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Brock Colter Spain

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Brock Colter Spain

November 2010

for Mom and Dad

“Making the decision to have a child is momentous. It is to decide forever to have your heart go walking around outside your body.”

Elizabeth Stone

ACKNOWLEDGEMENT

I am grateful to those who contributed to making this a better work. Especially the family and friends for whom there is no distiction; Jon Alexander, Yuki Fujii, Brook Spain, Cole Wallace, and Lucas Winter.

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Marines take cover behind a sea wall on Red Beach 3.

ABSTRACT

On November 20, 1943 young Higgins landing craft operator Leon Cooper ferried U.S. Marines of the Second Division ashore on the island of Betio, Tarawa Atoll. The Tarawa landing was to be the first American amphibious assault in World War II and at Red Beach it challenged an entrenched force of 5,000 Japanese soldiers. The fighting lasted only seventy-six hours but it remains one of the bloodiest offenses during WWII. Nearly 1,700 Americans died and over 2,000 wounded during the battle at Tarawa. Most of the dead, both American and Japanese alike, were quickly buried in unmarked graves and cemeteries on the island. Since WWII, some American remains have been recovered, accounted for, and returned to the United States. However, the remains of 564 U.S. Marines and countless Japanese soldiers have yet to come home.

Several years later…

Leon Cooper had returned home and made a life as a computer company executive. Since retiring, the 89 year old Malibu veteran has stumbled upon a new fight in a familiar place. A few years ago he learned of a landfill covering the bodies of his fallen comrades at Red Beach. Outraged he began spending his own money and raising awareness about the build-up of garbage and debris on hallowed ground. His efforts have resulted in nationwide recognition and a documentary, Return to Tarawa: The Leon Cooper Story. However, the ultimate goal has yet to be realized. Leon has made it his last work to clean-up Red Beach.

Apart from local and regional governments not cooperating, rising sea levels have also posed a threat to Leon's efforts. With an intending doom dictating the timeline, the clean-up of Red Beach pales in comparison to the relocation of 10,000 natives from their homes in one of the poorest regions on earth.

If not addressed the issues at Red Beach will simply be underwater. The moral line made at this juncture divides right from wrong and outlines actions in each. Are mounds of trash atop soldier's remains simply 'out of sight and out of mind'? Or is their trash in our oceans atop forgotten hero's buried at sea? History tells a story of man's inhumanity to man; a tale of war that led men to kill other men for shared principals and the translation of that naivety into a nation dumping trash on a graveyard. It is the goal of this thesis to explore the qualities of humankind that are embodied in a soldiers sacrifice by creating an architecture that controls degrading conditions in spite of certain destruction. This, a municipal waste management facility, chooses to hold the sacrifices of soldiers above their deaths and carries their bodies from the trash into a memoriam that eases trauma into memory while instituting new possibilities, new activities, and new images for a hopeful future.

The war in the Pacific was vast in comparison to the war on the European front. The terrain was unfamiliar, the strategy of attack had to be reinvented, and the amount of ocean that had to be conquered was so great that its boundaries were often underestimated. Before the summer of 1942, the Japanese Empire had expanded far beyond the borders of their own country, blanketing the surrounding Pacific from the Aleutians in the North Pacific down past Wake Island in the Central Pacific to the Gilberts on the equator; their western boundary ran from the Manchurian-Soviet border through eastern China and Burma to India; on the south it took in Sumatra, Java, Timor, half of New Guinea, and all of the Solomon's.[1] The scale of the Pacific Theatre was enormous. However, after failing to combat Russia and destroy the American Pacific Fleet at the Battle of Midway the empire was running out of options. Despite hopes to control the southern Solomon's on their last promising front, Japan braced for a change in military tactic. They retreated to their islands and began their defensive.

The allied strategy for victory was relatively simple. Both General Douglas McArthur, Commander of the Allied Forces in the Southern Pacific, and Admiral Chester W. Nimitz, Commander-in-Chief of the Pacific Fleet, developed a counter-offensive strategy known as island-hopping. The goal was to outflank and bypass significant enemy defenses wherever it proved to be strategic, leaving isolated those insignificant defenses to the rear of the actual fighting front. By island-hopping allied forces were able to strategically shorten the distance to Japan while establishing forward land bases for supply and support purposes. Within little more than a year, McArthur and Nimitz had implemented an effective and economical strategy that reached far up the Southwest Pacific severing some 135,000 Japanese from the fight and crippling their control over the war. During their campaign the Central and South Pacific commands had surrounded several island chains: the Gilbert's, the Marshall's, the Caroline's,



General Douglas MacArthur, President Franklin Delano Roosevelt and Admiral Chester W. Nimitz on board the USS Baltimore.

and the Mariana's. It was at Makin and Tarawa in the Gilbert's, where they met. On November 20 1943, Nimitz commanded 35,000 U.S. Naval and Marine forces to attack the islands of Makin and Tarawa, an important link in Japan's central pacific defense shield. The battle at Makin was met with little resistance as the island was overwhelmed in a series of heavy bombardments and short amphibious assaults. But Tarawa, an atoll of some two dozen islets linked by coral reefs, proved to be a more difficult objective. The attack took place at Betio, the primary island of the Tarawa



USS Maryland (BB-46) firing her 16"/45 guns, during the pre-invasion bombardment of Tarawa.

