Spurring Maritime Innovation in Annapolis

Lindsey Bullen, Denine Cheesman, Jeanne Choquehuanca, Joe Christo,
Raynell Cooper, Erin Gannon, Anusree Nair, Alexis Robinson, Brittany Rolf,
May Sein Win, Elisabeth Walker

Under the supervision of Dr. Scott Dempwolf

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Contents

Introduction

In 1987, the City of Annapolis created Maritime Zoning Regulations, delineating four zones along Annapolis' waterfront: Maritime Conservation District, Mixed Maritime District, Maritime Industrial District, and Maritime Eastport. The districts are designed to provide incentives to the maritime industry, while offering flexibility to property owners who wish to implement higher-value uses that would add to the success of the district.[1] With over 250 businesses and organizations related to boat servicing and supplies, boating instruction, brokerage, chartering, insurance, marinas, and other maritime needs,[2] Annapolis remains a major center for recreational boaters along the East Coast. However, the recession of 2007-2009 caused the worst economic decline for Annapolis' maritime industry since 1932. Maritime businesses continue to face rising land costs and rent, resulting in fewer new maritime businesses locating in the City.[3]

The Fall 2016 Community Planning Studio class was tasked with reviewing previous economic studies of Annapolis' maritime industry and updating the studies' recommendations with new approaches. Our Studio class examined ways to revitalize the City's maritime industry, focusing especially on how innovation-driven economic development tools could be applied in Annapolis. The following report synthesizes our research and proposes several recommendations that the City may implement in the short-, medium-, and long-term.

Background Research

To gain a deeper understanding of Annapolis' maritime industry and possible approaches for its revitalization, students conducted research from both primary and secondary sources on local land use, zoning, economic development, the national innovation economy, the maritime industry, and maritime education.

Literature Reviews

Land Use and Zoning

Our review of land use and real estate development in Annapolis demonstrated trends of increasing economic and political challenges for the maritime industry due to a combination of inflexible zoning regulations, rising competition, and market changes, among other factors. A major event that has especially shaped the current maritime industrial context was the passing of the 1986 Maritime Zoning

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[1] Department of Planning and Zoning, City of Annapolis, "Maritime Zoning and Economic Strategy." November 1986.

[2] List of Maritime Businesses in Annapolis provided by Hollis Minor, September 2016.

[3] Annapolis Economic Development Corporation, "2013 City of Annapolis Maritime Industry Economic Survey."

and Economic Strategy. While the strategy initially bolstered the maritime industry through its establishment of four exclusive maritime districts, it has since limited maritime business competitiveness. From the late 1980s forward, there have been steady declines in gross business incomes and the number of workers employed full-time in the maritime industry, coupled with rising property values[4]. While Maritime Industry Economic Development surveys between 1992 and 2013 have shown continued faith and loyalty on the part of businesses, it has also confirmed their awareness and experience of challenges in the industry.[5] Business owners also expressed interest in expanding professional networks and improving workforce development and more specialized maritime industry training. Fortunately, Annapolis' 2009 Comprehensive Plan appears to recognize these challenges, and has proposed mixed-use corridors, which would provide an important opening for incremental zoning updates that could help maritime businesses adapt to changes in the industry.

Local Economic Development

As we researched local economic development in Annapolis, we found that in the 2009 Annapolis Comprehensive Plan, one objective is to "promote Annapolis for maritime business, maritime tourism, and charter and fishing activities as part of Economic Development efforts"[6]. This makes it apparent that the desire to support the maritime industry is present, but we found that the initiatives to support this are lacking. After some analysis of the current state of the maritime industry in Maryland, it is clear that Anne Arundel County contains the majority of boat dealers, boat builders, and marinas in the state. The county also employees the highest number of workers in these maritime industries and has the highest revenue, presumably due to the large number of boat dealers and marinas. However, it became clear that Annapolis competes with the Eastern Shore to hold onto its maritime industries. When comparing Maryland to the United States as a whole, the decline in number of establishments, revenue, and employees for certain maritime industry sectors were significantly higher in Maryland than for the United States. Even so, we see Annapolis as having the potential to grow its maritime industry. Evidence shows changes occurring in the popularity of certain sectors of the maritime industry, reflecting the rising importance of topics like environmental sustainability. This adaptive nature of the maritime industry in Annapolis makes it a strong component of the City's economy that can thrive if given appropriate attention.

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[4] Average annual gross business income fell from $2,155,498 in 2002 and $3,487,662 in 2008, down to $1,558,802 in 2013. The percentage of workers employed full-time in the industry dropped by 44.6% from 2008 to 2013.

[5] In reporting on perceived business conditions in 2013, only about 10% of business owners reported better conditions compared to five years prior, and 57% reported considerably worse conditions.

[6] Annapolis Comprehensive Plan, 2009.

National Innovation Economy

Based on our literature review, innovation can be defined as a highly collaborative, often multidisciplinary and multi-directional process in which new or improved ideas are transformed into new products, services, organizations, and processes[7]. Recent technological advancements have fostered innovation, enabling changes in the workplace. There has been a shift away from the disconnected silos meant to sequester knowledge, to a dynamic ecosystem that depends on collaboration. As a result, incubators, accelerators, co-working spaces and makerspaces have begun to proliferate nationwide, giving rise to Innovation Districts and Innovation Clusters.

Regional innovation clusters and local Innovation Districts are geographically distinguishable concentrations of small to large size companies, specialized suppliers, service providers, research institutions, and industry anchor institutions from related sectors that connect with start-ups, incubators, and accelerators[8]. Public-private partnerships are also present in healthy clusters. An incubator is a facility meant to nurture startup companies who, upon graduation, have the potential to "create jobs, revitalize neighborhoods, commercialize new technologies, and strengthen local and national economies."[9]. Similar to incubators, accelerators work with young businesses to provide a range of assistance and support services so that they can secure early-stage seed funding.

Often used to facilitate these sorts of establishments, co-working spaces have emerged as an alternative to the traditional office model. They are a new typology of workspaces with no walls, no set hours, and community driven spaces. Makerspaces can share similar characteristics and are formed out of the desire to share resources (e.g. space, equipment, and ideas) in a flexible and collaborative way that would enable independent people and small business owners to transform their ideas into physical form.

National Maritime Industry and Maritime Education

Our literature review on the topics of the National Maritime Industry and Maritime Education provided us with helpful insight into the breadth and depth of the maritime industry, and helped us identify organizations that are at the forefront of education and innovation. The U.S. maritime industry is vast, comprised of multiple subsectors with diverse economic impacts. According to a report produced by the National Working Waterfront Network (NWWN), there are "130,000 ocean-related business establishments, with 2.398 million fulltime and part-time employees, who received $84.25 billion in wages and benefits [annually.]" Ocean-related jobs pay on average approximately $35,000 annually.[10] To look at who could fill these jobs, we considered education in the maritime industry. As boatyards and other marine employers look for ways to carry their businesses into the future, they are likely to seek

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[7] Wessner, 2013.

[8] Katz and Wagner, 2014

[9] NBIA, 2015

[10] NWWN

new employees who have completed educational programs that have better prepared them for success and reduced the likelihood of trial-and-error from simply learning on-the-job, according to *BoatUS Magazine*. As the City of Annapolis seeks ways to bolster and sustain its maritime zones and economy, it should leverage its substantial social capital—knowledge from professional experts and boating enthusiasts— to create educational opportunities that attract younger and older adults seeking new careers in boat-building and marine technology. To this end, we have compiled a list of education centers from across the nation (found in the Appendix) that shows where marine technology and boat-building education exists and what these types of programs look like. With this information, the City of Annapolis may potentially begin to build mutually supportive relationships with education centers whose graduates would benefit from future innovative opportunities in Annapolis' maritime zones.

Visits to Annapolis, Boat Tour, and Interviews

Our Studio class was able to gain insight and better understand the economic and political challenges we read about in economic surveys and census reports by making several trips to Annapolis. During our first visit, we met with Hollis Minor, who oversees the City's Economic Development Division. Hollis provided us with very helpful context, and took us on a tour of the City's Maritime Zones. Next, we attended the 2016 United States Sailboat Show, held on October 6-10 in Annapolis, and talked to many businesses owners and representatives that work in the industry, both in Annapolis and around the world.

Next, we took a boat tour along the Annapolis coastline with the Harbormaster and members of the City's Maritime Advisory Board. Board representatives described a shift in business types from historic fishing to the recreational boating, with less formal, smaller-scale activities like paddle boating and kayaking presenting challenges around incorporating and balancing these new water uses. Another frequently cited challenge was that of residential-industrial tension. While the renowned maritime character of Annapolis has drawn in new residents and tourism, it has sometimes come at the expense of maritime businesses. The city's popularity has led to steep increases in property values making it costly to operate businesses, and waterfront residents often oppose critical business development projects. Interviews revealed the belief that City Council process for approving projects may disadvantage maritime businesses, because the majority of City Council representatives do not have a maritime district in their voting district and therefore lack incentive to vote in their favor. Another interesting insight offered was in regard to the growing service sector of the maritime industry, and its reflection of wider changes in maritime consumers, uses, and business types. While our guides were quick to acknowledge the many unique advantages of the Annapolis maritime industry, they also very clearly expressed the need for greater support of business growth and adaptation.

Lastly, class members made several follow-up trips to Annapolis, both for the purposes of general research and to conduct field research on the prospective Makerspace site.

Below, are highlights from some of the informal interviews that were conducted, both during the United States Sailboat Show and afterwards.

Susan Zeller, Executive Director, Marine Trades Association of Maryland (In-Person, October 15, 2016, Annapolis, Maryland)

Susan Zeller confirmed that the establishment of Annapolis' Maritime Zones has played an important role in Annapolis continuing to be a maritime hub, and stated that the boat shows are a distinct reason why some individuals locate their maritime businesses in Annapolis. On the City's maritime industry, she noted that many businesses have passed down the marine trade through generations. The industry's population is aging, while younger generations are seeking post-secondary education elsewhere. Zeller also shared that environmental concerns and a lack of tax incentives discourages boat-building companies from locating in Annapolis, and that Annapolis' true strength is found in boat repair, servicing, and storage.

Additional recommendations by Zeller related to workforce development, current market trends, and business owner networking can be found in this report's **Recommendation 2: Education** section.

Mary Ewenson, Owner and Publisher, SpinSheet Magazine (By Phone, October 21, 2016)

Regarding the existing maritime industry in Annapolis, Mary Ewenson spoke of how businesses were again in a place to hire new, trained employees, after struggling through several years of recession after 2008. Employers throughout the City's Maritime Zones want younger individuals to join the industry, but, due to the small size and considerable workload of most businesses, they have little to offer new employees in terms of training. She emphasized the need for formal training for technical positions within the maritime industry.

Highlights From Other Interviews

- It is tough to find people with carpentry skills, according to one business owner.
- One business cited the power of word-of-mouth to build a client base; without advertising, the quality of the work can speak for itself and build a good business.
- Orca Green Marine said that the process of applying for the various certifications required by the Coast Guard and other agencies is costly and could be done more effectively for small businesses if multiple firms were to apply together.
- Many who were interviewed cited Annapolis' history and location as major draws.
- Many who were interviewed also cited the need for affordable space, and the supply and maintenance of skilled labor.

- One business owner cited regulations, primarily local ones, as the biggest problem facing the industry. He called the permitting problem "ungodly."
- One business owner notes that there are many interesting characters that have innovative ideas and good equipment, but they don't have a venue to meet and exchange ideas.
- There are two maritime communities: the makers and the owners.
- Annapolis has a great advantage for the maritime customer service businesses (good customer base, many boat owners who don't have the maintenance skills anymore), as well as being a beautiful city with lots of culture and many educated people.
- Innovative ideas are self-tested and self-funded: there is no financial and organizational system to support innovation.
- One employee of a maritime plastics business called Annapolis "the most recession-proof place in America."
- There is a high development pressure on the land because space is so limited, and property owners would make more money if they sold their land to residential developers. That requires subsidies.
- Interesting new trend: timeshare for boats. There is one in Annapolis.
- Business owners have very little power, because they often don't live in the city and cannot vote. Politicians would be open for new ideas, but some residents don't want the maritime industry to expand.

