MILITARIZED MODERNISM IN A ROOSEVELT CARIBBEAN

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INTRODUCTION

Modernism, an architecture associated with social concern and artistic avant-garde, became the architecture of the United States Navy, during World War Two (WWII). The term Modernist had many meanings. This research is a small study within the larger context of the style. It looks at the Modernist aesthetic as a tool used by the American government for the expedient completion of WWII Naval infrastructure.

Puerto Rico, a small United States territory located in the northeastern Caribbean, witnessed a surge in construction of Modernist Naval infrastructure from 1939 to 1943. The Naval infrastructures for overseas locations designated Advanced Bases were offshore nodes positioned to defend the mainland from attack. Modernist architecture, an aesthetic foreign to Puerto Rico's Spanish colonial architecture, was introduced to the island as part of this project.

Roosevelt Roads, the largest Advance Base of the Caribbean, constructed in Puerto Rico between 1941 and 1943, includes a set of buildings that were designed by American architect Albert Kahn. The white box by the sea labeled Naval Administration Building, and its surrounding warehouses are fundamental to this survey. These buildings are part of 1,650 drawings that Albert Kahn's firm completed between 1935 and 1945. This research explores how this Modernist program of Naval infrastructure occurred. Why was Modernism employed? What were FDR and Albert Khan's roles in these projects, and were these design choices due to utilitarian and industrial traditions, budgetary constraints, or both? [1]

[1] Franklin Delano Roosevelt was commonly known by his initial FDR, this abbreviation will be used throughout the text to reference the former President.

There is a connection between Franklin Delano Roosevelt and the Caribbean that led the president to become involved in the construction of the naval bases. The colonial relationship between the United States and Puerto Rico is crucial to the arrival of Modernism in Puerto Rico. Modernist architecture was used to modernize the island in the late 1930s. This process, part of FDR's national defense plan for the Caribbean, became a robust program of social aid that was meant to quell the colonial population while using their territory for military purposes.[2]

Franklin Delano Roosevelt was arguably the most influential United States President of the twentieth century. He was elected four consecutive times and died, on 12 April 1945, after serving as Commander in Chief for twelve years. His presidency, often associated with social reform in response to the Great Depression, and WWII military control influenced the politics that shaped the Caribbean of the twentieth and twenty-first century.[3]

FDR was passionate about the Navy and its historical role in the Caribbean. His fascination with the region entailed more than his love of the ocean or his service as Assistant Secretary of the Navy during World War One (WWI).[4] FDR's relationship with the Caribbean was complex and essentially overlooked by many historians because of his leadership during some of the Nation's difficult times.[5]

FDR's WWII policies for the American Atlantic, and the construction of Advance Bases reconfigured the Caribbean's arc of islands into, "a fleet of great stationary plane

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[2] Ronald Fernandez. *The Disenchanted Island: Puerto Rico and the United States in the Twentieth Century*. New York: Praeger, 1992.
[3] Geoffrey C. Ward, and Ken Burns. *The Roosevelt's: An Intimate History*.
[4] The term Assistant Secretary of the Navy will be abbreviated as ASECNAV.
[5] Geoffrey C. Ward, and Ken Burns. *The Roosevelt's: An Intimate History*.

carriers in the path of any would-be attacker of the Panamá Canal."[6] The keystone in this defense formation was Puerto Rico, an island appropriated by the United States in 1898.[7] Theodore Roosevelt, FDR's fifth cousin, participated in the Spanish-American War that led to the colonization of Puerto Rico. FDR's infatuation with the Caribbean was part of his committed to upholding his cousin's legacy.

During FDR's presidency, there was a surge in the use of Modernism. This type of architecture became an economical solution for the development of Advance Bases. This style is a minimalist aesthetic of steel and reinforced concrete that drew inspiration from industrial architecture, but that retained classical elements that made it appear more refined than simple warehouses. The United States Navy employed the aesthetic because of its pragmatism, as well as its subtleness.

Industrial architecture was not popular until the twentieth century because it was considered to be beneath the talents of an architect.[8] Albert Khan's designs for the automobile industry changed the derogatory stigma associated with industrial architecture.[9] His designs influenced Modernism, which in turn infiltrated the Federal Government, and the Department of Defense (DoD) during the mid to late 1930s.

FDR loved architecture and considered himself an amateur architect. His architectural inclinations date back to childhood, an interest that continued throughout his

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[6] Rexford G. Tugwell. *The Stricken Land, the Story of Puerto Rico.* Garden City, N.Y.: Doubleday & Company, 1947, Chapter 5.
[7] Ronald Fernandez. *The Disenchanted Island: Puerto Rico and the United States in the Twentieth Century*. New York: Praeger, 1992, 1-27.
[8] James F. Munce. *Industrial Architecture: An Analysis of International Building Practice*. London: Iliffe, 1961, 1.
[9] Federico Bucci. *Albert Kahn: Architect of Ford*. New York: Princeton Architectural, 1993, PAGE.

career. He embraced the title architect and justified it by claiming that Jefferson designed many buildings without a title.[10]

FDR understood how political leaders used architecture to represent faith in government and national institutions. He favored the symmetry and proportion of classicism but disapproved of archeological replicas. The design for Bethesda Naval Hospital embodies his architectural preferences. Architect Paul Philippe Cret was given the formal commission in 1939, but FDR is given credit for the schematic design that the architect followed.

FDR favored the abstracted classicism of proto-Modernists, such as Paul Philippe Cret, an architecture style that is sometimes confused with the European Modernism of Le Corbusier or Walter Gropius. During WWII, and mainly for economic purposes, it was not uncommon for naval engineers to adopt a severe form of abstracted classicism that resulted in stripped down concrete boxes.[11] This naval engineering approach to classicism derives from the education that naval engineers received.

Before WWII, many naval engineers were sent to study at the *Ecole Nationale des Ponts et Chaussée* in Paris. At this school, the engineers were taught concrete technologies and abstracted Greek classicism as an economic option for designing buildings.[12] French architect Auguste Perret was inspired by these concepts of abstraction and transferred them to his student Le Corbusier.

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[10] Steve Vogel. *The Pentagon: A History: The Untold Story of the Wartime Race to Build the Pentagon--and to Restore It Sixty Years Later*. New York: Random House, 2007, 68-69.

[11] *Manual of the Bureau of Yards and Docks, Navy Department Pertaining to the Public Works and Public Utilities of the Navy. 1923.* Washington: Govt. Print. Off, 1924, 3-13. 3-34. Architecturally appropriate designs…the designs shall preferably be plain and dignified with a minimum of ornamentation and free from ostentation.

[12] Peter Collins. *Concrete: The Vision of a New Architecture; a Study of Auguste Perret and His Precursors.* New York: Horizon Press, 1959, 195-96.

The most important aspect of Perret's designs is that they were in keeping with the utilitarian tradition of the early twentieth century in America. This approach to efficient design was in concert with the inclinations of America's naval engineers. These concepts also influenced Rexford Tugwell, Admiral Ben Morel, and Albert Kahn, individuals that were in charge of local politics, naval infrastructure, and Advanced bases respectively.

In *The Coming of the New Deal*, Arthur Schlesinger explains how FDR "kept up a lively interest in the most minute engineering and topographical details of the Public Works Administration (PWA)."[13] The PWA was one of the agencies dedicated to the construction of government infrastructure. These agencies often acted as contractors for defense projects. FDR took great pride in supervising these developments. He led construction issues, specifically if they pertained to naval infrastructure.

In 1967, Rexford Tugwell called Franklin Delano Roosevelt (FDR) the *Architect of An Era* because of his development of "world security."[14] Tugwell was appointed Governor of Puerto Rico by FDR from 1941-1946. He oversaw socio-economic reform programs that were meant to quell Puerto Rican poverty and secure the progress of the military infrastructure needed to protect the American commerce that went through the Panama Canal.

Roosevelt Roads was central to FDR's Caribbean defense system. The base known as, the Crossroads of the Caribbean was a short-lived venture. Strategic interests in this region changed as WWII efforts moved from Europe to the Pacific. Roosevelt Roads

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[13] Arthur M. Schlesinger. *The Coming of the New Deal*. Boston: Houghton Mifflin, 1958, 284.
[14] Rexford G. Tugwell. *FDR: Architect of an Era.* N.Y.: Macmillan, 1967, *x-xi*.

became twenty-nine thousand acres of expropriated land with a partial breakwater, a power plant, a logistics depot, and a Naval Administration Building.[15]

Chapter one of this thesis explores Puerto Rico's strategic importance, FDR's interest in the Caribbean and the architectural ramifications of his policies. It traces the agencies that were created to support the modernization of the island and the insertion of Modernist architecture as part of this agenda. It also argues that FDR's wartime efforts and his concept of "world security," which defined his third term, altered the built environment of most Caribbean islands, including Puerto Rico.

Chapter two focuses on the main thesis question. How did Modernism become the architecture of Advance Bases? It links events and characters that influenced Modernism. The appearance of industrial buildings in the late nineteenth century was parallel with a division between the architecture and engineering professions. The division of these professions encouraged engineers to be in charge of industrial construction and left architects debating building aesthetics. Modernism partly resulted from a crisis of style that developed as architects like Le Corbusier and Walter Gropius looked at industrialism, technology, and engineering for construction solutions. The style became popular with the Federal Government during the 1930s as architecture for low-cost projects that were central to FDR's revival of the construction industry. Albert Khan, the designer of Advance Bases from 1939 to 1945, was crucial to the development of Modernism and is studied as a character that influenced the style through his propagation of American industrialism.

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[15] Ronald Fernandez. *The Disenchanted Island: Puerto Rico and the United States in the Twentieth Century*. New York: Praeger, 1992.

Chapter three discusses Roosevelt Roads Naval Base in detail and reveals how the base was planned to rival Pearl Harbor in scale and significance. The chapter describes the construction process of the base between 1939 and 1945. The section is a formal analysis of the structures, particularly the US Navy's Administration Building, a white concrete box designed in Detroit by Albert Khan's firm. This building, grounded on Albert Khan's industrial schemes, is Modernist because it is too refined to be a simple feat of engineering, yet it is too industrial to be a classical structure.

A concluding chapter summarizes the lessons learned from the research and evaluates areas requiring further investigation. This study suggests that the United States Navy subscribed to the Modernist aesthetic during WWII, that Modernist architecture was used to modernize Puerto Rico so that the island could serve Americas national defense purposes, and that the implementation of this style introduced new construction standards to the region. These conclusions suggest that Naval architecture is a typology that affects the built environment of its host country, and that naval development should consider these influences.

CHAPTER ONE: FDR AGAINST TOTALITARIANISM

FDR's upholding of Theodore Roosevelt's legacy, the colonial dynamics between Puerto Rico and the United States, and WWII are issues that were central the modernization and militarization of Puerto Rico. The development of Puerto Rico is key to understanding how Modernism arrived in the region. These sociocultural, political, and economic perspectives frame Roosevelt Roads as more than an isolated Naval engineering effort.

WWII was a global cataclysm creating changes across the Caribbean.[16] The Caribbean theater was not exempt from conflict, though engagements were few, submarine warfare took place in the region, and between 1942 and 1943, hundreds of merchant ships were lost. The Caribbean theater was important to FDR, and integration of his defense scheme implicated dealing with the colonial relationship that existed between Puerto Rico and the United States.[17]

During WWII, the Federal Government favored Modernism for the construction of Naval Bases. Puerto Rican's defined this construction approach as "the American Style."[18] The alleged style included a mass production approach to construction that left islanders amazed. The development of naval infrastructure was part of a larger program that included construction of public buildings, transportation infrastructure, and

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[16] Gerardo M. Diz. *Puerto Rico: El Gibraltar Del Caribe: Intereses Estratégicos Estadounidenses Y La Base Aeronaval Roosevelt Roads*. San Juan, P.R.: Editorial Isla Negra, 2008, 15. "Según algunas historias generales de Puerto Rico, la Guerra, cuando se trata, es algo que estaba sucediendo en el "trasfondo" o a la que "fueron" los veteranos, para después regresar y ayudar a cambiar el rostro del país."

[17] Ibid, 15.

[18] Ronald Fernandez. *The Disenchanted Island: Puerto Rico and the United States in the Twentieth Century*. New York: Praeger, 1992, 148. "A Father Tackney observed … In less than two years, the men of Vieques learned more than they would have in 20 years here on the island alone. They could now operate strange Machines…thanks to the Americans, a common phrase among the people is "Estilo Americano" - which means the American way."

development of public services. The most striking addition to the island's services was the establishment of a cement industry. This industry was fundamental since cement for concrete, emblematic of Modern construction, was the fastest and most economic solution to the shortage of infrastructure.[19]

Accelerated concrete constructions across the island during the 1930's and 1940's led Puerto Ricans to proclaim that the American Style was more technologically advanced. Over the next two decades, Islanders replaced masonry for concrete. The vernacular architecture began to change as new and easier construction methods overtook five centuries of building customs.[20]

Puerto Rico is the smallest of the Greater Antilles. The Atlantic Ocean covers the North Coast, and the Caribbean Sea lies south. It is also an archipelago that consists of two smaller islands, Vieques, and Culebra. The Passage of Mona separates it from La Hispaniola on the west, and the Passage of Vieques separates it from the Virgin Islands to the east. It has a semi-rectangular shape and measures a hundred miles long by thirty-five wide (Figure 1).

Christopher Columbus discovered the island in 1493 on his second trip to America. About thirty thousand Taino Indians welcomed the Spaniards. The Taino's were forced to extract gold, and because of the arduous work conditions the race became extinct. The island ran out of gold after the Spaniards arrived, and once it stopped producing revenue, it became a Spanish stronghold. The Fort San Felipe del Morro, built

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[19] Gerardo M. Diz. *Puerto Rico: El Gibraltar Del Caribe: Intereses Estratégicos Estadounidenses Y La Base Aeronaval Roosevelt Roads*. San Juan, P.R.: Editorial Isla Negra, 2008, 16. "Esa infraestructura conllevó el desarrollo de un nuevo sistema vial, recursos energéticos y de agua, facilidades portuarias, comunicaciones, acciones de salubridad regionales, desplazamiento de comunidades expropiadas, importantes migraciones a municipios costeros, creación de empleos, inversiones considerables en ciertos municipios y regiones, y desarrollo de industrias como la del cemento."

[20] Fernandez, Ronald. *The Disenchanted Island: Puerto Rico and the United States in the Twentieth Century.* New York: Praeger, 1992, 137-164.

in 1539, survives as a testament of this military background. The defense system was used to protect the capital from piracy and maintain oversight of the region (Figure 2).[21]

Spain's interests in the Caribbean region dwindled as they began to exploit larger regions of Central and South America. By the seventeenth century, Puerto Rico was invisible to Spain. Without gold to offer the Spanish Crown, the island's economy fell into the hands of pirates. Shortly after contraband became the main source of goods for the citizens of Puerto Rico, and regardless of local efforts, this stalemate did not change until the late nineteenth century.

Puerto Rican struggle for autonomy was an ongoing problem that reached its peak during the 1860's. In 1868, an insurrection of about five hundred peasants called *"El Grito de Lares"* (The Shout of Lares) opened the door to reform dialogues (Figure 3). The process was slow, and Spain played "political ping pong" with the Islanders between 1870 and 1890.[22] Francisco Oller's 1893 painting, *"El Velorio"* (The Wake), is a glimpse into the spirit of the time (Figure 4).

In the painting, Oller depicts the mourning of a *jibaro* (peasant) child. He used the mourners to represent his wealthy *criollo* patrons, a group of elites that avoid eye contact with the cadaver because they are unaffected by the child's death.[23] Oller used the scene to express what he considered Puerto Rico's greatest problem, which was that the island possessed a small middle class and a marked division between rich and poor. The elites always looked to Spain as the example of progress while ignoring the peasant. Oller's overarching message was that the peasant embodied four centuries of social

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[21] Gerardo M. Diz. *Puerto Rico: El Gibraltar Del Caribe: Intereses Estratégicos Estadounidenses Y La Base Aeronaval Roosevelt Roads*. San Juan, P.R.: Editorial Isla Negra, 2008, 28.
[22] Ibid, 32.
[23] Ibid, 32.

diversity that remained invisible to the world.[24]

The small middle class leader was Luis Munoz Rivera. He was born in Barranquitas, Puerto Rico, July 17, 1859, and was a journalist that became a politician.[25] He fought for independence and participated in drafting the Autonomic Charter of 1897, a treaty that gave Puerto Rico an Insular Parliament with exclusive power.[26] The American invasion of July 25, 1898, nullified the Insular Government and turned the island into a spoil of war under the Sixth Treaty of Paris. Puerto Rico's struggle for autonomy was erased as the island confronted five more decades of political uncertainty.

The invasion of Puerto Rico was part of America's nineteenth century naval renaissance, a period marked by U.S. imperial awakenings. One of the institutions that promoted the growth of the navy was the Naval War College. Rear Admiral Alfred Thayer Mahan, a leading proponent of imperialist ideals, became an instructor at The War College in 1885 and was appointed President the year after. In 1887, Theodore Roosevelt was invited to lecture at the Naval War College where he met Admiral Mahan, and they became friends.

Theodore Roosevelt was an avid naval historian. He was born on October 27, 1858, and was a descendant of the Oyster Bay Roosevelts.[27] While studying at Harvard University he became interested in the War of 1812 and the role of the U.S. Navy in the conflict. This interest led him to write the book, *The Naval War of 1812: Or, The History of the United States Navy During the Last War with Great Britain.* After graduation,

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[24] Gerardo M. Diz. *Puerto Rico: El Gibraltar Del Caribe: Intereses Estratégicos Estadounidenses Y La Base Aeronaval Roosevelt Roads*. San Juan, P.R.: Editorial Isla Negra, 2008, 32.
[25] The Admirable Campaign was the set of 19th century military actions led by Simon Bolivar to free Venezuela from Spanish Control.
[26] Ronald Fernandez. *The Disenchanted Island: Puerto Rico and the United States in the Twentieth Century*. New York: Praeger, 1992, 33.
[27] Geoffrey C. Ward, and Ken Burns. *The Roosevelt's: An Intimate History*.

Roosevelt published the book, which was praised by the Naval community, and which led to his friendship with Admiral Mahan.[28]

Admiral Mahan was president of the Naval War College until 1889. A year after leaving the presidency he published *The Influence of Sea Power upon History,* a book that "articulated a vision of U.S. national power that was linked to a program of conquest and control."[29] As stated by Katherine McCafrey in her book, *Military Power and Popular Protest: The U.S. Navy in Vieques, Puerto Rico*:

> "The United States destiny, Mahan argued, rested upon expanding foreign commerce. Control over an isthmian canal was the key to strategic and commercial domination of the hemisphere…Colonies, therefore, where a key part of Mahan's formula, acting as necessary steppingstones to protect and fuel ships and gain access to enormous markets in Latin America and Asia. Supremacy over the Caribbean was crucial."[30]

As further outlined by McCafrey, Admiral Mahan's theories were not new; he simply outlined seventeenth and eighteenth-century commercial successes of European countries that owned navies. What made the Admiral's theories popular was that they were adopted and advocated by Theodore Roosevelt. Admiral Mahan's ideology was influential to the colonial relationship between Puerto Rico and the United Sates.[31]

Theodore Roosevelt was Assistant Secretary of the Navy from April 19, 1897, to May 10, 1898, under William McKinley, the 25th president of the United States. He resigned his post after the first year of service to join the Spanish-American War, and established a volunteer cavalry group called the Rough Riders. This group served under the partial supervision of Admiral Mahan, who became a strategic advisor for wartime

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[28] Theodore Roosevelt. *The Naval War of 1812, Or, The History of the United States Navy during the Last War with Great Britain: To Which Is Appended an Account of the Battle of New Orleans*. Best, 1889.
[29] A. T. Mahan, and Louis M. Hacker. *The Influence of Sea Power upon History, 1660-1783*. New York: Sagamore, 1957.
[30] Katherine T. McCaffrey. *Military Power and Popular Protest: The U.S. Navy in Vieques, Puerto Rico*. New Brunswick, N.J.: Rutgers University Pres, 21-22.
[31] Ibid, 21-22.

operations.[32] The war, which proclaimed Independence for Cuba, was waged against Spain in both Atlantic and Pacific theaters.

Theodore Roosevelt stated, "until we definitely turn Spain out of those islands (and if I had my way it would be done tomorrow), we will always be menaced by trouble down there."[33] He was so committed to the conflict that a week before the declaration of war he ordered the purchase of carbon, munitions, and supplies for the fleet, and ordered Commodore George Dewey to prevent Spanish ships from fleeing the Pacific. Theodore Roosevelt led the strategies of the war and then fought on the ground as commander of the Rough Riders.[34]

American troops invaded Puerto Rico through the town of Guanica on July 25, 1898. Within three days General Nelson Miles controlled Puerto Rico's second largest city, Ponce. French Ambassador Jules Cambon was the mediator between the United States and Spain. The day after the invasion of Puerto Rico, President McKinley dictated his terms to Cambon. He ordered Spain to relinquish sovereignty of Cuba and to cede Puerto Rico. On July 31, 1898, Cambon argued, "the demand to keep Puerto Rico as an indemnity was "an attempt to hide a conquest by arms."[35]

Spain proceeded with the negotiations and surrendered San Juan. By December 10, 1898, Puerto Rico was the property of the United States, but nobody knew what to do with the island. There were congressional debates on the unconstitutionality of owning a colony, on what to do with the colony's citizens, or how to tax the territory. There were

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[32] Katherine T. McCaffrey. *Military Power and Popular Protest: The U.S. Navy in Vieques, Puerto Rico*. New Brunswick, N.J.: Rutgers University Press, 2002, 50.
[33] Ibid, 22.
[34] Gerardo M. Diz. *Puerto Rico: El Gibraltar Del Caribe: Intereses Estratégicos Estadounidenses Y La Base Aeronaval Roosevelt Roads*. San Juan, P.R.: Editorial Isla Negra, 2008, 51.
[35] Ronald Fernandez. *The Disenchanted Island: Puerto Rico and the United States in the Twentieth Century*. New York: Praeger, 1992, 3.

some efforts on the part of Congress to alleviate the economic situation of the island, and many Puerto Ricans, who remained inspired by the values of the American Republic, desired to become a state. Nonetheless, there were bigger issues in the way of Puerto Rico becoming a non-contiguous state.

The main problem was that Puerto Rican's had Spanish blood. Senator Chauncey Depew of Oregon referred to this as the Black Legend, a "bag of undesirable characteristics that were Spain's terrible legacy to the new world."[36] According to this Black Legend, it was impossible to teach the principles of liberty to people with Spanish blood. A second problem was the skin color of Puerto Rican's, they had "colored people" blood, and this in combination with the Black Legend had Puerto Ricans at the bottom of racial hierarchies.[37] Puerto Ricans were considered to be unfit for democracy but according to George C. Perkings of California they stood a chance. The senator believed that because every Puerto Rican had some white blood in them, "they might eventually climb over the barriers erected by their Spanish and Negro heritage."[38]

President William McKinley was shot on September 6, 1901, died on September 13, and was succeeded by Vice President Theodore Roosevelt. As president, Theodore Roosevelt's international policy was focused on the Caribbean, especially locations that affected the defense of the Panama Canal.[39] The United States started constructing the Panama Canal in May 4, 1904, and FDR toured the Canal Zone with his mother that same year. The trip was surely enlightening to the status of his cousin's efforts in the region.[40]

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[36] Ronald Fernandez. *The Disenchanted Island: Puerto Rico and the United States in the Twentieth Century*. New York: Praeger, 1992, 12.
[37] Ibid, 13.
[38] Ibid, 13.
[39] David G. McCullough. *The Path between the Seas: The Creation of the Panama Canal, 1870-1914*. New York: Simon and Schuster, 1977.
[40] Rexford G. Tugwell. *FDR: Architect of an Era.* N.Y.: Macmillan, 1967, 29-30.