Atoll. Betio is only two miles long and 600 yards wide but it was significant because it held the only airstrip within an area of nine square miles. At a glance, the most obvious challenge posed to Marines was over 2,600 Japanese Imperial soldiers and 1,700 Korean laborers held up at Betio. However, further complicating the situation and with greater consequences, was the risk that hydrographic experts warned about prior to the morning of the assault. Unpredictable tides around the Gilbert Islands provided for tricky scheduling as there was a chance the tide would be too low during the assault and the landing craft would run aground on coral ledges offshore. Regardless of risk, heavy seaward bombardment from allied carriers tore at Betio one week prior to the assault in attempts to narrow the battlefield and concentrate the area of attack. Unfortunately, what no one realized before Tarawa was the Japanese soldiers' unimaginable ability to withstand intense bombardment within fortified shelters. Hundreds of these connected pillboxes made of concrete and coral work, reinforced with steel beams and coconut logs provided protection from the shelling. Their resiliency was so great that on the morning of the attack, Marines were met unexpectedly by a punishing alliance of nearly 4,500 Japanese soldiers.

Apart from Makin, the Tarawa landing was the first American amphibious assault in World War II and their inexperience showed. As American ships maintained a steady artillery barrage, Marines attacked their primary target at Red Beach. The first wave went in on amphibious tractors called LVT's or Amtracks. Despite the predicted low tide, they landed successfully, discharging troops and supplies. As Marines stormed each bastion with flame throwers and grenades, the flat-bottomed Higgins boats began clanging up the reef. Submerged in only three feet of water, many of the boats became wedged along coral ledges forcing Marines to wade through hundreds of yards of open water, under murderous fire. Only about half of the men made it.

[1] Sulzberger, C.L. The American Heritage Picture History of World War II. New York: American Heritage Publishing Co., Inc., 1966. (page 327)



Aerial view was taken looking north toward "The Pocket" as seen from a Douglas SBD-5 Dauntless aircraft.

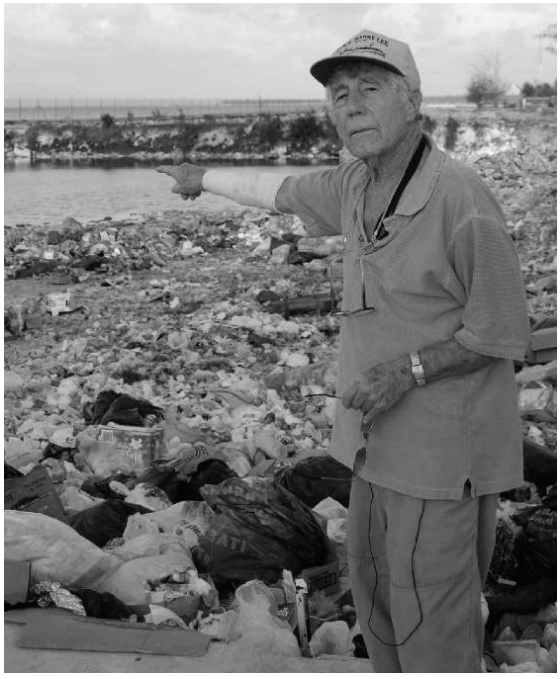
Among those fighting that day was young Higgins landing craft officer Leon Cooper. His tasks were to ferry U.S. Marines of the Second Division ashore on Red Beach, provide necessary supplies, and return the wounded across enemy waters to receive medical attention. It is obvious that his contribution to the fight was significant as he recalls the struggles of that day on Betio.

"We got about halfway there, and some guy came up in another landing craft and said boats are hung up on the beach, stand by. So we hung around instead of going in around 7 or 8 in the morning as we should have. The Marines had been vomiting everywhere during the long ride and more so during the long wait before we finally got the go-ahead.

An hour or so later we headed in. I couldn't see anything, except smoke and fire covering the whole island. It isn't much of an island, only about two-and-a-half miles long and about a half-mile wide. I landed somewhere on Red Beach, and it was all I could do to prevent the Marines from jumping out of the boat because we were being hit pretty heavy by machine-gun and other fire from Japanese positions on the island. With their heavy packs, the Marines would have drowned. They were scared and so was I. I still don't know to this day how I survived. I saw scores of guys just falling everywhere. All I can say about that first morning is that if there was anything that could have gone wrong, it did." [1]

Leon Cooper

The fighting lasted only 76 hours, but it remains one of the bloodiest offenses during WWII.[2] Nearly 1,112 Marines and sailors died and over 2,311 were wounded during the battle at Tarawa.[3] Only 17 of the Japanese defenders survived.[4] Most of the U.S. Marines killed were quickly buried in unmarked graves and cemeteries on the island. Since WWII, some remains have been recovered, accounted for, and returned to the United States. However, the remains of 564 Marines and other members of the Armed Forces have yet to come home.[5]



Leon Cooper points to the piles of garbage littering Red Beach.

Leon Cooper continued fighting in the Pacific. Eventually he returned home and made a life as a computer company executive. Since retiring, the 89 year old Malibu veteran has stumbled upon a new fight in a familiar place. A few years ago, while doing some research for his book, "The War in the Pacific: A Retrospective", he came across an associated press dispatch articulating the details of a landfill covering the bodies of his fallen comrades at Red Beach. Outraged, he began a journey of redemption and action, spending more than $120,000 of his own money and raising awareness about the build-up of plastic bags, cardboard boxes, dirty diapers, and other debris on hallowed ground.[6] His efforts have resulted in nationwide recognition and a documentary, "Return to Tarawa: The Leon Cooper Story". However, the ultimate goal has yet to be realized and time is of the essence. As Leon struggles to combat a disastrous environmental legacy, children play with discarded live ammunition and the remains of buried soldiers continue to surface amongst the trash. With little help from the American government, Leon has made it his last work to clean-up Red Beach, institute an appropriate memorial in its place, improve Tarawa's waste disposal program, and bring his fallen comrades home.

[1] Return to Tarawa: Interview With Leon Cooper. Armchair General L.L.C. 2008. 1 October 2009. <http://www.armchairgeneral.com/return-to-tarawa-interview-with-leon-cooper.htm>

[2] Pool, Bob. Tarawa Has Become A Different Sort of Battlefield. Los Angeles Times [Local] 20 April 2009.