Overview of Recommendations

To bolster the maritime industry and spur innovative maritime projects, we propose a multifaceted approach. Our research revealed that the networks between those involved in the maritime industry are mostly loose and informal. An initial focused effort on mapping and strengthening those networks would help the implementation of the remaining recommendations.

There appears to be sufficient interest in boat building (Chesapeake Light Craft, for example) and related marine equipment to pursue the development of a makerspace that would bring industry innovators together to share ideas. Another element of preparing the industry to evolve is creating a formal education and workforce development system to prepare the future maritime industry workforce. These strategies would help the industry not just grow, but innovate. The Annapolis Maritime Museum may be a serendipitous and proven partner that could lead some initiatives around these strategies.

To support some of the physical development options contemplated herein, as well as those needed to combat address sea level rise, we suggest zoning changes that would allow the City and selected developers to experiment in a limited and controlled way with development solutions that may be unproven or controversial.   The City of Annapolis is facing long-term challenges that will require action including zoning changes that officials and residents would not otherwise consider. Our emphasis is on

highly focused and limited zoning changes that will allow planners, official and residents to test ideas and develop evidence to guide the City's longer-term zoning strategies.

Finally, Annapolis will continue to face the need for substantial and sustained investment in its maritime and marine infrastructure if it is to remain a viable and competitive port city. From the replacement of tanks to maintain environmentally safe and sustainable fuel docks; to the revitalization of aging marinas, the associated costs are often too much for small and mid-size businesses to bear alone. As noted in our discussion on regional innovation clusters, public-private partnerships are a key feature of strong and effective clusters. To create and maintain such partnerships for the maritime cluster we recommend that the City create a maritime development authority[11] to help fund these projects.

While these strategies can be implemented separately and still function, we believe it would be most effective to have them working concurrently.

Recommendation 1: Maritime Innovation Network and Makerspace
Background/Context

Our research and interviews have shown that many small businesses and makers in Annapolis have already begun to connect on their own, and there is a small movement towards maritime innovation resulting from those connections. To help build upon and nurture those connections, our group is proposing an initial effort, perhaps supported by one or two summer interns, to identify and map the formal and informal networks of people, businesses, organizations, institutions and agencies involved in the maritime cluster, both in and around Annapolis. Using a simple, network mapping tool like NodeXL, for example, would allow City officials and others to visualize the networks. With further (no cost) assistance from the University of Maryland's EDA University Center to analyze the networks the City can develop highly targeted strategies to catalyze a more connected, focused and self-sustaining maritime innovation network. Profile sheets like the ones included in the appendix of this report may be linked to the network nodes, providing ready access to key information. The network model could easily be used as a business retention and expansion tool to aid economic developers in targeting site visits and assistance.

This initial step is relatively low cost, requiring funding for one or preferably two summer interns, related incidental expenses, and perhaps a nominal software expense. The City may wish to engage additional interns periodically to update and reassess the network model, but there is a good chance that someone in the network may be willing to take that on as a volunteer activity.

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[11] While referred to as a maritime development authority throughout this document, what we are proposing as a practical matter is an industrial development authority that would be focused on maritime industries but not necessarily exclusive to those industries.

We also recommend that city officials and maritime industry leaders consider the creation of a Makerspace in the city since, as these small businesses and makers continue to grow, they will at some point need a space to meet, connect, and expand. The Makerspace we are proposing below can be exactly that. To jump-start community and leadership discussions around a makerspace facility for maritime innovation, education and entrepreneurship we have developed a bold makerspace concept in partnership with the Annapolis Maritime Museum. This concept is supported by some background information and three representative case studies. We wish to emphasize that successful makerspaces are first and foremost active communities, and that the involvement of the Annapolis maritime maker community in the actual creation of a makerspace is crucial. Our proposed design concept is intended to facilitate the beginning of a dialogue, not the end of the design process.

Based on literature reviews, we are defining innovation as a highly collaborative, often multidisciplinary and multi-directional process in which new or improved ideas are transformed into new products, services, organizations, and processes[12]. This "create[s] new market demand or cutting-edge solutions to economic, social and environmental challenges"[13] that can result from research, applied sciences, or the manufacturing process itself. Technological advancements have fostered this sense of innovation, thereby enabling a wave of change in the workplace. The new innovation economy "represents a radical departure from traditional economic development"[14].

There has been a big shift away from the secret, disconnected silos that sequester knowledge, to a dynamic, "open innovation" ecosystem that strongly emphasizes and depends on collaboration, networking, and sharing of equipment, skills and knowledge.

As a result, makerspaces, co-working spaces, incubators, and accelerators have begun to proliferate nationwide, giving rise to innovation districts and innovation clusters.

Makerspaces are formed out of the desire to share resources, e.g., space, equipment, and ideas in a flexible and collaborative way that would enable independent people and small business owners to transform their ideas into physical form. Thus, the majority of successful spaces are formed by individuals who strive to create a new alternative model to the cooperative world that would allow for more independence. Although the layout and the equipment of makerspaces varies widely based on the scale and purpose of the space, makerspaces can be defined by their availability of equipment and shared work space.

Site Overview and Partnerships

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[12] Wessner, 2013

[13] Katz and Wagner, 2014

[14] Katz and Wagner, 2014

As we researched potential locations for a makerspace in the city and potential partnerships that could help establish one, we learned that an anchor institution in the community - the Annapolis Maritime Museum (AMM) - recently obtained site control of the Ellen O. Moyer Back Creek Nature Park (BCNP), a 12 acre park along Back Creek. AMM plans to expand its campus from its current 2nd St. home by moving the headquarters of their Education Center to BCNP, and also plans to revitalize the park, which has fallen into disrepair. Following discussions, meetings, and site visits with AMM, they expressed interest in potentially locating a makerspace on the site as well, and therefore we are proposing AMM as a partner and BCNP as the site for the proposed Makerspace.

Site Factors

The site currently features a mile of walking trails, a historic Water Works building constructed in 1935, and a Stormwater Education Experience display that was funded by the Maryland Department of the Environment and launched in 2009. Given the site's location, history, and the exciting programming that the AMM will be launching there shortly, we felt it was the perfect location for the Makerspace.

Two practical site factors guided the design decisions for the Makerspace:

1. AMM's Site Needs
    a. AMM plans to increase their current annual student visitors from 6,000 students at their current location to 10,000 at the new site, which requires a lot of classrooms and laboratories, both indoors and outdoors.
2. Flooding
    a. The area between the existing building and the creek is inundated in the frequent events of nuisance flooding. Hurricane Sandy covered the low-lying areas of the site in the same manner as the predicted sea level rise levels for 2100. Therefore, all structures/additions that we propose adding are either built above the 2100 level, or they can handle inundation, or adapt to it, and/or do not prohibit runoff to leave the site again. The same is true for the programmatic use of the spaces and their respective equipment.

Process

We began our proposal process by leveraging the literature reviews on makerspaces cited earlier in this report (and found in the Appendix), and by conducting some additional case studies (below). Following that, we held a meeting with the AMM and conducted a site visit with them, which led us to our first draft proposal in mid-November. We were then fortunate enough to have Garth Rockcastle (an architecture professor at the University of Maryland), Andrea Foertsch (a well-published expert on workplaces in the innovation economy), and members of the AMM offer feedback on the initial proposal. From that feedback, we realized that we needed to have a better-defined concept, dream big, and make

sure that we are addressing the needs of all parties and users in a harmonious way, which led us to our proposed design detailed below.

Case Studies

Our group reviewed case studies of three comparable sites, including one that is co-located with a museum, in order to understand the spatial requirements for standalone makerspaces and makerspaces that have been successful in shared environments.

Artisan's Asylum is a large-scale and well-established makerspace, which gave us a clear idea of the various types of studio spaces that could be incorporated into our space, JUMP provided an exceptional vision of how various creative environments can coexist, and Open Works offered insights into how a new and innovative local makerspace is operating.

Artisan's Asylum - Somerville, Massachusetts (also found in Appendix)

Artisan's Asylum is an example of a large-scale and well-established makerspace that operates more as an office for professionals with the ability to accommodate large scale production. Its modest origin took place through a series of meetings over the timespan of a year in the living room of Olin College alumni Gui Cavalcanti. The result of these meetings was a 1,000 square foot space which opened in 2010. Within four months, with the rapid membership growth which totaled 450 people, the space expanded to 10,000 square feet.

Currently, Artisan's Asylum has 31,000 square feet of workspace, which is 20% workshop space and 80% cube space. The workshop space houses fabrication tools and equipment, which caters to electronics, robotics, woodworking, jewelry, and metalsmith. The tools allow for welding, precision machining, rapid prototyping, digital fabrication, fiber arts, screen printing and more. There is also an additional 9,000 square feet of special project space for a super-large scale robotics project.

The cube space provides three varieties of spaces to accommodate differing needs of the members: studio workspaces, storage-only spaces, and flex space. Studio workspaces cater more to professionals looking for a long-term home base that could also serve as an office space. Shelf and storage spaces are for members who are more focused on the use of equipment and just need space for storage. Flex spaces are for immediate and short-term needs, thus are more fitted for hobbyists than professionals.

Funding Sources
The space is funded mainly by membership fees, which are priced based on the type of space rented and the duration of the time needed. Artisan's Asylum also works with large sponsorships such as the Robert

W. Deutsch Foundation, Autodesk, and MathWorks. Individuals can also contribute donations on their official website, or serve as volunteers.

The large scale of this makerspace allows enough funds to maintain a paid staff that includes managers for the shop and for administrations. This enables the Artisan's Asylum to become a program-driven space where events such as competition entries and The Maker's Masquerade help to instill a sense of community. It also offers classes which are open to the public and do not require membership to connect with and enhance the wider community. The result is a well-equipped and organized facility with a sense of community where ideas and creative energy flows freely. One example of the result of this space is the 3Doodler which raised $2.3 million in March 2013.

JUMP (Jack's Urban Meeting Place) - Boise, Idaho

JUMP is a lively community space built in the memory of J.R. (Jack) Simplot, an Idaho entrepreneur. Instead of just making a museum for his legacy with the vintage tractors he owned, the team at JUMP (which operates as a nonprofit organization and offers programs that are accessible to everyone) provides a space for the community to get together to inspire, grow and innovate.

What stands out about JUMP is the concept of "shared environments". JUMP is an intermix of shared spaces that bring the community of Boise together with various opportunities to build a "vibrant, imaginative ecosystem"[15]

The space is designed in a way that includes various uses like the Maker studio, Inspiration studio, Movement studio, and A.V. studios, which allow "everyone to become inspired, try new things, learn from each other, and expand their imaginations through classes, demonstrations, and play". Another major feature is the 7.5 acre JUMP park with yet another wide array of spaces and activities that promote community building. This includes an amphitheater, play areas, and slides. JUMP also "showcases 51 vintage steam engines and tractors dating as far back as 1885. These inspiring examples of industrial art and innovation connect agricultural roots to the future of downtown Boise."[16]

The makerspace at JUMP is called the Make Studio and is a 1,500 sq. ft. room for the builders, tinkerers, inventors, and creators to work together to design and develop their own creations. The Make Studio provides access to woodworking, soldering and welding equipment, as well as 3-D printers. It also acts as a testing space. Classes are offered frequently and are relatively affordable.

