents a sense of protection from hurricane waves and storm surges. As a walking and bike friendly community, the lifestyle was rooted in the interaction between the sidewalk and the residents, as most buildings' main living space was on the ground floor. Front porches, wrap-around porches, grilling spaces on the ground floor fostered a daily interaction amongst neighbors and between pedestrians or beach-bikers. To residents that interaction between the household and the sidewalk was a unique aspect of the soul of the Beach Haven community.

During Hurricane Sandy, the protective sand dunes in Beach Haven were destroyed and left residential homes exposed to the impact of ocean waves. The tidal surges in bay water level caused terribly damaging floods. Regulatory and economic factors lead to different approaches to rebuilding in Beach Haven. Homes that had been in local families for generations weren't required to have flood insurance, and in many cases the owners could not afford to rebuild and were forced to sell or relocate. Those who could afford to rebuild or had flood insurance, had to deal with meeting new regulations that required all living space to be above the new base flood elevations and set new standards for wet proofing and dry proofing their foundation systems.

The rental income available from re-built, newer, and usually larger homes, has enticed locals to move out of town for the summer and rent to tourists for short term rentals for extra income. This reduces the number of year-round residents during the summer, resulting in less attendance at town meetings and less involvement in local community issues.

This new urban population has forgotten the importance of community networks. Even though the planning of Beach Haven promotes pedestrian and bike travel, the new urban landscape does little to enable social interactions. It has become more common for social interactions to happen by invitation rather than by chance. For instance, social deck spaces that are elevated above the first floor of the home, do not provide the casual and friendly interactions that a more traditional wrap-around would provide.

2.0 Bodies of Research

2.1 Hurricane Associated Hazards

Since Beach Haven is on a barrier island it is prone to devastating hurricanes and Nor'easter Storms. Over the past few decades we have seen the frequency of these storms increase significantly. During a hurricane event, coastal structures are exposed to several hazards. However, the most significant damage can be attributed to wind and flooding. Wind speeds can be catastrophic during a hurricane event. The exterior force of the wind creates a lot of pressure within the home and in some cases entire roofs are torn away from the structural members. Any components that are loosely attached will most likely be removed by the wind (Ayscue 1996). There is also another exterior force created by the surrounding flood water. The hydraulic pressure builds up around the lower side of the structure and can cause foundation systems and joinery elements to fail.

Table 1. Saffir-Simpson hurricane-scale wind speeds (SSHWS) and damage

Strength	Sustained wind speed[a] [km/h (mi/h)]	3-s gust wind speed [km/h (mi/h)]	Damage potential
Category 1	119–153 (74–95)	143–187 (89–116)	Minimal
Category 2	154–177 (96–110)	188–216 (117–134)	Moderate
Category 3	178–208 (111–129)	217–256 (135–159)	Extensive
Category 4	209–251 (130–156)	257–304 (160–189)	Extreme
Category 5	252 (157) or higher	304 (189) or higher	Catastrophic

[a]One minute sustained over open water.

Table 1. Mehrshad and Memari, Saffir-Simpson hurricane-scale wind speeds and damage , 2020.

Tropical cyclones with a wind speed of at least 74 mph (119 kph) are classified as hurricanes (Mehrshad and Memari 2020). These extreme winds have enough force to lift some homes off their foundation. The Saffir-Simpson Hurricane Wind Scale (SSHWS) was created to define hurricanes based on their peak wind speed and separate them into five categories (Table 1). The damage potential can be estimated by a factor of four for every increment of 3-s gust wind speed (FEMA 2009a). The American Society of Civil Engineers (ASCE) used estimated potential gust wind speeds that cause property damage to create accurate design wind speeds (ASCE 2016). These calculations don't give an accurate prediction of where and when these gusts of winds occur, however, they provide a framework of how we can design in areas that are prone to high strength hurricanes.

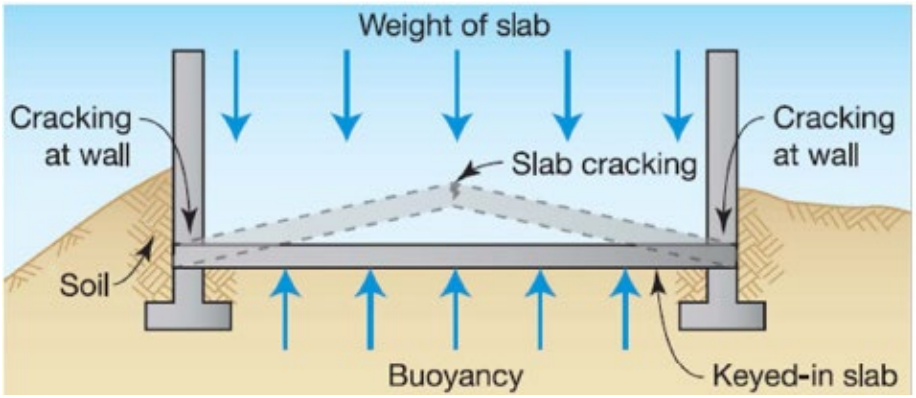

Fig. 1. Mehrshad and Memari, Slab and wall cracking for keyed-in slab, 2021.

