

ABSTRACT

Title of Thesis: A COMMUNITY GATEWAY:
CROSSING THE THRESHOLD INTO ANNAPOLIS

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Throughout the world, the prominence of train travel has led to the growth of cities. Railroads were intended to move masses of people vast distances, promote trade, celebrate culture, inspire the growth of suburbs, and more. As a result of train travel, train stations evolved as a significant part of the journey. Train stations became an essential part of the experience because they evoked a space for social interaction, economic development, and cultural appreciation.

This thesis will explore the role of a net zero energy train station as more than just a transportation hub but also as a place where people gravitate to in order to strengthen and celebrate the well-being of a given community, in this case Annapolis, Maryland. This well-being would be accomplished by the introduction of unique programs such as places for play, local artist galleries, cafes, and areas to work and learn through spatial experiences. The concept of designing a community train station that also creates a link with other cities would be a great way for the city of Annapolis to advance into the future.

Train stations are the “front door” of a community and have the potential to give a lasting impression of the city’s identity to visitors. However, stations should not only serve as the entry and exit points into a city but also as a crossroads for all people to congregate in order to

promote community unity. The energy that passes through the corridors of a train station, especially one with a terminus platform, is an added opportunity to introduce increased social interaction into a town. A train station can also offer the opportunity to incorporate sustainable processes into a design, such as maximizing use of natural light, reuse of water, and cross ventilation into a space as well as creating outdoor, green, public gathering areas and walkways which act as a bridge into the community. A train station is for both travelers and non-travelers alike with the focus of the design being to unify participants with both cultural and celebratory programs, a positive influence on their environment, an orientation to the offerings of the city, and an increase in community pride.

Connecting Annapolis to the region by introducing a light rail transportation system is beneficial in a variety of ways. A train station can become an iconic representation of a city's landscape and offer a perfect opportunity to highlight the history and way of life in Maryland's capital city. A new rail line and train station in Annapolis will ultimately play a vital new role in the city and create a chance for all people to build a valuable community experience.

A COMMUNITY GATEWAY
CROSSING THE THRESHOLD INTO ANNAPOLIS

By

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DEDICATION

This project is dedicated to my mom, Karen “Kitty” Urio who I am beyond thankful for. Without her continuous support and helpful advice, I could not have made it this far.

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Many thanks to all of my family and friends who have shown patience, offered reassurance, and have been a constant source of encouragement for me to work hard in order to attain my final goals.

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INTRODUCTION

Starting back in 2015, I realized that a railroad is much more than passenger cars and miles of track. I was traveling extensively by train throughout Europe when I became convinced that America needed to upgrade its rail system. As a traveler, I was increasingly impressed by how convenient it was to get to my desired destinations via rail. During one particular train ride, my seat was situated across from a Middle Eastern couple that spoke no English. I had just spent the prior night sleeping on another train and had to quickly transfer at the last stop so I was looking tired and worn out. A few minutes into the trip, the woman I was sitting across from offered me something I did not recognize. I could not read the label either but her hand was extended and she was saying “refresh.” Not to be rude, I accepted her treat and realized it was chewing gum. Despite our inability to converse, a personal connection had been established. For the remainder of the ride, we sat together and smiled but I concluded that this experience happened because I was in a communal compartment of a train. This encounter stayed with me. It made me realize how trains and ultimately train stations have the unique opportunity to promote social and cultural interactions between diverse people. This realization helped me formulate my thesis idea that a train station can be more than a transportation hub. It can be built as a unifying structure and designed to facilitate a positive force within a community.

To this day, even though cars and airplanes are convenient modes of modern transportation, trains and their related train stations have other positive attributes and remain highly desirable. They represent the heart of a city and perhaps even more so its pulse. A train ride emanates romanticism, adventure, and freedom and the station is where it all starts. Typically, train stations are grand public spaces that allow for people to welcome and send off travelers. However, the train station should expand its purpose and bring the community together

by creating a space that people want to stay at. Treating a train station as a place for people to congregate and want to visit for a specific reason will allow for an increased interaction amongst the residents of a community.

Demographic Context for Rail Travel

In the future, it is anticipated that much of the U.S. population will be living in cities. According to the U. S. Census Bureau, 80.7 % of the U.S. population lived in urban areas in 2010 a boost from the 79% counted in 2000.¹ The projection is that the nation's urban population will continue to grow but at a slower pace. Also, the number of elderly will be increasing more than either the number of children or working age adults. Knowing this demographic, the train will be more heavily sought out by the elderly as a viable means of accessible transport. In order to respond to this urban growth, we need to find a sustainable method that will keep people easily connected and plan for efficient movement between city centers. Providing people with accessible public transportation is going to be critical as well. Without efficient connections between cities, aging highways will become more congested and smaller cities will be more difficult to reach. Investing in a significant rail network will have profound impacts on our ability to reach new destinations, redefine our travel experiences, and change the way we connect with one another.

A region that could benefit from the introduction of a more extensive rail network is the Washington, D.C., Baltimore, and Annapolis metropolitan area. While both Baltimore and Washington, D.C. are connected to each other and have more localized city transport; Annapolis lacks a current rail system.² Introducing a light rail line into Annapolis will establish a connection that will offer people the opportunity to efficiently reach places of employment as well as the city's popular waterfront area. Designing a train station for Annapolis will further

promote the historic and economic importance of the capital city. It will also create a space to come together to appreciate cultural and educational activities. A sustainable train station in Annapolis designed to accommodate these enticing and relevant programs will draw in travelers and non-travelers alike to a destination that celebrates the essence of community well-being, a platform of unity, and a place to showcase the city's rich history and affinity with all aspects of the water.

Chapter 1:

Train Station Typology

Architectural Model

Passenger train stations developed as one of the more important new building types of the nineteenth century. The stations were built as an accommodation to train travel which was becoming the primary mode of transportation. No parallels to the train station existed, otherwise known as the “cathedrals of technology”, in terms of feats of engineering, scale of human movement, or complexity of function.³ Railroad stations were an integral part of the new system of train transportation and played a central role in the shaping of the United States and its unique culture.

With the introduction of trains into cities it often necessitated replanning to support the new infrastructure and the train station often became the focus of the new development. The focal point of the station was at the impactful center of town and not at its edge or periphery. Being at the center had the obvious advantage of making the station part of the fabric of the community.⁴ In addition to this social aspect, terminal stations possessed immense architectural significance. Traditionally, the station exemplified a building type consisting of the ticketing hall, the waiting area, and the train platform all arranged in a way to promote maximum functionality to the travel experience.

However, railway stations were without direct architectural precedent. Every building solution had to be invented.⁵ This lack of uniform style gave stations enormous flexibility to be different and emerge from the more traditional building types regarding movement and structure. The public train station, like the courthouse, library, and the stadium had a typology that was easy to recognize, recall, and recreate.⁶ The obvious cues for this unique identity were the station

roof, the platform canopy, the bridge over the tracks, and the public gathering space at the station entrance. One common type of station layout arrangement is the island platform, in which a single platform is positioned between two tracks, or alternatively can be two separate platforms outside the tracks. These platforms are popular on twin-track routes and require only one set of supporting services like ticket offices, kiosks, and bathrooms and one set of facilities like waiting rooms. If the station is at the end of the railway line the layout is a terminus station. The trains arriving here have to end their journey or reverse out of the station. Depending on the layout, this usually permits travelers to reach all the platforms without the need to cross any tracks. The idea of a concourse was first developed in a terminus station.⁷

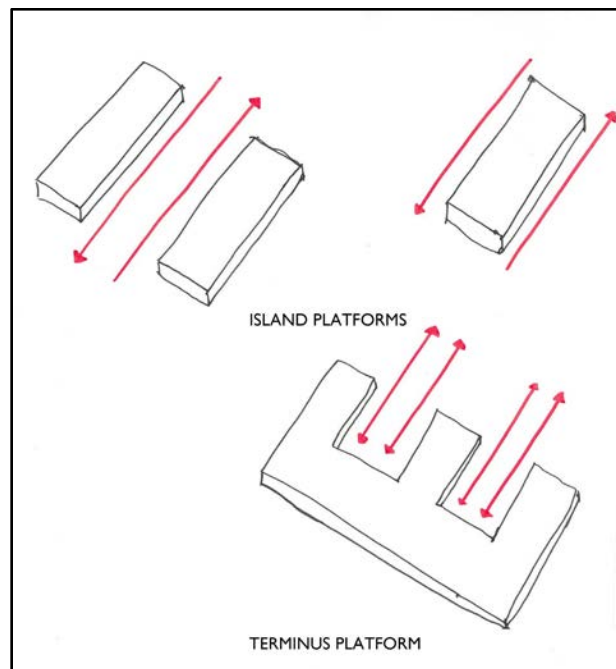


Figure 1: Platform Configurations- Two Island and One Terminus layout, Source by Author

Stations are not isolated landmarks but act as an interchange between systems. The station is where the traveler experiences the seamless transition between the train and the rest of the world, whether it be the destination city or other transport systems such as buses, subways, taxis, or even bicycles. Stations have the innate ability to animate towns with human movement and the complexities of street life.

Passenger stations are the architectural manifestation of the railway system. Over time, rural stations and urban stations have assumed a vision of their own based upon the size and character of the community they serviced and the resultant ridership. Rural stations have tended to resemble houses and wood sheds while urban stations were much larger and grander in style. Whether it be a “through station” or a great city terminal each station building represented the entrance and departure point of the town or city and had the unique responsibility to act as an impressive and eye-catching gateway. The station has the unique task of giving a journey a dignified beginning and end.⁸

However, by the middle of the twentieth century, the future of new train stations was in jeopardy due to faster transportation options coming into vogue. The public was lured to high-speed airplanes and the independence provided by the more affordable car. Airplanes allowed people to travel to further destinations. The new highway system did the same for the growing car dependent society.⁹ Also, commercial interests used truck transportation instead of the train. Unfortunately, many rural railroad stations were not maintained because of their infrequent use and many big city stations were destroyed because of the increase in land values in the city and their massive train sheds were no longer needed due to the electrification of trains.¹⁰

As with all things, there has been a shift from the dependence on the car towards an era of revival of traditional train travel and the redevelopment of the train station. The stations have become transportation hubs for connecting transport systems as well so one of the new uses of major stations is for suburban commuter traffic via subway or light rail. To add some perspective, the light rail is the preferred option for many regeneration projects. It is defined as an urban passenger guided train service that employs steel track laid in existing public streets. These quiet, relatively high-tech rail cars are well adapted to city as well as suburban needs. Light rail has the advantage of flexibility and is widely considered cost effective to install and maintain compared to a heavy rail system. Boarding may be from either a high or low platform level and can operate effectively at flows between 2,000 and 20,000 passengers per hour. In opposition, heavy rail is a type of urban passenger transportation service that may best be envisioned as high-capacity, semi-automated trains of four to ten cars, that make frequent stops and are powered by electricity from a third rail. The heavy-duty railroad cars are costly and disruptive to construct. Boarding is from a high-level platform and services 10,000 to 50,000 passengers per hour.¹¹

In the past, rail stations were more attentive to fulfilling their functional requirements but today there is obviously a greater sensitivity to the role of the station in its context.¹² The single transportation function of the traditional station has given way to multi-functionality, which has led to complex and diverse station forms. Stations are being built to create a central gathering place that elevates the quality of life of an area. Civilized life depends upon the existence of public gathering places where people can meet and have social interactions.

The design of the train station needs to change from the emphasis being on the train to the focus being on the passengers. A different design approach exists today when it comes to

ticketing, waiting, transferring between modes of transportation, and safety. Some architects are exploring avenues beyond typology to include issues of structure and the contributions of stations to the overall community atmosphere.¹³

Public transportation was becoming increasingly popular again as a solution to curtail air pollution, alleviate traffic congestion, and even thwart terrorism. The importance of a sustainable and safe railroad station for its architecture, source of community unity, and civic pride was also being recognized.

Precedents

Considering the central importance of transportation centers in representing their communities, it is critical to study examples of train stations with an emphasis on the community's character in order to understand both their strengths and weaknesses. The stations selected exemplify how the design style has changed over time but the meaning of space continues to be steadfast. Each example chosen clearly defines the user experience between the train platform and the urban edge as well as the role of the railroad building as a gateway. As one disembarks from the train, there is only the railroad station that exists before emerging into the community. This passageway to the street is a unique gateway to the community.

Pennsylvania Station and Grand Central Station

There are a number of train stations that are truly significant to the historical importance of rail travel in America. New York City has two prominent examples of train stations that are beloved by the public, the original Pennsylvania Station and Grand Central Station. The history that exists between these two stations reflects how the attitude toward rail travel shifted from the beginning to the middle of the twentieth century and illustrated the importance a train station can have on its community, city, and region.

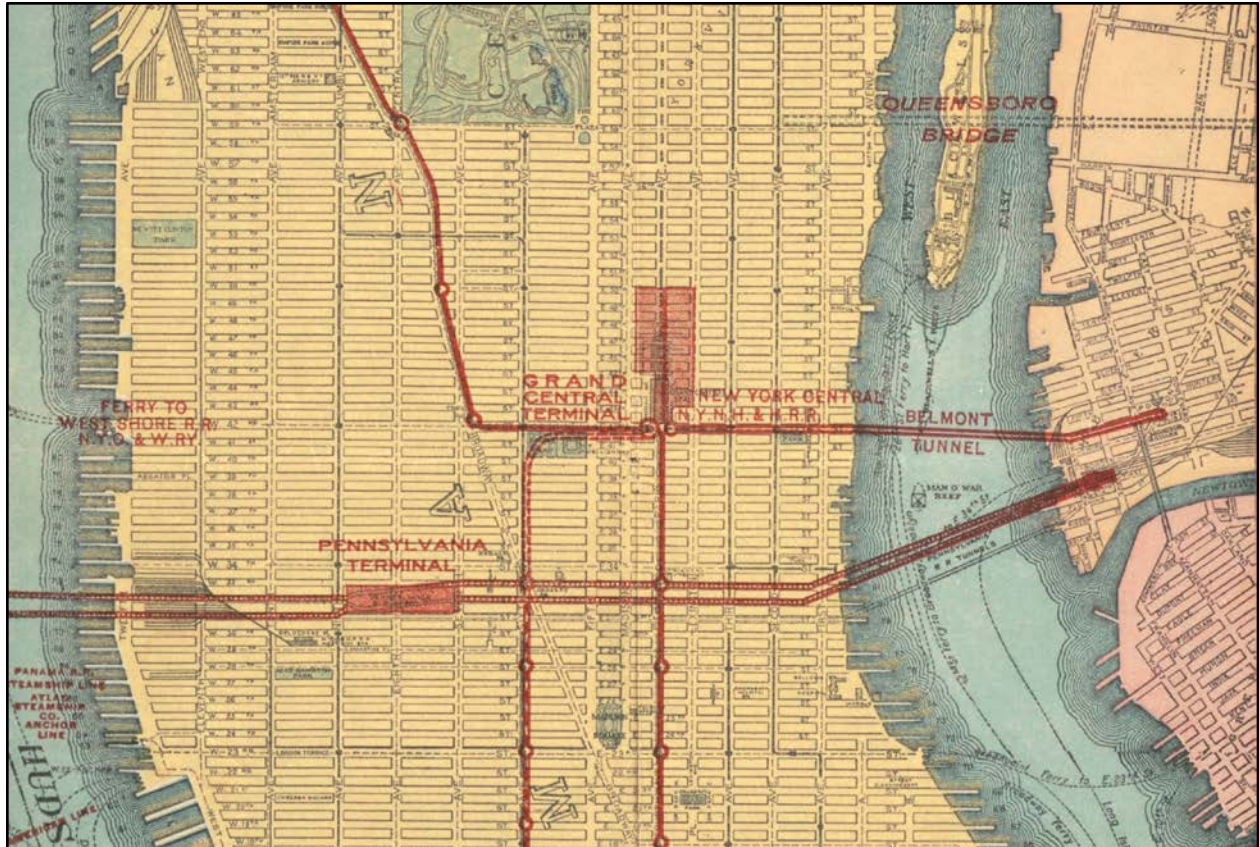


Figure 2: New York City Map 1908 showing Pennsylvania Station and Grand Central Station locations, Source Rand McNally and Company. [Rapid transit map of Manhattan and adjacent districts of New York City]. [New York?: Rand McNally & Co, 1908] Map. Retrieved from the Library of Congress, <http://www.loc.gov/item/00554816/>. (Accessed October 21, 2017.)

The Original Pennsylvania Station was opened to the public in 1910 and was supposed to endure forever. However, no one could have imagined that a mere fifty-three years later that this station would be slated for destruction. Pennsylvania Station was an exquisite piece of Beaux-Arts architecture that epitomized the intent of the City Beautiful Movement which was to introduce beautification and monumental grandeur into cities. The midtown Manhattan railroad station was designed by McKim, Mead, and White and was a breathtaking example of neoclassical style architecture with grand waiting rooms, a dramatic vaulted glass ceiling, and massive pink granite Doric columns.¹⁴

Pennsylvania Station gave travelers, visitors, and commuters an experience of grandeur, glamour, and the feeling of romance when entering and leaving Manhattan. Aside from the monumental space, the public had access to an array of amenity spaces including a formal dining room and coffee shop. The terminal covered two city blocks, from Seventh to Eighth Avenue and from 31st to 33rd Street.

There were many reasons why Pennsylvania Station did not last forever. At the time, the location of Pennsylvania Station was in a seedy area of Manhattan that was described as on the edge of nowhere. Travelers often used the station as a means to quickly just come from and go to their destinations.¹⁵ Furthermore, during the initial design phases of the project, the Pennsylvania Railroad company wanted to build a hotel above the train station. After much apprehension from the architects, a hotel was sacrificed in order to create meaningful interior spaces which left the station only three stories above the street level which was very low for a city committed to building vertically with tall skyscrapers.¹⁶ By the early 1960's, public interest declined in using train transportation and the railroad companies were in dire financial straits. Pennsylvania Station's most valuable asset was its real estate, in particular its air rights. As a result of the financial constraints, a decision was made to build a new Pennsylvania Station underground and make way for the new Madison Square Garden arena. As demolition was underway, there was public apathy for the loss of this architectural jewel until it was already gone.¹⁷



Figure 3: Original Pennsylvania Station (Interior), Source “NYP LOC2” Cervin Robinson.

https://commons.wikimedia.org/wiki/File:NYP_LOC2.jpg (accessed September 5, 2017).

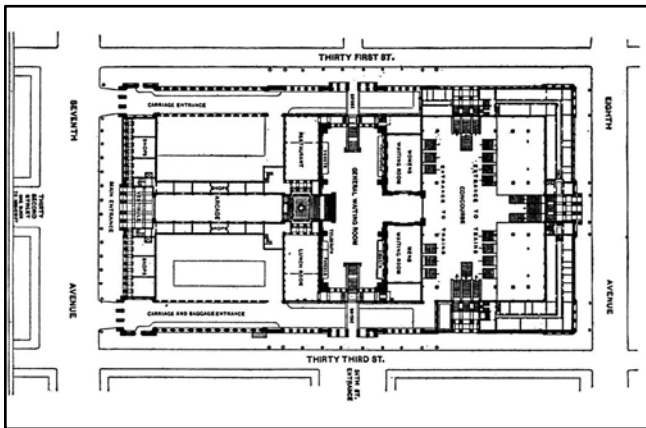


Figure 4: Original Pennsylvania Station (Plan), Source “Pennsylvania Station New York floor plan” John A Droege (author of “Passenger Terminals and Trains”).

https://commons.wikimedia.org/wiki/File:Pennsylvania_Station_New_York_floor_plan.jpg (accessed October 11, 2017).



Figure 5: Original Pennsylvania Station (Aerial), Source “Penn Station 3” Unknown.

https://commons.wikimedia.org/wiki/File:Penn_Station3.jpg (accessed October 11, 2017).

Grand Central Station, like Pennsylvania Station, had architectural and symbolic values that created an urban center. The station was designed by Reed and Stem Architects in 1913 and led to the development and growth of the neighborhood after it was opened. New shopping areas, office towers, hotels, and apartments within its immediate vicinity began to appear as a result of the station's civic engagement. For a while there were recreation places, art galleries, exhibition space, and a television broadcasting studio that drew in masses of people. As development began to expand surrounding the station, an axis promenade reinforced the urban gesture created between the station and the city. To this day, New Yorkers utilize Grand Central as a gathering place for a wide variety of events besides a travel hub. There are restaurants and open spaces for important events that promote a shared community experience.

Preservationists faced much opposition to saving Grand Central because the station had fallen into disrepair and its air rights were viewed as more profitable than the existing building. The strength of the preservationists was tested this time and was successful in saving Grand Central so it would not succumb to the same fate as Pennsylvania Station. In 1976, Grand Central was designated a historical landmark and restored back to its original splendor. To this day, Grand Central attracts crowds to appreciate the space and many activities.¹⁸



Figure 6: Grand Central Station (Opening 1913), Source “Grand Central Terminal Exterior 42nd St at Park Ave New York City” Unknown.

https://commons.wikimedia.org/wiki/File:Grand_Central_Terminal_Exterior_42nd_St_at_Park_Ave_New_York_City.jpg (accessed October 11, 2017).



Figure 7: Grand Central Station (Axis Promenade), Source “Grand Central Terminal Park Ave viaduct Summer Streets” Beyond My Ken.

https://commons.wikimedia.org/wiki/File:Grand_Central_Terminal_Park_Ave_viaduct_Summer_Streets.jpg (accessed October 11, 2017).



Figure 8: Grand Central Station (Main Concourse), Source “Grand Central Station Main Concourse Jan 2006” Original photography & stitching by Diliff, horizontal correction by Janke.

https://commons.wikimedia.org/wiki/File:Grand_Central_Station_Main_Concourse_Jan_2006.jpg (accessed October 11, 2017).

World Trade Center Transportation Hub

Today, one of the most well-known train station designers is Santiago Calatrava, who designed the World Trade Center Transportation Hub in downtown New York City. The project was completed in 2016 and was part of the master redevelopment plan surrounding the World Trade Center following the September 11, 2001 terrorist attacks. Given the weight of the events that transpired here the building needed to create a symbolic image for New Yorkers and make a profound statement for the world.

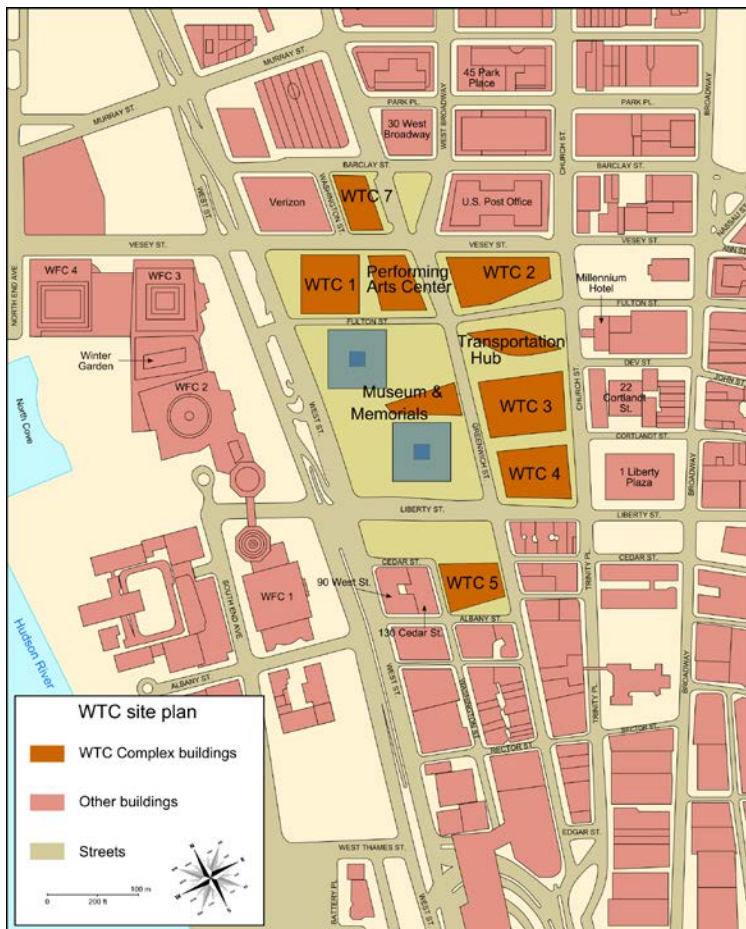


Figure 9: WTC Transit Hub Master Plan, Source “Lageplan des WTC-Komplexes mit neuen Straßenabschnitten” Unknown. https://de.wikipedia.org/wiki/One_World_Trade_Center#/media/File:WTC_Building_Arrangement_in_preliminary_site_plan.svg (accessed October 22, 2017).

Calatrava believes that “a railway station can generate a city.”¹⁹ This is a critical point to make because a train station is a prominent piece of architecture that should impact the community. The World Trade Center Transportation Hub inspires those that pass through it and offers an opportunity for the public to ponder the memory connected with the surrounding context for years to come. The goal of the project was to design a space that for a few moments out of the day, the public could feel that they occupied a space that belonged solely to them.

On the exterior, the structural steel ribs reach upward forming a canopy along the edge of the building and create an entry sequence as the building pinches inward. Inside, the building opens up onto a symmetrical staircase and offers significant views over the main concourse area. Travelling through the vast space, visitors have access to many commercial shops and a massive skylight, known as the oculus. The oculus is 330’ in length and is an operable skylight that can be opened on the anniversary of September 11th. One World Trade Center is perfectly framed through the opening of the oculus and becomes an object within the terminal.

Between each of the steel ribs, light is transmitted into the building in an effort to expose people to natural light as much as possible and get light into the lower platform levels. At night, the interior lighting illuminates the street front and is a beacon of prosperity and hope for a brighter tomorrow. There are a number of civic responsibilities this hub successfully exemplifies as there is a connection of green pedestrian spaces that allow travelers to orient themselves and navigate downtown Manhattan. Both the local and visiting travelers now have a monument building that they can use for symbolic value which is more than the coming and going on their way to catch a train.²⁰



Figure 10: WTC Transit Hub Steel Ribbed Entry Form, Source “World Trade Center Transportation Hub in New York City, USA (35970708720).jpg” Marco Verch. [https://commons.wikimedia.org/wiki/File:World_Trade_Center_Transportation_Hub_in_New_York_City,_USA_\(35970708720\).jpg](https://commons.wikimedia.org/wiki/File:World_Trade_Center_Transportation_Hub_in_New_York_City,_USA_(35970708720).jpg) (accessed October 22, 2017).



Figure 11: Oculus, Source “Interno del World Trade Center Transportation Hub” Anthony Quintano. https://en.wikipedia.org/wiki/Westfield_World_Trade_Center#/media/File:Oculus_World_Trade_Center_-_August_18_2016.jpg (accessed October 22, 2017).