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[15] http://jumpboise.org/

[16] http://jumpboise.org/

The mission of JUMP has been "creating an environment for inspiring human potential"[17]. JUMP has been an organic venture with its spaces evolving and changing based on community needs and has been very successful in connecting the community of innovators and creators while at the same time developing a sense of community.

Funding Sources
Most funding for JUMP comes from the Simplot family.

Open Works - Baltimore, Maryland

Open Works, the sixth-largest makerspace in the country, is an $11 million project of the Baltimore Arts Realty Co-operation (BARCO), a 501(c)(3) development company founded in 2012. It is located in Baltimore, a city that has a strong manufacturing legacy. Open Works is situated in one of the manufacturing districts that is a remnant of the bygone industrial era.

"Making" has been returning to Baltimore in recent years with the growing population of "artists, hackers, micro manufacturers, inventors, students, teachers, entrepreneurs and builders," and Open Works is aimed at bringing this community together through learning and collaborating with each other.
[18]

The building was an adaptive reuse of an existing two-story warehouse structure in the Station North Arts District of Baltimore. The 34,000 sq. ft. makerspace at Open Works "includes shared micro-studio spaces, computer labs, classrooms, digital fabrication shops (CNC machines for wood, plastic and metal, 3D Printing and Laser Cutters), a wood shop, a metal shop, an industrial sized paint booth, a textile studio and an electronics laboratory, all centered around a multi-use gathering/performance space meant for artistic and entrepreneurial collaboration." Storage lockers and conference rooms are also available. Floor plans are provided on their website.[19]

All of the facilities can be accessed with memberships that range from $70/ month to $250/ month. Learning opportunities are also provided through various adult and youth classes. Having opened to the public in September 2016, Open Works is in its growing stage. Open Works not only remains a place for makers to gather and work but will also promote workforce development by providing opportunities for job training.

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[17] http://jumpboise.org/

[18] http://www.openworksbmore.com/

[19] http://www.openworksbmore.com/make/our-facilities

Funding Sources
In addition to revenues from modest membership fees Open Works is funded through a combination of public and foundation grants, and corporate contributions.

Annapolis Maritime Makerspace Design Concept and Theme

Annapolis' maritime industry and the Chesapeake Bay have two trademarks in common: 1) they are old and have undergone major changes; and 2) they still thrive and function well because they adapted to changing circumstances. The main goal of this site is to express and to celebrate what the Annapolis Maritime Museum (AMM) teaches about the ecologies of maritime heritage and the Chesapeake Bay – about their unique maritime and terrestrial communities, their flexibilities and adaptabilities, their needs to share limited resources, and their unique interwoven history. In short, the goal of this site is to be a maritime applied learning center for all ages.

The Maritime Applied Learning Center Annapolis (MALCA) serves to enable visitors, students, and maritime makers and inventors to learn hands-on how the maritime industry and the Chesapeake Bay can continue to adapt to a changing future. The site thereby will serve as an innovative ecosystem that nurtures creativity.

Four principles of ecosystems and the unique connected heritage of the maritime history of the Chesapeake Bay guided the proposed floor plan and site design:

1. Togetherness that nurtures creativity
    a. An ecosystem is defined as "any place or time where organisms interact with their environment." In this environment "every organism is influenced somehow by every part of its environment."[20] Interaction between members is crucial for any ecosystem, and the study of flora and fauna confirms that a system is more vibrant, diverse, and thereby more resilient when it is comprised of a network of communities rather than of smaller, isolated entities.[21] These synergistic relationships are not only beneficial in biology and ecology, but also in the economy. Katz and Wagner say that "a synergistic relationship between people, firms, and place (…) facilitates idea generation and accelerates commercialization."[22] Every space on the site is designed to instigate togetherness, networking, the connection of loose ends, and creativity by exchanging ideas and testing them out.
2. Flexibility that enables adaptability
    a. Another important aspect of thriving ecosystems is the ability to learn and adapt accordingly and to be flexible in the development process. The site offers AMM's students and MALCA's makers the opportunity to learn and to develop ideas in different

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[20] marinebio, n.d

[21] Hwang and Horowitt, 2012

[22] Katz and Wagner, 2014

indoor and outdoor think tanks comprised of workshops and classrooms. The think tanks are designed in a way that allow them to adapt to different needs. Not only do they serve the students and maker community, but they can also provide support for the maritime workforce development through lecture series and peer-to-peer learning opportunities in the workshops.

3. Sharing of limited resources
   a. A well-functioning ecosystem is also characterized by the community's ability to share scarce resources. In the innovation economy literature review, as well as in the studio interviews with Annapolis maritime businesspeople, this topic was a recurring theme. Many start-up firms do not have the financial means to afford equipment such as plotters or manufacturing tools in order to test ideas and translate them into marketable products.[23] In Annapolis specifically, affordable space to start a business is a big roadblock for many potential innovators. The makerspaces and classrooms serve to overcome these challenges by offering the use of manufacturing equipment and space for an affordable membership fee.

4. Togetherness that nurtures resilience
   a. The last important design concept is the unique interwoven history of maritime history and the Chesapeake Bay. The site is a prime location to experience this heritage because it is situated at Back Creek between two marinas, it has historic relics of a former water treatment plant, and it has two hills that allow visitors to overlook the site and its surroundings. The site plan introduces new and emphasizes existing connections of water and land through the strategic position of design components that allow for different vistas over the creek, interactions with it, and dialogue with the maritime businesses. The plan also proposes ways to adapt to changing water levels through floatable structures. With these features, the site and its components teach visitors what happens in the maritime industry of the Chesapeake Bay. It also causes awareness and instigates discussions, thereby nurturing the resiliency of the maritime industry and the Chesapeake Bay.

Proposed Design Overview

As noted above, the overall intent of the design is to emphasize the relationship between the maritime heritage and the Chesapeake Bay as well as to foster community building and maritime inventions.

The first concept is translated by the prominent Bay Walk axis, which is clearly articulated by two unconventional design features that celebrate the site's maritime history: a sculptural Sail Gate is positioned where all the new, major paths intersect, and the Floating Makerspace Container Workshops provide an adequate terminus or entrance, depending if you approach the site on foot or via boat.

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[23] Foertsch, 2013

In order to enhance access to the water, both for educational as well as for accessibility purposes, a more narrow boardwalk pans out from the Bay Walk promenade. The concept is also indirectly translated by the position of the outdoor classrooms and the amphitheaters, which allow their visitors different views over the site and Back Creek.

All proposed new features also serve to enable people to interact with each other, which is important for the innovative and the community building process[24]. The Driftwood Play Scapes interpret the maritime theme in an artistic and interactive way, which was inspired by nature playgrounds and contemporary fine artist Jeffro Uitto's driftwood work entitled Knock on Wood[25].

Proposed Building Design and Related Programming

1. Existing Building Renovations - First Floor
   a. Lobby (344 SF)
      i. *A welcome space primarily for the Museum Education Center visitors including a receptionist desk, small exhibits, and kitchenette.*
   b. Discovery Room (319 SF)
      i. *An environment for open, non-directed learning, facilitating inquiry based exploration and discovery.*
   c. Ecology Lab (462 SF)
      i. *A teaching and experimental space geared toward older students, including microscope tables and fish tanks.*
   d. Roof Garden (327 SF)
      i. *An area that will serve as outdoor meeting space, assembly space, and lounge space.*
   e. Lecture Room (265 SF)
   f. Storage (92 SF)
   g. Restrooms (117 SF)
2. Existing Building Renovations - Second Floor
   a. Office Space (133 SF)
      i. *Work station for museum administration, volunteers, or interns.*
   b. Printer/Plotter Area (89 SF)
      i. *A shared space that will allow museum administration to print documents and Makerspace users to plot large scale designs.*
   c. Storage (53 SF)
3. Addition to Existing Building
   a. Makerspace

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[24] Katz and Wagner, 2014
[25] jeffrouitto, n.d

      i.   *Shared workspace where users share tools and equipment, featuring whiteboards, a lounge area and indoor bike storage. The space is flexible and dynamic, facilitating both socializing and networking. Its defining components are its workshops.*

1. Micro Studio Space (332 SF)
2. Flex Space (267 SF)
3. CNC Router Room (106 SF)
4. Dirty Workshop (487 SF)
5. Wood Workshop (105 SF)
6. Metal Workshop (105 SF)
7. Overhead Storage Room (212 SF)
8. Conference Room/Flex (215 SF)
   a. *An area for both Makerspace and museum users to hold meetings and small gatherings.*

b. Restroom (66 SF)
c. Total Building Square Footage with Addition: 4,721 SF

4. Proposed New Buildings
   a. Floating Makerspace Workshop (800 SF)
      i. *Shipping containers stacked on floating platforms to create buoyant structures that will house additional Makerspace workshops in an effort to connect with the aquatic and maritime elements of both the museum and Annapolis overall.*

5. Existing Site Renovations
   a. Paths
      i. *Reconfigured path design to lead visitors throughout the landscape in a meaningful way.*
   b. Amphitheater
      i. *Restoration of the existing amphitheater structure to allow for outdoor instruction and meeting space.*
   c. Signage
      i. *Revamped design of existing signage to help educate visitors about the history of the site, the city's maritime heritage, and the bay's past and future.*

6. New Site Elements
   a. Outdoor Classrooms (covered with sails)
      i. *Open-air structures that will allow for outdoor classes by AMM and lecture series of the makerspace community. Flexible sail roofs provide shelter from sun and rain. They also provide different vistas over the site and Back Creek, and could also be used for special events.*
   b. Additional Amphitheatres (wood and stone)
      i. *Additional room for outdoor classes by AMM and lecture series of the makerspace community, but only with partial sail coverage. They also provide interesting vistas over the site and the creek.*
   c. Driftwood Playscapes

      i. *Playful elements of the landscape constructed with natural play elements, such as driftwood - if it meets the National Guidelines for Nature Play Areas[26].*

   d. Baywalk

      i. *A promenade-like boardwalk that emphasizes the connection of the heritage and history of water and land. Off of the main axis spins a smaller boardwalk through the cove that allows for boat docking, creek explorations, and testing of Makerspace innovations.*

   e. Sailgate

      i. *The introductory element of the site acts as a gateway to the facility, welcoming visitors and leading them onto the baywalk for museum and Makerspace exploration.*

List of Precedent Firms

Several local small businesses could serve as strong makers on the site. Profiles for some of these firms can be found in the Appendix of this report: Orca Green Marine; Annapolis Hybrid Marine; Nobeltech.

Summary

While our proposed design is at the concept level and therefore does not include a launch plan or discuss budget and operating procedures/costs, we hope that it can serve to both provoke discussion and inspire ideas that can help spur innovation in the maritime industry in Annapolis.

