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A Return to Manning the Post: the Adaptive Reuse of Publically Owned Fire Control Stations from the Second World War

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A Return to Manning the Post

The Adaptive Reuse of Publically Owned Fire Control Stations from the Second World War

Prepared By:

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Master of Science

Historic Preservation

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May 2012

SIGNATURE PAGE

A Return to Manning the Post:

The Adaptive Reuse of Publically Owned Fire Control Stations from the Second World War

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DEDICATION

For the 10th Coast Artillery Regiment of Narragansett Bay - New Bedford and the 11th Coast Artillery Regiment of the Long Island Sound. Your legacy has endured through the harbor defenses that remain along the coastline.

It is my hope these structures will endure as symbols of the dedication, efforts, and sacrifices you made during the war effort.

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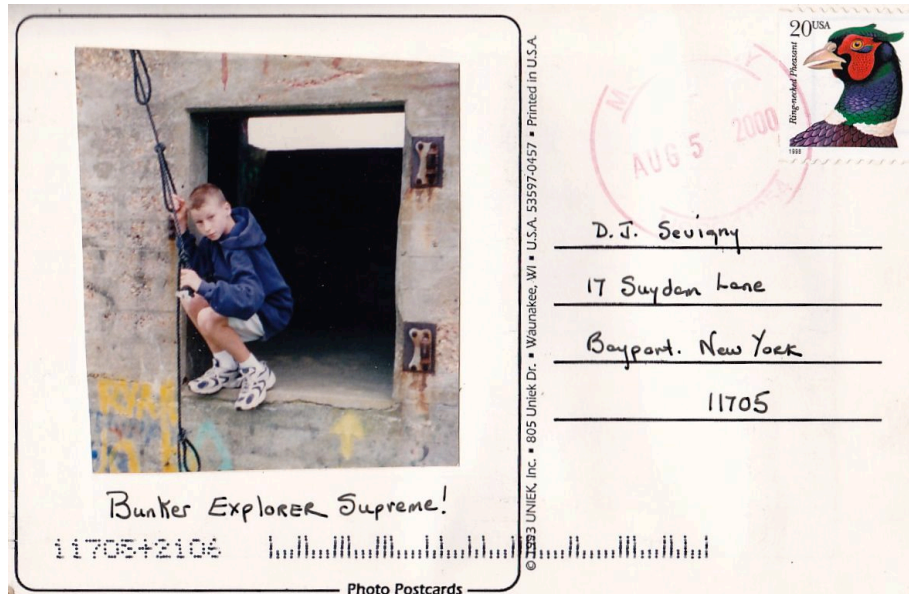
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And finally, I would like to thank Marge Winski for showing me to the two "bunkers" at Shadmoor State Park during the summer of 2000. Twelve years later, that single visit has morphed into this graduate thesis. Who knew?



The Author at Station 3-A at Shadmoor State Park in 2000.
Photo Credit: Marge Winski

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ABSTRACT

“A Return to Manning the Post: The Adaptive Reuse of Publically Owned Fire Control Stations from the Second World War”

This project examines the adaptive reuse potential of World War II-era fire control stations situated on public lands. The goal was to show the economic feasibility of reusing these derelict structures while simultaneously raising awareness of the scarce resources from our nation’s recent past. This has been done by conducting existing conditions assessments, forming scopes of work, attaining cost estimates, and creating cost analyses on three individual stations within two case studies in the northeastern United States. The cost analyses were based on Donovan Rypkema’s pro forma spreadsheet templates from his *Feasibility Assessment Manual for Reusing Historic Buildings*. Through this process, these abandoned stations showed potential to become a valuable income-generating asset for the public agency in ownership of these structures while saving a valuable piece of our World War II home front heritage.

PREFACE

In 1996, my mother entered a quilting contest at the Montauk Point Lighthouse as part of the landmark's bicentennial celebration. Out of all the contestants, my mother's quilt won, giving our family the opportunity to become friends of the Montauk Historical Society. By the time I was in fifth grade, my parents and I were given the honor of being the assistant lighthouse keepers for when the full-time lighthouse keeper, Marge Winski, was unable to attend the light for an extended period of time. For a good two weeks, my parents and I stayed at the easternmost point of Long Island surrounded by nothing more than the land and the sea. For someone who was ten years old, any reason to get out of school was an exciting venture. The fact that it was because I had to stay at the Montauk Lighthouse made it even better.

The lighthouse can easily be regarded as one of the most recognizable landmarks on Long Island, right on par with the Long Island Duck. Even though the tower itself has been well documented in countless images, paintings, highway signs, and scale models on front lawns, many surrounding landmarks in Montauk remained unnoticed.

Out in the distance was the ominous AN/FPS-35 radar tower at Camp Hero peering over the tree line, reminding us of the days when a Soviet missile strike was only a push of a button away. Immediately behind the tower was an austere rectangular mass composed of concrete. Painted white, the only breaks in the elevations were a series of three ribbon windows towards the top with a pair of smaller windows towards the bottom on each elevation. In comparison to the two hundred year old lighthouse, this tower is relatively young. Constructed during World War II, it was built to keep watch over the surrounding waters for enemy craft. If any were spotted, the tower would notify the massive gun batteries at the nearby Camp Hero and be fired upon. Unlike the rest of the museum, this fire control tower was off-limits to the public. When I was finally given the chance to go to the top, I was thrilled. Not too long after, Marge brought me to another area that

contained the remains of our nation's World War II past. Recently converted into public lands, Shadmoor State Park contained two additional fire control stations, but these were different. They didn't look like the tower behind the lighthouse. Instead, they laid in ruin amongst the natural landscape. To someone who was just about to enter the sixth grade, this was an incredibly exciting place to explore.

For the ensuing years, my friends and I became engulfed in anything World War II, starting with Steven Spielberg's and Tom Hank's *Saving Private Ryan*. Soon after, *Band of Brothers* was released on HBO, providing us with an even greater exposure to the day in the life of an American soldier in Nazi-occupied Europe. At the same time, *Metal of Honor: Frontline*, *Call of Duty*, *Battlefield 1942*, and *Day of Defeat* were released on the Nintendo Gamecube, Sony Playstation 2, and PC. The legacy of World War II was alive and well in the realm of entertainment, and we were soaking it all in. This exposure soon turned into reading books on the D-Day invasion at Omaha Beach and plenty others.

Fast-forward to the summer of 2011. I was in need of finding a good thesis topic for the upcoming year. After completing an internship at the light the summer before, my interest in Montauk was rekindled, and these two fire control stations remain in ruin. How could such important resources from our nation's recent history be reused? With this idea in mind and my knowledge of Historic Preservation fully embraced, a thesis topic grew and evolved throughout the fall. All of these factors throughout my life have played a major role in this thesis, and will continue to be a keen interest of mine after graduation. With that in mind, I sincerely hope this thesis will be utilized. Although these stations are made from splinter-proof concrete, they are certainly showing signs of wear and tear. Soon, they could disappear if nothing is done to save them from the elements.

-D.J. Sevigny, May 2012

1 - INTRODUCTION

The war effort during World War II did not only affect countless men and women who contributed to the European and Pacific theatres overseas, but also affected the daily lives of Americans in the United States. The rationing of food, metals, fuel, and other commodities reminded citizens of the war on a daily basis. Even the coastal landscape was altered to protect the coastline from enemy attack. The United States had both coasts protected to prepare for potential air raids from the Japanese in the Pacific and German U-boats in the Atlantic.

Today, many of these harbor defenses have been transferred from the federal government to other owners, both public and private. In many cases, the larger forts and camps have remained in federal hands; meanwhile many others have been transferred to state or local municipalities to be used as by the public. Smaller parcels of land containing various support facilities for harbor defenses were given back to private ownership. Unfortunately, many fire control (FC) stations on public lands have been left in abandonment.

Regarded as the “footnotes” of U.S. coastal defense,¹ FC stations were scattered throughout the coastal landscape to observe the horizon for enemy naval craft. These stations would pinpoint enemy ships using various methods of mathematics and report the attained coordinates to their associated gun batteries to be fired upon. Only one fort in the United States harbor defense system returned fire in hostile combat, Fort Mears in Unalaska, Alaska.² The rest of the nation’s harbor defense network was never used in combat. As a result, they have not garnered the dramatic imagery of combat seen in critically acclaimed movies and television series such as *Saving Private Ryan*, *Band of Brothers*, or *The Pacific*. With our current World War II veteran’s population disappearing over the next two

¹ Craig Lentz, e-mail message to author, December 21, 2011.

² Kathleen Lidfors, *World War II in the Aleutians: Alternatives for Preservation and Interpretation of Historic Resources at Dutch Harbor Naval Operating Base and Fort Mears U.S. Army, National Historic Landmark, Unalaska, Alaska*. (Anchorage, Alaska: Department of the Interior, National Parks Service, 1991), 2.

decades, the war will only be remembered by these sources of entertainment as well as the remaining built heritage to protect our nation's home front.

1.1 - Dwindling Veteran Population, Growing Recognition of Tangible Heritage

To many Americans, the attack on Pearl Harbor continues to be one of the most poignant moments from the Second World War. Seventy years after the attack, the Pearl Harbor Survivors Association will host their last anniversary before disbanding on New Years Day of 2012. The association began in 1958 and has remained an active force in orally interpreting the Day of Infamy since the association's formation. Out of the 28,000 original members, less than 2,700 are still living, many of whom in nursing homes. Harry R. Kerr, the director of the southeast chapter stated, "We felt we ran a good course for 70 years. Fought a good fight. We have no place to recruit people anymore: December seventh only happened on one day in 1941."³ The current veteran population has thinned to a point where the positions for president, vice president, treasurer, and secretary cannot be replaced - the basic positions required to keep their 501(c) 3 status as a non-profit organization.⁴

Nagourney's article highlights the transition of understanding World War II through tangible, physical resources over intangible accounts from veterans. Although veterans from Pearl Harbor are quickly disappearing, the United States Naval Base at Pearl Harbor has been designated a National Historic Landmark, as well as the shipwrecks of the USS *Arizona* and USS *Utah*.⁵

The disbanding of the Pearl Harbor Survivors Association in contrast to the increased recognition of World War II-related heritage at Pearl Harbor highlights an issue spanning throughout the United States. As Roger E. Kelly states:

³ Adam Nagourney, "Reliving Pearl Harbor, One Last Time, Together," *New York Times*, December 7, 2011, A1.

⁴ Ibid., A1, A18.

⁵ "National Historic Landmarks Survey: List of National Historic Landmarks by State - Hawaii," National Parks Service website, accessed February 15, 2012. <http://www.nps.gov/nhl/designations/Lists/HI01.pdf>

If recognized and preserved, tangible World War II home front heritage can contribute to social and political histories, develop deeper feelings of patriotism and reflective nostalgia, encourage cross-generational communication, and inspire grassroots heritage tourism for today's citizens. Varieties of home front heritage—landscapes, objects, structures, memories, stories, and secrets—are diminishing as are the number of the people directly associated with this past.⁶

As far back as 2004, the National Park Service has recognized the need to preserve tangible World War II home-front heritage because the current population of World War II veterans will not be around for much longer. As a result, the remaining landscapes, structures, and objects of the war effort will become increasingly valuable to preserve. In the coming generations, it will be these tangible sites and objects telling the stories instead of veterans from the war.

Outside of Pearl Harbor, the legacy of the war has been preserved in varying ways, even on the East Coast. One example is on the Mt. Hope Bay in Fall River, Massachusetts. The South Dakota class battleship USS *Massachusetts* is part of Battleship Cove, and is open to the public for tours. Further south, Cape Henlopen State Park on the Delaware coast contains the Fort Miles Historical Area. The fort was constructed in 1940 to protect the entrance of Delaware Bay - a direct link to Philadelphia. Added to the National Register of Historic Places in 2005, the area has been designed to interpret World War II coastal fortifications to the public.⁷

Similar coastal defense sites from World War II are also open to the public. FC Tower #23 in Cape May, New Jersey, was constructed in 1942 to serve as observation posts for the massive 12-inch and 16-inch guns at Fort Miles. Currently part of the Cape May Point State Park, the tower was added to the National Register of Historic Places in 2003 and went through a massive rehabilitation project in 2009

⁶ Roger E. Kelly "America's World War II Home Front Heritage." *CRM: The Journal of Heritage Stewardship*, volume 1, number 2, Summer 2004. Accessed February 16, 2012. http://crmjournal.cr.nps.gov/04_article_sub.cfm?issue=Volume%201%20Number%202%20Summer%202004&page=1&seq=1.

⁷ "Fort Miles Historical Area," Delaware State Parks website, accessed February 16, 2012. <http://www.destateparks.com/attractions/fort-miles/index.asp>.

to be opened to the public. Visitors are able to climb the cylindrical tower to catch a glimpse of the views offered at the top.⁸ Similarly, a joint effort by the Delaware Seashore Preservation Foundation and the Fort Miles Historical Association is aiming to undertake a project to restore FC Tower #3 within Delaware Seashore State Park.⁹

Even as these various sites of World War II home-front heritage are being preserved within the United States, many sites have been left to decay after the war's end. Obsolete technology, budget cuts, and numerous other factors have led to the abandonment of countless sites across the country. The passage of time has largely left these sites to be forgotten by the general public. Even so, their deteriorated state has left them to be nothing more than shadows of their former selves.

1.2 - Adaptive Reuse Potential

Cultural tourism is the economic model used in Cape Henlopen State Park the sites associated with Fort Miles, as well as many other sites across the nation. Such a model is not uncommon; in fact, Colonial Williamsburg, Virginia; Charleston, South Carolina; and countless house museums all depend on cultural tourism to remain active. Unfortunately, increasing amounts of the American public are choosing to vacation elsewhere, such as Las Vegas, Disney World, or other countries. Even senior citizens would rather spend their money at casinos than a historic house museum.¹⁰ As a result, the dependence on cultural tourism to preserve the majority of World War II built heritage cannot be a primary option.

⁸ "World War II Lookout Tower," Mid-Atlantic Center for the Arts and Humanities website, accessed February 16, 2012. http://www.capemaymac.org/content/subpage_main.aspx?id=2030.

⁹ Ron MacArthur, "Groups combine to save a silent sentinel along Delaware coast." *Cape Gazette*, Friday, October 12-Monday, October 15, 2007. Accessed February 16, 2012. http://savethetower.org/files/news_pdf/4_Capepages10-12-07.pdf.

¹⁰ John Durel and Anita Nowery Durel, "The Golden Age for Historic Properties," *History News*, Summer 2007. 7-8.

1.3 - The Need to Save Cottage-Style Fire Control Stations

Although there has been a recent effort to restore World War II coastal fortifications at the mouth of the Delaware River, such action has not been easily seen in other areas of the east coast. It is possible this inconsistency in preservation could partially lie in the varied building design utilized by the Army Corps of Engineers during the war. Not all FC stations are concrete towers, but rather take on a number of other forms. Virginia has a number of FC towers constructed of steel. The observation and plotting rooms are perched atop steel framework overlooking the tree line. Unfortunately, a number of these types have been dismantled.¹¹ In the northeast, a number of FC stations were camouflaged as cottages. After World War II, many of these cottage-style types of stations were sold off as excess property into private hands and converted to residences. Others were located on property handed to the state from the federal government.

The examples above are only a small portion of the preservation efforts dedicated to saving unique and important sites from the Second World War to serve as an education experience for future generations. Even with this activity, numerous other sites remain neglected, including FC stations. Because these stations appear in configurations other than towers, it is important to preserve as many aspects of World War II harbor defense as possible. Creative reuse solutions must be utilized in order to accommodate the limitations these stations possess.

Cottage-style FC stations cannot attract cultural tourists as easily as the towers on the coasts of New Jersey and Delaware. Like lighthouses, FC towers can be sustained through cultural tourism by having visitors pay for the novelty of climbing to the top to witness beautiful views of the coastline.¹² This unique feature is exclusive to only FC towers, for cottage-style FC stations are only about two stories in height. Since these stations do not attract large volumes of tourists for the views they offer, cottage-style FC stations have been left to deteriorate. Since these

¹¹ Gordon Bliss, comments to the author, March 3, 2012.

¹² Durel, "The Golden Age for Historic Properties," 8.

stations are seen as a liability concern, many have been closed to the public with concrete masonry unit (CMU) blocks and plywood. Instead of being interpreted as innovative and novel ways of camouflaging FC stations along the coastline, the remaining concrete shells have been left in an abandoned state for decades, seen as an eyesore to the general public.

1.4 - Purpose, Benefits, and Limitations of Study

The current trend to preserve World War II home-front heritage coupled with the increasing departure of cultural tourism-based preservation has lead to the following research question:

How can World War II era FC stations be adaptively reused to economically benefit the state governmental entity owning the structures?

The report will answer this question by systematically conducting existing conditions surveys, scopes of work, and cost analyses of three FC stations within two case studies in the northeast United States. Such an approach will result in each portion building upon each other. In other terms, an accurate cost analysis cannot be conducted unless an existing conditions report and successive scope of work are drafted beforehand.

The purpose of this study is rooted in variety of fields, all aiming to achieve similar goals. Non-profit organizations such as the Council on America's Military Past (CAMP) and the Coast Defense Study Group (CDSG) were both formed to recognize the importance of obsolete military posts within the United States. CAMP initially stood for the Council on Abandoned Military Posts, and was formed in 1966.

Their mission states:

Initially organized to identify, locate, preserve and memorialize the military installations and units that no longer serve the role for which they were created, mounting member interest soon included other subjects including soldier's life and customs of service.¹³

¹³ "About CAMP," CAMP website, accessed March 14, 2012.
<http://www.campjamp.org/About%20CAMP.htm>.

The council was then renamed the Council on America's Military Past in 1981 to accommodate the member's changed interests.

The CDSG was formed out of CAMP's military base field tours throughout the country. Some members were more interested in the fortifications themselves rather than military heritage in general. As a result, a small group of like-minded individuals began meeting as early as 1978. By 1993, the CDSG became an official non-profit organization¹⁴ based on the following principles:

- Educational study of coast defenses.
- Technical research and documentation of coast defenses.
- Preservation of coast defense sites, equipment, and records for current and future generations.
- Accurate coast defense site interpretations.
- Assistance to groups interested in preservation and interpretation of coast defense sites.
- Charitable activities which promote the goals of the CDSG.¹⁵

Both non-profit organizations are dedicated to the preservation of military heritage in the United States. Both aim to preserve these military sites as well as how they were initially used. As a result, both organizations contain a wealth of knowledge on how FC stations operated.

Harbor defense sites are rarely the main focus of rehabilitation projects in historic preservation. The scarcity of these building types coupled with their inherent design challenges of limited window and door openings and splinter-proof concrete construction make them a challenge to adaptively reuse.

The basic purpose of this study lies in the preservation of our nation's historic 20th century architecture. More specifically, it attempts to focus on modern fortifications constructed to defend our coastlines during the Second World War. There can be a strong case for the significance of these structures in relation to United States history. Not only were these stations constructed to protect the

¹⁴ "The Coast Defense Study Group 1978-2004," GDSG website, accessed March 14, 2012. <http://www.cdsg.org/group.htm>.

¹⁵ "Information About the CDSG," CDSG website, accessed March 14, 2012. <http://www.cdsg.org/group.htm>.

nation's coastline from enemy attack, but they also exemplify height of fire control technology, "represent[ing] the most significant advance to be made in harbor defense fire control until the introduction of radar in World War II."¹⁶

These structures can be eligible for nomination onto the National Register of Historic Places, making federal historic preservation tax incentives available to them during any future rehabilitation project. As a result, the State Historic Preservation Office (SHPO) and National Park Service (NPS) would oversee the rehabilitation project, putting these stations through the same process any other National Register-listed historic resource would go through.

In essence, these proposed projects would combine the immense amount of historical information provided by CAMP and the CDSG with the common practice of National Register nomination and historic rehabilitation projects seen across the country. This study is unique in that it attempts to preserve a neglected historic resource from the recent past without depending on cultural tourism as the primary source of income.

This study also aims to provide local and state agencies an additional source of funds by reusing these structures. The ultimate result would be twofold, for they would not only generate income but also be transformed from a public eyesore to a potential sought-after attraction. FC stations are located directly on the coastline, making the property very desirable to live near this natural luxury. Instead of the attraction of these sites being based on climbing to the top for a brief elevated view of the coastline, these stations would be able to offer an equally beautiful view at lower elevation by leasing these structures for an extended period of time. Since these stations were designed to look like dwellings, the most historically acceptable option would be their reuse as true dwellings.¹⁷

¹⁶ Timothy W. Layton, *Cultural Landscape Report for the Sandy Hook Coastal Defense Batteries: Gateway National Recreation Area*. (Boston: Olmstead Center for Landscape Preservation, 2010), 37.

¹⁷ "Secretary's Standards for Rehabilitation: Standard #1," Technical Preservation Services, National Parks Service website, accessed February 16, 2012. <http://www.nps.gov/tps/standards/rehabilitation.htm>.

This study will also address a major problem highlighted in Kelly's article on the importance of preserving sites and structures of World War II home front heritage in the United States, for they will be the only reminders of the conflict after the veteran population has completely disappeared. This study will also bring attention to a historic resource that has largely been left in a neglected state since their abandonment after the end of World War II. The extent of changes these structures have accumulated amount to barricaded doorways and windows obstructed by CMU blocks and plywood. Once these are removed, the concrete portions of these stations still retain all of their basic forms and most of their historic integrity. Although numerous cottage-style FC stations have been reused as private dwellings, they are not available to be used by the public. This study will determine if leasing these rehabilitated structures would be an economically viable option for state and local municipalities who own these stations.

1.5 - Organization of Study

This study will focus on two case studies in the northeastern United States. The first of which is a FC station in Narragansett, Rhode Island. Owned by the City of Providence, it is set within Camp Cronin, a 2.5-acre summer day camp for the children and senior citizens of Providence. The second case study focuses on two FC stations within the 99-acre Shadmoor State Park in Montauk, New York.

These case studies are divided into four parts; an existing conditions survey, National Register eligibility, scope of work, and cost analysis. The existing conditions survey will analyze the structure's present condition to create a scope of work to create more accurate feasibility analysis, with the potential National Register nomination serving as an economic incentive. The data will then ultimately inform how viable it is to reuse these stations as dwellings.

1.6 - Limitations of Study

The limitations of this study ultimately lie in two factors, time and accessibility. Because of the allotted amount of time, not all aspects of this study can be thoroughly analyzed. Since this study is focused on economics and not design, there will be no mention as to how the interiors will be precisely configured due to time constraints. In addition, the existing conditions survey will be conducted through a visual inspection and testing concrete delamination by the use of a hammer. The hammer test is limited in itself, for it does not detect the extent or exact depth of the delamination, only the general location.¹⁸ Even so, such a test can only be conducted in the first case study in Rhode Island, for the second case study in New York is presently closed off to the public. Except for Station 3-A in Shadmoor State Park, the annual rent per square foot per year within the pro forma spreadsheets are set at an average of \$20.00.

It is important to note that this report should not be seen as a comprehensive feasibility analysis of the three FC stations. Critical elements such as community input, local and state municipality approval, building code review, infrastructure development, and broader market analyses were not undertaken for the sake of time.

1.7 - Terminologies

This study is a unique combination of military architectural history, deterioration typologies, and economics. As a result, a diverse range of terms is used in each field. The major terms are defined as follows.

¹⁸ Linnea M. Linton "Delaminations in Concrete: A Comparison of Two Common Nondestructive Testing Methods." *APT Bulletin* Vol. 36, No 2/3 (2005). Pg. 21.
<http://www.jstor.org/stable/40004701>.

1.7.1 - Harbor Defense Terms

Barbette Carriage Gun Battery - Gun batteries without overhead coverage, but generally protected with an angled shield for protection from enemy fire.

Casemated Gun Battery - Gun batteries set within an enclosed covering of concrete and earth. The casemates restricted the gun's movement, but protected them from aerial attack. Batteries were placed in strategic locations throughout the United States coastline, meant to protect valuable port cities from enemy attack.

Depression Position Finder (DPF) - An instrument housed in FC stations to determine the range, or distance; and azimuth, or direction, of an enemy target out at sea.

Fire Control (FC) Station - Observation posts for both casemated and barbette carriage gun batteries, and were generally constructed slightly inland from the immediate coastline. The FC stations, in turn, were constructed on the immediate coastline to provide the best views possible.

Horizontal-Base System - A type of FC station characterized by their smaller massing and unique forms of camouflage. In the Northeast, these stations were commonly camouflaged as dwellings, leading them to also be referred to as cottage-style stations.¹⁹ These smaller stations dotted along the coastline. Since these stations were set at the ends of a pre-determined baseline, they can also be referred to base-end stations.²⁰

Triangulation - Defined in the Merriam-Webster Dictionary as, "...any...trigonometric operation for finding a position or location by means of bearings from two fixed points a known distance apart."²¹ This mathematic system was applied in either vertical or horizontal-base stations.

Vertical-Base System - A type of FC station characterized by a tower at least 125 feet above sea level in a rectangular, octagonal, or cylindrical massing. Unlike horizontal-base stations, these stations contained multiple observation rooms stacked one on top of another.

¹⁹ Craig Lentz, e-mail message to author, December 21, 2011.

²⁰ Bolling W. Smith, "Fire Control and Position Finding: Background." *American Seacoast Defenses: A Reference Guide, Second Edition*, ed. Mark A. Berhow et al. (McLean, Virginia: Coastal Defense Study Group Press, 2004), 257-8.

²¹ "Triangulation," Merriam-Webster Dictionary website, accessed February 17, 2012. <http://www.merriam-webster.com/dictionary/triangulation>.

1.7.2 - Existing Conditions Assessment Terms

Chipping - Small pieces or larger fragments of missing concrete.²² This is a result of either natural deterioration or vandalism.

Cracking - Division within the concrete between one sixteenth and one half inch wide. This condition is a result of building settlement, a weakness in the concrete, or excessive force exceeding the strength of the concrete. Small individual cracks are not as serious as larger cracks across an entire area.²³

Delamination - The outer surface of concrete has separated into layers. This is due to erosion of the binding agent or moisture infiltration, which leads to the occurrence of a freeze-thaw cycle or jacking from oxidation of the imbedded steel bars; both lead to the weakening of concrete. It could also occur as a result of poor concrete installation, creating voids within the concrete.²⁴

Efflorescence - The pulling of salts through concrete out to the surface, leading to a white film covering the area. This is due to the traveling of moisture through the wall. The source of the water can be through soil the wall is holding back, rainwater, or any other way moisture can enter through the concrete.²⁵

Erosion - A surface is worn down from the slow, natural effects of wind and water exposure.²⁶

Pitting - A result of erosion where small cavities on the exposed surface. In addition to being associated with erosion, it also occurs when concrete is mixed in an incorrect manner.²⁷

²² Anne E. Grimmer, *A Glossary of Historic Masonry Deterioration Problems and Preservation Treatments*. (Washington D.C.: National Park Service, Preservation Assistance Division, 1984), 4.

²³ *Ibid.*, 6.

²⁴ Jeremy Wells, comments to the author, February 20, 2012.

²⁵ Grimmer, 11.

²⁶ *Ibid.*, 12.

²⁷ *Ibid.*, 17.

1.7.3 - Cost Analysis Terms

Pro Forma Balance Sheet - “based on financial assumptions or projections: as...reflecting a transaction (as a merger) or other development as if it had been or will be in effect for a past or future period.”²⁸ In this study, the overall pro forma is divided into five spreadsheets. They are as follows:

Capital Cost Budget - This spreadsheet shows where the cost of rehabilitation is configured. The overall cost is divided in hard costs, which cover any physical materials or labor directly associated with the rehabilitation, and soft costs, which handle fees for the architect, structural engineer, and other financing, consulting, and building code entities, as well as any needed building permits and licenses.

Source and Use of Funds - This spreadsheet is where funds from loans, grants, tax credits, or from the state agencies themselves are amounted against the Capital Cost Budget.

Stabilized Year Operating Budget - This sheet compares annual taxes, utility costs, and insurance with the rental income. The rental income is determined in the fourth spreadsheet, titled Schedules to Stabilized Year Operating Statement. This sheet is also useful, for it calculates the mortgages from each loan used during the rehabilitation project.

Multi-Year Operating Statement - This sheet ties the data from all other spreadsheets together to determine if the possible rehabilitation is a viable venture to pursue.

²⁸ “Pro Forma,” Merriam-Webster Dictionary website, accessed February 17, 2012.
<http://www.merriam-webster.com/dictionary/pro%20forma>

1.8 - Bibliography

- Durel, John and Anita Nowery Durel, "The Golden Age for Historic Properties," *History News*, Summer 2007.
- "Fort Miles Historical Area," Delaware State Parks website, accessed February 16, 2012. <http://www.destateparks.com/attractions/fort-miles/index.asp>.
- Grimmer, Anne E. *A Glossary of Historic Masonry Deterioration Problems and Preservation Treatments*. Washington D.C.: National Park Service, Preservation Assistance Division, 1984.
- Kelly, Roger E. "America's World War II Home Front Heritage." *CRM: The Journal of Heritage Stewardship*, 1, no. 2, 2004. Accessed February 16, 2012. http://crmjournal.cr.nps.gov/04_article_sub.cfm?issue=Volume%201%20Number%202%20Summer%202004&page=1&seq=1.
- Layton, Timothy W. *Cultural Landscape Report for the Sandy Hook Coastal Defense Batteries: Gateway National Recreation Area*. Boston: Olmstead Center for Landscape Preservation, 2010.
- Lidfors, Kathleen. *World War II in the Aleutians: Alternatives for Preservation and Interpretation of Historic Resources at Dutch Harbor Naval Operating Base and Fort Mears U.S. Army, National Historic Landmark, Unalaska, Alaska*. Anchorage, Alaska: Department of the Interior, National Parks Service, 1991.
- Linton, Linnea M. "Delaminations in Concrete: A Comparison of Two Common Nondestructive Testing Methods." *APT Bulletin* 36, No. 2/3 (2005). <http://www.jstor.org/stable/40004701>.
- MacArthur, Ron. "Groups Combine to Save a Silent Sentinel along Delaware Coast." *Cape Gazette*, October 12-15, 2007. Accessed February 16, 2012. http://savethetower.org/files/news_pdf/4_Capepages10-12-07.pdf.
- Nagourney, Adam. "Reliving Pearl Harbor, One Last Time, Together." *New York Times*, December 7, 2011.
- "National Historic Landmarks Survey: List of National Historic Landmarks by State - Hawaii," National Parks Service website, accessed February 15, 2012. <http://www.nps.gov/nhl/designations/Lists/HI01.pdf>.
- "Pro Forma," Merriam-Webster Dictionary website, accessed February 17, 2012. <http://www.merriam-webster.com/dictionary/pro%20forma>.

“Secretary’s Standards for Rehabilitation: Standard #1,” Technical Preservation Services, National Parks Service website, accessed February 16, 2012.
<http://www.nps.gov/tps/standards/rehabilitation.htm>.

Smith, Bolling W. “Fire Control and Position Finding: Background.” *American Seacoast Defenses: A Reference Guide, Second Edition*, ed. Mark A. Berhow et al. McLean, Virginia: Coastal Defense Study Group Press, 2004.

“Triangulation,” Merriam-Webster Dictionary website, accessed February 17, 2012.
<http://www.merriam-webster.com/dictionary/triangulation>.

“World War II Lookout Tower,” Mid-Atlantic Center for the Arts and Humanities website, accessed February 16, 2012.
http://www.capemaymac.org/content/subpage_main.aspx?id=2030.

2 - LITERATURE REVIEW AND CASE STUDIES

The following chapter will focus on existing literature concerning the history and treatment of World War II harbor defense. The first section will deal with existing literature concerning harbor defenses and their role throughout history. Models for conducting existing conditions reports and elevation mapping will be covered in the second section, followed by literature associated with methodologies used for determining the economic feasibility of adaptively reusing historic structures in the third section. The fourth section will pertain to literature associated with the two principle case studies, their histories, and their current situation, and major themes associated with their reuse potential. An overview of similar FC stations that are not in need of or have recently gone through rehabilitation are covered in the fifth section.

2.1 - History of Harbor Defense and Fire Control Stations in the United States

2.1.1 - Fire Control Before World War II

Coastal fortifications went through a radical change during the end of the 19th century. Increased gun size led to a longer range, which resulted in a more advanced form of targeting ships out at sea. The front lines of these complex defense systems were the FC stations dotted along the coastline. These stations could monitor a target's range, or distance, and azimuth, or direction, for the batteries to follow. Since these stations were typically located in areas outside of the principle coastal fortification area, they have been frequently seen as secondary structures in relation to the main batteries.²⁹

Fire control stations in the United States can be found on both the eastern and western coasts in close proximity to the batteries they reported to. These unique building types appear in various forms, from abstract cylindrical and rectangular towers to the camouflaged appearance of a seacoast cottage, windmill, lighthouse, grain silos, or other common vernacular building types. After World

²⁹ Craig Lentz, comments to the author, December 21, 2011.

War II, the use of heavy artillery and triangulation for fire control became obsolete in favor of radar, long-range airplane war, and the introduction of Inter-Continental Ballistic Missiles (ICBMs).³⁰ As a result, seacoast fortifications were decommissioned with many left to deteriorate.

The FC stations used by coastal fortifications during the Second World War can be traced back to advancements in harbor defense from the late 19th century. The Gun Foundry Board was formed in 1883 to assess the harbor defenses of the United States in comparison to the European powers of England, France, Germany, and Russia. The earlier Dahlgren and Rodman cast iron guns from the Civil War era no longer fulfilled their duties as effective coastal defense weapons. The report resulting from the board's discussions concluded that a lack of demand for steel had led to inadequate foundries to make artillery comparable to those found in Europe. The rapid advancement of technology was a major change for the nation's harbor defense network in the decades to come.³¹

Three years later, the Board on Fortifications of Other Defenses was created by President Grover Cleveland. Otherwise known as the Endicott Board after Secretary of War William C. Endicott, the main purpose of the board was to make recommendations on updating the nation's harbor defenses. The introduction of the M1895 16 inch gun in 1895 was part of a decades-long process to update the nation's harbor defenses.³² One year later, the Board of Regulations of Seacoast Artillery Fire was formed in 1896 to create a more advanced fire control system.³³

The need to update the fire control system was further supported in 1905, when President Theodore Roosevelt ordered a board composed of military and civilian experts, headed by Secretary of War William Howard Taft. The Taft Board

³⁰ MSG James Loffler, discussion with author, March 30, 2012.

³¹ Edward Simpson, *Report of the Gun Foundry Board Organized by the President in Accordance with Act of Congress Approved March 3, 1883* (Washington: Government Printing Office, 1884), 39.

³² Gordon Bliss, comments to the author, February 17, 2012.

³³ Joe C. Freeman; Haller, Stephen A.; Hansen, David M.; Martini, John A. & Weitze, Karen J., *Seacoast Fortifications Preservation Manual: Golden Gate National Recreation Area San Francisco, California*. (San Francisco, California: Department of the Interior, National Parks Service, July 1999.) 31-34.

aimed to update the recommendations made by the Endicott Board created two decades earlier. Such updates could have not have come sooner, for Great Britain launched the HMS *Dreadnought* one year later in 1906. The *Dreadnought* was revolutionary at the time, for it possessed ten 12-inch guns mounted on five turrets, cutting-edge optical range finding systems, and faster steam propulsion. The uniform artillery size simplified the range finding process, for there was no need to accommodate for different size guns with varying ranges.³⁴

The advancements in naval technology of other superpowers could have easily related to the increased technology of fire control for coastal fortifications in the United States. Previously, the range of artillery rounds did not exceed the range of vision from the battery. Fire control was basically following a “point and shoot” method until the end of World War I.³⁵ The introduction of larger caliber artillery, such as the 1919 16-inch gun, necessitated the use of fire control instruments, such as an azimuth scope and depression position finder (DPF) to affix a better target on enemy craft out at sea.³⁶ FC stations were part of a larger collection of separate buildings reporting to the batteries. In addition to the FC stations, other buildings contributed to determining the location of a target out at sea such as the command post, plotting room, and observation posts scattered throughout the coastal landscape.³⁷

³⁴ Timothy W. Layton, *Cultural Landscape Report for the Sandy Hook Coastal Defense Batteries: Gateway National Recreation Area*. (Boston, Massachusetts: Olmstead Center for Landscape Preservation, 2010) 36-37.

³⁵ Gordon Bliss, comments to the author, February 17, 2012.

³⁶ Ibid.

³⁷ “Coast Artillery Plotting Room in Action.” From the archives of the Fort MacArthur Museum, c. 1940, Accessed February 2, 2012. <http://www.youtube.com/watch?v=YxmF6sEmzVU&lr=1&feature=mhee>.

2.1.2 - Fire Control During World War II

The Coast Artillery Corps during the Second World War used two primary methods of fire control, vertical-base system and horizontal-base system. Each system had their advantages and disadvantages. The vertical-base system, only a single observation tower was utilized. This compact arrangement of the observation post and plotting room within a single tower made communication between the two areas fast and effective. Such work can be easily observed by the commanding officer, for all of the observations are under a single roof. The vertical-base system did exhibit numerous disadvantages, the largest of which comes from its very purpose - the station must be at least 125 feet above sea level. The station relied on its height to create the vertical leg of a right triangle. The distance recorded by the DPF would form the hypotenuse. The horizontal leg forms the true range, or distance, between the station and the target. Triangulation was used to attain the measurement of the horizontal leg. Another major problem was the distance in which the vertical-range system can measure. The atmosphere refracted light, resulting in an incorrect measurement. Refraction increased the farther away the target was located, resulting in the DPFs to point at a datum point in order to be adjusted to give the known distance.³⁸

Horizontal-base stations did not have this problem. In fact, the horizontal-base system became increasingly accurate at targets farther out to sea. The FC stations are located at a predetermined distance apart, or baseline, which is generally one-quarter to one-third the maximum range of the battery. Like the vertical-base system, the location of a target was calculated by using triangulation. Two FC stations form the two set points of the triangle; meanwhile the target forms the third, or apex point. Coordinates were then sent to the plotting room by telephone, and placed on a 110-degree plotting board. The board is a map of the base and the battery's field of fire. Two movable arms represent the azimuth and

³⁸ Bolling W. Smith, "Fire Control and Position Finding: Background." *American Seacoast Defenses: A Reference Guide, Second Edition*, ed. Mark A. Berhow et al. (McLean, Virginia: Coastal Defense Study Group Press, 2004), 257-258.

range of each FC station, and are pivoted at the points of each station on the board. Once the azimuth and range is determined, these pair of arms creates the apex point on the plotting board. A third arm, called the gun arm, represents the battery. Once the coordinates are configured, they are sent to the battery to be used.³⁹

Even though the horizontal-base system was more accurate, it was heavily dependent on indirect communication. Before the advent of the telephone, such a system was highly time-consuming, and required more manpower to work in an effective manner. In addition, the horizontal-base system cannot track targets flanking the baseline. The weather also had a negative effect on this system, for both stations had to focus on the same target at the same time. Any rain, fog, or any other natural hindrance would make measurements ineffective. Even so, the horizontal-base system became the primary method of fire control by the Second World War.⁴⁰ Such a system “...represented the most significant advance to be made in harbor defense fire control until the introduction of radar in World War II.”⁴¹

2.2 - Review of Conditions Assessment Literature

Numerous journal articles and book chapters exist on explaining the chemical degradation of concrete over time and offer methods for treating deteriorated concrete, but most entail the usage of expensive high-tech equipment. A potential issue FC stations face is their constant exposure to the salty air coming from the crashing waves nearby. The accumulated salts could be removed through electrochemical preservation as done to Johanne Duiker’s Zoontraal Sanitorium in Hilversum, Holland,⁴² but this treatment is prohibitively expensive and impractical for this particular study. In similar regards, impact-echo, or pulse-echo testing can

³⁹ “Coast Artillery Plotting Room in Action.”