Before securing the Canal Zone, Theodore Roosevelt negotiated the independence of Panama with Colombia. He also debated the sovereignty of Panama and America's right to build the canal against France, who failed to complete the same project because of insalubrious conditions and the spread of Malaria amongst their workers.[41] To say this was Theodore Roosevelt's *chef-oeuvre* is an understatement. Puerto Rico was important to these efforts since it was the only American territory from which the canal could be monitored.

Puerto Rico was a military colony for two years after the American invasion. In 1900, the United States Congress, under the Foraker Act, changed the military regime to a civilian government.[42] Puerto Rico's potential as a Caribbean stronghold became more apparent in the decades to follow. The expansion of the American Navy was Theodore's second largest project. According to Admiral Mahan's theories, the colonial holdings needed to be protected by a strong naval power, and this posture led to the creation of The Great White Fleet.

The Great White Fleet was a set of sixteen battleships that cruised the world from December 16, 1907, to February 22, 1909. The ships were commissioned to stop in different ports and show the post-Spanish War progress of America's blue water navy. They also elevated America's naval status to become the world's third strongest navy.[43]

During WWI, the Generals of Kaiser Wilhelm II threatened the U.S. Atlantic Coast and encouraged Mexico to form a military allegiance. Germany sunk American

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[41] David G. McCullough. *The Path between the Seas: The Creation of the Panama Canal, 1870-1914*. New York: Simon and Schuster, 1977.
[42] The Foraker Act, also known as the Organic Act of 1900, was the United States Federal law that established a civilian government fro Puerto Ricans.
[43] "Naval History and Heritage Command." *The Great White Fleet*. Web. 5 Oct. 2015. <http://www.history.navy.mil/research/histories/ship-histories/the-great-white-fleet.html>.

merchant and passenger ships on the Coast of England, but President Woodrow Wilson refused to enter the war. However, in 1917, the war was declared when the Kaiser's Generals asked Mexico to invade the southwest of the United States. The continental threat pushed President Wilson to mobilize the Nation.[44] As ASECNAV, FDR was eager to expand the Navy and go to war since he sought to stand up to his cousin's reputation.

The United States defense concerns led to modifying Puerto Rico's colonial government in 1917. The Jones–Shafroth Act, which granted U.S. citizenship to Puerto Ricans, substituted the Foraker Act. Citizenship was also the way to test the loyalty of Puerto Ricans and increase manpower for the war effort. After WWI political progress came to a halt and Puerto Rico was forgotten. The island became nothing more than a popular retirement destination for Admirals and Generals, and their strict leadership styles created tensions with the locals who resented living under military regimes.

Young Franklin Delano Roosevelt was not a stranger to the concept of a Canal in Central America. His father, James Roosevelt, was a businessperson who spent the winter of 1887 at the White House pursuing a commercial venture for a Central American canal. He traveled to the White House with his wife, son, and business associates to convince President Grover Cleveland that America needed an isthmian canal in Nicaragua. The project was never completed, but Congress passed a bill for the Maritime Canal Company of Nicaragua that was signed by the President.[45]

The family ties with Central America and the Caribbean influenced FDR. His father's relation to a transoceanic canal in Central America and his cousin's involvement in the execution of the Panama Canal are undeniable influences to the policies he

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[44] *The Great War*. PBS Home Video, 1996. Film.
[45] Rexford G. Tugwell. *FDR: Architect of an Era.* N.Y.: Macmillan, 1967, 14.

introduced as president. From these connections, we can establish that the Caribbean was not only a national business, but also a family affair.

FDR was a well-traveled man who belonged to a wealthy family. He was born January 30, 1882, and was the only child of James Roosevelt I, and Sara Ann Delano. James Roosevelt I became ill when FDR was nine and, as a result, the family spent a lot of time in wellness resorts. FDR belonged to the Hyde Park on the Hudson Roosevelt's. A part of the family that, contrary to the Oyster Bay Roosevelts, was famous for their democratic inclinations.[46]

During his trips to Europe, FDR learned French and German. He was fond of the country, a sensibility towards nature that led him to become a protector of wildlife. He also learned seamanship in the Bay of Fundy while spending summers at Campobello aboard a fifty-foot deep-sea craft called *The Half Moon*.[47] He was schooled at home until he entered Groton School in 1896.

FDR's admiration for his cousin Theodore deepened while he was a student at Groton. In 1897, he visited Theodore at Oyster Bay. A year later, he followed his cousin's campaign, assisted with his 1899 inauguration, and visited him at the executive mansion in Albany.[48] FDR learned leadership and politics from observing Theodore, and admiration that led him to mimic his cousin's career.

The Roosevelt cousins served in the New York State legislature, both became governors of New York, both were ASECNAV, and both became President. However, there were some differences. Theodore was McKinley's vice president and FDR never held this position. He ran for vice president with Democrat James M. Cox but

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[46] Rexford G. Tugwell. *FDR: Architect of an Era.* N.Y.: Macmillan, 1967,, 1-9.
[47] Ibid, 10-14.
[48] Ibid, 13-14.

Republicans Warren Harding, and Calvin Coolidge defeated the ticket in 1920. A strong point in the Roosevelt's parallel careers was the term served as ASECNAV. Both men looked to the Navy as America's most important defense asset.

FDR began working as ASECNAV a year before WWI. He was unaccustomed to a desk job and spent much of his time visiting shipyards and talking to officers. The advent of war brought excitement to the officers of the navy who sought to expand the force and its ships. FDR was not immune to this enthusiasm. He promoted expansion while the president advocated neutrality and at times got in trouble for being insubordinate.[49]

FDR spent seven years in the position of ASECNAV and struggled with his duties because he believed he was better qualified than his superior, Josephus Daniels. He tried to become a naval officer or get a position in the New York State offices more than once, but both of these attempts failed. He was also eager to see combat action, and to play a role in the war, like his cousin Theodore. His restlessness, the open attacks on the administration, and his advocacy of war made his term difficult.[50]

The relationship between FDR and his leaders changed after the 1917 declaration of war. To imitate Theodore, FDR traveled abroad in 1918. Upon returning, he asked President Wilson for command of a battery of heavy naval guns, but by then the armistice was under negotiation. At the end of the war, the president traveled to France with FDR to negotiate the peace treaty. During this trip, Wilson expressed his desire to establish a League of Nations to ensure peace for the future. FDR came to understand the President's neutrality and to admire his efforts. His concept of world security sprang from his

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[49] Rexford G. Tugwell. *FDR: Architect of an Era.* N.Y.: Macmillan, 1967, 42.
[50] Ibid, 43.

disappointment during the congressional defeat of President Wilson's proposal.

FDR was stricken with polio in 1921, "from a tall, handsome, athletic man, he had become a wheelchair case, dependent on others even for the simplest movements." Polio was FDR's greatest battle, and a crippling obstacle that he refused to accept. His mother Sara saw this as the end of his career and suggested he retreat to hiding. His wife Eleanor differed. She felt that it was now, more than ever, that FDR had to pursue his dream of becoming president.

FDR fought Polio incessantly. His quest for recovery took him to Warm Springs Georgia, a place that brought him close to rural Americans and the poverty that they suffered. In the end, he came to realize he would never walk again. However, these years were formative to the social welfare ideas that marked his first term as president, ideas that were also present in the modernization of Puerto Rico.

FDR was elected president in 1932 and re-elected in 1936. His first two terms are marked by his concepts of American social security, mainly because the president faced the grueling effects of the Great Depression. FDR believed that the Federal Government should provide a certain level of security to its citizens. Conservative groups of the American 1930s viewed the concept of charity as something that belonged to the private sectors, and Federal aid was considered a radical approach to fixing the economy.

The term a "New Deal," was mentioned by FDR during his 1932 campaign. Following his election, the slogan became an umbrella title for any one of the forty-some agencies created during FDR's first one hundred days in office. One of the most ambitious solutions to end starvation was to create federal employment. The Works Progress Administration, renamed Work Projects Administration (WPA) in 1939, was the result of a five billion dollar appropriation that turned the American Government into the

world's largest employment agency. From 1933 to 1939 the agency constructed 70% of the Nation's schools, 65% of its public buildings, 35% of the public health facilities, and 10% of the transportation infrastructure.[51]

The Federal Government agencies dedicated to construction changed America's built environment. The sense of urgency in the construction of these structures, the integration of industrial design, steel, concrete, and the influence of WWI architects from Europe gave the architecture of FDR's time a unique flavor. While it is impossible to attribute every single structure to the president, it is important to consider that he coordinated many of the "most minute engineering and topographical details."[52]

Another important aspect of the agencies created by FDR was that they had the authority to act as construction agencies. They were able to pay other Federal Agencies, such as the Department of Defense, for construction work. The boards for these construction agencies included the president, who presumably led them, alongside his uncle Fred Delano, a notable city planner. There were other members involved in planning and construction boards, but the most notable ones that would eventually become part of the militarization of Puerto Rico were Harold L. Ikes and Rexford G. Tugwell.

The beginning of FDR's third term is characterized by something quite different. FDR led America through WWII, the most violent conflict in the twentieth century. In the midst of war and on the eve of a fourth term he stated, "Of this island shield Puerto Rico is the center. Its possession or control by any foreign power – or even the remote threat of such possession – would be repugnant to the most elementary principles of

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[51] Geoffrey C. Ward, and Ken Burns. *The Roosevelt's: An Intimate History*, Episode 7.
[52] Arthur M. Schlesinger. *The Coming of the New Deal*. Boston: Houghton Mifflin, 1958, 284.

National Defense."[53]

FDR's description of Puerto Rico reveals why he ordered the creation of the Puerto Rico Reconstruction Act (PRRA) on May 28, 1935. This agency was crucial to create the infrastructure necessary to support military bases, and to ensure that the government would have a way to pay for it. The program also quelled the Puerto Rican desire for a better economy while securing the Islander's cooperation during the purchase and appropriation of the territories needed to support the military defense in the Caribbean.

The final factor that placed Puerto Rico at the center of FDR's concerns was the results from a board conducted by Admiral Arthur Japy Hepburn in the spring of 1938. During the discussion, he told FDR that Puerto Rico was on an A-List for air, and submarine bases, and that given the U.S. shortage of territories in the Caribbean, this was "obvious necessity." Admiral William D. Leahy, then Chief of Naval Operations (CNO), informed the House Committee on Naval Affairs of a similar issue on May 9, 1938. He retired in August 1939, and by September was sent by FDR to Puerto Rico to serve as governor and oversee the development of military bases on the island."[54]

William Leahy was born in Hampton, Iowa, May 6, 1875, and grew up in Ashland Wisconsin. He attended the United States Naval Academy and graduated in 1897. While commanding the USS Dolphin, he became friends with FDR, who was ASECNVA. The two men cruised the Caribbean in the gunboat in early 1917 and visited

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[53] Rexford G. Tugwell. *The Stricken Land, the Story of Puerto Rico*. Garden City, N.Y.: Doubleday & Company, 1947, 137.
[54] Ronald Fernandez. *The Disenchanted Island: Puerto Rico and the United States in the Twentieth Century*. New York: Praeger, 1992, 138.

Puerto Rico.[55]

William Leahy became an Admiral in 1927, and was appointed Chief of Naval Operations (CNO) almost ten years later by FDR. He turned over his duties as CNO on August 1, 1939, and on that day the Senate confirmed his appointment as governor of Puerto Rico. Before Leahy left for Puerto Rico, he discussed the island's situation with FDR, and officials of the Department of Interior for about two weeks.[56] William Leahy was the president's confidant. He was sent to Puerto Rico to rectify the islands economy, and to oversee the territory's militarization.[57]

Hitler invaded Poland in September of 1939 accelerating America's preparations for war. The European war overshadowed Puerto Rico's socio-economic problems. The island, long considered the problem child of the United States, was suddenly referred to as an advanced listening post for America's defense of the Caribbean and the Panama Canal. High-ranking military and government officials turned to A.T. Mahan's, *Lessons of the War with Spain and other articles*, where he stated:

> "Puerto Rico, considered militarily, is to Cuba, to the future Isthmian canal, and to our Pacific Coast, what Malta is, or may be, to Egypt and the beyond... it would be very difficult for transatlantic state to maintain operations in the Western Caribbean with the United States fleet based upon Puerto Rico and the adjacent islands."

William Leahy arrived in Puerto Rico on September 1939. Two million Puerto Ricans occupied the island, but there were not enough natural resources to sustain the population. Unemployment reached astronomic proportions, and most Puerto Ricans

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[55] William D. Leahy, and Jorge Beruff. *Las Memorias De Leahy: Los Relatos Del Almirante William D. Leahy Sobre Su Gobernación De Puerto Rico (1939-1940) = Leahy's Puerto Rican Memoirs (1939-1940)*. 1. Bilingual ed. San Juan, P.R.: Proyecto Atlantea, 2002.
[56] William D. Leahy, and Jorge Beruff. *Las Memorias De Leahy: Los Relatos Del Almirante William D. Leahy Sobre Su Gobernación De Puerto Rico (1939-1940) = Leahy's Puerto Rican Memoirs (1939-1940)*. 1. Bilingual ed. San Juan, P.R.: Proyecto Atlantea, 2002.
[57] Ronald Fernandez. *The Disenchanted Island: Puerto Rico and the United States in the Twentieth Century*. New York: Praeger, 1992, 138.

suffered from starvation.[58] By the time Leahy assumed administration, the threat of war prevailed. William Leahy knew that he needed to modernize Puerto Rico and implement the plans proposed by the Hepburn Board.

The Hepburn Board was a survey of naval needs conducted by Rear Admiral J. Hepburn at the request of Secretary of the Navy Charles Edison. The board convened on June 7, 1938, during Leahy's tenure as CNO. The board's result, delivered on December 27, 1938, recommended the locations for future Air Bases. This decision was made twenty months after the bombing of Guernica, and at the time, bombing exercises had already begun in San Juan. In addition to its findings, the board developed a list of projects that were of immediate strategic importance, among these, was a submarine base in San Juan, Puerto Rico.[59]

William Leahy's first days in office involved a turnover he conducted with the incumbent governor, retired Major General Blanton Winship. He drove around the island after the turnover to inspect the existing infrastructure (Figure 5). His inspections disclosed some problems, which required urgent attention. The first issue he observed was the island's poor status of health and sanitation. Another problem was the "insolvency and inefficiency" of many projects executed by the Puerto Rico Reconstruction Administration (PRRA) (Figure 6).[60]

William Leahy noted in his memoirs that one of the few successful PRRA projects was the establishment of a cement plant (Figure 7). The cement plant was,

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[58] William D. Leahy, and Jorge Beruff. *Las Memorias De Leahy: Los Relatos Del Almirante William D. Leahy Sobre Su Gobernación De Puerto Rico (1939-1940) = Leahy's Puerto Rican Memoirs (1939-1940)*. 1. Bilingual ed. San Juan, P.R.: Proyecto Atlantea, 2002.

[59] *Building the Navy's Bases in World War II; History of the Bureau of Yards and Docks and the Civil Engineer Corps, 1940-1946.* Washington: U.S. Government Printing Office 1947, 4.

[60] William D. Leahy, and Jorge Beruff. *Las Memorias De Leahy: Los Relatos Del Almirante William D. Leahy Sobre Su Gobernación De Puerto Rico (1939-1940) = Leahy's Puerto Rican Memoirs (1939-1940)*. 1. Bilingual ed. San Juan, P.R.: Proyecto Atlantea, 2002, 81.

according to him, operating successfully, but selling the product below market price. Leahy concluded that the cement profits were not enough to create a fast return on investment for the Federal Government. He met with the Board of Directors, on a committee that he presided, and established that the company should sell cement at a higher price to everyone except the Federal Government.

It was not unlikely for the Governor of Puerto Rico to unilaterally establish changes. Being Governor involved being President of the Puerto Rico Cement Council as well as coordinator for PRRA projects. The Governor was also expected to manage The Housing Authority, Department of Health, Youth Administration, and Vocational Education. He also led The Farm Security Administration, PWA rural electrification, and the administration of Agricultural Extensions. These responsibilities lined up with the role of fund administrator for the Department of Interior and general construction.[61]

Leahy's role as a politician did not last long, as described by Linda McClain in her book, *The Role of Admiral Leahy in U.S. Foreign Policy*:

> "From his Caribbean outpost, and despite his assurances to Ickes, Leahy continued his advisory role to the President as the world situation deteriorated. During that summer of despair for the Western allies, in 1940 Leahy discussed past and future preparations for sea defense with the Acting Secretary of the Navy at the President's request. He also held talks with rear Admiral Raymond A. Spruance and an Admiral Greenslade on the war situation in the Caribbean, and with CNO Admiral Harold R. Stark on the naval situation in particular."[62]

The Admiral Greenslade mentioned by McClain referred to Rear Admiral John W. Greenslade, an officer appointed by the Secretary of the Navy on September 11, 1940,

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[61] William D. Leahy, and Jorge Beruff. *Las Memorias De Leahy: Los Relatos Del Almirante William D. Leahy Sobre Su Gobernación De Puerto Rico (1939-1940) = Leahy's Puerto Rican Memoirs (1939-1940)*. 1. Bilingual ed. San Juan, P.R.: Proyecto Atlantea, 2002.

[62] William D. Leahy, and Jorge Beruff. *Las Memorias De Leahy: Los Relatos Del Almirante William D. Leahy Sobre Su Gobernación De Puerto Rico (1939-1940) = Leahy's Puerto Rican Memoirs (1939-1940)*. 1. Bilingual ed. San Juan, P.R.: Proyecto Atlantea, 2002, 84.

to survey the future development of shore establishments. The Greenslade Board resulted from a meeting that Admiral Ben Moreell had with Admiral W.C. Fisher, Director of Shore Establishments. The meeting between Moreell and Fischer addressed a joint letter to the Secretary of the Navy in which they pointed out that the large increase of ships and planes needed to be parallel with corresponding shore establishments. This board suggested that Puerto Rico required a large operating base capable of supporting a large portion of the fleet, and so Roosevelt Roads was born.

William Leahy bolstered the need for a large base in Puerto Rico. He described the Caribbean situation as threatening and stated that, "The war in Europe was more than a spectacle which…Puerto Rico watched from afar… (Since) a great struggle was taking place in the sea lanes of the Atlantic."[63] These conflicts led the Governor to declare that, "Puerto Rico was not idle in matters of national defense," and that "even in 1939 (they) had begun to increase Naval establishment in the island."[64] Whether the reports were inflated or not, the statements confirm that defense projects in Puerto Rico were well under way before 1940.

What to build and how to build became the responsibility of the Bureau of Yards and Docks, and their chief Ben Moreell. [65] Admiral Moreell had quite possibly the most challenging job in the Navy. He was in charge of building bases across the world to support an ever-expanding fleet. The colossal effort of nine billion dollars was invaluable to winning the war while turning America's Navy into the world's greatest

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[63] William D. Leahy, and Jorge Beruff. *Las Memorias De Leahy: Los Relatos Del Almirante William D. Leahy Sobre Su Gobernación De Puerto Rico (1939-1940) = Leahy's Puerto Rican Memoirs (1939-1940)*. 1. Bilingual ed. San Juan, P.R.: Proyecto Atlantea, 2002, 84.
[64] Ibid, 84-85.
[65] *Building the Navy's Bases in World War II; History of the Bureau of Yards and Docks and the Civil Engineer Corps, 1940-1946.* Washington: U.S. Government Printing Office, 1947, 1.

seapower.

Admiral Moreell was selected by FDR on December 1, 1937, and promoted to Read Admiral without serving as Captain. They met in Azores during FDR's 1917 visit as ASECNAV. FDR, who at the time hoped to stand up a battery of naval guns, was visiting the then Lieutenant to congratulate him for fixing a set of them. There is no record of the relationship after that, but the young officer must have made an impression on FDR.

Moreell continued his career and served at various installations including Haiti, where he learned to speak French. His language proficiency got him to France in 1933 to Study at the *École Nationale des Ponts et Chaussées* (National School of Bridges and Roads). Moreell was an engineer without architectural pretenses but learned from French academics that included architectural design. Although the Admiral was not directly in charge of every single naval project, his background in design certainly the decisions made during the construction of the Caribbean defense system.

Admiral Moreell began working under the CNO administration of Admiral Leahy. He also worked throughout the entire WWII period until his retirement in 1946. He knew of the plans for Puerto Rico and corresponded with Albert Kahn to formalize the design efforts for the Advance Bases. Given these timelines, he was also in close contact with the subsequent governor of Puerto Rico, Rexford G. Tugwell.

The WWII climate of Puerto Rico was complex. The Puerto Rican newspaper *El Mundo* (The World) reported throughout the war. In 1942, the newspaper defined the conflict as "everyone's war" and celebrated Puerto Rican involvement in the fight for

global democracy.[66] One article revealed how Puerto Rico committed more men to the war than six continental states while another described how a single-family from San Juan lost five sons overseas.[67]

The articles regarding Puerto Rican involvement in WWII appeared next to stories that presented the prosperous future that this sacrifice afforded to the island's economy.[68] Puerto Ricans were encouraged by local politicians to embrace the militarization process as part of the economic progress. During WWII, the island was also valued for its sugarcane production. The distillation of rum from the island's sugar became a crucial asset to Americans, and, as a result, the territory experienced a short-lived period of economic growth during the war.[69]

Rexford Tugwell was the island's first civilian governor, and the last American to occupy the position (Figure 8). The governors preceding him were civilian, but they were also retirees coming out of high-ranking military positions. Prior to the 1930's, *The Bureau of Insular Affairs*, an office of the *War Department*, administered the Federal responsibilities for Puerto Rico and the Philippines. The structure of this office changed in 1934 when FDR established *The Division of Territories and Island Possessions*.

The new division was part of *The Interior Department*, and the restructuring of the organization was meant to centralize the territories administration under the Federal

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[66] "La Guerra De Todos," (Everyone's War). *El Mundo* 13 Sept. 1942: 6.
[67] "La Isla Aporto a Fuerza Armada mas Hombres que Seis Estados. Así lo Revela Luis F. Cuchi al Anunciar que la Convención de la Legión se Pedirá a un Mayor Personal para la Oficina de los Veteranos," (The island provided more men that six continental states to the armed forces. As revealed by Luis F. Cuchi when he announced that more Legions of Merit would be requested for the Office of Veteran Affairs). *El Mundo* 03 Nov. 1945: 5. Sosa. "Una Familia De San Juan Contribuye Cinco Hijos Al Esfuerzo De La Guerra," (A family of San Juan contributes five sons to the War effort). *El Mundo* 4 Mar. 1945: 5.
[68] Eliseo Combas Guerra. "Taussig Prometió a Los Países Del Caribe "El Lugar Que Les Corresponde En La Organización Del Mundo," (Taussig promised the countries of the Caribbean the place that they deserve in the worlds organization). *El Mundo* 2 Apr. 1944.
[69] Ronald Fernandez. *The Disenchanted Island: Puerto Rico and the United States in the Twentieth Century*. New York: Praeger, 1992.