Images
Image 1: Phase 1 - First Floor Plan

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[26] NWF and NLI, 2014

FIRST FLOOR PLAN

Image 2: Phase 1 - Second Floor Plan

SECOND FLOOR PLAN
Phase 1

Image 3: Phase 2 - Second Floor Plan

SECOND FLOOR PLAN
Phase 2

Image 4: Phase 2 - Loft Floor Plan

LOFT FLOOR PLAN
Phase 2

Image 5: View of building from driveway

Image 6: View of building and Sailgate

Image 7: View of Floating Makerspace Workshop

Image 8: View of Sailgate and Floating Makerspace Workshop

Image 9: View of Floating Makerspace Workshop from the water

Image 10: View of site and Floating Makerspace Workshop from inside renovated existing building

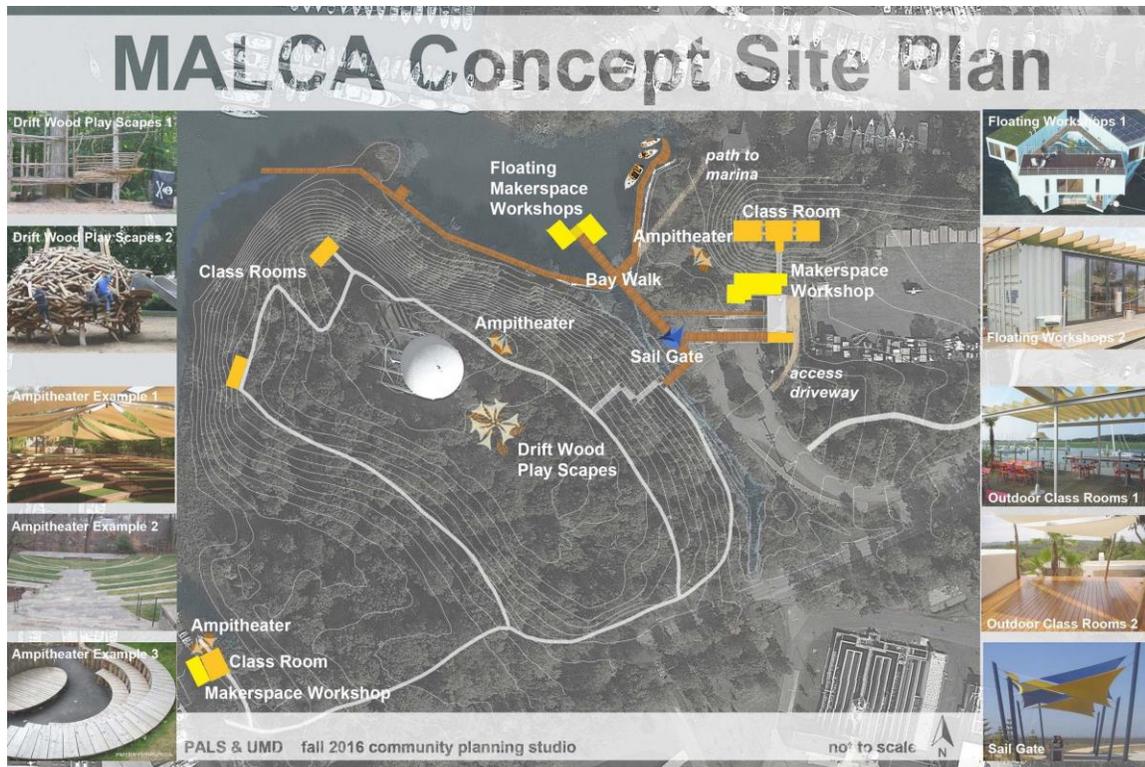

Image 11: MACLA Concept Site Plan

Image 12: Overview of Phase 1 and Phase 2 floor plans

Area Statement	(Sq ft)
First Floor	1827.06
Second Floor	2140.64
Terrace	327.39
Loft	426.69
Attic	779.87
Total Area	**5501.65**

USES	
Makerspace	
Annapolis Maritime Museum	
Common Use	

Recommendation 2: Education

Background

As the City of Annapolis seeks to spur innovation and economic development in its Maritime Zones, it should leverage its substantial social capital - knowledge from professional experts and boating enthusiasts - to attract a new generation of the maritime workforce. A powerful way to entice adults seeking careers in boat-building and maritime technology is to provide educational opportunities that prepare them for a seamless transition to the maritime industry in Annapolis. This section focuses on typical maritime education programs in the United States and makes education-related recommendations for Annapolis based on research and interviews conducted with persons active in Annapolis' maritime industry.

Maritime Technology Education in the United States

Four-year Bachelor of Arts or Bachelor of Science degrees may not be necessary for starting a career in the maritime industry. Most maritime technology education programs in the United States are one- or two-year degrees or certifications offered by community colleges, accredited certification programs, or trade schools. These programs focus on providing students with specific boat design, building, and repair skills that are directly applicable to employment in the maritime technology industry. Potential jobs for graduates depend on the program, but are likely to be found in boatyard operations, boat design and manufacturing, boat repair and restoration, and similar fields.

According to *BoatUS* Magazine's "The Boat Lovers' Guide to Marine Trade Schools," educational programs not only support persons starting a new career, but they also help improve quality thresholds for "standards-based work across the field." An entry-level employee trained in the latest technological skills and problem-solving could provide valuable, cutting-edge knowledge to even career technicians with years of experience. Additionally, boatyard and other maritime employers are likely to seek new employees who have completed educational programs that have better prepared them for success and reduced the likelihood of trial-and-error from simply learning on-the-job.

BoatUS notes that maritime education programs typically prepare students for one or both maritime sectors: manufacturing or service. The maritime service sector is more likely to retain jobs than the manufacturing sector through economic downturns, so educational programs that promote troubleshooting and problem-solving may be more valuable or sustainable for students. Regardless of program focus, maritime educational programs emphasize the importance of hands-on learning experiences and collaboration among students and industry professionals.

The following table features typical programs, courses, and classroom settings found at a few of the country's most well-known schools for degrees and certifications in maritime technology.

Table 1: Maritime Technology Education in the United States

School	Program/ Typical Courses	Facilities
The Landing School **Arundel, ME**	**Yacht Design:** Parametric Study, Structural Design Physics, Statics and Hydrostatics, Drawing Architectural Plans, Materials and Fabrication, Dynamics and Fluid Dynamics, CAD and 3D Modeling, Ergonomics and Aesthetics, Marine Systems and Ventilation **Wooden Boatbuilding**: Professional Shop Practices, Training in both Modern and Traditional Tools, Lapstrake Planking, Joinery and Refitting, Cold Molding Rigging **Composite Boatbuilding:** Professional Shop Practices and Tools, Atmospheric Ovens, Closed-Molding and Vacuum-Infusion, Construction and Repair Techniques, Plugs and Molds, Fabrication Techniques and Material Selection **Marine Systems:** Professional Shop Practices and Tools, Marine Diesel and Gasoline Engines, Composite Repair, Steering and Controls, Propulsion, AC Electricity Marine DC Electrical, Refrigeration and Air Conditioning, Marine Plumbing	Boatbuilding Shop, Design Studio, Systems Laboratory, Composites Shop, Classrooms, Learning Resource Center; not on the waterfront
Westlawn Institute of Marine Technology **Annapolis, MD**	**Yacht and Boat Design**: Hydrostatics, Principles of Resistance, Stability, Design Practicum, Marine Drafting, Drawing of Lines, Exterior/Interior Design, Powerboat/Sailboat/Multihull Design, Wooden Boat Construction, Fiberglass Boat Building and Production Methods, Aluminum Yacht Design and Construction, Computer Aided Yacht Design, Marine Engines, Propulsion Systems, Electrical Systems, Systems and Equipment Specifications	Courses are completely online
IYRS School of Technology and Trades Newport, RI	**Composites Technology**: CNC Machine Operator Training, Vacuum Infusion Processing, Advanced Composites Molding, CAD Software, Composites Restoration Practices, Molding Processes and Methods, In-Mold Coating Techniques, CAD/CAM	Library, Restoration Hall (Teaching and Workspace), Marina, Boat Restoration Facility, on the waterfront

IYRS School of Technology and Trades Newport, RI	Equipment Operations **Marine Systems**: Electronics and Electrical Systems, Steering, Marine Pumps, Fuel Systems, Diesel and Gasoline Engines, LPG Systems, AC and Refrigeration **Boatbuilding and Restoration**: Woodworking and Tool Use, Hull Shape and Lofting, Joinery, Spar Making, Surveying and Assessment, Drafting, CAD Software, Project Management, Sailing and Boat Handling	
Cape Fear Community College **Wilmington, NC**	**Boat Service and Manufacture**: Marine Spray Finishing, Fiberglass Boat Building, Fiberglass Boat Repairs, Hull and Joinerwork Prep, Engine Install, Boat Electrical Systems, Boat Plumbing System **Wooden Boat Building**: Yacht Joiner Practices, Yacht Repair/ Renovation, Yacht Rigging, Marine Drafting **Marine Technology**: includes Marine Software and Data Networks, Boat Handling/ Seamanship, Industrial Skills, maritime Engines, Marine Navigation, Marine Instrumentation, Marine GIS	Large Laboratory Facilities on the Waterfront
Northwest School of Wooden Boatbuilding **Port Hadlock, WA**	**Traditional Large and Small Craft** or **Contemporary Wooden Boatbuilding**: Classic Woodworking, Drafting, Lofting, Skiff Construction, Repair and Restoration, Yacht Interiors **Noncredit Workshops**: Boat Design, Diesel Engines, Carving, Marlinspike, Sailmaking, Rigging School day begins with two hours of lecture, followed by working on bench projects, drafting, lofting, and building in the boat shops. Students participate in all aspects of the work of a commercial boat shop. This may include sorting, selecting, and milling lumber; blocking up and moving boats; sanding, painting, and varnishing; and adjusting and servicing tools.	Waterfront Facitlities totaling 14,500 sf; includes lumber-milling rooms, large boatshops, library, computer stations, classrooms, offices; Complex contains independently-owned sail loft with sewing machines and hand-work benches where students may attend workshops outside of regular class hours.
New England Institute of	**Marine Technology**: Marine Welding and Cutting, Engine Theory/Lab, maritime Electricity and	Computer Labs, Collaborative Work Spaces

Technology **Warwick, RI**	Electronics Installation, maritime Engine Applications, Outboard Engine Overhaul and Systems Diagnosis, Fuel Systems Theory and EFI Applications, Marine Drive Systems Theory and Service, Diesel Engine Service and Maintenance, Marine Systems, Fiberglass Fabrication and Repair, Marina and Boatyard Management, Marine Surveying, Composites and Fabrication, Custom Air Brush Art, Maritime Industry Safety, Marine Propulsion Systems, Marine Gasoline and EFI Emissions	
Broward College **Davie, FL**	**Marine Engineering Management**: Marine Auxiliary, Marine Diesel Engines, Gasoline Engine Diagnostics and Repair, Marine Corrosion and Prevention, Marine Electricity, Marine Auxiliary Systems, Inboard/Outboard Saildrive and Transmissions, Marine Electronics, Welding	30,000 sf Facility

Data Source: Respective school websites

Most of these programs include theory courses that introduce students to the foundational concepts of marine technology, such as physics, statics, hydrostatics, fluid dynamics, and electrical systems; marine software and CAD/3D modeling are also common courses that are typically taught in classrooms or computer labs. Typical "hands-on courses" taught at many of these programs include materials and fabrication, joinery and refitting, rigging, lofting, composite molding and repair, refrigeration and air conditioning, plumbing, and diesel and gasoline engines. Instruction for these courses is usually performed in workshop facilities with tools and equipment.

As evident from these college programs and courses, typical maritime technology education lends itself seamlessly to workforce development, as students become technicians trained in a specific skillset that is directly applicable to specific jobs. Given this, a focus on maritime/marine education in Annapolis would be a focus on maritime/marine workforce development.

Existing Conditions in Annapolis

While Annapolis does not currently have a school that offers maritime technology degrees or certifications,[27] it has ample social capital from which a new generation of the maritime workforce would greatly benefit. In addition to the annual sailboat and powerboat shows hosted downtown, Annapolis is home to 100 Boat Servicing and Supplies businesses, as well as over 150 other boating instruction schools, boat brokers, recreational charters, finance/insurance/law firms, marinas, and other maritime organizations - each with highly knowledgeable and experienced local employees dedicated to sustaining the City's maritime industry.

Through the Marine Trades Industry Partnership (MTIP), the Maritime Trades Association of Maryland (MTAM) is undertaking comprehensive efforts to strengthen and sustain Maryland's maritime industry.

Susan Zeller, the Executive Director of MTAM, describes Annapolis' established maritime businesses, and the skills required for boat servicing, as mostly being passed down from generation to generation. Though it exists largely behind-the-scenes, this homegrown tradition of long-standing businesses has been integral to supporting the boating culture for which the city is known. However, Zeller notes that business leaders in Annapolis' maritime industry are aging, while younger generations are frequently pursuing different educational and professional paths elsewhere.