⁴⁰ Berhow, 258-259.

⁴¹ Layton, 37.

⁴² Wessel de Jonge, “Concrete Repair and Material Authenticity: Electrochemical Preservation Techniques,” *APT Bulletin*, Vol. 28, No. 4 (1997): 53. <http://www.jstor.org/stable/1504594>.

be done to accurately determine the depth and severity of concrete delamination,⁴³ but such a method is not nearly as practical and easy to use as the standard claw hammer.

Articles have been written explaining how degradation issues are visually interpreted for masonry repairs of many historic monuments. Such methodology can be transferred to reinforced concrete construction. The assessment of existing conditions has been noted in a concise but detailed manner within historic structure reports. Preservation Brief #43: *The Preparation and Use of Historic Structure Reports* states an existing conditions survey is a:

Survey [that] is performed to document physical spaces and elements, and to assess the current condition of building materials and systems. In conjunction with historical research, the condition survey helps determine the historic integrity of a structure. The survey and inspection should address the building's exterior and interior materials, features and finishes; structural systems; interior spaces; mechanical, electrical, and plumbing systems; and fire detection and security systems. Further study may be required such as non-intrusive or intrusive investigation, field-testing, sample removal, and laboratory testing and analysis of materials.

Information gathered during the survey can be documented with field notes on baseline drawings consisting of field sketches or measured drawings. In addition, documentation can include photographs (35-mm, large format, digital, perspective-corrected, and scale-rectified photographs; photogrammetry; and laser techniques), sketches and measured drawings, computer-aided design and drafting (CADD), video records, and written notes and field measurements. Depending upon project requirements, documentation may need to be prepared to archival standards regarding paper, photographs and negatives, electronic records, and backup data.⁴⁴

Because the brief depicts a broad overview of the existing conditions assessment portion of a historic structures report, available historic structures reports will help provide a useful template for future report on similar structures. For instance, the

⁴³ Linnea M. Linton, "Delaminations in Concrete: A Comparison of Two Common Nondestructive Testing Methods," *APT Bulletin* Vol. 36, No 2/3 (2005): 22. <http://www.jstor.org/stable/40004701>.

⁴⁴ "Preservation Brief #43: The Preparation and Use of Historic Structure Reports." Technical Preservation Services, National Parks Service website, accessed February 2, 2012. <http://www.nps.gov/history/hps/tps/briefs/brief43.htm>.

historic structures report for the Fire Island Lighthouse on Fire Island, New York⁴⁵ contains a detailed analysis of the light station prior to its rehabilitation into a museum. This specific historic structures report is useful because it outlines the overall organization of an existing conditions assessment as well as cost estimates for the light station's restoration at the end of the report.

An article written by Frank G. Matero explaining the existing conditions assessment conducted at Mesa Verde National Park yields useful information for this report. This article explains the importance of condition recording, digital documentation, and diagnosis. In addition, the problems plaguing any surviving plaster coating on the walls of Mesa Verde's structures can be applied to concrete decay. Delamination, and cracking are both issues both sites possess.⁴⁶ Linton's article explains how to test for delamination in concrete construction. Concrete becomes delaminated due to a series of cracks layered within a concrete slab. These layers ultimately weaken the overall load-bearing capacity of the concrete slab.

Of the masonry condition assessment sources that were investigated for possible application to concrete structures, the forms, categories, and damage indices created by Bernard Fitzner and Kurt Heinrichs proved most useful because their method uses measured increments to explain the extent of cracking, spalling, and other deterioration issues. The most important aspect of this article is the use of weathering mapping on monument elevations.⁴⁷ Although the mapping is used on the sandstone walls of Karnak Temple in Luxor, Egypt, the same principles can be applied to the concrete FC stations of the northeast coast of the United States.

⁴⁵ National Park Service, *Fire Island Lighthouse and Keeper's Dwelling: Fire Island National Seashore, Patchogue* (Washington D.C.: Department of Interior, 1983).

⁴⁶ Frank G. Matero "Managing Change: The Role of Documentation and Condition Survey at Mesa Verde National Park." *Journal of the American Institute for Conservation*, Vol. 42, No. 1. (2003): 50-55. <http://www.jstor.org/stable/3180055>.

⁴⁷ B. Fitzner and K. Heinrichs, "Damage Diagnosis on Stone Monuments: Weathering Forms, Damage Categories and Damage Indices." in R. Prikryl, & H. A. Viles (Eds.), *Understanding and Managing Stone Decay, Proceedings of the International Conference on Stone Weathering and Atmospheric Pollution Network*, (Charles University, Prague: The Karolinum Press, 2002), 34.

Charles Disanto's method for surveying the terra-cotta facades of Alwyn Court⁴⁸ uses elevation mapping and photography to visually address the problems of a deteriorated terra cotta façade in a manner that is similar to Fitzner and Heinrichs. The difference lies in how it was compiled. The practical implication of using the elevation mapping technique can serve as a guide for creating elevation maps for the two case studies, specifically by utilizing similar annotation methods used in Disanto's case study.

Although Grimmer's booklet concentrates on stone and brick construction, Grimmer utilizes various terms to explain the different types of phenomena on masonry construction as well as provides treatment options for these issues.⁴⁹ These deterioration issues can be applied to the issues seen in the two case studies.

2.3 - Review of Methods for Conducting Cost Estimates and Cost Analyses

Ultimately, the economic viability of reusing these FC stations lies in how costly the rehabilitation will be for the public agency. A number of resources will be used in order to help create an accurate estimate on the amount of funding required for the rehabilitation of these structures. RSMeans provides such data in various publications updated on an annual basis, and ranges from estimating new commercial construction to electrical installation.

Cost estimates attained from RSMeans will then be used in conjunction with Donovan D. Rypkema's *Feasibility Assessment Manual for Reusing Historic Buildings*.⁵⁰ Rypkema states the feasibility of a project is determined by three elements: objectives, constraints, and opportunities.⁵¹ These elements, in addition

⁴⁸ Charles Disanto "Survey of Terra-Cotta Facades at Alwyn Court, A Case Study," *APT Bulletin* Vol. 32, No. 4 (2001). <http://www.jstor.org/stable/1504769>.

⁴⁹ Anne E. Grimmer, *A Glossary of Historic Masonry Deterioration Problems and Preservation Treatments*. (Washington D.C.: National Park Service, Preservation Assistance Division, 1984).

⁵⁰ Donovan D. Rypkema, *Feasibility Assessment Manual for Reusing Historic Buildings* (Washington D.C.: National Trust for Historic Preservation, 2007)

⁵¹ Ibid.

to the contents within the rest of the manual, will prove useful, for this manual will form the backbone of the cost analysis of the two case studies.

2.4 - Case Studies

Two case studies will be reviewed for this report. The first of which is Station 1-B located at Camp Cronin, formally the south reservation of Fort Nathanael Greene in Point Judith, Rhode Island. The second case study is a pair of FC stations formally associated with Camp Hero in Montauk, New York. Referred to as Location 13A during World War II, the New York State Department of Parks and Recreation acquired the property in 2000 and became Shadmoor State Park.⁵² Knowing both the general history of these FC stations and the backgrounds of Fort Greene and Camp Hero is necessary contextual information.

Additional context on the treatment of these building types is provided by summarizing the history and current status of the three publically owned FC stations on the eastern coast of the United States. Camp Varnum has been maintained by the Rhode Island National Guard (RING) since 1957,⁵³ and is also located in Narragansett just north of Camp Cronin. The Hilda Lindley House, locally known as the Blockhouse, is located in Theodore Roosevelt State Park in Montauk and owned by the Suffolk County Department of Parks.⁵⁴ Fire Control Tower (FCT) #23 is located within Cape May State Park, just north of the Delaware Bay in New Jersey. It is owned by the New Jersey Department of Environmental Protection, Division of Parks and Forestry and leased to the Mid-Atlantic Center for the Arts (MAC).⁵⁵

⁵² John Rather, "After 20-year Effort, Shadmoor's a State Park." *New York Times*, October 22, 2000. Accessed February 1, 2012. <http://www.nytimes.com/2000/10/22/nyregion/after-20-year-effort-shadmoor-s-a-state-park.html?pagewanted=all>.

⁵³ MSG James Loffler, interview with the author, March 29, 2012.

⁵⁴ Janis Hewett, "Last Months for Blockhouse Family," *The East Hampton Star*, September 9, 2010. Accessed February 8, 2012. <http://67.199.116.138/dnn/Archive/Home20100916/>.

⁵⁵ "World War II Tower FAQ," Mid-Atlantic Center for the Arts and Humanities website, accessed April 8, 2012. http://www.capemaymac.org/content/subpage_main.aspx?id=2506.

2.4.1 - General History

Numerous sources yield varying amounts of information regarding the development and operation of harbor defenses, and subsequently, FC stations. On a federal level, the National Park Service has become the steward for a number of former harbor defense locations throughout the country. In particular, two former harbor defense sites have been assessed of their significance through cultural landscape reports; Golden Gate National Recreation Area in San Francisco, California⁵⁶ and the more recent Gateway National Recreation Area in Sandy Hook, New Jersey.⁵⁷ Both groups of fortifications within each National Recreation Area are significant by consistently showcasing the development of coastal fortifications from the Civil War era well into the Cold War. The high densities of fortifications in both areas reflect the importance of protecting the harbors of San Francisco and New York City throughout history, including World War II. In addition, both of these extensive reports exhibit the importance of the role these fortifications play in the nation's history. The role of FC stations are just as important as the batteries they supported, and their existence is well-documented in both reports.

2.4.2 - History of Station 1-B, Fort Greene/Camp Cronin - Point Judith, Rhode Island

The establishment of Fort Greene can be traced back to the Army's Harbor Defense Board survey of the Narragansett Bay coastline during the spring of 1940. The new fort was to contain four of the twenty-seven new 16-inch guns recommended by the board. The fort was officially announced in General Order no. 10 on September 10, 1941, and was named after General Nathanael Greene, who was born in Potowomut, Rhode Island in 1742. Greene became Brigadier General in 1775 and lead troops in Boston, Long Island, and New Jersey. He became Quartermaster General in 1778 making him the commander to the Army of the

⁵⁶ Freeman, Haller, Hansen, Martini, Weitze.

⁵⁷ Layton.

South, ultimately aiding in driving the British out of the Carolinas and Georgia. He moved to Georgia in 1785, where he died one year later.⁵⁸

The fort itself is composed of three independent areas, known as reservations. The east and west reservations were each designed to contain a pair of casemated 16-inch guns. The east reservation contained Battery 108, later named Battery Hamilton after Brigadier General Ailston Hamilton, which held one M1919 Mk II and one M1919 Mk III gun. The west reservation contained Battery 109, which was never completed after funding was suspended by the War Department in 1943.⁵⁹

The south reservation was located immediately west of the Point Judith Lighthouse and was made up of two 6-inch gun emplacements, otherwise known as Battery 211. Both emplacements shared a single earthen covered concrete magazines placed between the two guns. In addition, two 37mm, two .30 caliber, and two .50 caliber guns were located in the south reservation, as well as a number of Panama-type emplacements to allow for the installation of 155mm guns, none of which were occupied by guns. In addition to FC Station 1-B, the south reservation also contained two additional stations, titled 1-C and 2-C.⁶⁰ All three stations served Fort Greene, Fort Church at Sakonnet Point, and Fort Burnside on Conanicut Island. Additional FC stations were located outside of the south reservation, including the command post for Battery 109 camouflaged as a grain silo at the east reservation.⁶¹

After the war, the War Department granted the west and south reservations of Fort Greene to be reused as a summer camp for Junior Police boys from the City of Providence.⁶² The new summer camp was opened the summer of 1946 under the supervision of John P. Cronin, then the football coach of the LaSalle Academy in

⁵⁸ Schroder, Walter K. *Defenses of Narragansett Bay in World War II*. (Providence: Rhode Island Bicentennial Foundation, 1980), 46-47.

⁵⁹ Schroder, 48-51.

⁶⁰ Army Corps of Engineers, "Reports of Completed Works - Seacoast Fortifications of Narragansett Bay," 1942.

⁶¹ Schroder, 51-53.

⁶² "Fort Greene Site of Summer Camp," *Providence Journal*, May 14, 1946, 20.

Providence.⁶³ Cronin was a former professional football player who began his coaching career at LaSalle in 1927.⁶⁴ One year after the Junior Police camp was established at the former Fort Greene, the City of Providence created the Department of Recreation by an act of General Assembly. Cronin was appointed as the first Director of the Providence Department of Recreation immediately following the department's creation.⁶⁵ In 1957, the City of Providence received the title of the 33-acre Junior Police boys summer camp from the General Services Administration.⁶⁶ Cronin was still Director of Recreation by this time, and continued to hold the position until his retirement in 1973.^{67 68 69 70}

During his time as the Director of Recreation, John P. Cronin received much acclaim and awards for his work on behalf of the city. By 1960, LaSalle Alumni Football field was renamed John P. Cronin Field,⁷¹ and continues to bear his name to this day. In 1962, Cronin was appointed as a special advisor for the Citizens Advisory Council to the President's Committee on Juvenile Delinquency and Youth Crime. The resolution states, "the President's committee will be immensely aided by his vast reservoir of experience gained from many years of association with the youth of this area."⁷² Two years later, Cronin was applauded for his work to "better the youth of Providence through recreation, especially in the twilight zone of

⁶³ "Cronin is Named to Direct Camp," *Providence Journal*, June 28, 1946, 20.

⁶⁴ Ordinances and Resolutions of the Providence City Council, 1972. Pg. 613, No. 467.

⁶⁵ John Hutchins Cady, *The Civic and Architectural Development of Providence* (Providence, RI: Ackermann Standard Press, 1957), 278.

⁶⁶ "Seaside Camp Head Renamed Part of Fort Nathanael Greene to be Used for Camp Now Part of Providence," *Providence Journal*, June 11, 1957, 23.

⁶⁷ Ordinances and Resolutions of the Providence City Council, 1952. Pg. 253, No. 65.

⁶⁸ Ordinances and Resolutions of the Providence City Council, 1957. Pg. 267, No. 32.

⁶⁹ Ordinances and Resolutions of the Providence City Council, 1962. Pg. 304, No. 20.

⁷⁰ "Cianci names boy's camp after Cronin, ex-recreation director," *Providence Journal Bulletin*, July 17, 1975, B4.

⁷¹ Ordinances and Resolutions of the Providence City Council, 1960. Pg. 496, No. 438.

⁷² Ordinances and Resolutions of the Providence City Council, 1962. Pg. 418, No. 262.

delinquency.”⁷³ Additional awards and titles include: the recipient of the Service to Sports Award by the Jewish Bowling Congress,⁷⁴ election into the Rhode Island Interscholastic Coaches Association Hall of Fame, and becoming the Dean of football coaches in the State of Rhode Island - all accomplished in 1967. During this time, he was also coaching football, baseball, and hockey at the LaSalle Academy.⁷⁵ In 1971, Cronin received the Jack Martin Award by the Rhode Island Football Officials Association.⁷⁶

Two years after Cronin’s retirement, the camp was threatened by court battle between the City of Providence and the Town of Narragansett. The town claimed the city owed them \$12,941.49 in back taxes on the property during a three-year period between 1972 and 1974. The town claimed that if the city did not pay tax, it would auction off the property. The court case was based around the interpretation of land use. The city felt they did not need to pay taxes for they were providing the public with a government function of recreation through using the camp property. This service would be lost if the property was auctioned off by the town. If the property were to be auctioned, thousands of underprivileged children from Providence would no longer be able to leave the city during the summer.⁷⁷ By the spring of 1975, the city received a restraining order preventing the sale, allowing the site to be continued as a summer camp.⁷⁸

By the summer of 1975, the camp was renamed Camp Cronin by Mayor Vincent A. Cianci to honor John Cronin’s work for the City of Providence. Cianci states “Jack Cronin may have had a more positive impact on more people in Providence than anyone in the history of the city. I have no doubt that he changed

⁷³ Ordinances and Resolutions of the Providence City Council, 1964. Pg. 364, No. 107.

⁷⁴ Ordinances and Resolutions of the Providence City Council, 1967. Pg. 492, No. 435.

⁷⁵ Ordinances and Resolutions of the Providence City Council, 1967. Pg. 606.

⁷⁶ Ordinances and Resolutions of the Providence City Council, 1971. Pg. 647, No. 566.

⁷⁷ Fritz Koch, “Narragansett threatens to auction Providence summer camp,” *Providence Journal*, February 19, 1975, A21.

⁷⁸ “Providence gets order blocking sale of Point Judith camp,” *Providence Journal Bulletin*, March 8, 1975, B4.

for the better the lives of many young people.”⁷⁹ Even with the camp’s revived importance to the city, financial constraints and child abuse by some councilors increasingly limited the camp. The camp was closed for much of the summer of 1976 due to much-needed repairs to arrest the “abominable” state it was in, according to Recreations Director Louis Santiano. In addition to the camp’s deteriorating buildings, a number of camp councilors subjected children to physical abuse and homosexual advances. Both of the major issues were quickly taken care of. Mayor Cianci allotted \$15,000.00 for repairing the camp, with an additional \$20,000.00 to operate the camp during the summer. As part of the camp’s renovation, a number of buildings identified as “eyesores” were to be demolished. In addition, Cianci fired the camp councilor charged with the misconduct in the wake of the controversy. The camp’s program was also changed, limiting the camp only to day trips for children and the elderly.⁸⁰

In the wake of the councilor controversy, the camp primarily became an area for senior citizens to visit the coastline. By 1978, over 2,500 elderly citizens from numerous senior homes in Providence came to visit Camp Cronin.⁸¹ During the same time, the recognition of the camp’s military origins was beginning. In 1979, the city attempted to receive federal aid to restore two of the three FC stations on the former south reservation of Fort Greene. Director Santiano stated they were “nuisances and eyesores”⁸² and are a hazard if children attempt to climb them. Senator John H. Chafee agreed to help the city receive funds for the station’s restoration; however, if no fund was to be given, Rosciti Construction Inc. of Warwick will demolish all three FC stations. A primary reason for the station’s abandonment was due to the continued tax dispute between the city and the Town

⁷⁹ “Cianci names boy’s camp after Cronin,” B4.

⁸⁰ John P. Silva, “Camp Cronin to stay closed for much of this summer,” *Providence Journal Bulletin*, June 28, 1976, B1.

⁸¹ Ramona Clark, “Camp Cronin: peaceful and ‘so beautiful,’” *Providence Journal Bulletin*, August 21, 1978, B1.

⁸² Bob Wyss, “Funds sought to restore camp towers,” *Providence Journal Bulletin*, March 6, 1979. B1.

of Narragansett, ultimately preventing the city from making improvements to the property. In addition to the removal of the three FC stations, three barracks and a small shed were to be demolished.⁸³

The early 1980's brought forth a different attitude towards the camp. Instead of being seen as a valuable asset, the camp was seen as a "white elephant." The 32 acre camp was simply too large for its current use as a day camp for the elderly and inner city children. Both Mayor Cianci and the City Council realized this and began to look for alternative options by 1983. Although the majority of the camp was planning to be sold, Cianci favored retaining two and a half acres to continue being used as a day camp for the elderly.⁸⁴

By 1985, the city and the Rhode Island Department of Environmental Management came to an agreement on selling much of Camp Cronin to the State. Governor Edward D. DiPrete approved the sale January of 1985, but was halted after the state resurveyed the land and found the parcel was 2.03 acres smaller than initially agreed upon. As a result, the cost of the transaction dropped from \$800,000 to \$775,000. Nevertheless, 77.73 acres were transferred from the city to the state by the spring of 1985.⁸⁵ This area was to be incorporated into Fisherman's Memorial State Park. The remaining 2.5 acres of Camp Cronin were to be used for outings specifically designed for the handicapped, but "rehabilitation needs inhibit full use of this facility."⁸⁶ The city dedicated itself to maintain the site, and \$15,000 from the city's unspent street-sweeping funds was allocated to repair the camp.⁸⁷ In addition to making the camp handicapped-accessible, the funds were to be used to

⁸³ Ibid.

⁸⁴ "A more productive use for the city's Camp Cronin," *Providence Journal*, February 21, 1983, A18.

⁸⁵ Doane Hulick, "City, DEM agree on price for Pt. Judith property," *Providence Journal*, March 20, 1985, C1.

⁸⁶ City of Providence, "Parks, Recreation, + Open Space Plan 1985-1990." June 1985, 21.

⁸⁷ "City Council approves \$15,000 for Camp Cronin," *Providence Journal*, March 19, 1985, C3.

also expand cultural and environmental education for school children and their families.⁸⁸ Such plans were to be implemented by 1987.⁸⁹

Additional budget cuts during the early 1990's continued to hamper the potential the city planned for Camp Cronin,⁹⁰ but budget issues were quickly resolved to provide outdoor classes for the children of Providence.⁹¹ Today, the camp continues to be used by the city for allowing the elderly and inner city children to have access to the coastline for the day; however, limited funding has restricted usage to only the months of July and August.⁹² Since Station 1-B is the only FC remaining at Camp Cronin, it is likely that Stations 1-C and 2-C were demolished around 1979 resulting from a lack of federal funds for their restoration.

2.4.3 - History of Stations 1-A and 3-A, Location 13A/Camp Hero - Montauk, New York

The military presence in Montauk spans back to the Revolutionary War and continued to play an important role in multiple eras of the country's military history. Located at the extreme eastern end of Long Island, Camp Hero was constructed to be part of the Harbor Defenses of Long Island Sound (HDLIS) in 1942. The camp was named after Major General Andrew Hero, Jr., who fought in World War I and became Chief of the Coast Artillery Corps from 1926 until his retirement in 1930. Unlike Fort Greene, Camp Hero was located within a single area of 468 acres immediately west of the Montauk Point Lighthouse. Two gun batteries, each containing a pair of casemated MKIIM1 16-inch guns were constructed at Camp Hero. Construction of Battery 113, named Battery Dunn after Colonel John M.

⁸⁸ City of Providence, 28.

⁸⁹ *Ibid.*, 43.

⁹⁰ "Cianci budget cuts wrecks plans for school trips at Camp Cronin," *Providence Journal*, July 10, 1992, C1.

⁹¹ "Providence to resume outdoor classes for pupils at Camp Cronin," *Providence Journal*, July 13, 1992, C1.

⁹² Steven Piscopiello, interview with the author, March 30, 2012.

Dunn, was completed by June of 1943. Battery 112 was completed six months later in January of 1944.⁹³

The pair of FC stations presently at Shadmoor State Park are about three and a half miles west from Camp Hero. Stations 1-A and 3-A were located within what was known as Location 13A and were part of a string of FC stations spanning from Montauk Point west to Quogue, a distance of about forty miles. Overall, twenty-seven of these stations were constructed about three to four miles apart as part of the HDLIS. Location 13A was the largest station outside of Camp Hero itself; in addition to the pair of FC stations, the area was composed of an SCR-296 radar tower, two generator shelters, and a “Type D” building which housed living quarters, a mess hall, kitchen, and storeroom. Twenty-four men serviced the entire complex.⁹⁴

The land in which these stations were built upon was privately owned. After the war, the land was given back to the owners, including the FC stations and any other additions the federal government constructed during the war. In 1981, land developers Peter Schub and Robert Bear of Bridgehampton acquired the nearly 100 acres to subdivide the land into 60 residential lots. For the next two decades, fierce public opposition on the development eventually led to the creation of Shadmoor State Park in 2000.⁹⁵ Today, these two FC stations are set within the state park in abandonment while the many other FC stations formerly part of the HDLIS have been converted to private residences.⁹⁶

⁹³ Henry Osmer, *American Gibraltar: Montauk and the Wars of America*, (Denver, Colorado: Outskirts Press, 2011), 77-78.

⁹⁴ Adele Cramer, “Ditch Plains Artillery Fire Control Stations: A Report,” March 1995. 4-5.

⁹⁵ Rather, “After 20-year Effort, Shadmoor’s a State Park.”

⁹⁶ Cramer, 6-9.

2.5 - Review of Similar Cases

The following cases are FC stations that have remained intact since the end of World War II or have recently undergone rehabilitation. These similar cases will be seen as sources of reference for the two case studies to create a more accurate scope of work for their individual rehabilitations. In addition, recently rehabilitated cases show the feasibility of reviving previously abandoned stations.

2.5.1 - Camp Varnum - Narragansett, Rhode Island

About six and a half miles north northeast of Fort Greene lays Camp Varnum, another World War II harbor defense site constructed from 1942 to 1943. It was named after James Mitchell Varnum, a Brigadier General during the American Revolution. The current camp was originally a fort composed of two 6" rapid-fire guns moved from Fort Getty on Conanicut Island. In addition, 90mm and 37mm guns were later installed to protect the western side of Narragansett Bay from invading torpedo boats.⁹⁷

In addition to barracks, a mess hall, a radar installation, and searchlights, the fort also contained four FC stations. These stations aided in attaining coordinates for Fort Greene, Fort Church, and Fort Wetherill on the southeastern shore of Conanicut Island in Jamestown.⁹⁸ The fort was transferred over to the Rhode Island National Guard (RING) in 1957 and renamed Camp Varnum.⁹⁹

Presently, RING uses three of the four FC stations within the camp. Station 1-A, the northernmost station, is currently RING's archives. Station 1-B is reused as a supply building, and Station 1-C has been reused as a gym. Station 1-D remains unused partially due to constant flooding in the basement. Even so, all four FC stations at Camp Varnum have remained in good condition. Although the windows have been replaced, their original metal doors within the stations can serve as

⁹⁷ Schroder, 61.

⁹⁸ Ibid.

⁹⁹ MSG Loffler, March 30, 2012.

templates for replicas. Also, almost all of the original telephone equipment from the Second World War remains hanging on the walls and in excellent condition.¹⁰⁰

2.5.2 - The Blockhouse/Hilda Lindley House - Montauk, New York

Within the former Montauk Military Reservation where both Camp Hero and Location 13A were part of stands the Hilda Lindley House, or as the Lindley family refers to as the Blockhouse. Originally constructed as a Station 1-A within Location 15,¹⁰¹ the structure was built on top of a large hill overlooking both the Atlantic Ocean and the Block Island Sound.¹⁰² In 1951, Hilda Lindley bought the station from the Army as surplus property.¹⁰³ Set deep within the overgrowth of Montauk, the remote location prompted Lindley to form a local group to fight against planned subdivisions in 1970. Five years later, Theodore Roosevelt County Park was created, encompassing all of the 1,157 acres surrounding the former station. The group was to be called the Concerned Citizens of Montauk (CCOM), and continues to help preserve the natural landscape the area possesses. Within the past 40 years, CCOM has been responsible for making Camp Hero State Park, Shadmoor State Park, and various other areas of open space into parkland.¹⁰⁴

In agreement with the Suffolk County Parks Department, Hilda Lindley and her family were allowed to remain in the Blockhouse through a thirty-five year lease. Even though Hilda passed away in 1980, the summer home was still used by her son, Daniel and his family until 2011. During the summer of 2010, a Suffolk County Parks employee notified Mr. Lindley of the lease agreement, and asked him

¹⁰⁰ Tour of the Station 1-A by MSG Loffler, March 30, 2012.

¹⁰¹ Army Corps of Engineers, "Reports of Completed Works, Harbor Defenses of Long Island Sound," 1943. (Bel Air, MD: CDSG e-press, 2011).

¹⁰² Osmers, 77.

¹⁰³ Joan Powers Porco, *Holding Back the Tide: The Thirty-Five Year Struggle to Save Montauk - A History of the Concerned Citizens of Montauk* (Sag Harbor, N.Y.: Harbor Electronic Publishing, 2005), 23-24.

¹⁰⁴ "History and Accomplishments," CCOM website., accessed February 8, 2012. <http://www.ccom-montauk.org/about-us/history-accomplishments/>.

to begin moving their belongings from the home by February 20, 2011. Since then, the house has been unused, potentially becoming the new residence of the Suffolk County Parks supervisor.

Currently, the interior of the house is that of a typical summer home. In addition, the Lindley's have preserved many of the methods the Army used while stationed at the location during the Second World War. A generator provides electricity, the primary lighting source is by hurricane lamps, and fireplaces heat the house.¹⁰⁵

2.5.3 - Fire Control Tower #23 - Cape May, New Jersey

Just as the Station 1-B and Fort Varnum reported to Fort Greene and how the FC stations dotting the south shore of Long Island reported to Camp Hero, Fire Control Tower (FCT) #23 reported to Fort Miles protecting the Delaware Bay. Constructed in 1942, this FCT is not like the other FC stations covered in this report, for it was designed as a vertical-base station. In other words, this station used its height from sea level, not a second FC station, to determine the distance of a target through triangulation. As a result, this station is shaped as a massive cylinder as opposed to camouflaged cottages. The FCT is owned by the State of New Jersey and located within Cape May Point State Park. Initially, four of these towers dotted the shoreline across Cape May County. Since the end of the war, two have been demolished and a third is off-limits to the public due to the construction of the Grand Hotel around the original tower. It can still be seen perched atop the hotel today.¹⁰⁶

The increased scarcity of FCT's along the coastline prompted the Mid-Atlantic Center for the Arts & Humanities to take action. The MAC has been a major force in restoring a number of important historic places in the local area since the

¹⁰⁵ Hewett, "Last Months for Blockhouse Family."

¹⁰⁶ "World War II Lookout Tower," Mid-Atlantic Center for the Arts and Humanities website, accessed April 8, 2012. http://www.capemaymac.org/content/subpage_main.aspx?id=2030.

organization's founding in 1970. Most notably, MAC was responsible for the 15-year long restoration of the Cape May Lighthouse, which began in 1986.¹⁰⁷ Even in the deteriorated condition of FCT #23, the structure was placed New Jersey Register of Historic Places on May 29, 2003. In the same year, FCT #23 was placed onto the National Register of Historic Places on November 17, 2003.¹⁰⁸ In 2004, MAC signed a twenty-year lease for FCT #23 for the tower's restoration. Immediately after the lease was signed, a massive fundraising campaign began. Overall, the project cost \$1.3 million with funds aided by the New Jersey Historic Trust, the Casino Reinvestment Development Authority, and a Small Cities Block Grant administered by the New Jersey Department of Community Affairs and Lower Township. Robert Russell, MAC's restoration architect and partner of Holt, Morgan, Russell (HMR) Architects designed historically-accurate wooden windows and ladders, as well as designing replacement doors and other missing details.¹⁰⁹ Currently, MAC is raising funds to construct a welcome center on the site, and runs a memorial plaque program allowing family members to honor their veterans by placing a plaque in the tower.¹¹⁰

¹⁰⁷ "World War II Tower FAQ."

¹⁰⁸ "World War II Lookout Tower."

¹⁰⁹ "World War II Lookout Tower."

¹¹⁰ "World War II Tower FAQ."

2.6 - Conclusion

Based on the few number of books, reports, and newspaper articles on these stations, a history of each case study was created to understand how these stations were used during World War II as well as after the war was over. The south and west reservations of Fort Greene were reused as a junior police camp under the supervision of John P. Cronin. As Providence became more distressed, the fort eventually became an escape from the city for inner-city children. Such an innovative reuse under Cronin brought him much acclaim by the time he retired in 1973. The camp continued to be used as an overnight camp until a number of abuse incidents forced the Providence Department of Recreation to reorganize the camp as a haven for the city's elderly population. The decline in use eventually led to Providence selling all but 2.5 acres to RIDEM in 1985.

While these events were taking place, Station 1-B remained unused along with Stations 1-C and 2-C on the property. The other two stations were demolished in the early 1980's, leaving Station 1-B as the only reminder of the site's fire control past.

The history of Location 13A after World War II is less well-known, but the Concerned Citizens of Montauk fought hard to prevent the tract of land from becoming subdivided. The land eventually became Shadmoor State Park in 1999, leaving both Station 1-A and 3-A to remain untouched along with the surrounding natural landscape.

By using a combination of the numerous sources explained in this chapter, a comprehensive methodology can be utilized to determine the economic feasibility of the three FC stations. A process of visual inspection, elevation mapping, and concrete delamination testing can create a well-documented existing conditions report. Using RSMeans with assistance from fellow students in the Construction Management department can create a general cost estimate for each station. The estimates could then be applied to Rypkema's manual for rehabilitating historic structures.

Determining the feasibility of each station will then be guided by the related cases in New York, Rhode Island, New Jersey, and Delaware. Although the similar case of FCT #23 does not concern a cottage-style FC station, this is a successful partnership between a state government and local non-profit organization. Such a model has been adopted by the Delaware Seashore Preservation Foundation and the Fort Miles Historical Association to open another tower, FCT #3, to the public. Located within Delaware Seashore State Park, FCT #3 is similar in design to FCT #23 and also reported to the batteries at Fort Miles. Fundraising began in 2007 and continues to this day as part of the Fort Miles Fundraising Campaign, a massive campaign which began during the fall of 2010 aimed at making Fort Miles “the best WWII museum inside a WWII facility in the United States.”¹¹¹ Such partnerships can be critical to get these stations rehabilitated.

¹¹¹ Dr. Gary Wray, “From the Desk of the President,” *The Battery*, Spring 2010. Accessed April 8, 2012. http://www.fortmiles.org/newsletter/pdf/nl_spr_10.pdf. 1-2.

2.7 - Bibliography

"A more productive use for the city's Camp Cronin," *Providence Journal*, February 21, 1983.

Army Corps of Engineers, "Reports of Completed Works - Seacoast Fortifications of Narragansett Bay," 1942. Bel Air, MD: CDSG e-press, 2011.

Army Corps of Engineers, "Reports of Completed Works, Harbor Defenses of Long Island Sound," 1943. Bel Air, MD: CDSG e-press, 2011.

Bliss, Gordon. Comments to the author, February 17, 2012.

Cady, John Hutchins. *The Civic and Architectural Development of Providence*. Providence, RI: Ackermann Standard Press, 1957.

"Cianci budget cuts wrecks plans for school trips at Camp Cronin," *Providence Journal*, July 10, 1992.

"Cianci names boy's camp after Cronin, ex-recreation director," *Providence Journal Bulletin*, July 17, 1975.

"City Council approves \$15,000 for Camp Cronin," *Providence Journal*, March 19, 1985.

City of Providence. *Parks, Recreation, + Open Space Plan 1985-1990*. June 1985.

Clark, Ramona. "Camp Cronin: peaceful and 'so beautiful,'" *Providence Journal Bulletin*, August 21, 1978.

"Coast Artillery Plotting Room in Action." From the archives of the Fort MacArthur Museum, c. 1940. Accessed February 2, 2012.
<http://www.youtube.com/watch?v=YxmF6sEmzVU&lr=1&feature=mhee>.

Cramer, Adele. *Ditch Plains Artillery Fire Control Stations: A Report*. March 1995.

"Cronin is Named to Direct Camp," *Providence Journal*, June 28, 1946.

Department of Defense Legacy Resource Management Program. *Legacy Guidebook: A Reference Guide for the Legacy resource Management Program*. Washington D.C.: Department of Defense, 2011.

Disanto, Charles. "Survey of Terra-Cotta Facades at Alwyn Court, A Case Study." *APT Bulletin* Vol. 32, No. 4 (2001). <http://www.jstor.org/stable/1504769>.

Fitzner, B and K. Heinrichs. "Damage Diagnosis on Stone Monuments: Weathering Forms, Damage Categories and Damage Indices." In R. Prikryl, & H. A. Viles (Eds.), *Understanding and Managing Stone Decay, Proceedings of the International Conference on Stone Weathering and Atmospheric Pollution Network*. Charles University, Prague: The Karolinum Press, 2002.

"Fort Greene Site of Summer Camp," *Providence Journal*, May 14, 1946.

"Fourth Cliff Eligibility and Reservation Priority," Hanscom Air Force Base website, accessed April 7, 2012. <http://www.hanscomservices.com/fourthcliffgeneralinformation.asp#policies>.

Freeman, Joe C., Stephen A. Haller, David M. Hansen, John A. Martini and Karen J. Weitze. *Seacoast Fortifications Preservation Manual: Golden Gate National Recreation Area San Francisco, California*. San Francisco, California: Department of the Interior, National Parks Service, July 1999.

Grimmer, Anne E. *A Glossary of Historic Masonry Deterioration Problems and Preservation Treatments*. Washington D.C.: National Park Service, Preservation Assistance Division, 1984.

Hewett, Janis. "Last Months for Blockhouse Family," *The East Hampton Star*, September 9, 2010. Accessed February 8, 2012. <http://67.199.116.138/dnn/Archive/Home20100916/>.

"History and Accomplishments," CCOM website., accessed February 8, 2012. <http://www.ccom-montauk.org/about-us/history-accomplishments/>.

Hulick, Doane. "City, DEM agree on price for Pt. Judith property," *Providence Journal*, March 20, 1985.

Jonge, Wessel de. "Concrete Repair and Material Authenticity: Electrochemical Preservation Techniques." *APT Bulletin* Vol. 28, No. 4 (1997). <http://www.jstor.org/stable/1504594>.

Koch, Fritz. "Narragansett threatens to auction Providence summer camp," *Providence Journal*, February 19, 1975.

Layton, Timothy W. *Cultural Landscape Report for the Sandy Hook Coastal Defense Batteries: Gateway National Recreation Area*. Boston, Massachusetts: Olmstead Center for Landscape Preservation, 2010.

Lentz, Craig. Comments to the author, December 21, 2011.

- Linton, Linnea M. "Delaminations in Concrete: A Comparison of Two Common Nondestructive Testing Methods." *APT Bulletin* Vol. 36, No 2/3 (2005). <http://www.jstor.org/stable/40004701>.
- Loffler, James, MSG. Interview with the author, March 29, 2012.
- Matero, Frank G. "Managing Change: The Role of Documentation and Condition Survey at Mesa Verde National Park." *Journal of the American Institute for Conservation* Vol. 42, No. 1. (2003). <http://www.jstor.org/stable/3180055>.
- National Park Service. *Fire Island Lighthouse and Keeper's Dwelling: Fire Island National Seashore, Patchogue*. Washington D.C.: Department of Interior, 1983.
- Osmers, Henry. *American Gibraltar: Montauk and the Wars of America*. Denver, Colorado: Outskirts Press, 2011.
- Ordinances and Resolutions of the Providence City Council, 1957.
- Ordinances and Resolutions of the Providence City Council, 1960.
- Ordinances and Resolutions of the Providence City Council, 1962.
- Ordinances and Resolutions of the Providence City Council, 1964.
- Ordinances and Resolutions of the Providence City Council, 1967.
- Ordinances and Resolutions of the Providence City Council, 1971.
- Ordinances and Resolutions of the Providence City Council, 1972.
- Piscopiello, Steven. Interview with the author, March 30, 2012.
- Porco, Joan Powers. *Holding Back the Tide: The Thirty-Five Year Struggle to Save Montauk - A History of the Concerned Citizens of Montauk*. Sag Harbor, N.Y.: Harbor Electronic Publishing, 2005.
- Preservation Brief #43: "The Preparation and Use of Historic Structure Reports." Technical Preservation Services, National Parks Service website. Accessed February 2, 2012. <http://www.nps.gov/history/hps/tps/briefs/brief43.htm>.
- "Providence gets order blocking sale of Point Judith camp," *Providence Journal Bulletin*, March 8, 1975.