Government.[70] Harold Ickes oversaw *The Division of Territories and Island Possessions*. FDR and Ickes were friends. Ickes was selected by FDR and held the position during his entire tenure. Ickes was also a fan of Rexford Tugwell's ideas and was influential in his appointment as governor of Puerto Rico. Tugwell, who spent time analyzing the agricultural possibilities of various countries, was sent to Russia before becoming part of FDRs Brain trust. Tugwell's analysis of Russian agriculture coincides with Albert Kahn's industrialization of Russian agriculture.

Puerto Ricans were bystanders to their fate. The island was a Caribbean landmark that caught the interest of imperial leaders. The local politicians, who did not know how to handle the island's poverty, became accomplices to this modernization process. The process alleviated poverty, but also introduced building techniques that changed construction practices, and that over time, changed the culture itself.

[70] Ronald Fernandez. *The Disenchanted Island: Puerto Rico and the United States in the Twentieth Century*. New York: Praeger, 1992.

CHAPTER TWO: THE GREAT DIVIDE AND GLOBAL WAR

A great divide between architecture and engineering professions that affected the role of Architects as master builders began in the mid-eighteenth century.[71] By the mid-nineteenth century, engineers recognized the potential of steel and concrete, materials that were still considered vulgar by most architects. Industrial architecture became a field dominated by engineers since they understood the advancements of building technologies.[72] During the early twentieth century, as manufacturing became popular, architects began to reconsider their aversion to designing industrial facilities. The industrial designs of the 1900s were influential to Modernist architecture, which became a style employed by the Federal Government during the 1930s for low-cost projects.

During the early twentieth century an architect named Albert Kahn drifted from the tradition of exclusively designing high architecture and began designing industrial buildings. Albert Kahn worked with his brother, Julius Kahn, who was a trained engineer. President Franklin Delano Roosevelt and the United States Navy endorsed their industrial style of architecture. Albert Kahn, FDR, and the Navy referred to this type of construction as industrial, but the buildings designed by Albert Kahn for Roosevelt Roads fit the tenets of Modernism.

The Kahn brothers designed the first set of Advance Bases for America's two-ocean navy. The bases built in the Caribbean were part of this master plan. This chapter discusses how the industrial aesthetic tradition coupled with WWII budgetary constraints led to the use of Modernism in Naval architecture.

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[71] Mahan, F. A. "Organization of the Services of Public Works in France." *Military Engineer* 1913: 99-121.
[72] James F. Munce. *Industrial Architecture: An Analysis of International Building Practice*. London: Iliffe, 1961, 7.

Eighteenth and nineteenth-century industrial schemes were not branches of the architectural profession. The design of mills, warehouses, factories or military infrastructure was considered to be beneath the talents of the architect. Construction subspecialties, such as engineering, were developed during the mid-eighteenth century to satisfy this demand. The professional division started with the founding of the *Ecole des Ponts et Chaussée,* and the *Ecole Polytechnique*, two French government schools established between 1745 and 1794 for the training of civil and military engineers.[73]

The engineering *Écoles* acquired importance during the French Revolutionary Wars, which lasted from 1792 until 1802. The *Écoles* integrated architecture into the engineering curriculum since engineers were often commissioned to design "minor public buildings as well as utilitarian structures of monumental character."[74] Academics trained civil and military engineers on the treatises written by Vitruvius, Palladio, and Francois Blondell because they were required to design guardhouses and triumphal gates. During the late nineteenth century, engineers were encouraged to use Greek Classicism as a rational design solution for utilitarian projects.

The idea that Greek Classicism was superior to Roman Classicism dates back to Père Laugier's*, Essai Sur L'architecture*. In the essay he postulated that Greek revival was not archeological reproductions of Greek buildings, but a return to the simplicity of a trabeated articulation. Laugier's theories inspired Jacques-Germain Soufflot's design for *Ste. Genevieve*, "which avoided arches…except for the…formerets supporting the extremities of the domical vault."[75] Soufflot was inspired in the ruins of *Paestum* and

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[73] Peter Collins. *Concrete: The Vision of a New Architecture; a Study of Auguste Perret and His Precursors.* New York: Horizon, 1959.
[74] Ibid, 196.
[75] Ibid, 195.

spoke publicly to architecture students about the delicacy of Greek structures. Henri Labrouste, who became famous for measuring the ruins of *Paestum*, reinforced the idea that Greek architecture was beautiful because of its simple structures. Even medievalist Eugene Viollet le Duc, who fought against classism, admitted that the beauty of Greek architecture was embedded in its use of orders as decorative structure. Greek architecture, specifically the Parthenon, became the architectural precedent emulated by mid-eighteenth and nineteenth-century designers in France.

Before the rise of the Écoles architecture and engineering were not divided, and architects functioned as master builders in charge of every aspect of construction. They were proficient in masonry and led construction projects because they were the experts in construction materials and building technologies. High architecture made mostly of masonry, lost importance as utilitarian structures became more critical to the military. Architects were not trained to provide efficient designs for utilitarian structures and ultimately lagged behind engineering.[76]

Cast iron for buildings was perfected in the second half of the nineteenth century, but it was not popularly used in high architecture.[77] During the reign of Queen Victoria in Britain, also known as the Victorian age, architects struggled with the industrial aesthetics produced by steel, glass, and concrete. However, during this period the straightforward industrial structures, such as those designed by James Bogardus or Joseph Paxton, began to appear more frequently.

The profitable interests of industrialists were coupled with awareness of new materials that were suddenly more accessible due to mass production. Glass plate

[76] James F. Munce. *Industrial Architecture: An Analysis of International Building Practice*. London: Iliffe, 1961, 1.
[77] Ibid, 1-11.

manufacturing and the commercial development of the cast iron frame were specifically linked to construction developments that resulted in the design of industrial space. These structures acquired a minimalist aesthetic that became popular amongst a small group of architects. Britain led the industrial revolution with France and Germany following in its footsteps. The aesthetics generated by these early examples were certainly a precedent for the industrial architecture of the twentieth century.

One of the first buildings constructed with the steel skeleton frame is attributed to James Bogardus, an American designer who built a five-story factory in New York in 1848. Bogardus is also famous for his 1856 romantic drawing of a projected design for a factory, an image that reinforces the American fixation with the industrial building (Figure 9).[78] The transatlantic expansion of this architecture is also representative of its growing appeal as a solution to the utilitarian needs of commerce.

The industrial architecture was not immediately adopted for high architecture if anything it was strongly rejected by architects. The Pre-Raphaelite group and later on the followers of William Morris's Arts and Crafts movement called for a return to handmade goods and condemned industrial advances. Morris rejected the standardization employed in the Crystal Palace. This rejection of industrial design, and prefabrication stood at the heart of the divide between engineering and architecture.

The Crystal Palace had a profound effect on the industrial architecture of the nineteenth and twentieth century. This structure, built of cast-iron and plate-glass at Hyde Park London in 1851, was one of the first buildings that showcased the potential standardization (Figure 10). The building also introduced a basic form of prefabrication

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[78] James F. Munce. *Industrial Architecture: An Analysis of International Building Practice*. London: Iliffe, 1961, 7.

through its modularity, which resulted in a cubic appearance that allowed unobstructed spaces in the interior. The interiors were colorful and highly decorated, but because the building needed to be inexpensive, the exterior was free of decoration, which highlighted the industrial spirit of the structure.

Paxton's proposal was considered ordinary engineering for various reasons. Paxton was not a trained architect, he was a gardener, and the Crystal Palace was essentially a large greenhouse. Paxton won the design competition because he met the requirements set by the commission in charge of the exhibition. The commission established that the building had to be temporary, simple, affordable, and economical to build. Paxton was able to meet the requirement by designing a modular structure that took into account the size of the glass panes produced by the vendor. This design allowed Paxton to cover the exterior of the building, including the majority of its flat roofs, by using identical panes of glass, thus reducing the cost of production and the time required for installation.[79] In 1852, the building was relocated to Sydenham Hill, London, and it remained on the new site until a fire in 1936 destroyed it.[80]

The designs of Bogardus and Paxton were important to industrial architecture because they introduced concepts of prefabrication, and because they employed materials that were considered inappropriate for high architecture. The Crystal Palace is an iconic example because of the exposure it received, as well as the number of people who attended the Exposition. Moreover, the palace stood on the site as a reminder of these innovations for eighty-five years. Prominent architects visited the structure, which brought a sense of practicality into the designs of the twentieth century.

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[79] "The Crystal Palace Foundation." *Crystal Palace History*. Web. 5 Oct. 2015. <http://www.crystalpalacefoundation.org.uk/crystal-palace-history/>.
[80] Ibid.

Architectural forms changed under the impulse of the industrial revolution. For civil and military engineers it became necessary to adopt recognizable forms, and Greek Classicism afforded them a link to the past that was cost effective. By 1870 the development of industrial buildings, and the formal separation between architecture and engineering was established. The split, or great divide, was also a separation between science and art that left the field of industrial construction in the hands of engineers.[81]

Steel frame and reinforced concrete changed the design of industrial spaces. These technological advances grew in the midst of an architectural battle over the correctness of classical ornamentation. There were some architects that recognized the importance of steel and concrete, but they were a minority amongst the professional community. While architects were debating classical style at schools like the *Beaux Arts*, engineers developed proficiency over steel and concrete technologies.[82]

Albert Kahn was one of the few architects who recognized the importance of technological advances in industry and the need for architecture to keep up with these changes. As stated in the *Architectural Forum's* eulogy for the architect:

> "While so many of his fellow architects wrestled with problems of exterior decoration for banks, state capitols and universities, he was quietly creating shelter for mass production on a scale that few men of his generation ever dreamed of."[83]

He understood the importance of integrating engineering sub-specialties into project development and execution, and recognized the advantages of new materials and mass production as a solution to the needs of his car manufacturing clientele. He was also able to develop an industrial aesthetic inspired in the revolutionary advancements in

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[81] James F. Munce. *Industrial Architecture: An Analysis of International Building Practice*. London: Iliffe, 1961, 7.
[82] Ibid, 2-11.
[83] *"Albert Kahn 1869-1942." The Architectural Forum*. January 1942. Print

manufacturing and transportation. His involvement in early twentieth century industrial architecture was so extensive that it eventually earned him the title of "father of Detroit."[84]

Albert Khan's mass production of buildings should be considered writhing the larger context of American industrialism. His projects, greatly inspired by Fords assembly line and the production of low cost standardized goods, gained relevancy at a time in which the country was exploring modern economic and social systems. Other structures of this timeframe that are comparative to Albert Khans legacy is the extensive production of concrete grain silos for industrial farming, or the extensive construction of bridges and dams across the nation in an effort to control nature and introduce modernity into American homes.

Albert Kahn was born March 21, 1869, in Rhaunen, Germany. He had five younger brothers and studied in the Grand Duchy of Luxemburg until his father moved the family to America. His father was a Rabbi, and his mother had artistic inclinations. The family moved initially to Massachusetts in 1880 but moved a year later to join relatives in Detroit. His father did a series of odd jobs to make ends meet while the family struggled**.**

Albert had a talent for drawing and secured a job with the Architectural Firm of Mason and Rice at the age of fifteen. He was a quick learner and spent his free time in the firm's library reading about European architecture.[85] By age twenty-one, he earned a one-year travel scholarship. He set sail for Europe, and while traveling through Florence he became friends with Henry Bacon, the designer of the Lincoln Memorial. The two

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[84] Federico Bucci. *Albert Kahn: Architect of Ford*. New York: Princeton Architectural, 1993.
[85] W. Hawkins Ferry. *The Legacy of Albert Kahn: The Detroit Institute of Arts; 1970*. 1970, 9.

men traveled the rest of the year through Italy, France, Belgium, and Germany sketching buildings and architectural details. These travels, which occurred in 1890, would have exposed Kahn to the controversies surrounding the architecture and engineering profession.[86]

Albert Kahn worked with Mason and Rice until 1896 and then went into business with George Nettleton and Alexander Trowbridge. The venture lasted from 1897 when Trowbridge left the association to become the dean of Cornell University College. Nettleton died in 1900, and Kahn briefly joined forces with George Mason again, but the new venture did not last, and Kahn became independent in 1902.[87]

Around this time, Albert Kahn began a partnership with his brother Julius Kahn, who was five years younger. Julius studied engineering at the University of Michigan. After graduating in 1896, he worked with the U.S. Navy and the Army. In 1899, he became a junior associate of the American Society of Civil Engineers. Then in 1900 he moved to Japan, where he spent a year as chief engineer of iron and sulfur mines.[88]

Upon returning from Japan, the brothers established *Albert Kahn and Associates*. In 1902, Julius submitted a patent for the Kahn System, a reinforced concrete system that he perfected in Japan, and shortly after, this system became the brother's main method of construction. In Japan, Julius discovered that concrete was stronger in compression than in tension. Following this concept, he devised a steel skeleton supported by soldered edges that were bent back at forty-five-degree angles (Figure 11).[89]

The Kahn System transformed the brother's partnership because it allowed for

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[86] W. Hawkins Ferry. *The Legacy of Albert Kahn: The Detroit Institute of Arts; 1970*. 1970, 9.
[87] Ibid, 9.
[88] Federico Bucci. *Albert Kahn: Architect of Ford*. New York: Princeton Architectural, 1993, 31-33.
[89] Ibid.

greater spans and simplified construction.[90] The Kahn trussed steel metal bar, gave them the freedom to design uninterrupted spaces that became popular with the car manufacturing industry. This architecture, which was economical and easy to build, was also famous in the Federal Government that contracted the brothers to design minor military structures.[91]

Julius Kahn went on to establish the Trussed Concrete Steel Company so that he could produce the Kahn Bars. The company was later called the Truscon Steel Company, and then The Republic Steel Company of Cleveland in reference to the company that bought them out. In the meantime, the Kahn brothers employed these technologies into a design for the Boyer Machine Company. The building conceived in 1901 is considered to be Albert Kahn's first industrial design.[92]

The Kahn brothers used their system in 1903 for the Engineering School of the University of Michigan in Ann Arbor (Figure 12). The brick building with Doric pilasters was a success, but its design was classical. The commission that transformed their careers was building number 10 of the Packard Motor Company Plant (Figure 13). [93] The first buildings of the Packard Motor Company Plant were conventional mill construction, but Kahn realized that automobile assembly required more space, so he designed a different layout for building 10.[94]

The Kahn brother's success with building 10 and subsequent industrial designs for power and car companies of Detroit caught the attention of the industrialist, Henry Ford. In 1909, Ford employed them to design his Automobile Assembly Building in

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[90] Federico Bucci. *Albert Kahn: Architect of Ford*. New York: Princeton Architectural, 1993.
[91] W. Hawkins Ferry. *The Legacy of Albert Kahn: The Detroit Institute of Arts; 1970*. 1970, 11.
[92] Ibid, 11.
[93] Federico Bucci. *Albert Kahn: Architect of Ford*. New York: Princeton Architectural, 1993, 33.
[94] Ibid, 33.

Highland Park. This project revolutionized industrial architecture.[95]

Kahn became internationally recognized after completing Ford's Automobile Assembly Building in Highland Park. He continued to design for Ford while also designing for Dodge and Buick. His projects brought industrial architecture to a spotlight and transformed it into an aesthetic consideration for other types of buildings requiring mass production, such as housing, and farm structures.[96]

The explosion of the Ford assembly line and Kahn's style influenced buildings like the Fagus Factory, designed in 1911 by Walter Gropius and Adolf Meyer. Subsequent Ford commissions such as the Ford River Rouge Complex, constructed between 1917 and 1922, and the romantic depictions generated by Charles Sheeler furthered the image of America's new industrial aesthetic (Figure 14).

The architecture of the Kahn brothers applied only to factory buildings. Unlike European modernists, Albert Kahn favored the Arts and Crafts aesthetic for the commercial and domestic buildings. He was a founding member of the Detroit Society of Arts and Crafts, and the Cranbrook House is an example of the architecture he used for domestic space (Figure 15). Albert Kahn was a leader of industrial architecture and unlike the European designers that he influenced, he did not extend this aesthetic into domestic or civic structures.[97]

Another advocate of architects as master builders was FDR, who revisited the issue of the architect's role during his presidency. FDR considered himself an amateur architect and used construction as part of his political legacy. FDR commented his specific beliefs regarding architecture in *The Architectural Forum*. This journal provides

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[95] Federico Bucci. *Albert Kahn: Architect of Ford*. New York: Princeton Architectural, 1993, 39-49.
[96] Ibid, 39-49.
[97] W. Hawkins Ferry. *The Legacy of Albert Kahn: The Detroit Institute of Arts; 1970*. 1970, 15-16

primary source information on architecture during the war, but most importantly it was, and still is, a window into the thought process of politics and designers during the years preceding the war.

In August 1932, *The Architectural Forum* released an issue in which "eight forward-looking men" wrote essays that discussed the importance of architecture and the role of the architect.[98] The articles encouraged architects to reclaim the role of master builder and become the leaders of the construction industry. Important architects such as Franck Lloyd Wright, Buckminster Fuller, and Albert Kahn, wrote on the subject. The then New York State Governor, Franklin D. Roosevelt, also wrote a piece for the magazine; he was the only politician involved in this debate (Figure 16).[99]

The essay by FDR titled, *"The Encouraging Economic Factor,"* forecasted that a construction revival would follow the Great Depression. He stated that, "as soon as business improves it is only natural to expect that there will be a decided stimulation in building construction throughout the country."[100] He described architects as expert planners and called out for "better-trained men."[101] He then concluded by emphasizing that, "the architects position is more secure than ever to assure our country of buildings more efficiently designed."[102]

FDR's interest in designs that were commensurate with the role of the buildings was central to the revival of the construction industry. These interests played a major role in the development of New Deal agencies like the PWA. FDR was passionate about

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[98] Russel, Ernest John, Frank Lloyd Wright, William Orr Ludlow, R. Buckminster Fuller, Franklin D. Roosevelt, Albert Kahn, Edwin Bergstrom, and A. P. Greensfelder. "The Future of the Architect as Expressed by Eight Forward Looking Men." *The Architectural Forum* LVII (1932): 89-96.
[99] Franklin Delano Roosevelt. *"The Encouraging economic Factors." The Architectural Forum* LVII (1932): 93.
[100] Ibid, 93
[101] Ibid, 93.
[102] Ibid, 93.

methods of construction, their cost, and longevity of the structures. Department of Defense (DoD) infrastructure, which included Naval Bases, was part of this national undertaking. Naval architecture, while important, was not strictly considered high architecture. Naval buildings that were not dedicated to education such as the Naval Academy, or buildings housing superior officers and administrative functions were typically facilities of industrial nature.

Albert Kahn's essay for *The Architectural Forum* followed FDR's article on economics. His piece titled *"Federal Aid to the Social Welfare,"* also called for a "revival of the building industry."[103] Kahn explained the need for an "extensive building program," supported by "judiciously administered government aid."[104] He argued that this effort was necessary to revive the construction industry and encouraged architects to work with engineers since he believed that the technical knowledge of engineers was crucial to the survival of the architectural profession. Kahn's essay was an extension of FDR's article since he detailed the socioeconomic factors that his construction revival entailed, a revival that was inclusive of Puerto Rico.[105]

Rexford G. Tugwell was in charge of overseeing the construction of Naval Bases in Puerto Rico during his term as Governor. He became acquainted with FDR in 1932 when he was invited by economist Raymond Moley to join the presidents Brain Trust, a group of academics that acted as the president's think tank. Tugwell was initially brought in to weigh in on agricultural issues, but shortly after he became involved with the Resettlement Act, an agency dedicated to the relocation of struggling families into

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[103] Albert Kahn. " *Federal Aid to the Social Welfare*." *The Architectural Forum* LVII (1932): 94.
[104] Ibid, 94.
[105] Ibid, 94.

communities planned by the Federal Government.[106]

Rexford G. Tugwell was born in 1891 in Sinclairville, New York and came from a wealthy family. He worked in Paris during WWI and developed affinity towards Germany since he blamed the conflict on British imperialism.[107] In 1920, while teaching at Columbia University he received a Doctorate in Philosophy of Economics at Wharton School at the University of Pennsylvania. While studying, he gained an appreciation for workers rights and liberal politics.

In 1927, Tugwell spent ten weeks in the Soviet Union studying agricultural and social management. He was part of the *First American Trade Union Delegation*, an unofficial team sent to "observe labor conditions in Great Britain, France, Belgium, Holland, Germany, and Poland. The team investigated socio-economic developments in Russia."[108] They published a Report titled, *Russia After Ten Years: Report of the American Trade Union Delegation to the Soviet Union*, and Tugwell contributed an essay on Russian Agriculture. The year after the report was published Albert Kahn was contracted by the Soviet Government to plan and supervise the construction of tractor plants in Russia.[109]

Kahn's "Soviet Adventure," was part of a fifteen-year plan of American Aid to the Soviet Union. The contract between Kahn's firm and the Russian government was linked to the *Amtorg Trading Corporation*, a Soviet liaison company that facilitated commerce with major American enterprises. Kahn's participation in this effort resulted in Russia's industrialization of farming. The American Trade Union was a source of

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[106] Michael V. Namorato. *Rexford G. Tugwell: A Biography*. 1988, 60.
[107] Ibid, 11-19.
[108] American trade union delegation to the Soviet Union. Russia After Ten Years: Report of the American Trade Union Delegation to the Soviet Union. New York: International publishers, 1927, 7.
[109] Federico Bucci. *Albert Kahn: Architect of Ford*. New York: Princeton Architectural, 1993, 90-96.

information at a time in which there was not abundant data regarding Russia's agricultural needs. While there is not a direct link to Tugwell's report and the "Russian adventure," Kahn probably used the report as a source of information since these projects were of interest to the U.S. government.[110]

The Russian adventure began in 1919 when Henry Ford approached the soviet government with automobile sales. Between 1922 and 1925 Ford's sales of cars and equipment rose from six hundred to eleven thousand. The Soviet Union was mainly interested in the Fordson tractor, a machine that was crucial to the industrial farming. Because of the successful relationship, Henry Ford was asked by Soviet leadership to build a tractor plant in the Soviet Union. Ford Agreed and suggested Kahn to become the architect.[111]

The construction began in 1928 after Kahn completed a similar Ford facility in Cork, Ireland (Figure 17). The Soviet Government was so pleased with Kahn's work that they employed him for other projects (Figure 18). Albert Kahn signed a contract with the Russian government in 1930. The contract included the development of four large motorcar, motor truck, and motorcycle factories, as well as nine plants to produce tractors and farm implements (Figure 19). In addition, the contract specified that Kahn would train four thousand five hundred soviet architects and engineers in factory design and construction.[112]

Tugwell's involvement in the analysis of Russian agriculture and Kahn's contract with the Soviet Union offer insight to the importance of industrial architecture. Kahn's involvement in the development of five hundred designs for the Soviet government was

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[110] Federico Bucci. *Albert Kahn: Architect of Ford*. New York: Princeton Architectural, 1993, 90-96.
[111] Ibid, 90-96.
[112] Ibid, 90-96.

published in *The New York Times*, *The New York Evening Post*, and the *Frankfurter Zeitung*. In 1926, an article referencing Kahn's work was published in the *Frankfurter Zeitung*. The article was titled *Russland Geht Nach Amerika* (Russia Goes to America), and explained the Russian sentiment towards America by stating, "They despise America, that is, the great capitalism without a soul…but they admire America, that is, progress."[113]

The industrial buildings in Russia were reproductions of the buildings designed by Kahn for Ford in America. The structures were accessible to Modernists such as Walter Gropius, or Le Corbusier, who were inspired by mass production, and that sought to extend the industrial aesthetic into public projects, such as social housing. These designers were influenced by a variety of ideologies, but a critical factor in their design choice were functionality and cost.