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2.2 Hurricane Resilient Guidelines

In response to recurring hurricane damage the federal government set up the National Flood Insurance Program (NFIP) in 1968, to provide subsidized flood insurance for people living in flood areas. FEMA created the Flood Insurance Studies (FIS) program to conduct studies in flood prone areas around the United States. After conducting these studies they created the Digital Flood Insurance Rate Maps (DFIRMs) (Mehrshad and Memari 2020).

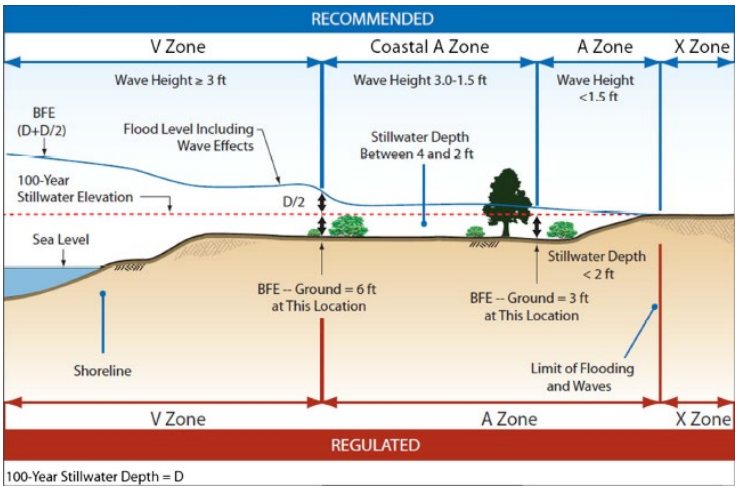


Fig. 2. FEMA, Coastal Flood Zones, 2020.

DFIRMs show the base flood elevations (BFEs) for riverine flood zones (Zones A, AE, AO, and AH) and coastal flood zones (Zones V and VE). FEMA determines the BFE by placing it at "the height that flood water level and wave effects (an additional 55% of the stillwater depth) is expected to reach during the base flood (100-year) event", and notes that and there is a 1% chance that the flood will equal or exceed that height in any given year" (FEMA 2009b). In other words, there is 1 out of 100 probability that the flooding event outlined in FEMAs flood maps will occur in any given year. FEMA flood maps are continuously updated.

2.3 New BFEs and Foundation Types

To qualify for the NFIP municipalities had to adopt FEMA recommendations for flood damage mitigation. Two of the major components of these recommendations deal with putting the living areas of homes above the BFE level and what type of foundation systems should be used.

Elevation requirements in Beach Haven state "all new construction and substantial improvement of any residential structure shall have the lowest floor elevated at or above the advisory base flood elevation plus one foot." (Ordinance Ord. No. 2013-4C of the Construction code of Beach Haven Borough)

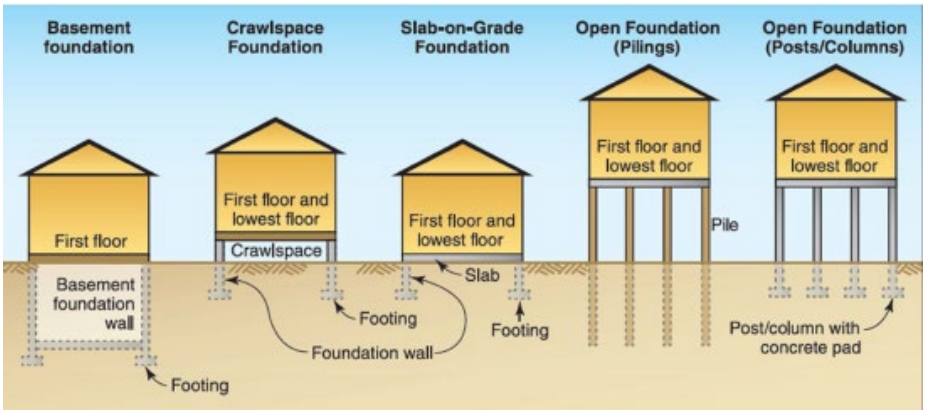


Fig. 3. Mehrshad and Memari, Slab and wall cracking for keyed-in slab, 2021.

New BFEs have forced residents in Beach Haven to retrofit their homes by elevating them above the BFE in their location. The most common method is to raise the home on pilings. Elevating a house on pilings allows for added storage space and garages to be placed beneath the 1st floor. My family's house in Beach Haven has a crawlspace foundation and is only elevated 4-5 ft above the ground. We are fortunate to live on a street that is further from the ocean and has a much lower BFE requirement.

You won't find basements in most coastal areas. This is due to the hydraulic pressure building up underneath the surface. Most coastal areas already have loose soil and when there is heavy rainfall the soil becomes saturated, which loosens the ground even more (Patterson and Ford 2009). However, there are two flood proofing methods that account for these hydraulic pressures.

Dry floodproofing and wet floodproofing methods are design solutions that help protect a building from flooding and from hydraulic pressures. These methods are used in flash flood areas and coastal areas and their use is subject to different regulations depending on what flood zone the building is located.