[3] Sulzberger, C.L. The American Heritage Picture History of World War II. New York: American Heritage Publishing Co., Inc., 1966. (page 365)

[4] Sulzberger, C.L., page 365

[5] Lepinski, Rep. Return to Tarawa: House Resolution Pending. 2009. Leon Cooper. 1 October 2009. <http://90daywonder.net/returntotarawa/id17.html>

[6] Pool, Bob.

"At the very least, remove the garbage from the area where the landings have taken place and install at that location a decent memorial to the guys who fought and died there." [1]

Leon Cooper



During the fighting on Tarawa in November 1943, a Marine rifleman pauses for a drink of water.

Wartime is a period of devastating psychological stress through which the body survives only by constant fear and emotional neglect. It is a conglomerate of pride, envy, gluttony, anger, and greed by which the fall of man is consecrated in the success of nations. War has determined boundaries, saved lives, divided power, and manifested peace while leaving in its wake a transcendent scar that runs the length of history. Those that die leave behind a familiar legacy of tears as family and friends search for the skills to mend their loss. Those that survive bear the burden of the dead while coping with the reality of life after war and the loss of their innocence.

For those men like Leon Cooper, the reality of losing innocence has culminated in an understanding of life that carries significance far into retirement. The battle didn't just end at Tarawa. Instead, it remains a vivid proclamation of the lives soldiers have led and the men they have become. Leon didn't just return nor stumble upon the remnants of an old memory. He bluntly realized the neglect of a lifestyle that brought him dignity and respect. His service at Tarawa provided proof of his character while reinstituting a measure of faith in courage and sacrifice. In times of good fortune, when the human condition is most comfortable, sanctifying proof of anything more than desire is futile. It is in times of evil that faith in knowing the capacity of true character excels us through the darkness of our primal habits and into a redeeming light. The memories of Tarawa are consistent with those of any war. Regardless of allegiance or motive, blood was spilt and precious metals ruined. However, the deplorable neglect of those young men who sacrificed everything to lie beneath a mountain of trash is an injustice to the character that they fought to earn. Those who miss at the importance of this hallowed ground admittedly label a soldiers memory as a pin placed at a date and time in history. For Leon and those active citizens who seek a forgotten but significant truth, the memory of Tarawa has made a deep mark that defines the value of bravery, courage, strength, and compassion in their lives. It is the significance of these characteristics that make memories worth commemorating, if not just for the sake of honoring the memory then for the responsibility of growing a future based off of such redeeming qualities of men.

[1] WWII Vet Leads Effort to Clean Up South Pacific Battle Site. VOANews.com. 1 October 2009. <http://www1.voanews.com/english/>

It is the goal of this thesis to explore the qualities of humankind that are embodied in a soldiers sacrifice by creating an architecture that controls degrading conditions in spite of certain destruction. This, a municipal waste management facility, chooses to hold the sacrifices of soldiers above their deaths and carries their bodies from the trash into a memoriam that eases trauma into memory while instituting new possibilities, new activities, and new images for a hopeful future.

MAN'S **INHUMANITY** TO MAN

War is a series of battles that are as common place as the home-made memorials erected to document the event. So much that society has attributed a bias to war that has become an integral definition of human interaction. Politics and news reports depend on wars to fuel there enterprises. In fact, presidential terms in the United States are characterized by it. Often to the extent that a president's reputation is contingent on successful war campaigning rather than avoiding war all together. Despite its influence the truth is that most wars are relatable to few and signify little beyond the typical raw emotions of sacrifice and loss. However, there are those few battles that quantify the reality of war while demanding a more complete understanding of humanities motives.

Unlike the shallow impact of a dispute amongst individuals the holistic quality of world war earns attention because entire nations rallied against a common threat. Soldiers weren't just fighting for their countries anymore. Instead, they fought for shared principles made consistent by a universal moral code. It seems contradictory to be referring to morality in war. Attempting to prove morality exists amongst such reckless hate seems more like an excuse to justify man's inhumanity to man than evidence proving otherwise. For all intents and purposes, humanities universal moral code condemns taking human life while war is characterized by it. But that is the definition of war. It isn't controlled by the everyday civil laws and regulations that govern cities. War is inhumane. So then morality in war must adhere to a code reminiscent of an ethical standard and seek credibility in the face of certain hypocrisy. This is the challenge that humanity faces. When good and evil motives are compared the reality is that their once vivid differences become transparent. Especially in war, when the constructs of humanity are disrupted by disillusion and violence, a soldier's sense of duty is no less than his rivals. Each is familiar with his motivation and whether compelled by murderous rage or a reputable courage every soldier fights.



U.S. Marine inspects Japanese tank used as a pill box. In the foreground a dead Japanese soldier lies grotesquely frozen by death as he fell.

EASING TRAUMA INTO **MEMORY**

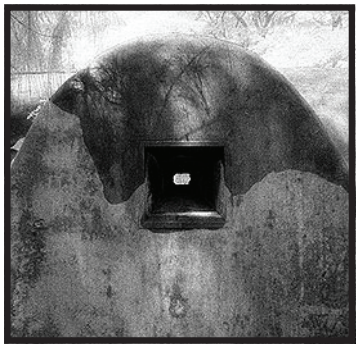
Memory is a formidable tool used to protect the mind and body from future harm and mistake. Acknowledging the significance of memory can teach valuable lessons. The most effective of those lessons are typically rooted in personal experience and are often more easily understood because they exhibit profound emotions conjured by familiarity. Professional soldiers are members of selective generations that are forced to absorb the harsh reality of war. Their experiences are unique and their knowledge rare. However, as veterans near the end of life their memory and its value are threatened by a loss in translation. Without the credibility of the source, experience runs the risk of losing value in the retelling and eventually forces an audience to take it on faith that the lesson is worth learning. Since struggling to formulate semblance is an unavoidable reality and because experience often provokes certain undeniable truths that demand retelling, the responsibility then lies with the translator to successfully depict the fictitious character of a memory as tangible reality. Society has defined these orators as playwrights, historians, and architects. As glorified storytellers they communicate those valuable lessons worth memorializing.