- “Providence to resume outdoor classes for pupils at Camp Cronin,” *Providence Journal*, July 13, 1992.
- Rather, John. “After 20-year Effort, Shadmoor’s a State Park.” *New York Times*, October 22, 2000. Accessed February 1, 2012.
<http://www.nytimes.com/2000/10/22/nyregion/after-20-year-effort-shadmoor-s-a-state-park.html?pagewanted=all>.
- Rypkema, Donovan D. *Feasibility Assessment Manual for Reusing Historic Buildings*. Washington D.C.: National Trust for Historic Preservation, 2007.
- Schroder, Walter K. *Defenses of Narragansett Bay in World War II*. Providence: Rhode Island Bicentennial Foundation, 1980.
- “Seaside Camp Head Renamed Part of Fort Nathanael Greene to be Used for Camp Now Part of Providence,” *Providence Journal*, June 11, 1957.
- Silva, John P. “Camp Cronin to stay closed for much of this summer,” *Providence Journal Bulletin*, June 28, 1976.
- Simpson, Edward. *Report of the Gun Foundry Board Organized by the President in Accordance with Act of Congress Approved March 3, 1883*. Washington: Government Printing Office, 1884.
- Smith, Bolling W. “Fire Control and Position Finding: Background.” *American Seacoast Defenses: A Reference Guide, Second Edition*, ed. Mark A. Berhow et al. McLean, Virginia: Coastal Defense Study Group Press, 2004.
- “World War II Tower FAQ,” Mid-Atlantic Center for the Arts and Humanities website, accessed April 8, 2012.
http://www.capemaymac.org/content/subpage_main.aspx?id=2506.
- “World War II Lookout Tower,” Mid-Atlantic Center for the Arts and Humanities website, accessed April 8, 2012.
http://www.capemaymac.org/content/subpage_main.aspx?id=2030.
- Wray, Gary. “From the Desk of the President,” *The Battery* Spring 2010. Accessed April 8, 2012. http://www.fortmilesa.org/newsletter/pdf/nl_spr_10.pdf.
- Wyss, Bob. “Funds sought to restore camp towers,” *Providence Journal Bulletin*, March 6, 1979.

3 - METHODS

The methods to determine how these three FC Stations 1-B, 1-A, and 3-A can be effectively reused have been categorized into three general areas. The first was to conduct an existing conditions survey of each case study to help establish the second area, creating a scope of work needed for rehabilitation. The third step was to use cost estimates and pro forma statements to determine if such rehabilitation can be economically feasible to the public agency.

3.1 - Overview of Work

Both case studies were set within larger parcels of publically owned land containing additional buildings. Although these buildings were not the central focus of this report, they are contemporary with the FC stations and are worthy of mentioning, for their existence could potentially make a stronger case for the site's nomination onto the National Register of Historic Places.

3.1.1 - Camp Cronin

Initially, the south reservation contained Battery 211, FC Stations 1-B, 1-C, and 2-C, as well as a number of support buildings made from wood construction were located nearby. Currently, three of these support buildings remain within the 2.5-acre camp and are used by the City of Providence for programming. An image of the south reservation of Fort Greene confirms these buildings were constructed during the same time as Station 1-B.¹¹² A small shed lies about one hundred and seventy-five feet immediately north of Station B-1.¹¹³ A larger T-shaped building is about one hundred feet northwest of B-1,¹¹⁴ and a smaller L-shaped building lies one hundred seventy-six feet northwest of the FC station.¹¹⁵ The former site of

¹¹² Walter K. Schroder, *Defenses of Narragansett Bay in World War II*, (Providence: Rhode Island Bicentennial Foundation, 1980) 52.

¹¹³ Google Earth, approximate measurements taken by the author, April 9, 2012.

¹¹⁴ Ibid.

¹¹⁵ Ibid.

Battery 211 was sold to RIDEM and currently serves as the base of the Point Judith Fisherman's Memorial.

Even with these support buildings in extant, only Station 1-B was assessed for historical integrity and economic feasibility. The support buildings were only incorporated into the report as support buildings for Station 1-B's proposed reuse plan.

3.1.2 - Shadmoor State Park

Unlike Camp Cronin, no wood frame buildings have been left after the war's end. No traces of the "Type-D" building remained, and only the four concrete pylons of an SCR-296 radar station¹¹⁶ were located about ten feet east of Station 3-A.¹¹⁷ The only existing support buildings was the west generator shelter, located just over seventy-seven feet west northwest of Station 3-A.¹¹⁸ In addition, the remains of the east generator shelter lay about ninety-four feet northwest of Station 3-A.¹¹⁹ No support buildings are around Station 1-A.

3.2 - Existing Condition Assessment

3.2.1 - Organization

The overall organization of the existing conditions assessments was modeled after those conducted for a historic structures report (HSR).¹²⁰ Specifically the HSR written for the Fire Island Lighthouse within the Fire Island National Seashore, New York was used as a model primarily because it is both an official report from the National Park Service and was available in the Architecture Library at Roger

¹¹⁶ Army Corps of Engineers, RCW for HDLIS.

¹¹⁷ Google Earth, April 9, 2012.

¹¹⁸ Ibid.

¹¹⁹ Ibid.

¹²⁰ National Park Service, *Fire Island Lighthouse and Keeper's Dwelling: Fire Island National Seashore, Patchogue*, (Washington D.C.: Department of Interior, 1983).

Williams University. The HSR dedicates three chapters to analyzing the existing conditions of the outbuildings and terrace, lighthouse tower, and lighthouse keeper's living quarters. The models for all three chapters were used in varying degrees.

In following the example given by the HSR, the assessment was divided into exterior and interior existing conditions. The exterior assessment began from the ground level up to the roof. The overall condition of each façade was explained first, addressing major concerns. Individual elements were then explained, such as wooden nailers embedded in the concrete to attach wooden members to the façade, or steel window hooks above the window openings.

The interior assessment followed in a similar fashion by explaining the larger elements, such as entire rooms, and narrowing down to the smaller and finer details, such as the condition of support columns or any remaining wooden window frames. Since Stations 1-A and 3-A within Shadmoor State Park have been sealed off from the public, only the interior existing conditions for Station 1-B at Camp Cronin have been assessed.

3.2.2 - *Diagnosis and Visual Aids*

Upon inspecting both case studies, a number of issues are affecting these structures could potentially be due to deferred maintenance, ultimately leading to excessive moisture infiltration.

The existing conditions assessment will be visually represented through elevation mapping modeled after the methods utilized by Fitzner and Heinrichs,¹²¹ Matero,¹²² and Disanto.¹²³ The key is divided into two separate areas, each

¹²¹ B. Fitzner and K. Heinrichs, "Damage Diagnosis on Stone Monuments: Weathering Forms, Damage Categories and Damage Indices," in R. Prikryl, & H. A. Viles (Eds.), *Understanding and Managing Stone Decay, Proceedings of the International Conference on Stone Weathering and Atmospheric Pollution Network* (Charles University, Prague: The Karolinum Press, 2002).

¹²² Frank G. Matero, "Managing Change: The Role of Documentation and Condition Survey at Mesa Verde National Park." *Journal of the American Institute for Conservation* Vol. 42, No. 1. (2003): 50-55. <http://www.jstor.org/stable/3180055>.

corresponding to their associated drawings. The left side will be for interpreting deterioration on each elevation; meanwhile the right side will interpret delamination in the concrete floor plates. Any other condition not listed in the key will be annotated on the maps themselves. Elements such as remaining wooden members, steel tie rods, steel window hooks, and steel hinges will be annotated on the drawings. These maps will show the extent of damage caused by neglect as well as inform the scope of repair needed to the existing concrete structures.

The elevations and plans will be drafted from a combination of on-site measurements taken by the author and the Army Corps of Engineers Reports of Completed Works for the Harbor Defenses of both Narragansett Bay and Long Island Sound.

Although concrete construction and masonry construction are two different building systems, many similar issues affecting the three FC stations within the two case studies have been categorized in *A Glossary of Historic Masonry Deterioration Problems and Treatments*. Identifying these problems was important so an accurate estimate could be attained. These issues have been labeled in the elevation mapping key on the following page.

¹²³ Charles Disanto, "Survey of Terra-Cotta Facades at Alwyn Court, A Case Study." *APT Bulletin* Vol. 32, No. 4 (2001). <http://www.jstor.org/stable/1504769>.

3.2.2.1 - Existing Conditions Survey - Elevation Mapping Key

EXISTING CONDITIONS SURVEY ELEVATION MAPPING KEY	
Materials	Deterioration Typologies
Asbestos Siding Gray	Chipping Black
Brick Red and White Hatch	Cracking Red Line
CMU Block Gray and Black Hatch	Delamination Crosshatch
Electrical Conduit Opening Purple	Efflorescence Green Line
Exposed Metal Component Blue	Erosion Stipple
Exposed Steel Reinforcement Bar Brown Line	
Exposed Wooden Member Orange	
Nailer Recess Yellow and Black Hatch	
Stove Duct Well Purple and White Hatch	

Linton's audible-sounding testing method determined the location of concrete delamination by tapping the concrete surface with a hammer. Solid concrete makes a sharp ping, meanwhile delaminated concrete makes a hollow, dull sound.¹²⁴ Although easy, the test did have limitations. This testing method could not accurately determine how deep delamination had occurred within the concrete.¹²⁵ Even with the tests limitations, it still served as a relevant test on the floors of Station 1-B. In order to identify the location of delamination, a one-foot grid was laid onto the floor by using a chalk line reel. Results were recorded on a floor plan scaled to one foot equaling one quarter of an inch drafted onto a piece of paper. The final drawings complete with façade mapping can be seen in the Appendix.

Stations 1-A and 3-A were not tested for delamination due to blocked doorways and covered windows, making it impossible access into these two stations.

3.3 - Cost Estimates

After the existing conditions assessments were completed and scope of work drafted, the next step was to use the data gathered to determine the extent of rehabilitation needed for each case study. The resource used were the RSMeans *Repair & Remodeling Cost Data 2010*¹²⁶ and RSMeans *Square Foot Costs 2012*.¹²⁷ If an accurate cost estimate for an issue affecting one of the FC stations was not found, contractors specializing in the affected area were contacted for the feasibility of a custom order. 20% contingency was added to the final cost to accommodate for

¹²⁴ Linnea M. Linton, "Delaminations in Concrete: A Comparison of Two Common Nondestructive Testing Methods." *APT Bulletin* Vol. 36, No 2/3 (2005): 21-22.
<http://www.jstor.org/stable/40004701>.

¹²⁵ Linton, 22.

¹²⁶ Bob Mewis, Christopher Babbitt, Ted Baker, *RSMeans Repair & Remodeling Cost Data 2010* (RSMeans Co. Inc., 2010).

¹²⁷ RSMeans Engineering Department, *RSMeans Square Foot Costs 2012* (RSMeans Co. Inc., 2012)

custom work, such as replacement wood windows as well as reconstructed steel doors and window hooks.

3.4 - Cost Analysis

In order to determine the viability of the research question, a cost analysis was undertaken. The pro forma spreadsheets from Donovan Rypkema's *Feasibility Assessment Manual for Reusing Historic Buildings*¹²⁸ formed the basis for the analysis. Information from the existing condition assessments highlighted the major issues currently affecting these structures. The pro forma itself is a series of five spreadsheets linked to allow relating data to flow from one spreadsheet to the next.

The first sheet is the Capital Cost Budget. This is where the cost of rehabilitation was configured. The overall cost was divided in hard costs, which cover any physical materials or labor directly associated with the rehabilitation, and soft costs, which handle fees for the architect, structural engineer, and other financing, consulting, and building code entities, as well as any needed building permits and licenses. The data collected from this spreadsheet was then linked to the second spreadsheet, which is the Source and Use of Funds. This is where the funds from loans, grants, tax credits, or from the state agencies themselves were calculated against the Capital Cost Budget.

The third spreadsheet is the Stabilized Year Operating Budget, which compares annual taxes, utility costs, and insurance with the rental income. The rental income was determined in the fourth spreadsheet, titled Schedules to Stabilized Year Operating Statement. This sheet is also useful, for it calculates the mortgages from each loan used during the rehabilitation project.

All of the calculated information from these spreadsheets is then linked into the Multi-Year Operating Statement, which is the fifth and final spreadsheet. There,

¹²⁸ Donovan D. Rypkema, *Feasibility Assessment Manual for Reusing Historic Buildings*, (Washington D.C.: National Trust for Historic Preservation, 2007).

the final determination is made on whether the rehabilitation of these FC stations is a viable venture for the state agencies to pursue.

3.5 - Conclusion

The methodologies used to determine the economic feasibility of reusing Stations 1-B, 1-A, and 3-A were aimed to gather the maximum amount of data over a span of two months. Addressing the deterioration through elevation mapping, treating it through cost analysis, and determining the economic feasibility of the station's rehabilitation was the model to follow for this report. Each station had aged differently due to location, previous mothballing attempts, and inherent issues with the concrete mixtures.

3.6 - Bibliography

Army Corps of Engineers, "Reports of Completed Works, Harbor Defenses of Long Island Sound," 1943. Bel Air, MD: CDSG e-press, 2011.

Disanto, Charles. "Survey of Terra-Cotta Facades at Alwyn Court, A Case Study." *APT Bulletin* Vol. 32, No. 4 (2001). <http://www.jstor.org/stable/1504769>.

Fitzner, B and K. Heinrichs. "Damage Diagnosis on Stone Monuments: Weathering Forms, Damage Categories and Damage Indices." In R. Prikryl, & H. A. Viles (Eds.), *Understanding and Managing Stone Decay, Proceedings of the International Conference on Stone Weathering and Atmospheric Pollution Network*. Charles University, Prague: The Karolinum Press, 2002.

Linton, Linnea M. "Delaminations in Concrete: A Comparison of Two Common Nondestructive Testing Methods." *APT Bulletin* Vol. 36, No 2/3 (2005) <http://www.jstor.org/stable/40004701>.

Matero, Frank G. "Managing Change: The Role of Documentation and Condition Survey at Mesa Verde National Park." *Journal of the American Institute for Conservation* Vol. 42, No. 1. (2003). <http://www.jstor.org/stable/3180055>.

National Park Service. *Fire Island Lighthouse and Keeper's Dwelling: Fire Island National Seashore, Patchogue*. Washington D.C.: Department of Interior, 1983.

Rypkema, Donovan D. *Feasibility Assessment Manual for Reusing Historic Buildings*. Washington D.C.: National Trust for Historic Preservation, 2007.

Schroder, Walter K. *Defenses of Narragansett Bay in World War II*. Providence: Rhode Island Bicentennial Foundation, 1980.

4 - RESULTS

The first standard outlined by the Secretary of Interior's Standards for Rehabilitation states "A property will be used as it was historically or be given a new use that requires minimal change to its distinctive materials, features, spaces, and spatial relationships."¹²⁹ Since the method of fire control and coastal artillery have been replaced by far more accurate and complex systems, the next logical step was to review what had happened to the stations once they were sold back into private hands. In addition to the Hilda Lindley House, many additional privately owned FC stations have been successfully reused as residences. Such examples can be seen in both the East End of Long Island and Sakonnet Point, Rhode Island. Although there are many more examples along the coastline, these are some located relatively close to the two case study locations. Ultimately, the potential of adaptively reusing these stations as residences depends on a number of factors, including present ownership, accessibility, and the existing design of the interior.

The following chapter was divided into four sections. The first section explained the existing conditions of each FC station. The second section outlined the scopes of work based on the existing conditions reports. Cost estimates for each station based on the scopes of work was the third sections, and the final section displayed the pro forma spreadsheets of the cost analysis to determine the economic feasibility of reusing these stations. The hard costs in the pro forma spreadsheets were based on the cost estimates in the previous section.

4.1 - Existing Conditions Survey

Out of the stations studied in this report, a number of character-defining features were consistent with all three structures. All were two stories in height with two bands of ribbon windows, one for each floor, cut across the majority of the principle south elevation, which faced the water. The exterior sides of concrete were formed to mimic wooden horizontal boards unless the wall was to be hidden

¹²⁹ "Standards for Rehabilitation," National Park Service Technical Preservation Services website, accessed May 11, 2012. http://www.nps.gov/hps/tps/standguide/rehab/rehab_standards.htm

under an attached wooden structure. The window hooks and mounts were a unique character-defining feature to Station 1-B, and were not incorporated into the designs of Stations 1-A and 3-A.

On February 20, 21, and 24, 2012, site visits were conducted for each station, resulting in the following information. Considering all three FC stations have suffered deferred maintenance since the end of World War II, the overall condition of each station were rated as follows:

Excellent condition represented a FC station with no serious issues affecting the concrete, intact wooden frame walls and roof, painted exterior, and window openings enclosed with original or replacement windows. None of the three stations within the two case studies were in this category, but all similar cases were, such as the FC stations at Camp Varnum and the Hilda Lindley House.

Good condition represented a FC station with no serious issues affecting the concrete, wooden frame walls and roof existing in varying stages of decay, and window frames existent.

Fair condition represented a FC station with no serious issues affecting the concrete.

Poor condition represented a FC station exhibiting serious issues affecting the concrete.

Since the entrances of Stations 1-A and 3-A in Shadmoor State Park have been blockaded, there was no way to assess the interior of these two stations. As a result, only the exterior was assessed for deterioration.

4.1.1 - Station 1-B

Overall Condition - Good

4.1.1.1 - Exterior Elements

General Description

The primary materials and methods used in the construction of this FC station was splinter-proof concrete embedded with metal reinforcement bars.¹³⁰ The station was built a single mass of concrete. All exterior walls measured one foot thick. The concrete was molded to depict ten-inch wide¹³¹ simple drop horizontal boards¹³² to make the structure appear as a vernacular seaside cottage.

The overall massing of the structure can be compared to a pair of rectangular volumes incorporated within each other. The basement and first floor can be described as a horizontally-oriented volume measuring thirty feet wide; twenty-two feet deep; and sixteen feet, six inches tall. Eleven feet is visible above ground level, the rest is set below ground. The second volume is symmetrically located on the southern half of the structure. Vertically oriented, the volume measured twenty-four feet, eight inches wide; thirteen feet deep; and twenty-three feet, six inches tall. Both volumes were combined into a single massing on the basement and first floors, resulting in recessed corners on the southeast and southwest corners.

Walls

South Elevation - Description

[Appendix 6.1.1.1 - Fig. 3]

[Appendix 6.2.2.2 - Fig. 1]

The overall elevation was formed with a false simple drop horizontal board motif. The southeast and southwest corners are recessed two feet into the structure. The first floor ribbon window was located six feet, nine inches above the ground level. Ribbon window measured one foot, nine inches wide, and spanned between the two corner recesses. The concrete windowsill was angled outward to

¹³⁰ Craig Lentz, comments to the author, December 21, 2011.

¹³¹ Measurements by the author, March 8, 2012.

¹³² Virginia and Lee McAllister, *A Field Guide to American Houses* (New York: Alfred A. Knopf, 2006), 41.

repel water, making the true window opening one foot, six inches wide. When incorporating the two-inch thick wooden windowsill, the opening is reduced to one foot, two inches tall.

The second floor ribbon window measured six feet, nine inches above the top of the first floor ribbon window. The ribbon window mirrors the first floors in dimension. The elevation continues for two more feet before it meets with the roofline.

Condition - Overall: Good

The concrete did not show signs of cracking and remained in good condition. The only sign of deterioration was a small patch of eroded concrete centrally located above the second story ribbon window. The erosion has caused two steel reinforcement bars to be exposed and became oxidized.

Steel elements include eight window hook mounts above each ribbon window, making sixteen overall. Only three window hooks remain on the first floor, with none surviving on the second floor. All window hooks and mounts are in poor condition from excessive oxidation.

In addition, vane-like steel supports were located at each corner of the ribbon window. One corner support is missing on the southwest corner of the second floor. The remaining second story corner support remains, but has suffered from severe oxidation. Both first floor corner supports are present and in good condition, but show signs of oxidation.

North Elevation - Description

[Appendix 6.1.1.1 - Fig. 4]

[Appendix 6.2.2.2 - Fig. 2]

Ten feet of concrete remained exposed to the elements. The remaining foot of concrete was covered from the roof's soffit boards. All concrete portions were formed in the simple drop horizontal board motif. Two blind windows measuring two feet, three inches by four feet one inch have been formed into the concrete.

The northwest corner enclosed an interior stair hall, making a six-foot, eight-inch by seven-foot, six-inch area composed of wooden construction. The lower two-foot, six-inch portion remained concrete to serve as the foundation for the wooden walls. The wooden wall was partially clad in ten-inch wide asbestos shingles to match the formed concrete motif.

A single doorway measuring three feet wide by six feet tall was located two feet, eight inches east of the wooden wall. Like the foundation, the doorway measured two feet, six inches above ground level.

Condition - Overall: Fair

The concrete did not show signs of cracking or erosion. Both blind windows showed evidence of the original paint scheme. False wood lintels remained attached above the blind windows. Exposed plastic screw anchors remained from the false window jambs. Since the use of plastic was not common then, it is possible these screw anchors were a later addition.

About half of the asbestos shingling remained on the wooden wall portion. The remains of a centrally located window opening were present. Exposed wooden framing seen from within the structure confirmed the presence of a window.

West Elevation - Description

[Appendix 6.1.1.1. - Fig. 5]

[Appendix 6.2.2.2 - Fig. 3]

The exterior concrete walls were formed in a simple drop horizontal board motif. A single blind window form, identical in dimension to those on the north elevation, was located on the first floor level. None of the wooden wall structure remained, leaving all interior areas open to the elements and half of the exterior envelope missing.

The first floor ribbon window continues into the southwest corner recess. The second ribbon window extends four feet before terminating nine inches from the wooden gabled roofline.

Condition - Overall: Fair

The concrete did not show signs of cracking or excessive erosion. Slight erosion at the top of the blind window recess has resulted in four reinforcement bars becoming exposed to the elements and have oxidized. Like the blind windows on the north elevation, plastic screw anchors surround the blind window. The only remnants of the wooden wall are a two-by-six inch sill plate on the first floor and steel ties for the second story sill plates. The dislodged wooden wall was still in existence, but lying horizontal on the ground immediately to the west of the station. Upon inspection, the exterior envelope of the wooden wall is asbestos shingles matching those on the north elevation.

One steel window hook mount for each floor was present on this elevation. The first floor mount retains its window hook. Although oxidized, both mounts and the first floor window remain in good condition.

East Elevation - Description

[Appendix 6.1.1.1. - Fig. 6]

[Appendix 6.2.2.2 - Fig. 4]

The first floor is entirely composed of concrete with simple drop horizontal board motif continuing on this elevation. Two blind window forms, identical to those on the north and west elevations, were located on the first floor. Like the west elevation, the second floor is almost fully open to the elements due to missing wooden wall construction. Only a small portion of the wooden wall remains on the northeast corner with asbestos shingles intact.

The ribbon windows mirror those on the west elevation.

Condition - Overall: Fair

The concrete did not show signs of cracking or severe erosion. Like the blind window on the west elevation, both blind windows contained exposed steel reinforcement bars that have been oxidized due to exposure to the elements. Like the north and west elevations, plastic screw anchors surrounded both blind

windows. A small portion of wooden wall on the second floor remained; the rest was lying on the ground immediately east of the station.

Like the west elevation, one window hook mount accompanied the ribbon window on each floor, making two hook mounts on the overall elevation. Both window hooks remain. Although oxidized, both window hook mounts and window hooks are in good condition and in working order.

Roof - Description

[Appendix 6.1.1.1. - Figs. 7-17]

The roof was gabled in form with gables oriented in a west to east manner [Appendix 6.1.1.1 - Figs 7, 8]. The second floor was camouflaged to resemble a massive second story wall dormer under a shallow shed roof. A section of the eave on the north elevation was extended into a small overhang just above the doorway. All common rafters measured two by six inches, with tie beams measuring two by four inches.

Condition - Overall: Fair/Poor

The northern side of the gable roof still retained the roof boards, tarpaper, and asbestos roof shingles [Appendix 6.1.1.1 - Fig. 9]. The two holes located within the eastern center section of the roof had lead to rot on four of the rafters [Appendix 6.1.1.1 - Figs. 10, 11]. About three quarters of the roof retained the original asbestos shingles. Shingles were only absent around the two large holes and a second location approximately two feet below the ridge board up to the gable's peak. All other rafters are weathered, but in good condition. All remaining roof boarding was in good condition [Appendix 6.1.1.1 - Figs. 12, 13]. The sill plate supporting the northern roof section has severely deteriorated, resulting in the structure to become unstable [Appendix 6.1.1.1 - Figs. 14-17]. The absence of the southern gable channeled moisture into this area, resulting in the sill plate to rot. Aside from the sill plate's poor condition, the remaining wooden studs and rafters remained in good condition.

The southern portion of the roof had lost all asbestos shingles and tarpaper. Only a small portion of roof boarding remains on the extreme western side near the ridge board. Due to the lack of roof boarding, seven rafters atop the dormer were missing. Eleven dormer rafters remain with four shifted from their original position. Four rafters remain flanking the dormer with one half missing on the extreme eastern side.

Chimneys

The opening of a false chimney remains near the ridge board on the northern side. A single two-by-four three feet in length was all that remained of the chimney construction [Appendix 6.1.1.1 - Fig. 18].

Trim

South Wall

No trim remained.

North Wall

In addition to the false lintels atop the blind windows, a number of soffit boards remained attached under the eave. The boards were tongue and groove bead board. Soffit boards on the western side were in good condition with remaining boards in varying stages of decay [Appendix 6.1.1.1 - Fig. 19].

East Wall

No trim remained.

West Wall

No trim remained.

Doorways
North Elevation Doorway

Wooden doorjambs and lintel have remained in place and were in fair condition.

Interior Doorways

All doors appear to be in excellent condition.

Windows
South Wall - First Floor

Window frames have remained in place and are in fair condition. Evidence of the top rail of a window sash remained attached on the extreme eastern window frame. In addition to the window hooks and existing top rail, the deteriorated hinges on the top window frame and corresponding lock plates on the bottom window frame suggested the presence of awning windows [Appendix 6.1.1.1 - Fig. 20].

Second Story

Like the first floor, window frames were present and in fair condition; however no trace of attached window sash remained [Appendix 6.1.1.1 - Fig. 21].

North Wall

The remnants of a window were present in the western wooden portion of the north elevation. The opening had been obscured by plywood, which made it unclear about how much of the window frame or sash remained.

The top rail of an awning window possibly from the station was screwed to hold a piece of plywood to cover the window opening's exterior [Appendix 6.1.1.1 - Figs. 22, 23].

Finishes

Any remaining finishes were sparse, but did exist. The two blind windows on the north elevation retained their reddish-brown paint color and wooden lintels. Areas of concrete around the blind windows still contained traces of white paint [Appendix 6.1.1.1 - Fig. 24]. The reused top rail of the awning window on the north elevation was also covered in what appeared to be a coat of whitewash.

4.1.1.2 - Interior Elements

Overall Description

The interior could be divided into four rooms and one stair hall situated in the northwest corner of the structure. The large single room in the basement was labeled Room B-1. The single room on the first floor was labeled Room 1-1. The second floor was divided into two rooms. Since the southern room defined the south elevation and was composed of concrete, it was labeled Room 2-1. The northern room sheltered by the roof gable was labeled Room 2-2.

The basement and first floor plans were nearly identical in design with the exception of the floor opening for the ladder rungs leading down to the basement. The southwest and southeast corners have been recessed to aid in supporting the second floor room. In addition, a central column runs from the basement to support the northern concrete wall of the southern room of the second floor.

General Architectural Elements

The overall interior spaces had very few character-defining features, but a number of elements did contribute to the station's overall character.

The poured concrete floors on all three levels have been textured with a trowel in an arc finish [Appendix 6.1.1.2 - Figs. 1].

All interior corners had been chamfered at a forty-five degree angle.

Condition

Basement Plan (Room B-1) - Overall Condition: Good [Appendix 6.1.1.2 - Figs. 2-5]

Although the floor was strewn with debris, the basement had retained much historical integrity. Much of the original paint scheme remained, as well as the wooden frames around the three exhaust vents and one vent located on the northern, eastern, and western walls. The steel ladder rungs leading to the first floor have oxidized, but remain in fair condition.

The ceiling retained the original paint, but rust staining had accumulated from excessive moisture infiltration from above. The staining was most apparent in the southeastern quarter of the ceiling. Such staining could have come from concrete delamination.

Stair Hall - Overall Condition: Fair
[Appendix 6.1.1.2 - Figs. 6-9]

The overall space measured five foot, eight inches wide by ten feet deep and extended through the first floor to the second floor. A three-foot by six-foot doorway opened into the stair hall on both the basement and first floors.

The stair hall retained much of the original wooden stair construction, but much had rotted to the point of collapse and was not able to be used [Appendix 6.1.1.2 - Fig. 5]. The concrete walls contained numerous steel ties where the stairs were located and have remained in good condition [Appendix 6.1.1.2 - Figs. 6-9]

First Floor Plan (Room 1-1) - Overall Condition: Good/Fair
[Appendix 6.1.1.2 - Figs. 10-17]
[Appendix 6.2.2.1 - Fig. 1]

The southern portion of the floor contains two circular imprints set within the concrete. Two-by-fours were used to enclose the southwestern quarter of the room. Only the sill plate remained to divide the southern half of the room, but exposed wall studs framed a wall dividing the eastern half of the room. A possible door opening was present in the wooden wall frame [Appendix 6.1.1.2 - Fig. 10]. All wooden members present appeared to be in good condition.

The only remaining utility fixture was a pair of electrical conduit boxes for an electrical outlet on the south wall about two feet above the floor. Both boxes were in line with the circular imprints in the floor.

A square opening was located within the southwest corner opening to the steel ladder rungs leading to the basement [Appendix 6.1.1.2 - Fig. 14]. A hole nine inches in diameter was located immediately northeast of the central column.

The major issue concerning the first floor is excessive delamination severely affecting the poured concrete floor. The eastern half and southwestern quarter of the floor was suffering from delamination [Appendix 6.1.1.2 - Fig. 15]. Considering the stair hall occupied half of the northwestern quarter, about half of the floor was delaminated. Portions of the floor have delaminated to the extent that small areas have been dislodged, exposing the steel reinforcement bars within. It is quite possible the delamination was a result of a combination of uncontrolled moisture infiltration and the floor's six-inch thickness. The floor is in poor condition due to the delamination.

In addition to the delamination, two corners have inhabited excessive cracking, the corner at the edge of the southwest corner recess and the southeast corner of the central column [Appendix 6.1.1.2 - Figs. 16, 17].

All four walls are in good condition, but have been covered with multiple layers of graffiti from ground to the ceiling. Even the central column had graffiti. Coats of white paint cover earlier graffiti campaigns in some areas on all walls.

Although the ceiling inhabits some light graffiti, no evidence of rust stains were present and it remains in good condition.

Second Floor Plan

Room 2-1 - Overall Condition: Excellent
[Appendix 6.1.1.2 - Figs. 18-24]

For this report, the second floor was divided into two separate rooms. Room 2-1 measured twenty-two, eight inches wide; eleven feet deep; and six feet, six inches tall and entirely encased in one foot of reinforced concrete. On the north wall, a single three-foot wide by four-foot tall doorway elevated two feet from the floor allowed access to the room. The second story ribbon window was located in this room.

Erosion was present on the northwestern corner of the room, possibly due to a discrepancy in the concrete mixture. Even so, no delamination was present, leaving the floor to remain in good condition. A steel tube approximately six inches

in diameter and four feet tall was located on the southeastern corner [Appendix 6.1.1.2 - Fig. 19]. The tube was filled with concrete and capped with a threaded mount approximately three inches in diameter and three-quarters of an inch in height. A circular imprint mirrored on the southwestern corner of the room was present [Appendix 6.1.1.2 - Fig. 22].

Graffiti was located on all four walls, but the original paint scheme remained underneath. The only damage to the walls was a small amount of chipping at the center of the south wall near the floor. Two holes, each about eight inches wide, were located into the north wall and opened into room 2-2. The exposed reinforcement bars within these holes showed mild signs of oxidation. Otherwise, the walls have remained in good condition.

Remaining electrical conduit boxes showed signs of oxidation, but an original electrical outlet was present on the south wall in the southeast corner near the steel tube [Appendix 6.1.1.2 - Figs. 24]. An additional conduit box was present on the ceiling, but in poor condition. The remnants of a telephone connection box were located in the northeast corner.

Room 2-2 - Overall Condition: Fair
[Appendix 6.1.1.2 - Figs. 25-28]

Room 2-2 was Adjacent to room 2-1 to the north. The stair hall from the basement led up to this room with the northern side of the roof serving as the north wall. A concrete plug with the numbers "83" engraved into it was centrally located adjacent to room 2-1. This plug seemed to match the location of the nine-inch diameter hole directly below the floor of Room 1-1.

Unlike the floors in other rooms, the concrete floor in room 2-2 was composed of reinforced concrete one foot in thickness. No delamination was present within the floor and had remained in good condition.

The west and east walls were no longer in place [Appendix 6.1.1.2 - Figs. 26, 27], but steel ties for their sill plates remained embedded in the concrete. Both

walls were lying horizontally on the ground to the west and east of the station [Appendix 6.1.1.2 - Figs. 28].

4.1.1.3 - Historical Background [Appendix 6.3.1 - Figs. 1-5]

The Army Corps of Engineer's Reports of Completed Works (RCW) for Fort Greene was the only source that offered any sort of historical information concerning the original appearance and layout of Station 1-B. Even though the documents only contained original drawings of the south and west elevations, they still offered much information regarding the original design. The ribbon window for the first and second floors each contained eight awning window sashes, one for each window hook. The sashes were three lights in width and one light in height. The west elevation drawing showed a window located in the eastern wall of the stair hall. A window on the second floor also brought natural light into Room 2-2. Both windows matched the blind window in dimension, with the stair hall window matched in height from ground level A set of stairs and a small porch leading to the doorway were located on the north elevation. These stairs were incorporated into the small overhang still in existence. Both elevations noted the presence of asbestos shingles covering the wood framed walls and roof. In addition, the false chimney "with smoke pipe," or stove duct, was noted, suggesting the presence of stoves within [Appendix 6.3.1 - Fig. 1].

A pair of sections, titled "Section A-A" and Section B-B" [Appendix 6.3.1 - Fig. 2], offered a glimpse into the station itself. Both sections noted the presence of the false chimney with "smoke pipe," as well as a section of the drainage system incorporated under and around the basement. "Section A-A" detailed the stair halls organization from the basement to the second floor. Tread count, platform location, door design, and even handrail placement were all accounted for. Also, it showed a handrail existed around the floor where the ladder rungs are presently located.

"Section B-B" was even more descriptive, noting the presence of a stove duct extending from the basement up to the false chimney. The round holes through the

floors of Rooms 1-1 and 2-2, as well as the holes in the north wall of Room 2-1 were part of the stove duct weaving through the structure. The steel pipe seen in Room 2-1 was also located in Room 1-1. In addition, the framing for the east wall of Room 2-2 was drawn, accurately showing how the wall fit in with the existing wooden construction.

The basement floor plan [Appendix 6.3.1 - Fig. 3] offered additional information regarding the stair hall's original configuration. One would go up the stairs in a counter-clockwise manner. Two floor drains were noted to exist within Room B-1, tying into a larger drainage system surrounding the exterior basement walls. The stairs for the porch extending off the north elevation was also noted.

The first floor plan [Appendix 6.3.1 - Fig. 4] also offered a great deal of information. Room 1-1 was divided into three sections. The eastern half was one room, with the southwest and northwest quadrants each being additional rooms. As noted in the plan, the circular imprints in the concrete floor were the locations of two azimuth scope mounts. The locations the five blind windows, or "false windows," were noted in this drawing. In addition, the two windows in the stair hall were noted, with the window on the west elevation mirroring the location of the blind window on the east elevation. The porch on the north elevation was also noted, possibly suggesting the presence of a small balustrade enclosing the porch.

The second floor plan [Appendix 6.3.1 - Fig. 5] offered valuable information regarding the presence of any interior walls. A small wall was located about four feet south of where the northern side of the roof met the concrete floor. The locations of a single window within both the west and east walls of Room 2-2 were noted. Like the first floor plan, a pair of azimuth scope mount were noted, one of which remained in existence today. The circular imprint within the concrete floor notes the other mount's location.

4.1.2 - Station 1-A

Overall Condition - Fair

4.1.2.1 - Exterior Elements

General Description

Although Cramer's report on these stations labeled each elevation by their more accurate intermediate directions, the Army Corps of Engineers rounded to the closest cardinal direction. This report will work off of the Army Corps of Engineers labeling system as their drawings were referenced in this report.

Unlike Station 1-B at Camp Cronin, the only remaining elements of Station 1-A were the concrete portions. The principal two-story portion was the southern half of the structure, and measured thirty-one feet in width, thirteen feet in depth, and twenty-one feet in height. Concrete composing the south, west, and east elevations were formed to mimic clapboard eight inches in height. Blind windows and doors of varying sizes adorn the south, west, and east elevations. A brick chimney was located on the east elevation. An attached concrete foundation measuring thirty feet in width and eleven feet in depth was adjacent to the north of the existing two-story structure. The north elevation contained two doors into the station; the upper door led to the first floor meanwhile the lower door directly underneath lead to the basement floor.

Both doors were blockaded, restricting any access to the structure. In addition, plywood had covered much of the ribbon windows. As a result, only the visible portions around the ribbon windows were assessed. Even so, the interiors were described to be in good condition, but covered in graffiti.¹³³

¹³³ Tom Dess, interview with the author, February 10, 2012.

Walls

South Elevation - Description

[Appendix 6.1.2, Fig. 3]

[Appendix 6.2.3, Fig. 1]

With the exception of a two-foot area above the first floor ribbon window and the blind windows and door, the entire elevation was formed with the clapboard treatment. Any smooth area around the blind doors and windows contained wooden nailers embedded within the concrete. These areas were not considered part of the blind window opening itself for this report. The first floor ribbon window, nine foot, nine inches above ground level and eight inches in height, extended eighteen feet from the southwestern corner. A large blind window approximately five feet, five inches wide by four feet, ten inches tall was centrally located directly below the ribbon window. The southeastern portion of the first floor area contained a blind doorway three feet in width by eight feet, three inches in height.

The second story contained a five-foot wide area recessed three feet into the center of the structure, ending once it reached down to the first floor. A blind circular window two feet in diameter was centrally located within the recess. Two attached towers were formed due to the central recess.

The western tower contained a ribbon window seven feet, ten inches above the first floor ribbon window. The height of this window was also eight inches and spanned the entire thirteen-foot width of the tower. A blind window two feet, six inches wide by four feet, three inches high was centrally located directly below the ribbon window.

The eastern tower mirrored the west in ribbon window size and orientation. A blind window of identical proportions to the other second story blind window was also located directly below the ribbon window. This blind window was two feet, four inches west of the eastern corner.

Condition - Overall: Good

No signs of major cracking were present on this elevation. A small crack accompanying moderate chipping on the first floor windowsill was present. In addition, chipping was present at the corners of all ribbon windowsills and in a uniform set of pairs across the top of all ribbon windows. Chipping was also present at the corner of the roofline.

Efflorescence was present on both corners below the western second story ribbon window and on the western side of the second story western blind window.

The steel supports within all ribbon windows were corroded, but an accurate assessment could not be attained due to limited access.