Providence Train Station

A modest precedent that is closely aligned with the proposed Annapolis train station site is the train station in Providence, Rhode Island. The train station was built in 1986 by the offices of Skidmore, Owings & Merrill. It serves both the MBTA, the local commuter transportation to Boston, and Amtrak with nationwide destinations and shipping. The station has four tracks and two island platforms for passengers and a fifth track for Providence and Worcester Railroad freight cars.²¹

Similar to Annapolis, Providence is a capital city and both sites are at the foot of their State Houses. Providence train station is a small station with beautiful interior architecture, a large square clock tower, and a popular cafe used by travelers and non-travelers. A parking garage is nearby as well. The location is also desirable because it is within walking distance of

downtown Providence and its many points of interest which include Johnson and Wales University, Providence Place Mall, and Waterplace Park which is a site for art installations, concerts, and is connected to cobblestone-paved pedestrian walkways along the waterfront known as the Riverwalk.²²



Figure 12: Providence Station Site Plan, Source Skidmore Owings & Merrill.
http://www.architectmagazine.com/design/buildings/past-progressives-providence-train-station-som_o
(Accessed November 22, 2017).



Figure 13: Providence Station Exterior View with State House Backdrop, Source Skidmore Owings & Merrill. <http://www.architectmagazine.com/project-gallery/providence-train-station-741> (accessed November 22, 2017).



Figure 14: Providence Station Interior Concourse, Source David B. https://www.tripadvisor.com/Attraction_Review-g60946-d561332-Reviews-Providence_Train_Station-Providence_Rhode_Island.html#photos;geo=60946&detail=561332&aggregationId=101 (accessed November 22, 2017).

Future of Rail Infrastructure

Creating value for a neighborhood through the design of the train station is a meaningful objective for a community, city, or region. Whether you are waiting for a train or just missed one, having a space where you can productively utilize your time will significantly enhance your journey. When the space is engaging, it will attract a greater number of people even those whom are not intending to travel anywhere. A train station becomes a unique destination when it is inviting and integrates the entire community.

A train station needs to originate from a vision agreed upon by local residents on what they think can best represent who they are as a community. Working from the outside to the inside, or vice versa, every piece can be considered a place that can expand and grow a

community. The solutions to advance space can range from gallery and performing arts programs to local markets and outdoor civic plazas. An even greater outcome that will result from more people engaging with a train station is comfort and pride with a familiar local space and an increase in the desire to use light rail transportation.

Rail design can benefit greatly from thinking beyond the station. Train stops need to highly consider the wayfinding experience of the user to ensure a comfortable transition between spaces. One way for this to be done is by bringing life to the urban edges and organizing activities to create destinations within. If this theory holds true, the users are no longer passengers and will not come and go between destinations but actively fill the space out of a desire to stay.²³

On a larger scale, throughout America, new investment projects are trying to advance future rail transportation opportunities. Recently, Amtrak announced their “Ready to Build” campaign which will focus on the modern passenger rail experience. Amtrak’s project goal is to revitalize five major urban railroad station centers.

The majority of the project’s investment is focused along the critical northeast corridor which is the most congested passenger line in the country. The northeast corridor of the United States stretches between Washington D.C. and Boston. The stations Amtrak intends to improve are New York City’s current Pennsylvania Station and its extension at Moynihan Station, Philadelphia’s 30th Street Station, the Baltimore Pennsylvania Station, Washington’s Union Station, and Chicago’s Union Station.²⁴

Considerable effort is being made to improve the experience of the rider. In New York and Washington D.C. the goal is to create and expand the existing stations in order to afford new opportunities for the growth of more trains that would connect people to their destinations. In

Philadelphia, Baltimore and Chicago the plan is to find master developers that can help improve the urban context surrounding the train stations by building new offices and housing that will transform the neighborhoods the train station serves.

The Purple Line

New infrastructure and the building of the Purple Line within the Washington D.C. community promotes the use of rail transit on a local level. The idea of mobilizing Washington’s perimeter suburbs is similar to the proposal of light rail transit connecting Annapolis to its outreaching urban centers. The Purple Line is going to energize the city by connecting to existing public transportation systems and improving pedestrian experiences, which is the similar intent of introducing rail transit into Annapolis.

PURPLE LINE: EVERYTHING YOU NEED TO KNOW	
START DATE:	2017
OPENING DATE:	2022
RIDERSHIP MAXIMUM CAPACITY:	74,500 DAILY BY 2040
TRANSFER HUBS:	NEW CARROLLTON, COLLEGE PARK, SILVER SPRING, BETHESDA
STREETCAR VEHICLE:	OVERHEAD POWER, SINGLE- CAR OPEN COMPARTMENTS, 136'
TIMETABLE:	7.5 MINUTE INTERVALS
PATH:	15/16.2 MILES DEDICATED LANE 1.2/ 16.2 MILES MIXED TRAFFIC CROSS TRAFFIC INTERACTION
FARE COST:	TO BE DETERMINED

Figure 15: Purple Line: Everything you need to know, Source by Author. <https://wamu.org/story/17/08/28/everything-need-know-purple-line/#.WaQdbdGLHPk.twitter>

The proposed plan for the Purple Line will be sixteen miles in length connecting Bethesda, Maryland to New Carrollton, Maryland and service twenty-one stations along its path. The system is going to reduce travel time for the entire region and bring riders within close proximity to work, school, and recreational activities. It will also provide traffic relief which is nearing capacity on the roads. The Purple Line will also put the region on a positive path to energy independence and a cleaner environment while simultaneously connecting people to urban centers that have access to more housing and job opportunities to revitalize city centers.

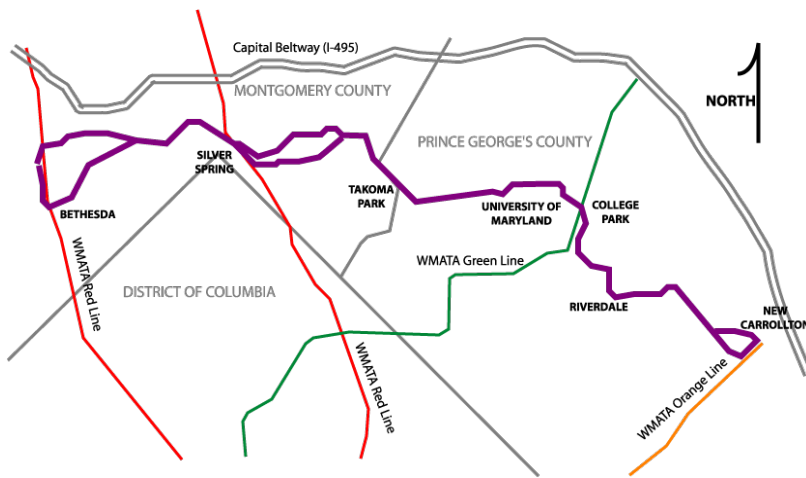


Figure 16: DC Purple Line Map, Source “Washington Purple Line.png” Arturo Ramos. https://commons.wikimedia.org/wiki/File:Washington_Purple_Line.png (accessed October 22, 2017).

As the country goes forward a rail transportation system can offer a solution to a number of social, urban, and environmental issues. Progress requires action, and using rail technologies to reach Annapolis will advance the city and the relationships within its community. When given the option not to drive, commuters opt for the usage of light rail.²⁵ Train stations are a key public space and piece of infrastructure in a community. Railroad stations become places that are “community hubs” that are safe, facilitate social inclusion, promote cohesion, and contribute to the development of strong communities. A community-orientated train station is the heart of the town where people can engage, shop, eat, work, play, learn, and relax.

Chapter 2: The City of Annapolis

History and Culture

Annapolis dates back to 1649 when it was settled by a Puritan community fleeing from Virginia. Their settlement was originally called Providence and located on the north side of the Severn River where it meets the Chesapeake Bay. It was not until 1684 that the settlement expanded onto the south side of the Severn River and designated the capital in 1694. The city was renamed Annapolis honoring Princess Anne, the future Queen of England.²⁶

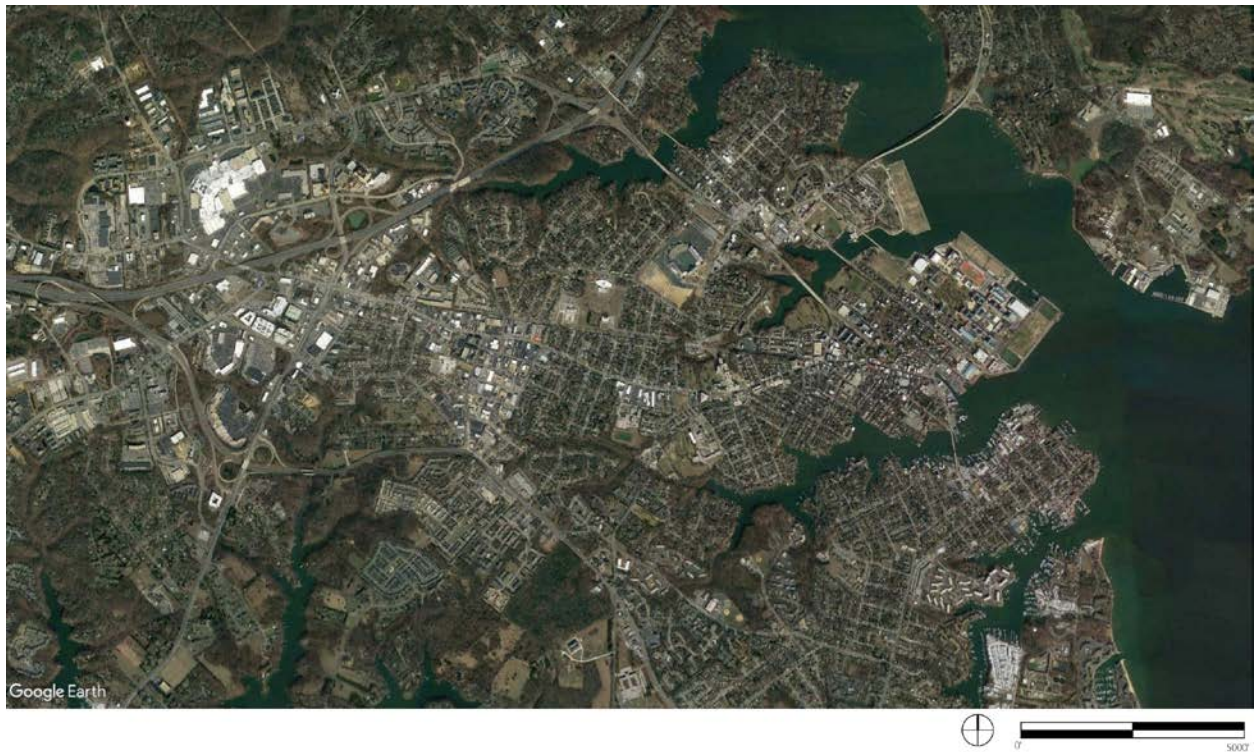


Figure 17: Annapolis, Maryland Aerial Photograph, Source Google Earth Pro, 2017

Annapolis is one of the oldest and most historically authentic small cities in America. The city is 7.2 square miles of land and 17 miles of waterfront.²⁷ In the early 1780's it was the first peacetime capital in the United States and used as an assembly place for the young Congress. The city was the site of the Annapolis Convention, in 1786, which led to the Federal Constitutional Convention. Another significant highlight of the city's history occurred in 1845 when the U.S. Naval Academy was established at the Army's Fort Severn, where it remains today. Due to Annapolis' close proximity to water, as seen in the aerial photograph, the primary industries make sense which include the packaging of seafood and the manufacture of small boats, plastics, and aerospace parts. The lucrative maritime industry in Annapolis is essential to its economy as well.

The city prides itself on its connection to its rich history and connection to the waterfront. For many years the waterfront was the main point of entry into the city with ships arriving regularly from places both near and far. Without the connection to the water, Annapolis would not have been as historically significant. Given the great deal of attention paid to the harbor front, the surrounding City Dock area is considered one of the best preserved in the country. With the easy access to water Annapolis is the self-proclaimed sailing capital of the world. Sailing is totally linked to American culture, its art, literature, history, music, and film. It therefore makes perfect sense for the National Sailing Hall of Fame to find its home in Annapolis. It is also the host city to the national sailboat show which annually draws people from all over the globe. The waterfront is an extremely active area and is still used by local boaters, sailing schools, and for related symposiums. It also supports a space along the water's edge for the public to walk through the different shops, dine at local restaurants, and enjoy the majestic views.²⁸



Figure 18: Annapolis Harbor Front, Source by Author

Part of the history relates to its deeply ingrained architectural identity. Annapolis has been referred to as “a museum without walls” because there are fifteen different architectural styles that can be found throughout the city. Each of the styles represents the cultural importance as well as the public and private life of the Annapolis community.²⁹ In 1965, the city of Annapolis was even named a National Historic Landmark. Looking beyond the unique places that draw people in can be found charming neighborhoods filled with community pride.



Figure 19: Annapolis Historic Center, Source by Author, Underlay Google Earth Pro, 2017

The traditional context of the downtown historic center is constructed with an abundant amount of stone, brick, and wood materials. Solid walls with punched openings can be found walking down many of the narrow streetways. Bricks dominate sidewalk edges and the streetscape. Many of the buildings in the downtown area are organized around public spaces that surround the State House, harbor front, and other public gathering areas. The scale of the buildings is relatively low ranging from 2-5 stories. New architectural development needs to be cognizant to preserve the image of Annapolis but can have the flexibility to interpret the typical material pallet with a more modern approach.



Figure 20: Annapolis Material Palette, Source by Author

Today Annapolis is located in Arundel county in the heart of Maryland and is still the center for state government activities. In 2009, a Comprehensive Plan was compiled in order to outline a number of goals and provide direction for city planning over the next decade. The purpose of the Comprehensive Plan is to address issues important to the citizens and establish a path to provide progress for the city. Local residents understand that their city has a character that needs to be celebrated, preserved, and appreciated which makes them hesitant to significant changes, however, without an effort to grow the city they may find they are no longer relevant to the region. The high-level goals outlined are to “Preserve and Enhance Community Character,” “Maintain a Vibrant Economy,” and “Promote a ‘Green’ Annapolis.” Some of the specific goals are to increase public access to the waterfront, create a pedestrian friendly environment, and provide a variety of public open spaces to sponsor various activities.³⁰

Transportation and access to and within Annapolis is seen as a problem. Finding a way to improve mobility in the city is aspired to by advancing realistic land use concepts and transportation strategies. It is understood that current car usage cannot increase. In the past, the simplest solution was to expand highways to accommodate more cars but the streets are now at maximum capacity and there exists a demand to move people/goods to adjacent areas of the city.

Currently, the public transportation system in Annapolis consists of a regional commuter bus provided by the Maryland Transit Administration. Most city residents live within a 5-minute walk to a bus stop. The city lacks a rail system, the bicycle network is limited and divided, and even though the city is predominantly walkable there is much that can be improved.

The city wants to provide regional public transportation for every citizen in order to move away from single-occupant vehicles. One policy suggestion outlined in the Comprehensive Plan was to study the potential to connect Annapolis to the Washington and Baltimore metropolitan

regions via rail. By introducing improvements and new types of commuter transport there will be a positive impact because people will have options on how they enter and leave the city.³¹

Destinations

There are many reasons people come to Annapolis. Depending on the reason for coming, the destination falls into one of two categories. The first is the local resident using their neighborhood amenities to conduct their daily lives. The other is the outsider coming to experience Annapolis as a visitor who may be unfamiliar with the surrounding neighborhoods.

Currently, the main highway axes that approach the city are from Baltimore along route 97, Washington D.C. on route 50, and from the Eastern Maryland Shore which is provided by access over the Chesapeake Bay Bridge.

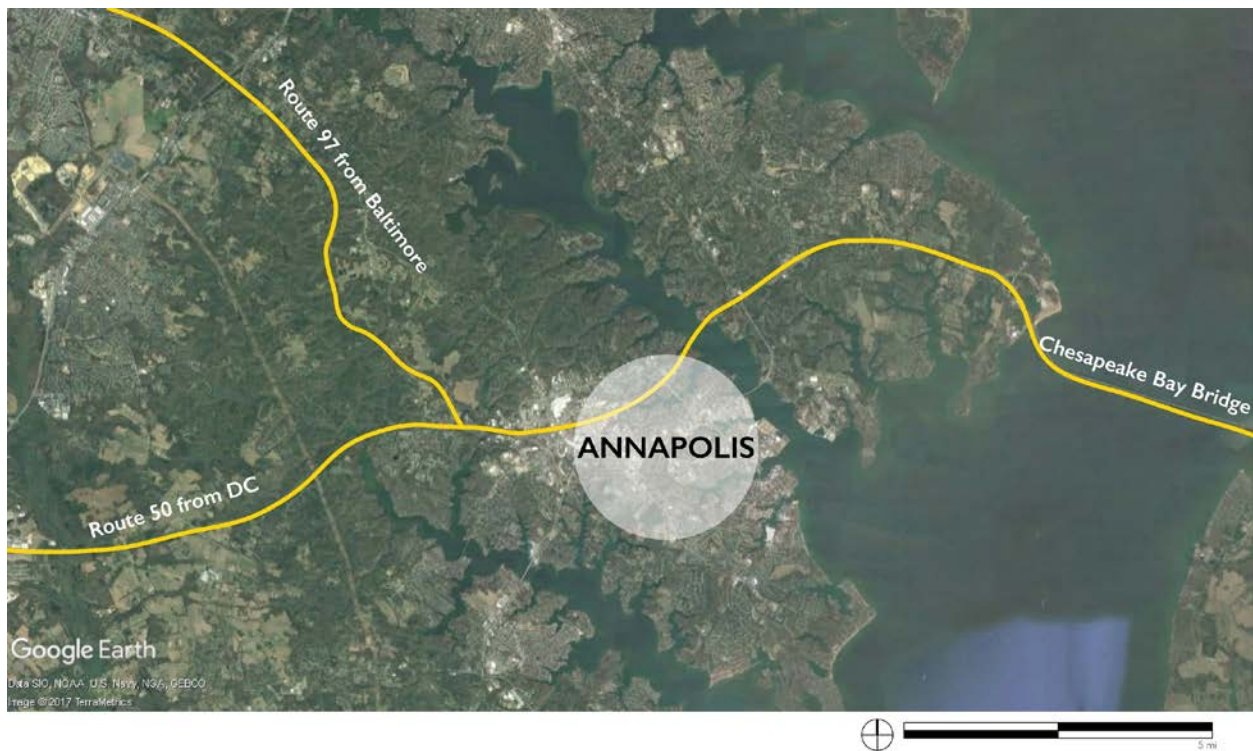


Figure 21: Highway Axes into Annapolis, Source by Author, Underlay Google Earth Pro, 2017

As vehicles approach the historic center the main streets become minor, one to two lane traffic routes. Highways converge together and exit onto Rowe Boulevard and approach the city from the northwest. More local traffic enters the historic center through West Street from the west and Compromise Street from the south. In downtown, there are a number of parking garage structures that can be used but at times of peak activity they cannot meet the demand.



Figure 22: Downtown Annapolis Roadway Entryways, Source by Author, Underlay Google Earth Pro, 2017

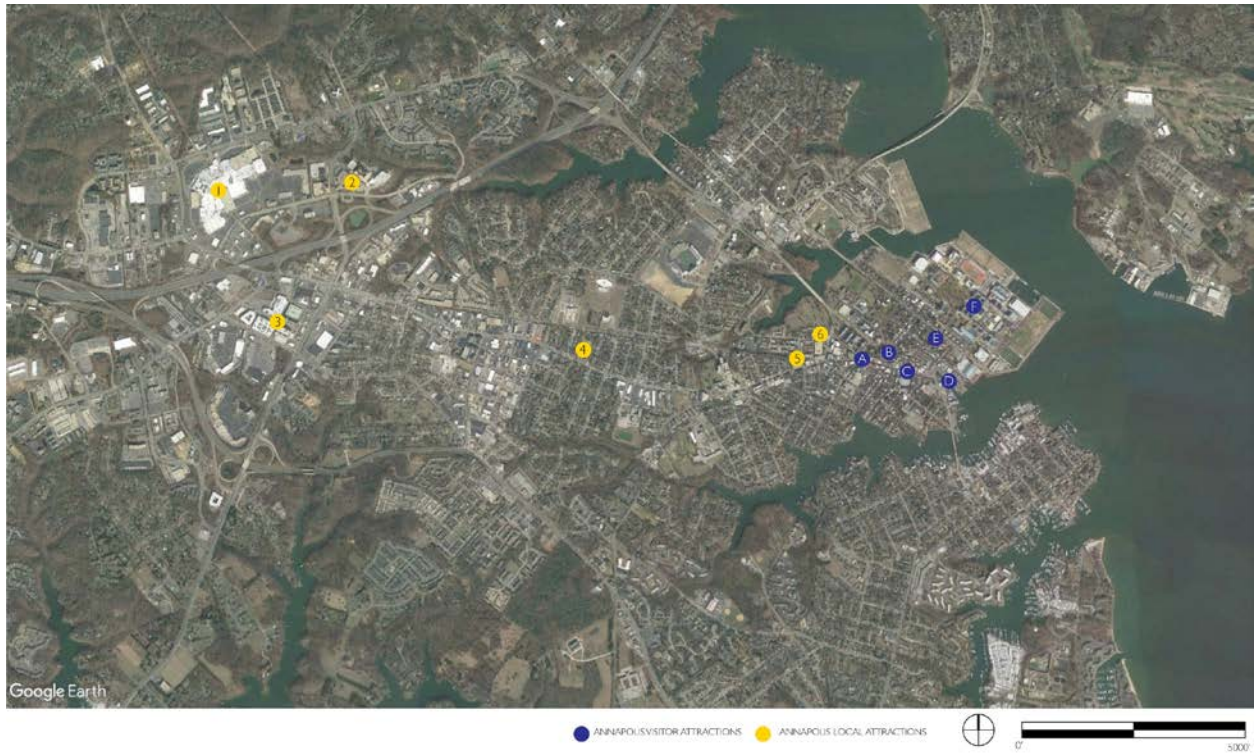
Annapolis has several different communities. Each one makes up a smaller residential community that contributes to the whole city. The community attributes that are essential allow people to meet and be active members in their town. Many of the community enclaves surround the downtown center of Annapolis. This region of Annapolis is comprised of young working families and retirees that utilize the schools, shops, and other public amenities.

For a community that has a significant number of suburban residents, there are many different shopping areas where people conduct regular activities. The Westfield Mall off of Route 50 is one of the more popular areas to find local residents. Other commerce areas that local residents gravitate to include areas surrounding newer apartment complexes where they live and work as well as along the West Street corridor. Throughout Annapolis, the Anne Arundel Medical Center and Anne Arundel Public Library provide the community destination points that are essential. There are also several community centers in Annapolis that offer activities that entertain the public. The Stanton Center is the most prominent local community center because it is part of the “Old Fourth Ward” and formerly the Stanton School. During a visit, I learned first-hand that the building was saved from the wrecking ball in the 1960-70’s during an urban renewal period. It was preserved because of its significant historical neighborhood connection.

As an outsider coming to explore Annapolis for a day there is another side of the city to visit. Primarily the visitor is more drawn to the historic center where there are more activities focused on the significance of the city. The primary reason people from all over the world are attracted to Annapolis is because of its prime location on the Chesapeake Bay Harbor and the presence of the U.S. Naval Academy. Annapolis offers visitors a unique glimpse into the past and an opportunity to explore the city’s local craft shops and enjoy local foods from the sea.

Each place of interest for Annapolis’ visitors has multiple entertainment offerings. St. Anne’s Episcopal Church is one of the more iconic landmarks in the city and is an orienting point because of its axial relationship with West Street and Main Street. The State House is the capital building and also helps people locate where they are because the building is situated at the highest point and is visible from all areas of the city. Walking the grounds of the State House one can also find the Treasury Building which is the oldest public building in Annapolis. Also,

many people can be seen walking along Main Street and Dock Street where there are numerous shops and waterfront restaurants. Along the harbor edge there are prominent market spaces, public gathering areas like Susan B. Campbell Park which offers views overlooking the Chesapeake Bay, and the National Sailing Hall of Fame. Within the streets of the downtown center, visitors enjoy the William Paca House and Garden. Paca was one of three local residents that signed the Declaration of Independence. Another common destination is the U.S. Naval Academy which offers expansive grounds to walk, grand buildings to explore, cultural museums to learn from, and athletic events to enjoy.



	1 WESTFIELD ANNAPOLIS MALL		A SAINT ANNE'S EPISCOPAL CHURCH
	2 ANNE ARUNDEL MEDICAL CENTER		B ANNAPOLIS STATE HOUSE
	3 ANNAPOLIS TOWN CENTRE		C ANNAPOLIS MAIN STREET
	4 ANNE ARUNDEL PUBLIC LIBRARY		D ANNAPOLIS HARBOR FRONT
	5 ANNAPOLIS WEST STREET		E PACA HOUSE
	6 ANNAPOLIS COMMUNITY CENTER		F UNITED STATES NAVAL ACADEMY

Figure 23: Points of Interest in Annapolis, Source by Author, Underlay Google Earth Pro, 2017

Analysis

Studying the demographics of Annapolis provides insight on how improving the transportation standard for the city will critically support the people and future development. The most recent population count for Annapolis was 38,841 people living in the city and around 20,000 employees.³² In the last century, Annapolis has had a steady increase in population and is expected to continue. By 2030 it is anticipated that the Annapolis will have a population of about 42,600 people.³³ On average, 2 million visitors travel to Annapolis each year to enjoy the pleasures of an excellent marketplace for all types of goods and services.³⁴

An important aspect of the Annapolis community is its role as a college town. Annapolis is the home to both the United States Naval Academy and St. John's College. On any given day, midshipmen can be seen walking throughout the city in their uniforms. The U.S. Naval Academy prepares young men and women for America's naval service. The U.S. Naval Academy was established on October 10, 1845 at Fort Severn. The original student body was 50 men. Today enrollment is 4,000 and 20% of the entering freshman are women.³⁵ St. John's College is known as the third oldest institution of higher learning in the United States. The school was founded in 1696 as King William's School and is located on a small campus next to the U.S. Naval Academy along College Creek. The students are nicknamed Johnnies and there are usually 450-475 undergraduate students enrolled in the school each year. Given the significant relationship the two schools have with each other and the prominence in Annapolis' identity, annually Johnnies battle Midshipmen in the Annapolis Cup croquet match; a beloved local tradition that St. John's College has won 26 of the 33 matches.³⁶

As far as population age trends, the median age in Annapolis is 37.2 which is similar to the rest of Anne Arundel County.³⁷ A significant proportion of the population is comprised of young to middle aged adults between the ages of 25 to 44 years old. The largest proportion of ages within the Annapolis community are children under the age of 18 who represent 23% of the population. In the years to come, it is anticipated that the greatest growth rate will be within the age of people 50-65 years old and those 85 and over. With an increase in these age ranges it is reasonable to project that in the coming years, there will be a significantly large group of elderly people in the population. Given the age demographic data, Annapolis is a community comprised of many young families with children and an increasingly aging population. Annapolis can benefit from more efficient public access via light rail to successfully transport its population to places of employment or maintain the ability of people to live independently as they age.