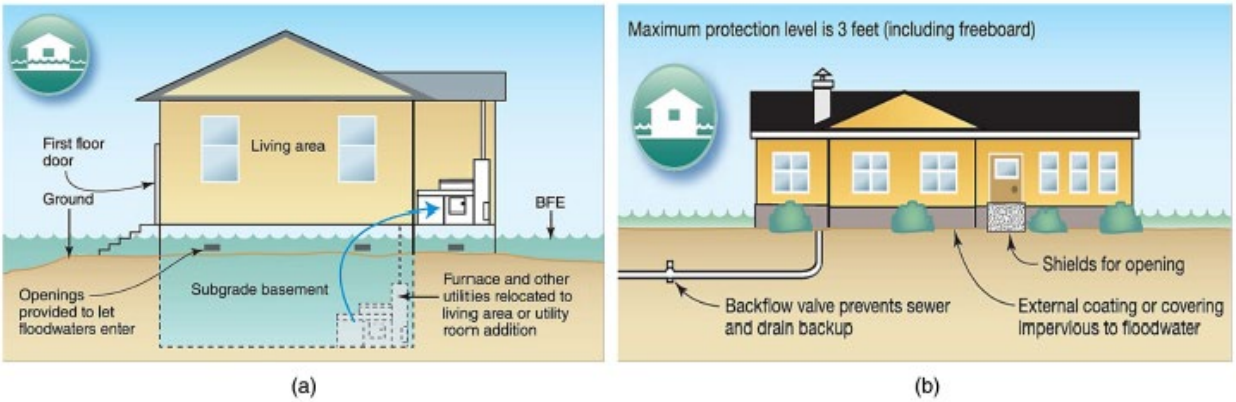


Fig. 3. Mehrshad and Memari, Slab and wall cracking for keyed-in slab, 2021.

The main strategy of wet floodproofing is to equalize the internal and external pressures acting on the house. This helps prevent any structural systems, within the home, from failing under too much hydraulic pressure (Mehrshad and Memari 2020). In other words, water is allowed to pass through the home below the BFE. Some homes relieve this pressure with breakaway walls that are designed to fail under a certain hydrostatic force, others use a calculated number of vents that will allow the water to penetrate the crawl space or basements. Coastal A Zones require breakaway walls; however, they are not required in Zone A. Structures in Zone A that do have enclosures and closed foundation systems require openings in the walls to allow water to pass through (Mehrshad and Memari 2020). The end objective is to allow the water to penetrate the structure below the BSE and avoid pressure on the foundation systems, namely the common cracks on foundation walls of basements and crawl spaces, because depending on the type of crack, the entire structural integrity of the building could fail. The foundation system is a point of interest because its resilience is essential to the success of other structure systems during a hurricane event (Mehrshad and Memari 2021). Looking into a new material standard for foundation types could be a solution to a more resilient design that fosters community resilience.

Dry floodproofing is essentially the opposite in the sense that it "aims to keep the house watertight within a limited time (a few hours) and depth (less than 0.6–0.9 m). The former permits both non engineered (prescriptive) and engineered flood openings that comply with National Flood Insurance Plan (NFIP) requirements in terms of the net open area and installation methods" (FEMA 2008). Dry floodproofing is allowed in flash flood areas but is not allowed in V Zones and not recommended in coastal A Zones because of its vulnerability to hydrodynamic forces (Mehrshad and Memari 2020). The most common foundation types are made of concrete or masonry. Both materials are strong but do eventually fail when exposed to the large hydraulic forces caused by ocean floods. These new requirements called for a new design solution that would promote building new homes on pilings (Lloyd 2007). As a result, this created new facades and elevated social spaces almost 9-10 feet off the ground. This trend accelerated after Hurricane Sandy when we began to see this new urban form grow at a fast rate. Almost every structure on the island was affected.

2.4 Interstitial Urbanism

Interstitial Urbanism can be defined as "Inhabiting the In-between", and it explores strategies for rejuvenating existing urban sites, usually through parks and built elements. Danica Lau explores the principles provided by Henri Lefebvre, Production of Space, and Michel de Certeau, The Urban Tactics, to study neighborhood-scale. Interstitial urbanism also calls attention to how a "site specific intervention grounded in reality" can revive neighborhoods. She explores how "small and sustainable urban interventions offer a potent alternative to large-scale urban developments" and addresses its transformational possibilities of the everyday urban realm (Lau 2012).

"The in-between space is where living extends and connects, and where the core of a town or city is contained. When properly articulated, an empty lot can become a public room for the city." (Lau 2012) Interstitial urbanism can also promote social diversification as it improves economically strained neighborhoods and connects them to the established neighborhoods.

Lau's design proposal for a public living room in an underutilized laneway in Ottawa is to provide new programs and places, enhance pedestrian movement and create varied urban textures that accommodate different uses. My work aims to enhance the connection between pedestrian movement and urban form in coastal areas by reincorporating elements of historic architecture to unused spaces on new residential buildings, for instance, a modified wrap-around porch or an enlarged version of the traditional stoop.

Abandoned areas, unproductive spaces and abandoned sites are all usually the object of interstitial urbanism. In my thesis, I address interstitial concepts not at the usual large scale of a town or city, but within the space of the new emerging residential architecture in my case study.

"Interstitial urbanism takes advantage of built environments' lack of affiliation to approach ordinary places in new ways. Unlike most urban design techniques, it can maneuver in the nooks and crannies of existing urban environments." (Lau 2012) Instead, I looked at the nooks and crannies of the existing buildings and used them to address the disconnect between the residential home and the street.