North Elevation/Foundation - Description

[Appendix 6.1.2, Fig. 4]

[Appendix 6.2.3, Fig. 2]

This elevation was formed without the false clapboards. The only notable features of this elevation were two doors. Otherwise, a total of ten conduit holes were located throughout the elevation, and steel ties were located in various areas.

Condition - Overall: Excellent

No signs of cracking, chipping, or efflorescence were present on the elevation. Even the foundation to the north of the structure was in excellent condition.

West Elevation - Description

[Appendix 6.1.2, Fig. 5]

[Appendix 6.2.3, Fig. 3]

The false clapboard treatment from the south elevation extended through to this elevation. Except for the middle portion, one blind window, and one blind door, the entire elevation was treated with clapboard molding.

Both the first and second floor ribbon windows continued around the southwest corner, extending on this elevation four feet.

A blind door three feet wide and seven feet, eight inches high was located six feet, six inches north of the southwest corner. A blind window identical in dimension to the pair on the south elevation was located four feet directly above the blind door. A smooth area nine-foot, four inches wide by two-foot, ten inches tall was located between the blind window and blind door and spanned south from the northwest corner. This area contained wooden nailers within the concrete.

Condition - Overall: Good

No cracking was present in the concrete. A small amount of chipping was located around the second story ribbon window. Efflorescence was also present below the same ribbon window on the southwest corner.

East Elevation - Description

[Appendix 6.1.2, Fig. 6]

[Appendix 6.2.3, Fig. 4]

Like the south and west elevations, this elevation is completely treated with false clapboards with the exception of two blind windows and the brick chimney.

A small ribbon window two foot, six inches wide and eight inches in height corresponded with the first floor ribbon window on the south elevation, and was located four feet north of the southeast corner. The second story ribbon window mirrored the one on the west elevation.

A blind window identical in proportion to those on the south and east elevations was located directly below the ribbon window. A second story blind window, also identical in proportion, was located three feet directly above the first floor ribbon window.

Condition - Overall: Excellent

There were no signs of cracking or efflorescence. The only areas of chipped concrete were located at the two upper corners of the first floor ribbon window and the western section of the roofline. Otherwise, the elevation was in excellent condition.

Roof

All traces of the original roof structure no longer remained as viewed from ground level.

Chimney

The brick chimney was located at the northern end of the east elevation abutting the north elevation [Appendix 6.1.2, Fig. 7]. The base measured four feet, four inches across and extended one foot, six inches out from the concrete wall. It begins to taper to two feet, six inches at a height of four feet, nine inches until it reached seven feet nine inches where the tapering ends. The tapered section is capped with a four-inch thick concrete cap.

It is probable the chimney was taller than its current height.

Trim

South Wall

Three false window jambs remain in place; one on the second story western blind window and two on the second story eastern blind window [Appendix 6.1.2, Fig. 10].

North Wall

No trim remained.

West Wall

A false lintel had remained in place on top of the blind door, and a false window jamb remained on the northern side of the blind window [Appendix 6.1.2, Figs. 10, 11]

East Wall

No trim remained.

Doorways

Only two doors were present on the structure, both being on the north elevation. The lower door measured three feet wide by six feet tall, and was located three feet below ground level and nine feet east of the northwest corner. A set of concrete steps led down to the door from the west. The upper door was located nine inches directly above the lower door and was the same in dimensions. Both doors were barricaded to restrict access within.

Windows

South Wall - First Floor

As viewed from the exterior, no traces of the original windows sashes remain for the ribbon windows.

South Wall - Second Story

As viewed from the exterior, no traces of the original windows sashes remain for the ribbon windows.

West Wall - First Story

As viewed from the exterior, no traces of the original windows sashes remain for the ribbon windows.

West Wall - Second Story

As viewed from the exterior, no traces of the original windows sashes remain for the ribbon windows.

East Wall - First Story

As viewed from the exterior, no traces of the original windows sashes remain for the ribbon windows.

East Wall - Second Story

As viewed from the exterior, no traces of the original windows sashes remain for the ribbon windows.

4.1.2.2 - Historical Background [Appendix 6.3.2, Figs. 1-4]

The RCW's for Station 1-A offer a great deal of information regarding the original appearance of this structure. The drawing of the "Front Elevation," [Appendix 6.3.2, Fig. 3] or south elevation showed the station's original appearance. There was originally a gable roof over the whole structure. The two attached towers were each capped with a hipped roof, making them appear as a pair of wall dormers. The cornice line from the roof between the two wall dormers extended west to join a porch attached to the west elevation. The drawing also noted the original height of the brick chimney, totaling thirty-five feet, six inches in height. The original chimney height towered over the current height of twenty-one feet.

A drawing of the west elevation also existed, offering additional clues as to the original appearance of the side porch. Concrete footings of this porch remained, as did the steel tie rods at the bottom of the west elevation.

In addition, a drawing of the east elevation remains as well [Appendix 6.3.2, Fig. 4]. Both the east and west elevation drawings depict the orientation of the wooden structure plated atop the concrete foundation to the north. The wooden framed sections were to be clad in cedar clapboard matching the concrete forms in

height. In addition, both drawings showed the location and typology of the windows set within the wooden structure.

All three of the elevation drawings depicted the roof to be covered in John-Manville asbestos shingles. The windows were also annotated as one-over-six double-hung sash with “white pine batten type shutters.” In addition, it appeared the ribbon windows might have been composed of metal shutters that opened from within rather than window sashes; however, no annotations on the drawings existed to support this claim.

Floor plans and sections existed [Appendix 6.3.2, Figs. 1, 2] , but could not be compared to the current condition of the interior due to inaccessibility.

The plans and sections did outline the interior’s original layout. The wooden structure was one single floor, which then split off between the basement floor and first floor through the use of stairs. A ladder composed of metal rungs then led to the second floor from within.

4.1.3 - Station 3-A

Overall Condition: Poor

4.1.3.1 - Exterior Elements

General Description

Both Cramer's report and the Army Corps of Engineers labeled each elevation by the intermediate directions. Such labels were used in this report.

Station 3-A had many similarities with Station 1-A in terms of massing and position. The remaining concrete structure was south in relation to an attached foundation adjacent to the north. The concrete portion measured thirty-two feet in width by fourteen feet in depth and nineteen feet, six inches in height. The attached foundation extended the north by eleven feet with a width of thirty-two feet. To the west of the foundation was a smaller adjunct foundation composed of CMU blocks with the dimensions of eight feet, six inches in width by eleven feet in depth.

Unlike Station 1-A however, no blind windows were set into the concrete. Only false clapboards measuring ten inches in height adorned the south, west, and east elevations.

This station had also been blocked off at the only points of egress. As a result, only the exterior was assessed for this report. Even so, all window openings were covered in concrete, so an accurate assessment of the windows could not have been undertaken.

Walls

Southeast Elevation - Description

[Appendix 6.1.3, Fig. 3]

[Appendix 6.2.4, Fig. 1]

The southeast, southwest, and northeast elevations were formed with a false clapboard motif ten inches in height.

A recess five feet wide and three feet deep bisected the overall façade. The recess contained a blind doorway on the first floor measuring seven feet tall by three feet wide. A second floor circular window two feet in diameter was centrally located five feet, nine inches above the blind door.

Flanking the recess was pair of attached towers identical in form and thirteen feet in width. The first floor ribbon window stretched across each tower measuring one foot, three inches in height, and was seven feet, eight inches above ground level. The second story ribbon window measured seven feet above the top of the first floor ribbon window. An additional two feet, six inches was on top of the second story ribbon window.

Condition - Overall: Fair

The largest amount of damage occurred near the roofline. Large areas of both corners of each attached tower were chipped off. A consistent crack running approximately six inches below the roofline traveled across the top of the whole elevation.

Northwest Elevation/Foundation - Description

[Appendix 6.1.3, Fig. 4, 8-13]

[Appendix 6.2.4, Fig. 2]

[Appendix 6.2.4, Fig. 5]

[Appendix 6.2.4, Fig. 6]

[Appendix 6.2.4, Fig. 7]

Like Station 1-A, an attached foundation lies adjacent to the north of this elevation. Also, this is the only elevation to not be treated with false clapboards. A total of four doorways were located on this elevation; two leading to the first floor and two leading to the second floor. Only one door, the easternmost door on the first floor, measured three feet in width by seven feet in height. The remaining three measured three feet in width by four feet in height.

A projection two feet in width were mirrored at the extreme edges extended one foot out from the elevation.

Ladder rungs beginning on the second floor lead to the top of the structure. Additional steel components include the hinges and latches next to the doorways.

The foundation was composed of concrete walls one foot in thickness. The ground level within is about four feet below the ground level outside the foundation.

The level change was reduced to about three feet below average ground level within the adjunct foundation.

Condition - Overall: Poor

The elevation has suffered from severe erosion, exposing much of the aggregate stone within. Since the aggregate was composed of round stones, it is possible they came from the beach nearby. The excessive erosion had caused the steel reinforcement bars to become exposed in multiple areas, most notably down half of the eastern corner of the western projection.

All exposed steel components are corroded, but remain in fair condition.

The foundation is in very poor condition. Numerous cracks have appeared on all three foundation walls. The northeastern foundation wall suffered from the most cracking from pressure exerted from the weight of the ground on the other side. So much so the center of the wall has a large piece missing from the top. The northwestern foundation wall had at least half of the wall chipped away.

All three foundation walls have also suffered from excessive efflorescence towards the base, possibly due to moisture traveling from the ground on the other side through the cracks in the foundation wall.

The adjunct foundation is also in very poor condition with many CMU blocks removed.

Southwest Elevation - Description

[Appendix 6.1.3, Fig. 5]

[Appendix 6.2.4, Fig. 3]

The elevation was formed in the false clapboard motif. The ribbon windows for both floors wrapped around the corner and extended four feet, eight inches to the north. The projection began three feet above ground level and ended four feet, six inches above ground level. A small rectangular opening was located at the base of the projection.

Condition - Overall: Poor

Cracking and severe chipping was present near the roofline across the elevation.

Severe erosion has erased the false clapboards in the upper left quadrant of the elevation, exposing one reinforcement bar. The lower corner of the projection had also suffered from severe erosion and efflorescence. Efflorescence was also present just below the second story ribbon window.

Northeast Elevation - Description

[Appendix 6.1.3, Fig. 6]

[Appendix 6.2.4, Fig. 4]

The elevation was a largely mirrored copy of the southwest elevation, with some small differences. A single conduit hole existed in the middle of the elevation close to the northern corner, and an iron frame was around the border of the small rectangular opening at the base of the projection. A terra cotta tube was also mounted within the foundation wall.

Condition - Overall: Fair

A major crack ran between the structure and the concrete foundation wall. In addition, a crack had run across the majority of the elevation parallel to the roofline, similar to the crack witnessed on the southeast and southwest elevations.

Chipping and erosion had occurred on the upper corners of the elevation and around the base of the projection.

Efflorescence was also present below the projection.

Roof

No trace of any roof structure was witnessed from ground level. It is important to note the major crack running within one foot of the present roofline across the southeast, southwest, and northeast elevations.

Chimneys

[Appendix 6.1.3, Figs. 14, 15]

The small openings at the base of the two projections and associated stove ducts within the projections on the northwest elevation suggest these projections could have been chimneys for stoves within. Both projections are in fair to poor condition, suffering from cracking, chipping, erosion, and efflorescence throughout.

Trim

Southeast Wall

Numerous areas of the concrete-formed trim have been chipped away.

Northwest Wall

No trim remained.

Northwest Wall

Numerous areas of the concrete-formed trim have been chipped away.

Northeast Wall

Numerous areas of the concrete-formed trim have been chipped away.

Doorways

The four doorways set within the northwest elevation have all been barricaded. The two doors leading to the first floor have been filled with CMU blocks, meanwhile the two doors on the second floor were covered in sheets of plywood.

Windows

All windows have been covered with plywood sheets. As a result, there was no way to assess their existing condition.

4.1.3.2 - Historical Background [Appendix 6.3.3, Figs 1-7]

Like the RCW's for the other two stations, the RCW for Station 3-A yielded much valuable information regarding the structure's original exterior appearance and interior layout. All four elevations are drawn, as well as the floor plans of the first and second floors. A section offers a view inside the original structure.

The station was topped with a hipped roof covered in asphalt shingles and capped by a wooden balustrade. The two concrete projections on the northwestern elevation formed the bases for two concrete chimneys extending thirty-one feet from ground level.

The attached wooden structure was clad in wooden clapboard matching in height of the formed concrete.

Even though all elevations have deteriorated since their initial construction, the northwest elevation experienced the greatest amount of change. A functioning porch extended from the wood framed section. The porch steps led to the main entrance. Three six-by-one double-hung sash windows were located on the first floor. The smaller window was located within the latrine constructed atop the current adjunct foundation composed of CMU blocks. The second floor contained two windows identical in form and in line with those on the first floor.

Aside from the latrine addition on the southwest elevation, the southwest and northeast elevations were mirrored in appearance. The same windows seen in the northwest elevation were seen in both of these elevations. The southwest elevation had the smaller window within the latrine elevation meanwhile a larger window was located on the second floor. The northeast elevation had one large window on each floor, totaling two windows overall.

Like station 1-A, the sections did outline the station's original layout, but they could not be compared to contemporary conditions. Even so, the plans were not like those seen on 1-A, for the wooden structure continued the floor planes of the concrete structure.

4.2 - Scope of Work

In order to make accurate cost estimates on the repair and rehabilitation of these stations, a scope of work must be outlined to determine the amount and priority of needed work. The issues with the highest priority were on the top of the list, diminishing in importance as the list continued.

The scope of work was aimed to accurately reconstruct the missing members outlined in the RCWs. Since these documents were drafted after these stations were completed, they are accurate measured drawings of what these structures originally looked like. The RCW for each station had elevations, sections, and floor plans.

These drawings were the only sources of accurate information on the station's original appearance. As a result, they formed the base for what was to be reconstructed. All concrete elements were to be retained wherever possible, as were remaining window and doorframes. The remaining wooden elements had been reused rather than replaced to retain some original fabric.

Due to time constraints, the interior design layout, cost of custom architectural elements, and compliance to building and fire codes were not incorporated. This report should not be seen as an accurate cost analysis, but rather a catalyst for potential reuse ideas.

Since the interiors of Stations 1-A and 3-A were not assessed, the general treatment methods for the delaminated floor of Station 1-B were adopted and utilized to attain a more accurate estimate.

4.2.1 - Station 1-B

4.2.1.1 - Exterior

South Elevation

- Install windows equal in size and appearance to the originals.
- Remove corroded window hook mounts. Replace with new steel mounts equal in proportion to the originals.
- Clean exposed reinforcement bar using abrasive cleaning methods and cover with new concrete.
- Clean all concrete using the gentlest means possible with mild cleaning agent.
- Repaint concrete in an appropriate color scheme.

North Elevation

- Remove existing asbestos shingles.
- Repair wooden portion of wall in accordance with historical documents. Incorporate with existing historic fabric wherever possible.
- Install new window equal in size and appearance to the original.
- Clad wall with cement fiber shingles similar in size and appearance to removed asbestos shingles.
- Clean all concrete using the gentlest means possible with mild cleaning agent.
- Repaint concrete in an appropriate color scheme.

West Elevation

- Reconstruct missing wooden wall in accordance with historical documents. Incorporate with existing historic fabric wherever possible.
- Install new windows equal in size and appearance to the originals.
- Repair and repaint existing window hook mounts and hooks.
- Clad wooden section with cement fiber shingles matching original asbestos shingles in size and appearance.
- Clean exposed reinforcement bar using abrasive cleaning methods and cover with new concrete.
- Clean all concrete using the gentlest means possible with mild cleaning agent.
- Repaint elevation in an appropriate color scheme.

East Elevation

- Reconstruct missing wooden wall in accordance with historical documents. Incorporate with existing historic fabric wherever possible.
- Install new windows equal in size and appearance to the originals.
- Repair and repaint existing window hook mounts and hooks.
- Clad wooden section with cement fiber shingles matching original asbestos shingles in size and appearance.
- Clean exposed reinforcement bar using abrasive cleaning methods and cover with new concrete.

- Clean all concrete using the gentlest means possible with mild cleaning agent.
- Repaint elevation in an appropriate color scheme.

Roof

- Remove all existing asbestos shingles and tarpaper to expose roof boards.
- Repair rotted roof rafters where needed.
- Replace missing roof boards with wood equivalent in size and dimension. Incorporate with existing historic fabric wherever possible.
- Reconstruct false chimney in accordance with historical documents. Incorporate with existing historic fabric wherever possible.
- Clad with cement fiber shingles matching original asbestos shingles in size and appearance.

4.2.2.2 - Interior

Overall

- Install electrical conduits throughout structure.
- Install plumbing where needed.

Basement (Room B-1)

- Remove all debris from the floor.
- Repair any floor cracks where necessary.
- Clean metal ladder rungs using abrasive cleaning methods and coat with rust-resistant paint.
- Repair fan vents to incorporate contemporary fan equivalents. Incorporate with existing historic fabric wherever possible.
- Install new door to stair hall based off historical designs.
- Clean all concrete using the gentlest means possible with mild cleaning agent.
- Repaint walls and ceiling in an appropriate color scheme.

Stair Hall

- Remove all unrelated debris from the area.
- Retain historic stair components where possible.
- Reconstruct stair in accordance with contemporary building codes.
- Clean all concrete using the gentlest means possible with mild cleaning agent.

First Floor (Room 1-1)

- Remove severely delaminated concrete where needed.
- Clean exposed reinforcement bars with abrasive cleaning methods.
- Recast and pour new concrete around cleaned reinforcement bars.
- Finish concrete in an arc pattern to match historic concrete floor.
- Repair chipped corners with concrete where needed.

- Clean exposed reinforcement bar with abrasive cleaner and cover with new concrete.
- Clean metal ladder rungs using abrasive cleaning methods and coat with rust-resistant paint.

The following will depend on final interior design:

- Reinstall interior partitions. Incorporate with existing historic fabric wherever possible.

OR

- Remove interior framing for interior partitions.
- Clean all concrete using the gentlest means possible with mild cleaning agent.
- Repaint walls and ceiling in an appropriate color scheme.
- Reinstall rail around opening to basement.
- Install floating wood floor if needed.

Second Floor

Room 2-1

- Repair chipped concrete where needed.
- Clean and treat corroding reinforcement bars within stove ducts.
- Clean azimuth scope mount using abrasive cleaning methods and coat metal portion with rust-resistant paint. NOTE: Do not paint threaded section on top.
- Retain original electrical outlet and incorporate into new electrical system if possible. If incorporation cannot be done, clean conduit box, paint with rust-resistant paint, and leave in-situ.
- Clean all concrete using the gentlest means possible with mild cleaning agent.
- Repaint walls and ceiling in an appropriate color scheme.

Room 2-2

- Reconstruct north wall of room 2-2 after roof repair has been completed.
- Finish the east wall, west wall, and ceiling with sheetrock if appropriate.
- Clean all concrete using the gentlest means possible with mild cleaning agent.
- Repaint walls and ceiling in an appropriate color scheme.

4.2.2 - Station 1-A

4.2.2.1 - Exterior

South Elevation

- Remove all accumulated efflorescence.
- Install windows equal in size and appearance to the originals.
- Clean all concrete using the gentlest means possible with mild cleaning agent.
- Reconstruct missing wooden components in accordance with historical plans.
- Repaint elevation in an appropriate color scheme.

North Elevation

- Remove barricades from existing door openings.
- Reconstruct missing wooden structure in accordance with historical documents.
- Install new windows equal in size and appearance to the originals.
- Clad wooden structure with clapboards matching concrete forms in size and dimension.
- Repaint elevation in an appropriate color scheme.

West Elevation

- Remove all accumulated efflorescence.
- Reconstruct missing wooden structure in accordance with historical plans.
- Install new windows equal in size and appearance to the originals.
- Clad wooden structure with clapboards matching existing concrete forms in size and dimension.
- Clean all concrete using the gentlest means possible with mild cleaning agent.
- Reconstruct missing wooden components in accordance with historical documents.
- Repaint elevation in an appropriate color scheme.

East Elevation

- Reconstruct missing wooden structure in accordance with historical plans.
- Install new windows equal in size and appearance to the originals.
- Clad wooden structure with clapboards matching concrete forms in size and dimension.
- Reconstruct chimney to original height in accordance with historical documents.
- Clean all concrete using the gentlest means possible with mild cleaning agent.
- Repaint elevation in an appropriate color scheme.

Roof

- Reconstruct roof in accordance with historical documents.
- Clad roof in cement fiber shingles matching asbestos shingles in historical documents.

4.2.3 - Station 3-A

4.2.3.1 - Exterior

Southeast Elevation

- Install windows equal in size and appearance to the originals.
- Clean and repair all chipped areas with new concrete.
- Clean all concrete using the gentlest means possible with mild cleaning agent.
- Reconstruct missing wooden components in accordance with historical plans.
- Repaint elevation in an appropriate color scheme.

Northwest Elevation

- Clean exposed reinforcement bars using abrasive cleaning methods.
- Clean surrounding area and cover exposed reinforcement bars with concrete.
- Clean and repair all chipped areas with new concrete.
- Reconstruct chimneys to original height in accordance with historical documents.
- Remove all accumulated efflorescence.
- Remove barricades from all door openings.
- Remove existing foundation walls.
- Pour new foundation walls.
- Reconstruct missing wooden structure in accordance with historical documents.
- Install new windows equal in size and appearance to the originals.
- Clad wooden structure with clapboards matching existing concrete forms in size and dimension.
- Repaint elevation in an appropriate color scheme.

Southwest Elevation

- Clean and repair all chipped areas with new concrete.
- Remove all accumulated efflorescence.
- Reconstruct missing wooden structure in accordance with historical plans.
- Install new windows equal in size and appearance to the originals.
- Clad wooden structure with clapboards matching concrete forms in size and dimension.
- Clean all concrete using the gentlest means possible with mild cleaning agent.
- Repaint elevation in an appropriate color scheme.

Northeast Elevation

- Clean and repair all chipped areas with new concrete.
- Remove all accumulated efflorescence.
- Reconstruct missing wooden structure in accordance with historical plans.

- Install new windows equal in size and appearance to the originals.
- Clad wooden structure with clapboards matching concrete forms in size and dimension.
- Clean all concrete using the gentlest means possible with mild cleaning agent.
- Repaint elevation in an appropriate color scheme.

Roof

- Reconstruct roof in accordance with historical documents.
- Clad roof in asphalt shingles.

4.3 - A Need for Nomination onto the National Register of Historic Places

The nomination of these structures onto the National Register of Historic Places would not only recognize their important place in history, but also make them eligible for federal and state tax incentive programs. Such programs serve to make the rehabilitation of recognized historic resources more attractive to governmental agencies, non-profit organizations, and for-profit developers. Since the 20% federal tax incentive program would effectively reduce the overall cost of rehabilitation, the program has been incorporated into this report in section 4.5 - Feasibility Analysis.

4.3.1 - Contextual Information

The Reports of Completed Works for Fort Nathanael Greene state that the date of transfer for Station 1-B was December of 1942.¹³⁴ Station 1-A within Location 13A was two months earlier, in October of 1943. Interestingly enough, Station 3-A was transferred in late December of 1944, perhaps because the station was constructed in tandem with the SCR-296 radar tower¹³⁵ about ten feet east of the station.

Regardless when the structures were erected, all three represent the importance of recognizing the protecting as many of these stations as possible before they disappear. Without these stations, the casemated gun batteries inland would not have been able to function. As a result, these stations are key elements to the overall harbor defense network.

¹³⁴ Army Corps of Engineers, "Reports of Completed Works, Harbor Defenses of Narragansett Bay," 1943 (Bel Air, MD: CDSG e-press, 2011).

¹³⁵ Army Corps of Engineers, "Reports of Completed Works, Harbor Defenses of Long Island Sound," 1944 (Bel Air, MD: CDSG e-press, 2011).

4.3.2 - *The National Register Eligibility Process*

In essence, a potentially eligible property for the National Register of Historic Places must fit within at least one of the four Criteria of Evaluation. As outlined in National Register Bulletin 15: Criteria of Evaluation:

The quality of significance in American History, architecture, archeology, engineering, and culture is presented in districts, sites, buildings, structures, and objects that possess integrity in location, design, setting, materials, workmanship, feeling, and association, and:

- A. That have associated with events that have made a significant contribution to the broad patterns of our history; or
- B. That are associated with the lives of persons significant in our past; or
- C. That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
- D. That have yielded, or may be likely to yield, information important in history or prehistory.¹³⁶

Depending on individual interpretations, Station 1-B within Camp Cronin and Stations 1-A and 3-A in Shadmoor State Park could possibly be eligible for all four criteria, and have been explained in detail below.

4.3.2.1 - South Reservation, Fort Nathanael Greene/Camp Cronin

Criterion A:

During the Second World War, Fort Nathanael Greene was the western flank of the Harbor Defenses of Narragansett Bay, mirrored by Fort Church at Sakonnet Point in Little Compton. Since Newport was a major base for the Navy during the war, the protection of Narragansett Bay was incredibly important. Naturally, the role of Fort Greene cannot be understated, easily making it eligible for Criterion A under the themes of military and maritime history during the Second World War.

Criterion B:

¹³⁶ United States Department of the Interior, "National Register Bulletin: How to Apply the National Register Criteria for Evaluation," 1995, 2.

In addition to being named after Nathanael Greene, the area's post-World War II reuse could not have been possible without John P. Cronin, Providence's first Director of Recreation and well-regarded coach at the LaSalle Academy. Cronin dedicated decades of his life to bettering the lives of countless inner-city children from after World War II to his retirement in 1972. Without the city's acquisition of the former Fort Greene in 1957, Cronin would not have been able to achieve such a massive impact on the children of Providence. As a result, Camp Cronin could have some legitimate potential to be nominated under Criterion B.

Criterion C:

Even though fire control was in use since the turn of the 20th century, the usage of camouflage was a unique addition to FC stations. The increased use of airplanes, radar, and missiles made these stations obsolete by the war's end. As a result, these stations exemplify a very narrow snapshot of the development of harbor defenses.

The overall design of these structures is also quite unique. These were designed to help protect the men within. As a result, the concrete portions face the coast with the wooden sections placed behind for added protection. Such a unique building type is not commonly encountered upon anywhere else in the country.

In addition, these stations were part of a larger network of harbor defense. These stations might not be able to individually nominated, but there is no doubt Camp Cronin could be incorporated into a single National Register nomination for all three reservations of Fort Greene. The existence of the two support building within Camp Cronin only adds to the overall integrity of a potential nomination under Criterion C.

Criterion D:

Since Station 1-B is already open to the public, this criterion would not be able to be applied to the station itself; however, since it appears the surrounding

ground has remained untouched for at least thirty years, it is possible there could be archeological resources around the station.

In addition, Battery Hamilton is not open to the public and set within the base of the Rhode Island National Guard. It is quite possible there could be more information within the battery if it was to be reopened for analysis. The same could be said for the unfinished Battery 109 presently located in Fishermen's Memorial State Park. As a result, the singular National Register nomination for Fort Greene could be applied under Criterion D.

4.3.2.2 - Location 13A/Shadmoor State Park

Unlike Station 1-B within Camp Cronin, the two FC stations in Shadmoor State Park have already been analyzed for a potential National Register nomination in Adele Cramer's report from 1995.¹³⁷ According to the report, the two stations were not eligible for nomination onto the National Register because the wooden portions of both structures have disappeared; sections that ultimately camouflaged them from afar. Although the report did provide a detailed overview of the National Register eligibility process, it did not assess these stations for their basic function as fire control stations but rather for their now missing camouflaged appearance. In addition, the report viewed these stations individually¹³⁸ rather than being part of a larger network.

If these stations were seen through such a narrow lens, Cramer's assessment was a correct statement; however, their key roles within the larger network of the Harbor Defenses of Long Island Sound far outweigh their loss of material integrity.

Criterion A:

Although the wooden camouflage elements have completely disappeared, the concrete sections have remained. The remaining sections sheltered the azimuth

¹³⁷ Adele Cramer, "Ditch Plains Artillery Fire Control Stations: A Report," March 1995.

¹³⁸ Ibid., 9-11.

scopes and DPF's, making them the most significant elements of the station. Without these areas, these could not be classified as FC stations. In addition, the numerous other FC stations lining the south shore of Long Island have almost all of their wooden camouflage sections remaining, for many have been successfully reused as private dwellings.

Just as Fort Nathanael Greene protected Narragansett Bay, Camp Hero protected the Long Island Sound. As a result, the entire network of Camp Hero and associated locations dotting Long Island's south shore can be placed into a single National Register nomination. More specifically, the nomination can also be eligible for Criterion A under the themes of military and maritime history during the Second World War.

Criterion B:

Unlike Fort Greene's reuse as Camp Cronin after World War II, Camp Hero's reuse as the Montauk Air Force Base could not be traced back to a single figure. As a result, it might not be possible for eligibility for Criterion B.

Criterion C:

Like Station 1-B, these two stations are equally unique for their construction. In addition, their role as a part of the Harbor Defenses of Long Island Sound makes them eligible under Criterion C.

Criterion D:

Since both Stations 1-A and 3-A have been blockaded at the entrances, discovering what lies within could not be accomplished. The surroundings could also yield potential archeological resources, for the ground has appeared to remain untouched for an extended period of time. Like the two casemated batteries in Camp Hero, these stations could also yield additional historical information. As a result, this nomination is eligible for Criterion D.

4.4 - Cost Estimates

The following charts offer estimates on rehabilitating the basic components of each FC station. Due to time constraints, the estimates do not include costs for interior partitions, or compliance to contemporary building codes; these costs only reflect the reconstruction of missing elements existent in the RCW's with the inclusion of basic plumbing and HVAC system installation. Each section is divided to explain the exterior and interior cost estimates, which are then broken down further to highlight each major area such as the walls, roof, windows, and so on. All costs were taken from *RMeans Repair & Remodeling Cost Data 2010*¹³⁹ and *RMeans Square Foot Costs 2012*.¹⁴⁰ Since the fabrication of replacement ribbon windows was a custom order, the cost has been estimated.

¹³⁹ Bob Mewis, Christopher Babbitt, Ted Baker, *RMeans Repair & Remodeling Cost Data 2010* (RMeans Co. Inc., 2010).

¹⁴⁰ RMeans Engineering Department, *RMeans Square Foot Costs 2012* (RMeans Co. Inc., 2012)

4.4.1 - Station 1-B

4.4.1.1 - Exterior Walls

<i>Walls</i>	<i>Unit Cost Estimate</i>	<i>Estimated Cost</i>
<i>Concrete Wall Patching</i>		
Sandblasting Steel	\$6.50 sq. ft.	\$13.00
Patching	\$341.67 c. ft.	\$683.34
<i>Concrete Painting</i>		
Sandblasting Concrete	\$3.67 sq. ft.	\$4,249.86
Painting (two coats)	\$0.45 sq. ft.	\$521.10
<i>Wooden Wall Construction</i>		
<i>First Floor</i>		
Studs (2x4)	\$1.72 sq. ft.	\$1,205.60
Plywood (1/2" thick)	\$2.90 sq. ft.	\$266.80
Felt Underlayment	\$13.80 sq. ft.	\$1,987.20
Fiber Cement Shingles	\$7.98 sq. ft.	\$1,149.12
Painting (two coats)	\$0.45 sq. ft.	\$64.80
<i>Second Floor</i>		
Studs (2x4)	\$1.72 sq. ft.	\$4,561.70
Plywood (1/2 inch thick)	\$2.90 sq. ft.	\$701.80
Felt Underlayment	\$13.80 sq. ft.	\$3,339.60
Fiber Cement Shingles	\$7.98 sq. ft.	\$1,931.16
Painting (two coats)	\$0.45 sq. ft.	\$108.90
<i>Second Floor Eve</i>		
Studs (2x4)	\$1.72 sq. ft.	\$356.20
Plywood (1/2 inch thick)	\$2.90 sq. ft.	\$150.80
Felt Underlayment	\$13.80 sq. ft.	\$717.60
Fiber Cement Shingles	\$7.98 sq. ft.	\$414.96
Painting (two coats)	\$0.45 sq. ft.	\$23.40
<i>Subtotal</i>	<i>-----</i>	<i>\$22,446.94</i>

4.4.1.2 - Windows

Windows	Unit Cost Estimate	Estimated Cost
<i>Ribbon Windows</i>	Custom Order	\$2,000.00 ¹⁴¹
<i>Sash Windows</i>		
Concrete Cutting	\$7.75 lin. Ft.	\$465.00
Window Cost	\$885.00	\$7,965.00
Window Installation	\$780.00	\$7,020.00
Subtotal	-----	\$17,450.00

4.4.1.3 - Doors

Doors	Unit Cost Estimate	Estimated Cost
Exterior Door (combination storm and screen, 3' width)	\$450.00	\$450.00
Subtotal	-----	\$450.00

4.4.1.4 - Roof

Roof	Unit Cost Estimate	Estimated Cost
Rafters (2x6)	\$2.30 lin. ft.	\$506.00
Particle Board (5/8" thick, pneumatic nailed)	\$1.40 sq. ft.	\$667.80
Felt Underlayment	\$13.80 sq. ft.	\$13,648.20
Fiber Cement Shingles	\$7.98 sq. ft.	\$7,892.22
<i>False Chimney</i>		
Studs (2x4)	\$1.72 lin. ft.	\$30.96
Particle Board (5/8" thick, pneumatic nailed)	\$1.40 sq. ft.	\$90.30
Felt Underlayment	\$13.80 sq. ft.	\$890.10
Fiber Cement Shingles	\$7.98 sq. ft.	\$514.71
Subtotal	-----	\$24,240.29

¹⁴¹ Cost is an approximation.

4.4.1.5 - Floors

Floors	Unit Cost Estimate	Estimated Cost
<i>Concrete Repair</i>		
Removal	\$11.35 sq. ft.	\$2,270.00
Sandblasting Reinforcement Bars	\$6.50 sq. ft.	\$1,300.00
Recasting (6-inch slab)	\$1,025.00 c. yd.	\$68,336.75
Subtotal	-----	\$71,906.75

4.4.1.6 - Interior Concrete Wall Painting

Painting Concrete Walls	Unit Cost Estimate	Estimated Cost
<i>Basement</i>		
Wall Painting (two coats)	\$0.45 sq. ft.	\$350.33
<i>Stair Hall</i>		
Wall Painting (two coats)	\$0.45 sq. ft.	\$96.56
<i>First Floor</i>		
Wall Painting (two coats)	\$0.45 sq. ft.	\$312.75
<i>Second Floor</i>		
Wall Painting (two coats)	\$0.45 sq. ft.	\$133.88
Subtotal	-----	\$893.52

4.4.1.7 - Doors

Doors	Unit Cost Estimate	Estimated Cost
Door (5-paneled, fir, 3' width)	\$540.00	\$1,080.00
Subtotal	-----	\$1,080.00

4.4.1.8 - Stairs

Stairs	Unit Cost Estimate	Estimated Cost
Wooden Treads (pre-fabricated, box-type, oak, 3' 6" wide, 14 risers)	\$2,525.00	\$3,607.15
Subtotal	-----	\$3,607.15

4.4.1.9 - Ceiling Painting

<i>Ceiling Painting</i>	<i>Unit Cost Estimate</i>	<i>Estimated Cost</i>
<i>Basement</i>		
Ceiling Painting (two coats)	\$0.60 sq. ft.	\$307.50
<i>First Floor</i>		
Ceiling Painting (two coats)	\$0.60 sq. ft.	\$312.00
<i>Second Floor</i>		
Ceiling Painting (two coats)	\$0.60 sq. ft.	\$141.00
<i>Subtotal</i>	<i>-----</i>	<i>\$760.50</i>

4.4.1.10 - Electrical

<i>Electrical</i>	<i>Unit Cost Estimate</i>	<i>Estimated Cost</i>
Systems (service & distribution, lighting, devices, equipment connections, basic material, fire alarm & detection)	\$6.64 sq. ft.	\$9,681.12
<i>Subtotal</i>	<i>-----</i>	<i>\$9,681.12</i>

4.4.1.11 - Plumbing

<i>Plumbing</i>	<i>Unit Cost Estimate</i>	<i>Estimated Cost</i>
Toilet	\$865.00	-----
Sink	\$530.00	-----
Shower (3'x 3')	\$775.00	-----
Plumbing Rough-In (80% of materials)	\$1,736.00	-----
<i>Subtotal</i>	<i>-----</i>	<i>\$3,906.00</i>

4.4.1.12 - Total Hard Cost Estimate

<i>Total Hard Cost Estimate</i>	<i>\$156,422.27</i>
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4.4.2 - Station 1-A

4.4.2.1 - Exterior Walls

<i>Walls</i>	<i>Unit Cost Estimate</i>	<i>Estimated Cost</i>
<i>Concrete Painting</i>		
Sandblasting Concrete	\$3.67 sq. ft.	\$3,956.26
Painting (two coats)	\$0.45 sq. ft.	\$485.10
<i>Wooden Wall Construction</i>		
<i>North Elevation</i>		
Studs (2x4)	\$1.72 sq. ft.	\$610.60
Plywood (1/2" thick)	\$2.90 sq. ft.	\$1,029.50
Felt Underlayment	\$13.80 sq. ft.	\$4,899.00
Clapboard (3/4" x 10")	\$8.15 sq. ft.	\$2,893.25
Painting (two coats)	\$0.45 sq. ft.	\$159.75
<i>West Elevation</i>		
Studs (2x4)	\$1.72 sq. ft.	\$364.64
Plywood (1/2 inch thick)	\$2.90 sq. ft.	\$614.80
Felt Underlayment	\$13.80 sq. ft.	\$2,925.60
Clapboard (3/4" x 10")	\$8.15 sq. ft.	\$1,727.80
Painting (two coats)	\$0.45 sq. ft.	\$95.40
<i>East Elevation</i>		
Studs (2x4)	\$1.72 sq. ft.	\$364.64
Plywood (1/2 inch thick)	\$2.90 sq. ft.	\$614.80
Felt Underlayment	\$13.80 sq. ft.	\$2,925.60
Clapboard (3/4" x 10")	\$8.15 sq. ft.	\$1,727.80
Painting (two coats)	\$0.45 sq. ft.	\$95.40
<i>Subtotal</i>	<i>-----</i>	<i>\$25,489.94</i>

4.4.2.2 - Windows

Windows	Unit Cost Estimate	Estimated Cost
<i>Ribbon Windows</i>	Custom Order	\$2,000.00 ¹⁴²
<i>Sash Windows</i>		
Window Cost	\$885.00	\$3,540.00
Window Installation	\$780.00	\$3,120.00
Subtotal	-----	\$8,660.00

4.4.2.3 - Doors

Doors	Unit Cost Estimate	Estimated Cost
Concrete Cutting	\$7.75 lin. ft.	\$147.25
Exterior Door (combination storm and screen, 3' width)	\$450.00	\$900.00
Subtotal	-----	\$1,047.25

4.4.2.4 - Roof

Roof	Unit Cost Estimate	Estimated Cost
Rafters (2x6)	\$2.30 lin. ft.	\$1,715.80
Particle Board (5/8" thick, pneumatic nailed)	\$1.40 sq. ft.	\$1,572.20
Felt Underlayment	\$13.80 sq. ft.	\$15,497.40
Fiber Cement Shingles	\$7.98 sq. ft.	\$8,961.54
<i>Chimney</i>		
Chimney (20" x 32" with two 12" x 12" flues)	\$172.00 v. lin. ft.	\$1,462.00
<i>False Chimney</i>		
Studs (2x4)	\$1.72 lin. ft.	\$55.04
Particle Board (5/8" thick, pneumatic nailed)	\$1.40 sq. ft.	\$58.80
Felt Underlayment	\$13.80 sq. ft.	\$579.60
Fiber Cement Shingles	\$7.98 sq. ft.	\$335.16
Subtotal	-----	\$30,237.54

¹⁴² Cost is an approximation.