The industrial aesthetic was crucial to Modernist design because industrial buildings needed to be easy to build, and inexpensive. There was a high demand for housing during the interwar period, in both America and Europe, and Modernism became a solution to this problem. In America, once the urgency of war surpassed the demand for housing, Modernism became the solution for defense infrastructure. It was an architecture that succumbed to FDR's statement regarding the need for design to be commensurate with the role of the building.

Albert Kahn's industrial designs improved the conditions of a war-ravaged Russia by establishing functional buildings that modernized the country. Although Kahn's buildings were not the only element influencing European designers, it is a component that has not received enough attention since Modernism is often exclusively associated

[113] Federico Bucci. *Albert Kahn: Architect of Ford*. New York: Princeton Architectural, 1993, 90-96

with avant-garde movements. In order to establish a truthful narrative of Modernism, it is important to recognize that the style was not just part of an artistic culture, but that is was also a political tool used to insert buildings quickly, wherever needed.

An early European group that is renowned for its industrial approach to design is the German *Deutsche Werkbund*, known in English as the German Association of Craftsmen founded in 1907. One of its influential members was Hermann Muthesius, a German architect and theorist that promoted ideas of the Arts and Crafts movement. Muthesius was also interested in the British reforms of industry, and while he advocated for craft, he also promoted standardization as a means to expand German design.[114]

Walter Gropius was also part of the *Deutsche Werkbund* and reached international fame after his 1911 collaborative design with Adolf Meyer for the *Faguswerk*, also known as Fagus Factory (Figure 20). In *A Concrete Atlantis: U.S. Industrial Building and European Modern Architecture, 1900-1925*, author Reyner Banham explains how historian and architecture critic, Sigfried Gideon, was likely in correspondence with Walter Gropius by 1911 while traveling between the United States and Canada. He indicates that Gideon sent Gropius photographs of American industrial buildings and that while most of these were "largely from the American concrete industry, (the) term may be taken to include the offices of the various Khan operations in Detroit."[115]

Reyner Banham's statement suggests that Gropius was aware of Albert Khan's work in America, which means he might have followed his large-scale designs for the Russian government. However, Walter Gropius did not adopt the industrial aesthetic as

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[114] John V. Maciuika. *Before the Bauhaus: Architecture, Politics, and the German State, 1890-1920*. Cambridge: Cambridge UP, 2005.
[115] Reyner Banham. *A Concrete Atlantis: U.S. Industrial Building and European Modern Architecture, 1900-1925*. Cambridge, Mass.: MIT, 1986. Print.

his sole design approach until after WWI. Before the Great War Gropius favored the ideas of Henry Van De Velde.

Henry Van de Velde, an affiliate architect selected by the *Deutsche Werkbund* developed the antithesis to Muthesius's ideology. In 1914, he proposed that the artist was meant to be a creative individualist.[116] He was director of the *Kunstgewerbeschule* (School of Arts and Crafts) in Weimar, but was forced to leave because of his Belgian nationality. He nominated Gropius as his successor, because of their shared ideas regarding artistic individuality.

After the Great War, *The Deutsche Werkbund* continued to influence the German Avant-Garde. However, the nations political unrest and the need for infrastructure, led leaders like Walter Gropius to re-evaluate the benefits of mass production and standardization. The first manifesto for the *Staatliche Bauhaus*, drafted by Walter Gropius in 1919, called for a return to the crafts, but by 1923 some of these views had begun to change.[117]

The development of the 1923 De Stijl manifesto, described architecture as a "plastic unit made up of industry and technology."[118] These descriptions of future architecture are seen in Oskar Schlemmer's Manifesto for the First Bauhaus Exhibition. Although he begins by expressing how the Great War resulted in an "impassioned romanticism, which was a flaming protest against materialism and the mechanization of art and life," he acknowledges that there was a change in the Bauhaus's ideology.[119] He

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[116] Ulrich Conrads. *Programs and Manifestoes on twentieth-century Architecture*. Cambridge, Mass.: MIT, 1970, 28.
[117] Ulrich Conrads. *Programs and Manifestoes on twentieth-century Architecture*. Cambridge, Mass.: MIT, 1970, 49.
[118] Ibid, 66.
[119] Ibid, 69.

then states:

> "Americanism transferred to Europe, the new wedge into the old world, death to the past, to moonlight, and to the soul, thus the present time strides along with the gestures of a conqueror. Reason and science, 'mans greatest powers,' are the regents and the engineer is the sedate executor of unlimited possibilities. Mathematics, structure and mechanization are the elements, and power and money are the dictators of these modern phenomena of steel, concrete, glass, and electricity. Velocity of rigid matter, dematerialization of matter, organization of inorganic matter, all these produce the miracle of abstraction…Art…lives a life after death in the monument of the cube, and in the colored square."[120]

Schlemmer's quote reveals that the school drifted from its original embrace of the craft as the sole method of production, and that engineering and American industrial aesthetics were influencing the new approach to design.

Another important factor to Gropius's embrace of industry and mass production are the ideas of Swiss-French architect Le Corbusier. Between 1914 and 1915 Le Corbusier developed the Dom-ino House, a prefabricated concept for mass-produced housing (Figure 21). In 1920 he published a Manifesto titled, *Towards an Architecture: the Guiding Principles*, and in it he discussed architecture and engineering as "two things that march together."[121] He described mass production as the new industrial spirit and claimed it was the architecture of the future.

The ideas postulated by Le Corbusier were formulated during his internship with Auguste Perret. Le Corbusier was twenty-one years old when he joined Perret's firm.[122] Although they were not kindred spirits, Le Corbusier acknowledged Perret as "the only one in the path of a new architectural direction," but he criticized Perret's lack of

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[120] Ulrich Conrads. *Programs and Manifestoes on twentieth-century Architecture*. Cambridge, Mass.: MIT, 1970, 70.
[121] Ibid, 59.
[122] Peter Collins. *Concrete: The Vision of a New Architecture; a Study of Auguste Perret and His Precursors.* New York: Horizon, 1959, 153.

contempt towards the past.[123]

Auguste Perret was a trained classicist. He was born in 1874, and accepted into the Beaux Arts in 1891. He studied with Julien Guadet, a former student of Greek Classicist Henry Labrouste. Most importantly, Perret rejected his architectural diploma to pursue a career as a contractor since the French government prohibited architects to exercise both professions. Auguste Perret, just like Albert Kahn, had an extensive career executing construction projects for the government. He became a pioneer of reinforced concrete, and between 1902 and 1904 he produced, what is considered today, as one of the first apartment complexes made entirely out of reinforced concrete.

Auguste Perret subscribed to the theories of Auguste Choisy, a professor of architecture that taught at the *Ecole des Ponts et Chaussées*. Choisy theorized, "the classical Hellenic age had brought the structure of its temples into harmony with forms which…its architects were obliged…to retain."[124] His expositions revealed to Perret, and later Le Corbusier that, "the exterior form must be the translation of the interior structure," in other words, form should follow the function of the interior. Perret, contrary to Choisy's engineering students was not designing "minor public buildings," or "utilitarian structures."[125] Perret's challenge was to determine the appropriate form that a building should take while producing simplified architecture with characteristics of past monuments. Le Corbusier took this ideology as the founding principle to his manifesto.

The simple aesthetics of steel and reinforced concrete enabled Modernist pioneers to produce a language of "columns, beams, arches, walls, apertures, vaults, and slabs,"

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[123] Peter Collins. *Concrete: The Vision of a New Architecture; a Study of Auguste Perret and His Precursors.* New York: Horizon, 1959, 153.
[124] Ibid, 196.
[125] Ibid, 196.

that could be combined into endless patterns.[126] Influential architects such as Le Corbusier, and Walter Gropius, who experimented with industrial schemes before WWI, and that subscribed to Perret's ideology, were captivated by the efficiency embodied in Kahn's designs for Henry Ford's buildings. They were aware of his works and copying his industrial approach as a solution to post-WWI necessities.

While other artistic influences, such as the Vienna Secessionists, or Italian Futurists were also influential to European Modernists, Ford's Highland Park Factory should be acknowledged as one of the earliest sources of inspiration. The speed of construction at which industrial structures emerged, mixed with post-WWI resentment towards monarchies and their classical architecture, influenced architects to adopt industrial forms.

Modernist pioneers such as Le Corbusier and Walter Gropius employed a language of forms that resembled American industrialism. They corresponded with each other during the interwar years and developed a plethora of treatises as well as the main educational programs that shaped many Modernists architects of the 1930's. Walter Gropius became Chair of the Harvard Graduate School of Design in 1938, while Le Corbusier turned into an international ambassador of the style. These architects popularized Modernism across the globe.

Russian Constructivism, another post WWI architectural movement that was influenced by Fordism and Albert Kahn's buildings, also shaped the ideologies of Gropius and Le Corbusier. The first Constructivists manifesto appeared in 1920 before Kahn's contract with the Soviet Government, but notion of his designs were already

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[126] Peter Collins. *Concrete: The Vision of a New Architecture; a Study of Auguste Perret and His Precursors.* New York: Horizon, 1959, 198.

prevalent in Russia's architectural community. The Constructivist Manifesto, drafted by Naum Gabo and Antoine Peusner, promoted color free sculptures made of industrial materials. Constructivist architects, promoted architecture without decoration in representation of the Communist proletariat, and employed variations of this artistic ideology until 1925.[127]

The architecture itself, which was minimally produced, resulted in an industrial aesthetic composed of lines intersecting Platonic solids. Constructivism eventually succumbed to Stalin's version of classicism, an oversized architecture composed of abstracted decorations. Nonetheless, the 1929 manifesto titled, *Ideological Superstructure,* written by Constructivist architect El Lissitzky's, coincides with the Russian government's decision to hire Albert Kahn for the modernization of Stalingrad.[128] The manifesto also shows how industrialism and Modernism continued coinciding during the interwar years.

Le Corbusier and Walter Gropius traveled to Russia on repeated occasions to exchange artistic ideas with the Constructivists. These ideas were then brought back to Western Europe and taught at schools like the *Bauhaus*. The members of Avant-Garde movements remained committed to the improvement of post-WWI Europe. The artistic developments traveled across Europe and eventually back into the United States. Modernism, which had been seen in the works of some architects in America before WWII, became popular with the United States Federal Government during the 1930's. The re-introduction of Modernism in America coincided with the Great Depression and

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[127] Ulrich Conrads. *Programs and Manifestoes on twentieth-century Architecture*. Cambridge, Mass.: MIT, 1970, 56.
[128] Ulrich Conrads. *Programs and Manifestoes on twentieth-century Architecture*. Cambridge, Mass.: MIT, 1970, 121.

FDR's revival of the construction industry.

Modernism took different roles in America and Europe. It was used overseas as architecture of social concern, while it was used in America as a means to expand industrial architecture, and low budget projects. In the case of the Navy, the immediate demand for Naval Air Stations from which to protect the homeland became paramount to the wartime effort, and Modernism was the time efficient solution to that demand.

While industrial trends were not the only thing influencing Modernist Architecture during the interwar years, the industrial aesthetic played a decisive role in the buildings constructed for WWII defense. The buildings that Puerto Ricans colloquially described as "American Style," during the late 1930's, were square industrial structures made of steel, reinforced concrete, and exposed structural elements. These buildings, established almost overnight, reflected the tenacious spirit of a nation that was determined to win the war.[129]

Modernism became popular in Europe after the Great War as ahistorical design emerged as a break from tradition. The term Modernism is complex since it spans over a long period of time and covers all of the arts. While this research is unable to examine every element that influenced Modernism, we can suggest that the factories produced by the Kahn brothers set an early precedent for this type of architecture.[130]

Modernism was part of a twentieth century evolution in architecture that occurred during a period of political unrest, innovation in construction materials, and development of new building technologies. After the Great War, this minimalist aesthetic evolved into a design choice for domestic and civic structures across Europe. This design approach

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[129] Ronald Fernandez. *The Disenchanted Island: Puerto Rico and the United States in the Twentieth Century*. New York: Praeger, 1992, 148.
[130] Federico Bucci. *Albert Kahn: Architect of Ford*. New York: Princeton Architectural, 1993, 34.

began almost a hundred years after the nineteenth-century industrial revolution, and is evidence of how architecture was attempting to catch up with industry.

The new stripped-down architecture that surfaced in post-WWI Europe applied Platonic solids with a trace of Greek classicism and industrial flair.[131] Conceptual scales, such as Le Corbusier's Modulor, even employed the golden ratio. Honesty of materials in celebration of their purity was also part of the style. Glass, steel, and reinforced concrete were favored since they represented industrial modernity. Exposing their natural state and the structural elements of the design were also components of the aesthetic. The architecture of this period, which was initially catching up to industrial technology began to extend concepts of industry, mass production, and standardization into diverse aspects of life and society.

The post-WWI American climate was different from the European. The industrial aesthetic was not integrated into domestic or civic architecture. In contrast to Europe, a sense of prosperity and invention reigned in America during the 1920's. The years preceding the Great Depression were marked by Nikola Tesla's evolution of electricity and Westinghouse's incorporation of energy into American homes. New amenities for kitchen and bathroom spaces were being added as part of an outpour of industrial design. The introduction of Greyhound buses and stations connected the nation, while transportation developments such as the Burlington Zephyr locomotive accentuated the advantages of steel in aerodynamics. Contrary to Europe, America was

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[131] Platonic Solids: any of the five geometric solids whose faces are all identical, regular polygons meeting at the same three-dimensional angles. Also known as the five regular polyhedra, they consist of the tetrahedron (or pyramid), cube, octahedron, dodecahedron, and icosahedron. "Platonic Solid | Mathematics." *Encyclopedia Britannica Online*. Encyclopedia Britannica. <http://www.britannica.com/topic/Platonic-solid>.

not rebuilding a war-ravaged continent.

In Europe, this age of invention and industrial achievement was explored differently. WWI was the first technological war of the twentieth century. The war lasted little over four years, and by the end of the conflict, four imperial powers ceased to exist, countries were renamed, and maps were redrawn. Postwar Europe, which grappled with conflicting politics and social unrest, was a breeding ground for architectural ideologies, and the urgent need to create post-war infrastructure drove the concept of mass-produced buildings.

After WWI, ideas of mass production expanded across Europe faster than before. Mass produced housing grew in the United States during the Great Depression, and became a keystone of FDR's construction industry revival. Federal projects ranged from civic, public, and housing, to transportation, and in many cases the type of architecture employed depended on what FDR deemed to be appropriate. A great deal of public housing subscribed to the Modernist aesthetic, because it was cost effective. During WWII, as the emergency shifted from housing shortages to wartime defense, Modernism became the solution for Naval infrastructure. Puerto Rico, which was covered in shantytowns that needed to be modernized, became a blank slate for the Modernist aesthetic.

The efficiency of Modernism suited the rapid development of Naval infrastructure. This development, energized by the collective concerns of the citizens of the country, led the country's leaders to focus on exploiting new building technologies and cheaper materials. This plan was successful because FDR, was specifically interested in architecture. Advance Naval Bases, which did not require lavish decorations, were allowed to be more industrial than continental structures.

The modern Navy, associated with ships and airplanes was a twentieth-century invention. The first Naval Bases varied in shape, and functions, and were industrial spaces. The employment of architects for the design of Naval Bases did not occur until the twentieth century. By 1915, the Navy possessed one hundred and seventy-four installations across nineteen states, two territories, and seven countries. The infrastructure developed before WWI ranged from wood and stone to iron. There was no thought given to standardization, and most of the construction was executed in haste through government contracts.[132]

Albert Kahn was responsible for the Navy's first major upgrade. In WWI, under the leadership of FDR, he was commissioned to design the majority of the Navy's continental bases. Although there are limited details on what he specifically worked on, it is known that he handled the 1917 design of the U.S. Aviation School in Langley, VA. (Figure 21)[133]

The Navy created the Bureau of Yards and Docks in the 1920's, and they became responsible for the design of Naval Bases.[134] Naval leaders were concerned with the architecture of their naval bases. Publications dating back to 1924 evidence the existence of architectural boards with specifications such as, "appropriate designs... preferably dignified...(and) with the minimum ornamentation."[135] The WWII leader of the Bureau of Yards and docks, Admiral Ben Moreell, was aware of this aesthetic guidance.

Admiral Moreell was trained in the previously described curriculum and would

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[132] John Richard Edwards. *Strategical Importance of Our Naval Stations Article on the Imperative Need of Developing along with the Fleet Adequate and Efficient Naval Stations,* Washington: Government Printing Office 1916.
[133] W. Hawkins Ferry. *The Legacy of Albert Kahn: The Detroit Institute of Arts; 1970*. 1970, 15.
[134] *Manual of the Bureau of Yards and Docks, Navy Department Pertaining to the Public Works and Public Utilities of the Navy. 1923.* Washington: Government Printing Office,1924.
[135] *Manual of the Bureau of Yards and Docks, Navy Department Pertaining to the Public Works and Public Utilities of the Navy. 1923.* Washington: Government Printing Office,1924.

have known about Auguste Perret's technological advancements in reinforced concrete. Moreell's arrival in Paris coincides with the partial completion of the building for the *Service Technique de Construction Navales* (Technical Service for Naval Constructions). The construction of the project spanned between 1928 and 1956, but the main office of the building was inaugurated in 1931. This building included the characteristics associated with Perret's constructions.

The building was made of reinforced concrete, with a clear distinction between the structure and the walls, and legibility of the interior space is represented in the openings of the façade (Figure 23). Moreell was absorbing this architecture during his year abroad, and when he returned to the United States became a leading expert in reinforced concrete. It is not hard to imagine that some of his knowledge came from studying Perret's achievements.

During WWII, as the demand for war infrastructure increased, the buildings became even more uniform in appearance. Albert Kahn worked in the development of the "Arsenal for Democracy."[136] During his participation in this effort, he realized that there was not enough time to pay close attention to every detail. He believed that "the building should be adapted to the production," and in the case of the war, the production was dictated by the life and death of American troops.[137]

The "Arsenal of Democracy," a slogan used in 1940 by FDR during a radio broadcast, was part of a promise he made to Churchill. The president's intent was to support the United Kingdom, but to keep American out of combat. The arsenal consisted of plants for making tanks, airplanes, and aircraft engines. Most of the warehouses for

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[136] Geoffrey C. Ward, and Ken Burns. *The Roosevelt's: An Intimate History*.
[137] Federico Bucci. *Albert Kahn: Architect of Ford*. New York: Princeton Architectural, 1993.

this production belonged to leaders of the car industry that loaned their facilities to the government in an act of nationalism. The endeavor resulted in the production of less vehicles and world breaking records in the assembly airplanes.[138]

The Arsenal for Democracy rose from the 1937 bombing of Guernica. The raid on civilians occurred on 26, April 1937, on order of the Spanish Nationalist Government of Francisco Franco, who was in allegiance with German and Italian forces. The bombing of Guernica by the *German Luftwaffe*, the Nazi air branch, was their chance to test the destruction capability of air strikes. The attack on Guernica struck at the heart of U.S. and British concerns, while emphasizing that the war would favor whoever controlled airspace.[139]

In 1938, the Navy began to rehearse the bombing of San Juan, Puerto Rico (Figure 24). Strategists believed that if the Germans took over Brazil they could build up forces and invade Puerto Rico, then Miami, Atlanta, and the rest of the mainland. These concerns were at the forefront of FDR's wartime planning. The construction of bases in Puerto Rico began as support for the mock bombings of San Juan, and as the war progressed, the scope of military installations spiraled out of control.[140]

The 1938 Hepburn Board also influenced the Arsenal for Democracy.[141] This new project, a sideline to Albert Kahn's efforts in the construction of the Arsenal for Democracy, was completed with the assistance of 450 architects. The team drafted over 1650 drawings for the Navy in a period of seven months. In less than a year, the Kahn

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[138] Federico Bucci. *Albert Kahn: Architect of Ford*. New York: Princeton Architectural, 1993.
[139] *PBS*. PBS. <http://www.pbs.org/treasuresoftheworld/a_nav/guernica_nav/main_guerfrm.html>.
[140] Ronald Fernandez. *The Disenchanted Island: Puerto Rico and the United States in the Twentieth Century*. New York: Praeger, 1992.
[141] *Building the Navy's Bases in World War II; History of the Bureau of Yards and Docks and the Civil Engineer Corps, 1940-1946.* Washington: U.S. Government Printing Office 1947.

brothers became the assembly line for wartime infrastructure.[142] Roosevelt Roads was one of the Bases drafted by the brothers firm.

The concept of Advance Bases began to appear in the late 30's. Studies on how to build the bases faster had been underway since 1937. The Advance Bases were different, they were more industrial than continental bases because they served strict defense objectives, and because they had to be built quickly.[143] The Advanced Bases were, in essence, a Naval typology.[144]

The *Architectural Forum* of January 1943 features a photo of Ben Moreell in a one-page spread titled, *Some Building Faces of 1942*. That same feature described the government's role in the following statement:

> "Obviously the most overwhelming change in building was governments almost complete monopoly of the client's role. And not only was government a demanding client but one who kept changing the ground rules so often the building had (and still has to) excavate its way through layers of multigraphed regulations while carrying on its normal function of design and construction. That much of the regulation is necessary is clear; that as much more is not, seems equally clear. Now that government has vastly expanded its building bureaucracy, strong purpose will be needed to shrink it, if it shrinks at all with huge public works programs and post war prospect seemingly to justify its continuation. By common concern the best government agency to work with is the Navy's Bureau of Yards and Docks, and by equally common consent the worst ones are still numerous housing agencies. The reason for that are made clear here after."

Industrial architecture played a crucial role in the development of Modernism, which was then adopted by the Federal Government for the construction of Advance Bases. Roosevelt Roads was one of the 1650 drawings produced by Albert Kahn's office, an industrial design that appealed to Navy engineers.

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[142] Federico Bucci. *Albert Kahn: Architect of Ford*. New York: Princeton Architectural, 1993.
[143] *Building the Navy's Bases in World War II; History of the Bureau of Yards and Docks and the Civil Engineer Corps, 1940-1946.* Washington: U.S. Government Printing Office 1947.
[144] Ibid.

CHAPTER THREE: THE WHITE BOX BY THE SEA

The first set of durable naval installations dates back to The War of 1812 when large stone forts accommodated Naval functions and the Army's infantry defense. These structures were designed to intercept enemy forces approaching American shores instead of providing logistical support to the Navy. In 1815, President Monroe appointed Simon Bernard, a General of Napoleons French Engineering Corps, to construct the first set of forts. Bernard arrived in the United States and was made a Brigadier General in the American Army with the title of Assistant Engineer.[145]

Bernard returned to France in 1830, and after that defense projects declined because they were too costly to maintain. Politicians were not concerned with naval infrastructure until Admiral Mahan's 1890 publication of *The Influence of Seapower Upon History*. There were some efforts to modernize the Navy, such as Theodore Roosevelt's Great White Fleet, yet the notion of shore establishments remained undeveloped. WWII shaped the contemporary Navy.