For architects unparticular, their responsibility to control physical space provides unique opportunities to communicate on scales that demand attention. Specifically, it is this profound quality to enclose the human form that provokes a shift in perspective where the relationship between human scale and broader human understanding is translated. Given today's seemingly limitless boundaries, there is a tendency to enclose the human form in the fullest sense. This may seem advantageous because it is the architect's responsibility to manipulate spatial understanding. However, by completely altering the physical environment



Polished black granite walls reflect passing images in the names of Vietnam veterans.





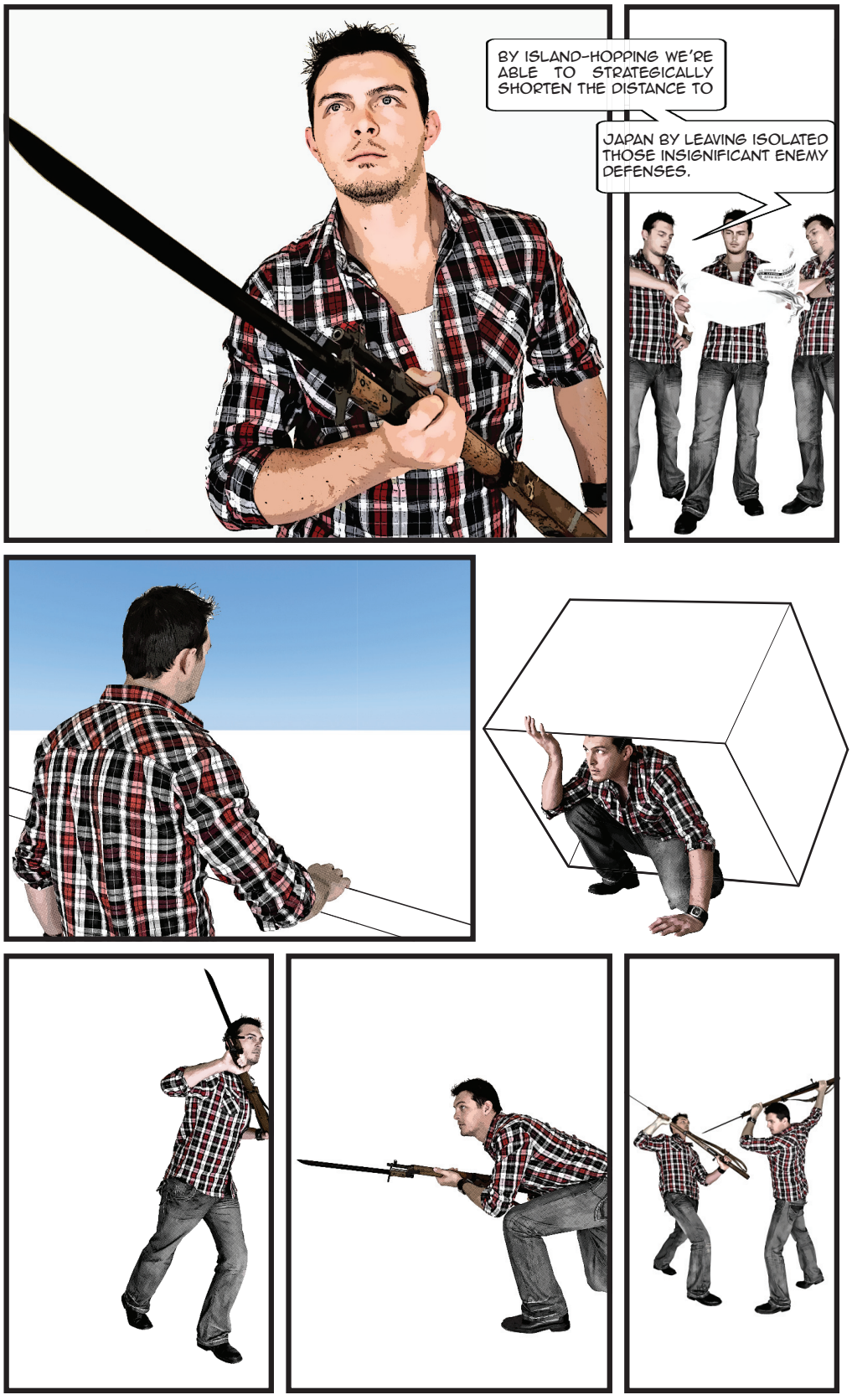




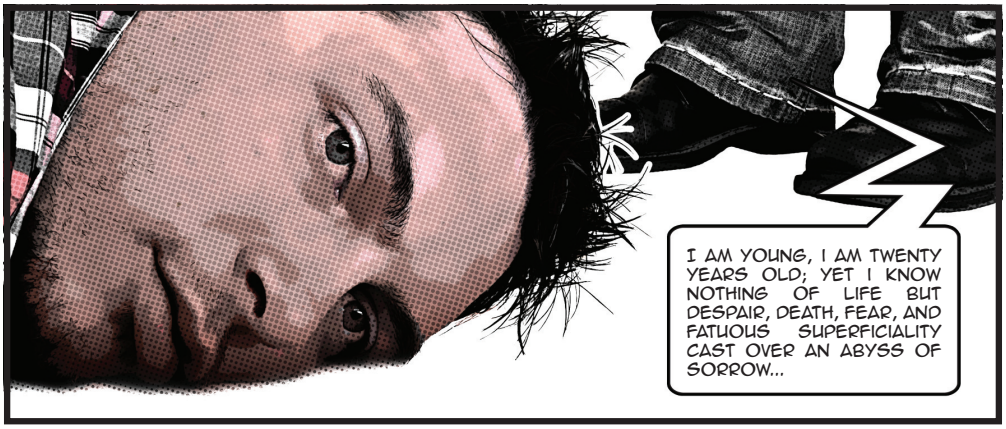

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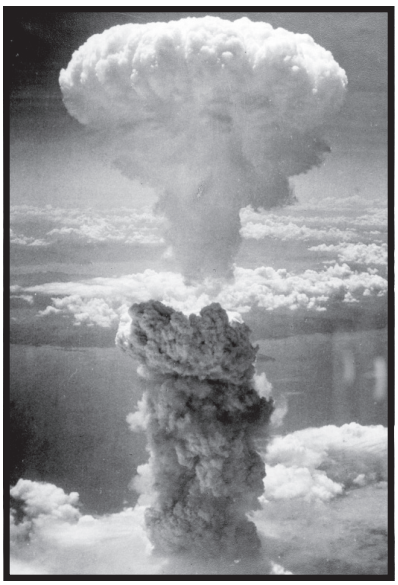



BY ISLAND-HOPPING WE'RE ABLE TO STRATEGICALLY SHORTEN THE DISTANCE TO
JAPAN BY LEAVING ISOLATED THOSE INSIGNIFICANT ENEMY DEFENSES.