4.4.2.5 - Floors

<i>Floors</i>	<i>Unit Cost Estimate</i>	<i>Estimated Cost</i>
<i>Concrete Repair</i>		
Removal	\$11.35 sq. ft.	\$2,270.00
Sandblasting Reinforcement Bars	\$6.50 sq. ft.	\$1,300.00
Recasting (6-inch slab)	\$1,025.00 c. yd.	\$68,336.75
Wooden Floor		
Floor Installation (wood joist, 2x8, 12" o.c.)	\$3.31 sq. ft.	\$1,011.21
Floating Floor	\$7.50 sq. ft.	\$2,367.63
<i>Subtotal</i>	<i>-----</i>	<i>\$75,285.59</i>

4.4.2.6 - Interior Concrete Wall Painting

<i>Painting Concrete Walls</i>	<i>Unit Cost Estimate</i>	<i>Estimated Cost</i>
<i>Basement</i>		
Wall Painting (two coats)	\$0.45 sq. ft.	\$216.00
<i>First Floor</i>		
Wall Painting (two coats)	\$0.45 sq. ft.	\$216.00
<i>Second Floor</i>		
Wall Painting (two coats)	\$0.45 sq. ft.	\$252.00
<i>North Elevation</i>		
Sandblasting	\$3.67 sq. ft.	\$2,275.40
Wall Painting (two coats)	\$0.45 sq. ft.	\$279.00
<i>Subtotal</i>	<i>-----</i>	<i>\$3,238.40</i>

4.4.2.7 - Stairs

<i>Stairs</i>	<i>Unit Cost Estimate</i>	<i>Estimated Cost</i>
Wooden Treads (pre-fabricated, box-type, oak, 3' 6" wide, 14 risers)	\$2,525.00	\$721.43
<i>Subtotal</i>	<i>-----</i>	<i>\$721.43</i>

4.4.2.8 - Ceiling Painting

<i>Ceiling Painting</i>	<i>Unit Cost Estimate</i>	<i>Estimated Cost</i>
<i>Basement</i>		
Ceiling Painting (two coats)	\$0.60 sq. ft.	\$191.40
<i>First Floor</i>		
Ceiling Painting (two coats)	\$0.60 sq. ft.	\$191.40
<i>Second Floor</i>		
Ceiling Painting (two coats)	\$0.60 sq. ft.	\$279.00
<i>Subtotal</i>	<i>-----</i>	<i>\$661.00</i>

4.4.2.9 - Electrical

<i>Electrical</i>	<i>Unit Cost Estimate</i>	<i>Estimated Cost</i>
Systems (service & distribution, lighting, devices, equipment connections, basic material, fire alarm & detection)	\$6.64 sq. ft.	\$7,881.68
<i>Subtotal</i>	<i>-----</i>	<i>\$7,881.68</i>

4.4.2.10 - Plumbing

<i>Plumbing</i>	<i>Unit Cost Estimate</i>	<i>Estimated Cost</i>
Toilet	\$865.00	-----
Sink	\$530.00	-----
Shower (3'x 3')	\$775.00	-----
Plumbing Rough-In (80% of materials)	\$1,736.00	-----
<i>Subtotal</i>	<i>-----</i>	<i>\$3,906.00</i>

4.4.2.11 - HVAC Systems

<i>HVAC Systems</i>	<i>Unit Cost Estimate</i>	<i>Estimated Cost</i>
Small heating systems, hydronic, electric boilers, steam, 1 floor, 1480 sq. ft., 61 M.B.H.	\$16.28	\$19,324.36
Chilled water, air cooled condenser systems Packaged chiller, air cooled, with fan coil unit Apartment corridors 1,500 sq. ft., 2.75 ton	\$5.78	\$6,860.86
<i>Subtotal</i>	-----	<i>\$26,185.22</i>

4.4.2.12 - Total Hard Cost Estimate

<i>Total Hard Cost Estimate</i>	<i>\$183,227.25</i>
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4.4.3 - Station 3-A

4.4.3.1 - Foundation

Foundation	Unit Cost Estimate	Estimated Cost
Basement Wall (6' high, 8" thick)	\$107.50	\$8,331.25
Subtotal	-----	\$8,331.25

4.4.3.2 - Exterior Walls

Walls	Unit Cost Estimate	Estimated Cost
<i>Concrete Patching</i>		
Sandblasting Reinforcement Bar	\$6.50 sq. ft.	\$559.00
Patching	\$341.67 c. ft.	\$29,383.62
<i>Concrete Painting</i>		
Sandblasting Concrete	\$3.67 sq. ft.	\$4,264.54
Painting (two coats)	\$0.45 sq. ft.	\$522.90
<i>Wooden Wall Construction</i>		
<i>North Elevation</i>		
Studs (2x4)	\$1.72 sq. ft.	\$804.10
Plywood (1/2" thick)	\$2.90 sq. ft.	\$1,355.75
Felt Underlayment	\$13.80 sq. ft.	\$6,451.50
Clapboard (3/4" x 10")	\$8.15 sq. ft.	\$3,810.13
Painting (two coats)	\$0.45 sq. ft.	\$310.38
<i>West Elevation</i>		
Studs (2x4)	\$1.72 sq. ft.	\$113.52
Plywood (1/2 inch thick)	\$2.90 sq. ft.	\$191.40
Felt Underlayment	\$13.80 sq. ft.	\$910.80
Clapboard (3/4" x 10")	\$8.15 sq. ft.	\$537.90
Painting (two coats)	\$0.45 sq. ft.	\$29.70
<i>East Elevation</i>		
Studs (2x4)	\$1.72 sq. ft.	\$284.66
Plywood (1/2 inch thick)	\$2.90 sq. ft.	\$479.95

Felt Underlayment	\$13.80 sq. ft.	\$2,283.90
Clapboard (3/4" x 10")	\$8.15 sq. ft.	\$1,348.83
Painting (two coats)	\$0.45 sq. ft.	\$74.48
<i>Latrine (Modern Bathroom)</i>		
Studs (2x4)	\$1.72 sq. ft.	\$347.44
Plywood (1/2 inch thick)	\$2.90 sq. ft.	\$585.80
Felt Underlayment	\$13.80 sq. ft.	\$2,787.60
Clapboard (3/4" x 10")	\$8.15 sq. ft.	\$1,646.30
Painting (two coats)	\$0.45 sq. ft.	\$90.90
Subtotal	-----	\$59,175.10

4.4.3.3 - Windows

Windows	Unit Cost Estimate	Estimated Cost
<i>Ribbon Windows</i>	Custom Order	\$2,000.00 ¹⁴³
<i>Sash Windows</i>		
Window Cost	\$885.00	\$8,850.00
Window Installation	\$780.00	\$7,800.00
Subtotal	-----	\$18,650.00

4.4.3.4 - Doors

Doors	Unit Cost Estimate	Estimated Cost
Concrete Cutting	\$7.75 lin. ft.	\$147.25
Exterior Door (combination storm and screen, 3' width)	\$450.00	\$900.00
Subtotal	-----	\$1,047.25

4.4.3.5 - Roof

Roof	Unit Cost Estimate	Estimated Cost
<i>Principle Roof</i>		
Rafters (2x6)	\$2.30 lin. ft.	\$1,283.40
Particle Board (5/8" thick,	\$1.40 sq. ft.	\$1,682.80

¹⁴³ Cost is an approximation.

pneumatic nailed)		
Felt Underlayment	\$13.80 sq. ft.	\$16,587.60
Asphalt Shingle	\$1.66 sq. ft.	\$1,995.32
<i>Latrine Roof</i>		
Rafters (2x6)	\$2.30 lin. ft.	\$299.00
Particle Board (5/8" thick, pneumatic nailed)	\$1.40 sq. ft.	\$182.00
Felt Underlayment	\$13.80 sq. ft.	\$1,794.00
Asphalt Shingle	\$1.66 sq. ft.	\$215.80
<i>Porch Roof</i>		
Rafters (2x6)	\$2.30 lin. ft.	\$194.35
Particle Board (5/8" thick, pneumatic nailed)	\$1.40 sq. ft.	\$205.80
Felt Underlayment	\$13.80 sq. ft.	\$2,028.60
Asphalt Shingle	\$1.66 sq. ft.	\$244.02
<i>Chimney</i>		
Chimney (20" x 20" with one 12" x 12" flue)	\$118.00 v. lin. ft.	\$1,462.00
Subtotal	-----	\$28,836.69

4.4.3.6 - Floors

Floors	Unit Cost Estimate	Estimated Cost
<i>Concrete Repair</i>		
Removal	\$11.35 sq. ft.	\$2,270.00
Sandblasting Reinforcement Bars	\$6.50 sq. ft.	\$1,300.00
Recasting (6-inch slab)	\$1,025.00 c. yd.	\$68,336.75
<i>Wooden Floor</i>		
Floor Installation (wood joist, 2x8, 12" o.c.)	\$3.31 sq. ft.	\$1,257.80
Floating Floor	\$7.50 sq. ft.	\$2,945.00
Subtotal	-----	\$75,285.59

4.4.3.7 - Door Enlargement

<i>Door Enlargement</i>	<i>Unit Cost Estimate</i>	<i>Estimated Cost</i>
<i>First Floor</i>		
Concrete Cutting	\$7.75 lin. ft.	\$69.75
<i>Second Floor</i>		
Concrete Cutting	\$7.75 lin. ft.	\$139.50
<i>Subtotal</i>	<i>-----</i>	<i>\$209.25</i>

4.4.3.8 - Interior Concrete Wall Painting

<i>Painting Concrete Walls</i>	<i>Unit Cost Estimate</i>	<i>Estimated Cost</i>
<i>First Floor</i>		
Wall Painting (two coats)	\$0.45 sq. ft.	\$243.45
<i>Second Floor</i>		
Wall Painting (two coats)	\$0.45 sq. ft.	\$247.50
<i>North Elevation</i>		
Sandblasting	\$3.67 sq. ft.	\$2,635.06
Wall Painting (two coats)	\$0.45 sq. ft.	\$323.10
<i>Subtotal</i>	<i>-----</i>	<i>\$4,103.71</i>

4.4.3.9 - Stairs

<i>Stairs</i>	<i>Unit Cost Estimate</i>	<i>Estimated Cost</i>
Wooden Treads (pre-fabricated, box-type, oak, 3' 6" wide, 14 risers)	\$2,525.00	\$1,803.58
<i>Subtotal</i>	<i>-----</i>	<i>\$1,803.58</i>

4.4.3.10 - Ceiling Painting

<i>Ceiling Painting</i>	<i>Unit Cost Estimate</i>	<i>Estimated Cost</i>
<i>First Floor</i>		
Ceiling Painting (two coats)	\$0.60 sq. ft.	\$324.60
<i>Second Floor</i>		
Ceiling Painting (two coats)	\$0.60 sq. ft.	\$330.00
<i>Subtotal</i>	<i>-----</i>	<i>\$654.60</i>

4.4.3.11 - Electrical

<i>Electrical</i>	<i>Unit Cost Estimate</i>	<i>Estimated Cost</i>
Systems (service & distribution, lighting, devices, equipment connections, basic material, fire alarm & detection)	\$6.64 sq. ft.	\$11,188.40
<i>Subtotal</i>	<i>-----</i>	<i>\$11,188.40</i>

4.4.3.12 - Plumbing

<i>Plumbing</i>	<i>Unit Cost Estimate</i>	<i>Estimated Cost</i>
Toilet	\$865.00	-----
Sink	\$530.00	-----
Shower (3'x 3')	\$775.00	-----
Plumbing Rough-In (80% of materials)	\$1,736.00	-----
<i>Subtotal</i>	<i>-----</i>	<i>\$3,906.00</i>

4.4.3.13 - HVAC Systems

<i>HVAC Systems</i>	<i>Unit Cost Estimate</i>	<i>Estimated Cost</i>
Small heating systems, hydronic, electric boilers, steam, 1 floor, 1480 sq. ft., 61 M.B.H.	\$16.28	\$27,431.80
Chilled water, air cooled condenser systems Packaged chiller, air cooled, with fan coil unit Apartment corridors 1,500 sq. ft., 2.75 ton	\$5.78	\$9,739.30
<i>Subtotal</i>	<i>-----</i>	<i>\$26,185.22</i>

4.4.3.14 - Total Hard Cost Estimate

<i>Total Hard Cost Estimate</i>	<i>\$253,739.28</i>
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4.5 - Cost Analysis

The following cost analysis utilized the cost estimates from the previous section to determine the overall cost and feasibility of reuse. The spreadsheets were taken from the compact disc within Rypkema's *Feasibility Assessment Manual for Reusing Historic Buildings*.¹⁴⁴ For all three stations, architectural fees were ten percent; engineering and other design fees were five percent; and other consulting fees were one and one quarter percent of the hard costs. In addition, a 20% contingency was applied to cover custom-designed elements and anything not noted in the cost estimates.¹⁴⁵

Since all three stations are located on public property, no property taxes exist for these structures. As a result, an investment corporation such as the National Trust Investment Corporation¹⁴⁶ must be used to take advantage of the Federal Historic Tax Incentive Program. The pay back rates from the investment corporation were assumed to be 85% of the overall hard cost estimate. Water and electricity utility payments were assumed to be at \$400.00 every month. This number was based on the author's prior experience. The cost of infrastructure development to service these stations were not taken into account.

Stations 1-B and 1-A were estimated at an annual rental cost of \$20.00 per square foot. A small market assessment of the surrounding area around Shadmoor State Park helped determine an accurate rental income for Station 3-A. The rental properties of 74 Surfside Avenue,¹⁴⁷ in addition to homes on Seaside Avenue,¹⁴⁸ and

¹⁴⁴ Donovan D. Rypkema, *Feasibility Assessment Manual for Reusing Historic Buildings* (Washington D.C.: National Trust for Historic Preservation, 2007).

¹⁴⁵ Jeremy Wells, discussion with the author, May 16, 2012.

¹⁴⁶ "Home," National Trust Investment Corporation website, accessed May 16, 2012. <http://ntcicfunds.com/>.

¹⁴⁷ "74 Surfside Avenue, MONTAUK (South of the Highway)." Hamptons Real Estate Online website, accessed April 29, 2012. http://www.hreo.com/mac/expansion.jsp?bts=0&inum=65966&inlist=76639,66561,96198,91502,73162,59770,69424,68252,87390,94823,65966,73902,57502,92538,82364,66133,88178,87249,92367,70437,87454,90330,61024,90601,86080,90158,88805,71414,57166,56527,69012,95131,69946,80208&searchType=rental&sortOrder=1&vtsort=&limit=4&styles=&fromoh=&oh_id=&oh_flg=&period=1

Miller Avenue¹⁴⁹ were used in the assessment. All three properties are adjacent to the park. The final reuse options will be covered in the following chapter.

¹⁴⁸ "Oceanfront Just Steps to Ditch Plains Beach." Hamptons Real Estate Online website, accessed April 29, 2012.
http://www.hreo.com/mac/expansion.jsp?bts=0&inum=82364&inlist=76639,66561,96198,91502,73162,59770,69424,68252,87390,94823,65966,73902,57502,92538,82364,66133,88178,87249,92367,70437,87454,90330,61024,90601,86080,90158,88805,71414,57166,56527,69012,95131,69946,80208,67558,87248,77523,81851&searchType=rental&sortOrder=1&vtsort=&limit=4&styles=&fromoh=&oh_id=&oh_flg=&period=1

¹⁴⁹ "Montauk Ocean Views." Hamptons Real Estate Online website, accessed April 29, 2012.
http://www.hreo.com/mac/expansion.jsp?bts=0&inum=87454&inlist=76639,66561,96198,91502,73162,59770,69424,68252,87390,94823,65966,73902,57502,92538,82364,66133,88178,87249,92367,70437,87454,90330,61024,90601,86080,90158,88805,71414,57166,56527,69012,95131,69946,80208,67558,87248,77523,81851,68678,68414,80535,60186,85599,61060,92311,73741&searchType=rental&sortOrder=1&vtsort=&limit=4&styles=&fromoh=&oh_id=&oh_flg=&period=1

4.5.1 - Station 1-B

4.5.1.1 - Capital Costs Budget

CAPITAL COSTS BUDGET			
Cost Category	Amount	Total Amount	
Hard Costs		\$156,422.27	
Superstructure	\$22,446.94		
Floor Structure	\$71,906.75		
Roof Structure & Cover	\$24,240.29		
Doors & Windows	\$17,900.00		
Interior Construction	\$6,341.17		
Plumbing	\$3,906.00		
Electrical	\$9,681.12		
Soft Costs			\$47,317.74
Architectural Fees	\$15,642.23		
Engineering Fees	\$7,821.11		
Other Design Fees	\$7,821.11		
Construction Period Interest	\$6,256.89		
Other Consulting Fees	\$1,955.28		
General Conditions	\$3,910.56		
Permits and Licenses	\$3,910.56		
Contingency		\$31,284.45	
TOTAL CAPITAL COSTS		\$235,024.46	

4.5.1.2 - Source and Use of Funds

SOURCE AND USE OF FUNDS			
SOURCE OF FUNDS		USE OF FUNDS	
Equity- 1st Position	\$208,432.67	Hard Costs	\$156,422.27
Tax Credit Equity	\$26,591.79	Soft Costs	\$47,317.74
		Contingency	\$31,284.45
TOTAL SOURCES OF FUNDS	\$235,024.46	TOTAL USES OF FUNDS	\$235,024.46
Funds Needed	\$235,024.46		
Shortfall	\$0.00		

4.5.1.3 - Stabilized Year Operating Statement

STABILIZED YEAR OPERATING STATEMENT		
Category	Amount	Total Amount
Gross Scheduled Income (GSI) (see schedules)		\$29,160.00
Effective Gross Income (EGI)		\$29,160.00
Fixed Expenses		\$1,762.68
Insurance	\$1,762.68	
Variable Expenses		\$11,714.10
Administrative Costs	\$364.50	
Property Management	\$1,020.60	
Utilities (see schedules)	\$9,600.00	
Repair and Maintenance	\$729.00	
Reserves for Replacement		\$2,115.22
Roof	\$1,175.12	
Floor Coverings	\$940.10	
Total Expenses		\$15,592.00
NET OPERATING INCOME (NOI)		\$13,568.00
CASH FLOW		\$13,568.00

4.5.1.4 - Schedules to Stabilized Year Operating Statement

SCHEDULES TO STABILIZED YEAR OPERATING STATEMENT			
RENTAL INCOME SCHEDULE			
Tenant *	Rentable Square Feet (s.f.)	\$/s.f./Year	Annual Rent
Total Interior Space	1458	\$20.00	\$29,160.00
UTILITIES			
Utility	Estimated Monthly Income		Annual Expense
Water and Sewer	\$400.00		\$4,800.00
Electricity	\$400.00		\$4,800.00

4.5.1.5 - Multi-Year Operating Statement

MULTI-YEAR OPERATING STATEMENT						
	1	2	3	4	5	6
Gross Scheduled Income (1)	\$29,160.00	\$29,597.40	\$30,041.36	\$30,491.98	\$30,949.36	\$31,413.60
Effective Gross Income	\$29,160.00	\$29,597.40	\$30,041.36	\$30,491.98	\$30,949.36	\$31,413.60
Less: Fixed Expenses (2)	\$1,762.68	\$1,789.12	\$1,815.96	\$1,843.20	\$1,870.85	\$1,898.91
Less: Variable Expenses (3)	\$11,714.10	\$11,889.81	\$12,068.16	\$12,249.18	\$12,432.92	\$12,619.41
Less: Replacement Reserves	\$2,115.22	\$2,115.22	\$2,115.22	\$2,115.22	\$2,115.22	\$2,115.22
Total Expenses	\$13,829.32	\$14,005.03	\$14,183.38	\$14,364.40	\$14,548.14	\$14,734.63
Net Operating Income	\$13,568.00	\$13,803.24	\$14,042.02	\$14,284.38	\$14,530.37	\$14,780.06
Cash Flow	\$13,568.00	\$13,803.24	\$14,042.02	\$14,284.38	\$14,530.37	\$14,780.06
Overall Return (4)	5.77%	5.87%	5.97%	6.08%	6.18%	6.29%

(1) Income assumed to increase

1.50%	per year.
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(2) Fixed expenses assumed to increase

1.50%	per year
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(3) Variable expenses assumed to increase

1.50%	per year
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(4) Equivalent to *Capitalization Rate*: Net Operating Income divided by Total Project Cost

4.5.2 - Station 1-A

4.5.2.1 - Capital Cost Budget

CAPITAL COSTS BUDGET		
Hard Costs		\$183,227.25
Superstructure	\$27,489.94	
Floor Structure	\$75,285.59	
Roof Structure & Cover	\$30,237.54	
Doors & Windows	\$7,707.25	
Interior Construction	\$4,534.03	
Plumbing	\$3,906.00	
HVAC	\$26,185.22	
Electrical	\$7,881.68	
Soft Costs		\$55,426.24
Architectural Fees	\$18,322.73	
Engineering Fees	\$9,161.36	
Other Design Fees	\$9,161.36	
Construction Period Interest	\$7,329.09	
Other Consulting Fees	\$2,290.34	
General Conditions	\$4,580.68	
Permits and Licenses	\$4,580.68	
Contingency (20%)		\$36,645.45
TOTAL CAPITAL COSTS		\$275,298.94

4.5.2.2 - Source and Use of Funds

SOURCE AND USE OF FUNDS			
SOURCE OF FUNDS		USE OF FUNDS	
Equity	\$244,150.31	Hard Costs	\$183,227.25
Tax Credit Equity	\$31,148.63	Soft Costs	\$55,426.24
		Contingency	\$36,645.45
TOTAL SOURCES OF FUNDS	\$275,298.94	TOTAL USES OF FUNDS	\$275,298.94

Funds Needed \$275,298.94

Shortfall \$0.00

4.5.2.3 - Stabilized Year Operating Statement

STABILIZED YEAR OPERATING STATEMENT		
Category	Amount	Total Amount
Gross Scheduled Income (GSI) (see schedules)		\$23,740.00
Effective Gross Income (EGI)		\$23,740.00
Fixed Expenses		\$2,064.74
Insurance	\$2,064.74	
Variable Expenses		\$6,521.15
Administrative Costs	\$296.75	
Property Management	\$830.90	
Utilities (see schedules)	\$4,800.00	
Repair and Maintenance	\$593.50	
Reserves for Replacement		\$2,477.69
Roof	\$1,376.49	
Floor Coverings	\$1,101.20	
Total Expenses		\$11,063.58
NET OPERATING INCOME (NOI)		\$12,676.42
CASH FLOW		\$12,676.42

4.5.2.4 - Schedules to Stabilized Year Operating Statement

SCHEDULES TO STABILIZED YEAR OPERATING STATEMENT			
RENTAL INCOME SCHEDULE			
Tenant	Rentable Square Feet (s.f.)	\$/s.f./Year	Annual Rent
Total Interior Space	1187	\$20.00	\$23,740.00
UTILITIES			
Utility	Estimated Monthly Income		Annual Expense
Water and Sewer	\$400.00		\$4,800.00
Electricity	\$400.00		\$4,800.00

4.5.2.5 - Multi-Year Operating Statement

MULTI-YEAR OPERATING STATEMENT						
	1	2	3	4	5	6
Gross Scheduled Income (1)	\$23,740.00	\$24,096.10	\$24,457.54	\$24,824.40	\$25,196.77	\$25,574.72
Effective Gross Income	\$23,740.00	\$24,096.10	\$24,457.54	\$24,824.40	\$25,196.77	\$25,574.72
Less: Fixed Expenses (2)	\$2,064.74	\$2,095.71	\$2,127.15	\$2,159.06	\$2,191.44	\$2,224.31
Less: Variable Expenses (3)	\$6,521.15	\$6,618.97	\$6,718.25	\$6,819.03	\$6,921.31	\$7,025.13
Less: Replacement Reserves	\$2,477.69	\$2,477.69	\$2,477.69	\$2,477.69	\$2,477.69	\$2,477.69
Total Expenses	\$8,998.84	\$9,096.66	\$9,195.94	\$9,296.72	\$9,399.00	\$9,502.82
Net Operating Income	\$12,676.42	\$12,903.73	\$13,134.45	\$13,368.63	\$13,606.33	\$13,847.59
Cash Flow	\$12,676.42	\$12,903.73	\$13,134.45	\$13,368.63	\$13,606.33	\$16,071.90
Overall Return (4)	4.60%	4.69%	4.77%	4.86%	4.94%	5.03%

(1) Income assumed to increase

1.50%	per year.
-------	-----------

(2) Fixed expenses assumed to increase

1.50%	per year
-------	----------

(3) Variable expenses assumed to increase

1.50%	per year
-------	----------

(4) Equivalent to *Capitalization Rate*: Net Operating Income divided by Total Project Cost

4.5.3 - Station 3-A

4.5.3.1 - Capital Cost Budget

CAPITAL COSTS BUDGET			
Cost Category	Amount	Total Amount	
Hard Costs		\$253,739.28	
Foundation	\$8,331.25		
Superstructure	\$59,175.10		
Floor Structure	\$79,316.95		
Roof Structure & Cover	\$28,836.69		
Doors & Windows	\$19,697.25		
Interior Construction	\$6,116.54		
Plumbing	\$3,906.00		
HVAC	\$37,171.10		
Electrical	\$11,188.40		
Soft Costs			\$76,756.13
Architectural Fees	\$25,373.93		
Engineering Fees	\$12,686.96		
Other Design Fees	\$12,686.96		
Construction Period Interest	\$10,149.57		
Other Consulting Fees	\$3,171.74		
General Conditions	\$6,343.48		
Permits and Licenses	\$6,343.48		
Contingency		\$50,747.86	
TOTAL CAPITAL COSTS		\$381,243.27	

4.5.3.2 - Source and Use of Funds

SOURCE AND USE OF FUNDS			
SOURCE OF FUNDS		USE OF FUNDS	
Equity	\$338,107.59	Hard Costs	\$253,739.28
Tax Credit Equity	\$43,135.68	Soft Costs	\$76,756.13
		Contingency	\$50,747.86
TOTAL SOURCES OF FUNDS	\$381,243.27	TOTAL USES OF FUNDS	\$381,243.27
Funds Needed	\$381,243.27		
Shortfall	\$0.00		

4.5.3.3 - Stabilized Year Operating Statement

STABILIZED YEAR OPERATING STATEMENT		
Category	Amount	Total Amount
Gross Scheduled Income (GSI) (see schedules)		75,825.00
Effective Gross Income (EGI)		\$75,825.00
Fixed Expenses		\$2,859.32
Insurance	\$2,859.32	
Variable Expenses		\$5,497.31
Administrative Costs	\$947.81	
Property Management	\$2,653.88	
Utilities (see schedules)	\$0.00	
Repair and Maintenance	\$1,895.63	
Reserves for Replacement		\$3,431.19
Roof	\$1,906.22	
Floor Coverings	\$1,524.97	
Total Expenses		\$11,787.83
NET OPERATING INCOME (NOI)		\$64,037.17
CASH FLOW		\$64,037.17

4.5.3.4 - Schedules to Stabilized Year Operating Statement

SCHEDULES TO STABILIZED YEAR OPERATING STATEMENT			
RENTAL INCOME SCHEDULE			
Tenant *	Rentable Square Feet (s.f.)	\$/s.f./Year	Annual Rent
Total Interior Space	1685	\$45.00	\$75,825.00
UTILITIES			
Utility	Estimated Monthly Income		Annual Expense
Water and Sewer	\$400.00		\$4,800.00
Electricity	\$400.00		\$4,800.00

4.5.3.5 - Market Analysis

Market Analysis	
Address	Cost/sq. ft./Year
74 Surfside Avenue	\$43.76
Seaside Avenue	\$39.00
Miller Avenue	\$53.34
Average	\$45.37

4.5.3.5 - Multi-Year Operating Statement

MULTI-YEAR OPERATING STATEMENT						
	1	2	3	4	5	6
Gross Scheduled Income (1)	\$75,825.00	\$76,962.38	\$78,116.81	\$79,288.56	\$80,477.89	\$81,685.06
Effective Gross Income	\$75,825.00	\$76,962.38	\$78,116.81	\$79,288.56	\$80,477.89	\$81,685.06
Less: Fixed Expenses (2)	\$2,859.32	\$2,902.21	\$2,945.75	\$2,989.93	\$3,034.78	\$3,080.30
Less: Variable Expenses (3)	\$5,497.31	\$5,579.77	\$5,663.47	\$5,748.42	\$5,834.65	\$5,922.17
Less: Replacement Reserves	\$3,431.19	\$3,431.19	\$3,431.19	\$3,431.19	\$3,431.19	\$3,431.19
Total Expenses	\$8,928.50	\$9,010.96	\$9,094.66	\$9,179.61	\$9,265.84	\$9,353.36
Net Operating Income	\$64,037.17	\$65,049.20	\$66,076.40	\$67,119.02	\$68,177.27	\$69,251.40
Cash Flow	\$64,037.17	\$65,049.20	\$66,076.40	\$67,119.02	\$68,177.27	\$69,251.40
Overall Return (4)	16.80%	17.06%	17.33%	17.61%	17.88%	18.16%

(1) Income assumed to increase

1.50%	per year.
-------	-----------

(2) Fixed expenses assumed to increase

1.50%	per year
-------	----------

(3) Variable expenses assumed to increase

1.50%	per year
-------	----------

(4) Equivalent to *Capitalization Rate*: Net Operating Income divided by Total Project Cost

4.6 - Conclusion

With the exception of the floor in Station 1-B and the exterior of Station 3-A, the splinter-proof reinforced concrete construction has withstood the harsh coastal conditions in generally fair condition. Any repair methods would be concentrated on preventing the imbedded reinforcement bars from further corrosion. Alternatively, only the remaining wooden elements of Station 1-B can be effectively reused, for both Stations 1-A and 3-A have no traces of any wooden structures remaining. As a result, contemporary construction would have to replace the missing wooden elements on all three stations.

A combination of the Federal Historic Preservation Tax Incentive Program and a tax-free cash flow from being located on public lands both aided in the total amount of annual cash flow earned. As a result, the possibility of all three stations being effectively rehabilitated and reused is possible. Based on the pro forma spreadsheets, the municipalities owning the stations can benefit from a steady positive cash flow over the course of time. The following table will show the total project cost, cash flow, and capitalization rate for each station after the first year.

4.6.1 - Results

	<i>Station 1-B</i>	<i>Station 1-A</i>	<i>Station 3-A</i>
Total Cost	\$235,024.46	\$275,298.94	\$381,243.27
Total Cash Flow	\$13,568.00	\$12,676.42	\$64,037.17
Capitalization Rate	5.77%	4.60%	16.80%

4.7 - Bibliography

"74 Surfside Avenue, MONTAUK (South of the Highway)." Hamptons Real Estate Online website, accessed April 29, 2012. http://www.hreo.com/mac/expansion.jsp?bts=0&innum=65966&inlist=76639,66561,96198,91502,73162,59770,69424,68252,87390,94823,65966,73902,57502,92538,82364,66133,88178,87249,92367,70437,87454,90330,61024,90601,86080,90158,88805,71414,57166,56527,69012,95131,69946,80208&searchType=rental&sortOrder=1&vtsort=&limit=4&styles=&fromoh=&oh_id=&oh_flg=&period=1.

Army Corps of Engineers, "Reports of Completed Works, Harbor Defenses of Narragansett Bay," 1943. Bel Air, MD: CDSG e-press, 2011.

Army Corps of Engineers, "Reports of Completed Works, Harbor Defenses of Long Island Sound," 1944. Bel Air, MD: CDSG e-press, 2011.

Cramer, Adele. "Ditch Plains Artillery Fire Control Stations: A Report." March 1995.

"Home," National Trust Investment Corporation website, accessed May 16, 2012. <http://ntcicfunds.com/>.

Lentz, Craig. Comments to the author, December 21, 2011.

"Montauk Ocean Views." Hamptons Real Estate Online website, accessed April 29, 2012. http://www.hreo.com/mac/expansion.jsp?bts=0&innum=87454&inlist=76639,66561,96198,91502,73162,59770,69424,68252,87390,94823,65966,73902,57502,92538,82364,66133,88178,87249,92367,70437,87454,90330,61024,90601,86080,90158,88805,71414,57166,56527,69012,95131,69946,80208,67558,87248,77523,81851,68678,68414,80535,60186,85599,61060,92311,73741&searchType=rental&sortOrder=1&vtsort=&limit=4&styles=&fromoh=&oh_id=&oh_flg=&period=1.

McAllister, Virginia and Lee. *A Field Guide to American Houses*. New York: Alfred A. Knopf, 2006.

Mewis, Bob , Christopher Babbitt, Ted Baker. *RSMMeans Repair & Remodeling Cost Data 2010*, RSMMeans Co. Inc., 2010.

“Oceanfront Just Steps to Ditch Plains Beach.” Hamptons Real Estate Online website, accessed April 29, 2012. http://www.hreo.com/mac/expansion.jsp?bts=0&innum=82364&inlist=76639,66561,96198,91502,73162,59770,69424,68252,87390,94823,65966,73902,57502,92538,82364,66133,88178,87249,92367,70437,87454,90330,61024,90601,86080,90158,88805,71414,57166,56527,69012,95131,69946,80208,67558,87248,77523,81851&searchType=rental&sortOrder=1&vtsort=&limit=4&styles=&fromoh=&oh_id=&oh_flg=&period=1.

RSMeans Engineering Department. *RSMeans Square Foot Costs 2012*, RSMeans Co. Inc., 2012.

Rypkema, Donovan D. *Feasibility Assessment Manual for Reusing Historic Buildings*. Washington D.C.: National Trust for Historic Preservation, 2007.

United States Department of the Interior, “National Register Bulletin: How to Apply the National Register Criteria for Evaluation,” 1995.

Wells, Jeremy. Discussion with the author, May 16, 2012.

5 - DISCUSSION

This report should be seen as an initial step to begin preserving our abandoned World War II home front heritage rather than a detailed feasibility analysis. The first step towards the preservation of these valuable resources is the recognition of the important role they played during the Second World War. These stations were part of an interconnected coastal network dedicated to protecting our shores from enemy bombardment, ultimately making them nationally significant historical resources. In addition, they exemplified the most advanced forms of fire control before the use of radar, missiles, and airplanes as the primary methods of warfare.

Nomination onto the National Register of Historic Place would not only recognize these important historical resources, but they would also be eligible for valuable federal and state tax incentives for when they are rehabilitated. Such incentives are key to make the project more cost-efficient.

5.1 - Adaptive Reuse

The adaptive reuse of these three FC stations clearly shows how local and state municipalities can utilize these structures to their benefit. Although the raw data was compiled and shown in chapter 4, how can such data be practically implemented for the public agencies to benefit? As reviewed in Rypkema's manual, "a feasibility analysis isn't simply looking up a percentage in some table of real estate numbers. It's a process of narrowing the range of uncertainty through the systematic identification of objectives, constraints, and opportunities."¹⁵⁰ As a result, this chapter was organized by each FC station and aimed to outline the objectives, constraints, and opportunities for each location.

¹⁵⁰ Donovan D. Rypkema, *Feasibility Assessment Manual for Reusing Historic Buildings*. (Washington D.C.: National Trust for Historic Preservation, 2007).

5.1.1 - Station 1-B

Currently, Station 1-B is situated within the 2.5 acre Camp Cronin, a small day camp owned by the City of Providence. Because the city might not have the funds necessary to rehabilitate this structure themselves, alternatives must be taken into consideration.

In the fall of 2011, Roger Williams University created the Community Partnerships Center (CPC). The role of the CPC is to expose students attending the university to real world projects through a mutual partnership with a related entity. If the city was to partner with the CPC on rehabilitating not just Station 1-B but Camp Cronin as a whole, the end result would be two-fold; students would have an enriching education and the city would have new applicable ideas to utilize.

In addition to Historic Preservation, Construction Management, and Architecture students working on Station 1-B and the two support buildings, Environmental Science and Education majors could collaborate to create an effective summer education program focusing on the area's abundance of marine life.

In the case of Station 1-B, the structure could be utilized to accommodate for weekend stays during the summer months. Instead of hiring camp counselors for supervision, the children's parents would be invited to chaperone. Such a policy is already in use at Battleship Cove in Fall River as part of a very successful overnight program for the Boy Scouts of America.

In terms of design, the blind window recesses in the concrete can be cut out for true windows to be installed. Such a treatment has been done to the four FC stations at Camp Varnum, and do not excessively detract from the structure's overall historical character. It is advised, however, to retain at least one blind window recess to show how the others originally appeared.

In addition, HVAC systems have been omitted from the cost analysis of this station to save the overall cost of rehabilitation.

5.1.1.1 - Objectives

- Rehabilitate Station 1-B back to its intended appearance.
- Reinvent Camp Cronin for the city to better utilize.
- Respect the camp's World War II origin outside of Station 1-B.

5.1.1.2 - Constraints

- The city does not have funds necessary for a full updating campaign.
- Fire code could possibly pose an issue.
- Past mistreatment of campers by camp councilors.

5.1.1.3 - Opportunities

- Station 1-B would be effectively reused for future generations to enjoy.
- Camp Cronin would become a popular summer camp for the city to utilize and capitalize upon.
- The CPC at Roger Williams University would allow students in a variety of disciplines to get real-world exposure on the single proposed project.

5.1.2 - Station 1-A

Like Station 1-B in Camp Cronin, Station 1-A is located on public property within the ninety-nine acre Shadmoor State Park. Blockaded from the public, the station stands as a curious ruin to people in the park. The knowledge gap about the station, in addition to the station in an unsupervised area, has made the station subject to vandalism and graffiti.

The station itself also has a number of embodied challenges; the floor plates of the concrete section do not line up with the wooden floor plate to the north. The station's split-level design created a single story within the wooden section, resulting in the station having a greatly diminished potential floor area. In addition, the station's small ribbon windows and misaligned blind windows and doors with the internal floor plates have severely limited the amount of potential natural light to enter the structure.

Even with these severe limitations, a feasible reuse has been found. The Montauk Historical Society (MHS) is a local non-profit organization "dedicated to preserving the history of Montauk,"¹⁵¹ and has been incorporated since 1962.¹⁵² The MHS operate two museums within Montauk, the Second House Museum and the Montauk Point Lighthouse, the fourth oldest lighthouse in the nation and the oldest in the State of New York. Recently, the lighthouse has been granted the designation as a National Historic Landmark for its imperative role in guiding countless trade ships into New York City.¹⁵³

Interestingly enough, the lighthouse property has direct ties to the Harbor Defenses of Long Island Sound. Just east of the tower lies Station 2-C, a vertical-base FC tower. In addition, Station 2-B, a dug-in FC station, was located within a bluff immediately south of the tower. Relentless erosion of the point has resulted in

¹⁵¹ "Montauk Historical Society," Montauk Point Lighthouse Museum and Gift Shop website, accessed May 8, 2012. <http://www.montauklighthouse.com/society.htm>

¹⁵² "Second House Museum," Montauk Point Lighthouse Museum and Gift Shop website, accessed May 8, 2012. http://www.montauklighthouse.com/second_house.htm

¹⁵³ Russell Drumm, "Lighthouse Now a Landmark," *East Hampton Star*, March 8, 2012. Accessed May 8, 2012. <http://easthamptonstar.com/?q=News/2012308/Lighthouse-Now-Landmark>

Station 2-B to tumble onto the coastline, and currently lies upside down on the beach below its original location.