Citing Henri Lefevbre's, Critique of Everyday Life, Lau states that Lefevbre believed the forgotten, everyday areas were really where a city's life unfolded, not so much in a city's elite spaces (Lefebvre 1947). He was interested in studying the regular neighborhoods, which possessed "everydayness: neighborhoods that were built around the humble and repetitive aspects of life, as opposed to those related to either the world of production or consumption." (Lefebvre 1947)

Lefebvre sharply criticized urban theories that focused predominantly on perceived and conceived space while ignoring the lived dimension of space or the micro-realm. Lefebvre's term "micro public space" suggests the possibility of public-ness and urbanity in even the smallest urban spaces.

"Trivial and commonplace vacant lots, sidewalks, front yards, parks, and parking lots are available to be claimed for new uses and meanings, by the poor, the recently immigrated, the homeless, and even the middle class. These spaces exist somewhere in the junctures between private, commercial, and domestic realms. In the absence of a distinct identity of their own, these spaces can be shaped and redefined by the transitory activities they accommodate." (Lau 2012) My thesis addresses how it is possible to use the traditional wrap-around porch space to revive the connection between the residential home and street by incorporating sidewalks and open lot space of residential areas into the fabric of Lefebvre's "everydayness".

Edward Soja named these spaces the "thirdspace", a space bearing the possibility of new meanings, a space activated through social action and the social imagination. "Everything comes together... subjectivity and objectivity, the abstract and the concrete, the real and the imagined, the knowable and the unimaginable, the repetitive and the differential, structure and agency, mind and body, consciousness and the unconscious, the disciplined and the transdisciplinary, everyday life and unending history." (Soja 1996) Soji's "thirdspace" connects urban architecture to the sociality of everyday human life.

Michel de Certeau described, in The Practice of Everyday Life, the city as a place for walking, an elementary form of experiencing the city (Lau 2012). Michel de Certeau wrote of the urban dweller, "Their story begins on ground level, with footsteps. Their intertwined paths give shape to spaces. They weave together. In that respect, pedestrian movements form one of these 'real systems whose existence in fact makes up the city.' They are not localized; it is rather that they spatialize." (Certeau 1988)

"The contemporary North American city insists upon vehicles as a means of transportation, and the subsequent range of pedestrian movements are often limited. As such, the idea of the 'street' is often forgotten, and the ability for dwellers to spatialize decreases as a result. In this sense, an interstitial urban intervention that reinstated the pedestrian realm, would also contribute to recovering spatiality in cities. And this is a valuable outcome." (Lau 2012)

These interstitial, in-between spaces are the channels that connect daily lives and they have different meanings for different people at different times (Lau 2012). An important group in promoting the interstitial awareness was Team 10, which promoted bottom-up or ground-up practices that were concerned with the quality of life on the street level. Team 10's ground up movement looked to encourage relations between inhabitants and between building's surroundings. For them, urban form was a connection of places and life patterns (Smithson 1968). Team 10 members noted that "Man may readily identify himself with his own hearth, but not easily with the town within which it is placed. 'Belonging' is a basic emotional need- its associations are of the simplest order. From 'belonging' - identity- comes the enriching sense of neighborliness. The short narrow street of the slum succeeds where spacious redevelopment frequently fails." (Frampton 2010)

Smithson stressed the importance of "association" in architectural design. She envisioned an urban form and works of architecture that would foster and encourage human associations and encounters. They believed that the citizen's private life should be woven into the public realm with rich transitional spaces from the house to the street: "The house is the first finite city element. The street is our second finite city element. The street is an extension of the house, in it children learn for the first time of the world outside the family, a microcosmic world in which the street games change with the seasons and the hours are reflected in the cycle of street activity." (Smithson 1968)

Jane Jacobs's Lower Manhattan project defended the importance of maintaining traditional, every day, small-scale, interstitial spaces, and the streets as a means of maintaining community (Jacobs 1961).

Interstitial urbanism utilizes daily routines and existing urban patterns to create designs from the ground-up rather than the top-down. Architects reassemble narratives of place to intensify and render more visible ordinary stories of city life (Lau 2012). Interstitial urbanism places the needs of the users - social and practical - at the center of its discourse and offers an alternative strategy for communities to transform the existing urban fabric according to their needs, from the bottom up.

3.5 Historic Preservation & Fake Architecture

When the historic character of a downtown is preserved, the downtown may become a tourist attraction that enhances the local economy and the sense of community pride (Tyler 2000). The success of historic districts has encouraged the construction of fake historic buildings as a way of promoting tourism or encouraging downtown revitalization. This fake historic architecture copies the historic style of period to look like it has actually been built in that period (Levi 2005).

Many architects oppose the construction of fake historic architecture because they believe it debases our appreciation of both real historic architecture and contemporary architecture (Huxable 1997). Huxable uses the example of the reconstruction of Williamsburg as a colonial town, where historic buildings from the 1800s were replaced by fake 1700s-looking buildings for tourists. To her, this showed that the public wants historic-looking buildings and is less interested in preserving actual architectural history. The construction of fake historical images can hurt efforts toward historic preservation because historic preservation often becomes secondary to the development of these historical theme environments (Boyer 1992). Others argue that these neo-traditional designs evoke the feeling of the past, and emotional bonding to the place (Kim 2000).

The goal of Daniel Levi's study in San Luis Obispo was first to explore how people view fake historic architecture. Is it rated lower in beauty than other types of architecture? Do people discriminate between real and fake historic architecture? Second, what impact does fake historic architecture have on historic preservation? Does it lessen or encourage support for historic preservation? (Levi 2005).