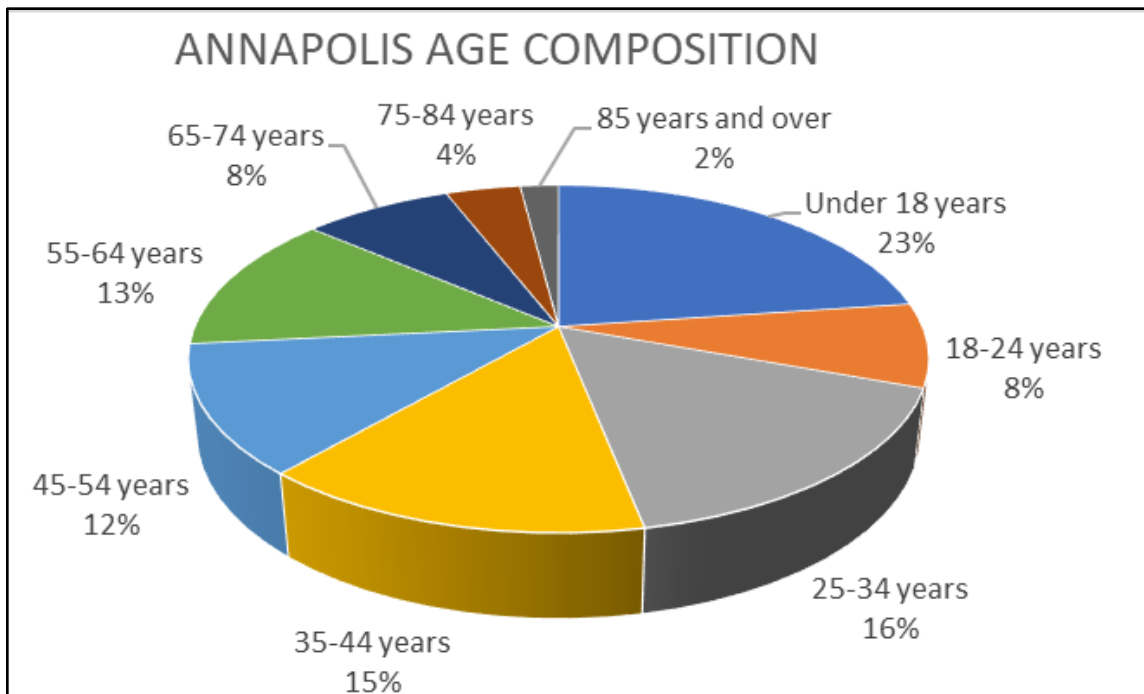
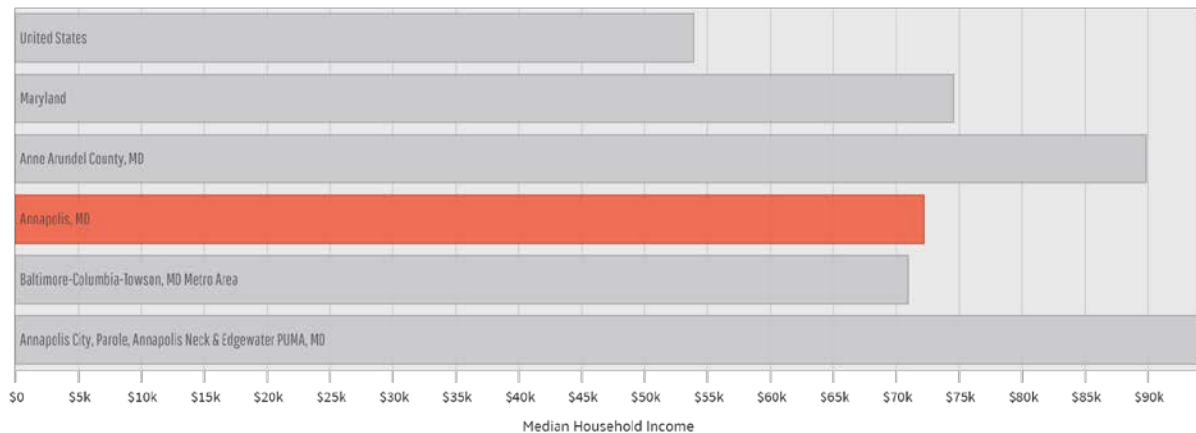


Figure 24: Annapolis Age Composition, Source by Author
<https://www.annapolis.gov/813/Demographic-Statistical-Profile>

For the most part, there is economic security within Annapolis. The city is comprised of more than 15,000 homes.³⁸ The median household income is \$72,214. Compared to the rest of Anne Arundel county, this average is lower but in relation to the rest of the United States this number exceeds the normal household income. Property values range between \$350,000 and \$400,000 which is higher than any other part of the county.³⁹ A proposal to bring rail into a city is more certain when the community possesses substantial financial backing in developing the project. With people wanting to visit or live in Annapolis, a rail line will only heighten their interest.

Median Household Income in Annapolis, Md



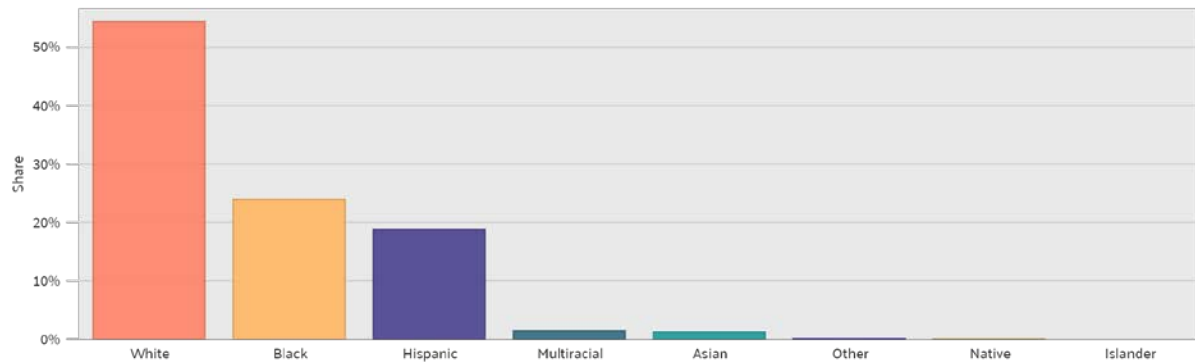
Dataset: ACS 5-year Estimate
Source: Census Bureau

DATAUSA:

Figure 25: Median Household Income, Source Census Bureau
<https://datausa.io/profile/geo/annapolis-md/#income> (accessed October 28, 2017).

In Annapolis there is also a diverse population. While the majority of the population is 54.4% white, there is a considerable number of Black and Hispanic members in the society, 23.9% and 18.8%, respectively. The remainder of the population consists of Multiracial, Asian, and Other backgrounds. There is a large quantity of single person living and public housing throughout the city. With new developments there is a desire to create more affordable housing opportunities within the community. This information suggests that over time the cultural prominence will begin to take shape and influence the community to inspire new connections among local residents. Similarly, with a desire to expand affordable housing, new lower income residents will require better access to public transportation options. Introducing a train system will help a community to reach jobs that will increase their standard of living.

Race & Ethnicity in Annapolis, Md



Dataset: ACS 5-year Estimate
Source: Census Bureau

DATAUSA:

Figure 26: Race and Ethnicity Data, Source Census Bureau
<https://datausa.io/profile/geo/annapolis-md/#income> (accessed October 28, 2017).

The labor force is very active in Annapolis. There is an estimated 20,456 employees in Annapolis today. The most common occupations Annapolis residents hold include Management, Business, Science, and Arts, Sales and Office, and Service. Annapolis residents hold positions of varying degree which suggests the city is very diverse in nature. With many employment opportunities throughout the Maryland region and within Annapolis, light rail service will provide more options for people.

Employment by Occupations in Annapolis, Md

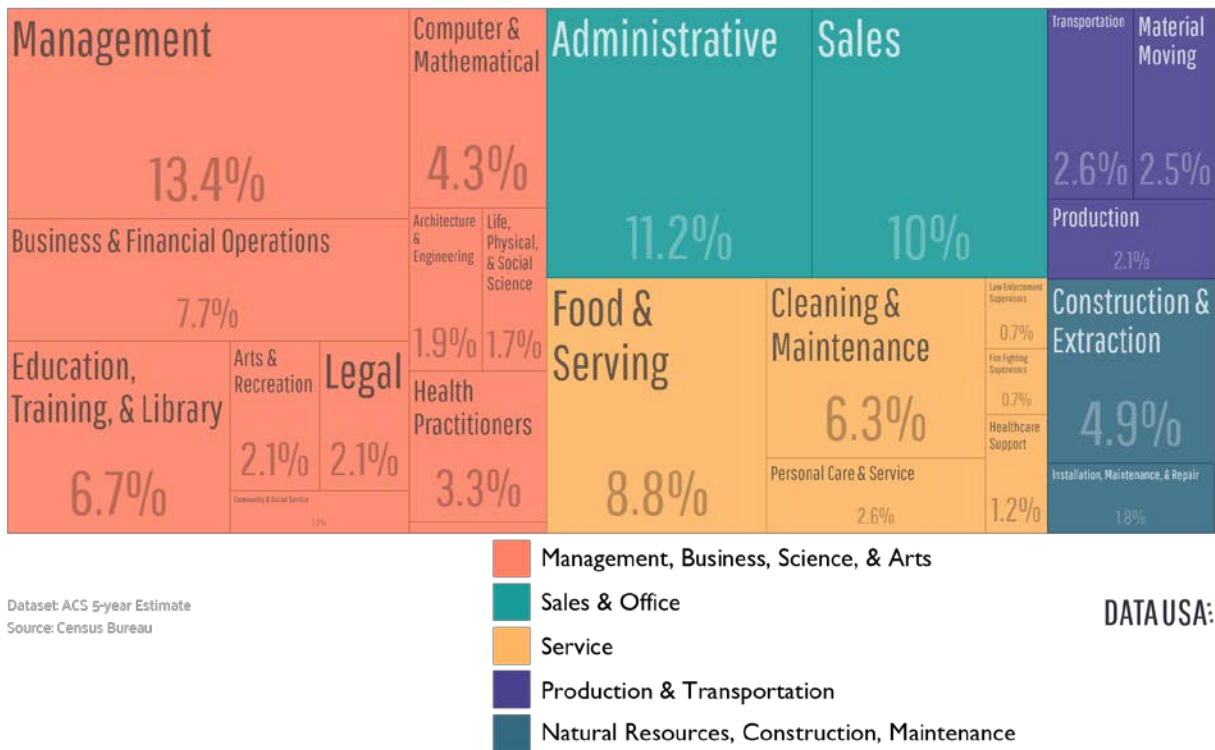


Figure 27: Annapolis Employment by Application, Source Census Bureau <https://datausa.io/profile/geo/annapolis-md/#income> (accessed November 15, 2017).

More than half of the community residents commute out of the city to their place of work within the greater Maryland region. A majority of the families in the city have two cars and drive independently to work. Existing public transportation to places of employment are viewed as inefficient and thus rarely used. The most common method of travel by the public is driving alone at 69.7%, followed by carpooling at 7.92%, and the third use of public transit at 7.2%. Other methods of travel to work include those that work from home, walk, call a taxi, bike, motorcycle or other.

Commuter Transportation in Annapolis, Md

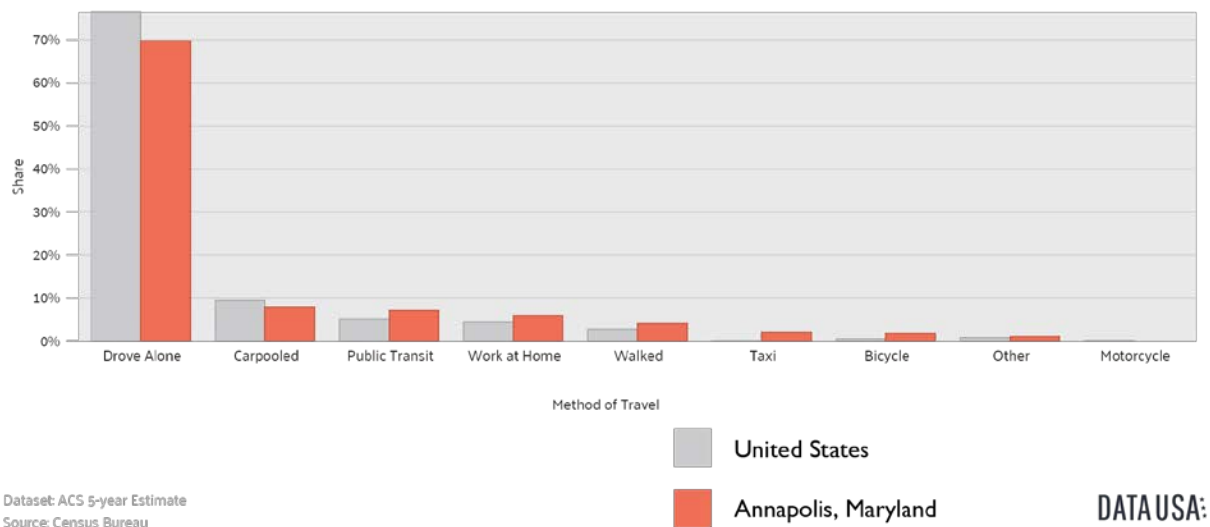


Figure 28: Annapolis Commuter Transportation, Source Census Bureau <https://datausa.io/profile/geo/annapolis-md/#income> (accessed October 28, 2017).

Understanding what is important to the people of Annapolis and how the city functions is a critical step to successfully implement a rail system into the urban environment. Knowing that its historic culture is key to the image of Annapolis allows the designer to create a place that celebrates the city in a way that also promotes its past. To understand the people that live in Annapolis and the way they regularly navigate the city is also a goal of the project. This understanding will establish how a train station can better serve the entire community and bring the people that live and visit Annapolis together in a shared communal exchange. This interaction is envisioned to take place within the train station itself, accordingly site selection is critical to ensure that the community can come together and that the city will benefit from the connection.

Chapter 3: Site Analysis and Response

Site Selection

A train station, to the extent that it is an asset to its community, is a reflection of the people and industries that are its patrons. Therefore, finding a favorable site for the location of a new train station is critical to the success of the project. After an intensive overview of the city of Annapolis and its demographics, a few important factors are significant in narrowing down the site selection process. The site has to be in a prominent area of the city, accessible by the public, and able to withstand the required infrastructure associated with a light rail transit system. Most importantly, the site will need to benefit all aspects of the community that defines Annapolis. This moment of realization will occur where the local community meets the historic center.

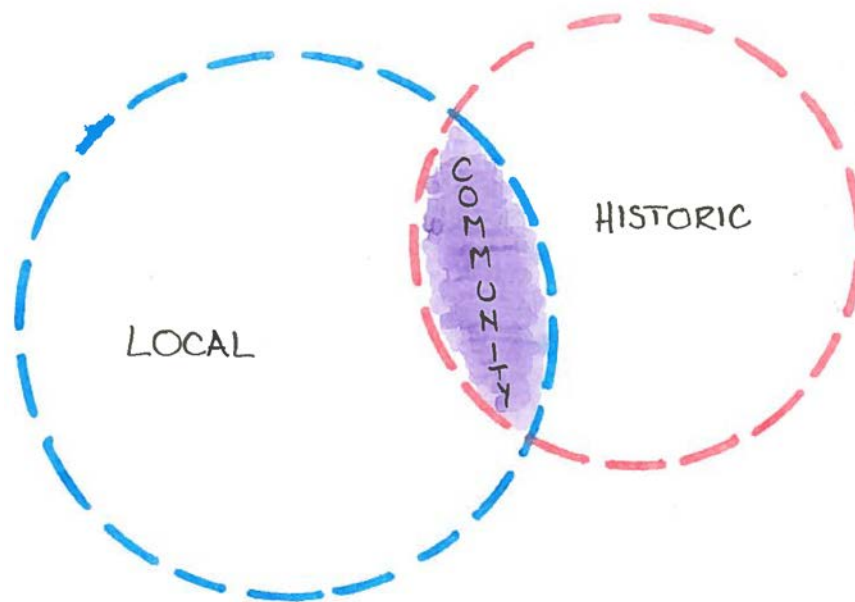


Figure 29: Annapolis Community Connection Region- Determining an area where the historic and local community overlap will help locate a site that will bring the two pieces together, Source by Author

In an effort to identify the best possible site, finding a location within close proximity to popular city gathering spaces would be critical. Also, an ideal location for the train station would be within close range to the historic center considering this is where a great deal of city activity occurs and the wayfinding experience for users would be easy to organize. The Maryland State House is a prominent visual marker that can be seen from most parts of the city due to its central location on an elevated position. When the most viable sites to consider were identified, the locations at each of the primary vehicular entry corridors along Rowe Boulevard, Compromise Street, and West Street were targeted because that is where train access would be feasible.

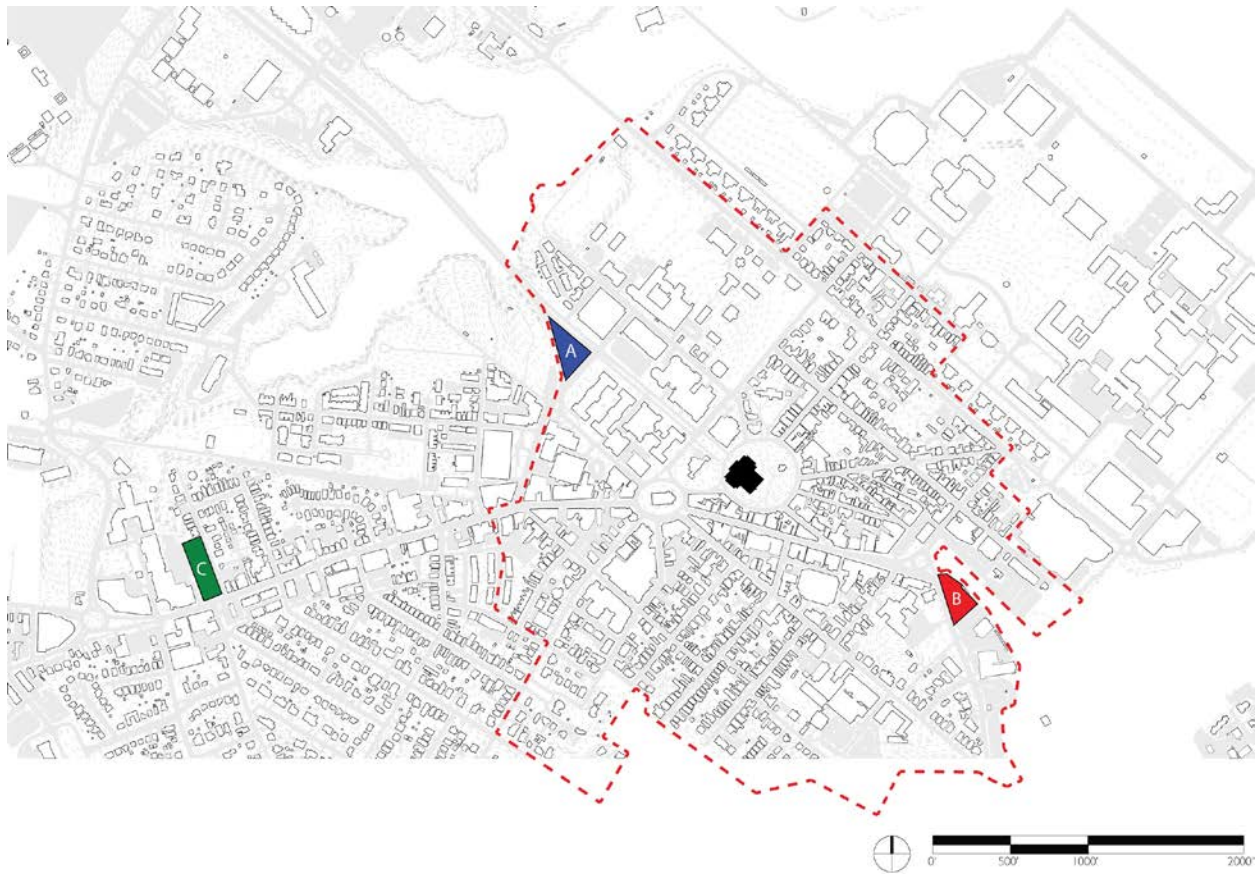


Figure 30: Site Selection Locations, Source by Author

Site A

Site A is located on Bladen Street which is the same road as Rowe Boulevard, the exit from Route 50. The site is in the historic district of Annapolis and approaches the city from the north. It is an active site today and provides public transportation, including a commuter bus stop to Baltimore. The site was selected because it has the most potential for efficient train circulation and there is a historic connection to the city that can be reintroduced. In the early 20th century, there was an electric railroad line that connected Annapolis to Washington D.C. and Baltimore. In the place of the old rail station now there is a parking structure and a low-income housing complex. Site A is an open lot across from the former Bladen Street Station. The site's location on the boundary of the historic center will connect both the residential and historic centers of Annapolis. Site A is approximately 30,000 sq.ft., is within close range of many destinations, and has a walkscore of 91% making it easy to walk throughout the community without a car.⁴⁰

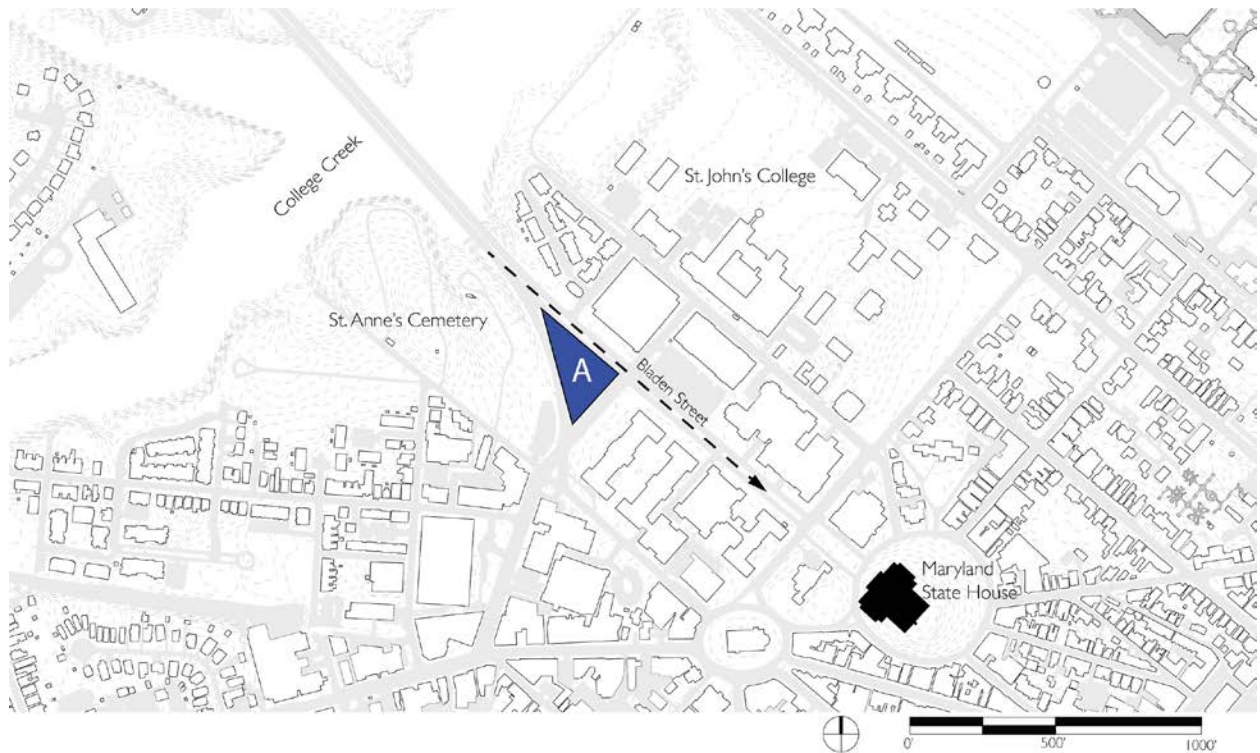


Figure 31: Site A, Source by Author

Site B

Site B is directly in the center of the Annapolis Harbor along Compromise Street, the entry point to the historic center from the south. The site is ideal because it navigates through a densely suburban portion of Annapolis. Plus, it will directly affect many individual households along its route and provide access to the waterfront. However, this site will most likely pose a challenge to get rail car access because many of the streets become very narrow toward the center of the city and navigation may be impossible at street grade. Considering the proposed site is located in the middle of the existing city center, orientation and proximity to popular destinations is easy to accommodate. Site B has a walkscore of 94% and is approximately 34,000sq ft.⁴¹ Other potential concerns with Site B is the proximity to the waterfront because of flooding and concerns over sea level rise. There is also a local desire to maintain and preserve the current harbor front and even though design is a way to make the harborfront a more celebrated spot, support might be difficult to obtain from long-term residents.

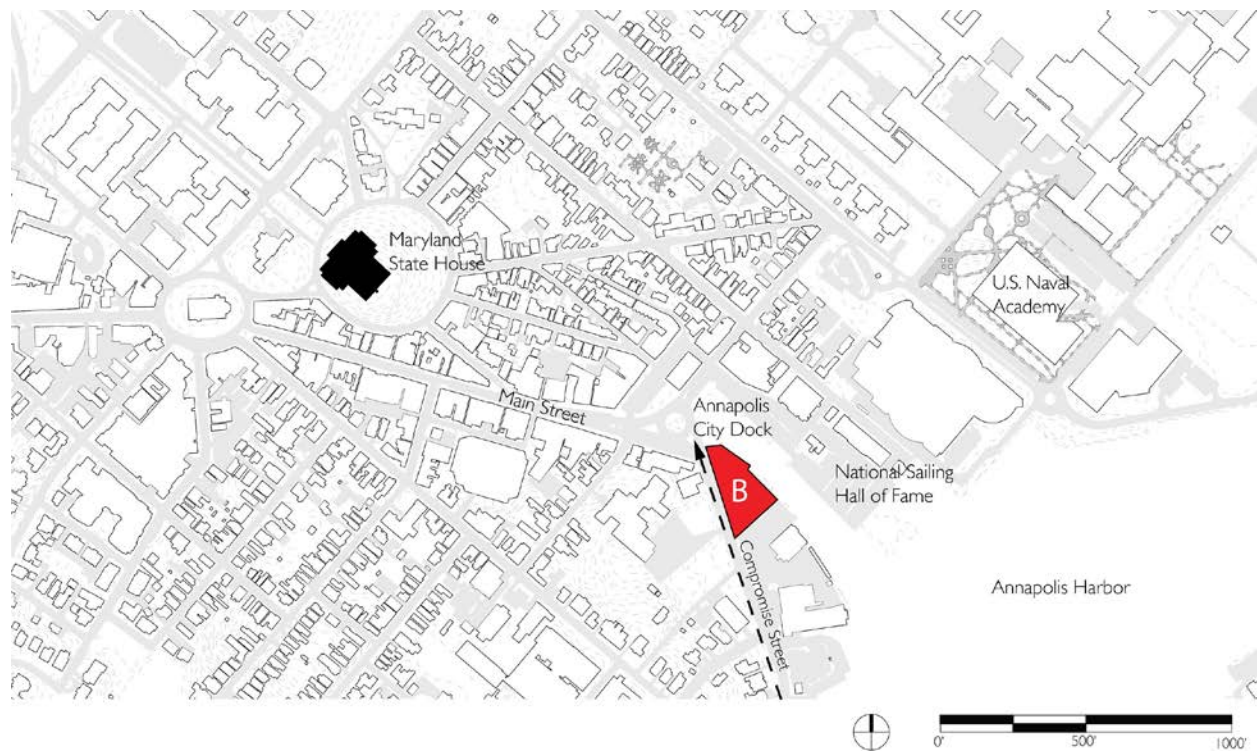


Figure 32: Site B, Source by Author

Site C

Site C can be found buried with the local axis way on West Street. Accessing the site using light rail trains is possible along the West Street roadway or along the Poplar bike trail and Loew's access road behind the site. The strongest consideration with site C is its prominence with the local community. Site C is situated on the primary corridor for residents living in Annapolis. The site is located within close proximity to a number of shops and apartments which is why the site has a walkscore of 75%.⁴² However, as an entryway into the city it is difficult for nonresidents to find their way around. Site C is about one mile away from the edge of the historic center and there are no significant landmarks that help orient visitors. Site C is an open lot, roughly 42,000sq ft making it an ideal location to be filled in to complete the urban edge.