To attract new and innovative employees and sustain the City's maritime service/repair/storage industry, there needs to be a revitalized interest in "working with your hands," as well as education-to-employment (workforce development) opportunities. The network development and makerspace initiatives are intended in part to facilitate this interest.

MTAM recognizes these needs and actually founded MTIP (mentioned above) in order to build a sustainable workforce for Maryland's maritime trades. The program is composed of MTAM, EARN Maryland (Employment Advancement Right Now), maritime employers, local workforce development professionals, and educators (MTAM, "Partnership Overview for Educators."[28]). MTIP recruits young people to the industry and instructs them through a six-week paid internship; trains the industry's incumbent workers; matches workers to immediate job openings; and trains employers involved in the internship program. The ultimate goal for the MTIP is to establish an Apprenticeship program for Maryland's marine and maritime trades.

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[27] The focus here is on programs providing recreational/commercial boat-design or building education, rather than four-year naval architecture or marine engineering programs at larger universities/research institutions. The latter programs, such as those offered by the Naval Academy, tend to steer graduates to naval or industrial ship-building and transportation, which is not the type of maritime culture that Annapolis seeks to promote through this project.

[28] Marine Trades Association of Maryland. "Marine Trades Industry Partnership & the Role of Education Partners." (www.mscaonline.org/.../Partnership%20overview%20for%20Educators).

Recommendations for Annapolis

Recommendations made in this section emphasize the utilization of the proposed Makerspace as a means to attract a talented new workforce, support the existing workforce, and grow an innovation-driven maritime economy in Annapolis.

The Maker City book[29] draws a connection between a successful Maker City - in Annapolis' case, an innovation-driven maritime economy - and the presence of talented, skilled, and educated individuals. It suggests seven education/training-related mechanisms that would lay a foundation for a sustainable innovation economy, a few of which are especially applicable to Annapolis.

- *Build Skills by Focusing on New Forms of Vocational Education:* Utilize the proposed Makerspace as a place for elective vocational education. For example, Vocademy, located in Riverside, California, offers tools, workshops, and classes for members looking to hone specific skills. The Makerspace is also used by local high schools and community colleges who seek out hands-on training opportunities for their students. Annapolis could draw both local individuals and students from Anne Arundel Community College to use the Makerspace to further their skill development and boost their resumes.
- *Create New Forms of Apprenticeships and Internships around Making:* Annapolis should further support MTAM's efforts to connect students/trainees with existing employees. Funding for these efforts could be underwritten by the Maritime Development Authority.
- Organize existing Annapolis business leaders who are interested in developing a young, new maritime workforce for the City. This organization could operate independently or as an Annapolis-focused sub-group of MTAM's Marine Trades Industry Partnership. Capitalize on their extensive knowledge and experience to host the recurring workshops on foundational theory or skills-development to be held at the Makerspace.
- Develop an online portal to promote the "One Stop Shop" nature of the existing maritime industry in Annapolis. The portal should aggregate websites of all maritime businesses in Annapolis, and allow potential customers to clearly view the range of services provided. The portal should also include a forum for business leaders to network and connect to their customers. Identification of the appropriate partner(s) to develop and maintain the online portal could be included in the intern's scope of work, but we do not recommend that the City take on responsibility for the portal. Rather, it could be an early project for the emerging innovation network that could build working relationships and social capital along with a web portal. Students from University of Maryland's I-School might be tasked to provide technical support.

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[29] Hirshberg, Peter, Dale Dougherty and Marcia Kadanoff. "Maker City: A Practical Guide for Reinventing Our Cities." (https://makercitybook.com/chapter-5-workforce-development-51226b58a1cc#.cqb1twwgp)

- Seek partnerships with local institutions, such as the American Boat and Yacht Council (ABYC), Annapolis School of Seamanship, Chesapeake Light Craft, and Anne Arundel Community College. These institutions have a vested interest in attracting a talented new maritime workforce to Annapolis, and may offer instruction or equipment for use at the Makerspace. Additionally, stakeholders should seek advice from the Landing School and the IYRS-adjacent Tinker│Bristol Makerspace on how to effectively implement maritime education and a Makerspace in Annapolis' existing industry. Depending on the level of interest, one or more of the institutions profiled in Table 1 might be open to an active role or franchise arrangement. For example, the Landing School has a strong modular program centered on power boats and yacht design at its Arundel, Maine campus. Opening an Annapolis school centered on sailboats and sailing yacht design might have some appeal.

Recommendation 3: Zoning

Background

The Maritime Advisory Board consists of seven members who represent the maritime industry for the City of Annapolis. This board would be essential in providing expert and informed analysis of the maritime industry, and could provide significant support for recommended Makerspace and Maritime Development Authority. Under the *Annapolis Code of Ordinances (15.16.030)* the Port Warden currently will not approve any application for a license or permit involving the placement, erection, or construction of structures in the water beyond the harbor lines[30] for temporary or permanent use. This could complicate development of any maritime innovation space on the water. Reference of Annapolis' current zoning is shown in **Map 1**.

In the Annapolis *Code of Ordinances* there are also stringent rules against the development of commercial regions in Maritime Zones; therefore, we are suggesting the incremental placement of overlay and floating zoning that would enable the development of a Makerspace and gradual expansion of an Innovation District.

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[30] "The *harbor lines* in the waterways are located at a distance from the shoreline depending on the location of lawfully installed piers, mooring pilings, wharves and bulkheads, the configuration of the shoreline and the zoning of the land at the shoreline" Annapolis, Maryland Code of Ordinances 15.18.020

Map 1: Existing Land Use of Downtown Annapolis

Existing Land Use
Downtown Annapolis

COMMERCIAL
INDUSTRIAL
INSTITUTIONAL
MARITIME
MIXED USE
RECREATION AND OPEN SPACE
RESIDENTIAL

Data Source: Annapolis 2030 Comprehensive Plan

Maritime Zones of Annapolis that could be considered for implementing new zoning code include Waterfront Maritime Industrial (WMI), Waterfront Mixed Maritime (WMM), and Waterfront Maritime Eastport (WME). Each district has different requirements and restrictions on what can and cannot be built in the area. Under *Title 21: Planning and Zoning in the Annapolis Code of Ordinances*, there is no building or tract of land to be dedicated to any other use than those listed by the zoning district's requirements, such as percentage of land cover by buildings, with the exception of uses lawfully established before or on the date of the zoning code adoption. There are some community design uniformity codes, such as an established front yard, that can be found in the *Code of Ordinances*. This limits the diversity of housing and business structures that can be established and limit the space that would be accessible for a makerspace community.

The WMI zone would be optimal for an Innovation District because it represents the backbone of Annapolis' maritime industry and includes businesses that would be key candidates for developing a Makerspace. According to the *Code of Ordinances*, within the WMI district, non-water dependent building structures and parking are permitted within the one-hundred-foot maritime use setback if it includes a site plan incorporating building structures that are set back 100 feet for at least 50% of the lot width. The total gross open area contiguous to the waterfront and continuous on the site must remain equal in square footage to 100 times the lineal shoreline frontage of the zoning lot. Restrictions under WMI include restaurants, launderettes, and general maritime office and research, which might limit what can be suggested for development. Current zoning in WMI restricts the amount of growth allowable and would lead to limited success of a maritime Makerspace with limited resources.

There are also cases within the WMM district, where if parking is provided within or beneath a structure, all exterior views of the structure should resemble a working facade in order to keep with the aesthetics of the neighborhood. Housing in the area is regulated to mostly single family attached and detached with some two family attached homes. These structures may be expanded for residential use but must meet the requirements of the *R2-NC Single Family Residence Neighborhood Conservation District*. In the WME, no multi-dwelling structures of five units or less can lawfully exist unless established before August 1987. After August 1987, multi-dwelling structures are considered nonconforming, but bed and breakfast inns are acceptable under R2-NC. The WME and WMM zones are very busy maritime centers and are already popular maritime spaces. This fact could support and complement the development of makerspaces; however, the stringent zoning code in place limits commercial and residential development and would stifle innovative growth.

To the extent that physical development is necessary for the revitalization of the Annapolis' maritime industry, these codes of ordinance would have to be altered, with some recommendation from the Maritime Advisory Board, to give leeway for the diverse community needs of a Makerspace and other innovative land uses.

Challenges

The City of Annapolis is a historic city with many restrictions on development that must follow historic design. As seen in the *Code of Ordinances*, there are limitations on what developments are allowed within harbor lines as well as the adjacent neighborhoods. For a maritime community to flourish, there must be designated space and room for expansion. If the Makerspace is to be developed anywhere else in Annapolis, it would require a change in the zoning laws to allow more commercial development focused on maritime consumers and development of gathering spaces that would increase maritime amenities. The Makerspace would need flexibility in space programing within the building space and throughout the parcel of land. If that planned use does not fit the existing zoning code, then recommendations for changes to the zoning code should be made.

Opportunities

Current maritime companies and manufacturers in Annapolis are located on the coast and inland. It may seem like a problem for businesses to be inland; however, many inland businesses have been successful with boat part manufacturing and repair. This indicates that ready access to water is not a requirement for building the maritime community. Businesses that are located along the coastline are also heavily industrial and surrounded by space with potential for expansion. Unfortunately, these areas are also limited in development by the current *Code of Ordinances*. There would be greater opportunity to expand and develop the resources needed for a Makerspace if the development of public and private amenities were allowed in industrial areas.

Incremental Zoning

We are recommending that the City of Annapolis take an incremental zoning approach to implementing either an overlay zone or floating zone in areas that are already defined as maritime industrial areas. By the current Annapolis *Code of Ordinances*, the maritime industrial areas are not allowed any development outside of industrial use that has already been declared. This could challenge the process recommended for the development of a vibrant Makerspace and Innovation District. The opportunities created by overlay zoning would allow current zoning practices to continue and change as needed. There will be no pressure placed on landowners to make changes, and instead incentives for developers and landowners. Floating zones could be implemented over time as the speed and success of development is determined. It is recommended that zoning amendments and rezoning happen every ten years, and after assessment of the viability of the area. There should be a plan to increase the amount of area under the overlay or floating zone, if there is consistent and growing development.

Our zoning recommendations are incremental, consisting of three phases to be implemented by 2045 with fifteen-year benchmark periods. The first phase follows the *Annapolis Comprehensive Plan* for development of mixed use zoning. The City of Annapolis has identified "Opportunity Areas" that have been selected based on the character of expected and desired development. The comprehensive plan includes the redevelopment of targeted areas with characteristics that fit descriptions of "Urban Commercial," "Urban Center Low," and "Urban Center".[31] An Urban Commercial area is defined as containing mixed commercial uses, including retail, offices, and service activities. An Urban Center area is defined as a large scale mixed use area consisting of retail, office, entertainment, lodging, and residential activities. An Urban Center Low area is described similarly to Urban Commercial areas in terms of character and building heights, but allows for a mix of land uses that is similar to Urban Centers. Extensive background research was conducted to ensure that the selected areas were prime for proposed new residential and commercial development. Each type of development also includes plans for pedestrian and bicycle oriented development. We support the effort to increase mixed use development at different density standards (**Map 2**). The *Comprehensive Plan Generalized Proposed Land Use Map* recommends land use changes that would provide opportunity for the zoning code to be amended to allow multiple amenities and services not previously allowed by stringent zoning. There is already projected growth for these areas, which leads to the second phase of incremental zoning.

The second phase targets three specific areas that have the best potential for a Makerspace to flourish. Similar to the "Urban Center Low" development that Annapolis has proposed in its comprehensive plan, we recommend the adaptation of overlay zoning to maritime areas that will be the most influential and catalytic in creating an Innovation District in the future. The overlay would include allowance for some commercial development including food service, allowance for mixed used educational/work space, and some residential development. For the purposes of this document we shall refer to it as the Makerspace Overlay. Starting with one area at a time, as identified on **Map 3**, small changes to the zoning code would allow for the emergence of a Makerspace.