The results show that a great majority of the population does care for true Historic Preservation, 88% according to Table 2, where citizens rated the importance of discretionary city services; and 85% in Table 3, where they rated the importance of the Architectural Review Commission standards (Levi 2005).

TABLE 2. Importance ratings of discretionary city services.

92%	Street trees and public landscaping
88%	Historic preservation
81%	Economic development
80%	Cultural events (La Fiesta, etc.)
76%	Recreation programs
70%	Architectural review for aesthetics of new construction
61%	Public art
49%	Tourism promotion

Note: Percentages are for ratings of "important" and "very important" combined.

TABLE 3. Ratings of the importance of Architectural Review Commission standards.

88%	Beauty (or aesthetics) of the building
88%	Building is compatible with the site
87%	Building materials are appropriate for the project
85%	Historic buildings are preserved
75%	Building style matches (or fits in) with the surrounding buildings
59%	Building adds to the historic character of the city

Note: Percentages are for ratings of "important" and "very important" combined.

TABLE 4. Attitudes about architecture and historic preservation.

Fake Historic Architecture and Contextualism	
81%	Buildings that look historical add to the character of a city.
52%	New construction should match existing buildings in the area in style, colors, and heights.
46%	Constructing historic-looking buildings shows respect for a community's history.
16%	New buildings should look historic in order to add to the existing historic character of the city.
Contemporary Architecture	
21%	New buildings should reflect the current style of architecture, rather than copying historic styles.
16%	New, historic-looking buildings are "architectural fakes" that are inappropriate.
13%	Modern building styles are more attractive than new, historic-looking buildings.
Historic Preservation	
52%	Historic buildings should be preserved, regardless of how beautiful they are.
48%	Historic buildings should only be preserved if they are of historic importance to the community.
28%	Preserving historic buildings should not get in the way of economic development.
12%	Expanding economic development is more important than preserving historic buildings.

(Levi, 2005)

Even though the scope of the survey was extremely limited, it's interesting to note that historic-looking buildings were viewed as attractive compliments to the existing historic buildings in San Luis Obispo. The attitude surveys showed strong support for historic preservation and constructing fake historic architecture was viewed as a sign of respect for the community's history (Levi 2005).

3.0 Beach Haven as a Case Study

3.1 March Storm 1962

Since Beach Haven is on a barrier island it is prone to devastating hurricanes and Nor'easter Storms. Over the past few decades we have seen the frequency of these storms increase significantly. On September 14th, 1944, Beach Haven was hit by a hurricane that destroyed a few homes on the island but didn't cause much concern among the community. It wasn't until the March storm of 1962, when the community started to realize that they needed to change local building codes and construction practices. During the storm there was a significant loss in property and life. This called for a new design solution that would promote building new homes on pilings (Lloyd 2007). As a result, this created new facades and elevated social spaces almost 9-10 feet off the ground.

However, it wasn't until 2012 when we began to see this new urban form grow at a fast rate. Almost every structure on the island was affected by Hurricane Sandy. The dunes that provided some form of security were completely destroyed and left every home exposed to the powerful wave surges. Flooding was one of the most severe and costly damages endured. Similar to the storm of 1962, this created another push for new building codes and building practices. Unfortunately, this has also indirectly promoted the destruction of a local community and its way of life.

3.2 Historic Preservation Ordinance 2004

Fortunately, before Sandy, members of the community had already noticed the importance of preserving the rich architectural history of Beach Haven. One of these community members was Jeanette Lloyd, who runs the Historic Preservation Advisory Commission in Beach Haven. Lloyd stresses the importance of historic preservation and its social and cultural benefits. Lloyd believes that "by its very nature, historic preservation retains the unique character of buildings and entire neighborhoods. Preserving buildings signals to residents and visitors alike that the past is valued as older structures provide tangible evidence of a broad and rich cultural heritage." (Lloyd 2007)

In New Jersey we have the Municipal Land Use Law, "which governs local planning and zoning, allows for the creation of Historic Preservation Advisory Commissions (HPACs) and the inclusion of Historic Preservation Elements in the municipal Master Plan." (Lloyd 2007) This gave local municipalities the ability to create historic districts by putting in place ordinances that gave the HPAC the power to evaluate and lower the risk of damage and destruction to historic structures. On October 12, 2004, the Historic Preservation Ordinance (Ordinance #2004-24) was put in place. The new historic district would span about 15 blocks and is known as the Greater Beach Haven Historic District. This historic district was declared a "locally designated Historic Landmark" in 2007 (Lloyd 2007).

A lot of Lloyd's work had the goal of preserving the few existing historic structures on the island. Luckly, most of her work was put into place before Hurricane Sandy hit. If it wasn't for the creation of the Historic Preservation Advisory Commission, we would only see a small trace of what Beach Haven once was. The creation of historic districts is crucial to the preservation of a community. I want to use the work Lloyd did and bring it into a more contemporary context by highlighting design elements that will bring back the social and cultural benefits we have lost over the years. We can't stop people from moving in and rebuilding but we can suggest new ways to design that are resilient and considerate of what used to exist.