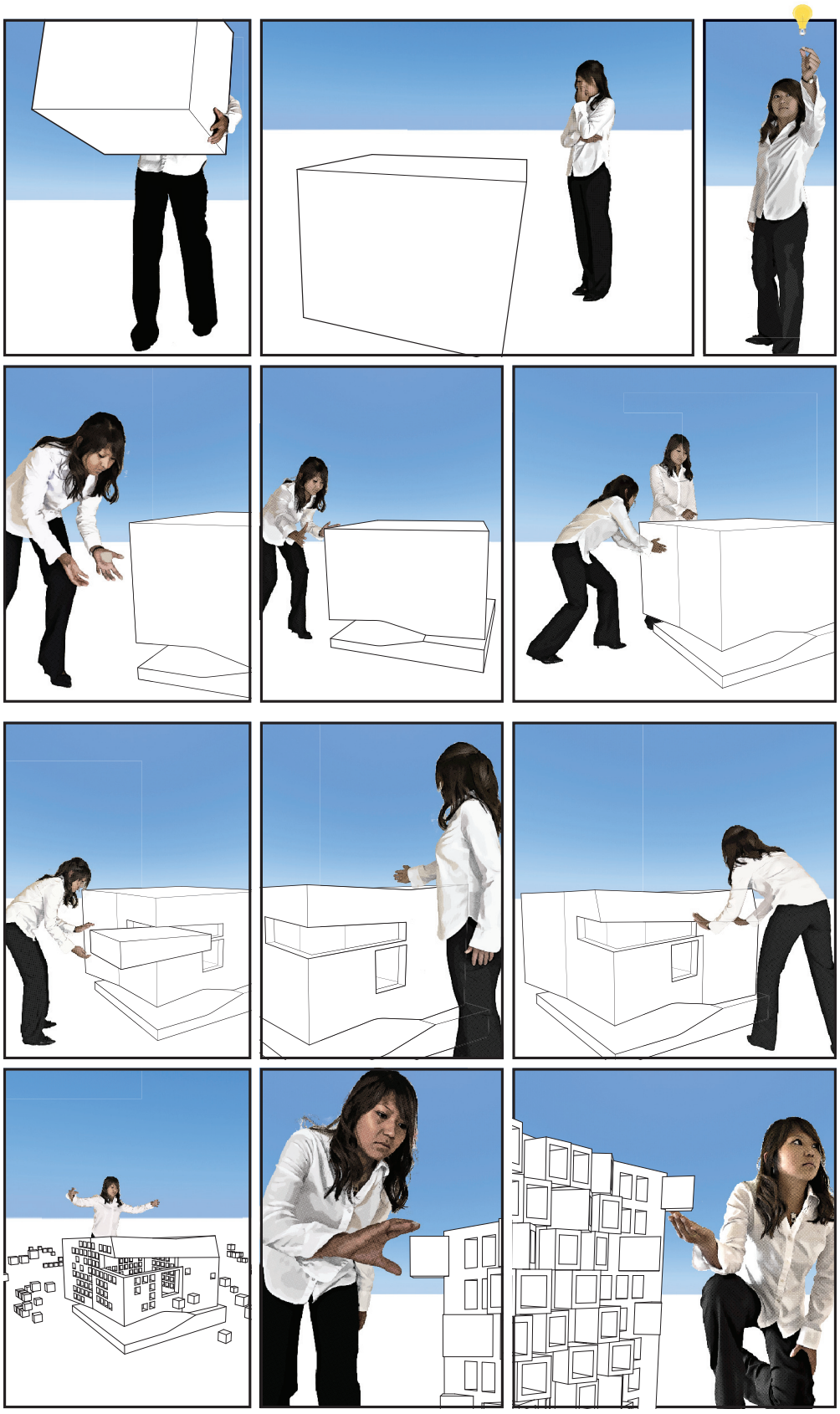


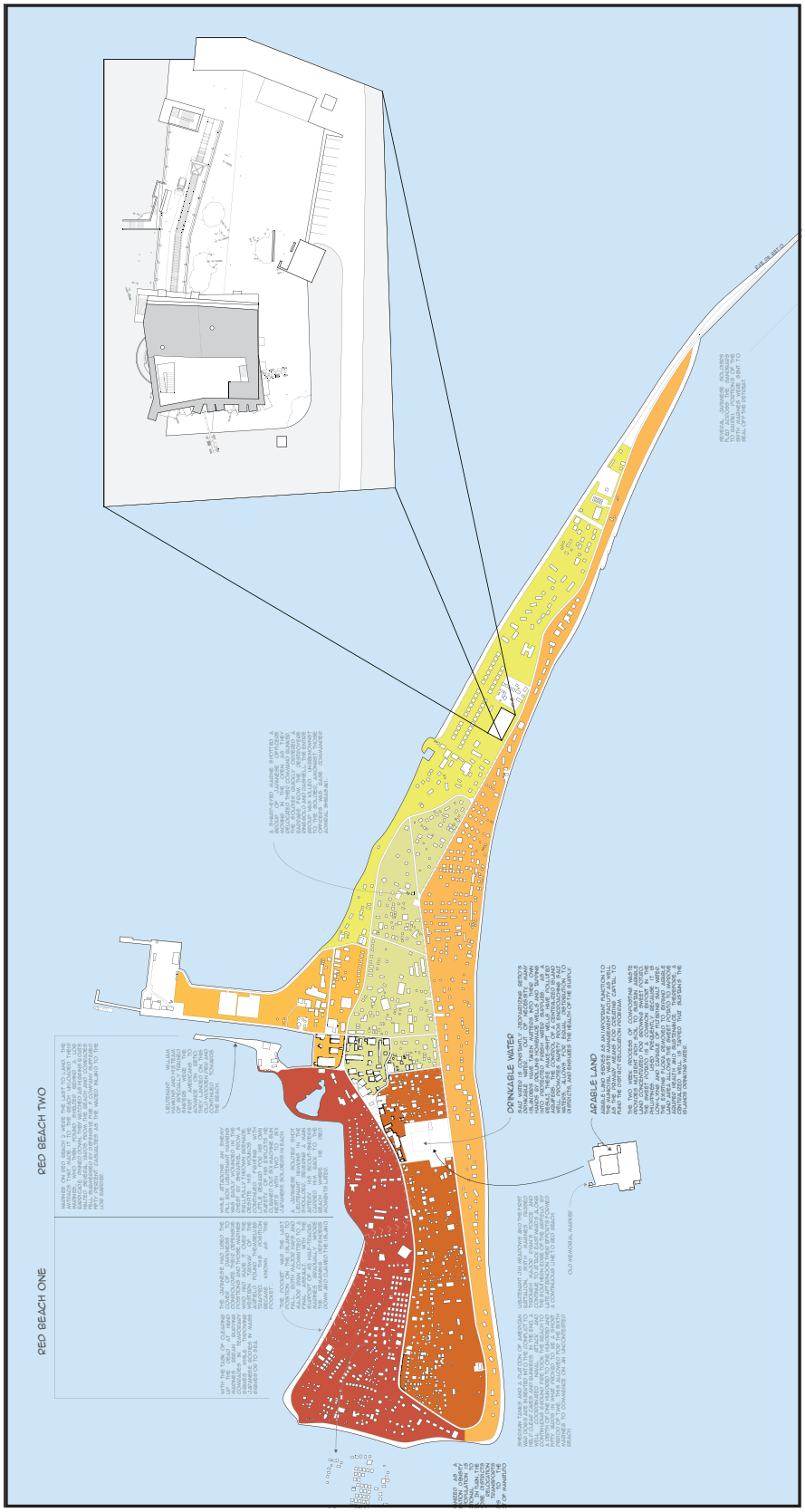

I AM YOUNG, I AM TWENTY YEARS OLD; YET I KNOW NOTHING OF LIFE BUT DESPAIR, DEATH, FEAR, AND FATUOUS SUPERFICIALITY CAST OVER AN ABYSS OF SORROW...