FDR was a key figure in the Navy's expansion. The concept of shore bases developed in WWII as a response to the rapidly growing Navy. During this time, the functions associated with the needs of a particular establishment were grouped into specific locations. Naval bases varied in shape, and the size depended on the operational roles of the base. The Advance Bases emerged as an American architecture for overseas defense, which enabled the Navy to operate at a distance from the mainland for extended

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[145] Piet Lombaerde. *Naval Bases, Townplanning and Fortification during the First French Empire in Europe and the United States = Marinearsenalen, Stedebouw En Vestingbouw Tijdens Het Franse Eerste Keizerrijk in Europa En De Verenigde Staten = L'arsenal Maritime, L'urbanisme E*. Antwerpen: Stevin Simon-Stichting, 1992.

periods. This architecture was, first and foremost, economical, which is why Advance Bases employed steel and concrete as the main construction materials for designs that were required to be simple.

In January 1941, *The Architectural Forum* published an article under a section titled, *Building Money*. In 1941, this article described how military construction represented the "biggest Government contribution to Building in all U.S. history."[146] The article also explained how the increase in military construction was scheduled to expand one hundred and thirty-one percent over the course of the upcoming year (Figure 25).

In February 1941, William Lescaze, a Swiss-born American architect and a Modernist pioneer wrote an article for *The Architectural Forum* and advocated for a comprehensive defense plan that he called Defense Architecture. Lescaze argued that the military plans were being kept secret by the government and that military infrastructure needed to be designed by architects and engineers. He proposed to create a Department of Defense Architecture office led by a Secretary of Public Architecture. This office would replace the multiple government agencies that executed defense construction. What Lescaze did not know was that the Government had already decided how they would manage the issue and that a master plan administered by architects was not part of the program.[147]

In March of 1941, a journalist from the *United Press* named Bernard Crandell interviewed Albert Khan. Crandell began his article by stating:

"Tanks, plants, arsenals, airplane engine buildings and giant aircraft factories are all the same to Khan when he set his 450 architects and engineers to work. They turned out 1650 drawings in seven months when the Navy wanted Khan to handle the construction

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[146] "Building Money." *The Architectural Forum* (1941): 63-67. Print.
[147] William D. Lescaze. "The Architects World: Building for Defense." *The Architectural Forum* (1941): 127-28. Print.

drawings for the new Naval bases in the Pacific and Atlantic." [148]

The Navy's Advance Bases were a "true assembly line" for a mass-produced Navy, and Albert Khan did not consider his designs to be Modernist.[149] He described the Naval structures as industrial and when questioned about their aesthetics he replied:

> "Strictest economy must prevail in manufacturing buildings, especially in National Defense projects. Therefore elimination of non-essentials and of everything not purely utilitarian is imperative...Just as the mere clothing of a skeleton of a modern airplane by designers with an eye for line and a sense of fitness produces an object of beauty, so the frank expression of the functional, the structural element of the industrial building makes for success...Occasionally a client is particularly solicitous about the appearance of his factory, and occasionally it proves difficult to dissuade him from building a classical temple." [150]

However, Khans designs for the Administration building at Roosevelt Roads is too abstracted to be considered classical and too refined to be labeled industrial. This Modernist structure is at the intersection of these two classifications.

The government had been Albert Kahn's client throughout his career. Albert Kahn's brother Felix Kahn was also in business with the Federal Government. Felix Kahn joined Alan MacDonald construction firm in the early twentieth century after studying civil engineering. Felix Kahn's firm pioneered reinforced concrete building in California after the earthquake of 1906. The firm became an important player in San Francisco's building scene after the earthquake. In February of 1931, the MacDonald and Felix Kahn firm joined the Six Companies venture that became responsible for the construction of the Hoover Dam.[151]

After the Hoover dam was built the Six Companies became one of the Federal

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[148] Federico Bucci. *Albert Kahn: Architect of Ford*. New York: Princeton Architectural, 1993, 110
[149] Ibid, 110
[150] Ibid, 110-111.
[151] Donald E. Wolf. *Big Dams and Other Dreams: The Six Companies Story*. Norman: University of Oklahoma Press, 1996.

Government's preferred construction companies. They built other colossal structures bridges, naval ships, and Advance Bases in the Pacific. Albert Kahn's association to Six Companies through his brother Felix cannot be discarded as influential to his selection as a designer of the Advance Bases. Arundel Corporation and Consolidated Engineering received the award for the construction of Advance Bases in the Atlantic, but only because Six Companies received the larger award for construction of bases in the Pacific (Figure 26).[152]

In addition to Naval Bases, there were Army and Air Force Advance Bases. The prefabricated designs for Army Bases in the Caribbean, published in the July 1942 edition of The *Architectural For*um, show the differences in design. Mainly the Shaw, Naess, and Murphy Firm designed the Army and Air Force bases, after the death of Albert Khan. The territories leased by *America under the Destroyers for Bases Agreement* became the site for most of these bases (Figure 27).[153] The difference in design is most dramatically seen when comparing the Naval Stations in Puerto Rico against the Army posts in Bermuda (Figure 28).

Roosevelt Roads was different from most of the other bases in the Caribbean because it made part of the 1939 contract completed by Albert Kahn's firm. The former Roosevelt Roads naval Station headquarters are in the town of Ceiba, Puerto Rico, a municipality located on the northeastern coast of the main island. However, the geographical boundaries of the base included Ceiba and the adjacent islands of Vieques

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[152] Donald E. Wolf. *Big Dams and Other Dreams: The Six Companies Story*. Norman: University of Oklahoma Press, 1996.

[153] Destroyers for Bases Agreement, signed on September 2, 1940, was a treaty between the United States And Great Britain. Fifty U.S. destroyers were transferred to the United Kingdom's Royal Navy in exchange for a ninety-nine-year land lease on eight British Colonies. The United States used the land leased to establish defense positions and implemented the designs of the Shaw, Naess, and Murphy Firm. The locations included: Newfoundland, eastern side of the Bahamas, Southern coast of Jamaica, Western coast of St. Lucia, West coast of Trinidad (Gulf of Paria), Antigua, and British Guiana.

and Culebra. Roosevelt Roads included the territories of Ceiba, Vieques, and Culebra along with the waters between them (Figure 29).

Prior to 1939, the only naval installations on the island were a radio station and a hydrographic office. In 1939, William Leahy awarded a fixed-fee contract comprised of forty-four projects that included the construction of a Naval Air Station at Isla Grande, San Juan. The three hundred and the forty-acre site of mangrove and tidal mud flats housed an airstrip operated by Pan American Airlines. Despite the massive dredging operations that were required to make the site functional, the Navy chose the location because it was practical for seaplane operations (Figure 30).[154]

The Bureau of Yards and Docks prepared the layout for the airbase at Isla Grande, which was built over seventy percent dredge fill (Figure 31). The buildings, which were subject to high-velocity winds, were permanent structures. The Navy chose to use steel and masonry for the industrial buildings, and reinforced concrete for the personnel units. A naval source praising the constructions stated that, "flat roofs and a cubical design gave architectural treatment in keeping with local civilian practice."[155] While the architectural treatment described is hardly reminiscent of Spanish Colonial Architecture, it fits perfectly the description of Modernism.

The Tenth Naval District created on November, 1939, a month following the award of the contract for Isla Grande, included the Bahamas and the Antilles from Cuba to Trinidad (Figure 32). The establishment of this district coincided with the Destroyers for Bases Agreement and reemphasized Puerto Rico as keystone of Caribbean operations. Isla Grande, while convenient, was too small to meet the needs of the navy, which in

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[154] *Building the Navy's Bases in World War II; History of the Bureau of Yards and Docks and the Civil Engineer Corps, 1940-1946.* Washington: U.S. Government Printing Office 1947, 5.
[155] Ibid, 5.

turned pushed forward the development of a larger base in Puerto Rico. Governor Leahy selected the eastern coast of Puerto Rico after his examination of the island.[156]

In 1940, before leaving office, Governor Leahy confirmed that the Caribbean's largest fleet operating base would be on the eastern coast of Puerto Rico. The project was expected to include protected anchorage, a battleship graving dock, repair facilities, fuel depots, supply depots, a hospital, and an air station. The military leaders involved in designing the facilities program believed that they needed a base that could provide services for sixty percent of the Atlantic Fleet. In *Military power and popular protest: the U.S. Navy in Vieques, Puerto Rico*, Katherine McCaffrey described the Caribbean as the American Mediterranean. The making of a Caribbean Pearl Harbor began on May 8, 1941, when the base name was changed from Fajardo Roads to Roosevelt Roads in honor of the president.[157]

Once the location was chosen the Navy acquired the lands by declaring a national emergency. The Navy expropriated 6680 acres of land near *Ensenada Honda* (Figure 33). The Fajardo Reserve, created during WWI as a military reserve, and facilitated the expropriation of Ceiba's unoccupied terrains.[158] The Navy also claimed 21,020 acres of the island of Vieques, two-thirds of the island, to supply quarrying for an immense breakwater that would connect Ceiba to Vieques (Figure 34). This appropriation entailed

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[156] *Building the Navy's Bases in World War II; History of the Bureau of Yards and Docks and the Civil Engineer Corps, 1940-1946.* Washington: U.S. Government Printing Office 1947, 5.
[157] Katherine T. McCaffrey. *Military Power and Popular Protest: The U.S. Navy in Vieques, Puerto Rico*. New Brunswick, N.J.: Rutgers UP, 2002.
[158] Gerardo M. Diz. *Puerto Rico: El Gibraltar Del Caribe : Intereses Estratégicos Estadounidenses Y La Base Aeronaval Roosevelt Roads*. San Juan, P.R.: Editorial Isla Negra, 2008. Print, 116.

the relocation of ten thousand civilians that were forced to move to the island of St. Croix.[159]

Construction in Ceiba and Vieques began immediately after the onset of WWII. The artillery defense for Roosevelt Roads was in Fort Bundy, an artillery facility located southwest of Ceiba (Figure 35). By late 1941, the initial workforce of two hundred men grew into three thousand. Construction of the base began at lighting speed. Thousands of Puerto Rican men worked around the clock breaking rock in Vieques for the stone and cement breakwater. Within a period of one year, these Puerto Rican men were exposed to more technology, construction, and equipment, than any preceding generation.[160]

The construction of the base slowed down immediately after it began. Military priorities shifted to the Pacific after the attack on Pearl Harbor, and the Navy scaled back its original plans. The destruction of Pearl Harbor challenged the idea of concentrating a fleet at a single installation. The halted operations resulted in unemployment and deceleration of cement production. The standstill of production and employment was particularly hard for the island's economy since Puerto Rico experienced the greatest production of cement it had ever seen in 1940.[161]

The Navy approved the Construction for the northern section of Roosevelt Roads on 23 January 1942 (Figure 36). The plans for the base, approved by the Bureau of Yards and Docks, were ambitious. The area of *Punta Puerca* was designed to be an amphibious base with four piers, barracks, and a camp for construction battalion forces

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[159] Ronald Fernandez. *The Disenchanted Island: Puerto Rico and the United States in the Twentieth Century*. New York: Praeger, 1992, 138.
[160] Katherine T. McCaffrey. *Military Power and Popular Protest: The U.S. Navy in Vieques, Puerto Rico*. New Brunswick, N.J.: Rutgers UP, 2002.
[161] Jorge Beruff. *Puerto Rico En La Segunda Guerra Mundial: Baluarte Del Caribe*. San Juan: Ediciones Callejón, 2012.

(Figure 37). The northeast of *Ensenada Honda* would destroyers, fueling depots, and additional barracks. The terrains that would serve the airfield of the base were positioned west of this bay.[162]

The northern section of the base was revised in September and October of 1942, and approved 15 March 1943. The revisions resulted in elimination of the piers for the amphibious base, and the radio station. Construction of the base continued until the summer of 1943. By then the base was equipped with roads, 120 lodging facilities, a supply depot, a fuel distribution center, munitions magazines, sewage systems, and the docks near the airfield. The road network connected nearby communities with the airfield, *Ensenada Honda*, and *Puerca Bay* through a littoral street named Langley Road.[163]

There was also a subterranean system developed to contain fuel. Six concrete fuel tanks with 50,000-gallon capacity, and four others with 250,000-gallon capacity. A central fuel farm that was next to the pier housed the lines used to fuel airplanes. There were also twenty-four munitions magazines, four large and twenty smaller ones. The rest of the munitions magazines, 107 of them, were located on the east side of Vieques.[164]

The breakwater to connect Ceiba with Vieques began on October 1942 but was canceled by May 1943. Upon cancelation, the breakwater only reached 7,000 feet, fifteen percent of the projected 40,700 feet required for the connection. In 1943, the water and sewage system in Ceiba was simplified to cut costs. The water system at Ceiba consisted of a twenty-seven-inch diameter pipe that ran eleven miles through a mountain.

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[162] Jorge Beruff. *Puerto Rico En La Segunda Guerra Mundial: Baluarte Del Caribe*. San Juan: Ediciones Callejón, 2012, 117.
[163] Ibid, 117.
[164] Ibid, 118.

The water was dispersed through pumps and reserve tanks after being filtered. From the tanks, the water circulated through the installation via gravity. In Vieques, wells had to be dug to obtain potable water that was stored it in cisterns.[165]

The piers for battleships began in April 1942 with the first concrete pour completed in June. In June 1943, the plans for the piers were revised. The Pier One structure was 1100 feet long by 155 feet wide and a depth of 45 feet. The bombproof power plant, with four-foot thick walls, was placed near the pier, but was never used. The administration building, supply depot and a maintenance facility were added to support pier-side operations.[166]

Three 6000 by 300 feet airstrips composed the airfield of the base. Towards the end of the works, the government had invested about two million dollars in 580,000 cubic yards of concrete for the airfields. In addition to the airfields, it was necessary to pave parking lots, build Bachelor Officer Quarters, enlisted quarters, and an additional supply depot. Works at Roosevelt Roads ended in mid-June 1943, and the base was commissioned on 1 July 1943 as a Naval Operating Base. The first commander of the base was also in charge of the Marine Barracks, and the Naval Ammunition Depot in Vieques. This commander administered his duties from the Naval Administration Building.[167]

The Naval Administration Building, Supply Depot, and Public Works warehouse are behind the battleship piers. The location of these structures indicates that they were part of the initial construction, since they are adjacent to Pier One (Figure 38). The

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[165] Gerardo M. Diz. *Puerto Rico: El Gibraltar Del Caribe: Intereses Estratégicos Estadounidenses Y La Base Aeronaval Roosevelt Roads*. San Juan, P.R.: Editorial Isla Negra, 2008. Print, 120-121.
[166] Gerardo M. Diz. *Puerto Rico: El Gibraltar Del Caribe: Intereses Estratégicos Estadounidenses Y La Base Aeronaval Roosevelt Roads*. San Juan, P.R.: Editorial Isla Negra, 2008. Print, 120.
[167] Ibid,120.

Naval Administration Building was the headquarters for the administration of the base as well as the seat of the Commanding Officer, who is customarily the highest-ranking officer of the base. The supply depot and Public Works warehouse are next to the Naval Administration Building (Figure 39). These secondary buildings have no decoration since they were of less importance (Figure 40).

The Naval Administration building is a white box made of reinforced concrete. The cubed building has a flat roof and four symmetrical façades. Langley Road delivers access to the building's main façade, which like the three others, is composed of six structural bays that are accentuated with grey colored paint. The bays do not have horizontal tie-ins on the roofline. The verticality of the two-story structure makes the building seem taller and more elegant than the other structures that surround it. The two-story building has floor to ceiling windows in each level that demarcate the interior space of each section. The building's strict proportions showcase a modularity that is emphasized by slightly recessing the windows into the façade. The play between the extruded structure and the recessed windows creates a faux crenel in the roofline that is reminiscent of medieval fortifications. The building screams militarism in high fashion.

The Naval Administration Building is a Modernist structure made of steel and reinforced concrete. However the approach to this design, while industrial, is more classical than the slicked surface buildings generated by designers like Le Corbusier or Walter Gropius. A conservative sense of classicism underlies the industrial vocabulary used in the design. The building is a fusion of Classicism and Industrial aesthetics. A sticking difference between these structures and the design of buildings such as the Glen Martin Administration Building is that this structure is smaller and more minimalist. Nonetheless, this was Khans premise. The Advance Base architecture was meant to me

minimal since it focused on providing the bare essentials.

The Roosevelt Roads Supply Depot and Public Works warehouse are industrial extensions that spread behind the main façade of the Naval Administration Building. This configuration resembles the late industrial architecture designs that Kahn produced between 1917 and 1943. The metal roofline applied to the Public Works Warehouse in Roosevelt Roads mimics the skylight roof design employed by Khan's Firm in buildings like the Chrysler-Dodge half ton plant built in 1938 at Warren, Michigan (Figure 41). Albert Khans schematic principles, found at a smaller scale in the designs for Roosevelt Roads, are not as refined as the structures conceived for the continental mainland. The curving of the Administration Building's facade highlights the somewhat brute nature of this structure (Figure 42). These differences in design approach, which resulted in simpler products at Roosevelt Roads, support the concept that Advance Base architecture was simpler than Khan's continental designs.

Even after construction stopped at Roosevelt Roads, the contract for the base kept growing. The scaled-back version of the base was slowly becoming the fleet concentration that the Greenslade Board once envisioned. The base was redesigned as a Naval Air station and placed in caretaker status on November 1, 1944. There were locals protesting against the military installations and requests from the islands senate were submitted to Tugwell, but there were government officials in Washington that felt that the United States should keep the bases to protect commercial interests in the region.[168] From then until 1957 the base was opened seven times and closed eight. In 1957, Cold

[168] Ronald Fernandez. *The Disenchanted Island: Puerto Rico and the United States in the Twentieth Century*. New York: Praeger, 1992.

War tensions led the Navy to reopen the station. The base operated for forty-seven years until its closure on March 31, 2004.

The final closure of the base brought American militarism in Puerto Rico to the international scene. In 1999, a stray bomb killed a civilian guard that was observing a routine aerial exercise on the island of Vieques. The incident reignited anti-military activism that led to civil disobedience. Between 1999 and 2004 celebrities, and politicians joined the local revolts, as the protest became famous.

Naval operations at Roosevelt Roads ceased on March 31, 2004, and since closure most of the facilities have deteriorated. The Federal Government returned the land to the Government of Puerto Rico, who has placed some of the structures in use. The airfield renamed *Jose Aponte de la Torre* Airport, services Vieques, Culebra, and the Virgin Islands, while other local agencies and the Army Reserve occupy sections of the base (Figure 43).

The architecture of the Advance bases is representative of a time when America was showcasing its industrial aesthetics through the construction of naval installations around the world. The buildings at Roosevelt Roads, which are over two thousand miles away from Detroit, are a symbol of the global influence of Khan's industrial aesthetics. These constructions, led and initiated by FDR, dramatically changed the architectural landscape of Puerto Rico and the Caribbean. They introduced a new architectural language of steel and concrete that differed from the vernacular construction methods known to Puerto Ricans. They also serve as the physical remains of this WWII story.

CONCLUSION

Military architecture, in this case, naval architecture, has been ignored as influential to the dissemination of Modernist architecture. Naval architecture, often categorized as engineering, is disregarded by the architectural community as a building system that is extraneous to society. The term, naval architecture, is not even considered an element of the built environment since this term is used to describe the design of battleships.

Architects, primarily Albert Kahn, designed the Navy's WWII Advance Bases and designed Modernist buildings on every continent on the globe. Puerto Rico is just one of hundreds of examples. Most of the air traffic control centers built for the war across the Caribbean became international airports to a host of countries that currently depend on them for tourism. Naval architecture is a realm of the built environment and a very influential one.

Naval architecture was one of the tools used in the economical shift that swept the Caribbean during WWII. It is the physical evidence of a military economy that acted as a transition point for the agricultural societies that were being industrialized. The expansive range of this architecture is due to its cost effectiveness. By building inexpensive structures, the United States was able to construct more. Naval architecture was the driving force for Puerto Rico's modernization, and naval interests are the foundation that enabled housing and public works developments across the island.

The naval typology of the Continental United States was better designed than its colonial counterpart. The infrastructure generated in Puerto Rico, although improving poverty, was often of inferior quality. There is also the issue of a standardized aesthetic

that homogenized the Spanish colonial landscape that existed before the war. The modernization process was not good or bad since these terms lose their meaning in the grand scheme of things. The modernization was different, and it inadvertently generated a plethora of unforeseen changes, mainly because it was a top-down approach to development.

An important issue regarding the use of the Modernist aesthetic for naval infrastructure is that is was encouraged by FDR, the Navy, and the architects that worked for the Federal Government. The endorsement of such high-ranking leaders, during the Navy's greatest growth period, reflects that this was their architecture. The concept of naval architecture has since ceased to be acknowledged, but this does not change that the industrial aesthetic was once considered to be the appropriate solution for naval infrastructure. The question of what is naval architecture, begs further research. The historical significance of Modernist architecture should be taken into account when designing future naval installations. Are the Navy's buildings meant to look a certain way? Should structures be standardized? This issue has not been properly addressed and is worth exploring.

Another concern resulting from this research is the question of ownership. As previously mentioned most of the architecture community treats military infrastructure, in general, as a system that is outside the confines of our society. However, this architecture shaped much of the Continental United States and reshaped the colonies that were once part of the Nation. This architecture belongs to the people of the United States and is an unacknowledged patrimony.

There were difficulties during this research that need to be addressed. Photography's of bases were unavailable from sources such as the Naval History and

Heritage Command because naval bases are not part of the Navy. The Seabee Museum, which retains the records of naval infrastructure, published a book regarding Advance Bases, yet the name of Albert Kahn is missing from the text. A final observation regarding this research is that the subject was, for the most part, omitted from American and Puerto Rican history and that this exclusion deserves further research.

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ILUSTRATIONS: CHAPTER ONE

Figure 1 | Digital image. *Building the Navy's Bases in World War II*. Naval History and Heritage Command, n.d. Web.

Figure 2 | Map of the San Juan National Historic Site, which includes the Castillo San Felipe del Morro. *Park Map*. Digital image. *San Juan National Historic Site*. N.p., n.d. Web.

Figure 3 | 1968 Commemoration of the *Lares* uprising. Charron, Jose. *Grito De Lares 1968*. Digital image. *Lucha Y Conmemoración En El Grito De Lares*. N.p., n.d. Web.

Figure 4 | *El Velorio, The Wake*. Digital image. *The Iconic Painting Called "Velorio" By Francisco Oller*. Joey Medrano, n.d. Web.

Figure 5 | Delano Jack. *Puerto Rico's Changes*. Digital image. *The Caribbean in Transition*. Library of Congress, n.d. Web.