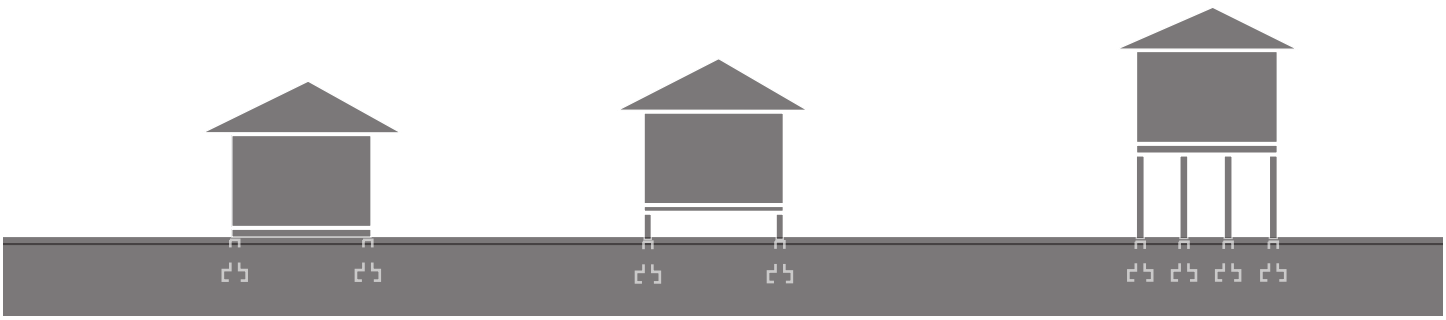
Many of these styles of homes can still be found in the Greater Beach Haven Historic District. "This architectural diversity shows that Beach Haven adapted to building trends and accommodated the new and the old side by side. The various styles are expressed in the details and the different expressions from each period are important to preserve." (Lloyd 2007) It is important to understand that the goal of this thesis is not to recreate the past. We can't control every design element in new construction. However, we can highlight the most historically significant elements that can be implemented into new construction.

3.3 Traditional Architecture of Beach Haven

At the start of the nineteenth century many developers were looking for new building designs. Medieval cathedrals were a large inspiration for domestic homes in the 1840s and would be defined as a Gothic Revival style. This style can be characterized by "steep gabled roofs, pointed arch lancet windows, gingerbread trim, and board/batten siding." (Lloyd 2007) The European Renaissance was also a source of inspiration. The Italianate style would gain some popularity towards the end of the nineteenth century. Italianate style can be characterized by a "balanced composition, low pitched roofs, overhanging eaves with heavy brackets, rounded or segmental arches, window and door crowns or hoods, square towers and cupolas." (Lloyd 2007) Second Empire was a French inspired style that resembles the Italianate style in many ways. However, its distinct feature is "the top story's steeply pitched concave, convex, or straight roofline." (Lloyd 2007) Stick style is another rustic European style inspiration. The main highlights of Stick style are its ornamentation on the exterior of the structure. Queen Anne was a very popular style towards the end of the 1800s. This style included "asymmetrical compositions, turrets, bay windows, wrap-around porches, and a variety of surface textures." (Lloyd 2007) Towards the end of the nineteenth century and into the twentieth century, Shingle style became a popular American style that is closely related to resort and shore cottages. This style has "a composition of geometric order, a continuity of surface expressed best with a sheathing of wood shingles and pitched gables creating a roof covering volumetric expanses more horizontal than vertical." (Loyd 2007)

As we enter the twentieth century, we begin to see the Craftsman style emerge, which was an American design inspired by the English Arts and Crafts movement and "common buildings of the American vernacular landscape...Craftsman-era house includes: the use of local materials that emphasize the builders' skills and architectural simplicity and structural honesty." (Lloyd 2007) In 1880 there was a new interest in colonial American housing, which created homes that were almost identical to Georgian and Federal era dwellings. These homes would have a side gable roof, symmetrical and balanced facades with flat undecorated wall surfaces, palladian windows, and ornamental details around the front door (Lloyd 2007). Lastly, the Planbook and Kit Houses were part of an affordable housing project in the early twentieth century. This still was unique because it included several different building types, such as bungalows, Foursquares, cottages, Cape Cods, and Ranches.

4.0 Methodology Framework



Type I - Slab on Grade *Type II - Crawlspace* *Type III - Open Foundation (Posts/Columns)*

The framework for my methodology is split up into three phases. In phase one I distinguished the different building types that exist in the local area. As mentioned before, there are three main building types that can be found in coastal architecture. Based on the foundation of the structure, there is a building Type 1 (Slab on Grade), Type 2 (Crawlspace), and Type 3 (Open Foundation Post/Column). As mentioned previously, the foundation type is a point of interest when reviewing the resilience of coastal homes.

Style I *- Traditional*

Style II *- Transitional*

Style III *- Contemporary*

In phase two I began to organize the building types into three different styles. Based on the historic and existing architecture on the island, there is a building Style 1 (Traditional), Style 2 (Transitional), and Style 3 (Contemporary). Building style 1 is where we will see most of the historic homes, the most popular being Queen Anne and Victorian. In style 2 there is a mix of hurricane resilient design with an attempt to recreate historic design elements. In building style 3 there will typically be more contemporary homes that are heavily influenced by hurricane resilient designs, such as elevating the home on 10 foot posts.