With the lighthouse's recent National Historic Landmark designation and the property's direct association with Station 1-A, perhaps the MHS would be interested in leasing the abandoned station from the state to be interpreted as a house museum. Although this traditional method is already utilized at Second House, there are no other FC stations in the area that are open to the public. Since the MHS already owns both a vertical-base FC station and a dug-in FC station, their acquisition of Station 1-A would allow them to explain the role of fire control by visitors experiencing all three stations within Montauk. So far, only the Mid-Atlantic Center for the Arts & Humanities and the Fort Miles Historical Association have been recognizing and interpreting singular World War II-era FC stations, leaving much room for the MHS to expand and allow visitors to view and experience all three types of stations. Although Station 2-C has tumbled onto the beach, the MHS has the station's original appearance interpreted in both a scale model and a large image within the current exhibit space. The explanation of fire control through experiencing the FC stations for themselves would greatly enhance visitor exposure to an important chapter in Montauk's military history.

Since the MHS is a non-profit organization, it could apply for funds from a grant source. Such foundations such as the Long Island Community Trust could provide the MHS with funds if a strong program centered around the educational benefits of interpreting these FC stations is determined and concisely explained.

5.1.2.1 - Objectives

- Rehabilitate Station 1-A back to its intended appearance.
- Have the station become an income-generating resource for New York State.
- Create Station 1-A into an engaging visitor experience to benefit the MHS.

5.1.2.2 - Constraints

- Inherent design challenges.
- Remote location within a state park.
- Funding needed for the rehabilitation.

5.1.2.3 - Opportunities

- Preservation of a scarce cultural resource on Long Island.
- Potential to fully explain fire control through examples.
- Reorganization and expansion of the MHS to interpret Montauk's recent past.

5.1.3 - Station 3-A

Located within Shadmoor State Park just west of Station 1-A, Station 1-C's design provides for an alternative reuse. Since the wooden floor plates would match with the existing concrete floor plates, this station has the potential to be reused as a dwelling to rent or lease. The fact that the design outlined in the RCW's shows many windows in the wooden section and the station has the largest square footage only supports this reuse idea.

When looking at three homes for rent that are immediately surrounding Shadmoor State Park, it is clear that people are willing to pay a great deal for the opportunity to vacation at the exclusive seaside location. The fact that the station is not far from the nearby Surfside Avenue, but still distant from surrounding development could make the station even more exclusive to rent or lease.

A private developer can easily rehabilitate the station; however, the need to nominate this structure is imperative for this to be possible. The 20% Historic Preservation Tax Incentive Program is a very attractive incentive to developers. Even without the tax incentive program, developers have been well-versed in rehabilitating historic buildings on the East End, most recently the Bulova Watch Factory in Sag Harbor¹⁵⁴ and the Topping Rose House in Bridgehampton.¹⁵⁵

5.1.3.1 - Objectives

- Rehabilitate Station 1-A back to its intended appearance.
- Provide New York State with an economically feasible reuse option.

¹⁵⁴ Paul A. Johnson, "Construction Could Be Weeks Away for Bulova Factory Condos," Curbed Hamptons website, accessed May 8, 2012. http://hamptons.curbed.com/archives/2011/09/30/construction_could_be_weeks_away_for_bulova_factory_condos.php

¹⁵⁵ Jennifer Landes, "A Bull Becomes a Rose," *The East Hampton Star*, May 1, 2012. C1.

5.1.3.2 - Constraints

- Intrusion of development into a state park.

5.1.3.3 - Opportunities

- Preservation of a scarce cultural resource on Long Island.
- Creation of an income-generating resource for the state.

5.2 - Conclusion

As Kelly stated in his article on the need to preserve home front heritage in the United States:

Preserving archeological and architectural resources related to World War II requires creative thinking by groups and individuals. Site resource inventories, the consideration of impacts of memorial projects, and protection from relic hunters and encroachment are very important elements for future site integrity, significance, and meaning. Preservation easements with private landowners may be useful to achieve some protection objectives. Listing in the National Register of Historic Places, designation in state and local historic property registries, and other forms of recognition give an official status to a place, often requiring public consideration for zoning or land use changes.¹⁵⁶

The adaptive reuse options for the three FC station are unique in their own right, but their methods are already seen in various forms throughout the country. The winter 2011 issue of the National Park Service's *Common Ground* focused on the importance of parks. One article titled "Portals of Imagination: Designing the Parks of Today...and Tomorrow"¹⁵⁷ documented an engaging conversation with various professionals with related experience with interpreting the built and natural environment in the United States.

The twelve-page article contained useful and inspiring dialogue concerning the future of federal, state, and local park systems in the country. More specifically, the following quotes can be directly applied the proposed reused strategies for the three FC stations.

John Reynolds, the former Deputy Director of the National Park Service, noted the adaptive reuse of Rob Hill within the Golden Gate National Recreation Area as "the epitome of the experimentation going on right now."¹⁵⁸ Reynolds explains how the unique reuse of this former Army camp has given countless

¹⁵⁶ Roger E. Kelly "America's World War II Home Front Heritage," *CRM: The Journal of Heritage Stewardship*, volume 1, number 2, Summer 2004. Accessed February 16, 2012. http://crmjournal.cr.nps.gov/04_article_sub.cfm?issue=Volume%201%20Number%202%20Summer%202004&page=1&seq=1

¹⁵⁷ Lucy Lawless and Tim Davis, "Portals of Imagination: Designing the Parks of Today...and Tomorrow," *Common Ground*, volume 16, number 3/4 (2011), 26-39.

¹⁵⁸ *Ibid.*, 33.

children from the City of San Francisco the opportunity to experience nature. If it were not for the camp's close proximity to the city, these children would never be given the chance to be in such close contact with the natural environment.

Such an idea can be directly applied to Camp Cronin, but on a smaller scale. Even if the proposed overnight program is applied and in need of more space, wooden reconstructions of the two demolished FC stations could provide additional sleeping quarters while accurately recreating the appearance of the former south reservation of Fort Greene.

The article also reflects what could happen within Shadmoor State Park. Catherine Nagel, the Executive director of the City Parks Alliance, stated how non-profit organizations have become powerful forces in the wake of a drop in public funding. Such groups raise money, host design competitions, and ultimately maintain the park. As she notes, "once people are engaged, they demand more."¹⁵⁹ Although Nagel was referring to urban parks, the same principles can be applied to the MHS out on the East End of Long Island. A key element will be to get the local community involved. Through the Concerned Citizens of Montauk, the local community has rallied together in the past to make Theodore Roosevelt County Park, Shadmoor State Park, and Camp Hero State Park. Once the benefits of this plan are made known, public support would make the project much more feasible.

Chris Matthews, a landscape architect at Michael Van Valkenburgh Associates, notes the importance of experience when fundraising for a project. Instead of promoting what will be constructed, the project is more attractive if the experience is realized and capitalized upon. He states, "We talk about the experiences you want to have, the memories you want to make. So that people understand that what you build is a means to an end. And the end is your experience."¹⁶⁰

¹⁵⁹ Ibid., 31.

¹⁶⁰ Ibid.

The experience of going into Station 1-A to peer through the ribbon windows just as the Coast Artillery Corps did during the war can be quite memorable. Linking this station with Station 2-C at the Montauk Point Lighthouse would only amplify the overall experience and provide visitors a hands-on education on fire control and harbor defense before the advent of radar.

Matthews also made an interesting point concerning the viability of the introducing a private developer into a public park, the exact scenario suggested for Station 3-A in Shadmoor State Park:

In general terms, the advantage of accruing to developers is open space. So they can charge more for what they develop, but they also give back to the community. It's the way many of the London squares were built, the way housing and a lot of public space in Boston came to be. Absolutely for-profit, philanthropy. Once you realize that the parks are valuable commodities, there are people cleverer than we are who can put a value on it. The minute you do that, it changes the equation.¹⁶¹

As noted by Kelly, creative thinking must be applied to preserving our home front heritage. The latest issue of *Common Ground* exemplified the most recent creative trends in a wide range of America's parks. The article also exhibited the awareness the National Park Service has on the multitude of options available for preserving our nation's heritage.

Reynolds states, "We have to rebuild the dialogue about the value of these places, how they fit with people's lives, how they make us richer as a people."¹⁶² State and local government can easily research and apply these existing precedents to the case studies outlined in this report. Most importantly, however, is the need to have these sites recognized for their important role in the history of the United States. Without their recognition, they will remain as unmanned posts silently watching over the coastal landscape.

¹⁶¹ Ibid., 37.

¹⁶² Ibid., 33.

5.3 - Bibliography

Cramer, Adele. "Ditch Plains Artillery Fire Control Stations: A Report," March 1995.

Drumm, Russell. "Lighthouse Now a Landmark," *East Hampton Star*, March 8, 2012. Accessed May 8, 2012. <http://easthamptonstar.com/?q=News/2012308/Lighthouse-Now-Landmark>.

Johnson, Paul A. "Construction Could Be Weeks Away for Bulova Factory Condos," Curbed Hamptons website, accessed May 8, 2012. http://hamptons.curbed.com/archives/2011/09/30/construction_could_be_weeks_away_for_bulova_factory_condos.php.

Kelly, Roger E. "America's World War II Homefront Heritage." *CRM: The Journal of Heritage Stewardship*, volume 1, number 2, Summer 2004. Accessed February 16, 2012. http://crmjournal.cr.nps.gov/04_article_sub.cfm?issue=Volume%201%20Number%202%20Summer%202004&page=1&seq=1.

Landes, Jennifer. "A Bull Becomes a Rose," *The East Hampton Star*, May 1, 2012.

Lawless, Lucy and Tim Davis. "Portals of Imagination: Designing the Parks of Today...and Tomorrow." *Common Ground*, volume 16, number 3/4, Winter 2011.

"Montauk Historical Society," Montauk Point Lighthouse Museum and Gift Shop website, accessed May 8, 2012. <http://www.montauklighthouse.com/society.htm>.

Rypkema, Donovan D. *Feasibility Assessment Manual for Reusing Historic Buildings*. Washington D.C.: National Trust for Historic Preservation, 2007.

"Second House Museum," Montauk Point Lighthouse Museum and Gift Shop website, accessed May 8, 2012. http://www.montauklighthouse.com/second_house.htm.

6 - APPENDIX

The author took the following photographs throughout the spring semester of 2012. In addition, the author hand drafted and colored all floor plan and elevation maps during the same time period.

The RCW's were courtesy of the Coastal Defense Study Group.

6.1 - Images

6.1.1 - Images - Station 1-B

6.1.1.1 - Exterior



[Fig. 1] South and east elevations of Station 1-B, looking northwest.



[Fig. 2] View of Station 1-B from atop the Point Judith Fishermen's Memorial, formerly Battery 211. Looking north. Note surrounding development.



[Fig. 3] South elevation of Station 1-B, looking north. Note dense overgrowth.



[Fig. 4] North elevation of Station 1-B, looking south. Note the scant remains of a false chimney.



[Fig. 5] West and south elevations of Station 1-B, looking northeast.



[Fig. 6] East elevation of Station 1-B, looking west. Note remains of the original wooden wall at the northeast corner.



[Fig. 7] View of remaining roof structure and stair hall, looking southeast.



[Fig. 8] View of roof structure on the east elevation, looking west.



[Fig. 9] View of asbestos shingle roof, looking northeast. Note the two additional buildings on the property. Both were support buildings for Station 1-B and the other two FC stations, Station 1-C and 2-C, within the south reservation. The two stations were torn down in the latter part of the 20th century.¹⁶³



[Fig. 10] Detail of rafters, looking northeast. Note the occurrence of rot near holes in the roof.

¹⁶³ "Funds South to Restore Camp Towers," *Providence Journal Bulletin*, March 6, 1979.



[Fig. 11] Detail of roof holes. The surrounding roof decking remains in good condition.



[Fig. 12] Detail of roof structure, facing southeast. Although weathered from exposure, the rafters have remained in good condition.



[Fig. 13] Detail of roof structure, facing southeast. Although weathered from exposure, the rafters have remained in good condition.



[Fig. 14] Detail of sill plate and roofing system, looking northwest.



[Fig. 15] Detail of sill plate and roofing system, looking north. Note increased deterioration of wood and steel members.



[Fig. 16] Detail of sill plate and roofing system, looking northwest. Note the missing sillplate.



[Fig. 17] Detail of sill plate and roofing system, looking northeast. Note increased deterioration of wood and steel members.



[Fig. 18] Detail of false chimney opening. Note the single remaining 2x4 on the upper right corner. This remnant can be used to attain an accurate height for the reconstructed false chimney.



[Fig. 19] Detail of blind windows on north elevation, looking southeast. Note intact wooden lintels, soffit boards, and reddish-brown paint treatment.



[Fig. 20] Detail of first floor ribbon window, looking northwest. Note the cracked concrete, wooden window frames, remnant of window sash, and intact window hook and mount.



[Fig. 21] Detail of ribbon window frames in Room 2-1. Marks on the upper frame were for the hinges of each awning window.



[Fig. 22] View of ribbon window sash remnant on the north elevation, looking south. The remnant is painted white and reused for bracing plywood covering the stair hall window opening.



[Fig. 23] Detail of ribbon window sash remnant. Note original hinge and screws, all in good condition.



[Fig. 24] Detail of blind window on the north elevation. Note the plastic screw anchor for a wooden jamb, reddish-brown paint in blind window, and trace of white paint on the concrete area formed to mimic simple drop wooden board.



[Fig. 25] Detail of stair hall, looking southeast. Note the original paint treatment on the basement level exposed to the elements.



[Fig. 26] View of southwest recessed corner, looking southeast. Note the dense overgrowth.



[Fig. 27] View of second story window hook and mount on west elevation, looking south. Note corroded steel corner support.

6.1.1.2 - Interior



[Fig. 1] Detail of concrete floor in Room 2-1, looking southeast. Note the textured arc finish. The same pattern can also be found on the concrete floor in Rooms B-1 and 1-1.



[Fig. 2] View of Room B-1, looking southwest. Note rust stains on the ceiling, debris, intact electrical conduits, and original paint treatment.



[Fig. 3] View of Room B-1, looking southeast. Note rust stains on the ceiling, debris, intact electrical conduits, and original paint treatment.



[Fig. 4] View of Room B-1, looking northeast. Note rust stains on the ceiling, debris, intact electrical conduits, ladder rungs, and original paint treatment.



[Fig. 5] View of Room B-1, looking northwest. Note rust stains on the ceiling, debris, intact electrical conduits, ladder rungs, and original paint treatment.



[Fig. 6] View of the stair hall, looking northwest. Note original stair configuration and condition.



[Fig. 7] View of wooden portion of north elevation. Note the traces of a small fire to the left of the window.



[Fig. 8] View of the stair hall from Room 2-2.



[Fig. 9] View of additional stair hall supports.



[Fig. 10] View of Room 1-1, looking southwest. Note the hole for a stove ductwork and original paint treatment under graffiti.



[Fig. 11] View of Room 1-1, looking southeast. Note the hole for a stove ductwork and original paint treatment under graffiti.



[Fig. 12] View of Room 1-1, looking northeast. Note the wooden framework for partition walls and original paint treatment under graffiti.



[Fig. 13] View of Room 1-1, looking northwest. Note the wooden framework for partition walls, ladder rungs, and original paint treatment under graffiti.



[Fig. 14] Detail of ladder rungs in Room 1-1, looking north.



[Fig. 15] The cracking suggests delamination has occurred due to moisture infiltration. Note electrical outlet boxes on the south wall.



[Fig. 16] Detail of deterioration of central column in Room 1-1, looking northwest. Moisture exposure has led to reinforcement bar corrosion.



[Fig. 17] Detail of recessed southwest corner in Room 1-1, looking southwest.



[Fig. 18] View of Room 2-1, looking southwest. Note original paint treatment.



[Fig. 19] View of Room 2-1, looking southeast. Note original paint treatment and scope mount.



[Fig. 20] View of Room 2-1, looking southwest. Note original paint treatment and scope mount.



[Fig. 21] View of Room 2-1, looking southwest. Note original paint treatment.



[Fig. 22] View of the floor in Room 2-1, looking southeast. Note the base of a second scope mount in addition to the one in extant.



[Fig. 23] View the Atlantic Ocean from Room 2-1.



[Fig. 24] Detail of intact electrical outlet.



[Fig. 25] The south wall of Room 2-2, looking southeast. Note the false chimney remnant at the base of the wall.



[Fig. 26] View of the west elevation of Room 2-2, looking east.



[Fig. 27] View of the east elevation of Room 2-2, looking west.



[Fig. 28] Fallen wooden wall for west elevation, looking south.

6.1.2 - Images - Station 1-A



[Fig. 1] South and East elevations of Station 1-A, looking northwest.



[Fig. 2] View of Station 1-A from afar, looking north.



[Fig. 3] South elevation, looking north.



[Fig. 4] Collage of north elevation, looking south. Note the split-level transition between the concrete and foundation levels.



[Fig. 5] West elevation, looking east. Note the remaining door lintel and window jamb.



[Fig. 6] East elevation, looking west.



[Fig. 7] View of foundation, looking west.



[Fig. 8] Detail of attached porch location, looking south. Note the numerous steel ties and concrete pylons west of the main structure.



[Fig. 9] Detail of the south elevation, looking north. Note the paired concrete chipping above the ribbon windows, corroded steel within the ribbon windows, locations of wooden nailers, and formed concrete to mimic wooden clapboards.



[Fig. 10] Detail of the southwest corner. Note the excessive efflorescence and locations of remaining window jambs bordering each of the two blind windows.



[Fig. 11] Detail of the west elevation. Note the smooth concrete where the porch roof was located, the blind window with associated wooden jamb, and concrete formed to mimic wooden clapboards.

6.1.3 - Images - Station 3-A



[Fig. 1] Southeast and northeast elevations of Station 3-A, looking west.



[Fig. 2] View of Station 3-A from afar, looking west. Note the station's proximity to nearby development and the coastline.



[Fig. 3] View of southeast elevation, looking northwest. Note the excessive erosion and cracking at the roofline.



[Fig. 4] View of northwest elevation, looking southeast. Note the exposed ladder rungs and excessive erosion.



[Fig. 5] View of the southwest elevation, looking southeast. Note the excessive erosion and efflorescence.



[Fig. 6] View of the northeast elevation, looking northwest. Note the excessive erosion and cracking at the roofline.



[Fig. 7] View of the foundation, looking west. Note the west generator building in the background.



[Fig. 8] View of the foundation, looking south. Note the large crack where the southeast and northeast foundations walls meet.



[Fig. 9] View of the latrine foundation walls, looking south. Note the missing CMU blocks.



[Fig. 10] View of the southwest foundation wall, looking northeast. Note the excessive concrete erosion throughout.



[Fig. 11] Detail of the northwest foundation wall, looking southwest. Note the bowing due to insufficiently retaining the change in ground level.



[Fig. 12] Detail of northwest elevation, looking east. Note the numerous steel ties suggesting the location of the now missing wooden floorlevel.



[Fig. 13] Detail of the southwest chimney base, looking east. Note the excessive erosion led to exposed reinforcement bars.



[Fig. 14] Detail of northeast chimney base, looking south. Note excessive erosion and efflorescence, as well as metal doorframe around the chimney access hatch.



[Fig. 15] Detail of northwest elevation, looking southeast. Note the excessive erosion throughout.



[Fig. 16] Detail of northwest elevation, looking south. Note the excessive erosion and exposed reinforcement bars at the top of the southwest chimney base.

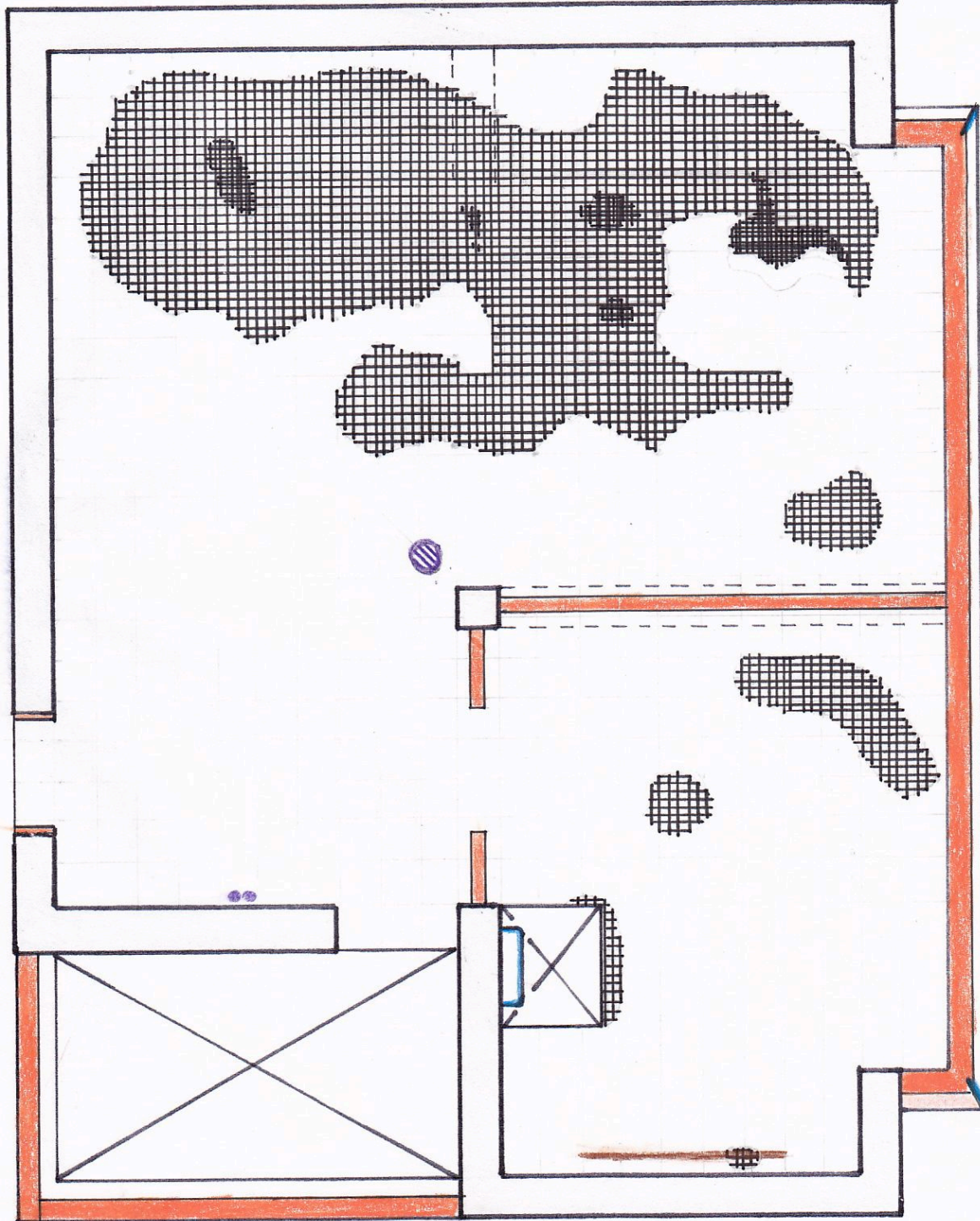
6.2 - Elevation Maps

6.2.1 - Existing Conditions Survey - Elevation Mapping Key

EXISTING CONDITIONS SURVEY ELEVATION MAPPING KEY	
Materials	Deterioration Typologies
Asbestos Siding Gray	Chipping Black
Brick Red and White Hatch	Cracking Red Line
CMU Block Gray and Black Hatch	Delamination Crosshatch
Electrical Conduit Opening Purple	Efflorescence Green Line
Exposed Metal Component Blue	Erosion Stipple
Exposed Steel Reinforcement Bar Brown Line	
Exposed Wooden Member Orange	
Nailer Recess Yellow and Black Hatch	
Stove Duct Well Purple and White Hatch	

6.2.2 - Station 1-B

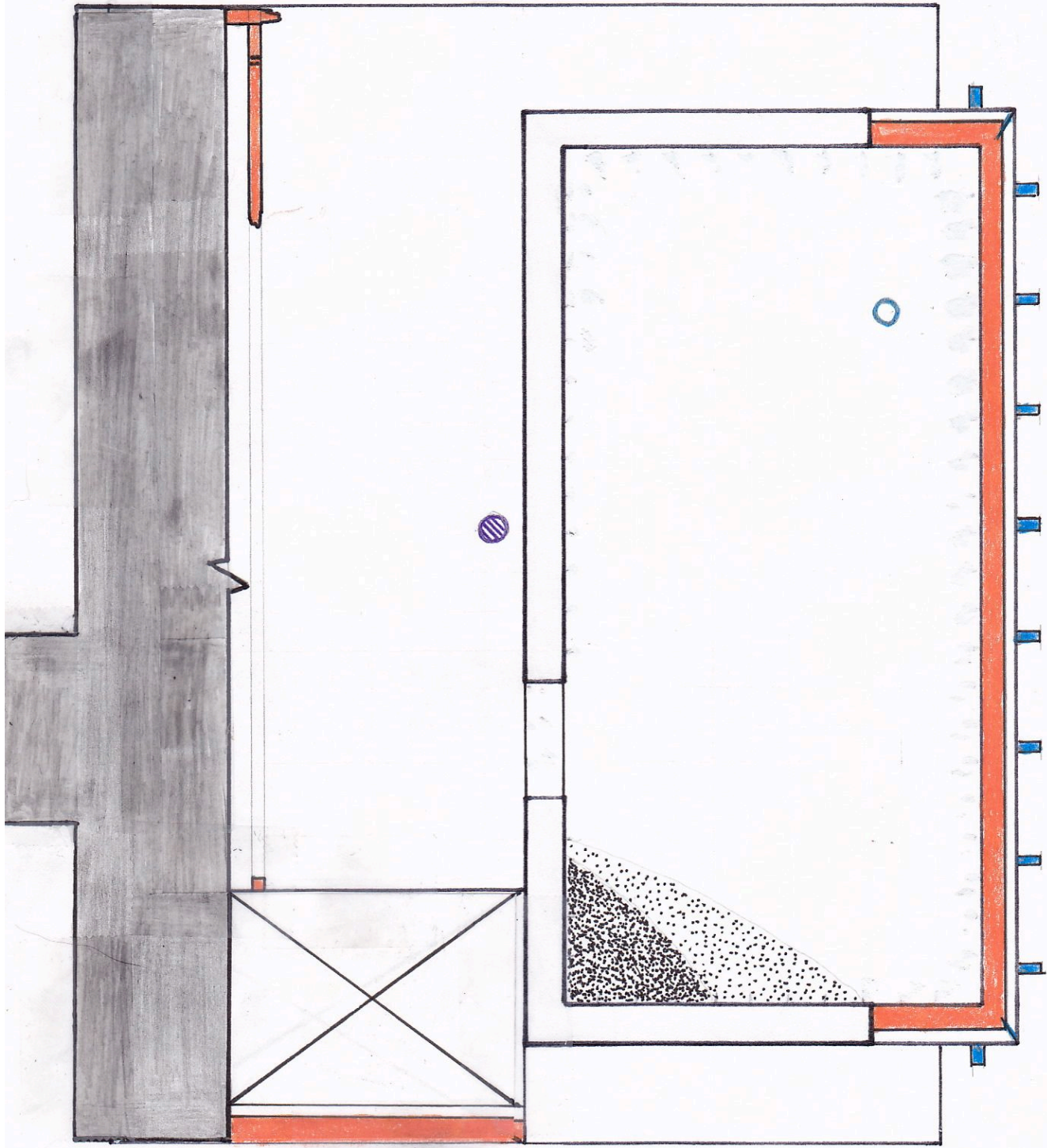
6.2.1.2 - Plans



Station 1-B, Camp Cronin
Point Judith, Rhode Island

[Fig. 1]
First Floor Plan - Room 1-1

Scale $\frac{1}{4}'' = 1'$
Donald J. Sevigny, Spring 2012



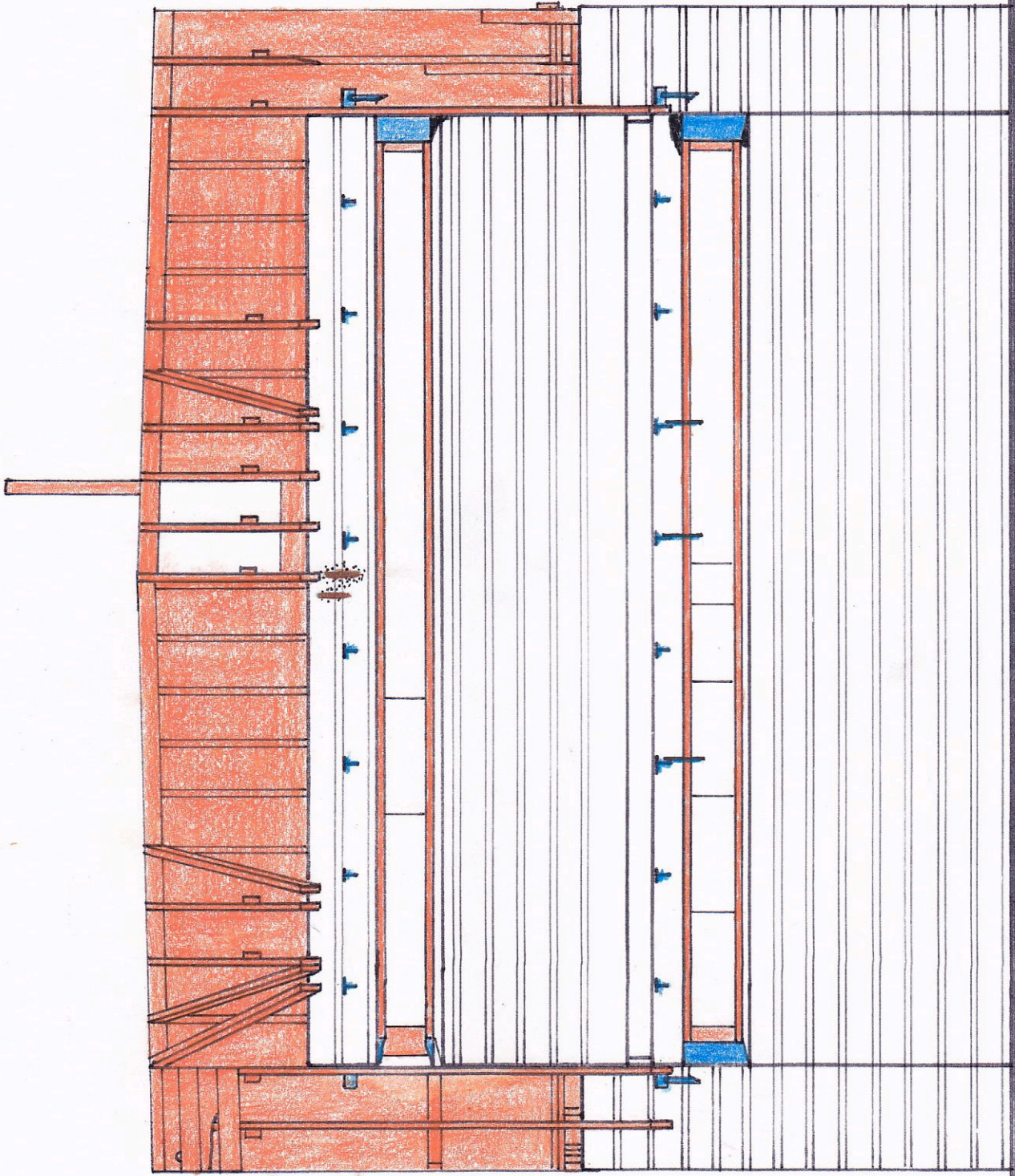
Scale 1/4" = 1'

Donald J. Sevigny, Spring 2012

[Fig. 2]
Second Floor Plan - Rooms 2-1 and 2-2

Station 1-B, Camp Cronin
Point Judith, Rhode Island

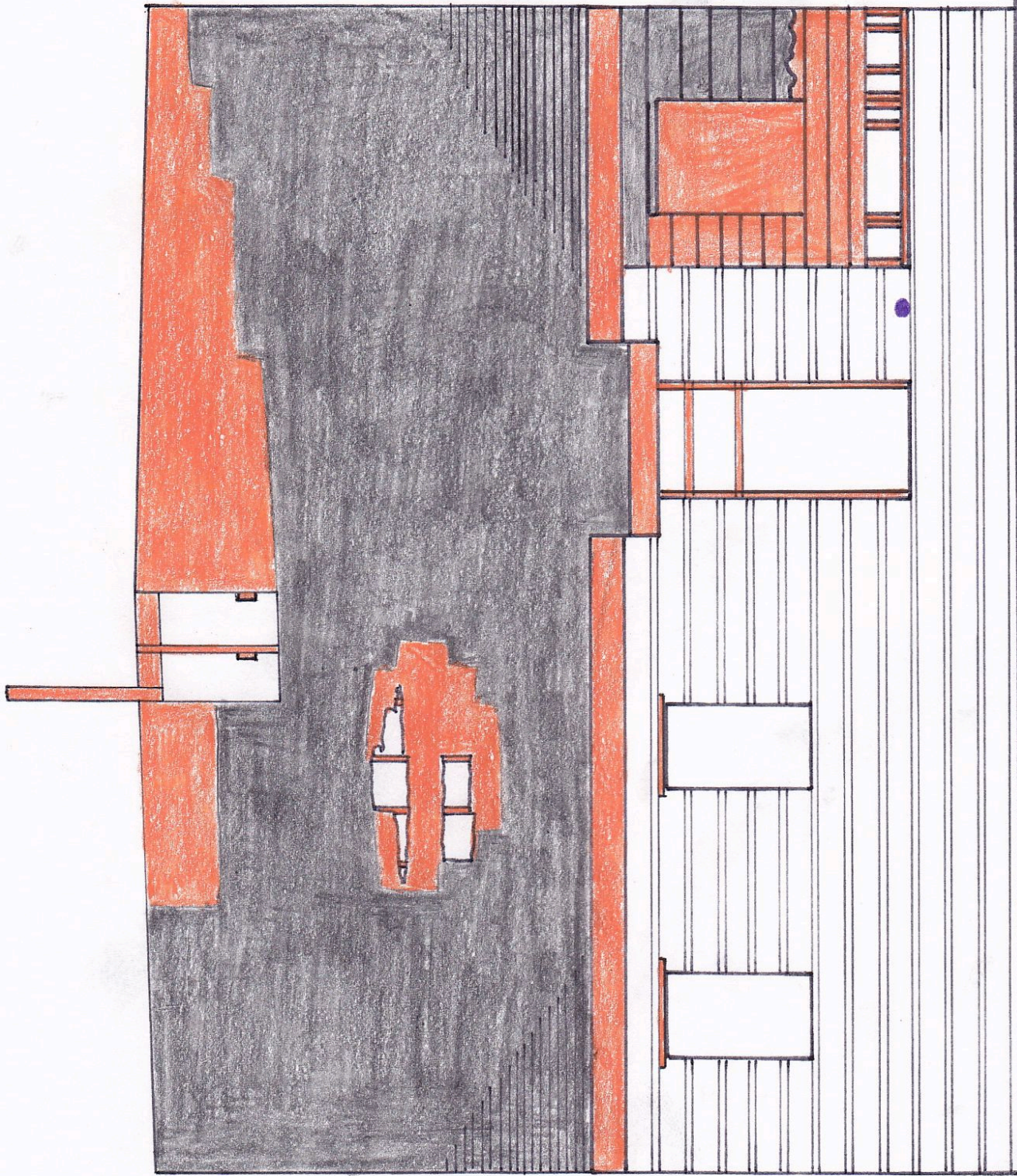
6.2.2.2 - Elevations



Station 1-B, Camp Cronin
Point Judith, Rhode Island

[Fig. 1]
South Elevation

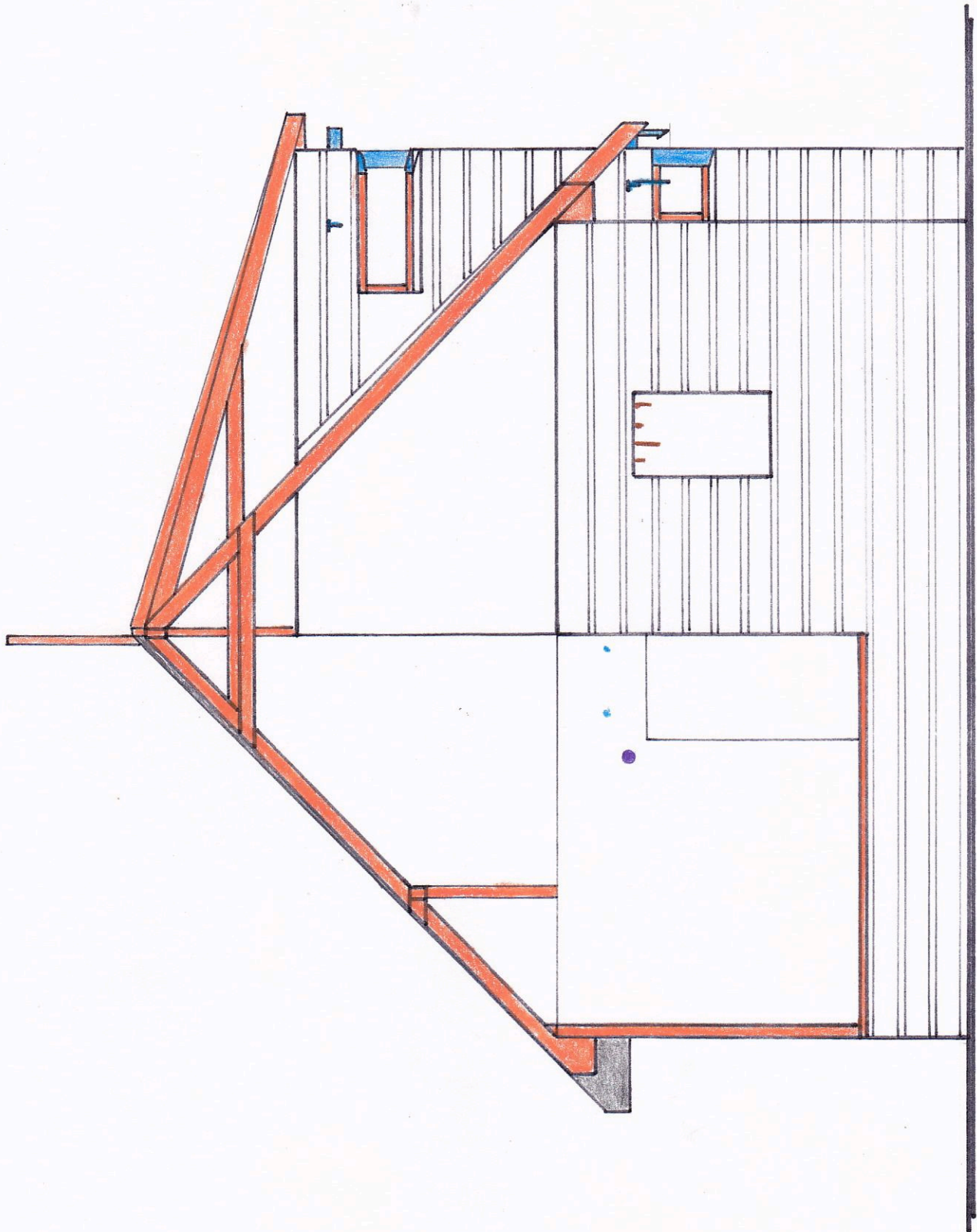
Scale 1/4" = 1'
Donald J. Sevigny, Spring 2012