Figure 6 | Birsd Eye Perspective of the Eleanor Roosevelt Development in Hato Rey, Puerto Rico, 1938. PRAA project. Print image. *Leahy's Puerto Rican Memoires (1939-1940).*

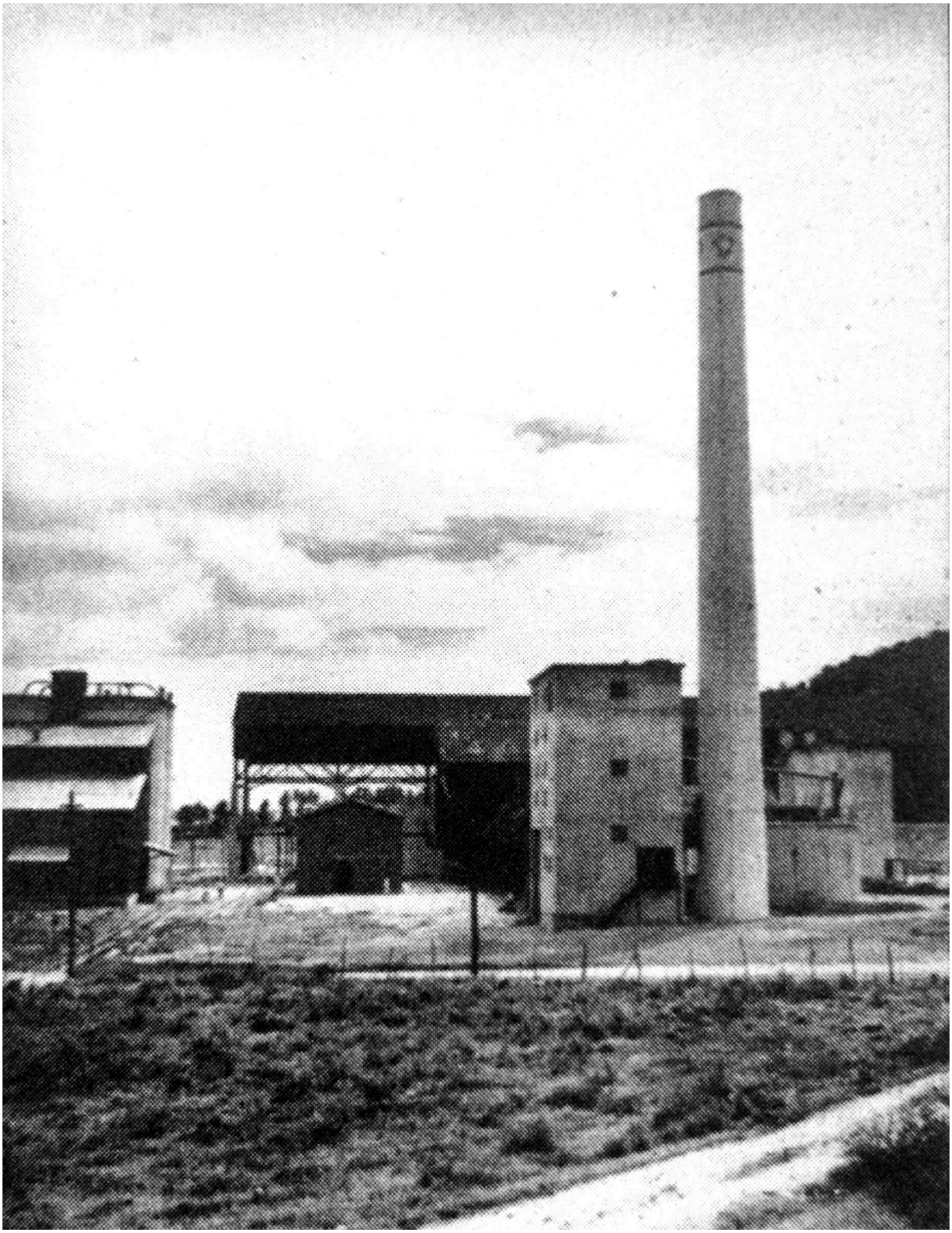


Figure 7 | Rodriguez, Beruff. First Cement Plant in Puerto Rico. Print image. *Leahy's Puerto Rican Memoires (1939-1940).*

Figure 8 | Filardi, Carmelo. Caricature of Governor Rexford Tugwell. Print Image. *El Mundo*, 1946

ILUSTRATIONS: CHAPTER TWO

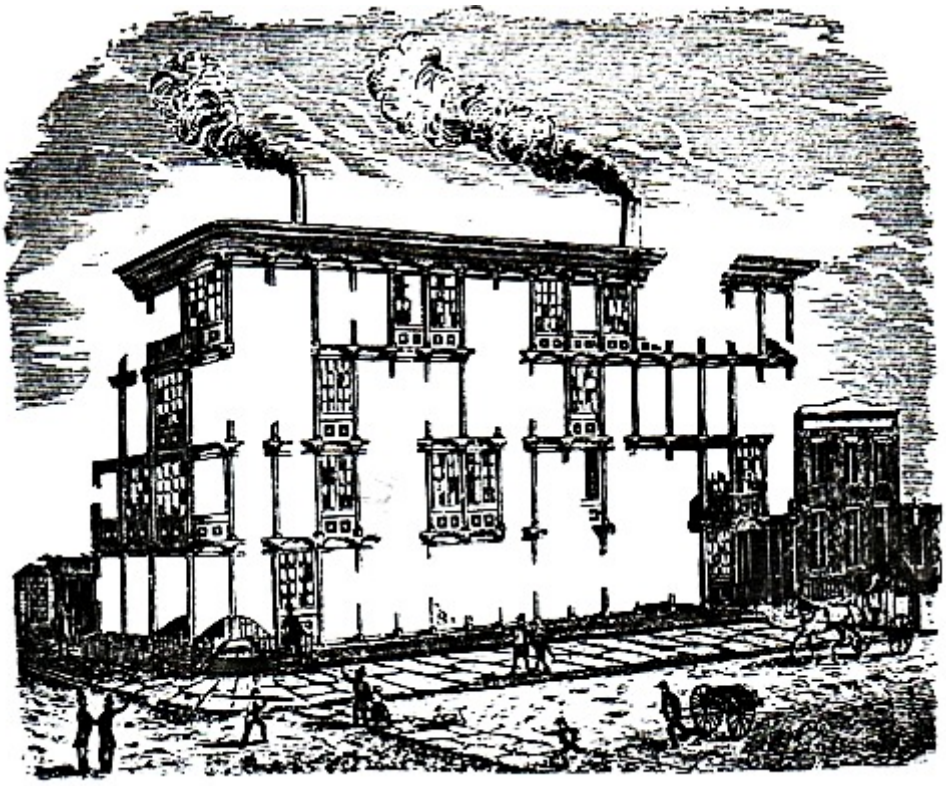


Figure 9 | Bogardus. James. Projected design for a Factory – showing the resistance of cast iron, 1856. Print Image. *Industrial Architecture: An Analysis of International Building Practice.*

Figure 10 | Delamotte, Phillip. Crystal Palace at Sydenham, 1854, n.d. Web.

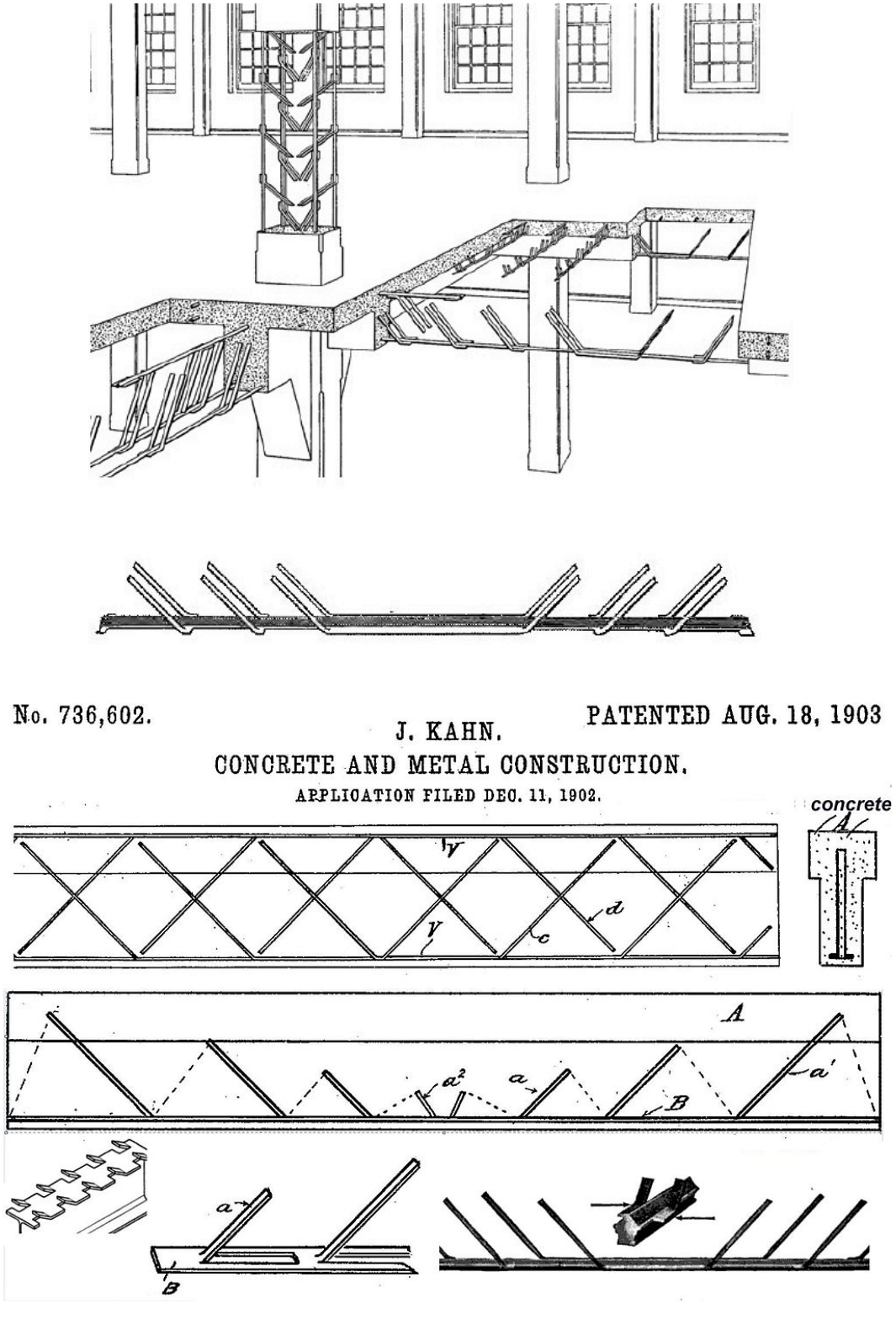


Figure 11 | Kahn, Julius. Truss Bar and Patent, 1903-04. Digital image, public domain.

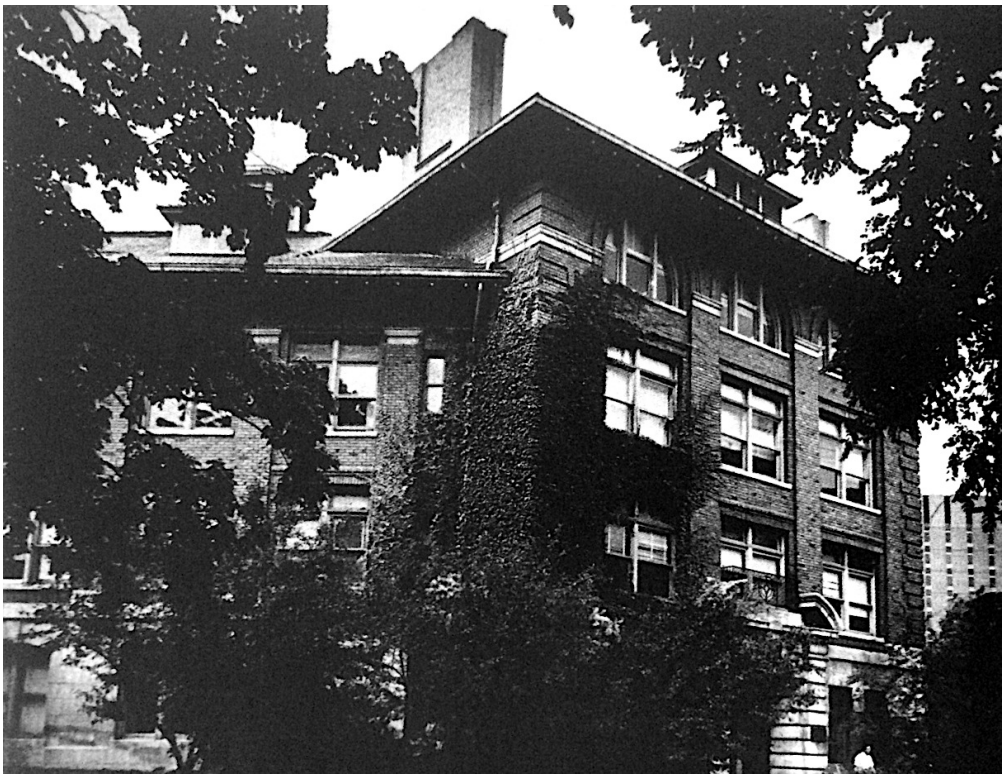


Figure 12 | Engineering Building, University of Michigan, Ann Arbour, 1903, Photo by Henry A. Leung. Print image. *The Legacy of Albert Kahn: The Detroit Institute of Arts; 1970.*

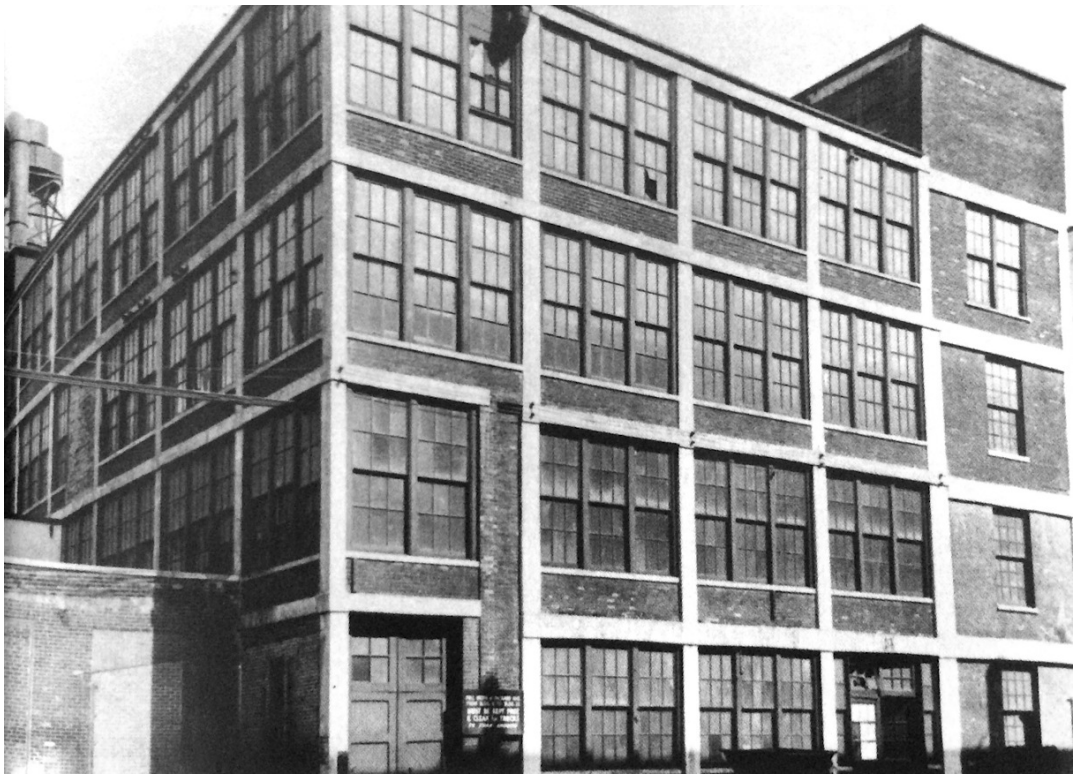


Figure 13 | Packard Motor Car Company Building No. 10, Detroit, Michigan, 1905, Photo by J. McCaughey. Print image. *The Legacy of Albert Kahn: The Detroit Institute of Arts; 1970.*

Figure 14 | Sheeler, CHarles. *American Landscape, 1930*. Digital image. *Blank, Empty and Missing Things: Stone and Wood*. Museum of Modern Art, New York, n.d. Web.

Figure 15 | Cranbrook House, Bloomfield Hills, Michigan, 1907, Photo by Henry A. Leung. Print image. *The Legacy of Albert Kahn: The Detroit Institute of Arts; 1970.*

THE ENCOURAGING ECONOMIC FACTORS

BY

FRANKLIN D. ROOSEVELT

GOVERNOR OF THE STATE OF NEW YORK

Keystone

I FEEL that the present economic depression will prove a great boon to the architectural profession. It has given us a chance to take stock of how well or how poorly we have been building these many years.

More expert planning by the better trained men is necessary to meet the economic adjustment. In the past, many buildings have been erected from plans prepared by men without proper architectural training and this has resulted in a reckless waste of space and awkward and inconvenient arrangements. Competition is demanding better planned and designed buildings which will, in a large measure, eliminate the jerry-built construction. Mortgage companies are requiring higher standards which will necessitate the employment of architects fitted to meet their requirements.

Also because of economic conditions, every piece of material used in a building must be put to a severe test. Is a certain material economical? Will future maintenance make it costly in the end? Does it best fit its purpose? Has it the required æsthetic qualities?

To make this analysis is not the work of an incompetent man, but that of the architect with training, experience and judgment.

For the past three years there has been a retrenchment in business, social and community activities. Naturally, architecture has suffered along with the rest. There is not a village, town or city which has not constructed fewer buildings during this depression. As soon as business improves it is only natural to expect that there will be a decided stimulation in building construction throughout the country.

It is true that the building of homes at this time has been almost at a standstill. Families have been obliged to combine forces and live in the same quarters. When conditions improve, an impetus to home building will take place and new developments will spring up. There is already a decided trend toward more carefully supervised developments. This means more desirable and attractive places in which to live at no greater cost than some of the hideous developments of rows and rows of unsightly houses which are a blot on our landscape.

With these conditions in mind, it would seem that the architect's position is more secure than ever to assure our country of buildings more efficiently designed, more economically sound, and more properly related to their social needs and communities.

Figure 16 | Roosevelt, Franklyn D. Print image. The Encouraging Economic Factors, The Future of the Architect as Expressed by Eight Forward Looking Men." *The Architectural Forum* LVII (1932): 93

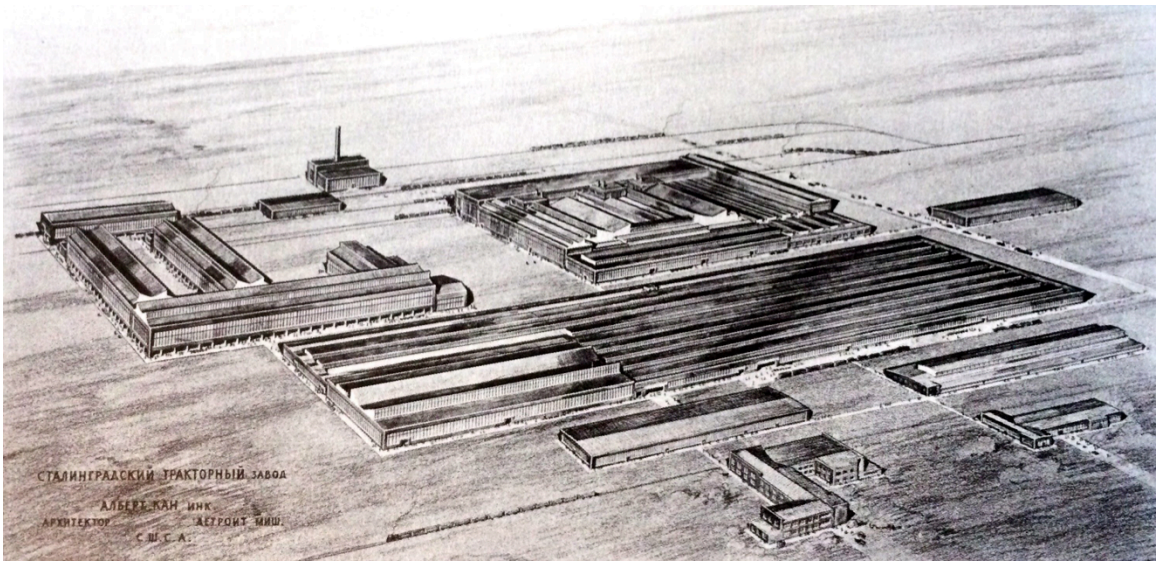


Figure 17 | Rendering of Tractor Plant, Stalingrad, Russia, 1930, Photo by Jeffrey White Studios. Print image. *The Legacy of Albert Kahn: The Detroit Institute of Arts; 1970.*

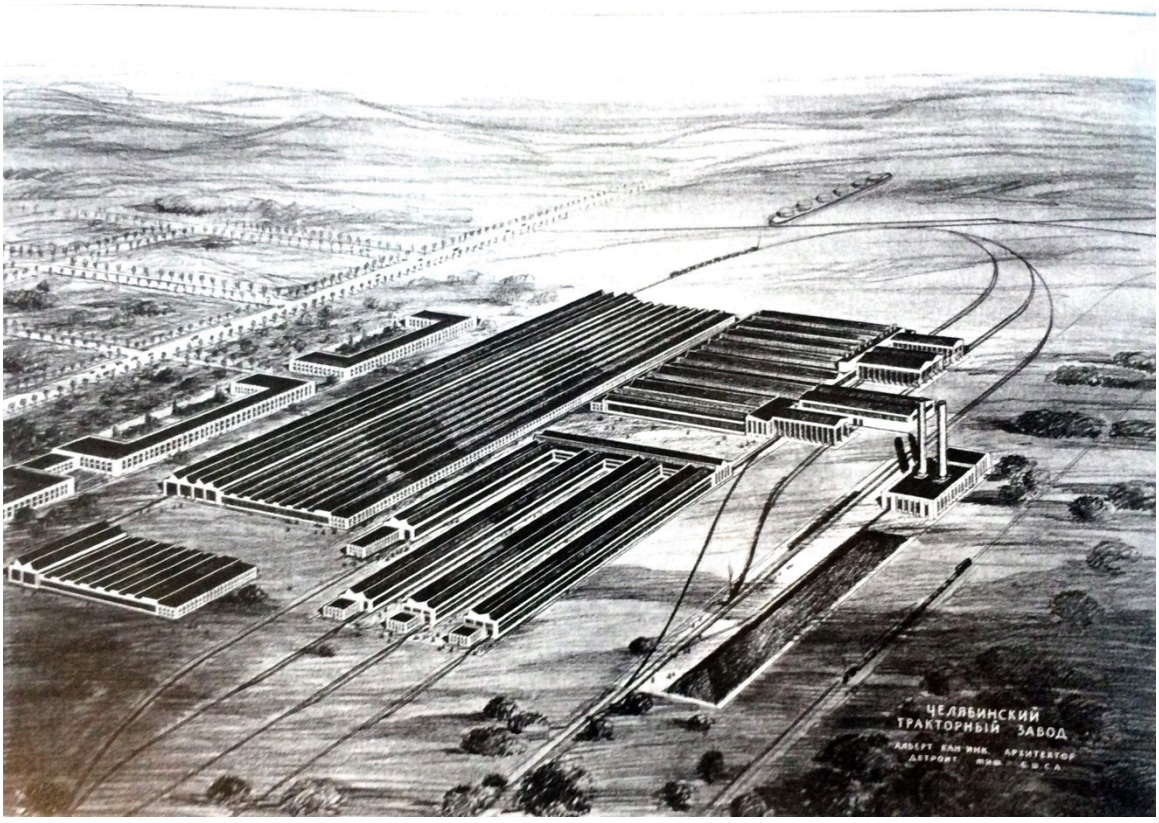


Figure 18 | Rendering of Tractor Plant, Cheliabinsk, Russia, 1933, Photo by Jeffrey White Studios. Print image. *The Legacy of Albert Kahn: The Detroit Institute of Arts; 1970.*

Figure 19 | Tractor Plant – Interior, Cheliabinsk, Russia, 1933, Photo by AKA. Print image. *The Legacy of Albert Kahn: The Detroit Institute of Arts; 1970.*

Figure **20 | Das** *Fagus-Werk, Hauptgebäude (Frontale)*. Digital image. N.p., n.d. Web.