Lastly, phase three is a close-up analysis of the use of space between the street and the home. To do this I categorized the types of spaces into private, semi private, and public. The private and public spaces refer to the casual or invitational use of space. Based on Jeanettes Lloyd's work, I created a criteria for the use of space:

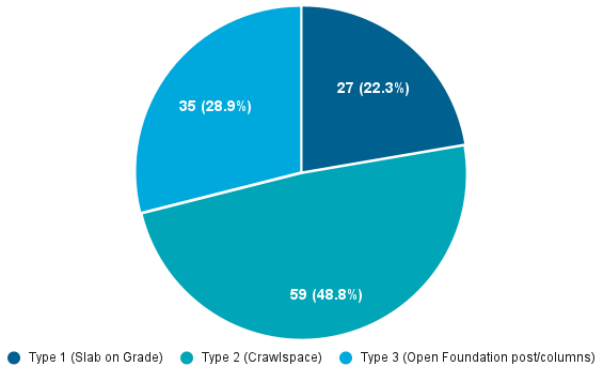
Private - *All social spaces are enclosed or elevated above the BFE. Social spaces are seen more as a space for invitation rather than causal interactions. These spaces can be seen as elevated decks, screened in porches, and fenced in yards. Distinguishing the transition spaces between the street and the residential home as private will worsen this disconnect.*

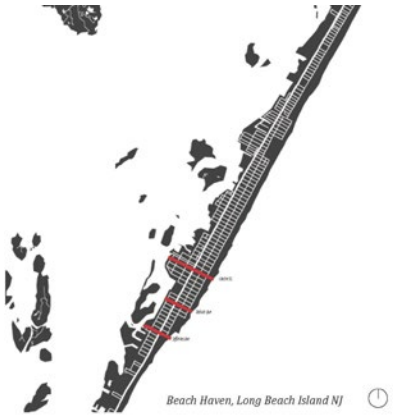
Semi Private - *Transition and social spaces are located at street level or slightly elevated with a use of a stoop. Some homes may have screened in porches or portions of the porch will be enclosed. These spaces can be seen as sunrooms, screen rooms, or a semi-outdoor kitchen. Distinguishing the transition space between the street and the residential home as semiprivate can be an acceptable solution for resolving this disconnect.*

Public - *Transition and social spaces act as one and are located at the street level or slightly elevated on a deck. Most homes that fit this criteria are older retrofitted homes, typically in the 19th and 20th century styles. These spaces can be seen as wrap-around porches with ornamental railings and trims. Traditional ornamentation is incorporated into these spaces to preserve the historic architecture that used to define the community. Distinguishing the transition space between the street and the residential home as public solves a lack of social connection but can cause problems when distinguishing the building type.*

5.0 Findings

5.1 Phase 1: Distinguishing Building "Type"






Type 1 (Slab on Grade)

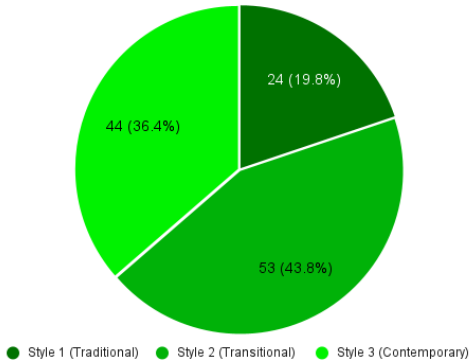

Type 2 (Crawlspace)

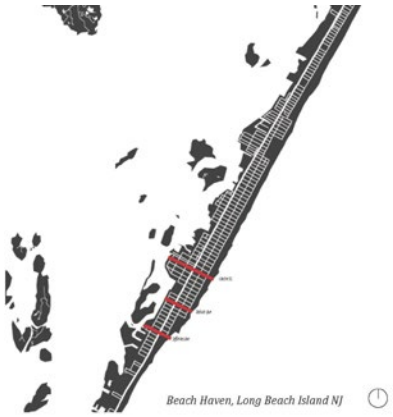

Type 3 (Open Foundation Post/Column)

The sample size included a total of 121 homes and three streets: Centre St, Belvoir Ave, Jefferies Ave. Out of the entire sample size, 59 homes had a crawlspace foundation, 35 homes had an open foundation, and 27 homes had a slab on grade foundation. It is important to organize and disquish the building type based off of the foundation. In this case, it will help us understand the architectural resiliency of each home and to what extent. It is important to note that type 2 and type 3 homes are close in this sample size, but it is possible for the majority to switch when the sample

size is increased. Also, in some streets that are more prone to flooding, you will see a larger number of type 3 homes. In other words, some streets will feel the effects of new codes and regulations more compared to others.

5.2 Phase 2: Distinguishing Building "Style"






Style 1 (Traditional)