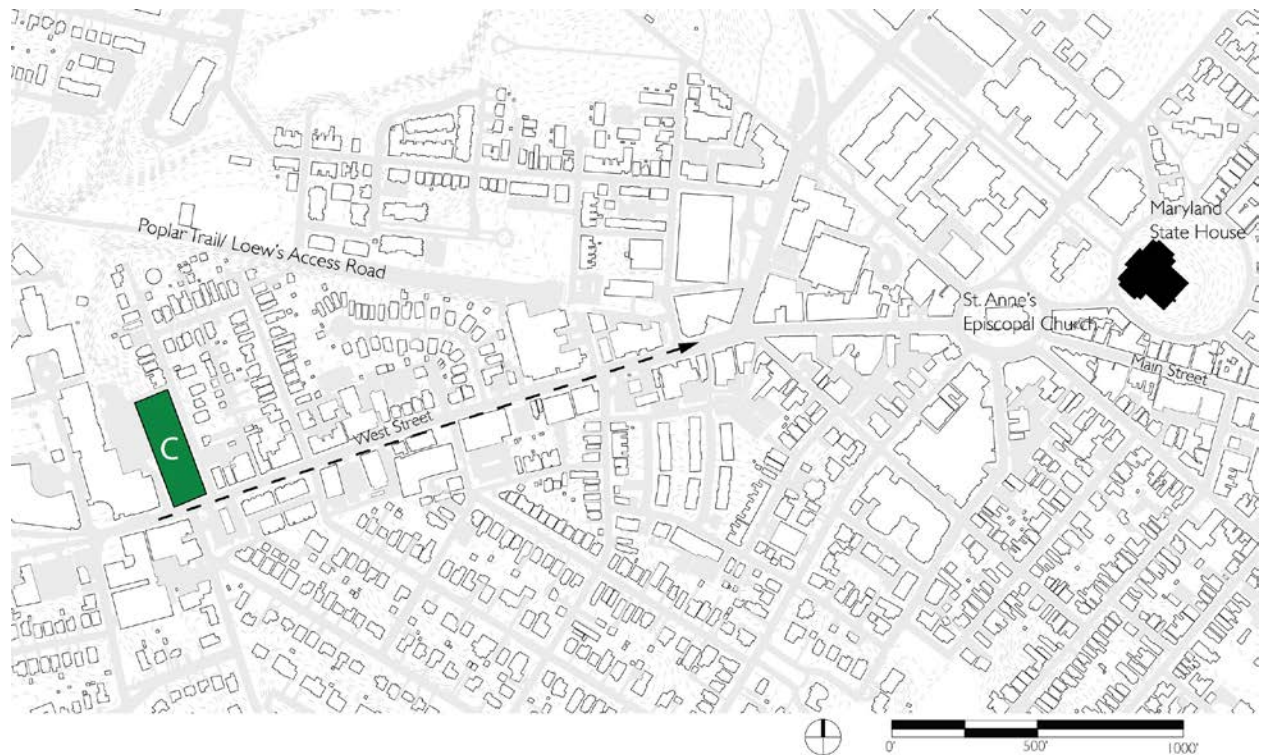


Figure 33: Site C, Source by Author

Each site offers a wide range of opportunities that can help grow Annapolis. The sites also offer predictable obstacles that will need to be resolved with the introduction of a train station. In an effort to determine the best site to propose, a scoring system was created to analyze strengths and weaknesses. Comparing the tally of results for each site, using the parameters of approach, context, and setting, the identification of site A, on Bladen Street, results in the most promising site for this thesis.

ANNAPOLIS TRAIN STATION SITE SELECTION		SITE A WB&A HISTORIC STATION (BLADEN STREET)	SITE B HARBOR FRONT (ANNAPOLIS CITY DOCK)	SITE C RESIDENT CONNECTION (WEST STREET)
APPROACH	ENTRY	NORTH	SOUTH	WEST
	EASE OF TRAIN ACCESS	3	1	2
	WALKSCORE	2	3	1
CONTEXT	EXISTING PUBLIC TRANSIT ACCESS	3	1	2
	THRESHOLD	3	2	1
	RESIDENTIAL CONNECTION	2	1	3
	REGIONAL CONNECTION	2	3	1
	HISTORIC CENTER CONNECTION	3	3	1
	ORIENTATION	3	3	1
	PROXIMITY TO CITY DESTINATIONS	3	3	1
SETTING	CONNECTION TO WATER	2	3	1
	FLOOD PLAIN CONCERNS	3	0	3
	POTENTIAL GROWTH FROM DEVELOPMENT	3	1	2
	LOT SIZE	30,000 sqft	34,000 sqft	42,000 sqft
TOTAL		32	24	19

Figure 34: Site Selection Matrix, Source by Author

Bladen Street Site A outscores each of the other sites under consideration for a train station that will benefit the city of Annapolis. The site reinforces the idea of entry sequence into the historic center and helps establish a sense of arrival. Bladen Street Site A has a very prominent role in Annapolis with meaningful connections to the entire community. Within immediate proximity, Bladen Street Site A is close to St. Anne's Cemetery, St. John's College and Maryland's State House. The site offers an opportunity to design a prominent building that respects the inherent historic nature of the city. The outcome of working on this site is that it will serve the public as a meaningful destination to gather.



Figure 35: Site A- Bladen Street (Selected Site), Source by Author, Underlay Google Earth Pro, 2017

Bladen Street Site History

Today, Annapolis is the only capital city in America east of the Mississippi River without rail transport of any sort. This was not always the case. The Bladen Street site has a significant history that is important to understand in order to justify why it is the best option for the development of a train station. The WB&A Railroad, whose initials comprised the name of (Washington, Baltimore, and Annapolis), the last came first, for it was the Annapolis & Elk Ridge Railroad which laid the first rail and built the first station at Annapolis.⁴³ The Annapolis & Elk Ridge Railroad, which started from an early charter granted in 1837, and the Baltimore & Annapolis Short Line eventually merged and became the Washington, Baltimore, and Annapolis Electric Railway, which first appeared as a corporate entity on April 8, 1902. The town of Annapolis was very excited at the end of 1907 to welcome the first electric car into its town and many came out to celebrate the arrival of the new WB&A. The railroad cars built for the WB&A were state of the art and the most comfortable used on any interurban line in the country. This railway was in demand and even took on a greater significance during World War I as one of its stops was Camp Meade, a U.S. army base. After the war, it took until 1921 for the WB&A to again resume regular service into Annapolis Junction.

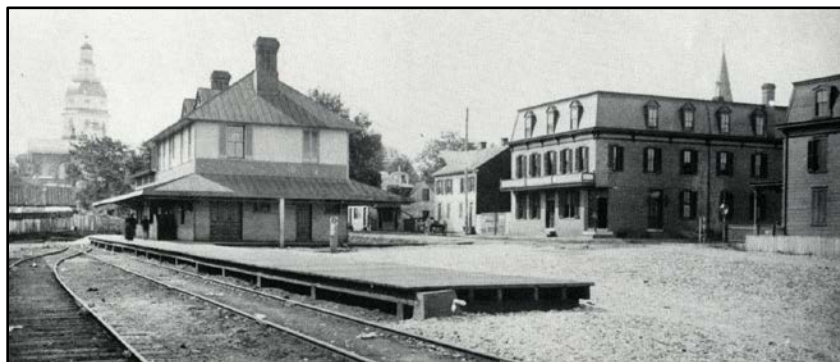


Figure 36: WB&A Bladen Street Station with State House in background, Source Maryland State Archives/ Forbes collection MSA SC 182-799.

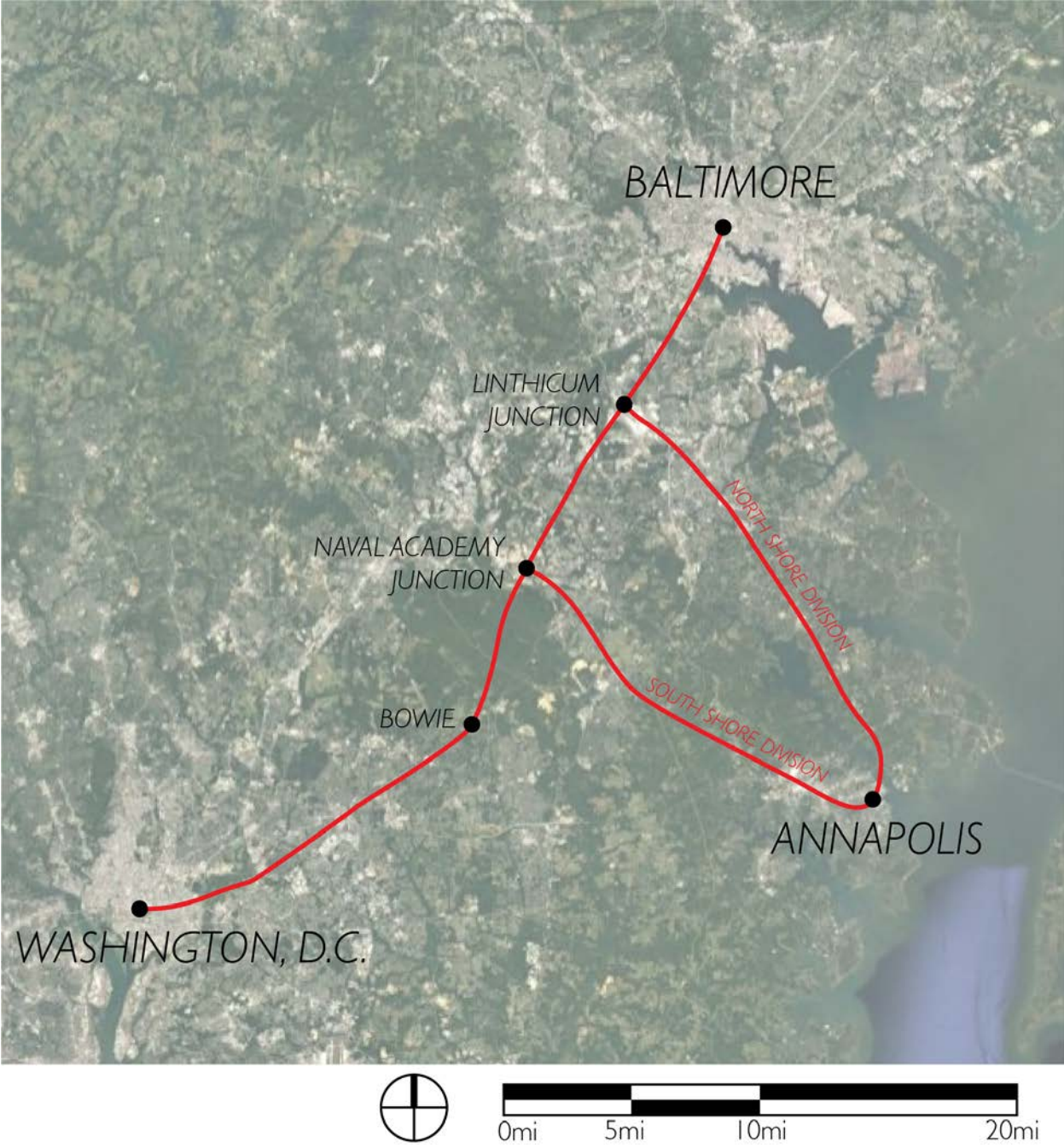


Figure 37: WB&A Map, Source by Author, Underlay Google Earth Pro, 2017

Unfortunately, it would soon be apparent that the automobile industry was asserting its place as a new form of competition to the WB&A. Also, the Defense Highway that was built was providing an alternative route into Annapolis. As a result, gross receipts for the railroad began to decline. The railroad only survived because of a law exempting it from taxes. Many people felt strongly that public transportation should be self-sustaining. Therefore, in January 1931, during the Great Depression, the extension of the tax law exemption failed to pass by one vote and the railroad line went into receivership. The line remained in operation for four more years but was then abandoned at public auction in June 1935 and it officially ceased operations on August 20, 1935 along with the loss of 442 jobs.⁴⁴

At some point between 1951 and 1956, the tracks in D.C. were removed. The right of way of the North Shore Line of the WB&A as well as some equipment were bought by the Bondholders Protective Society, who then formed the Baltimore and Annapolis Railroad Company. This railroad continued to operate rail passenger service between Baltimore and Annapolis until 1950 and freight service along with diesel passenger buses into the early 1970's. Today there are plans to turn the former trackways into bike paths and incorporate them into the East Coast Greenway. The south shore line that runs along the southern edge of the Severn River into Odenton, Maryland is only being proposed while the north shore line is already the popular B&A trail that ends in Glen Burnie, Maryland.

Significance to the Community

The Bladen Street site has the potential to transform Annapolis into a public gathering space that will help promote community growth and reimagine the way people enter the city. The site is within the historic center of Annapolis. Designing a structure on this site will ultimately have very little disruption on the character and businesses of the downtown area. The location is optimal for a train station because it is situated along the primary entry axis of the city. As one enters Annapolis by foot, car or train, they will be welcomed with views toward the State House, a significant landmark building, and know they have arrived somewhere special.



Figure 38: Bladen Street Entry Corridors, Source by Author

Today the site is an open park with a few benches, a fountain, and a small memorial statue honoring the community local firefighters. Even though green spaces are ideal for a city, the site fails to inform people they have entered Annapolis. A train station can serve a greater purpose on this site and underline the importance of urban civic spaces by designing green park areas more connected to the public realm of the city.



Figure 39: Bladen Street Site Existing Conditions, Source by Author

An important factor in selecting the Bladen Street site is its connection to the historic center and the communities of Annapolis. Given the irregular shape of the site, each edge and corner conditions are critical to address. The community will approach from West Street along Calvert Street leading the train station to where pedestrians, cars, and rail will intersect.



Figure 40: Calvert Street Entry Toward Bladen Street Site, Source by Author

Within the immediate context of the site there are several structures that are important to the development of the project and worthy of awareness. On Bladen Street there is Bloomsbury Square, an affordable housing complex with 51 units and the Calvert Street Garage, one of several parking location options within close range of the site. Along Calvert Street there is Maryland's State Treasury Building which is the government offices responsible for keeping Maryland's fiscal records. Also, within the surrounding area of the Bladen Street site there are buildings that can benefit from development here and can become more open to public activity passing through the city.



Figure 41: Bladen Street Site Surrounding Conditions, Source by Author



Figure 42: Bladen Street Site Relationship to Context, Source by Author

The site's relationship to the surrounding larger city areas support the significance this site will have in advancing the rich context of Annapolis. The Bladen Street site is directly on the edge that separates the historic and local communities so there is opportunity for a broader range of people to be drawn to the site. The site is also close to many destinations people are most interested in visiting when they come to Annapolis. Within a quarter mile from the site people can easily access community centers, Maryland's State House, and Saint Anne's Episcopal Church. The downtown center of the harbor, St. John's College, and the U.S. Naval Academy are also within a half mile from the site and Main Street, the old Treasury Building and Paca House and Gardens are on the journey linking the entire historic district by foot.



Figure 43: Bladen Street Site Existing Transit Access, Source by Author

The process of developing a transit-oriented project requires a thorough analysis of the transportation options that service an area. Bladen Street site is already a crossroads of primary transit access to the downtown area of Annapolis. A trolley car exists with several different route options that circulates the historic center. While the Yellow Route offers immediate access to the site, the Purple and Green Routes can be reached within a one block distance. Another form of public transit access on Bladen Street is the Baltimore-Annapolis Bus 70 which is the main public transit route offered to residents. For commuters using the proposed light rail system to get to work, there are several existing parking structures that can be used to service the station.



Figure 44: Bladen Street Site Entry Sequence, Source by Author

The user sequence of the approach to the Bladen Street site is ideal for creating an experience that allows people to navigate their journey. The initial awareness of arrival into Annapolis occurs as one crosses over College Creek. The passage over the open waterway informs visitors they are crossing a threshold between spaces. This experience via railcar is the first indication of entry before arriving at the gateway into Annapolis. Every edge of the site is transparent and accessible by regional, community, and historic center visitors. Station users enter Annapolis and transition seamlessly because of the orienting views of the State House.

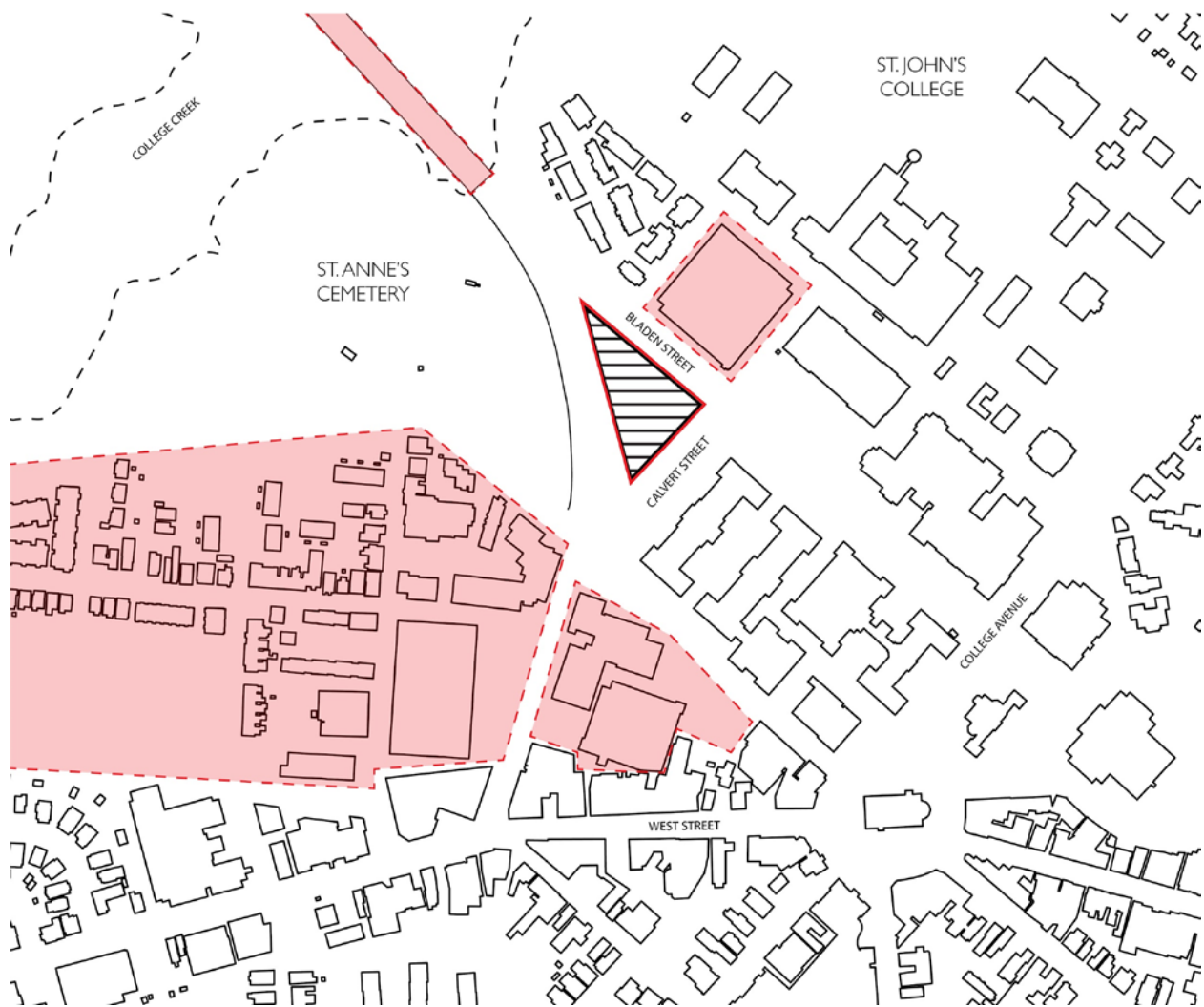


Figure 45: Bladen Street Site Future Development Areas, Source by Author

With major infrastructure projects, it is prudent to anticipate that there will be growth within a community. Building rail lines that connect regions, presents an opportunity to draw people into the new public service. The Bladen Street site will help expand Annapolis and its surrounding areas by increasing the urban fabric of the city. Rail transit will lead to fewer cars and increased interest in living in the area. If this impact occurs, at some point in the future, parking structures will not be as necessary and land use surrounding the station can be developed for more commercial and residential density.

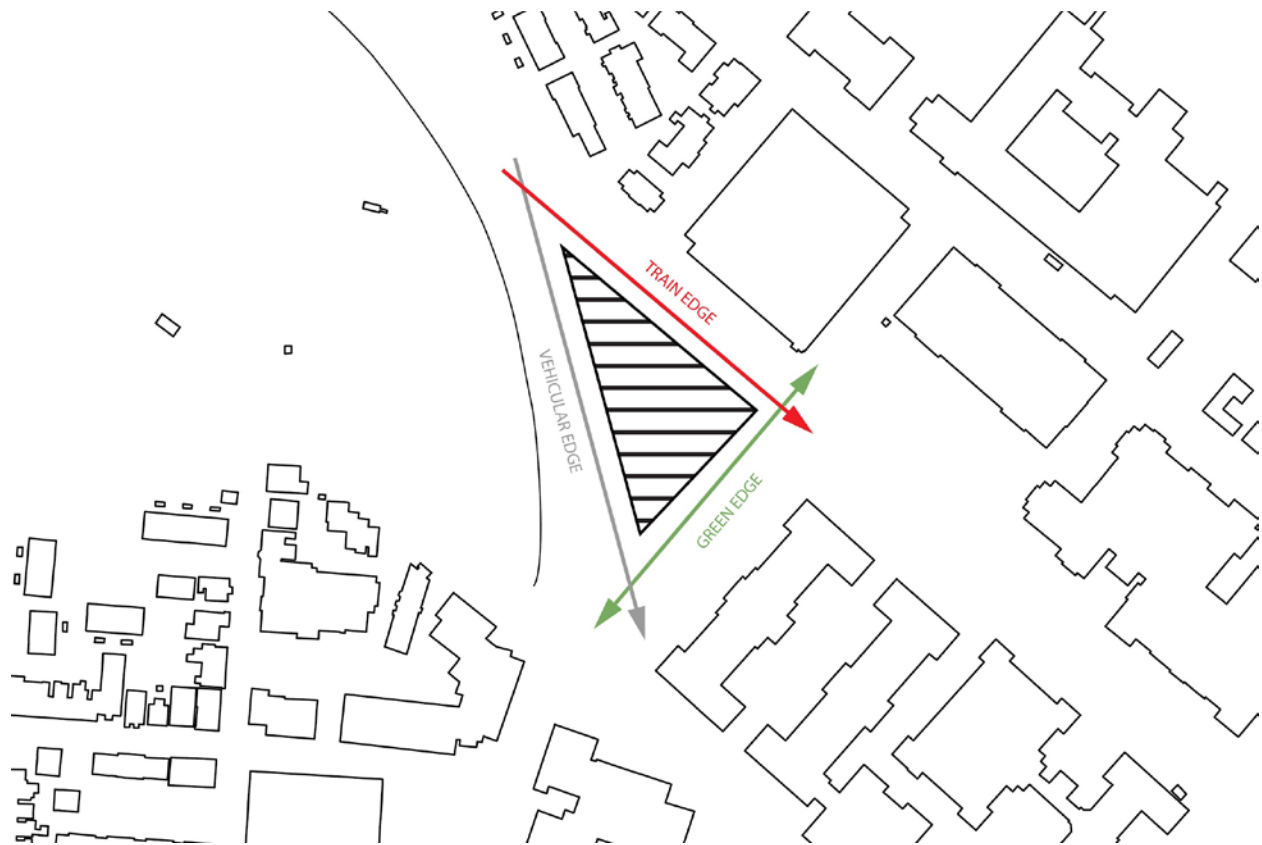


Figure 46: Bladen Street Active Edges, Source by Author

A train station hub is important to be as transparent and user-friendly as possible. Through the design process every edge of the building should be active and varied between use. Considerations for vehicular access for passenger pick-up and drop off, rail platform transfers, and pedestrian transitions are all important planning factors. Bladen Street has the possibility to accommodate each of these situations along a dedicated edge. Along each edge, new forms of community engagement can occur in the spaces surrounding the building.