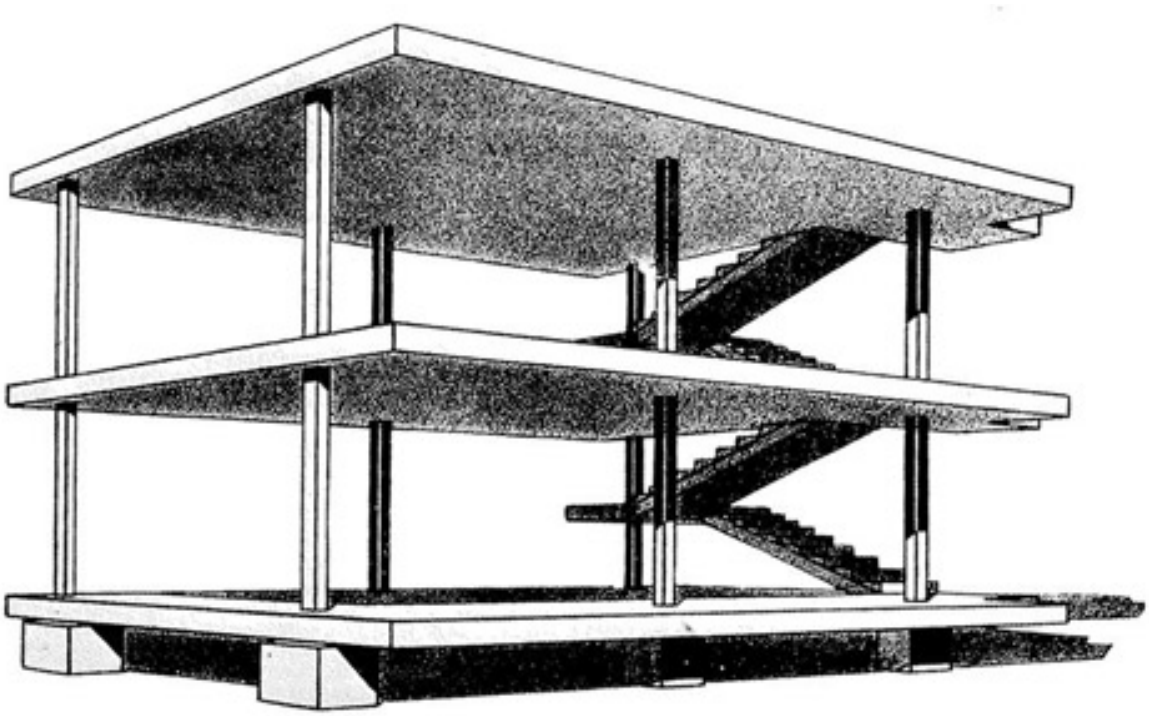


Figure 21 | View of the Dom-ino system, 1914, Print image. *Le Corbusier & Pierre Jeanneret, Oeuvre Complète Volume 1*, 1910–1929, Les Editions d'Architecture Artemis, Zürich, 1964

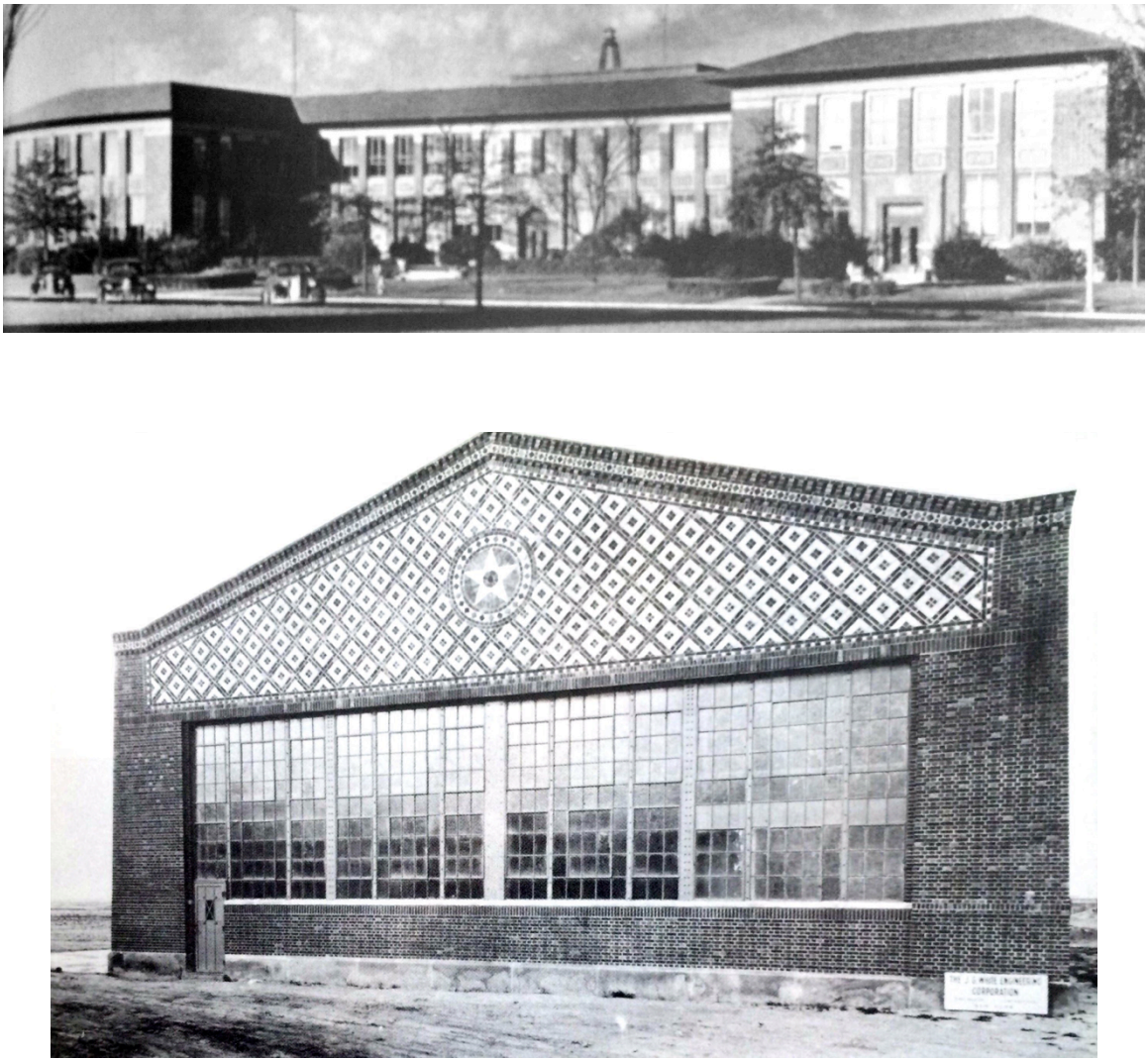
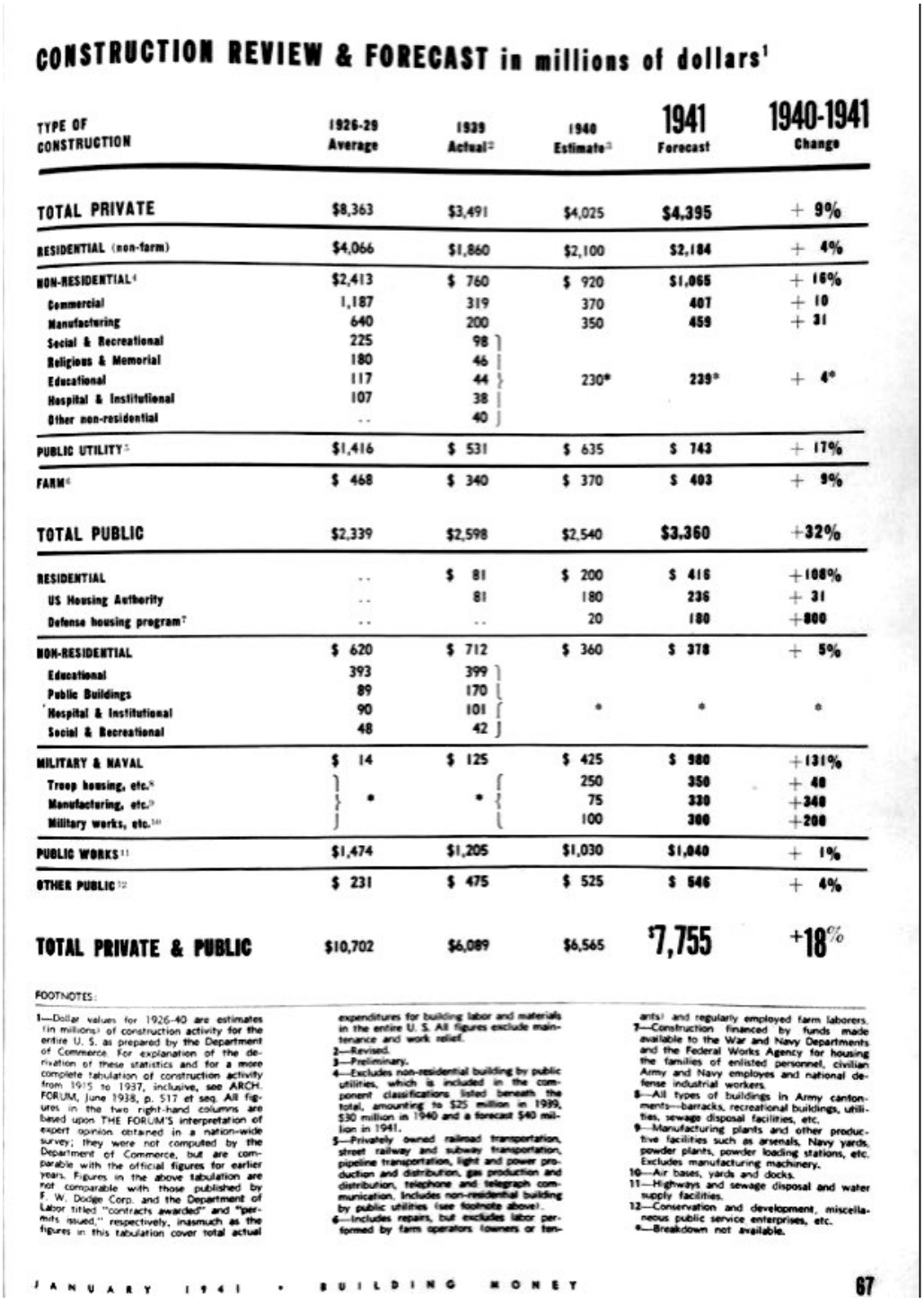


Figure 22 | Top: U.S. Aviation School Laboratory Building front façade, Langley Field, VA. Bottom: Hangar, Langley Field, VA, 1917. Photo: AKA. Print image. *The Legacy of Albert Kahn: The Detroit Institute of Arts; 1970.*

Figure 23 | Service *Technique de Construction Navales* (Technical Service for Naval Constructions), Auguste Perret, Île-de-France, 1928-56. Photo: Chevojon, AN/IFA fonds Perret 535 AP 423/4, Auguste et Gustave Perret, UFSE, SAIF, 2009. Phot. Valérie Gaudard. © CRMH Île-de-France, 2008

Figure 24 | Fighter plane formation practicing over San Juan, Vivoni Family Collection, late 1930s. Print Image. *Leahy's Puerto Rican Memoirs* (1939-1940)

ILUSTRATIONS: CHAPTER THREE



CONSTRUCTION REVIEW & FORECAST in millions of dollars[1]

TYPE OF CONSTRUCTION	1926-29 Average	1939 Actual[2]	1940 Estimate[3]	1941 Forecast	1940-1941 Change
TOTAL PRIVATE	$8,363	$3,491	$4,025	$4,395	+ 9%
RESIDENTIAL (non-farm)	$4,066	$1,860	$2,100	$2,184	+ 4%
NON-RESIDENTIAL[4]	$2,413	$ 760	$ 920	$1,065	+ 16%
Commercial	1,187	319	370	407	+ 10
Manufacturing	640	200	350	459	+ 31
Social & Recreational	225	98			
Religious & Memorial	180	46			
Educational	117	44	230*	239*	+ 4*
Hospital & Institutional	107	38			
Other non-residential	--	40			
PUBLIC UTILITY[5]	$1,416	$ 531	$ 635	$ 743	+ 17%
FARM[6]	$ 468	$ 340	$ 370	$ 403	+ 9%
TOTAL PUBLIC	$2,339	$2,598	$2,540	$3,360	+32%
RESIDENTIAL	--	$ 81	$ 200	$ 416	+108%
US Housing Authority	--	81	180	236	+ 31
Defense housing program[7]	--	--	20	180	+800
NON-RESIDENTIAL	$ 620	$ 712	$ 360	$ 378	+ 5%
Educational	393	399			
Public Buildings	89	170			
Hospital & Institutional	90	101	*	*	*
Social & Recreational	48	42			
MILITARY & NAVAL	$ 14	$ 125	$ 425	$ 980	+131%
Troop housing, etc.[8]			250	350	+ 40
Manufacturing, etc.[9]	*	*	75	330	+340
Military works, etc.[10]			100	300	+200
PUBLIC WORKS[11]	$1,474	$1,205	$1,030	$1,040	+ 1%
OTHER PUBLIC[12]	$ 231	$ 475	$ 525	$ 546	+ 4%
TOTAL PRIVATE & PUBLIC	$10,702	$6,089	$6,565	$7,755	+18%

FOOTNOTES:

1—Dollar values for 1926-40 are estimates (in millions) of construction activity for the entire U. S. as prepared by the Department of Commerce. For explanation of the derivation of these statistics and for a more complete tabulation of construction activity from 1915 to 1937, inclusive, see ARCH. FORUM, June 1938, p. 517 et seq. All figures in the two right-hand columns are based upon THE FORUM'S interpretation of expert opinion obtained in a nation-wide survey; they were not computed by the Department of Commerce, but are comparable with the official figures for earlier years. Figures in the above tabulation are not comparable with those published by F. W. Dodge Corp. and the Department of Labor titled "contracts awarded" and "permits issued," respectively, inasmuch as the figures in this tabulation cover total actual expenditures for building labor and materials in the entire U. S. All figures exclude maintenance and work relief.

2—Revised.

3—Preliminary.

4—Excludes non-residential building by public utilities, which is included in the component classifications listed beneath the total, amounting to $25 million in 1939, $30 million in 1940 and a forecast $40 million in 1941.

5—Privately owned railroad transportation, street railway and subway transportation, pipeline transportation, light and power production and distribution, gas production and distribution, telephone and telegraph communication. Includes non-residential building by public utilities (see footnote above).

6—Includes repairs, but excludes labor performed by farm operators (owners or tenants) and regularly employed farm laborers.

7—Construction financed by funds made available to the War and Navy Departments and the Federal Works Agency for housing the families of enlisted personnel, civilian Army and Navy employes and national defense industrial workers.

8—All types of buildings in Army cantonments—barracks, recreational buildings, utilities, sewage disposal facilities, etc.

9—Manufacturing plants and other productive facilities such as arsenals, Navy yards, powder plants, powder loading stations, etc. Excludes manufacturing machinery.

10—Air bases, yards and docks.

11—Highways and sewage disposal and water supply facilities.

12—Conservation and development, miscellaneous public service enterprises, etc.

*—Breakdown not available.

JANUARY 1941 • BUILDING MONEY 67

Figure 25 | Construction Review & Forecast in millions of dollars. Print image. *The Architectural Forum*, 1941

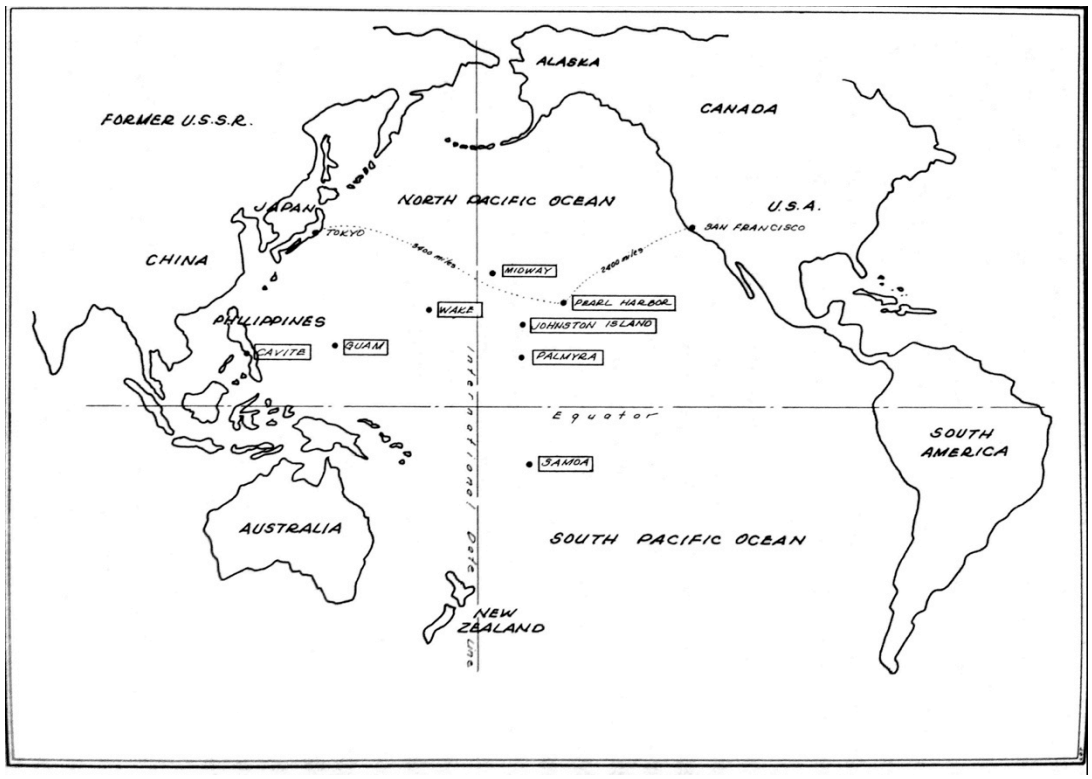


Figure 26 | Location of Pacific Islands on which Six Companies firms were building naval airbases, or related facilities, right up until the outbreak of WWII. Print image. Wolf, Donald E. *Big Dams and Other Dreams,* 1996

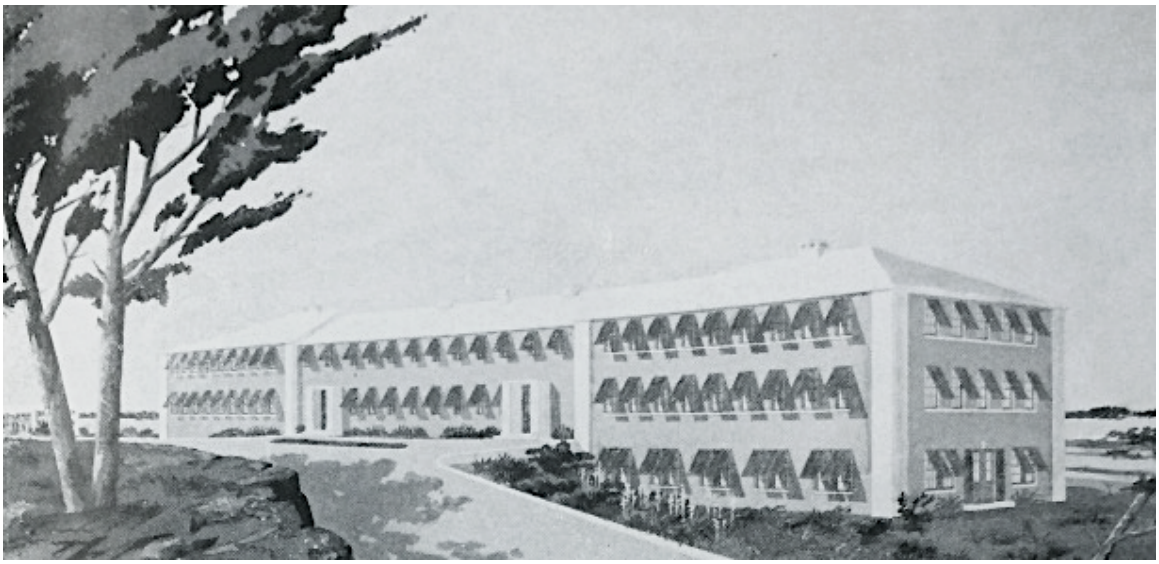


Figure 27 | Projected Construction, Shaw, Naess, and Murphy, Architects. Print image. *The Architectural Forum*, July 1942

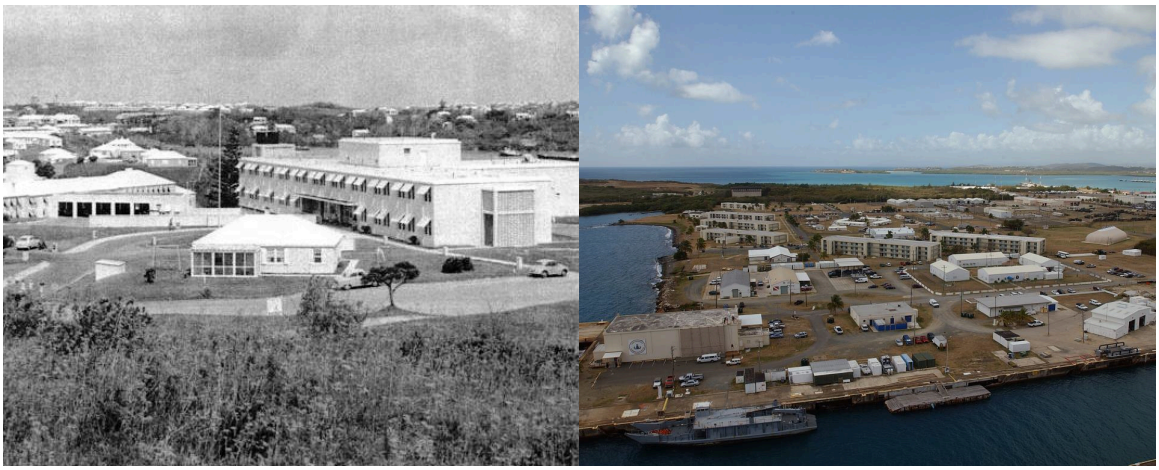


Figure 28 | L: *American Military Bases in Bermuda from 1941 to 1995*. Digital image. *American Military Bases in Bermuda from 1941 to 1995*. N.p., n.d. Web. R: *Camp Moscrip*. Digital image. *Roosevelt Roads Naval Station*. N.p., n.d. Web.