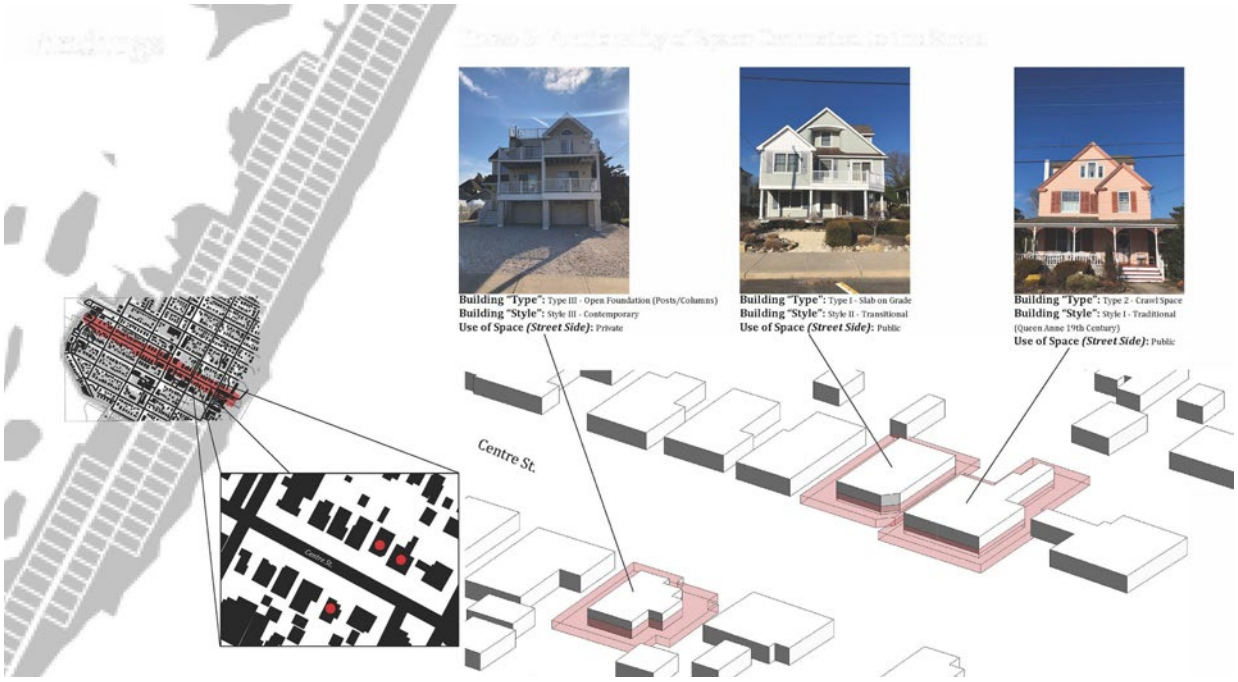

Style 2 (Transitional)


Style 3 (Contemporary)

From the same sample size, 53 homes were in the transitional style (style 2), 44 homes were in the contemporary style (style 3), and 24 homes were in the traditional style (style 2). When comparing the two data sets, I found that all type 3 homes were in the contemporary style, however, with an exception to 9 other homes with different building types. This tells us that the new contemporary style that is being pushed is heavily influenced by new hurricane resilient guidelines. In other words, it isn't the style or the historic significance of the home that has created this social disconnect, but rather new codes and regulations imposed by government agencies.

5.3 Phase 3: Functionality of Space Connected to the Street

In phase three I began to define the use of space and used the concept of interstitial urbanism to justify the spaces I was analyzing and comparing. The main purpose of this phase is to understand the relationship between each building type and style. In this phase I found that many of the homes closer to the ground had a better use of exterior social spaces, especially homes also in the traditional style. I also found that not all contemporary homes have a disconnect with the street, however, all type 3 homes in the contemporary style do. The term interstitial space most closely applies to type 3 homes because the increase in unused spaces is directly influenced by the building design. As a result, there is a greater disconnect between the residential home and the street.



I chose three homes on Centre St. as an example of how I applied phase 3. Starting from the left, this home is a type 3 building in a contemporary style (style 2). It is clear how all social spaces are private and elevated on a post/column foundation system, with a blank garage facade. The next home is a type 1 building in a traditional style (style 2). This home is a good example of a home that has social spaces below the BFE and still holds on to some traditional design elements. The last home is a type 2 building in a traditional style (style 1), more specifically, 19th century Queen Anne. This home is an important example of what needs to be preserved from a social design perspective.

7.0 Conclusion & Implications

We can see how these elevation requirements led to new architectural styles that gradually transformed the culture and aesthetic of the community. The front porches that once allowed casual interactions between the bikers and pedestrians were replaced by elevated decks where the sidewalk is no longer easily viewable. Reverse-living style interiors became more popular because the new building height provided new views that can be enjoyed from the living spaces on the top floor. This fostered a more insular approach to outdoor dining and diminished the grilling and dining on the ground floor that used to happen amongst neighbors. Some streets now feel the canyoning effect due to taller homes flanking both sides, and views of the ocean/bay are unavailable for smaller homes due to surrounding larger homes.

By analyzing the features of some historical residential and commercial landmarks of Beach Haven, I was able to select some of the design elements that are most representative of the culture and history of Beach Haven and offer suggestions on how to incorporate them into new coastal architectural designs. From my qualitative research, based on Jeanette Lloyd's Design Guidelines for the Preservation of Historic Structures, I was able to distinguish what historic design elements I could easily implement into a contemporary setting; while also promoting a reconnection with the street.

My analysis framework is intended to protect the residence of local communities and their way of life from rapid urbanization. While we try to keep up with natural disasters, we can't forget about what used to exist. On the other hand, we can't always recreate what used to exist, but we can preserve what still does. It all begins with getting to know the community, whether that is a historic commission, indigenouse councils, or an urban population. By focusing on smaller areas that are usually forgotten, real change can be made in a large or small scale urban environment. In my case the porch and front of the home seem to be the most promising areas for redesign, however, in other locations these variables may change.

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