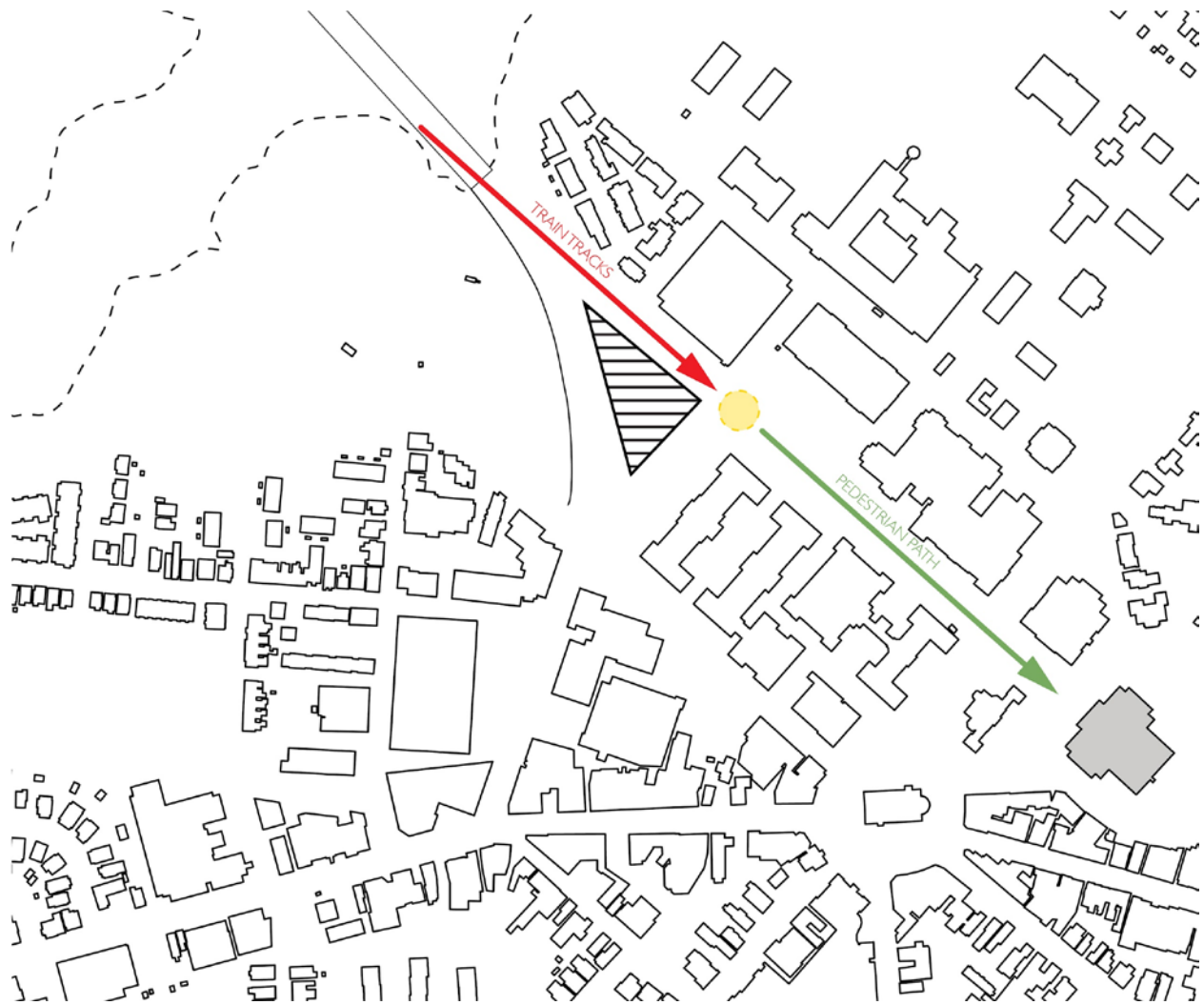


Figure 47: Bladen Street Transition and Orientation, Source by Author

Rail passengers are the primary users regularly experiencing the station. Organizing a celebrated corridor for them will increase the value of the outcome of the project. Locating tracks along the median of Rowe Boulevard brings passengers in directly in line with the State House. The train station itself is where a train rider transitions from passenger into local visitor. As a visitor enters the city, there is an opportunity to introduce pedestrian streets in axis with the State House and continue the celebrated experience of entering Annapolis.

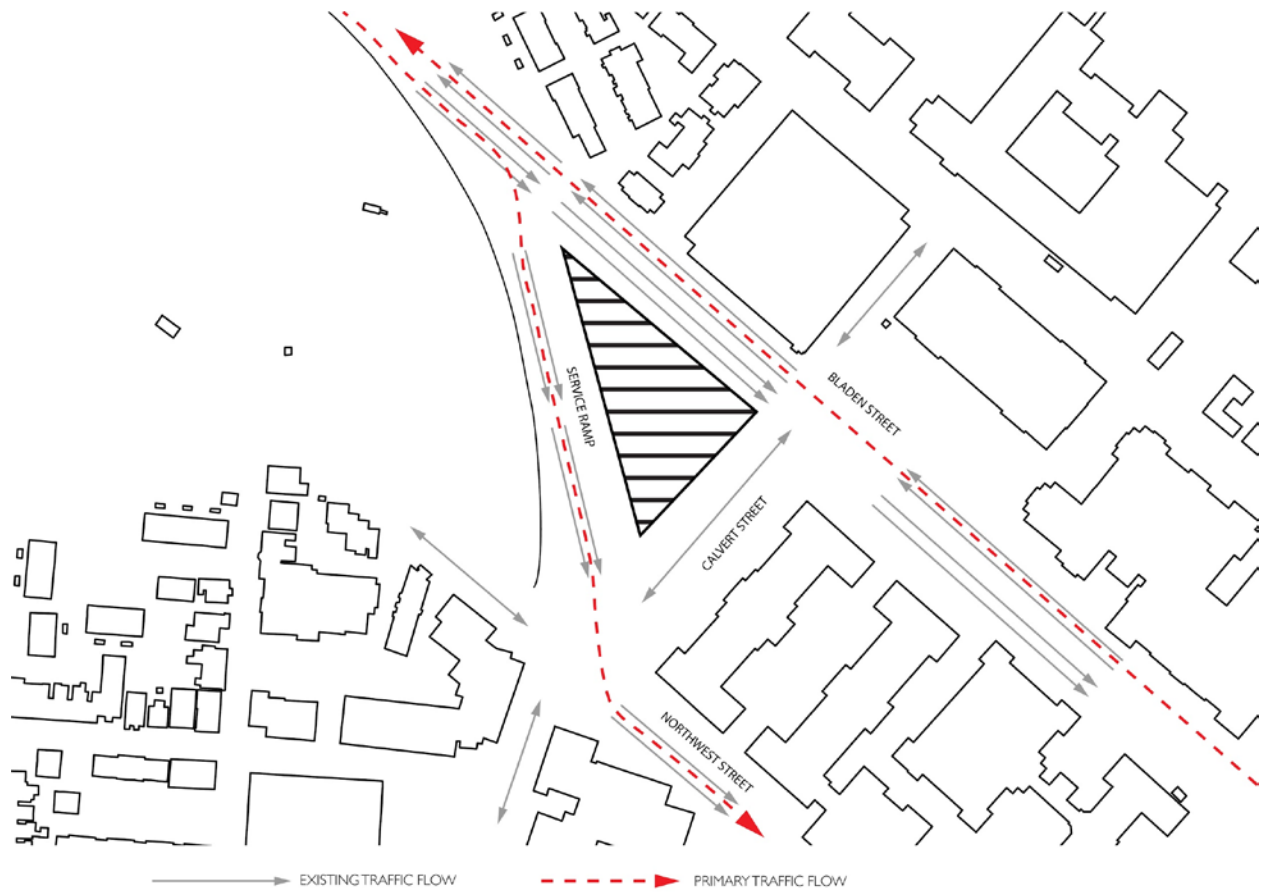


Figure 48: Bladen Street Existing Transit Access, Source by Author

Analyzing the current conditions of how cars circulate in this area of the city is important because the roadway over College Creek is the primary entry point where vehicular traffic enters and exits Annapolis' downtown region. Currently, the main traffic routes are two lanes wide which allows more traffic to continuously move around the site. Studying the primary flow of traffic around the site revealed that most cars enter the city along the service ramp connecting Rowe Boulevard to Northwest Street and exit on Bladen Street.



Figure 49: Bladen Street Proposed Transit Access, Source by Author

Proposing a more efficient circulation course for traffic to follow will alleviate concerns about how the site is accessed by individual cars, trains, and people. The pattern of primary vehicular traffic movement is able to remain the same with cars entering downtown using the two lanes of the service ramp toward Northwest Street and exiting the historic center using the two lanes along Bladen Street.

Train tracks are best-suited to run down the median of Rowe Boulevard and use the two lanes of Bladen Street entering the historic center of Annapolis as a platform stop for riders to board and disembark the train cars. After an exploration of typical turning radii of train cars along tracks, the most efficient path that can service the train station requires a terminus platform layout. As trains depart from the station, train cars will reverse out of the station and continue along Rowe Boulevard and exit Annapolis. A terminus layout will create a minimal impact on the Historic Center of Annapolis. The design of a terminus platform forces passengers to pass through the station and experience the station as their destination. Compared to other platform

alternatives, a through station does not require all passengers to disembark and experience the train station. As part of the goal of making Annapolis more accessible to pedestrians, there is an opportunity around the city to extend bike paths and introduce green spaces toward the site and along the routes oriented toward the waterfront.

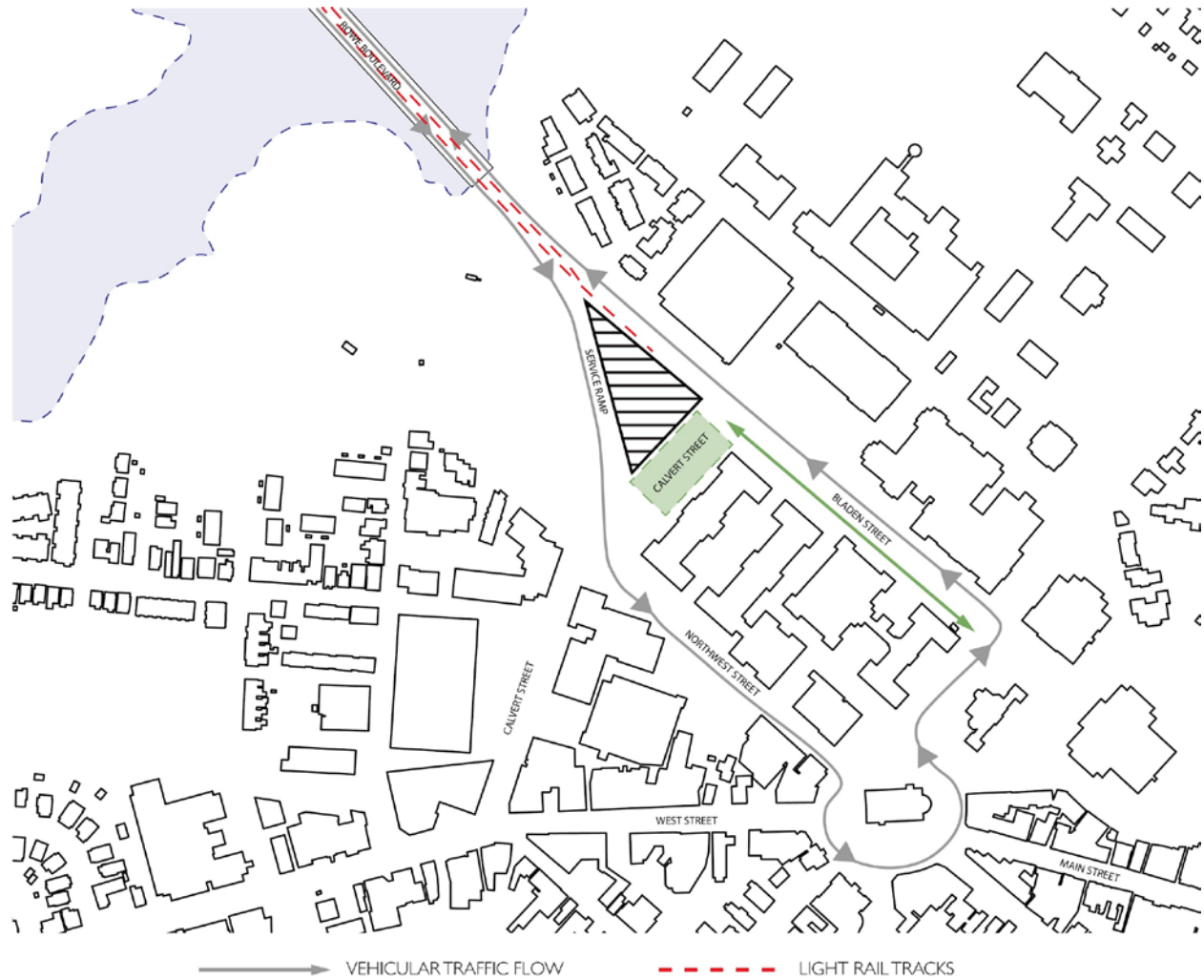


Figure 50: Annapolis Circulation Pattern, Source by Author

Organizing traffic circulation surrounding the site will allow for new pedestrian streets to be planned along Bladen Street and Calvert Street. Pedestrian streets will allow for civic space to be proposed on primary foot traffic avenues that have critical relationships to the site’s surrounding context connecting the site further with the historic and local communities.

Looking at how traffic moves around the station shows there is a continuous loop of entry and exits points. The light rail train cars enter and exit the site in a linear path to create minimal disruption of vehicular and pedestrian traffic.

Connection to the Region

No three cities in the United States are so closely connected that offer the same level of interest to the traveling public as Washington D.C., Baltimore, and Annapolis. A light rail line between these cities will solidify the importance Annapolis represents for the entire state in this modern day. Connecting the region with this type of infrastructure is one solution to reduce the number of cars on the congested roadways and provide a sustainable image for the state to advance. Annapolis is the destination point along the rail line and the transit line paths will cross through neighborhoods in Anne Arundel and Prince George’s counties.

Maryland’s population is approximately 6.0 million people.⁴⁵ Baltimore and Washington D.C. are the two most prominent urban centers within the Maryland region. There is an obvious preference for people commuting to work every day to travel independently. Census data shows that 73.8% of people drive to work solo. The second and third most common choice of transportation is 9% using public transit and 8.85% carpooling. These records are similar to the numbers in Annapolis.

Commuter Transportation in Maryland

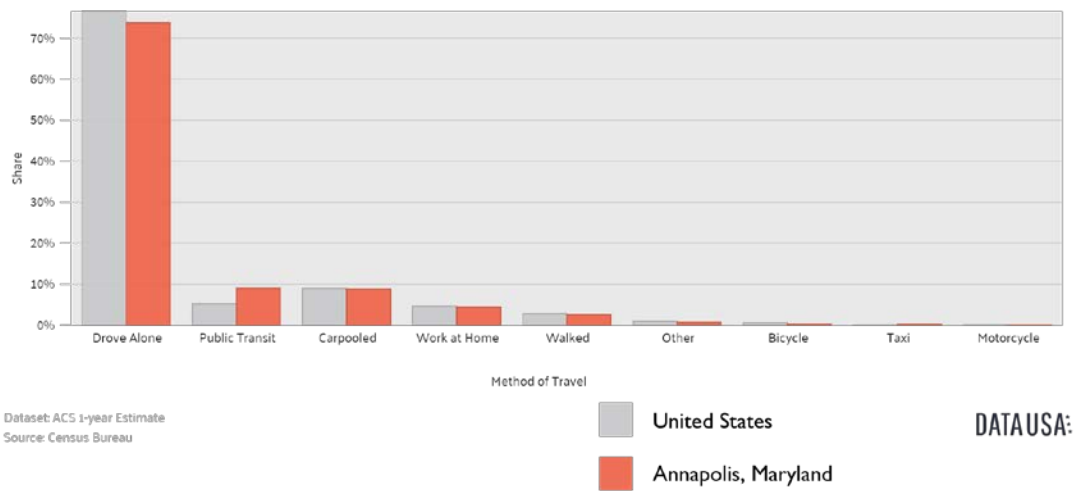


Figure 51: Maryland Commuter Transportation, Source Census Bureau

Not only will the community of Annapolis be able to access more jobs, commerce, schools, and other social activities by the completion of this project but also each of the stops on the rail line will connect more people to each other. Finding better access to public transit will present the opportunity to go beyond their neighborhoods. Many of the communities surrounding Baltimore, Washington D.C., and Annapolis bring in the highest income levels throughout the state. A majority of the people that live in the center of Maryland are commuting families that work in urban centers. Connecting this region in the most seamless manner as possible is important for people to work and reach their highest potential.

Income by Location in Maryland

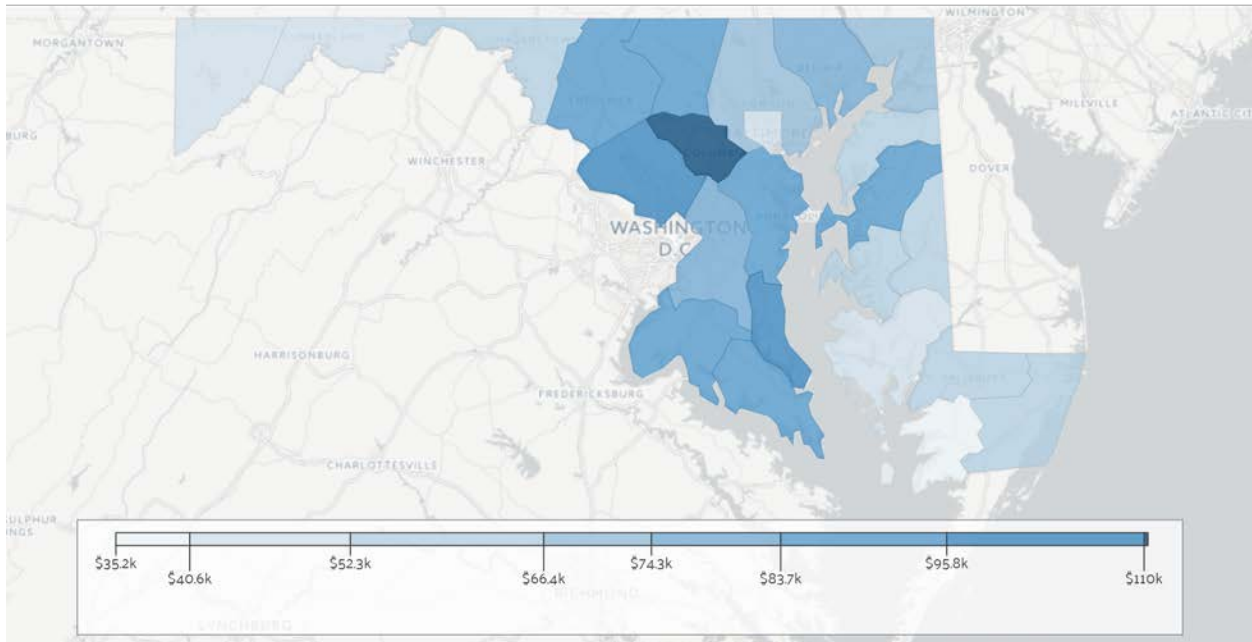


Figure 52: Maryland Income by Location, Source Census Bureau <https://www.indexmundi.com/facts/united-states/quick-facts/maryland/percent-of-people-of-all-ages-in-poverty#map> (accessed November 6, 2017).

Identifying a route that will provide the most people with an immediate connection point to the light rail service will create the best chance for individuals to utilize the system.

Population densities reveal that in Maryland, most people live within a close proximity to Baltimore and Washington D.C. The next most populous areas surround the city of Annapolis and the areas in between each city center. These regions are densely populated residential communities. Planning the track lines along these corridors is the most rational solution to gain significant commuter access.

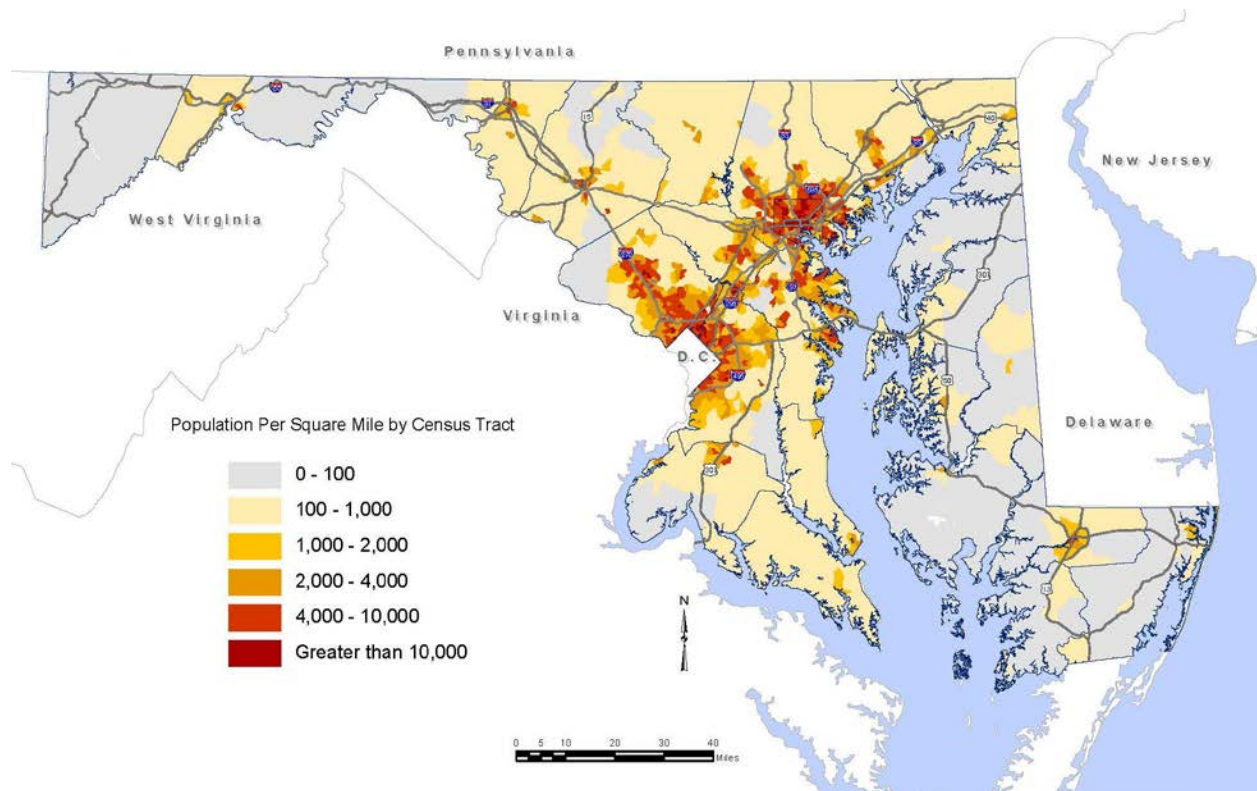


Figure 53: Maryland Population Densities, Source Maryland Department of Planning, from the U.S. Census Bureau <http://census.maryland.gov/census2010/maps.shtml> (accessed November 6, 2017).

Two rail lines from Annapolis, one to Baltimore and a second to Washington D.C., will allow for the most efficient avenues for people in route to city centers. Considering one rail line for a path from Annapolis is a challenge to the project because the midway point between Baltimore and Washington D.C. fails to pass through areas where the largest number of people reside in the region addressed. One rail line also requires many necessary transfers and a challenge to navigate succinctly. If there is only one line to a city, the other city fails to be a point for connection among communities. The distances between Annapolis and each connecting point makes two separate lines a more achievable goal. Annapolis is 24.2 miles from Baltimore Washington Airport and 23.5 miles from New Carrollton, Maryland.

BWI Airport and New Carrollton, Maryland are the proposed two light rail receiving junctions because they offer transfer points with existing modes of transportation. At BWI, there is access to Baltimore's LINK light rail system that can carry passengers directly into downtown Baltimore. Connecting a path from Annapolis to BWI Airport will also allow for a regional relationship between air (airplane), land (light rail train), and sea (Annapolis is the sailing capital of the World). A transfer mode located in New Carrollton provides riders access to Washington D.C.'s metro system. New Carrollton's metro station is currently the end of the Orange line and will be the future end of the Purple line. The Orange line will carry passengers into the center of Washington D.C. underneath the National Mall and as far west as Fairfax County, Virginia. When the Purple line is complete, passengers will be able to travel through the southern communities of Prince George's and Montgomery Counties. Two lines from Annapolis to these transfer points completes the transit loop between all three cities because the MARC Penn Line trains and Amtrak trains already link Washington D.C. and Baltimore.

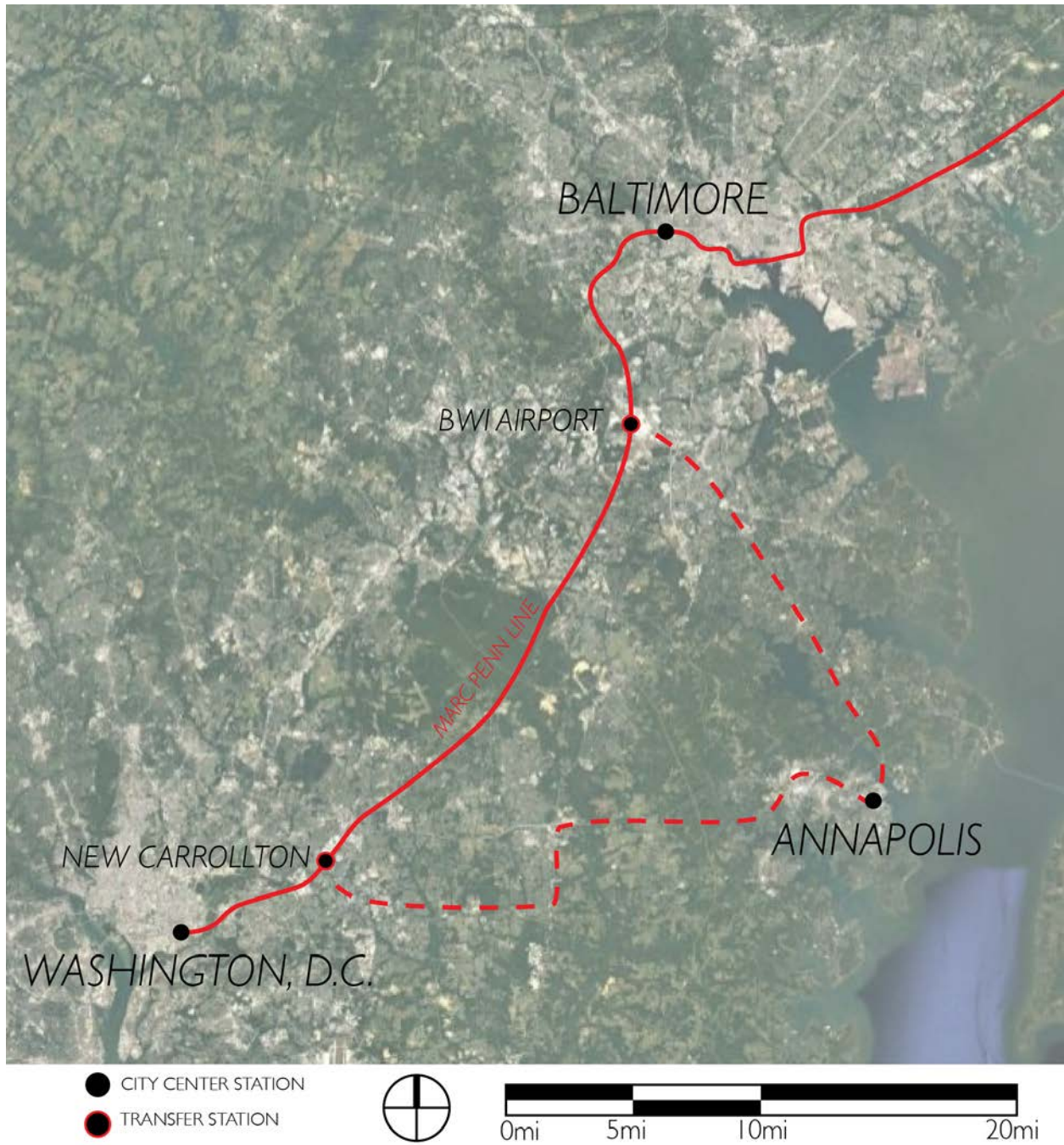


Figure 54: Proposed Rail Lines to Annapolis, Source by Author, Underlay Google Earth Pro,

Establishing light rail lines from Annapolis to Baltimore and Washington D.C. will provide the regional population with easy access to a public rail service.