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[31] Annapolis Comprehensive Plan Chapter 3 - Land Use and Economic Development pages 23-25
http://www.annapolis.gov/Government/Departments/PlZon/CompPlan/Ch3_LandUse_EconDev.pdf

Map 2: First Phase of Proposed Land Use in Annapolis
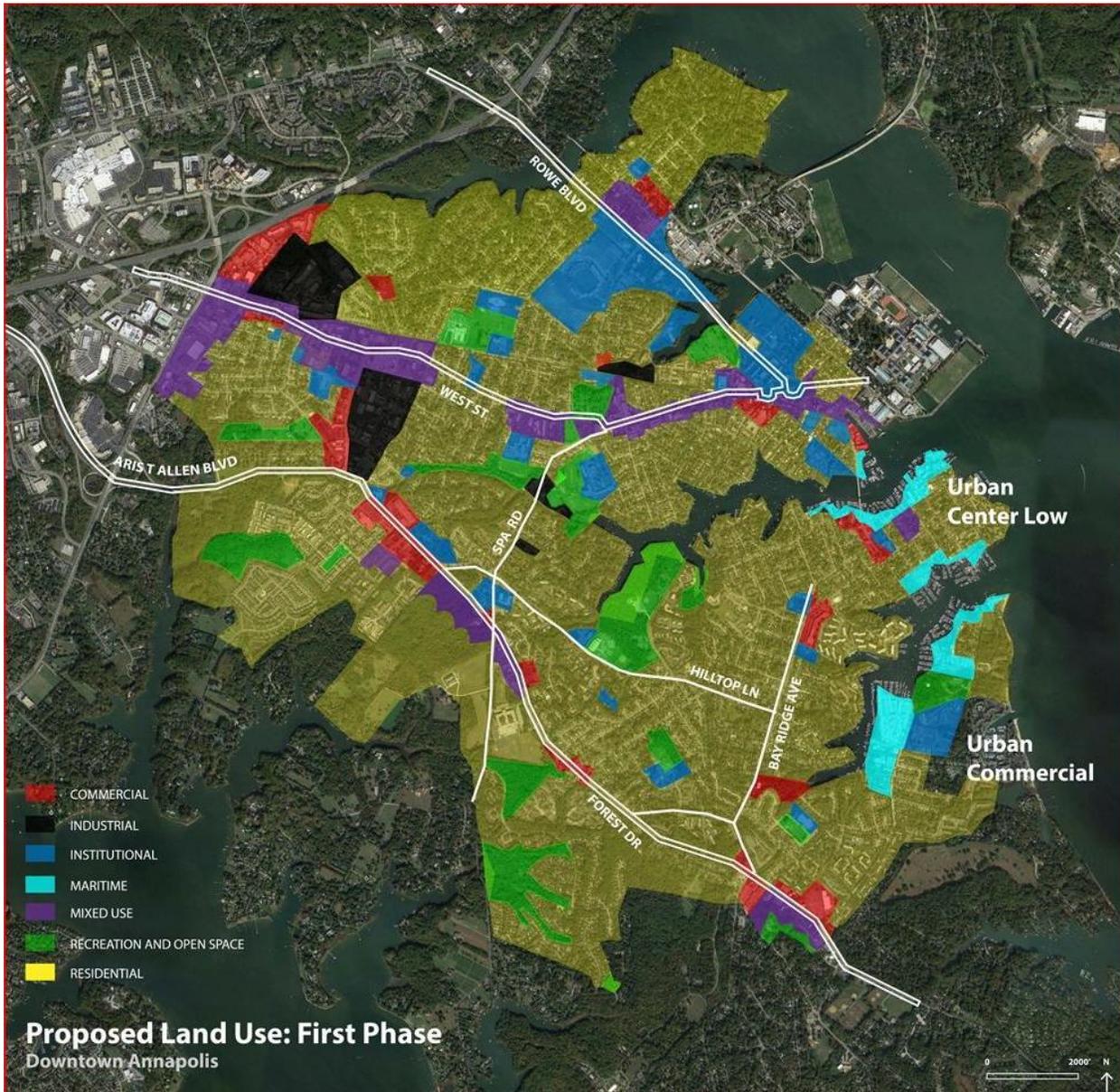
Data Source: Annapolis 2030 Comprehensive Plan

Three areas - Spa Creek, Back Creek, and Inland - have been identified by our team as being the areas that would be most successful for the beginnings of a Makerspace. Each area, shown on **Map 3**, provides a variety of characteristics that would encourage different aspects of development occur in the Innovation District. Each has potential to be successful in Annapolis but the most successful model should be determined by the maritime community in Annapolis.

Map 3: Second Phase of Proposed Land Use in Annapolis
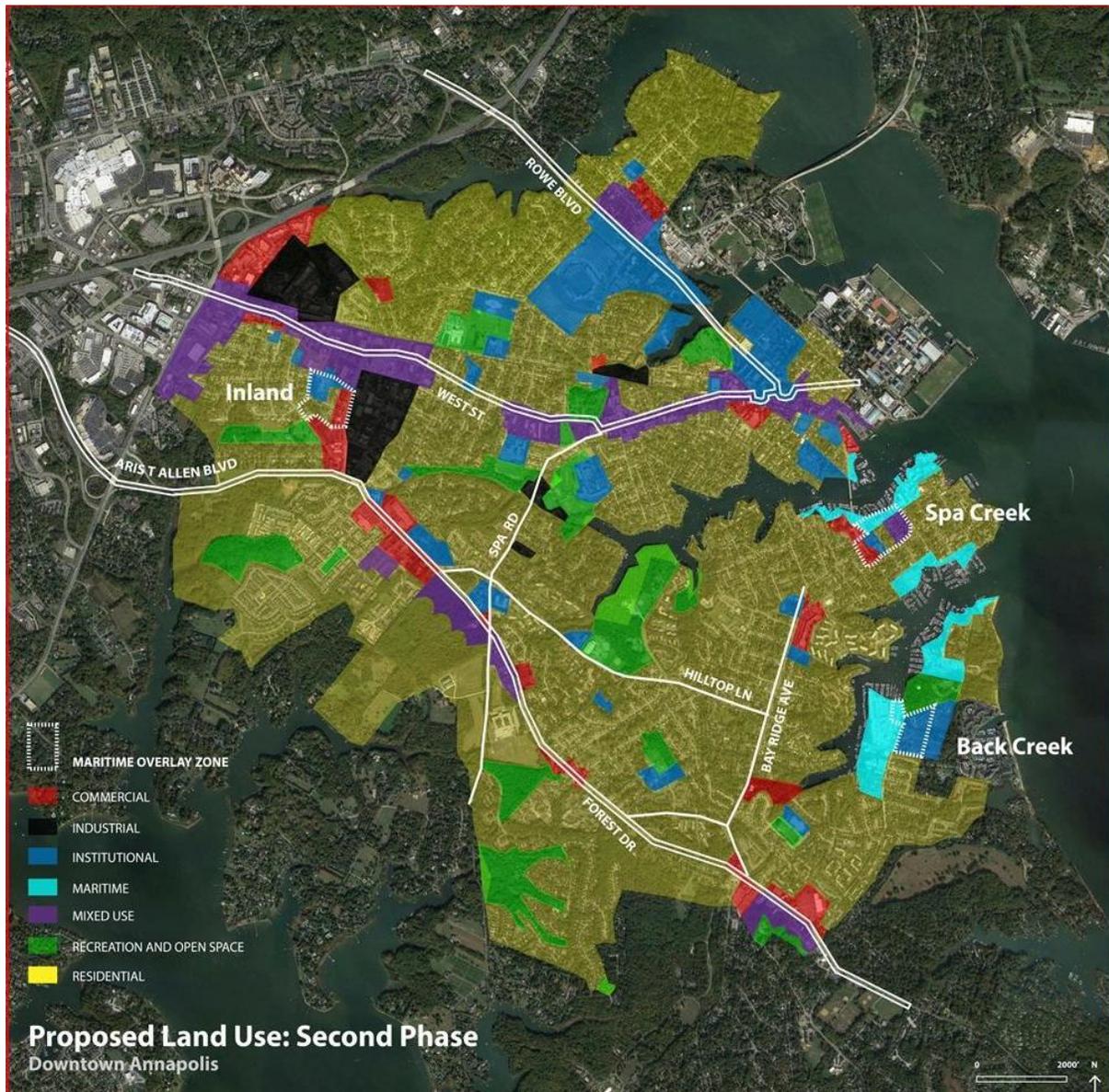
Data Source: Annapolis 2030 Comprehensive Plan

Spa Creek Details

<u>Pros:</u>
- Near already established maritime zoning that is located on water and has established docking (near water/ bay);
- Already has a different mix of institutional, residential, and commercial uses;
- Already has an established vibrant commercial area; and

- Surrounded by residential land use that will provide residents easy access to the Makerspace and establish the space as community asset

Cons:
- Surrounded by residential land use and might face a greater resistance by neighbors because of anticipated traffic increases;
- Land might be the most expensive of the three proposed sites; and
- Relatively difficult for people outside Annapolis to access the site.

Back Creek Details

Pros:
- There's already an interest for a Makerspace; and the Makerspace proposed in this document is located in this maritime zoned area;
- Large zone for industrial zoning;
- Land may not be as expensive; and
- Very small residential presence might result in less neighborhood resistance.

Cons:
- Land use not varied (not commercial);
- Small residential presence would not allow this to be a resource for the residential community as well as the maritime community; and
- Located far from a main roadway, which may prove hard for a community to build around.

Inland Details

Pros:
- Extremely diverse land use (industrial, institutional, residential, commercial, recreational and open space);
- Accessible open space that might be utilized;
- Less residential land use nearby would allow for less residential resistance; and
- Located along a commercial corridor and main Annapolis access way.

Cons:
- Land might be expensive;
- Far from the water; and
- No maritime zoning nearby.

The third phase, shown on **Map 4**, widens the Makerspace Overlay over successful points of development in order to promote community investment and development into additional Makerspaces and uses that support the innovation culture.

A note on zoning related to floodplains is located in the Appendix of this report.