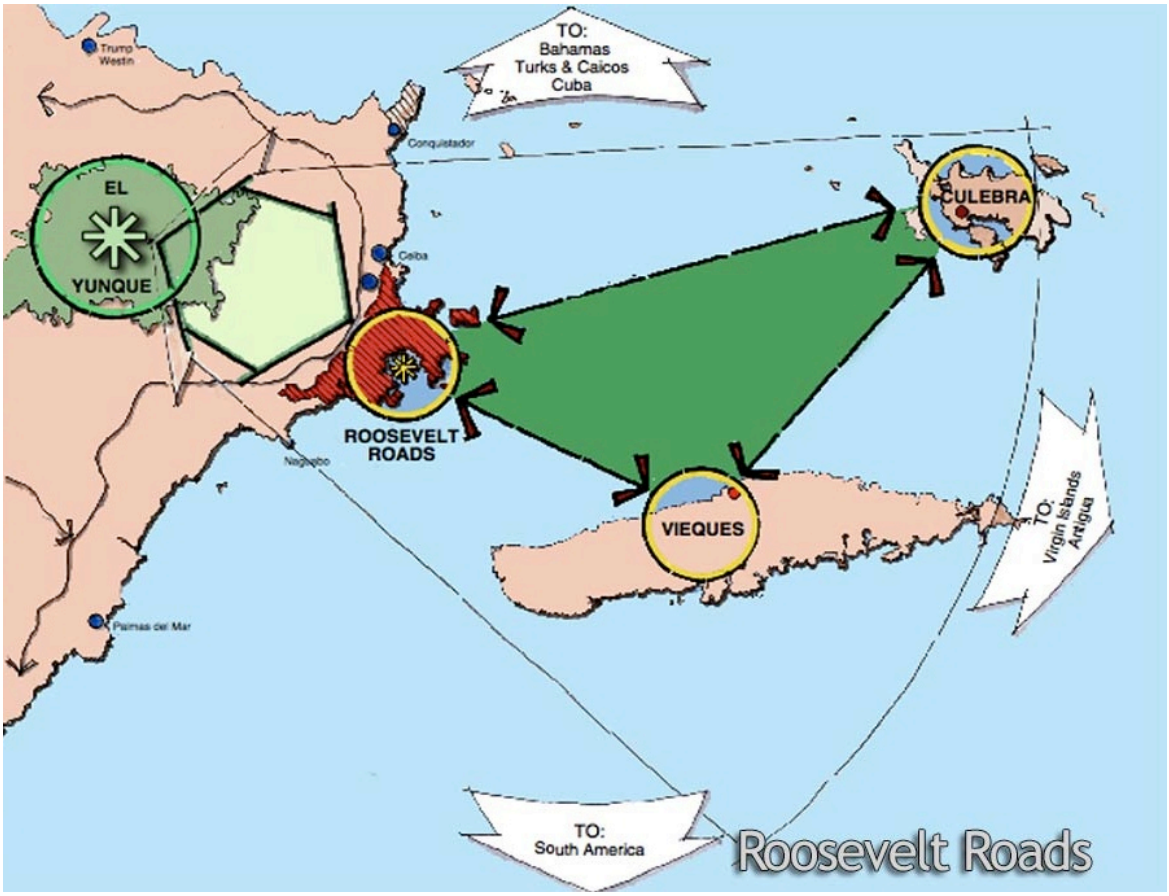


Figure 29 | The Roosevelt Roads triangle. Digital image. *Roosevelt Roads*. N.p., n.d. Web.

Figure 30 | Aerial view of Naval Air Station Isla Grande, San Juan, Puerto Rico, as it appeared in the Jun 1947 edition of the 'US Navy Naval Aviation News.' Digital image. N.p., n.d. Web.

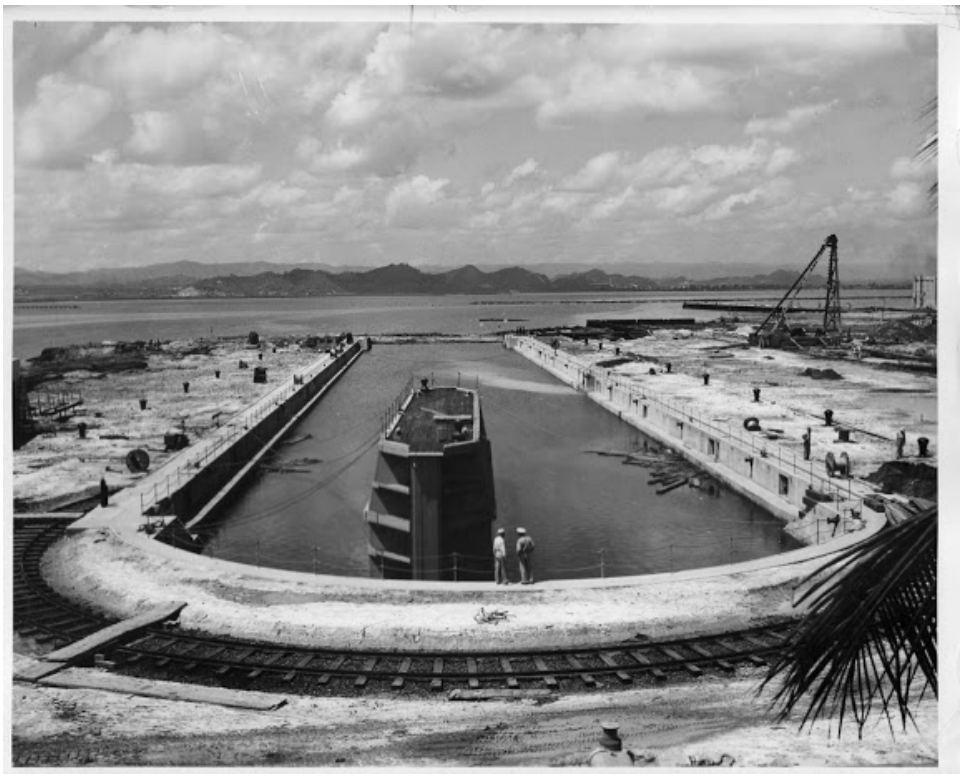


Figure 31 | No. 549 Graving Dock, NAS San Juan, P.R. May 9, 1941. Digital image. N.p., n.d. Web.

Figure 32 | Tenth Naval District Headquarters, San Juan, Puerto Rico, 1940. *Building the Navy's Bases in World War II*. Digital image. *Roosevelt Roads*. N.p., n.d. Web.

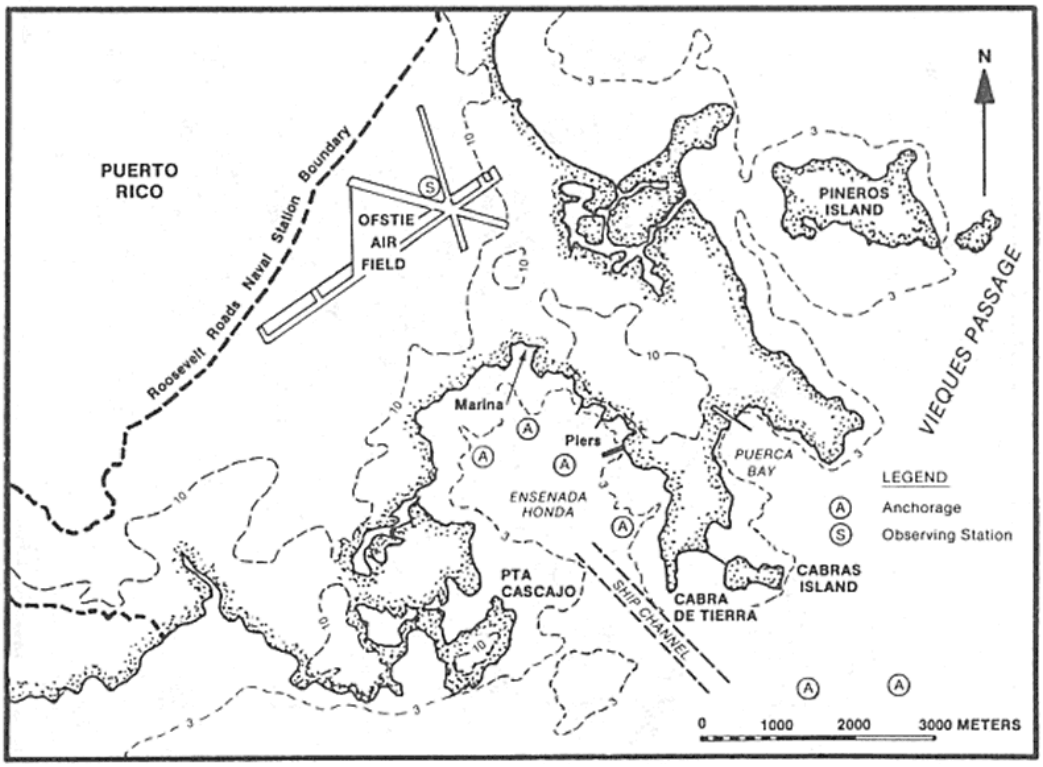


Figure 33 | Map of Roosevelt Roads. *Building the Navy's Bases in World War II*. Digital image. *Roosevelt Roads*. N.p., n.d. Web.

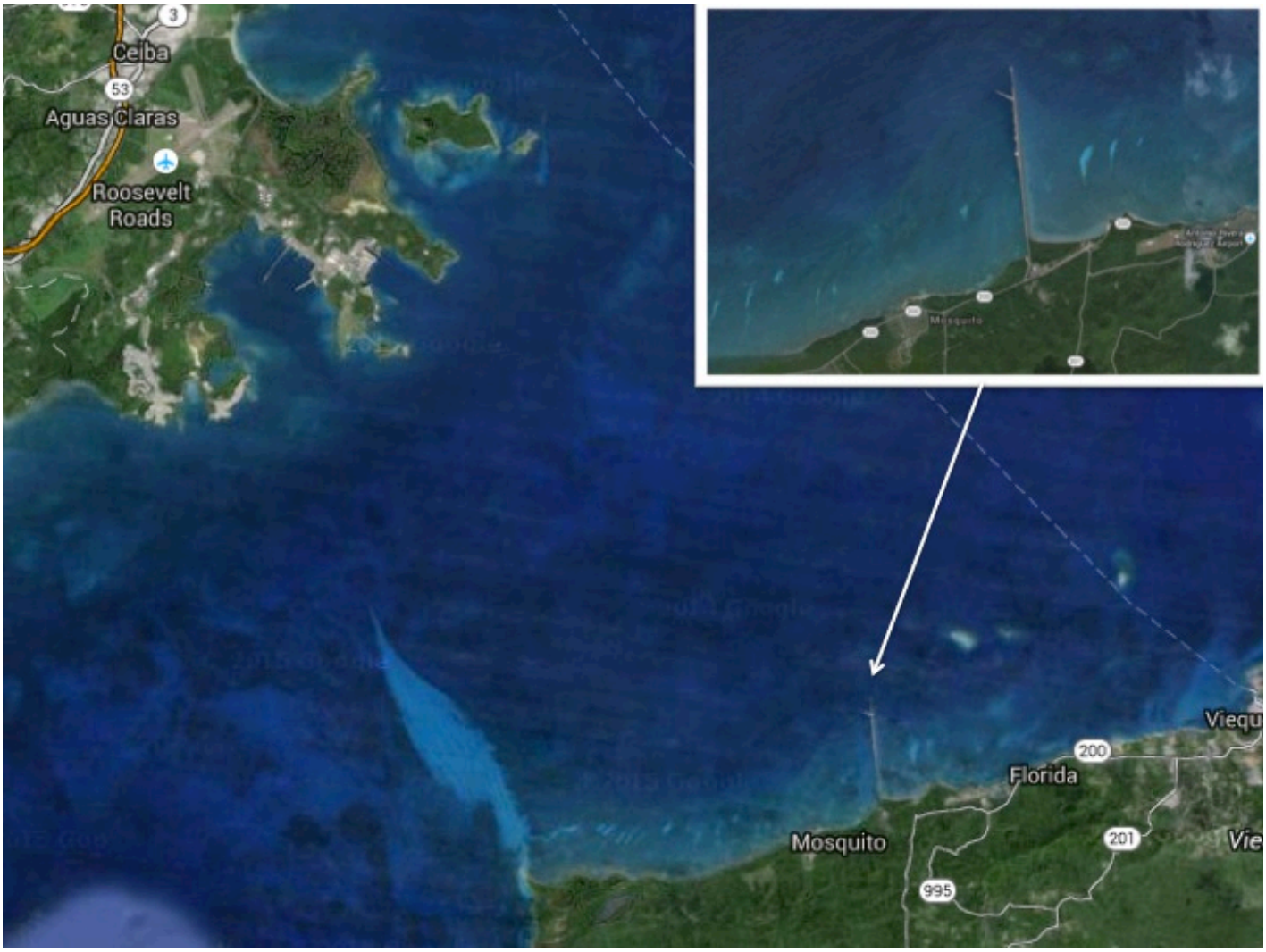


Figure 34 | Satellite image of 7,000 of the 40, 700 feet of breakwater that were meat to connect Vieques with Ceiba. Digital image. Google maps. N.p., n.d. Web.

Figure 35 | Post war image of Fort Bundy, c. 1960, photo courtesy of Walter Nazario. Digital image. N.p., n.d. Web.

Figure 36 | Dry Dock Material Yard at Roosevelt Roads, Ensenada Honda Bay, 1942, photo courtesy of Walter Nazario. Digital image. N.p., n.d. Web.

Figure 37 | Top: Dry Dock construction in Puerca Bay, 1942. Bottom: Image of the Dry Dock before it was permanently flooded in 1980, photo courtesy of Walter Nazario. Digital images. N.p., n.d. Web.

Figure 38 | Naval Administration Building. Roosevelt Roads, Puerto Rico, 2014. Photos by author.

Figure 39 | Supply Depot located behind the Naval Administration Building. Roosevelt Roads, Puerto Rico, 2014. Photos by author.

Figure 40 | Public Works Warehouse located behind the Supply Depot, Roosevelt Roads, 2014. Top: *Public Works Warehouse*. Digital image. *Roosevelt Roads*. N.p., n.d. Web. Bottom: image by author.

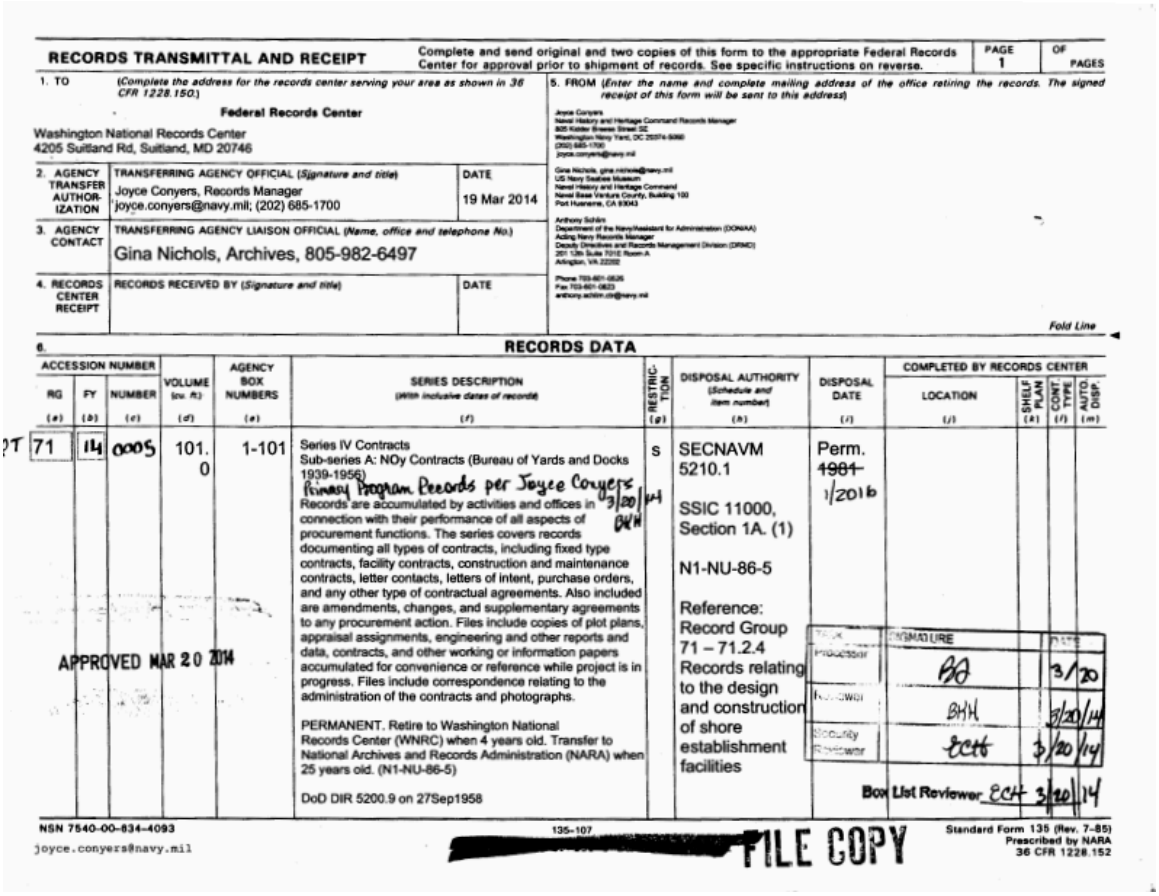
Figure 41 | *Albert Kahn: Dodge Half-Ton Truck Plant*. Digital image. *Tumblr*. N.p., n.d. Web.

Figure 42 | Naval Administration Building. Roosevelt Roads, Puerto Rico, 2014. Photos by author.

Figure 43 | Port Operations Building, Roosevelt Roads, 2014. Image by author.

APPENDIX A:

Seabee Museum transmittal receipt of records transferred to the National Archives and Records Administration. Includes the contract number for the architectural engineering services completed by Albert Kahn Incorporated.



RECORDS TRANSMITTAL AND RECEIPT

Complete and send original and two copies of this form to the appropriate Federal Records Center for approval prior to shipment of records. See specific instructions on reverse.

PAGE 1 OF PAGES

1. TO (Complete the address for the records center serving your area as shown in 36 CFR 1228.150.)

Federal Records Center

Washington National Records Center
4205 Suitland Rd, Suitland, MD 20746

5. FROM (Enter the name and complete mailing address of the office retiring the records. The signed receipt of this form will be sent to this address)

Joyce Conyers
Naval History and Heritage Command Records Manager
805 Kidder Breese Street SE
Washington Navy Yard, DC 20374-5060
(202) 685-1700
joyce.conyers@navy.mil

Gina Nichols, gina.nichols@navy.mil
US Navy Seabee Museum
Naval History and Heritage Command
Naval Base Ventura County, Building 100
Port Hueneme, CA 93043

Anthony Schlim
Department of the Navy/Assistant for Administration (DONAA)
Acting Navy Records Manager
Deputy Directives and Records Management Division (DRMD)
Arlington, VA 22202
Phone 703-601-0626
Fax 703-601-0623
anthony.schlim.civ@navy.mil

2. AGENCY TRANSFER AUTHORIZATION — TRANSFERRING AGENCY OFFICIAL (Signature and title): Joyce Conyers, Records Manager joyce.conyers@navy.mil; (202) 685-1700 — DATE: 19 Mar 2014

3. AGENCY CONTACT — TRANSFERRING AGENCY LIAISON OFFICIAL (Name, office and telephone No.): Gina Nichols, Archives, 805-982-6497

4. RECORDS CENTER RECEIPT — RECORDS RECEIVED BY (Signature and title): — DATE:

Fold Line

6. RECORDS DATA

ACCESSION NUMBER RG (a)	FY (b)	NUMBER (c)	VOLUME (cu. ft.) (d)	AGENCY BOX NUMBERS (e)	SERIES DESCRIPTION (With inclusive dates of records) (f)	RESTRICTION (g)	DISPOSAL AUTHORITY (Schedule and item number) (h)	DISPOSAL DATE (i)	COMPLETED BY RECORDS CENTER LOCATION (j)	SHELF PLAN (k)	CONT TYPE (l)	AUTO DISP. (m)
PT 71	14	0005	101.0	1-101	Series IV Contracts Sub-series A: NOy Contracts (Bureau of Yards and Docks 1939-1956) Primary Program Records per Joyce Conyers 3/20/14 BHH Records are accumulated by activities and offices in connection with their performance of all aspects of procurement functions. The series covers records documenting all types of contracts, including fixed type contracts, facility contracts, construction and maintenance contracts, letter contacts, letters of intent, purchase orders, and any other type of contractual agreements. Also included are amendments, changes, and supplementary agreements to any procurement action. Files include copies of plot plans, appraisal assignments, engineering and other reports and data, contracts, and other working or information papers accumulated for convenience or reference while project is in progress. Files include correspondence relating to the administration of the contracts and photographs. PERMANENT. Retire to Washington National Records Center (WNRC) when 4 years old. Transfer to National Archives and Records Administration (NARA) when 25 years old. (N1-NU-86-5) DoD DIR 5200.9 on 27Sep1958	S	SECNAVM 5210.1 SSIC 11000, Section 1A. (1) N1-NU-86-5 Reference: Record Group 71 – 71.2.4 Records relating to the design and construction of shore establishment facilities	Perm. ~~1981~~ 1/2016				

APPROVED MAR 20 2014

	SIGNATURE	DATE
PROCESSOR	BD	3/20
REVIEWER	BHH	3/20/14
SECURITY REVIEWER	ECH	3/20/14

Box List Reviewer ECH 3/20/14

NSN 7540-00-634-4093 — 135-107 — Standard Form 135 (Rev. 7-85) Prescribed by NARA 36 CFR 1228.152

joyce.conyers@navy.mil

[redacted] FILE COPY

(Note: see also NOy-4173)

NOy-3560: contract; *Technical Report and Project history Architectural and Engineering Service,* re: Albert Kahn, Incorporated, Aug 1944 (1 of 3)

NOy-3560: contract; *Completion Report Architectural and Engineering Service,* re: Albert Kahn, Incorporated, 8 Oct 1940 (2 of 3)

NOy-3560: contract; *Architect's Services, Naval Public Works Projects,* re: Albert Kahn, Incorporated, 12 Aug 1939 – 4 Apr 1945 (3 of 3)

Source: Archives of U.S. Navy Seabee Museum, Naval Base Ventura County.

APPENDIX B:

Letters between Albert Kahn and Ben Moreell found in box 1 of the Albert Kahn papers, Bentley Historical Library, University of Michigan.

COPY

NAVY DEPARTMENT
Bureau of Yards and Docks
Washington, D.C.

23 January 1940

Dear Mr. Kahn:

I have noted from your last report, the progress made on plans and specifications for the Naval Air Base program and wish to compliment you on the splendid showing.

I particularly appreciate your recognition of the need for speed in the preparation of these plans and specifications for the steps you have taken to meet those needs. It is very helpful to us in the accomplishment of a none too easy task.

I hope that your health is again fully restored and that you are not taxing your strength too greatly.

With best wishes, I am

Sincerely yours,

R. Moreell.

Mr. Albert Kahn
c/o Albert Kahn, Inc.
New Center Bldg.
Detroit, Michigan

Source: Albert Kahn Papers, Bentley Historical Library, University of Michigan.

IN REPLY ADDRESS
THE BUREAU OF YARDS AND DOCKS
AND REFER TO No.

NOy-3560

NAVY DEPARTMENT
BUREAU OF YARDS AND DOCKS
WASHINGTON, D.C.

May 9, 1940.

Dear Mr. Kahn:

Congratulations on meeting the May 6th date for release of all Air Stations plans. As I have stated to you before, the despatch with which you have prepared these plans and specifications, has been very helpful to this Bureau in undertaking promptly an important addition to National Defense Facilities.

I enjoyed reading in the Sunday supplement about the "Million-Dollar Office Boy".

With best wishes for your continued success, I am

Sincerely yours,

[illegible]
Chief of Bureau

Mr. Albert Kahn,
Albert Kahn, Inc.,
New Center Building,
Detroit, Michigan.

Source: Albert Kahn Papers, Bentley Historical Library, University of Michigan.