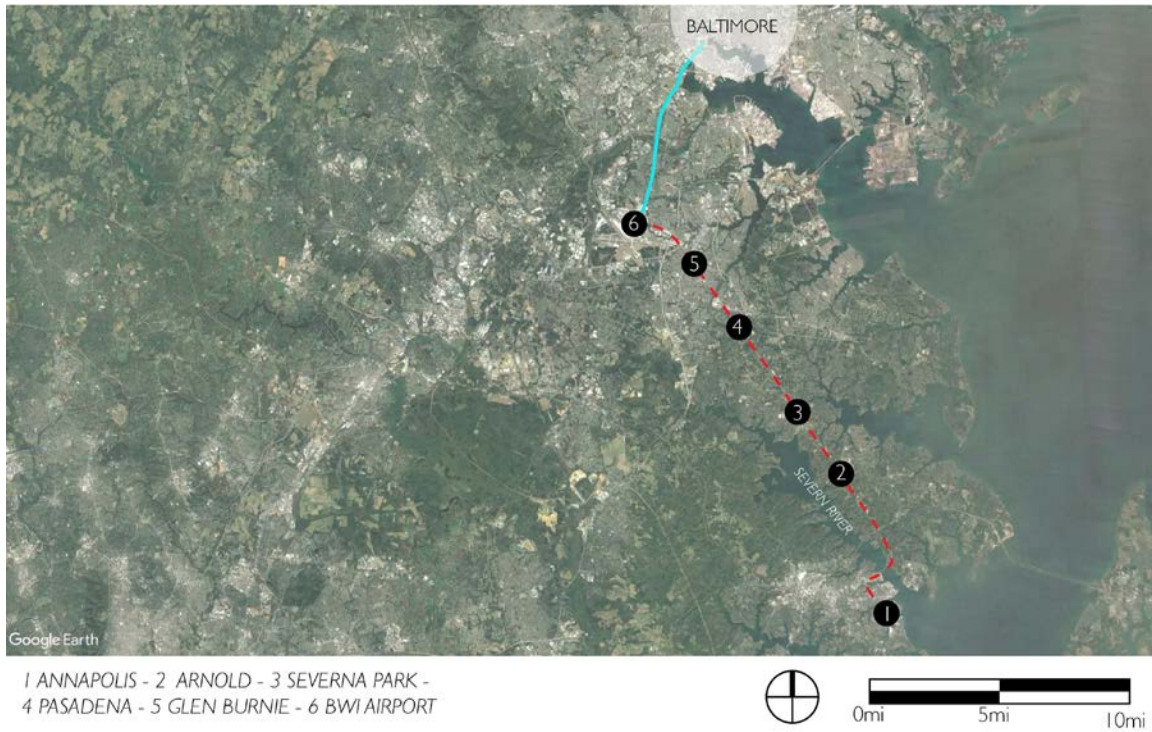


Figure 55: Proposed Rail Lines, Annapolis to Baltimore, Source by Author, Underlay Google Earth Pro, 2017

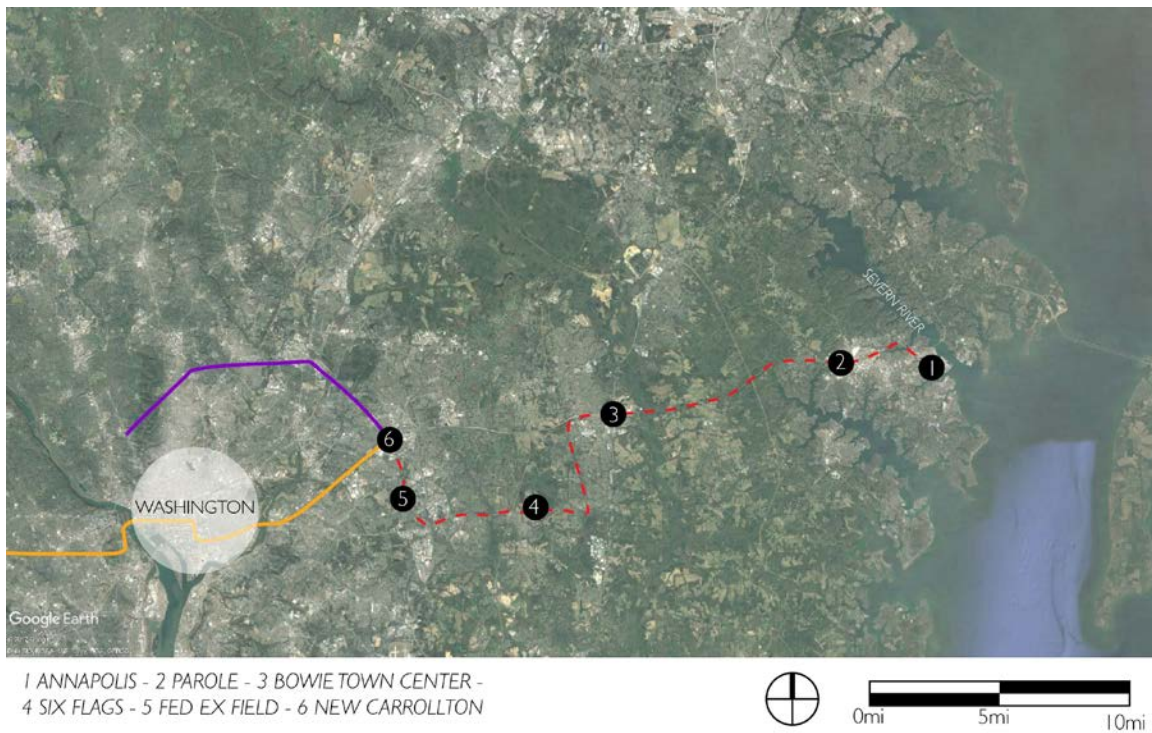


Figure 56: Proposed Rail Lines, Annapolis to Washington D.C., Source by Author, Underlay Google Earth Pro, 2017

Primary stops along each city center route will both bring people together and move them more efficiently throughout the region. The Baltimore-Annapolis rail line runs on the north side of the Severn River through the most populated communities. This path also runs through the communities that were once connected by the WB&A electric railroad and connects to Baltimore's light rail LINK system at BWI Airport (turquoise line on map). The Washington D.C. rail line is able to run along the median of Route 50, the main highway access between the two cities. Extending the line to Six Flags amusement park and FedEx Field brings the public to community gathering destinations and is an alternative for getting people to places without the requirement of driving and parking. At the transfer point in New Carrollton, riders will have access to Washington D.C.'s Orange and Purple metro lines.

Finding a site for the design of a modern train station in a historic city like Annapolis can be a challenge. The Bladen Street site offers the best solution because of the potential it has as a gateway building that is easily identifiable as the public enters the city. Most importantly, the Bladen Street site presents an opportunity to pay tribute to the site's notable railroad history. Creating a link on the peripheral edge of downtown Annapolis defines a destination location for the entire region and engages the local community. Crossing the threshold toward the Bladen Street site will require careful design attention that recognizes the value of a historic center and promotes a sense of unity.

Chapter 4:

Design Criteria for Historic Annapolis

Historic Preservation Commission

The community of Annapolis is interested in preserving as well as enhancing its character. The city is a remarkable urban environment that evokes a sense of history and a sense of place, expressed in the character of its streets, the fit of its land to the water, and its pleasing human scale.⁴⁶ Annapolis even has its own Historical Preservation Commission, required by city code. The Commission's broad mandate is to safeguard Annapolis' heritage as reflected in its historic architecture and its broadly visible waterfront. The Commission includes seven volunteer members who reside in the city of Annapolis and possess an interest or professional training in history, architecture, curation, landscape architecture, urban design, historic preservation, or other related discipline.

The architectural and historic significance of Annapolis has been recognized both locally and nationally. The regulations governing the historic districts are “to stabilize and improve property values in the district; to preserve specific buildings or structures which are deemed to be of historic or architectural value; to foster civic beauty, to strengthen the local economy; to promote the use of the district for the education, pleasure, and welfare of the citizens.”⁴⁷

The historic district has a radial city plan, sloping terrain, and numerous water views. Governor Francis Nicholson's 1695 town plan for Annapolis is the oldest surviving Baroque urban plan in the United States. The plan continues to define the city's built form with sharply intersecting diagonal streets, urban open spaces, and sites for important buildings.⁴⁸



Figure 57: The 1695 Baroque City Plan of Annapolis by Francis Nicholson, Source Annapolis Architecture Guide <http://www.bohlarchitects.com/annapolisarchitectureguide/AnnapolisCityPlan.htm> (accessed December 2, 2017).

It also has a visual unity that emanates from the human scale of buildings and streetscapes, which are narrow with uniform setbacks, and this is what the Historical Preservation Commission seeks to preserve.⁴⁹ Each building contributes to the closely scaled urban street scheme. New buildings should reinforce the historic town plan of Annapolis and should respect traditional views and visual and cultural focal points including St. Anne’s Church, the State House, and the water. They also want to preserve the open spaces that provide relief and focus for the eye. It was noted that new construction in the Annapolis historic district has to be mindful of existing scale, material and fenestration while clearly representing 21st century design.⁵⁰

New Building Design in the Historic Center

It is not the goal of the historic district ordinance to encourage new buildings to copy the city's numerous historic styles. To the contrary, per the Historical Preservation Commission, the ordinance encourages good contemporary design which follows the design principles of existing neighborhood buildings and respects the scales, proportions, order, rhythms, and materials of the prevailing historic context, generally defined of at least one-half block in both directions. Where a lot falls near the edge of the historic district, historic buildings located near but outside the district boundaries are included in the lot's immediate neighborhood.

New buildings should not be mistaken for historic buildings. New buildings which merely imitate the forms and materials of historic buildings dilute the quality of existing historic structures. Creative building design which is compatible with the character of the immediate neighborhood is encouraged. New buildings should be designed to strengthen the unity of the existing streetscape.⁵¹

Scale is perhaps the most important design principle to be considered in evaluating proposed new construction in the historic neighborhoods. Scale applies both to individual buildings and to streetscapes. An institution or commercial building newly constructed within an existing residential neighborhood may be described as having a neighborhood scale if its overall size is similar to typical neighboring residences, or if the whole is broken down into building elements that are similar to its neighbors.⁵² Also, the intimate scale of Annapolis' streetscape that needs to be preserved include the placement of buildings on their lots, the human scale of building features, and the presence of trees and shrubs fifteen feet apart. Annapolis strives for a creative visual harmony.⁵³

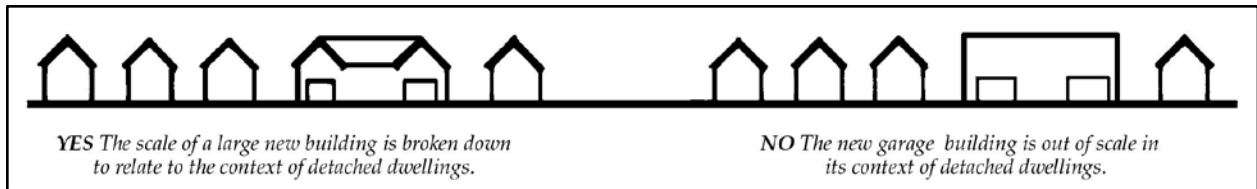


Figure 58: Street Front Sketch reflecting correct and incorrect strategies on preserving the image of Annapolis, Source The Annapolis Historic Preservation Commission <https://www.annapolis.gov/DocumentCenter/Home/View/2157> (accessed December 2, 2017).

Some historical preservation regulations regarding new building are as follows: the new buildings need to conform to the prevailing setback lines. Methods of achieving accessibility should be integrated into the site plan and all efforts made to avoid ramps and handicap lifts on primary facades of buildings. Paving materials should be historic, preferably brick, crushed oyster shells, or brick tire tracks. Street furniture such as benches, bike racks, bus shelters, etc. should be simple in character and constructed of wood or painted metal. Roofing for proposed new buildings should relate to the overall design of the new building. Windows and doors in new buildings should relate to the scale and proportion of openings on buildings in the immediate neighborhood and to the design of the new building.⁵⁴ Landscape design and materials should be appropriate for both the streetscape and the building to which they directly relate. Mature trees and shrubs should be preserved wherever possible.

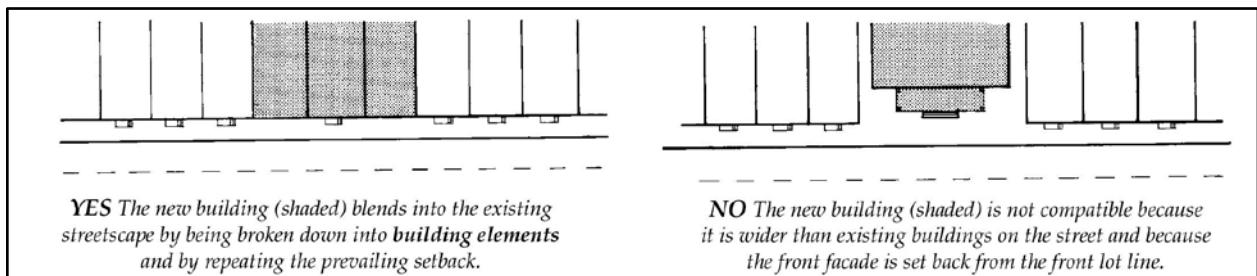


Figure 59: Plot Plans along street edge showing successful and unsuccessful intervention, Source The Annapolis Historic Preservation Commission <https://www.annapolis.gov/DocumentCenter/Home/View/2157> (accessed December 2, 2017).

New additions, exterior alterations, or related new construction shall not destroy historic materials that characterize the property. The new work shall be differentiated from the old and shall be compatible with the massing, size, scale, and architectural features to protect the historic integrity of the property and its environment. New additions and adjacent or related new construction shall be undertaken in such a manner that if removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired.

In the end, all changes to existing buildings or new buildings need to be applied for and reviewed and approved by the Historical Preservation Commission. They make their decisions on a case by case basis.⁵⁵

Annapolis' View on Sustainability

One of the three main imperatives that defines the vision of Annapolis is its commitment to being a “Green city.” The “greening” of Annapolis refers to a host of actions to protect the community’s natural resources such as its shorelines, creeks, and forested areas.⁵⁶ In addition to this protection of natural resources, “greening” helps to create a healthy living environment for Annapolis’ residents. This takes the form of supporting open areas such as pedestrian walkways, recreational activities as well as cultural offerings that enhance the community’s quality of life. It also entails expanding transportation options so walking, biking, and taking transit are all viable alternatives to driving. Each of these strategies can be integrated into the design of the train station in an effort to make Annapolis a more sustainable community.

Annapolis' Primary Environmental Challenges

Annapolis is located in the Chesapeake Bay watershed and is part of the coastal plain. The Chesapeake Bay and the creeks of Annapolis are fundamental to the city's identity and beauty. However, the Bay is threatened by polluted urban stormwater and agricultural runoff that flows into the Bay and impacts its ecological well-being. While the Chesapeake Bay's watershed spans parts of six states and is 64,000 square miles, attention to all local improvements is necessary.⁵⁷ The Chesapeake Bay Foundation, the largest independent conservation organization, is dedicated solely to "Saving the Bay." The "Save the Bay" campaign is in effect because there are eighteen million people and three thousand species of plants and animals that live, work, and play in the Chesapeake Bay watershed and since it is compromised it needs to be saved.⁵⁸



Figure 60: Chesapeake Bay Watershed Map, Source U.S. Department of Agriculture
<https://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/programs/initiatives/?cid=stelprdb1047323> (accessed November 27, 2017).

Goals Toward Being a Green City

Increase the Tree Canopy

Maryland's Department of Natural Resources determined that approximately 41% of Annapolis is covered by the urban tree canopy. The city is committed to increasing the tree canopy cover to 50% by 2036. To work towards this goal, Annapolis began a program to give away 500 native trees annually to city residents, with the stipulation that these trees be planted inside the limits of Annapolis.⁵⁹ Trees native to the Maryland coastal plain are red maples, river birches, green ashes, and chestnut oaks. Hardy flowers represented in the landscape would be azaleas, black-eyed susans, wild geraniums, and sunflowers. Using native trees/plants make the landscaping more environmentally beneficial. Native species planted help prevent erosion and pollution by stabilizing the soil and slowing the flow of rainwater runoff.⁶⁰

Minimize Noise Pollution

A policy exists to seek minimal noise disturbance in neighborhoods and a light rail system is quiet so its installation would not be in contradiction with the current policy.⁶¹

Shrink Annapolis' Carbon Footprint and become a Community of Green Buildings

Annapolis will accommodate growth and new development in the future as part of the city's continuing need to regenerate. Sustainable design is defined as the practice of increasing the efficiency with which buildings and their sites use energy, water, and materials. The philosophy behind sustainable design techniques are essential because it encourages decisions at each phase of the design process that reduce the negative impacts on the environment by reducing carbon emissions and energy use and improves the comfort and health of building occupants while improving a building's performance.⁶²

The city has adopted Green Building Standards for all public buildings and buildings with more than 7,500 sq. ft. of gross floor area, which includes the dimensions of the train station.⁶³ The city also supports land use patterns that limit vehicular travel demand. Annapolis has a commitment to a more fuel-efficient public vehicle fleet which might be satisfied with a light rail system.

Overview of a Net Zero Design

Net Zero Definition

Buildings are one of the primary sources of energy consumption in the United States. All new construction needs to be a zero-energy building. In an effort to support the goals Annapolis has set out for itself, the train station will be designed to meet net zero energy standards. Net zero building design aims to create buildings that are able to produce as much energy as it uses over the course of a year. Recent developments in construction technologies, renewable energy resources, and research is allowing net zero energy buildings to become more feasible.

Net Zero buildings maximize design strategies to minimize energy requirements in combination with renewable energy systems that meet reduce energy demands. Net Zero design is a relatively new concept that lacks one definition. The approach to Net Zero building depends on the “project goals, and the values of the design team and building owner.”⁶⁴ In the United States, there are four Net Zero design options (net zero site energy, net zero source energy, net zero cost energy, and net zero energy emissions) that should be considered going forward with the design process of Annapolis’ train station. Each definition is as follows:

- Net Zero Site Energy: A site ZEB produces at least as much energy as it uses in a year, when accounted for at the site.
- Net Zero Source Energy: A source ZEB produces at least as much energy as it uses in a year, when accounted for at the source. Source energy refers to the primary energy used to generate and deliver the energy to the site. To calculate a building’s total source energy, imported and exported energy is multiplied by the appropriate site-to-source

conversion multipliers.

- **Net Zero Energy Costs:** In a cost ZEB, the amount of money the utility pays the building owner for the energy the building exports to the grid is at least equal to the amount the owner pays the utility for the energy services and energy used over the year.
- **Net Zero Energy Emissions:** A net-zero emissions building produces at least as much emissions-free renewable energy as it uses from emissions-producing energy sources.

Each approach to designing a net zero building has advantages and disadvantages. The most common methods used are Net Zero Site Energy and Net Zero Source Energy. Net Zero Site Energy method will be used to achieve the design goals outlined for the train station because it will produce the most attainable results possible for this project. Important considerations of each definition are summarized below.

DEFINITION	PLUSES	MINUSES
NET ZERO SITE ENERGY	<ul style="list-style-type: none"> • Easy to implement. • Verifiable through on-site measurements. • Conservative approach to achieving ZEB. • No externalities affect performance, can track success over time. • Easy for the building community to understand and communicate. • Encourages energy-efficient building designs. 	<ul style="list-style-type: none"> • Requires more PV export to offset natural gas. • Does not consider all utility costs (can have a low load factor). • Not able to equate fuel types. • Does not account for nonenergy differences between fuel types (supply availability, pollution).
NET ZERO SOURCE ENERGY	<ul style="list-style-type: none"> • Able to equate energy value of fuel types used at the site. • Better model for impact on national energy system. • Easier ZEB to reach. 	<ul style="list-style-type: none"> • Does not account for nonenergy differences between fuel types (supply availability, pollution). • Source calculations too broad (do not account for regional or daily variations in electricity generation heat rates). • Source energy use accounting and fuel switching can have a larger impact than efficiency technologies. • Does not consider all energy costs (can have a low load factor).
NET ZERO ENERGY COSTS	<ul style="list-style-type: none"> • Easy to implement and measure. • Market forces result in a good balance between fuel types. • Allows for demand-responsive control. • Verifiable from utility bills. 	<ul style="list-style-type: none"> • May not reflect impact to national grid for demand, as extra PV generation can be more valuable for reducing demand with on-site storage than exporting to the grid. • Requires net-metering agreements such that exported electricity can offset energy and nonenergy charges. • Highly volatile energy rates make for difficult tracking over time. • Does not consider all energy costs (can have a low load factor).
NET ZERO ENERGY EMISSIONS	<ul style="list-style-type: none"> • Better model for green power. • Accounts for nonenergy differences between fuel types (pollution, greenhouse gases). • Easier ZEB to reach. 	

Figure 61: ZEB Definition Summary, Source Zero Energy Buildings: A Critical Look at the Definition (accessed December 1, 2017).

Net Zero Energy Building Concept

Net zero buildings achieve a balance when a building's weighted supply meets or exceeds its weighted demand over a period of time. When both values are considered in balance, there is a positive inverse relationship with each other constantly reflecting a reference buildings energy efficiency.

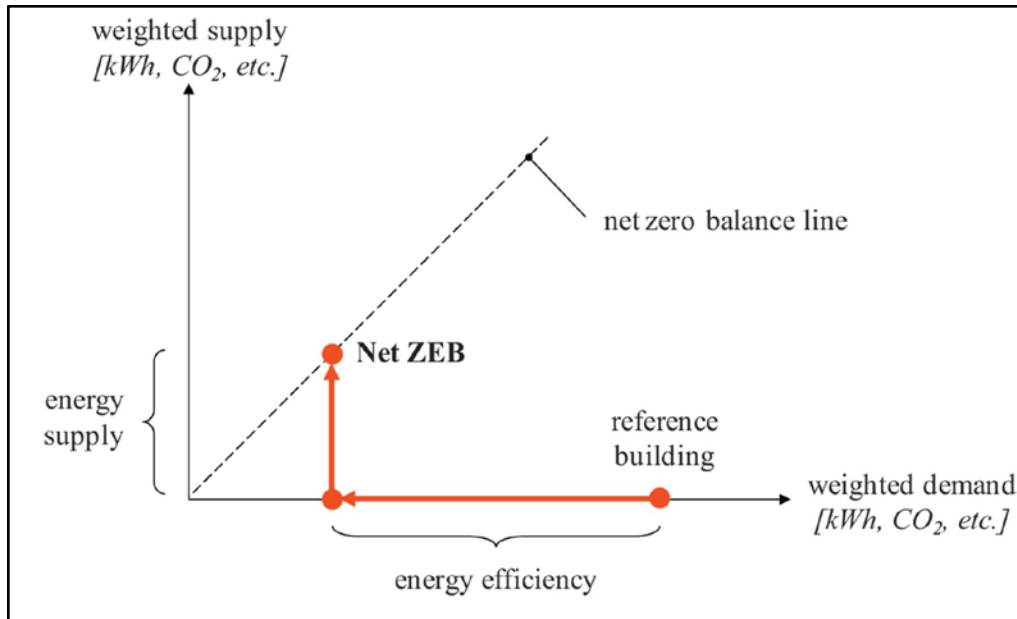


Figure 62: Graphic Representation of net ZEB Concept, Source I. Sartori, et al., Net zero energy buildings: A consistent definition framework, *Energy Buildings* (2012), doi:10.1016/j.enbuild.2012.01.032 (accessed December 1, 2017).

The path to reach a net zero building requires action that reduces energy demands through passive and active design strategies to achieve the net zero balance. Maximizing a building's energy efficiency involves researching strategies focused on high-performance envelopes, air barrier systems, daylighting, sun control and shading devices, a selection of glazing, passive solar heating, natural ventilation, and water conservation. Passive design strategies maximize site conditions such as daylighting, natural ventilation and solar energy to efficiently service a building. Active design strategies integrate specific solutions to increase the possibility of a building's Net Zero performance. Active strategies include the use of renewable

energy technologies such as solar panel energy, wind turbines, high-performance HVAC systems, heat pumps, electric lighting controls, and geothermal heat pumps to create energy and comfort in a building.

Net Zero Energy Calculation Procedure

Calculating the energy performance of a building requires the use of simulation tools and specific information about a buildings area and volumes. A buildings full-time/ part-time operation schedule, standard temperature points, lighting equipment, and internal loads from occupants are factors that are part of the analysis. Steps for calculating energy performance of a building include “1. Determine the net energy budget, 2. Evaluate different options for renewable energy supply (on-site or off-site), 3. Design on-site renewable energy, 4. Calculate the gross delivered energy 5. Calculate CO2 emissions based on the simulated demand from different energy carriers.”⁶⁵ A target for a train station in Annapolis to achieve a performance value of 20-25 kBtu/sq.ft/year establishes a goal that can be achieved in the Mid-Atlantic region.

The World’s First LEED Platinum Building

Philip Merrill Environmental Center

The Philip Merrill Environmental Center is known as an icon for sustainable design principles and energy efficiency. The Chesapeake Bay Foundation opened up its new headquarters in 2001 along the waterfront in Annapolis. As a local building in Annapolis that is environmentally aware and exemplifies sustainable strategies, the Philip Merrill Environmental Center can be a source to research specific applications and methods on how to incorporate practices into the train station design.

The building is clad with recycled metal panels and requires significantly less energy than the typical office building and has a minimal impact on its bayfront surroundings. Principles

of Passive-solar design strategies and outdoor-air ventilation minimize annual lighting and HVAC demands. The Philip Merrill Environmental Center uses natural resources like solar energy, rainwater recollection, and the earth's constant ground temperature to service the building. Comfort and beauty do not need to be sacrificed for smart, sustainable design ideas as architectural design can emphasize sustainable practices into a user's experience.⁶⁶



Figure 63: Philip Merrill Environmental Center, Source Andreas Kollegger
<https://www.flickr.com/photos/kolleggerium/134545080> (accessed November 25, 2017).



Figure 64: Philip Merrill Environmental Center- South Wall PV Panels for onsite energy production, Source theregeneration <https://www.flickr.com/photos/theregeneration/2917294886> (accessed November 25, 2017).

Figure 65: Philip Merrill Environmental Center- Natural Ventilation from bay breezes, Source Solaripedia
http://www.solaripedia.com/13/283/3128/chesapeake_bay_foundation_ventilation_diagram.html (accessed November 25, 2017).

The community of Annapolis needs to be kept in the forefront when embarking on a major design project because it will help build support and credibility for the project's success. Designing in a contemporary style that also pays tribute to the historic preservation guidelines of Annapolis while simultaneously creating a self-sustaining building is a unique approach to celebrate the prominent charm of the city's culture. The best way to attain all of these goals is by working together and engaging the community in an experience they can personally relate to and take pride in.

Chapter 5: **Program**

Primary Spaces

The layout of a train station has a significant impact on creating a functional space that users can move through efficiently. As designers, time needs to be devoted to creating program requirements and calculating how much space is needed to support them. A train station's dimensions and features are determined by the location and size of the site. By definition a train station is the point of arrival and departure in a city but can also be recognized as a place for community gatherings. With any strong design, an opportunity exists to bring in vast numbers of people to enjoy the offerings of the space.