Map 4: Third Phase of Proposed Land Use in Annapolis
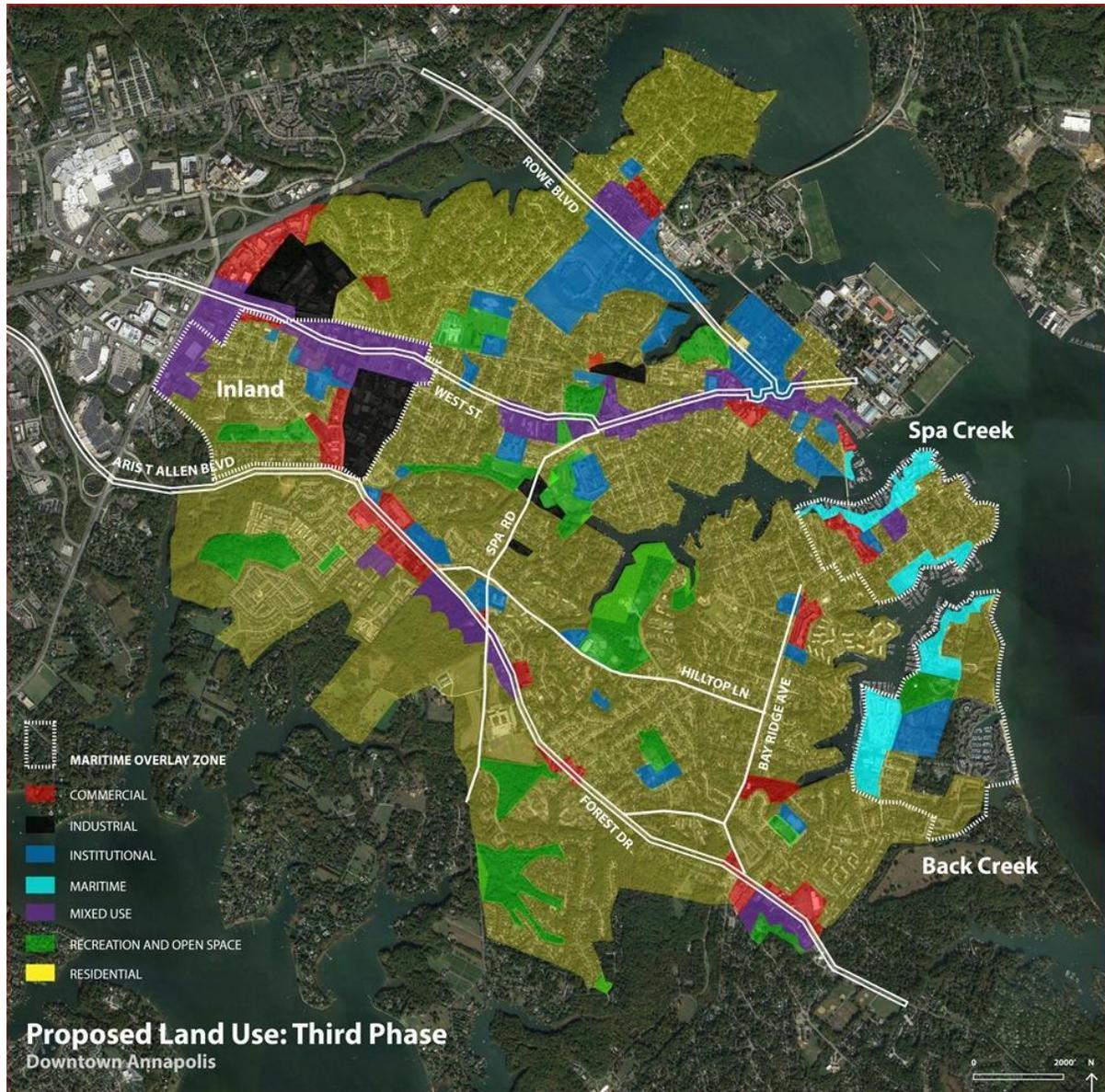
Data Source: Annapolis 2030 Comprehensive Plan

Recommendation 4: Maritime Development Authority

Background

The maritime industry in Annapolis could benefit greatly from the creation of a Maritime Development Authority. A development authority is an organization created by a local or state government that uses both financial and non-financial means to promote the economic development of a city, county, or state. These include loans for new and expanding businesses, tax incentives for businesses looking to relocate, or the construction of shared facilities that can be used by start-ups and other small businesses. Development authorities also work to connect the business community to state and federal sources of funding. All of these instruments and more could help both the portfolio of current businesses in the maritime industry in Annapolis as well as promote innovation by funding new players in the industry.

There are other types of organizations that can support economic development work while remaining outside of the government structure, like nonprofits or business leagues. However, the advantage of a development authority over these other entities is the ability to issue bonds for projects. Bonds typically reduce financing costs up to 30 percent annually when the bonds are tax-exempt, meaning they can charge lower interest rates while still maintaining high yields for investors.[32]

Nationally, development authorities are quite common. Several municipalities in Maryland, including Anne Arundel County and Howard County, have development authorities. However, a Maritime Development Authority would be a relatively novel innovation, both locally and nationally because it will focus on just one industry. Many areas, including the New York area, have port authorities, but those are generally set up to operate seaports and are not designed to incubate an innovation economy or support small businesses. Port authorities are also usually self-financing, while development authorities usually rely on some form of outside capital. Our research could not find any development authorities that were meant to be specific to certain industries and not general enough to cover all industries.

While we could find no perfect analogues to a proposed Maritime Development Authority, we analyzed the development authorities in three cities with similarities to Annapolis to better understand what sort of services these organizations could offer and how they could help the maritime community in Annapolis.

Case Studies

The San Diego Economic Development Corporation (EDC) has been a successful tool for the city of San Diego to serve local businesses. The EDC fosters partnerships in the community, gives companies access to data and research for decision making, and helps to maximize investments and opportunities. This is beneficial because it allows for the leveraging of networks to work with local government and to create introductions between businesses and trade associations. The EDC works with elected officials,

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[32] http://ida.lacity.org/benefits.html

universities, and other policymakers to strengthen the area's workforce, infrastructure, transportation, and housing. This type of partnership could be beneficial to the City of Annapolis by connecting community leaders to the maritime industry. As a waterfront city like Annapolis, San Diego boasts over 70 miles of coastline and has a strong Navy presence. Because of this, San Diego has emerged as a hub for maritime technology, drawing in government as well as academic researchers who look to these local firms for equipment and software. The maritime industry plays a vital role in Annapolis and an entity like the EDC could help it to grow and become a more innovative community. One current initiative that the EDC is involved with is Operation San Diego, which works to support the region's military infrastructure. They also played a major role in creating Innovate78, an initiative that works to bring together the assets of the county in order to "retain, expand, and attract talent, companies, and investment."

The following are elements of this case study that are applicable to Annapolis:
- Create community connections to and within the maritime industry
- Attract university involvement in the region
- Draw in innovation for the maritime industry

The Alexandria Economic Development Partnership (AEDP) is funded by the City of Alexandria, and is a public-private partnership organized as a 501(c)(6). The 501(c)(6) status allows them to maximize flexibility as a business advocacy organization. They are led by an independent board of directors and are able to work closely with city officials. AEDP promotes Alexandria as an ideal location for businesses by capitalizing on its assets including multiple Metro stations, historical character, and a riverfront location in order to enhance the city's tax revenue and increase employment opportunities. Annapolis could have similar successes with a maritime-based development authority given its similarities to Alexandria: historical character, waterfront location, and proximity to the nation's capital. One of AEDP's initiatives includes working with businesses and organizations to give instruction on state and local taxes and incentive programs that are available, something that could be beneficial to the City of Annapolis. This brings important financial knowledge to the community's businesses to help them succeed. In addition, AEDP publishes year-end reports that provide information on topics such as development in Alexandria, office market trends, retail forecasts, economic indicators, and residential updates. This provides area information to Alexandria businesses and keeps them well-informed.

The following are elements of this case study that are applicable to Annapolis:
- Help businesses decipher state and local tax incentives
- Provide city and regional updates on the business climate, specifically maritime

The Howard County Economic Development Authority (HCEDA) is a public-private partnership located in Columbia, MD. This example is of importance because it demonstrates the ability of a development authority to operate under Maryland code. Its mission is to be a catalyst for economic growth and sustainability in Howard County to ensure a sufficient tax base for the county. Their methods for economic growth include supporting existing businesses, relocating businesses to the county, and helping to build new businesses. For Annapolis, it is important in the maritime industry to support these three

things as well. HCEDA also serves as a liaison between public and private development and planning organizations. They have structured their organization into three areas: business development, marketing, and the Maryland Center for Entrepreneurship. This has allowed HCEDA to successfully maintain, grow, and attract businesses to Howard County. In Annapolis, creating an authority similar to this would allow the maritime industry to grow and prosper by supporting businesses as well as bringing in new businesses. HCEDA hosts different types of events to support area businesses, including roundtable discussions, forums, and meetings. This creates an environment conducive to collaboration and support. Within HCEDA is the Maryland Center for Entrepreneurship, which helps to launch businesses and grow them during their early stages. They accomplish this by providing resources and networks for new businesses, giving support during the most vulnerable stages of business development.

The following are elements of this case study that are applicable to Annapolis:
- Support the start of new, innovative maritime businesses
- Create networks and support systems within the maritime industry
- Help bring maritime businesses to Annapolis from other maritime economies

Benefits to the Annapolis Maritime Industry

Creating Momentum

Annapolis would benefit from the creation of a maritime development authority because by reinvigorating the maritime industry, the city as a whole is reinvigorated. The maritime industry has been instrumental to the city's economy. It also represents a primary activity and experience around which Annapolis' cultural identity has been formed, promoted, and preserved. A maritime development authority would create multiple new financial mechanisms that would enable maritime businesses to operate more efficiently and as a result help Annapolis be more competitive with other coastal cities.

Uniting Stakeholders

By bringing together disparate community leaders and stakeholders, formalizing partnerships and associations, and building a more connected community, a development authority will encourage innovation and create opportunities for cross-sector exchange and collaboration. The maritime development authority would also be another voice for the maritime industry and help grow political clout, as not all City Council members have maritime in their jurisdictions so the industry's success is not their priority and many maritime business owners do not live in the city itself so their voice is not represented.

Bridging the Industrial-Residential Divide

Many residents have chosen to live in Annapolis because of its maritime culture, but they sometimes oppose economic development measures that would enable maritime businesses to thrive. Residents sometimes fear that new development or changes to existing industry can increase traffic, bring undesired uses, or physically alter the character of their neighborhoods. A maritime development authority will help mediate the conflict between maritime industry and residents.

Accessing Capital

By facilitating public-private partnerships, a development authority can attract and procure the capital needed for critical updates to facilities and services needed by maritime businesses. A development authority is eligible and better equipped to apply for funding from state and national agencies. Instead of each individual maritime development project needing to go before city council for approval, a development authority could address multiple projects at once. Maritime businesses on their own are also generally unable to finance many infrastructure improvements needed to make their businesses more competitive. A maritime industrial development authority could serve as a vehicle for gaining greater political and economic leverage.

Establishment of the Maritime Development Authority
Legislate the Authority

The Annapolis Maritime Development Authority should operate like an Industrial Development Authority as outlined in the economic development section of the *Maryland Code*, specifically *§ 12-105*. Annapolis will need to establish the Maritime Development Authority in its own charter and code in order to give local authorization for its activities.

Establish Priorities and Create Guidelines

When establishing the Authority in their Charter and Code, Annapolis will need to delineate what qualifies for funding under the Maritime Development Authority and if there are only specific areas of the City where the funding can be applied. Will only projects located within the maritime districts be funded? Will associated industries like restaurants and retail stores be allowed to receive funding? Trying to clarify these types of questions from the beginning may be helpful in making funding decisions in the future, but also needs to not be too restrictive so that only a few projects qualify. We suggest that priority funding should go to businesses located in or wanting to locate in the maritime zones, but allowing for exceptions to this as needed, such as a business needing a unique space that is not available in a maritime zone but is directly connected to the industry. While defining what type of business should be eligible for Authority support, the direct connection to maritime industry should be considered. A

restaurant would not add to maritime industry innovation, but if it makes Annapolis more appealing to boaters and maritime businesses, it helps keep the maritime industry going and should be considered.

Create Board and Identify Stakeholders

Along with creating the Authority in the Charter will come decisions about the structure of the Authority, which stakeholders will be involved, and who will staff the Authority. It will be critical to identify and engage a diversity of stakeholders that bring fresh perspectives and a range of skills. This will include local maritime businesses, marinas, and maritime industry-oriented associations, such as the Marine Trades Association of Maryland, Annapolis Maritime Advisory Board, and Annapolis Working Waterfronts. The stakeholders must be from other sectors and at different governance levels. Partners who can provide funding should be engaged, like the Anne Arundel Economic Development Corporation, Maryland Industrial Development Financing Authority (MIDFA), and the Maryland Economic Development Assistance Authority and Fund (MEDAAF). Other stakeholders could be the Maryland Department of Commerce's manufacturing office and the Maryland Department of Labor's Licensing and Regulation (DLLR).