Scale $\frac{1}{4}'' = 1'$
Donald J. Sevigny, Spring 2012

[Fig. 2]
North Elevation

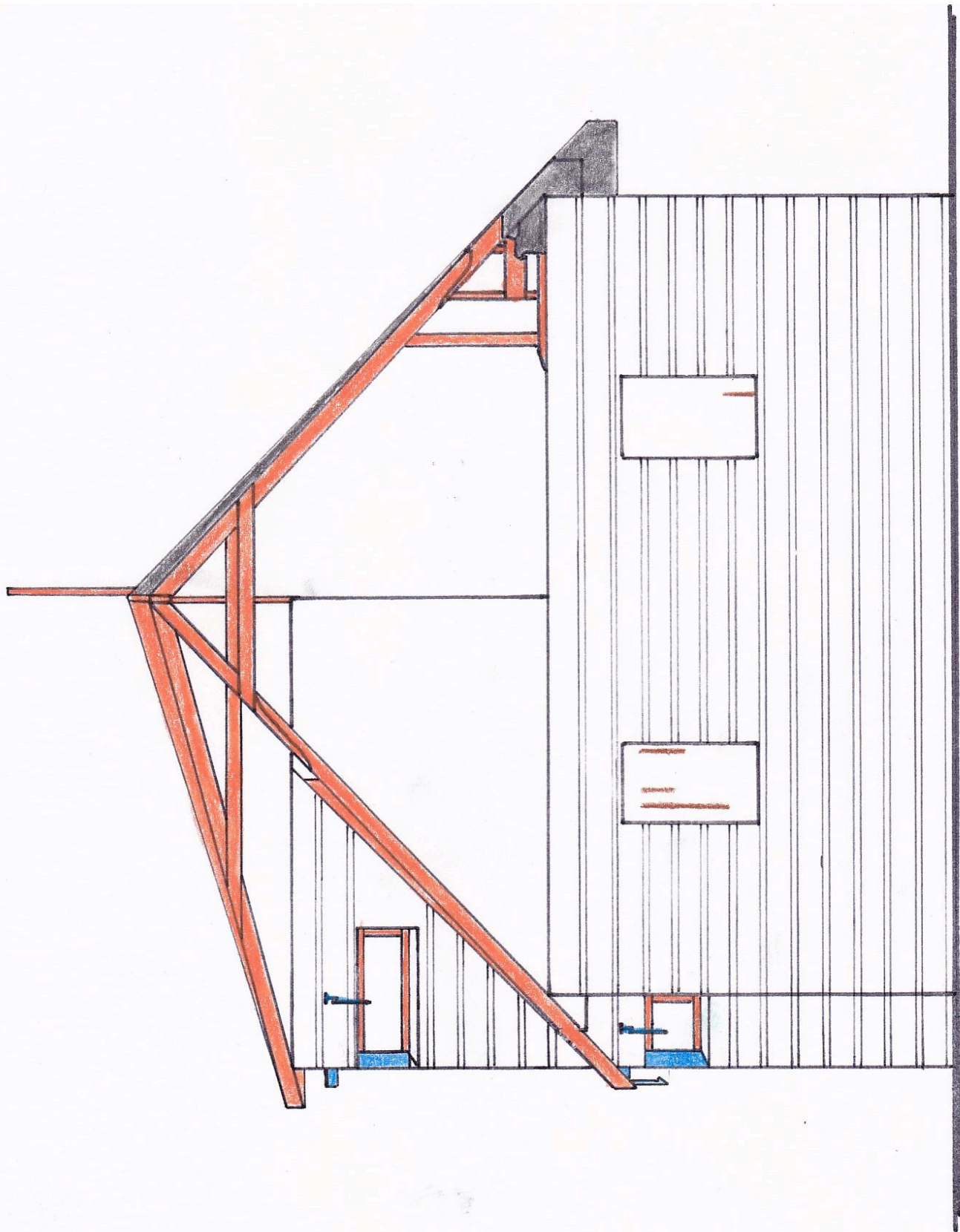
Station 1-B, Camp Cronin
Point Judith, Rhode Island



Scale 1/4" = 1'
Donald J. Sevigny, Spring 2012

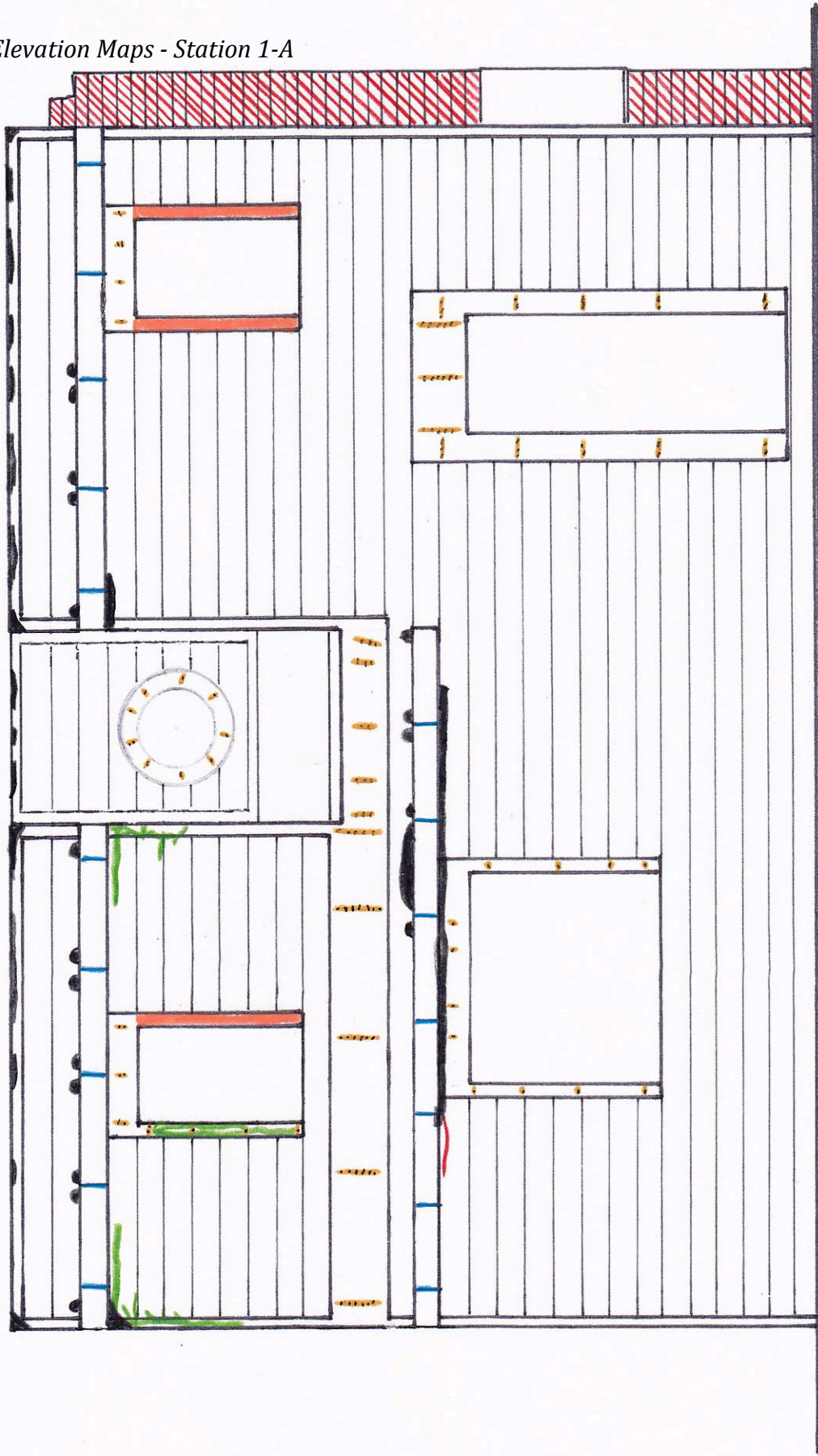
[Fig. 3]
West Elevation

Station 1-B, Camp Cronin
Point Judith, Rhode Island



Scale $\frac{1}{4}'' = 1'$ Donald J. Sevigny, Spring 2012	[Fig. 4] East Elevation	Station 1-B, Camp Cronin Point Judith, Rhode Island
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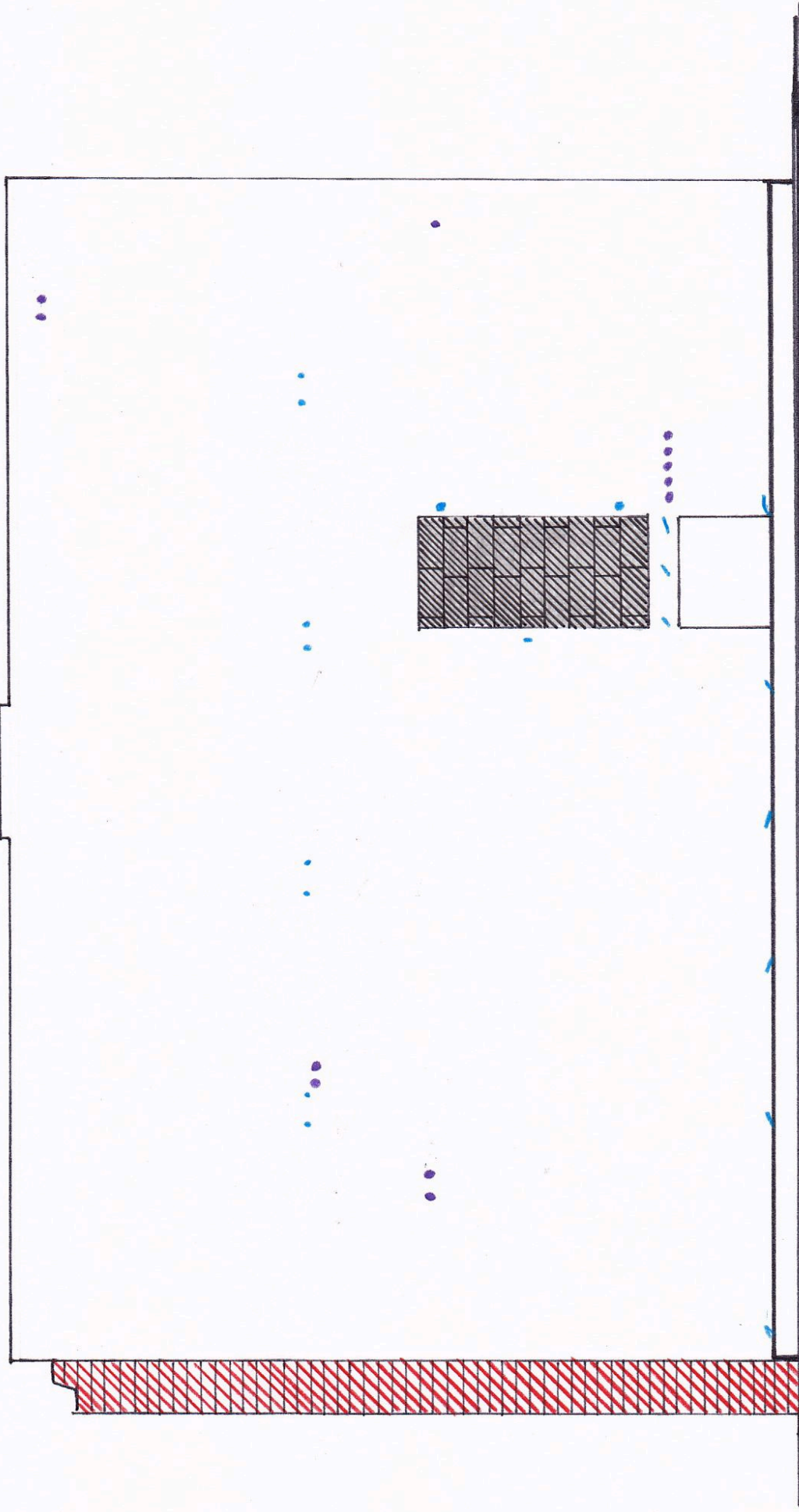
6.2.3 - Elevation Maps - Station 1-A



Station 1-A, Shadmoor State Park
Montauk, New York

[Fig. 1]
South Elevation

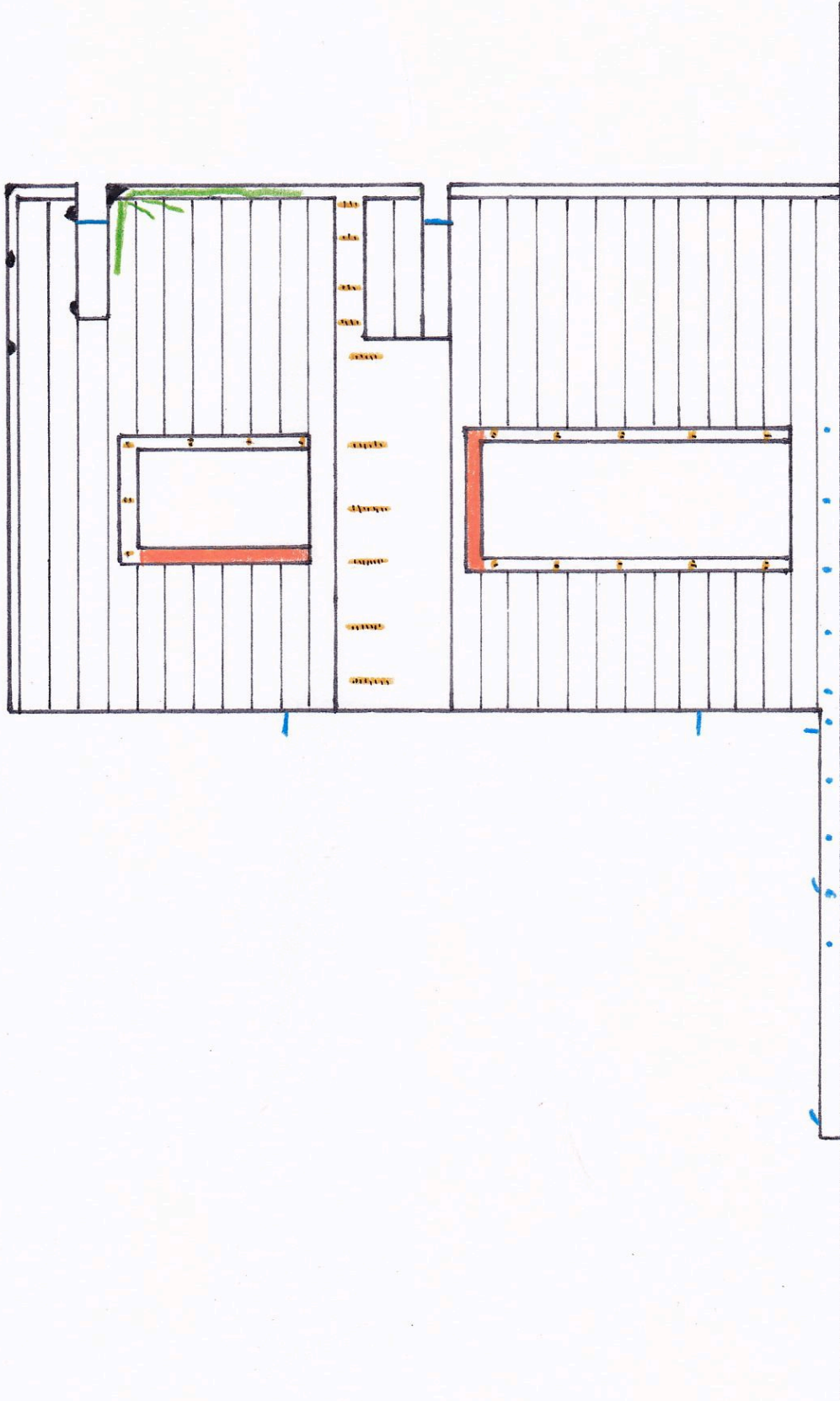
Scale 1/4" = 1'
Donald J. Sevigny, Spring 2012



Station 1-A, Shadmoor State Park
Montauk, New York

[Fig. 2]
North Elevation

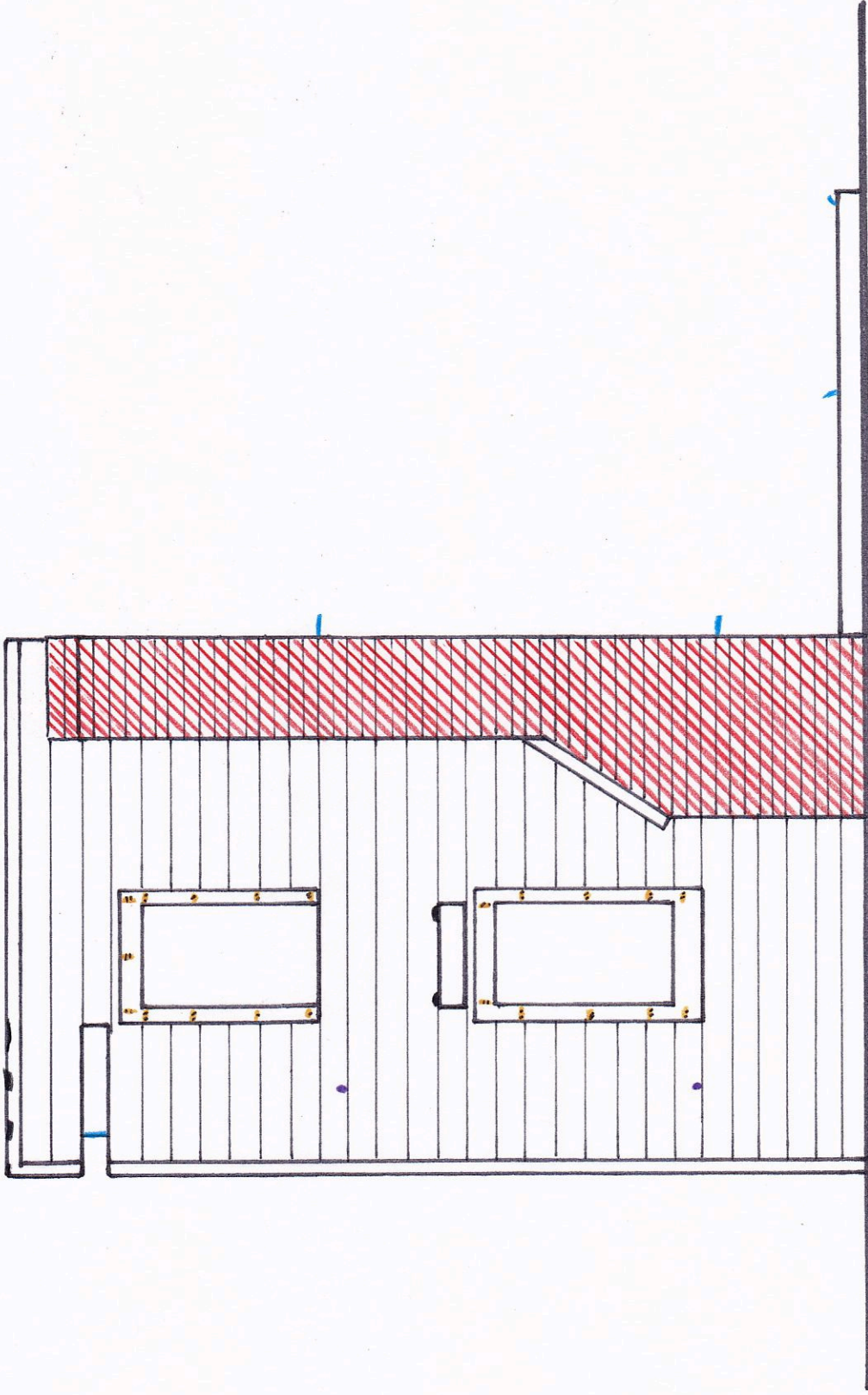
Scale 1/4" = 1'
Donald J. Sevigny, Spring 2012



Scale 1/4" = 1'
Donald J. Sevigny, Spring 2012

[Fig. 3]
West Elevation

Station 1-A, Shadmoor State Park
Montauk, New York

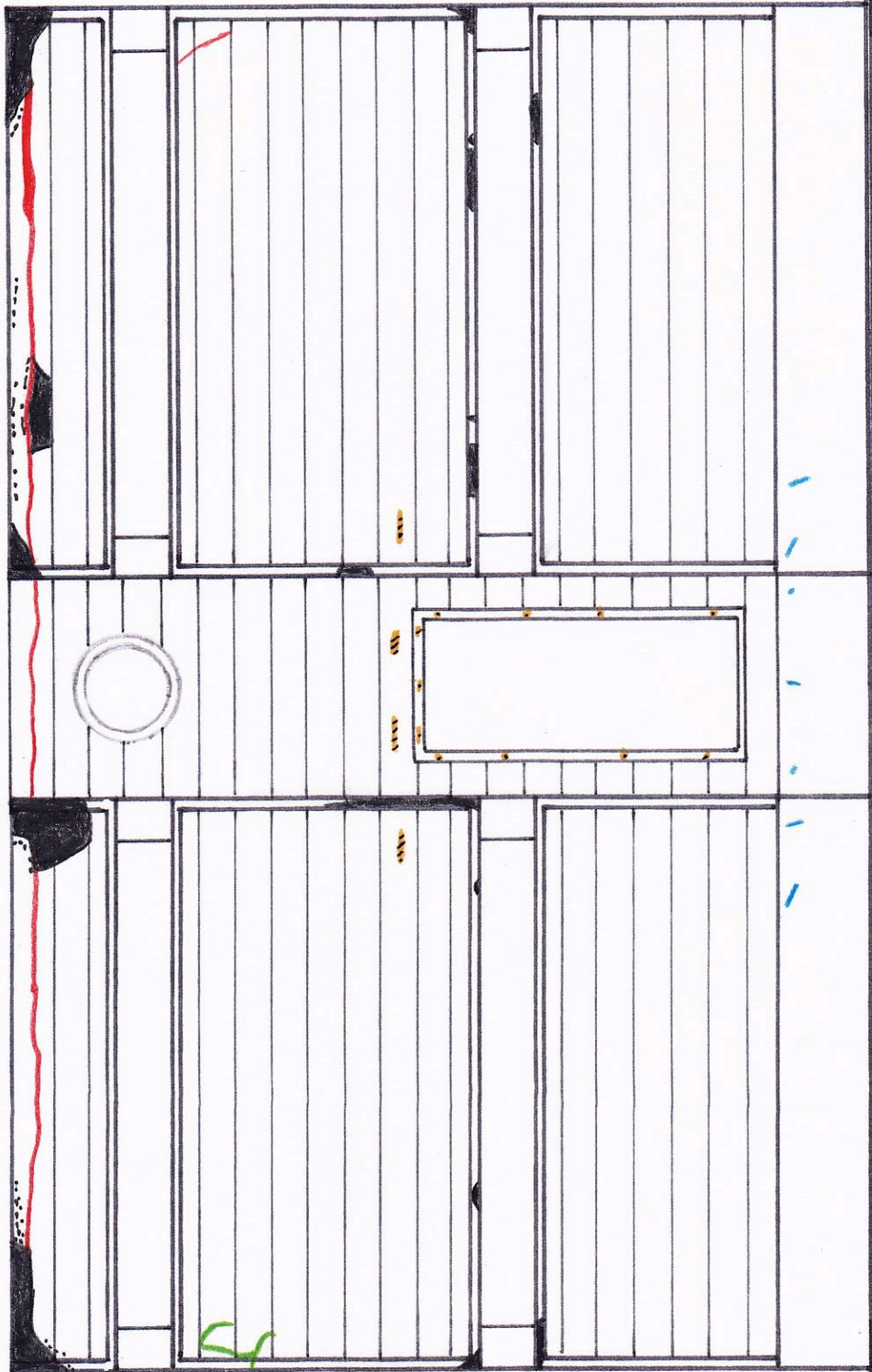


Scale 1/4" = 1'
Donald J. Sevigny, Spring 2012

[Fig. 4]
East Elevation

Station 1-A, Shadmoor State Park
Montauk, New York

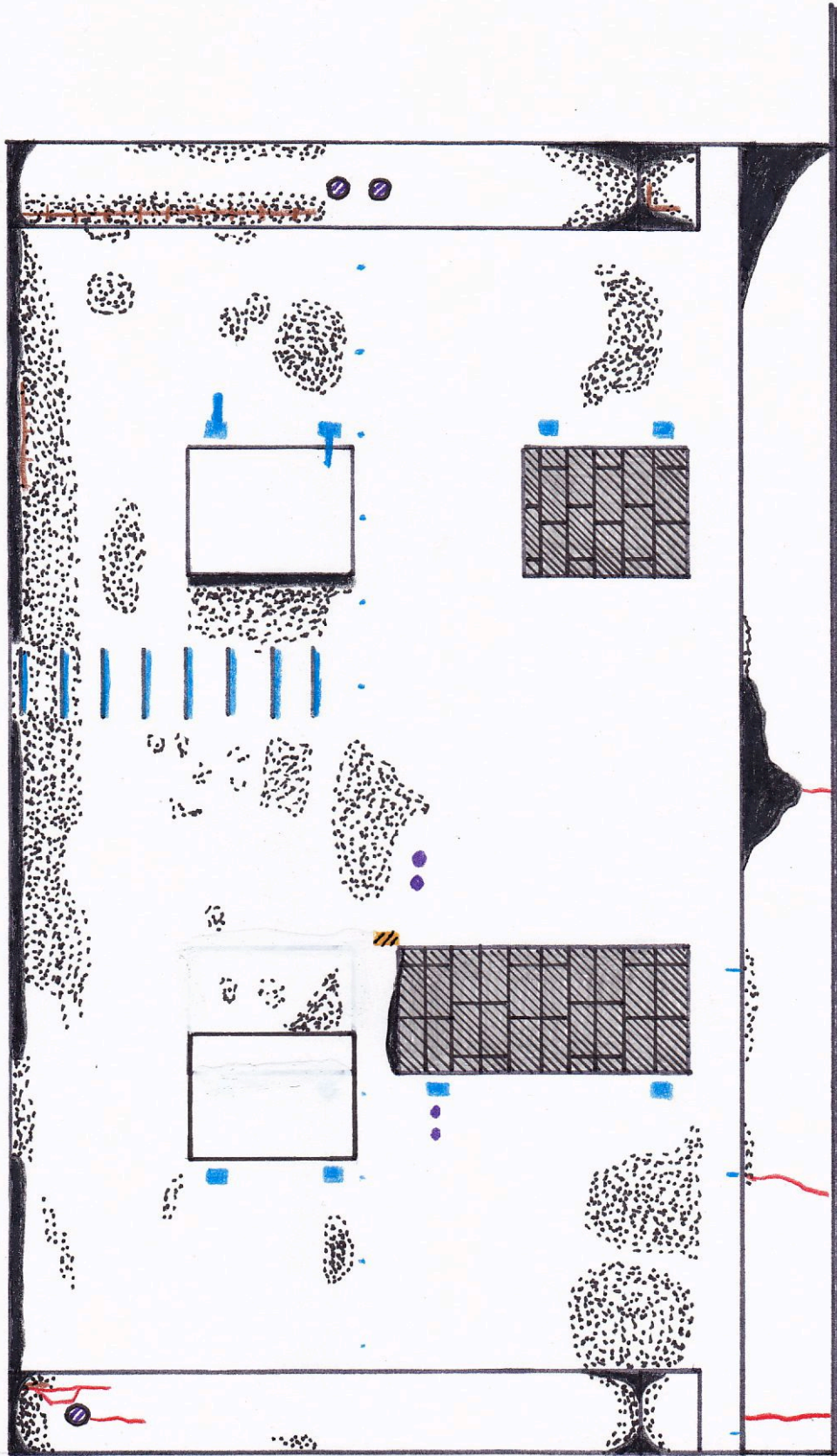
6.2.4 - Elevation Maps - Station 3-A



Station 3-A, Shadmoor State Park
Montauk, New York

[Fig. 1]
Southeast Elevation

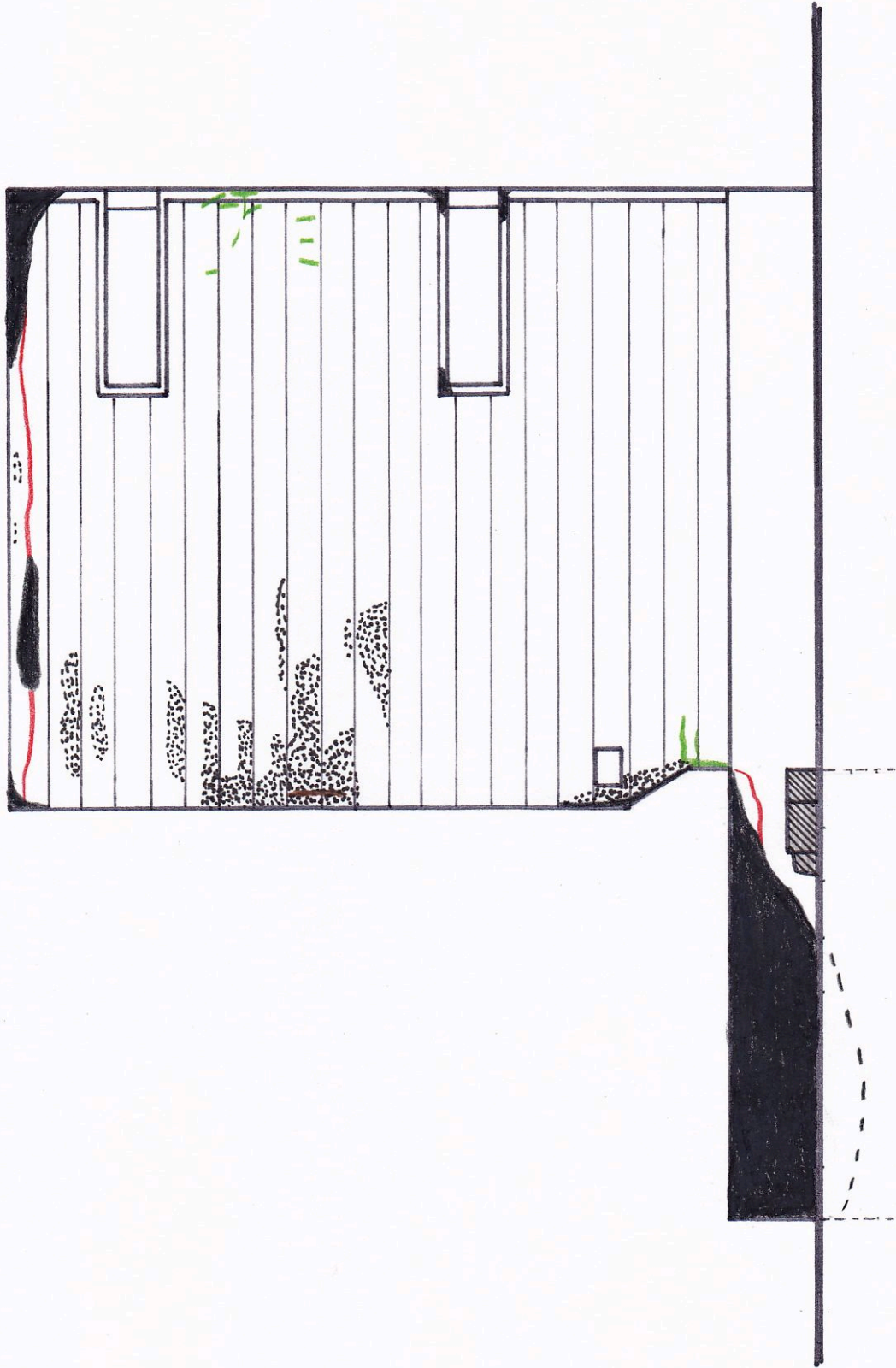
Scale 1/4" = 1'
Donald J. Sevigny, Spring 2012



Scale 1/4" = 1'
Donald J. Sevigny, Spring 2012

[Fig. 2]
Northwest Elevation

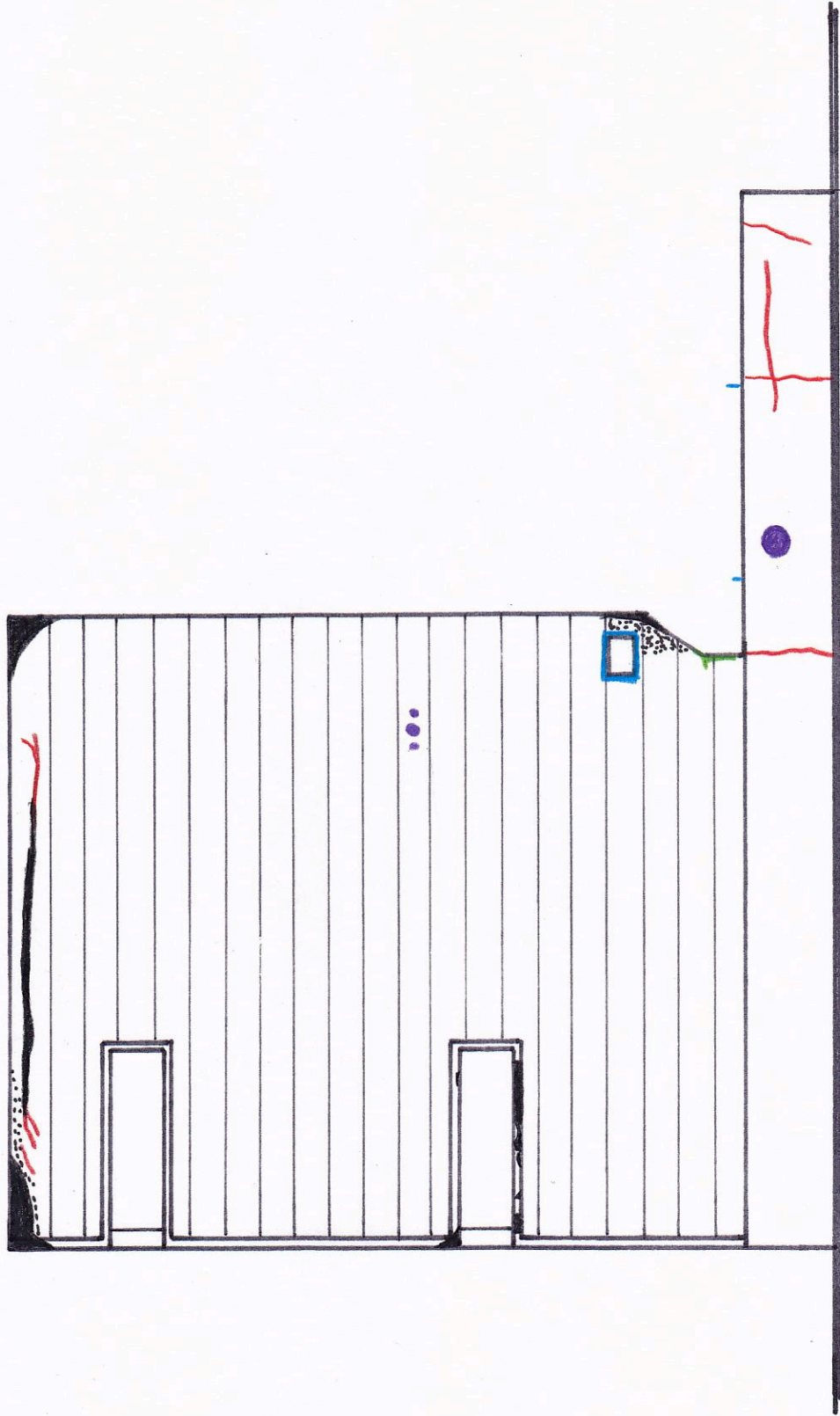
Station 3-A, Shadmoor State Park
Montauk, New York



Station 3-A, Shadmoor State Park
Montauk, New York

[Fig. 3]
Southwest Elevation

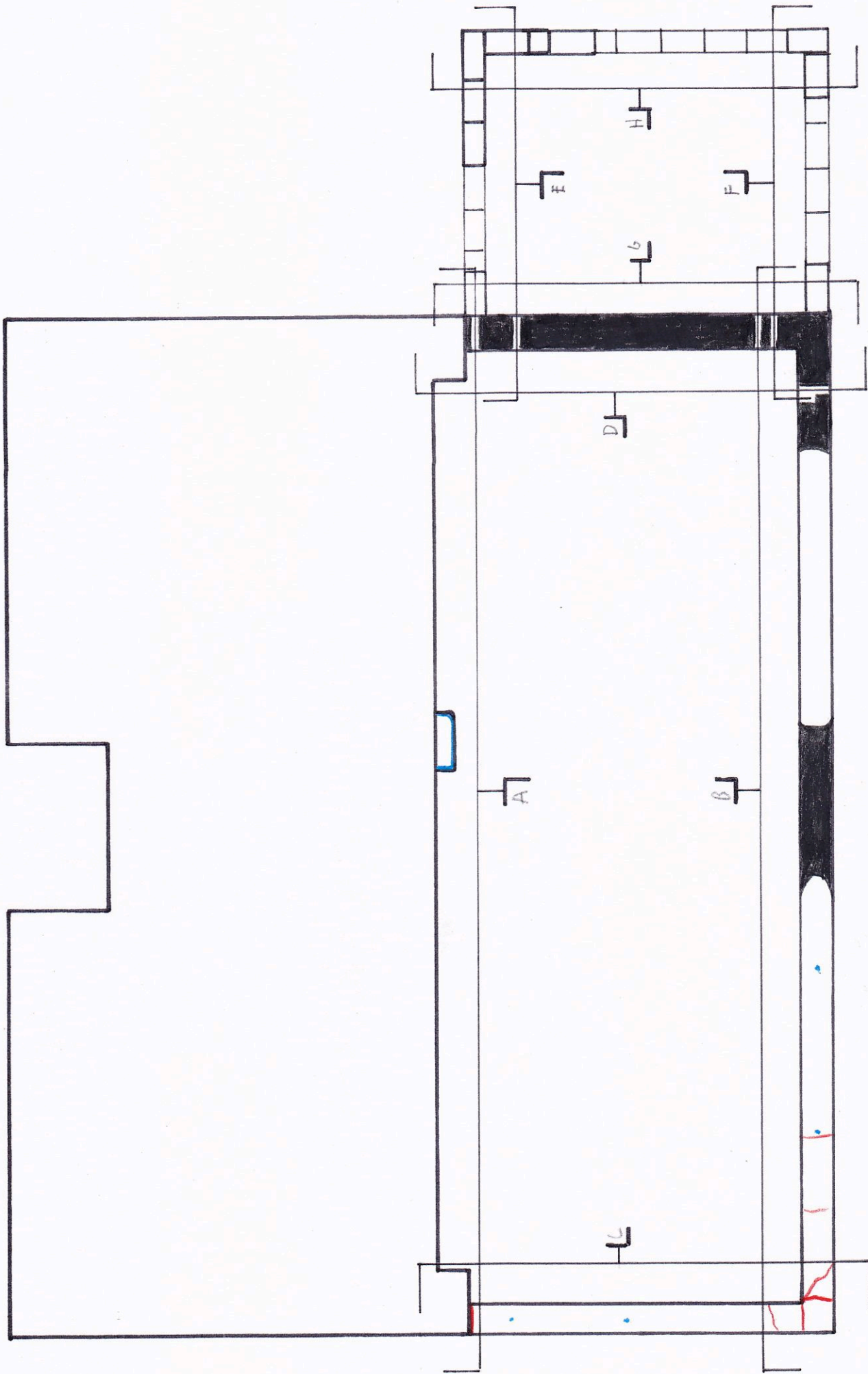
Scale 1/4" = 1'
Donald J. Sevigny, Spring 2012