There are basic requirements that are essential for the construction of any train station. Major spaces include an exterior civic space, interior waiting hall, and platform area. Each area plays an important role in the function of the station and needs to establish a meaningful experience through space. For the user, the movement between spaces creates a sequence that transitions a person from being a train passenger to a local visitor.

An exterior civic space is a direct link between the city and the train station. The edge of the civic space should be treated as an active streetscape welcoming people as they arrive. The role of the station is significant and identifies a destination. A public plaza space will permit a user to move quickly and freely between other means of transportation. The civic space should also act as a place of repose and include a gathering and waiting location for users.

The main waiting hall is a transitional space between the exterior and interior. The waiting hall is the most architecturally significant space as it is the primary place visitors and passengers congregate. Typically, the waiting hall is a large, open space that provides access to

the other station programmed spaces. From the waiting hall people are able to purchase tickets, gather information, and access refreshment areas and restrooms. As the primary function is for users between spaces, circulation, and activities to entertain the public are important functions to consider in designing the space. Also, upon arrival the hall should provide a prominent image of the destination city and display signs of its culture.

The platform is where train passengers board and disembark the train. The platform captures the first and last experience of travelers and the city. Even though the space is primarily for arriving and departing, the space needs to be efficient for maximum transition between user experiences. A platform edge is a long, linear space that is easily accessible and determined by train lengths for convenient boarding. An overhead canopy offers passengers protection from weather elements while moving along the platform edge. A canopy covering can highlight direction and movement that is significant to the architectural expression of the train station.

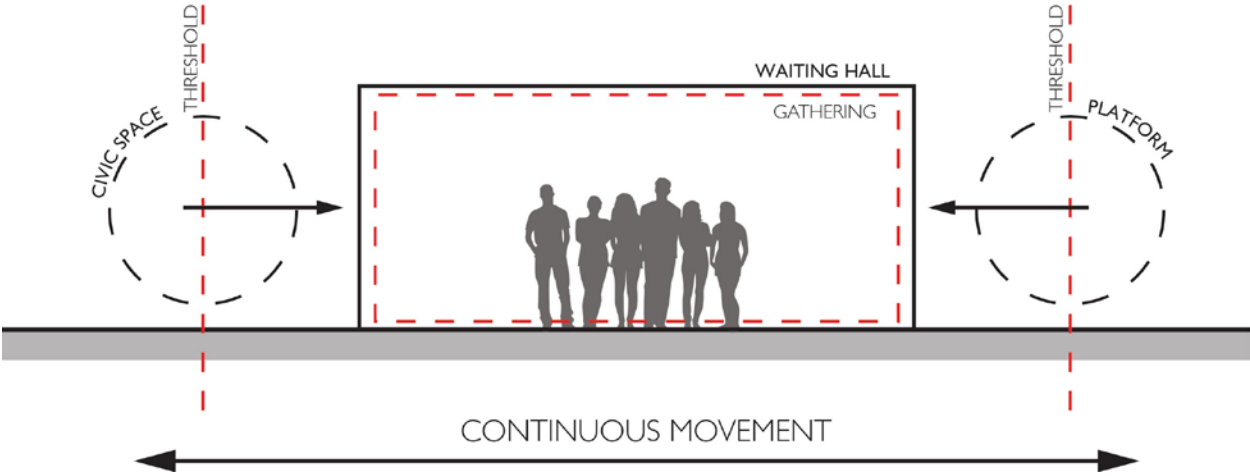


Figure 66: Train Station Primary Spaces Relationship, Source by Author

Secondary Support Spaces

Train stations that have a more prominent role within a community and act as a destination for people to gather must have features that make the space usable and desirable. Introducing programs like cafes and bike shops that welcome visitors to a train station in Annapolis offer people the opportunity to stay for an extended period of time. Connecting to the community inspires chance encounters between people. These gathering places should promote community interaction and positive outcomes.

Café and lounge spaces provide users with a more intimate and comforting location to spend their time. Often part of the experience of being in a train station is seeking refreshments. A place for people to drink coffee and snack increases their desire to go to a place. For a capital city like Annapolis with tourists, commuters, students, and families finding a work space will always be in demand. Local lounge spaces that offer ample work surfaces and access to WIFI will give all members of the community a space to gather and stay connected.

Annapolis is considered a very walkable community. Many of the common destinations the public is interested in are within a quarter mile radius from the Maryland State House. However, there are currently very few bike paths that reach the historic downtown center. There is an interest by the public in making Annapolis more accessible to bicycle circulation. Introducing a bike shop and extending bike paths at the train station's site will allow new opportunities to move throughout the city. Promoting bicycle use and alternative transportation options by providing secure parking, rental, and retail uses on site will promote sustainable community engagement for those passing through the station.

Configuring each of these elements in a way that maximizes the advantages of the site and organizes the connection to the community will facilitate an enthusiasm to experience the space. Understanding the adjacencies of the spaces within a train station is critical for organized

movement. The waiting hall is the central celebratory space for gathering that many other programs are centered around. Attention to accessibility and security concerns are also important considering the station is a public building within close proximity to the U.S. Naval Academy and state government buildings. The location of the site within Annapolis and the planned programmatic pieces establish a prime destination and an excellent opportunity for people to gather.

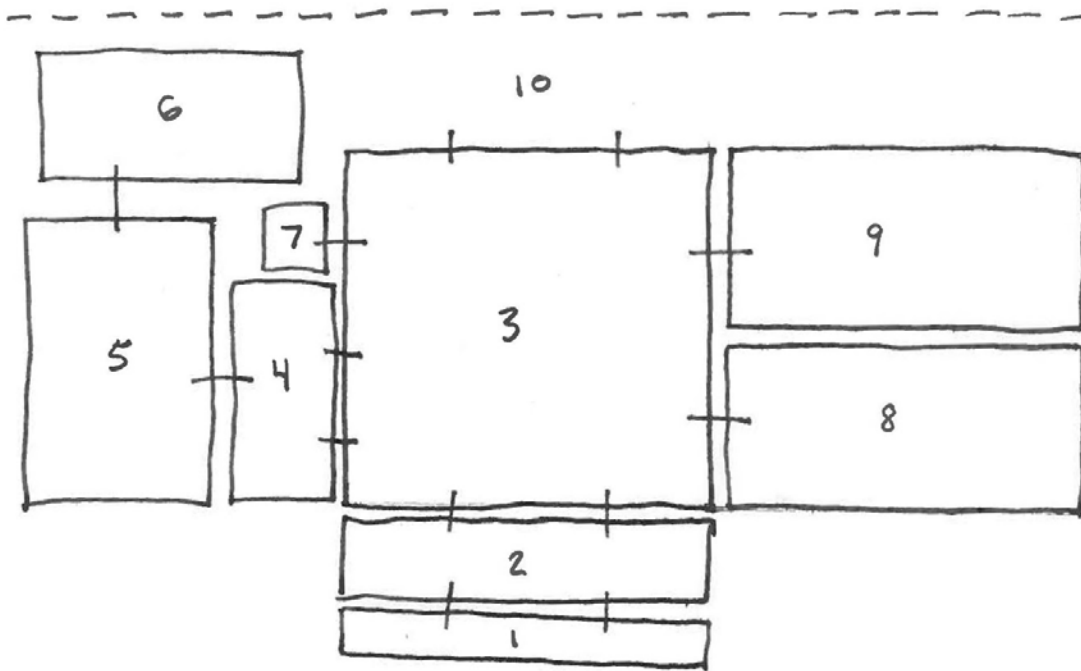


Figure 67: Train Station Program Adjacencies, Source by Author
 1. Transfer Area 2. Exterior Space 3. Waiting Hall 4. Ticket Center 5. Station Operations and Security
 6. Service 7. Private Core (Bathrooms and Lockers) 8. Cafe/ Workspace 9. Bike Shop 10. Platforms
 and Tracks

Platform Organization

In an effort to develop site relationships, selecting a light rail train vehicle for the project is needed to understand special adjacencies and size requirements. Light rail vehicle types are not drastically different; however, Alstom is a company that produces a modern vehicle that is highly adaptable to existing city and street conditions. Today, Alstom's Citadis Spirit vehicle services 45 cities, 14 countries, and 5 continents.

Alstom's light rail vehicle is highly accessible and has a low-floor design allowing for easy access from the street edge and an interior void of steps or ramps. The trains are able to travel at a maximum speed of 65 mph and can be custom-made to reflect a city's charm. Part of the growth technologies with Alstom's vehicle fleet is the development of hybrid powering solutions. Light rail vehicles are usually powered through a catenary wire system from above. In an effort to preserve historical cities and minimize a city's infrastructure constraints, the Citadis vehicle has an option that does not require a catenary power from above for lengths of its trip. When not powered through an above power source, several powering options include:

- APS Technology: power supply from the ground, through an in-street conductor that is only charged when a train is in contact with it
- Batteries: on-board energy storage for medium to longer distance travel
- Super-capacitors: on-board energy storage for shorter distance travel that requires in-station recharging

For Annapolis, Alstom's Citadis light rail vehicle is ideal for its versatility and ability not to disrupt the rich character of the historic city that the Bladen Street site is on the edge of. There

are a range of vehicle types to select from. In order to prove the site is able to service the most people, the maximum length train is shown on site. The train is 157' long, 8'-8" wide and able to carry 300 passengers.⁶⁷ There are two platforms proposed in order for passengers to exit from both sides of the train. One platform brings passengers directly onto the site and the other is in line with the State House building to bring passengers forward toward the celebrated view corridor.

The Bladen Street site is best suited as a terminus station. Light rail trains will enter the city of Annapolis through a shared traffic lane along Rowe Boulevard and then enter into a designated platform zone. Departing trains will require conductors to switch sides and direction of travel and will reverse out of the station into a separate shared lane with traffic on Rowe Blvd.

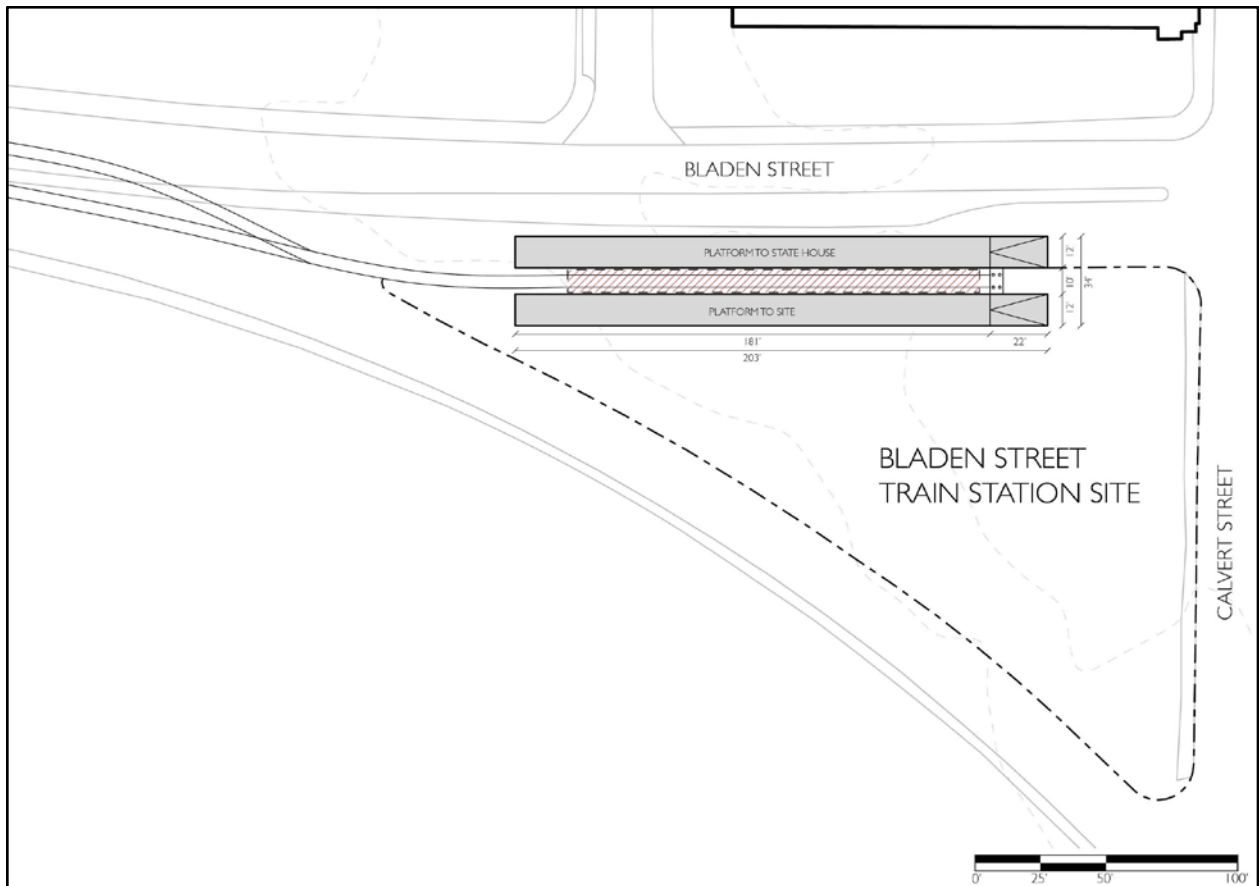


Figure 68: Platform Plan, Source by Author

The turning radius of a Citadis train is a minimum of 82'. If the station was a through station, the required street planning would disrupt much of the exterior spaces adjacent to the train station's proposed site. Pedestrian approaches toward the site and green streetways would be difficult to plan. The necessary requirements for a light rail vehicle to use multiple lanes to make a complete turn further supports the Bladen Street Station as a terminus location.

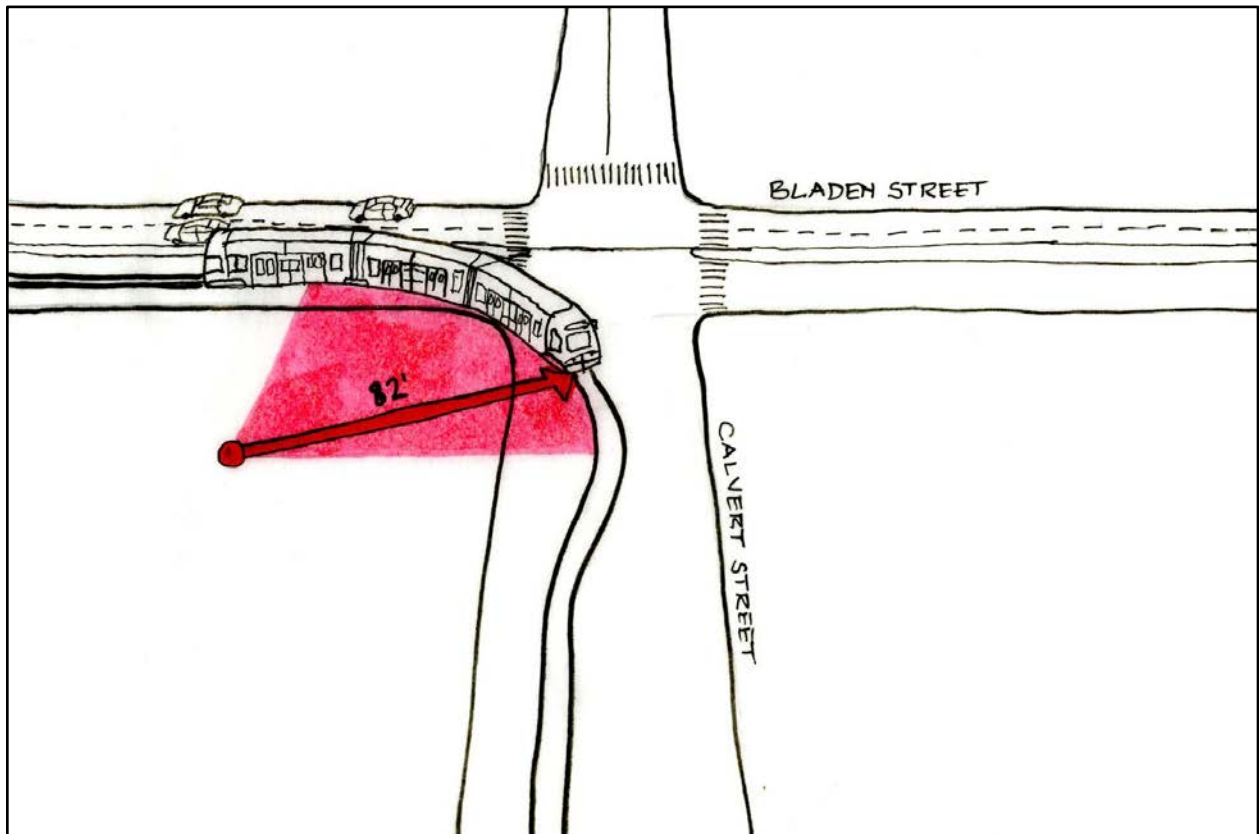


Figure 69: Light Rail Train Turning Radius, Source by Author

Organizing platform and track conditions on the site in this way allows for a seamless passenger experience as they enter Annapolis. Each platform is 12' wide meeting the necessary widths required for passenger exchange and 14" above the top of the rail. At the end of the platforms, there are ramps that are accessible and move passengers in a direction through the station and into the city.

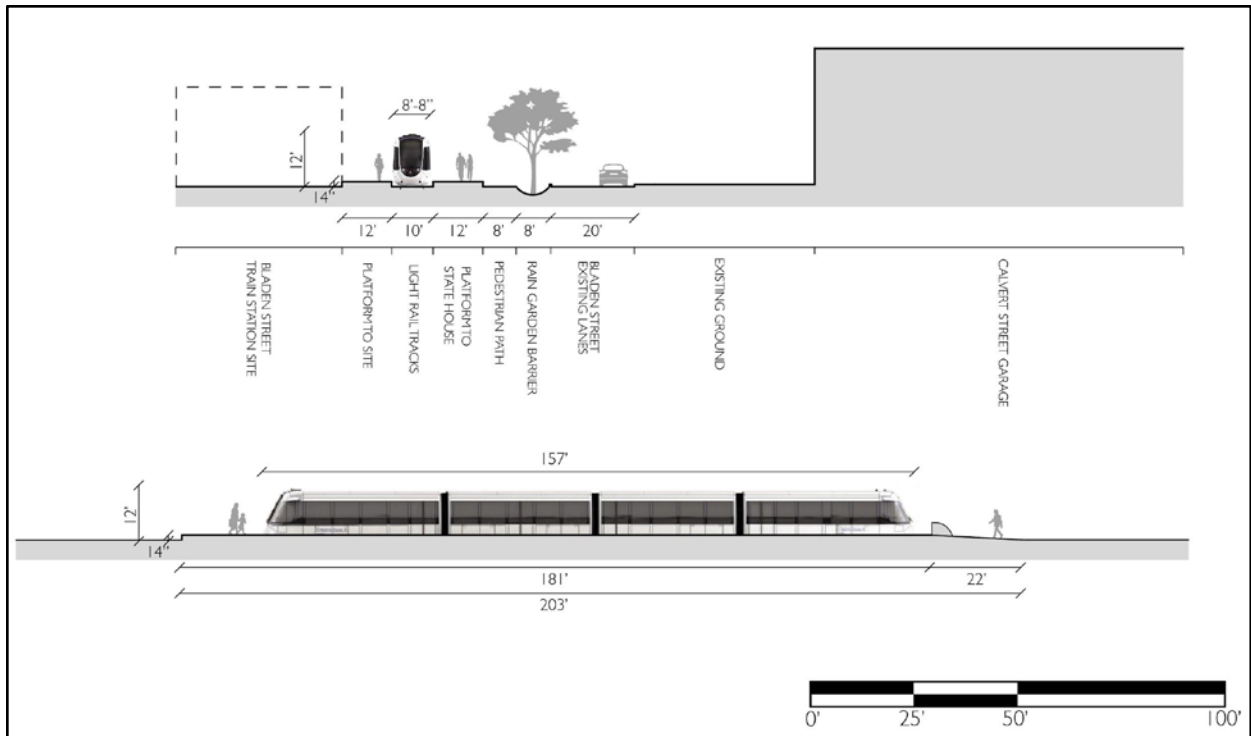


Figure 70: Platform and Track Sections, Source by Author

Building Program

Exterior Space	AS NECESSARY
Civic Space	
Pedestrian Streets	
Drop Off Zone	
Transfer Area for Buses, Trolley, Cabs	
Waiting Hall	5,000 sf
Interactive Sustainability Exhibits	
Seating Areas	
Ticket Center	800 sf
Counter	
Information Station Workspace	
Station Operations and Security	1,800 sf
Office(s)	
Employee Recreation Area	
Security Headquarters	
Employee Restroom	

Baggage Room/ Lockers	100 sf
Lounge/ Work Space	3,000 sf
Refreshment Area	
Preparation Space	
Seating and Work Zone	
WIFI Hotspot	
Bike Shop	2,000 sf
Rental Room	
Storage	
Repair Shop	
Public Restroom	600 sf
Men's, Women's, Gender Neutral Bathrooms	
Service	1,200 sf
Janitor's Closets/ Storage	
Loading Dock	
Mechanical	
Circulation	AS NECESSARY
Platform & Track	203' LENGTH 34' WIDTH
TOTAL	14,500 sf

Community Engagement Through Sustainability Awareness

City officials in Annapolis build and foster partnerships with other jurisdictions, the private sector, and local environmental groups in order to address natural resource protection and environmental education. An outlook for the city is to promote sustainability awareness and positively impact the community. In an effort to advance the train station as a local destination, the goal is to integrate interactive designs highlighting the importance of sustainability so that visitors will be able to understand and experience how to beautifully protect the environment.

Knowing Annapolis has such close ties to the water and the Chesapeake Bay, educational programs on water safety and how to protect the quality of water will be a focal point and be made available in the station. Also, information kiosks on the surrounding native plants and tree canopy will be sponsored by groups interested in horticulture. Multiple strategies will also demonstrate how to refresh air, create self-sustaining energy, and ultimately live a healthy lifestyle. Each exploration will offer the opportunity to connect all members coming through the train station. Sensory experiences of sight, touch, and sound through sustainable design initiatives will be part of the program that will advance the user's journey through the space. Public awareness of the train station's role as a sustainable gem within Annapolis will inspire new behaviors.

Passive Design Strategies

Rain Gardens

In an effort to address sustainability issues related to water runoff and pollution into the Chesapeake Bay, a few strategies will restrict these negative ramifications. To date, Annapolis has developed more than 60 bioretention areas, which are called rain gardens to slow down the impacts of water runoff. These gardens are planted with native flowers, shrubs, and canopy trees on top of an engineered gravel and rock substrata that allows excess stormwater to be soaked into the ground. Rain gardens capture water and hold it temporarily in order to remove the land pollutants. Opportunity exists for rain gardens to be designed along pedestrian pathways in an effort to create adjacent space for people to walk along and see rain gardens restore habitat, solve ecological problems, reduce maintenance, beautify the overall surroundings, and create a sense of place. With the proposal of many pedestrian streetscapes, existing impervious surfaces will be removed to mitigate stormwater runoff concerns and make the city landscape more resilient.



Figure 71: Rain Garden Along Pedestrian Streetway, Source by Author

Rain Chains

Rain chains can be used as part of the building design to capture the public's attention and visually demonstrate how rainwater can be collected and not wasted. As an overflow of water drains from hardscape surfaces above, chains are used to transfer water into storage containers. The process creates a visual and aural sensation as water moves from one place to another. The water collected can be purified and stored on site for reuse. A further connection of water reuse connects the visitors of Annapolis' train station because the reused water can be found throughout the building in bathrooms, sprinklers, and water fountain attractions where the public gather.

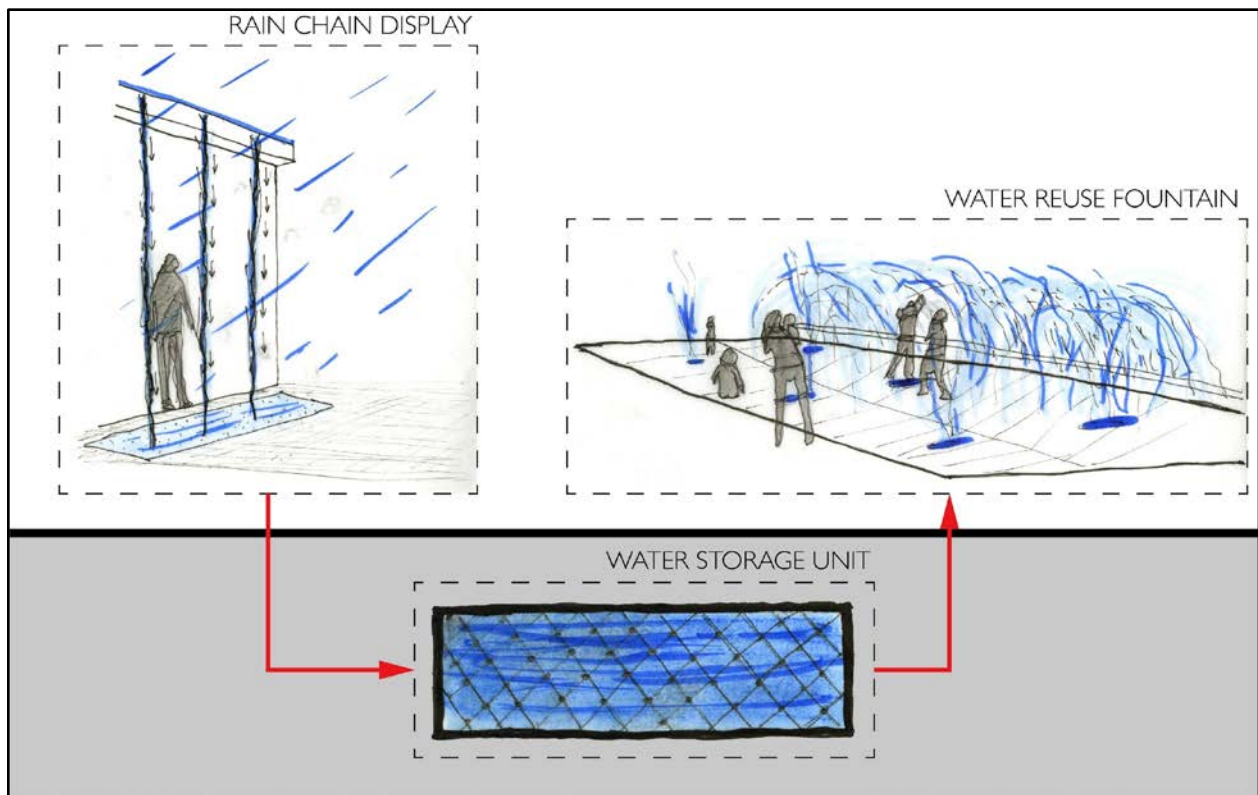


Figure 72: Water Collection and Reuse Method, Source by Author

Phytoremediation Wall System

Green walls can be designed into a space in an attempt to improve indoor air quality.