Alternative Option for Structure

An alternative to Annapolis creating its own Maritime Development Authority is to instead branch off of the Anne Arundel Economic Development Corporation's (AAEDC) programs. The AAEDC already does bond financing and funding. However, the AAEDC's activities are not specific to maritime industries, but the City could possibly partner with them to help grow this section of their work by funding an additional staff person through a memorandum of understanding who works for both the AAEDC and the City. This eliminates the need to pass separate legislation or have startup money. If a more informal partnership is desired, the City could also just utilize the AAEDC as advisors who may have already faced some of the same challenges Annapolis will have to overcome and may know of funding sources the City can tap into.

Funding Opportunities

Startup and seed funding for the Authority to begin could come from the Maryland Economic Development Assistance Authority and Fund (MEDAAF), a Department of Commerce program that supports this type of economic development initiative. Additional seed/startup funding might come from the U.S. Department of Commerce and other federal agencies with an interest in maritime development and marine innovation.

Sustaining operating funds for Industrial Development Authorities (IDA's) typically come from bond fees, developer fees, and proceeds from the sale or lease of completed projects. Done right, the creation of a

maritime (industrial) development authority could become self-sustaining relatively quickly with minimal financial support required from the City.

Not all projects funded by the Authority need to be about "development" in a narrow sense. The Authority could apply for grants from the federal, state, or private foundations to help with workforce development, land acquisition, growing small businesses, encouraging innovation, or to address growing environmental concerns due to sea level rise. For example, Wise, VA's Industrial Development Authority received a $2.2 million grant from the White House's Partnerships for Opportunity and Workforce and Economic Revitalization program to do workforce development to support Virginia's Emerging Drone Industry Cluster Project.

The ability to raise bond funds for capital improvement projects is the perhaps the biggest and certainly the best-known advantage to industrial development authorities as opposed to, say, 501(c)(3) organizations. However successful IDA's are adept at identifying multiple sources of public and private funds, tax credits, and methods for layering complex financing deals needed by many public-private partnership projects. Layering bonds, federal and state grants, tax credits, equity, soft loans and other sources a powerful tool for infrastructure and other maritime projects. For example, the Industrial Development Authority in Harlan County, Kentucky received a $2.52 million grant from the United States Department of Interior Office of Surface Mining and paired it with $10.5 million from a private investment firm to build a wood pellet manufacturing plant.

Some financing tools like Tax Increment Financing (TIF) can be onerous for cities if undertaken as "one-off" projects that must me managed by regular city finance staff. An authority would include staff with expertise in these types of projects that could assist and advise regular finance staff with complex financing projects. Depending on how the City chooses to set it up, the authority may handle all or most of the administrative burden associated with such projects.

Maritime Development Authority Activities in Practice
Financing Capital Improvement Projects

The Authority issuing bonds would significantly aid local maritime businesses in updating or improving facilities and services. For example, in our interviews, one specific example cited was that of a marina's struggle to replace an aging fuel tank to comply with state environmental regulations. While the marina in question was more than interested in replacing the fuel tank, the cost was so prohibitively high, the owner stated that she "would not be able to make back the money spent in her lifetime."[33] Without financial help the fuel dock will likely shut down when the tank permit expires, impacting hundreds of Annapolis boat and business owners and visitors. In this particular example, the fuel dock primarily serves Spa Creek, with the only other fuel dock being the City dock which is inconvenient and time consuming

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[33] Interview with owner of a Back Creek marina

for boaters on Spa Creek. While the fuel dock has always operated as a private service, the environmental sustainability requirements along with other factors suggest a rationale for considering the fuel dock as a valuable public good,[34] that if lost, would disproportionately impact the wider maritime industry.

If a maritime industrial development authority is established, there are several ways in which the deal might be structured as a public-private partnership. For example, the partnership might own the entire fuel system, from tank to pump. The partnership would lease the land and / or necessary easements from the property owner and then lease back the fuel system to the marina business. That lease could be for a fixed rent, a percentage-of-sales rent, or some combination of the two. There could be back-end buyout provisions. The key is negotiating a structure that works for all parties[35].

A Strategy for Strengthening Community Networks

An Authority could also help the maritime industry develop as a community, and bring together maritime businesses with other influential stakeholders in ways that encourage greater collaboration and innovation. While maritime businesses are currently loosely associated with one another, their connections are relatively weak and ineffective, and they do not currently represent a strong or united force in the face of political and economic challenges. Formalizing the maritime business process and networks will enable newcomers to more easily enter into the industry, all maritime entities to better connect with one another, and for the overall industry to generate and share innovative ideas. Maritime businesses are also generally siloed from stakeholders with similar or parallel interests. A special effort should be made to identify multi-sector "keystones" or community leaders that successfully move across professional and social circles and are able to bridge different communities to one another (p.10). Increased opportunities for diverse groups of people to come together lead to greater "promiscuous" collaboration, experimentation, and ultimately innovation (p. 71).[36] Keystones could be identified through social network analysis with Microsoft Excel's NodeXL software that could help visualize the number, strength, and types of existing connections among maritime industry stakeholders. The University of Maryland's Economic Development Center could be brought in to support these efforts. A greater understanding of the existing maritime network would enable the Authority and others to develop a more clear and pointed strategy for engaging the keystones and forging the critical connections necessary for building a stronger community.

Makerspace

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[34] According to Investipedia, public goods are characterized as "nonrivalrous and nonexcludable", meaning that such a good can be consumed by many without reducing the quality or availability of the product to others; http://www.investopedia.com/terms/p/public-good.asp

[35] If the City does not form the maritime development authority a similar strategy might work with a co-op as the patient funding source rather than the authority.

[36] Concepts from Hwang, Victor W. and Horowitt, Greg (2012). The Rainforest: The Secret to building the next Silicon Valley. Los Altos Hills, California.

The designation of a physical space for maritime business development, community-building, and training could help consolidate disparate efforts being made around these areas. If based in the centrally-located and well-known Annapolis Maritime Museum, people from outside the maritime industry could become involved, which enhances the odds for cross-sector exchange and innovation. Consolidating equipment and support for product testing and certification within a makerspace/business center would greatly benefit small businesses looking to get new products ready and approved for use on the water. The direct location of the Annapolis Maritime Museum and the maritime districts on the waterfront is ideal and would enable a hands-on, rapid development cycle.

Summary

We propose that the City of Annapolis establish a Maritime Development Authority that operates like an Industrial Development Authority.

Purpose

- Honor Annapolis' rich maritime history by helping the maritime industry to grow, innovate, and thrive;
- Unite stakeholders and increase political clout;
- Support the existing maritime business community and incubate small businesses and entrepreneurs looking to get started in the industry;
- Bond capital projects for improvements to the maritime industry's physical entities;
- Make Annapolis' maritime industry more economically competitive with other coastal cities; and
- Help foment a culture of maritime industry innovation in Annapolis that makes it the place to be for innovation in the industry.

Benefits of an Authority

- Ability to provide bond financing;
- Can apply for grants from a variety of sources for things like workforce development, growing small businesses, addressing environmental concerns, and improving physical infrastructure;
- Formal organizing mechanism to unite stakeholders who currently operate in different silos;
- Projects will not have to compete with other Annapolis capital improvement projects for funding; and
- Would be solely focused on improving the maritime industry.

Roadmap

While each of the four recommendations above would require varying levels of effort for full implementation, and parts of each proposal may be more useful for generating further ideas than they are for actual implementation, our group did scope out a recommended roadmap that breaks prospective implementation down into three phases.

Short-Term Implementation (up to 1 year)

- Community leaders will be identified to support the creation of the Maritime Development Authority. This includes the search for a possible Board of Directors.
- In the early stages of the Maritime Development Authority, community-building will be supported.
- An assessment of the area surrounding the proposed Makerspace site will be conducted to check for compatability of a floating zoning code that could allow for the emergence of other amenities for the makerspace, including but not limited to commercial or residential facilities.
- Recruitment of maritime business leaders to advance Annapolis' needs within the Marine Trades Industry Partnership will be conducted.
- Renovations will be completed on the Waterworks Building to accommodate the Microstudio Space and the Rooftop Workshop at the Makerspace.

Mid-Term Implementation (1 to 5 years)

- The Maritime Development Authority will be officially established and approved by the City Council. Its structure will be defined. Through this process, funding sources will be identified and obtained
- An MTAM Apprenticeship program that utilizes lecture and studio spaces of Makerspace will be established.
- The Makerspace campus site plan will be finished, and fundraising for long term goals will begin.

Long-Term Implementation (5 to 10 + years)

- Additional sites for maritime innovation should be considered as to not overtake current neighborhood characteristics and to support other areas that are seeing innovation and may not be able to relocate.
- Funding mechanisms for the Maritime Development Authority will be solidified into a concrete process.
- The Maritime Development Authority will begin working to support capital improvements, including the proposed Makerspace. The Maritime Development Authority will also support the overall expansion of the maritime industry while expanding the investor base to include multiple sources.
- Annapolis-based degree/certification program for maritime trades that utilize lecture, studio, and workshop spaces of Makerspace will be established.

- Construction will be completed on the new floating Makerspace structure and the addition to the existing Makerspace building, and all facilities will be fully outfitted with tools and furniture.
- An annual benchmark analysis report of zoning progress will be launched.

Conclusion

In proposing the Makerspace, increased maritime trades education, zoning changes, and Maritime Development Authority, we believe Annapolis' maritime industry can thrive. However, there is a common thread through all of these proposals that is required in order for them to work: the maritime community needs to unite. The existing networks of those involved in maritime need to formalize and work together. Stakeholders need to create synergy by pooling resources and sharing ideas if they want the industry to adapt, expand, and innovate. If the maritime industry presents itself as a united front, they will have better leverage to convince the citizens, city government, and elected officials that making a concerted effort to support maritime initiatives will benefit the entire City of Annapolis.

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Appendices

The following appendices provide supplemental and background information developed or collected by students during the semester-long studio. Much of this information has been synthesized into the final report proper. The appendices were prepared as topical background studies by students and are incorporated here in their original form with minimal editing.

Appendix - Floodplain Zoning

Floodplain Zoning

According to the Maryland State DFIRM Outreach on flood risk, a large portion of Main Street, Annapolis and adjacent marina are under a 100- and 500-year floodplain. All the marinas that surround Annapolis are within 100-year floodplains, but most disturbing is that a large portion of the historic commercial district is covered by the 500-year floodplain. The community flood risk is assessed by FEMA Flood Insurance Study, which takes into consideration river flow, storm tides, rainfall, and other coastal storm surges. This information is created for Flood Insurance Rate Maps by the National Flood Insurance (NFIP) for floodplain management and insurance purposes. These maps can help determine what areas of Annapolis need the most attention when it comes to preparing for flood mitigation and sea level rise.

Based on research by Whitney, Bailey, Cox, & Magnani LLC and maps by the Maryland Department of Planning the Historic Annapolis District is looking at 5-10 feet inundation of sea level rise. Large parts of Eastport are also within 5-10 feet inundation. According to the "Flood Mitigation Strategies for the City of Annapolis" study current flooding at City Dock is caused by high tides and storm surges. Storm drains in the district start to back up when the water elevation reaches almost two feet. Because of the structure of the storm drains and the fact that they have not been updated in decades causes flooding to happen

often. The study shows that from January 1 to September 30 2010 high tides were recorded between 3.5 and -1.85 feet. There are many structural and nonstructural recommendations throughout the report. Some structural recommendations include new seawalls, pumping stations, and portable cofferdams. Nonstructural recommendations include elevation, reconstruction, and relocation. These recommendations were made personally to the City of Annapolis with consideration to what they are in the position to handle. The City has gotten together city officials, business owners, and residents in community meetings to discuss the situation the City is in and the decisions that must be made for the future of the city with the impending sea level rise.

Appendix - Company Profiles

Appendix - Literature Reviews