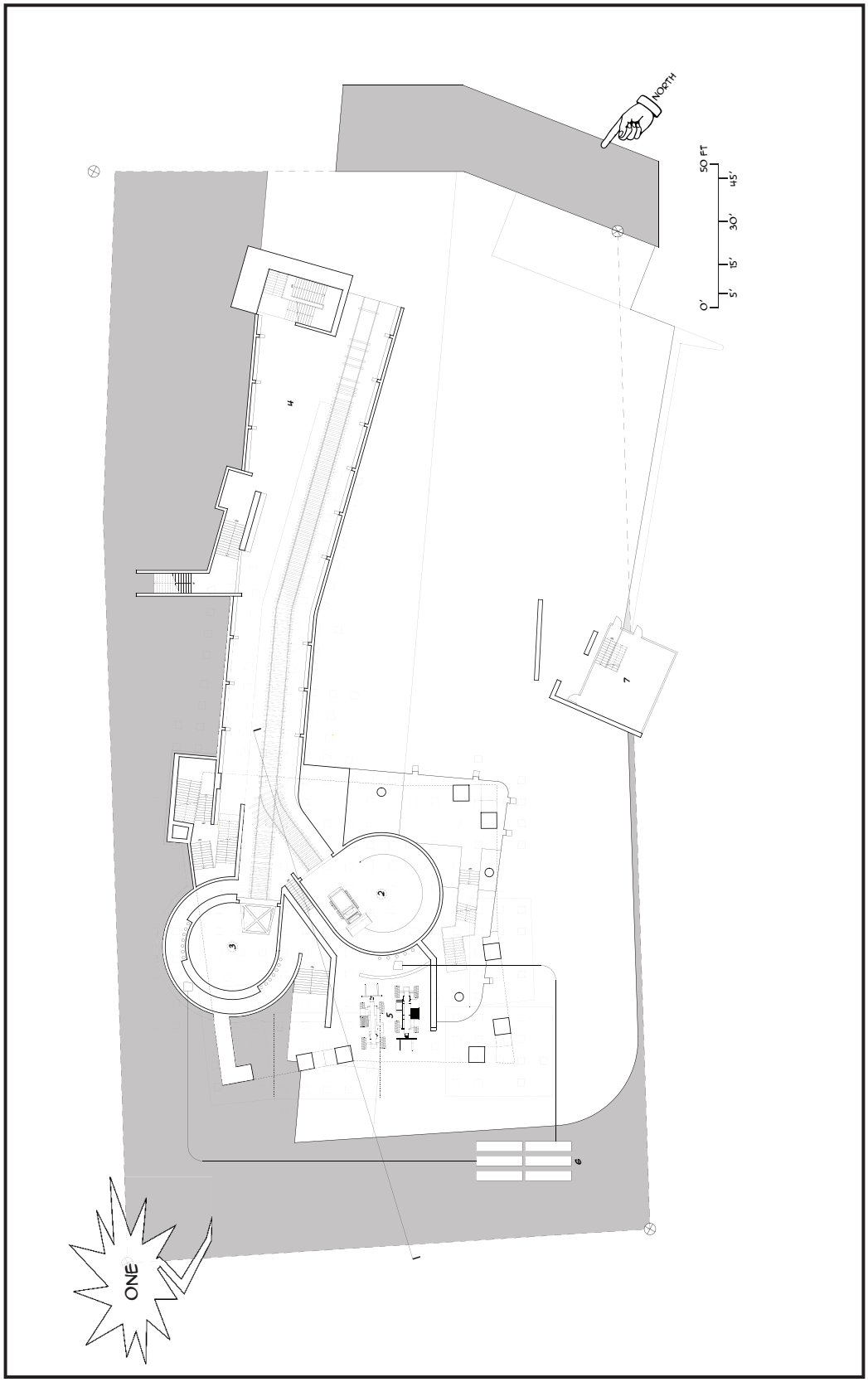

I SEE HOW PEOPLES ARE SET AGAINST ONE ANOTHER, AND IN SILENCE, UNKNOWINGLY, FOOLISHLY, OBEDIENTLY, INNOCENTLY SLAY ONE ANOTHER.