Phytoremediation wall systems are designed with plant roots exposed which increases the plant's ability to refresh the air within the building. Air is able to move through the wall system, be cleansed by a plant's root system, and then be reintroduced into the environment.

Phytoremediation Wall Systems can be introduced into many types of spaces within the public realm in an effort to advance the user's experience of space.⁶⁸ While the air surrounding the train station's visitors is being purified, green walls also act as a centerpiece that people are able to connect with visually or physically while waiting for a train.



Figure 73: Phytoremediation Wall System Experience, Source by Author

Figure 74: Phytoremediation Wall System, Source Inhabitat <https://inhabitat.com/nyc/gorgeous-living-wall-purifies-the-air-inside-this-new-emergency-call-center-in-the-bronx/active-modular-phytoremediation-system-som-case-2/> (accessed November 27, 2017).

Green Roofs

Green roofs are found on top of buildings either partially or completely covered with plants. Green roofs help absorb rainwater, provide further insulation to a building's interior, and lower urban temperatures all while creating a living habitat and an aesthetic roofscape. There are several green roofs throughout Annapolis today, including the Annapolis Police Department, that are improving the city's well-being. However, the existing green roofs in Annapolis fail to make a direct connection to the public because they cannot be seen and people are unaware they are there. A green roof should be included in a design so building occupants can be part of the space. As part of the design of the train station hub, angled roofs can create a visual connection as users approach the building as well as roof terraces and outdoor seating options can envelop the public into the vegetated roof space.

In San Francisco, Pelli Clarke Pelli Architects have designed the Transbay Transit Center that transforms the idea of a transportation hub into an urban destination. The focus of the design is the green rooftop park with a multitude of activities open for the public to come together and participate in. Upon its completion in 2017, the transportation station will provide a sustainable experience for the public to take part to understand more about their local environment. The green rooftop terrace covers five city blocks and is visible to both pedestrians walking by and to station visitors from light wells in the interior spaces.⁶⁹



Figure 75: Transbay Transit Center (Above and Interior), Source Transbay Joint Powers Authority <http://tjpa.org/media-gallery/image-gallery/transit-center-architecture> (accessed November 27, 2017).

Active Design Strategies

Solar Panels

Sunlight can be absorbed and used as a source of energy to generate electricity and heat a building through the use of solar panels. Solar panels can be used to power much of the train station. Solar panels can be arranged on roofs in a manner that stand out architecturally so people see the power source and are supportive of the view. New technologies have developed transparent and semi-transparent glazing options that include solar concentrators that can generate energy. A building can collect and generate its own power through the use of solar panels and stand out as an object a community can see.⁷⁰

Hickok Cole, a local firm in Washington D.C., is designing the American Geophysical Union headquarters building that has solar panels extending beyond the footprint of the building's edge. The upper stories of the building are primarily glass and the structure system within the building extends outward to support the loads exerted on the building from the overhanging solar panels. From the street below a more formal visual connection is established as solar panels become part of the building's expression.⁷¹

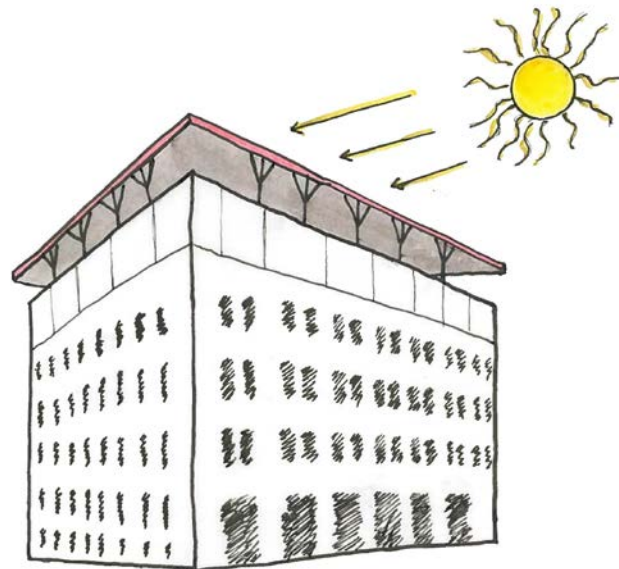


Figure 76: American Geophysical Union Building, Source Hickokcole
<https://hickokcole.com/projects/agu/> (accessed November 27, 2017).

Figure 77: Structural/ Visual Connection with PV Panels on Roof, Source by Author

Pavegen Floor Panels

Energy can be created simply by people walking across the floor. Pavegen is a global network that uses innovative technology to engage people as they walk across a surface by simultaneously showing them how they are directly powering the space they occupy. The flooring system is able to absorb a person's step as they add pressure on a tile and transform that motion into electricity. Pavegen floor panels are ideal to use in areas where there is significant foot traffic like a transportation hub.⁷² Passengers and community members alike will play a significant role and be able to visually recognize their value of moving through a space.



Figure 78: Pavegen Floor Tile (Canary Wharf, London), Source Pavegen <http://www.pavegen.com/canary-wharf> (accessed November 27, 2017).



Figure 79: Pavegen Pathway Engagement, Source by Author

Engaging train station visitors with sustainable design features will create an experience that promotes healthy living environments. Each of the strategies incorporated into the design of the train station spaces have the opportunity to promote Annapolis' goal to be a green city through passive and active design planning. Organizing program features that maximize the existing conditions of the site help control water reuse opportunities so that the public will be able to thoughtfully understand how the building innovatively collects, stores, and reuses stormwater. Similarly, the orientation and design of a green roof will help the building perform efficiently as the interior green walls purify the air the public breathes and reduces air pollution. Use of sustainable technologies will also help advance the lifestyle of the community passing through the station. While solar panels can be an active source of energy powering the building, the paven floor tiles encourage visitors to be active within the space and help generate the electricity required for the train station. The purpose of the sustainable design program features is to make the public aware of the positive role they can be a part of in Annapolis' goal for a greener future.

It is necessary to analyze spatial relationships because they provide an initial solution on how to arrange and organize programs efficiently. Similarly, rationalizing scale of spaces and required sizes for platforms on the train station site will offer preliminary insight on site organization and massing. In an effort for the train station design to include the entire Annapolis community, it is essential to advance the typical program functions in such a way that promotes sustainability and gives a visitor both a profound experience at the station and leaves them with a new awareness of "going green." Completing an in-depth analysis on program is an important first step in working towards the schematic design process.

Chapter 6: **Design Proposal**

Design Process

As with the beginning of all design projects, there are a variety of studies that are considered that highlight the important relationship to site. One of the most important relationships of the proposed design is the connection between building mass and the canopy that covers the platform of the train tracks. The goal of the final massing concept proposed was a traditional building mass that supports the message of the historic image in Annapolis while introducing a contemporary image as people enter the city.

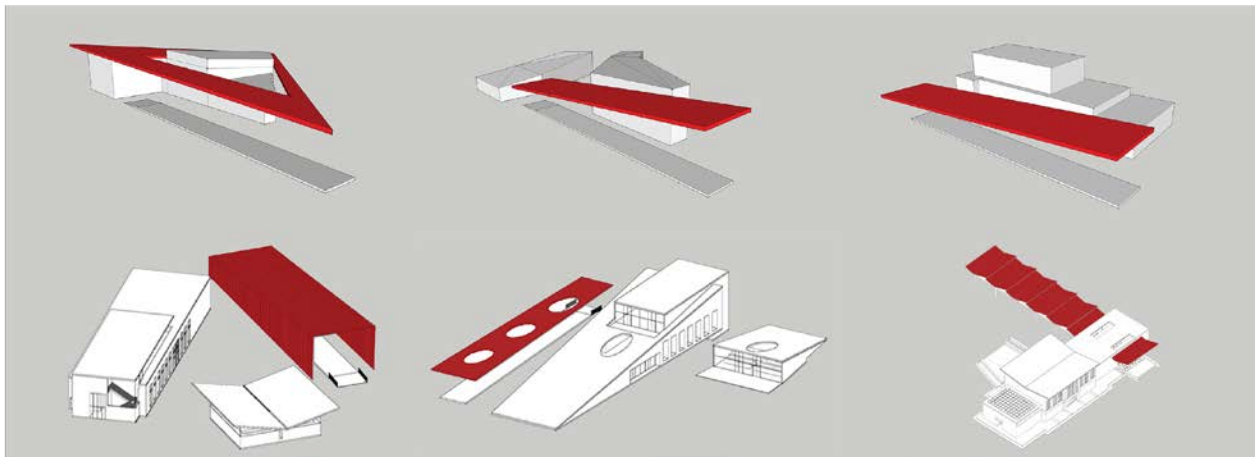


Figure 80: Massing Studies, Source by Author

“Crossing the Threshold”

Today as a person enters into the historic center of Annapolis there is no sense of arrival highlighting the entry experience. College Creek acts as a natural barrier that indicates the movement between spaces defining the edge of the historic district. Rowe Boulevard is a wide asphalt covered roadway leading the public into a horizon line filled with trees. This axis into Annapolis currently lacks an urban context welcoming you in.



Figure 81: Existing Entry Sequence into Annapolis, Source by Author

The transit station acts as a gateway signifying the entry into Annapolis for all users. The station is on a receiving axis coming over the bridge above College Creek. Pedestrians, automobiles and light transit vehicles enter the historic center approaching the building. During the approach sequence, as the public gets closer to the station, Maryland’s State House comes into prominent view which acts as a landmarks into the city towards the harbor.



Figure 82: Proposed Entry Sequence into Annapolis, Source by Author

Site Design

Building placement on the site preserves the most important traffic loop into and out of Annapolis along Northwest Street and Bladen Street. By maintaining this traffic loop, the terminus platform has its own designated zone to allow for the safety of passenger transfer. Reorganizing aspects of the existing street pattern has allowed an opportunity for designated drop off and pick up areas as well as walkways moving pedestrians toward the State House. Movement throughout the community is critical to creating a sustainable future. The building itself begins to engage the message of sustainable design through its use of green roofs, photovoltaic panels, and extensive permeability on the ground plane.



Figure 83: Transit Station Site Plan, Source by Author

Design Parti

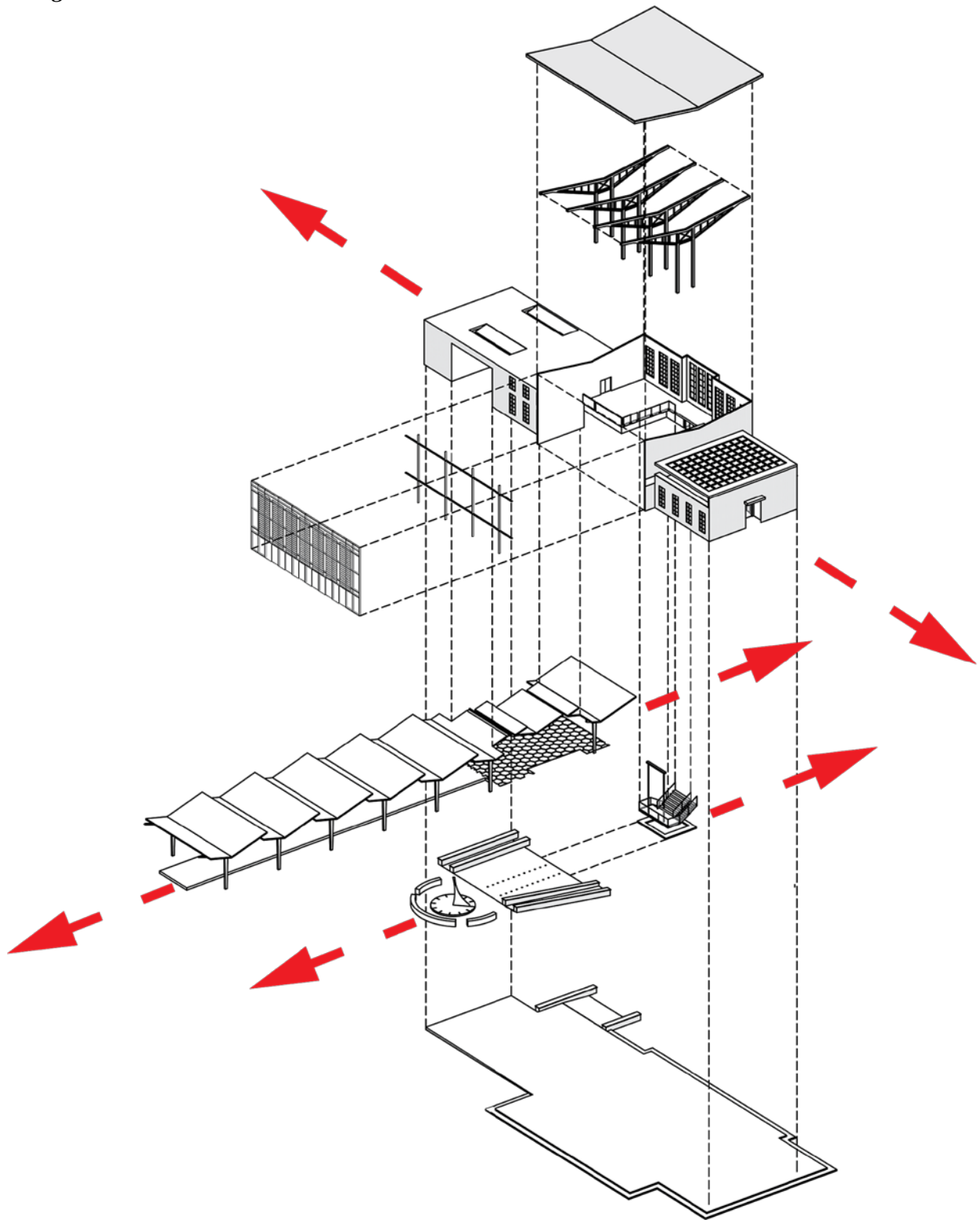


Figure 84: Design Parti, Source by Author

Program Organization

Program is organized into the brick mass of the building as well as into public and private zones. The community experience through the threshold is highlighted by two axis through the gateway. The more public spaces of the building are in the center including the waiting hall, ticket center and cafe. The more private zones are organized into the solid brick wings of the building and locate offices, kitchen, storage and building core. Placing the program into a linear brick mass begins to define the sites edge with the historic center as well as its context.

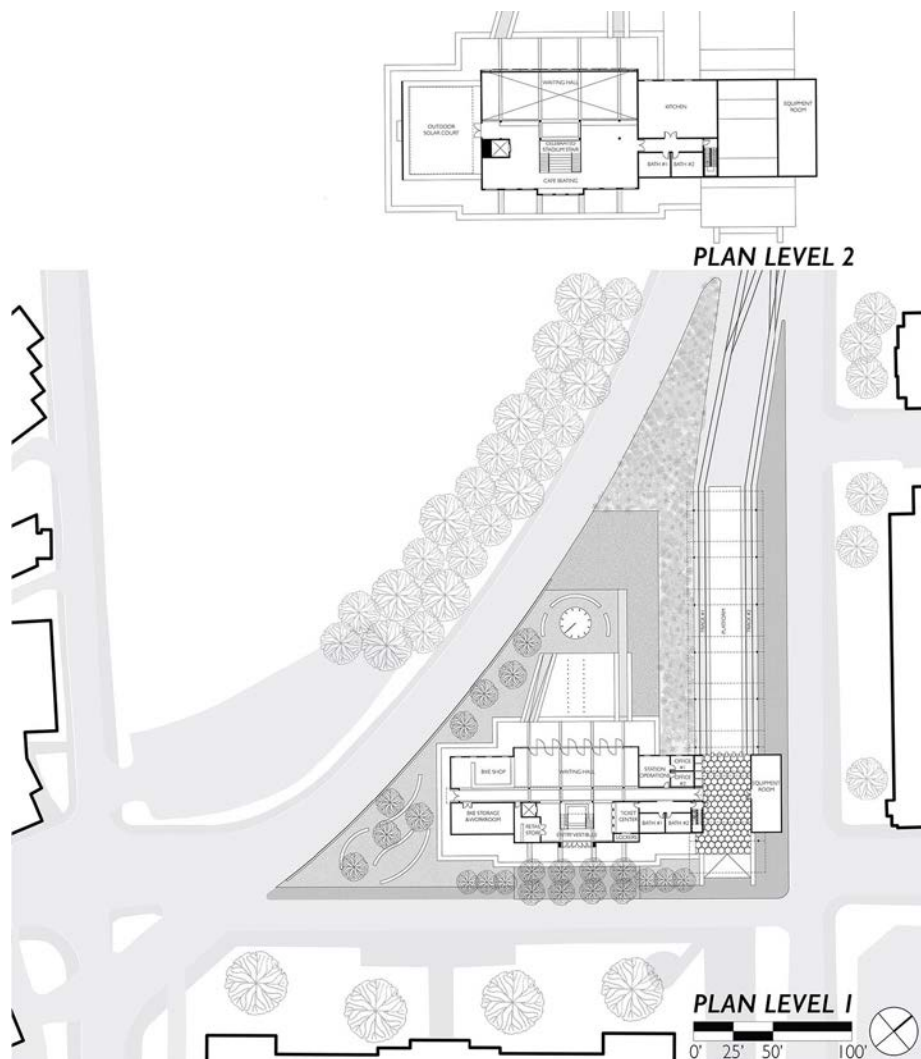


Figure 85: Plan levels 1 and 2, Source by Author

The Arrival

As the community begins to approach the site they have immediate access to both axis entry into the building, the waiting hall and the platform. Along the drop off zone, there are a number of gathering areas for the public to rest as they make their way into the downtown harbor front on foot or by passenger vehicle.



Figure 86: Arrival to the station, Source by Author

The envelope of the building begins to express a relationship that supports the historic image and celebrates the idea representative of a path forward through architecture. The drop off elevation stems from the proportions, materiality, and scale of the surrounding area. On the opposite side, the garden elevation expresses a more contemporary approach to designing a facade for a historic city through the expression of the layering of glass materials. Regulating lines and similar geometries form a relationship between the two edges to unify the expression.

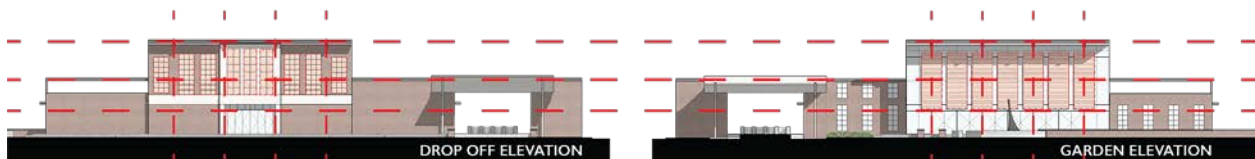


Figure 87: Elevation organization, Source by Author

Platform Intersection

The canopy is an exterior area that intersects the building mass as visitors to the station move from the historic center to their train. There are slits in the roofline that allow for bands of light to enter the space and highlight movement along the platform. As the public enters the space, they have the opportunity to enter the building, buy tickets and pass through security barriers as they board and exit trains. Designed into this space is pavenge floor tiling as a way to engage the community in the sustainable message of the building.



Figure 88: Entry from Annapolis onto platform, Source by Author



Figure 89: Section through station canopy and platform, Source by Author

Waiting Hall Intersection

As passengers begin to move between the drop off/ pick up areas, they enter the building and have the option of a small retail shop, a ticketing area to gather information, and a central staircase leading visitors to the cafe or into the waiting hall. Once in the center space, the structure of the interior is on display as it moves people through the space on the ground level and directs views to the exterior garden. The destination in the garden zone allows for an outdoor gathering area for the public to share. Including water play into the design engages the public with the idea that the image of Annapolis is founded on the idea and connection to its harbor.

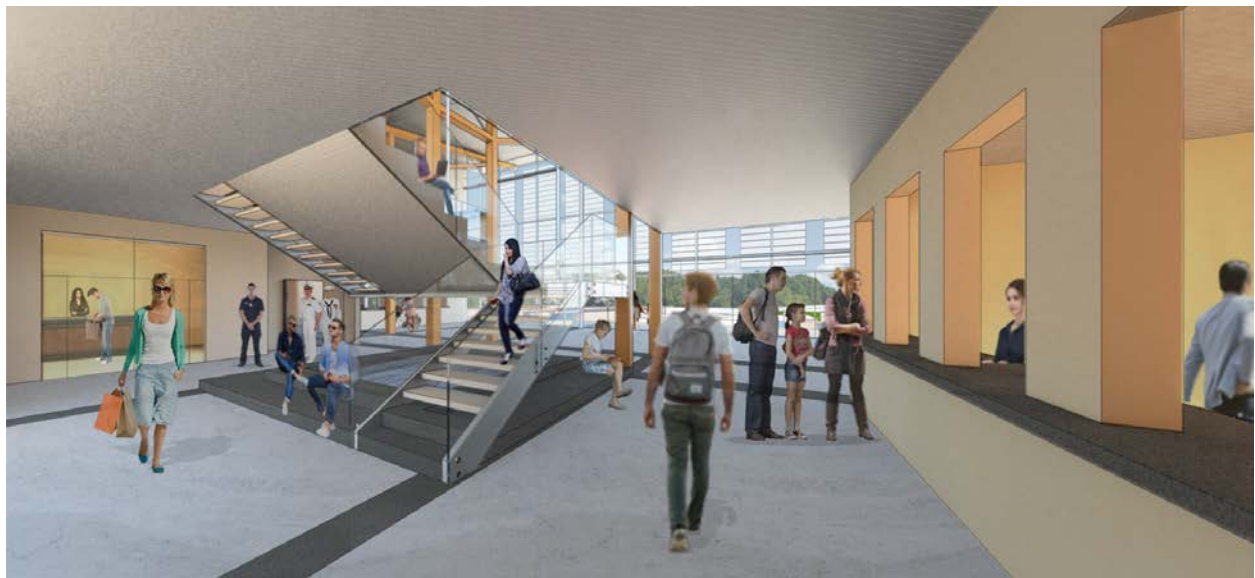


Figure 90: Entry from Annapolis into waiting hall, Source by Author



Figure 91: Section through waiting hall into garden, Source by Author

Center Gathering Space

At the center of the waiting hall intersection is a celebrated staircase that begins to bridge a link between the interior space and designates the most opportune space for public gathering. The structure of the stair is independent of the elaborate structure of the building as it is suspended from the ceiling using steel cables that create an imagery that the stair is delicate in nature. As users engage with the space, the landing is 8' wide that allows for the community to gather as they transition between floors. At the center of the stair, stadium seating allows for the building's occupants to wait for their train or work as they drink or eat from the cafe. The shared spaces link the community experiences around the building. As people are engaged on the steps, the structure of the building frames views outward into the garden area establishing a connection of the axis through the waiting hall. Beneath the stair is a reflecting pool that controls circulation on the first level. At the same time, introducing water to the interior space, references the city's important history to water in line with the water play in the garden.



Figure 92: Center Gathering Area- stadium stair, Source by Author

Net Zero Design

As part of the goal to achieve a net zero design, there were a number of considerations that have been applied to the building's design. The first step of designing an efficient building mass and orientation is its site; the building is organized around a narrow footprint to allow for optimal cross ventilation. Secondly, a number of facade studies were conducted to determine an optimal window-wall ratio which would allow for a fully transparent garden elevation. A transparent edge blurs the line between interior and exterior spaces and informs the public how a building can be connected with the environment. Incorporating active design strategies and technologies into the design allow the building to perform independently. Most importantly, when the station is compared to similar building typologies, the energy performance exceeds targets set for efficient buildings going into the future.

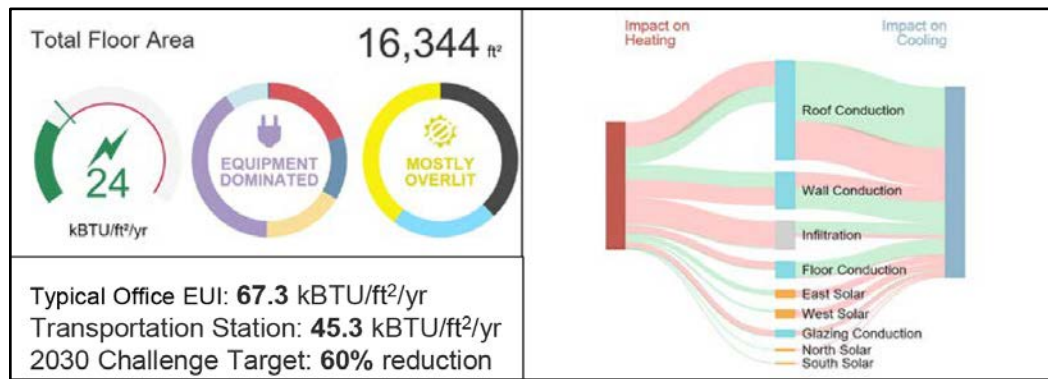


Figure 93: Technical performance output of station, Source by Author

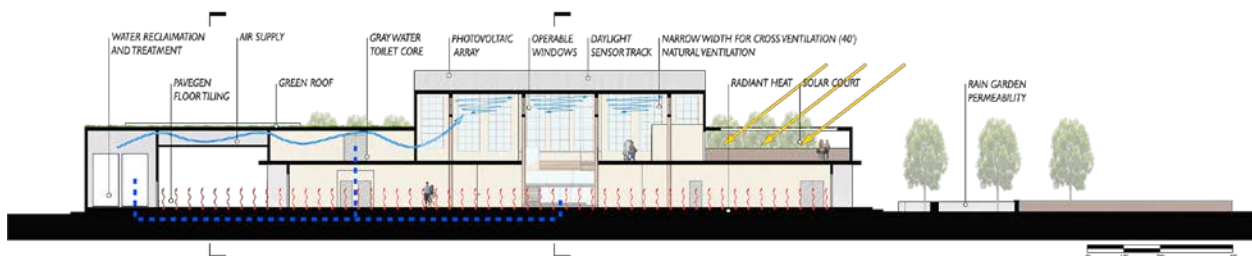


Figure 94: Section through building mass highlighting sustainable strategies of the station, Source by Author

Public Garden

Connecting the public in an exterior space fully integrates the experience of entering Annapolis through architecture. The axis through the brick mass is completely identified. As the community is fully engaged with the city, they can see trains entering the site and the canopy directing movement into the historic district. Water can be collected on the surface of the roofs and then transferred to the rain garden on the site that the public can be apart of. The transparent glass elevation sets the stage and the backdrop is the waiting hall welcoming people as they enter Annapolis.



Figure 95: Public Garden, Source by Author

Chapter 7: **Conclusion**

Into Annapolis and Forward

The message of connecting our communities and the importance of sustainable architecture is critical to understand and incorporate into design as we advance into the future. The personal experience of coming and going into cities is something to be celebrated. Every person has a journey that is unique and riding on a train begins to stimulate a special meaning that can lead to new discoveries. Passing through the gateway and crossing the threshold into Annapolis welcomes people into the city through architecture, landscaping, landmarks, and movement along the path. While the design of the transportation station is dependent on its site and the context of Annapolis, the theme can be applied to all communities.



Figure 96: Crossing the threshold into Annapolis, Source by Author

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