Scale 1/4" = 1'
 Donald J. Sevigny, Spring 2012

[Fig. 4]
 Northeast Elevation

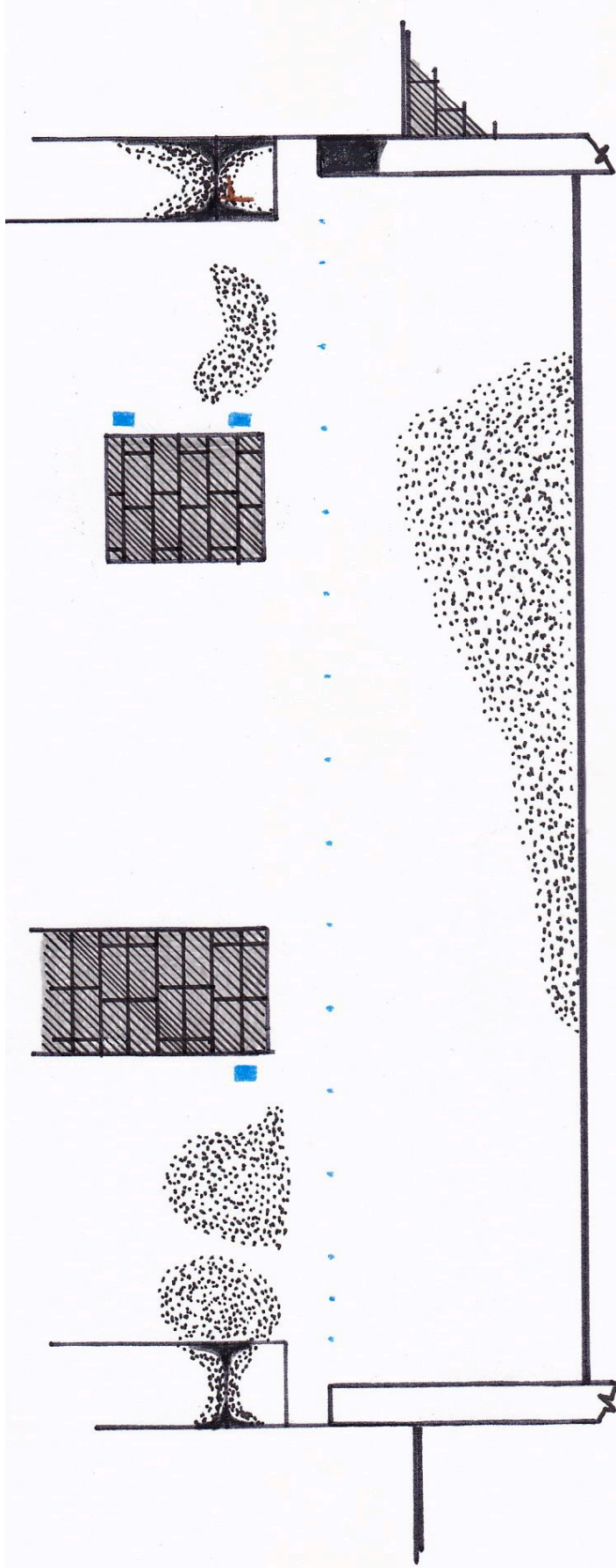
Station 3-A, Shadmoor State Park
 Montauk, New York



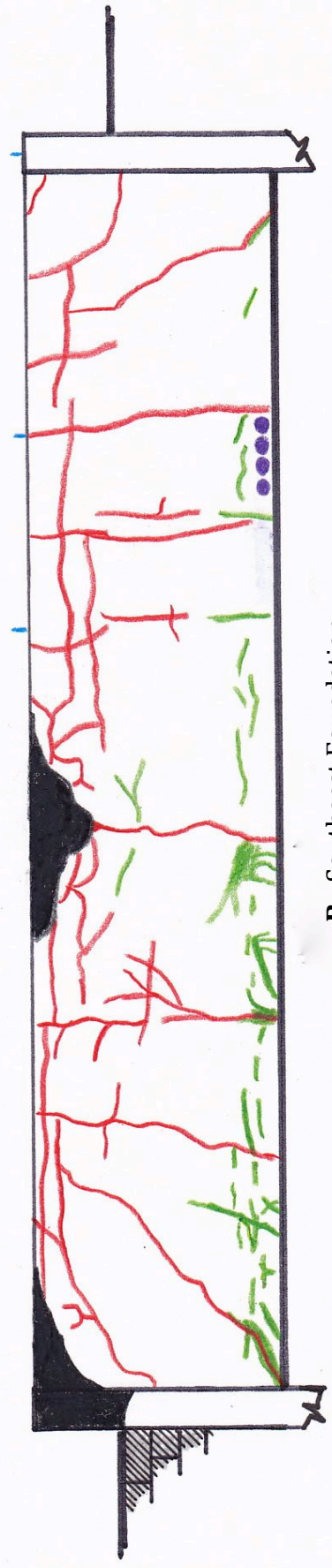
Scale 1/4" = 1'
 Donald J. Sevigny, Spring 2012

[Fig. 5]
 Index of Foundation Sections

Station 3-A, Shadmoor State Park
 Montauk, New York



A - Northwest Foundation

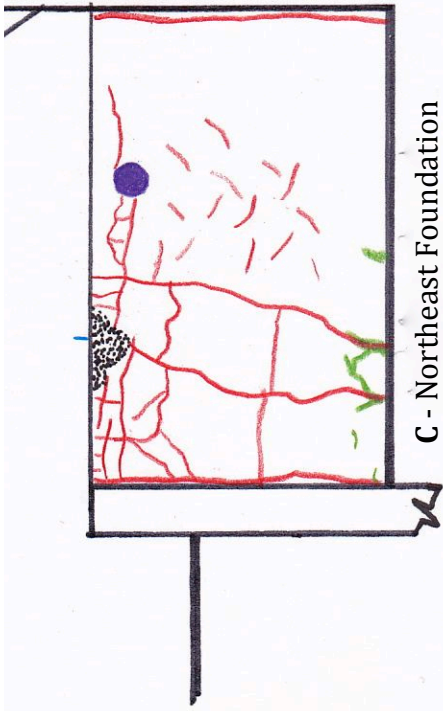


B - Southeast Foundation

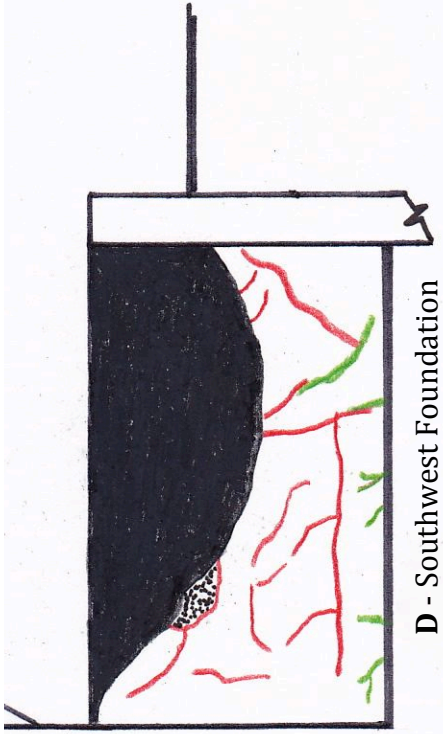
Scale 1/4" = 1'
 Donald J. Sevigny, Spring 2012

[Fig. 6] Sections - Northwest and Southeast Foundations

Station 3-A, Shadmoor State Park
 Montauk, New York



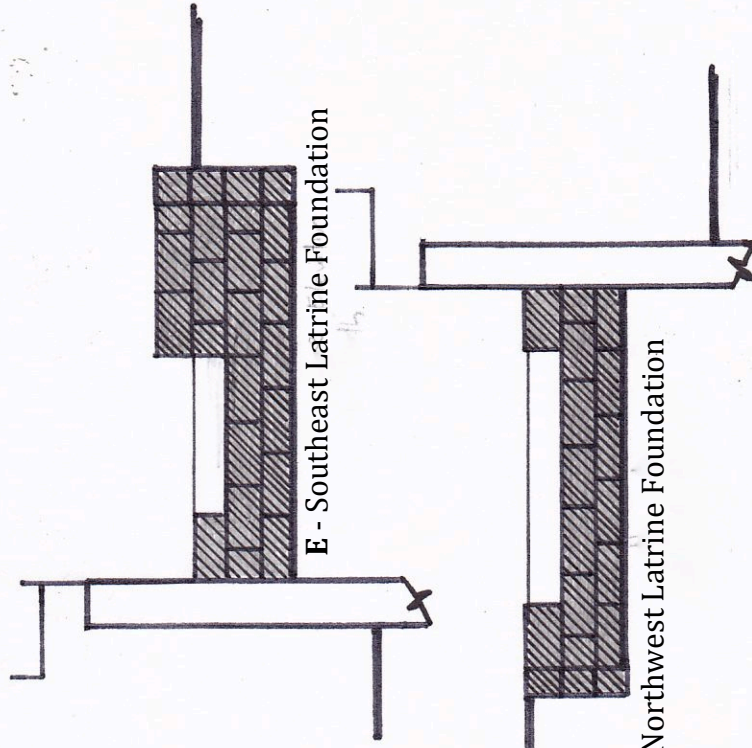
C - Northeast Foundation



D - Southwest Foundation



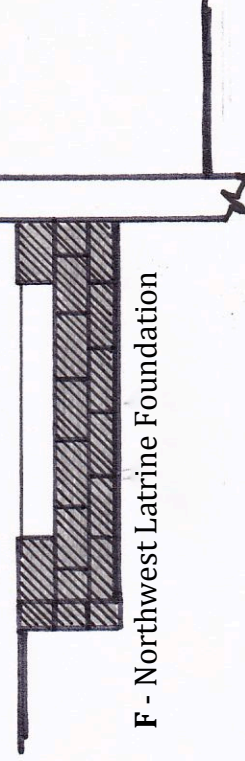
G - Northeast Latrine Foundation



E - Southeast Latrine Foundation



H - Southwest Latrine Foundation



F - Northwest Latrine Foundation

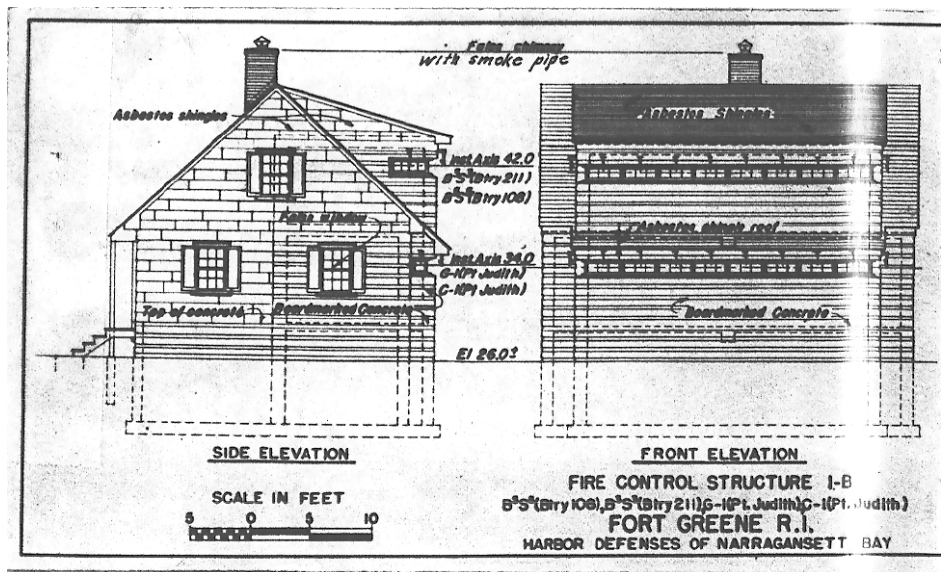
Scale 1/4" = 1'
 Donald J. Sevigny, Spring 2012

[Fig. 7] Sections - Northeast, Southwest,
 and Latrine Foundations

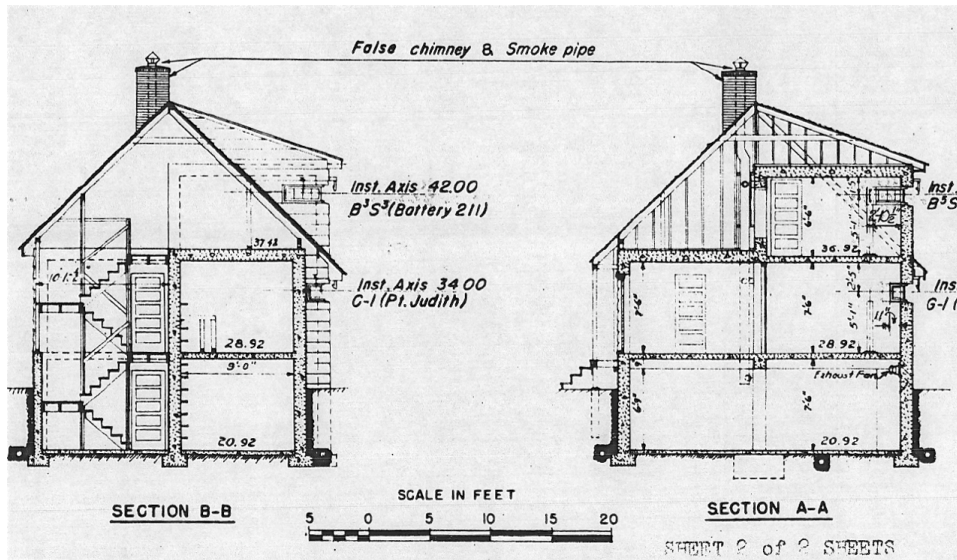
Station 3-A, Shadmoor State Park
 Montauk, New York

6.3 - Historical Information

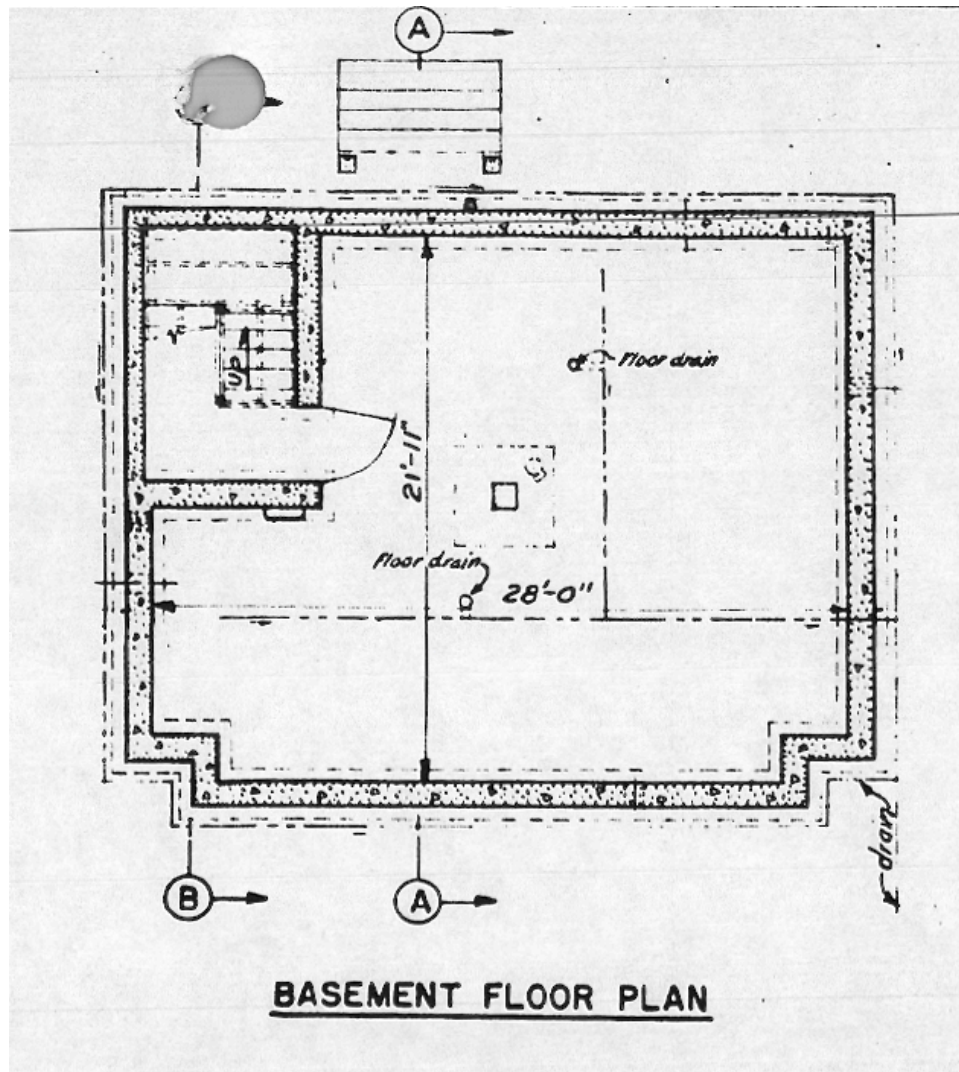
6.3.1 - Reports of Completed Works, Fort Nathanael Greene



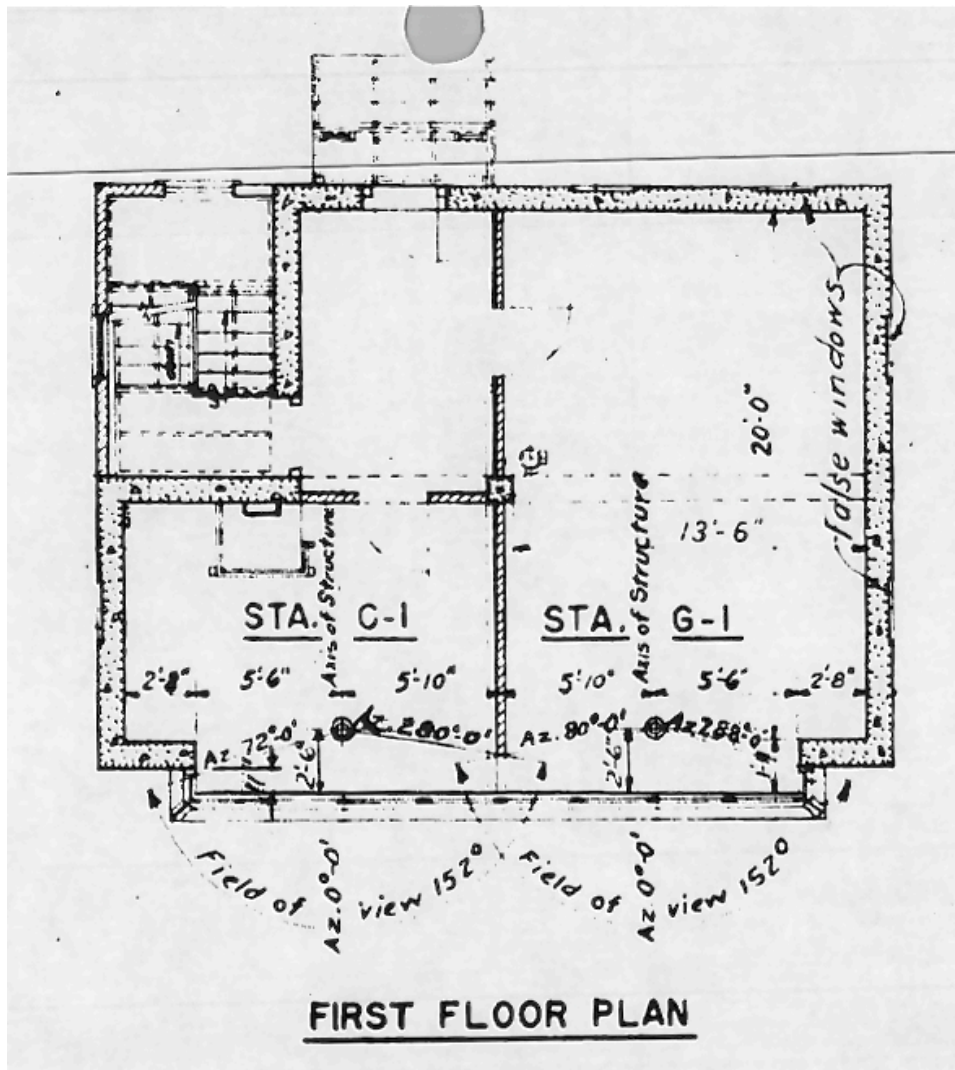
[Fig. 1] The west (side) elevation and south (front) elevation.



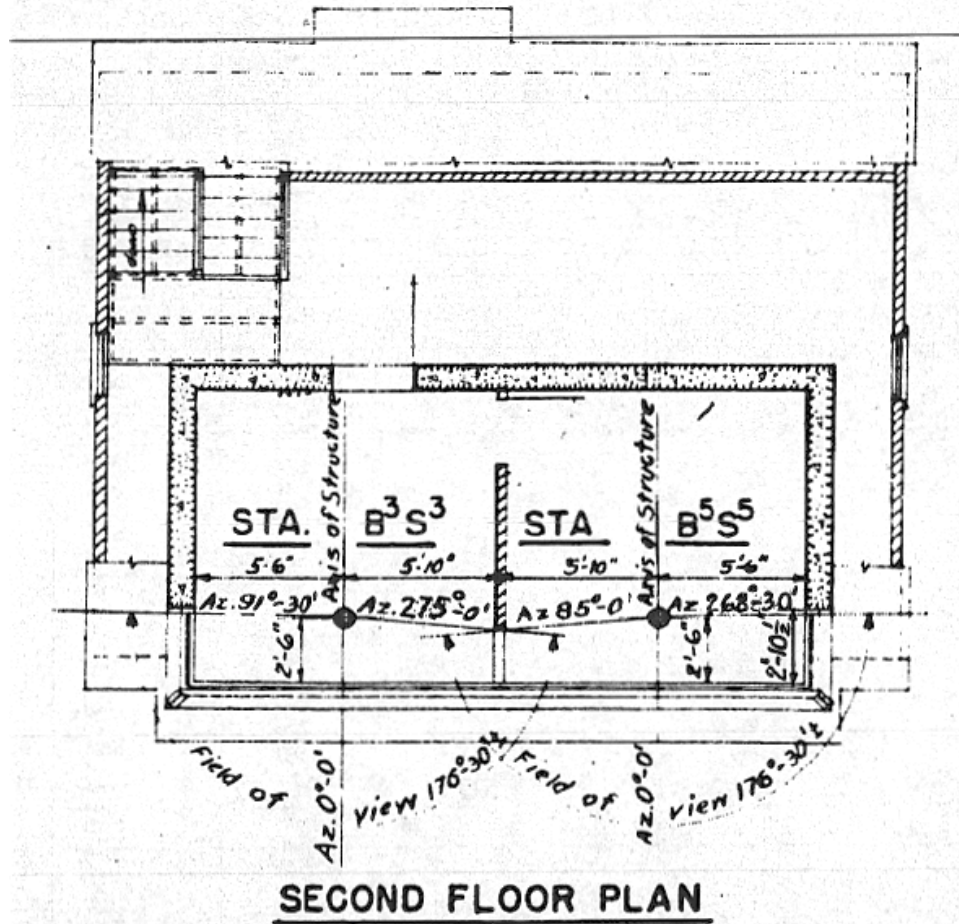
[Fig. 2] A pair of sections showing interior spaces, including the stair hall.



[Fig. 3] Basement floor plan.

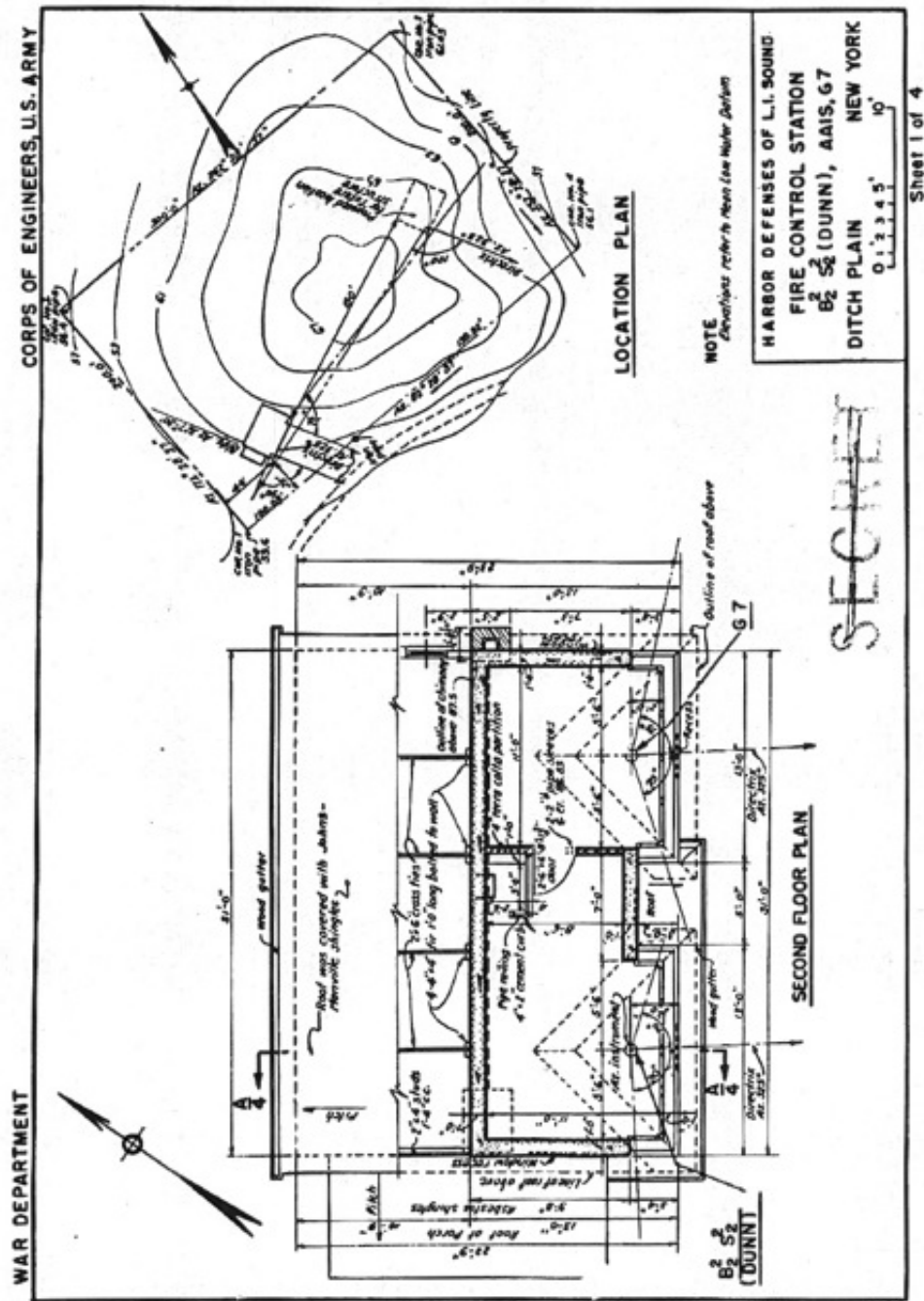


[Fig. 4] First floor plan. Note the location of interior partitions.

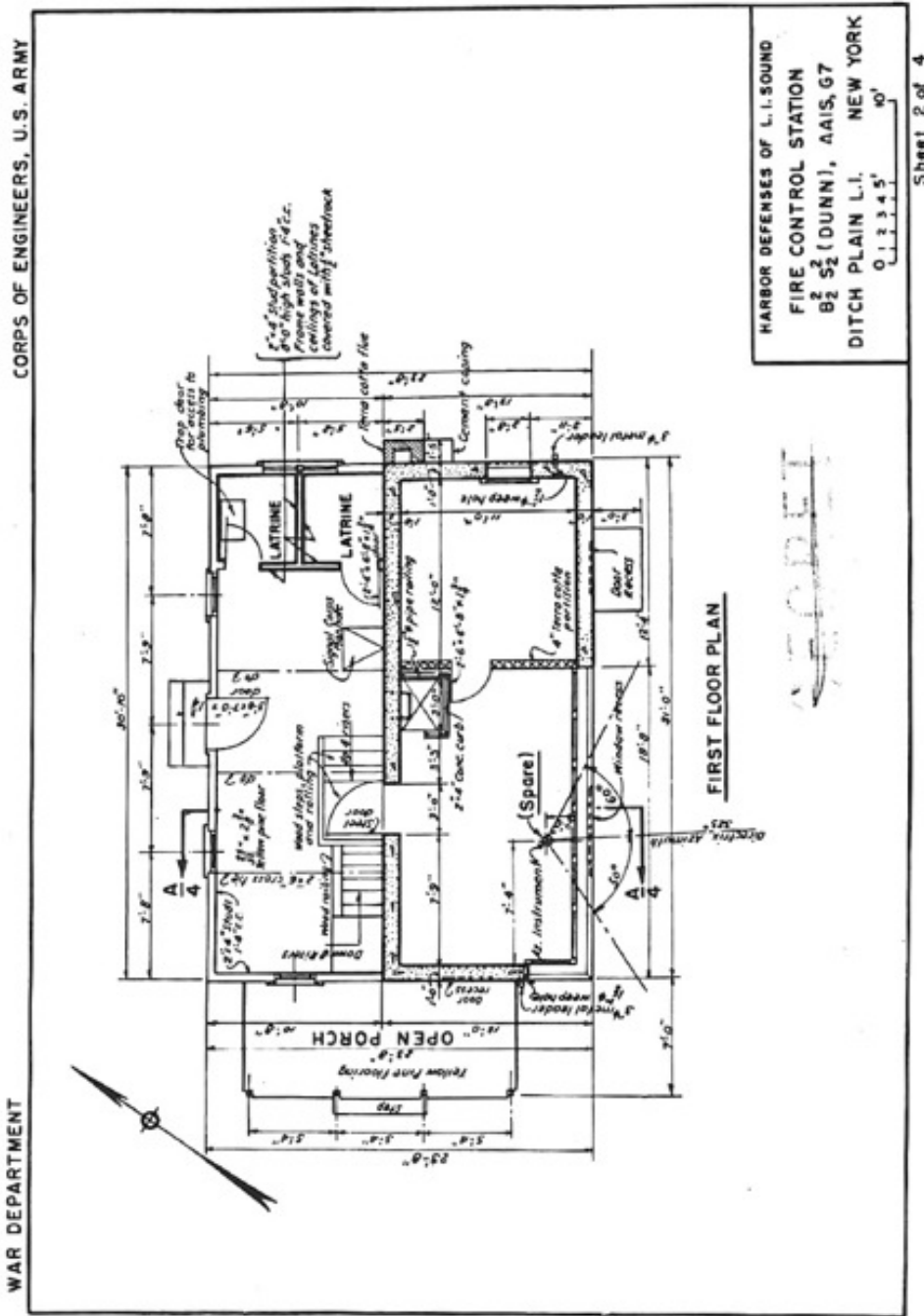


[Fig. 5] Second floor plan. Note the location of interior partitions.

6.3.2 - Historical Information - Reports of Completed Works, Camp Hero

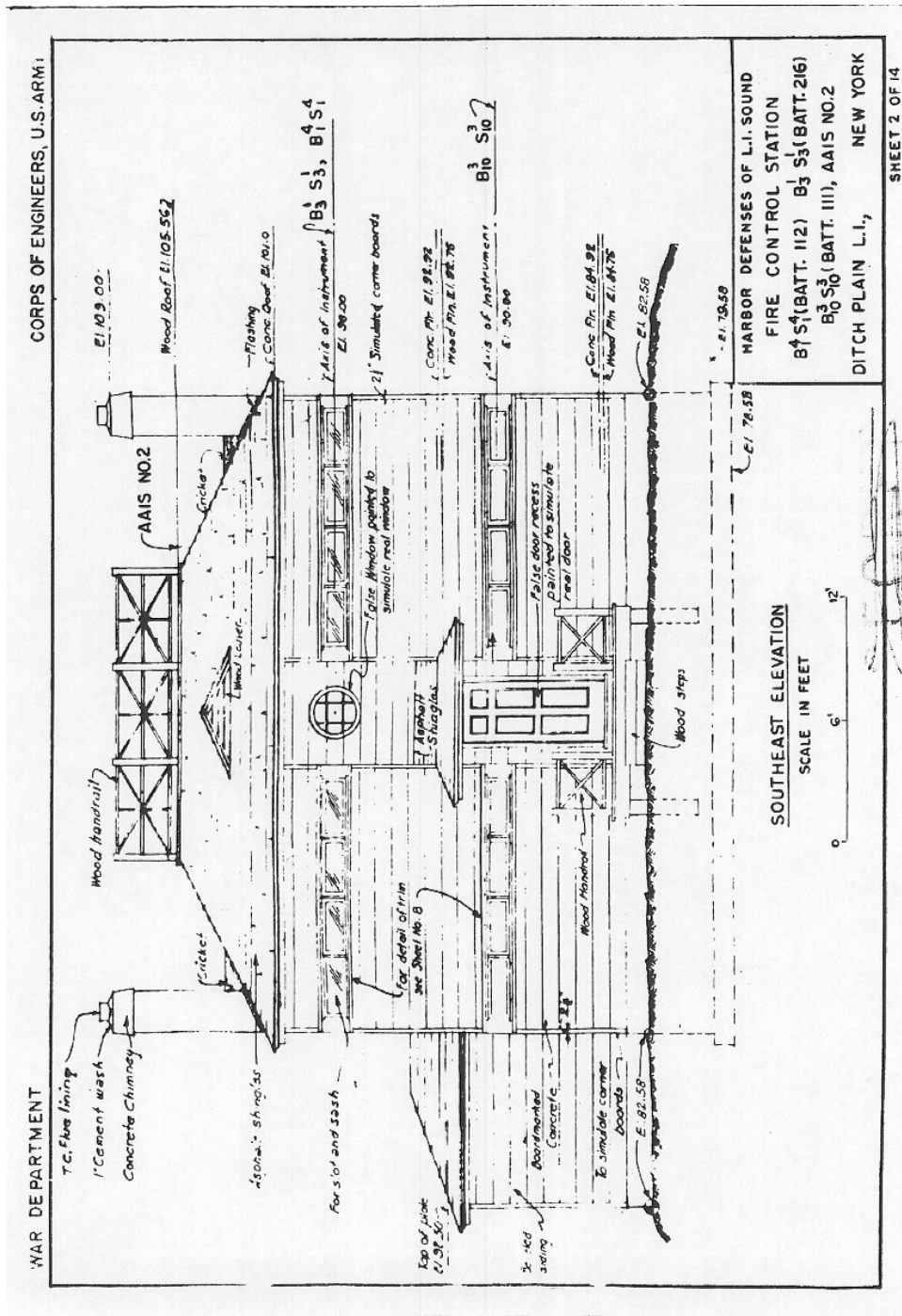


[Fig. 1] Second floor plan.

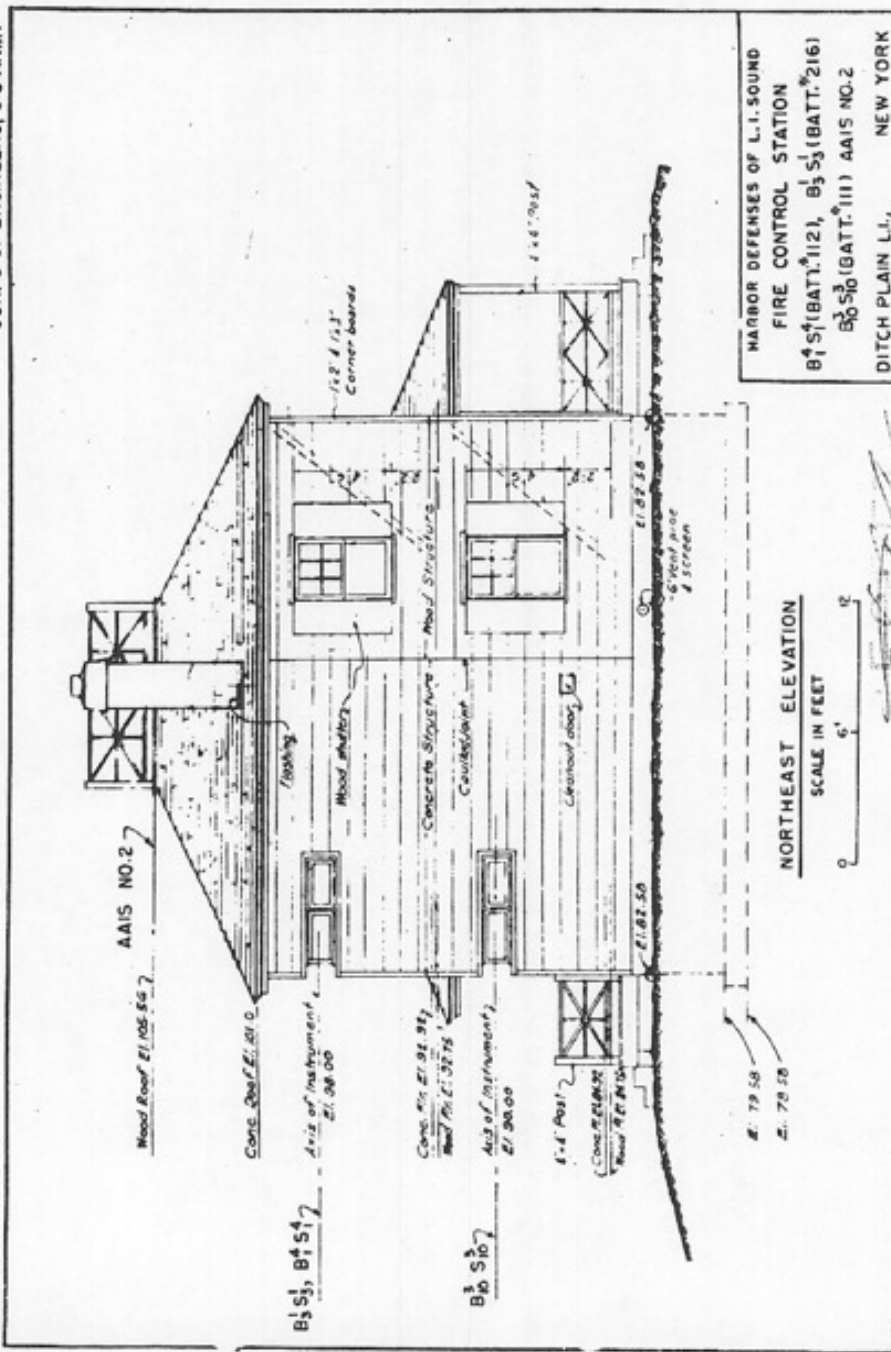


[Fig. 2] First floor plan.

6.3.3 - Historical Information - Reports of Completed Works, Camp Hero



[Fig. 1] Southeast elevation.



HARBOR DEFENSES OF L.I. SOUND
 FIRE CONTROL STATION
 B¹ S¹ (BATT. 112), B³ S³ (BATT. 216)
 B⁰ S⁰ (BATT. 111) AAIS NO. 2
 DITCH PLAIN L.I., NEW YORK
 SHEET 3 OF 12

NORTHEAST ELEVATION
 SCALE IN FEET
 0 6' 12'

[Fig. 2] Northeast elevation.