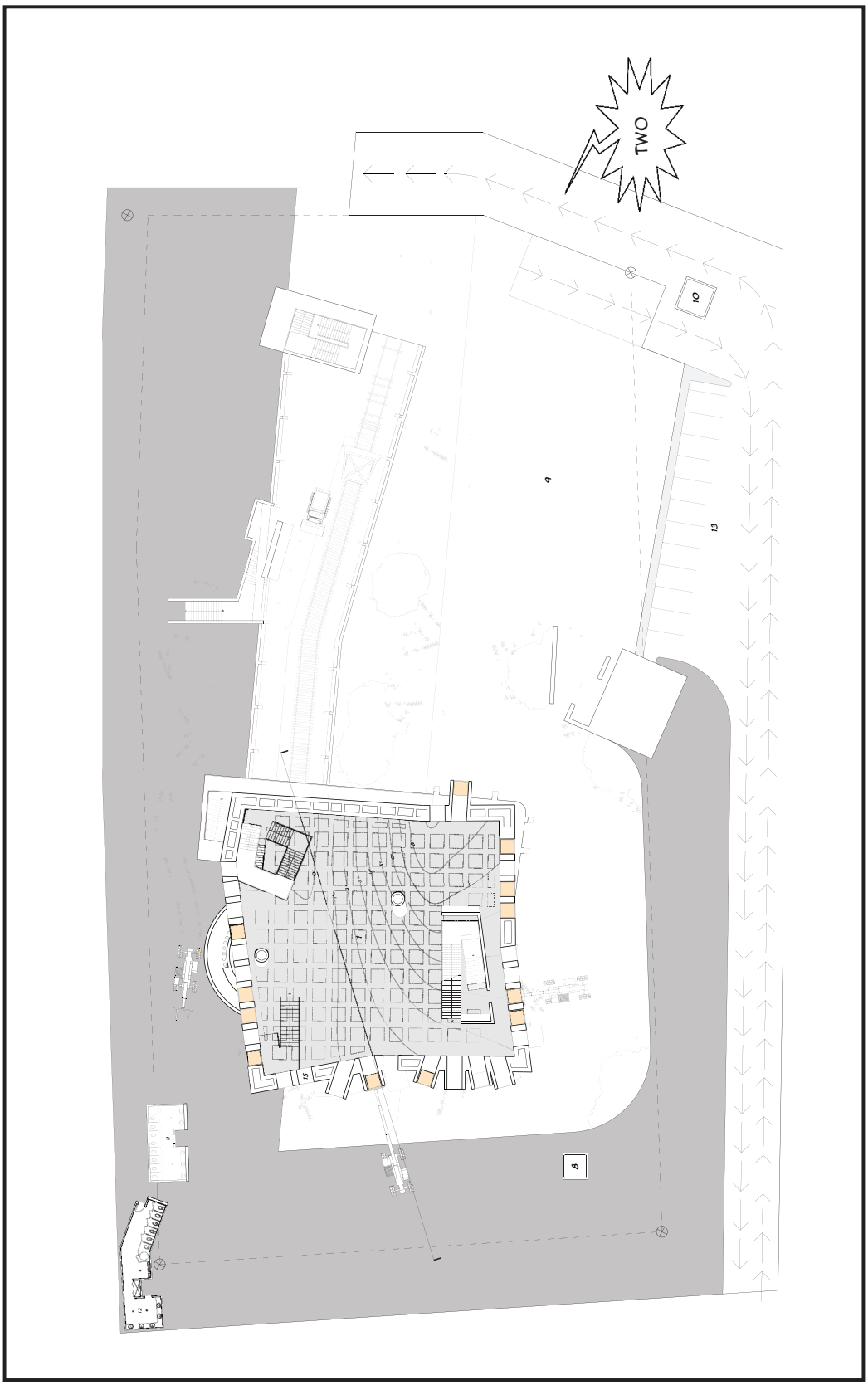


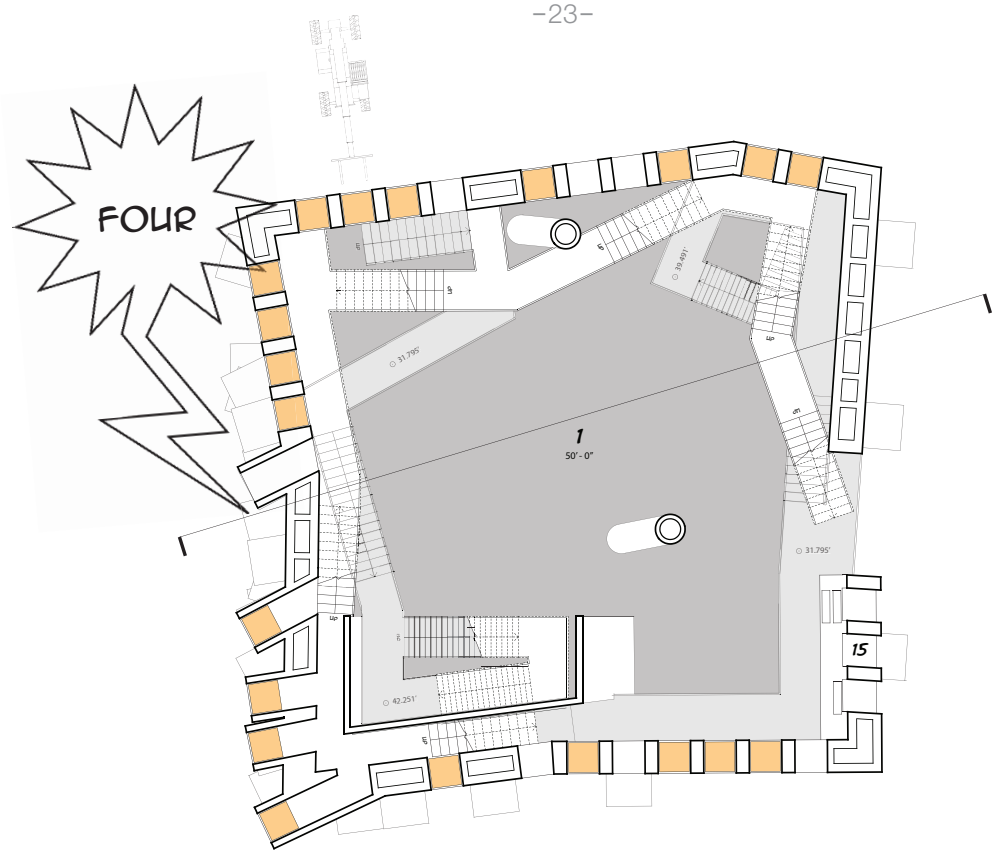


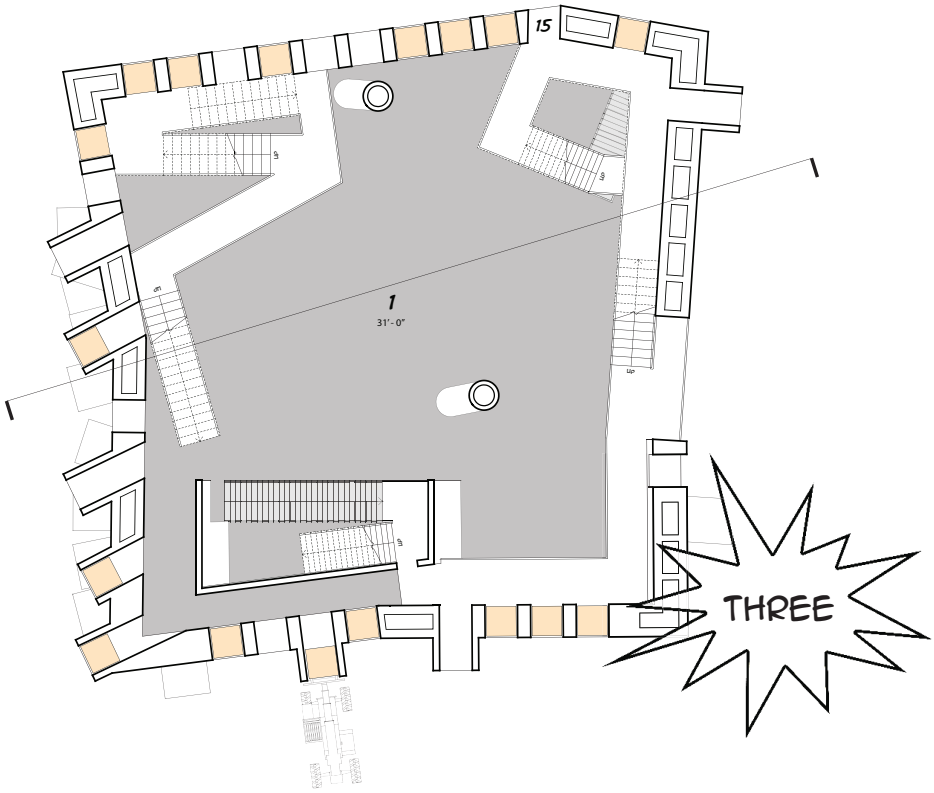


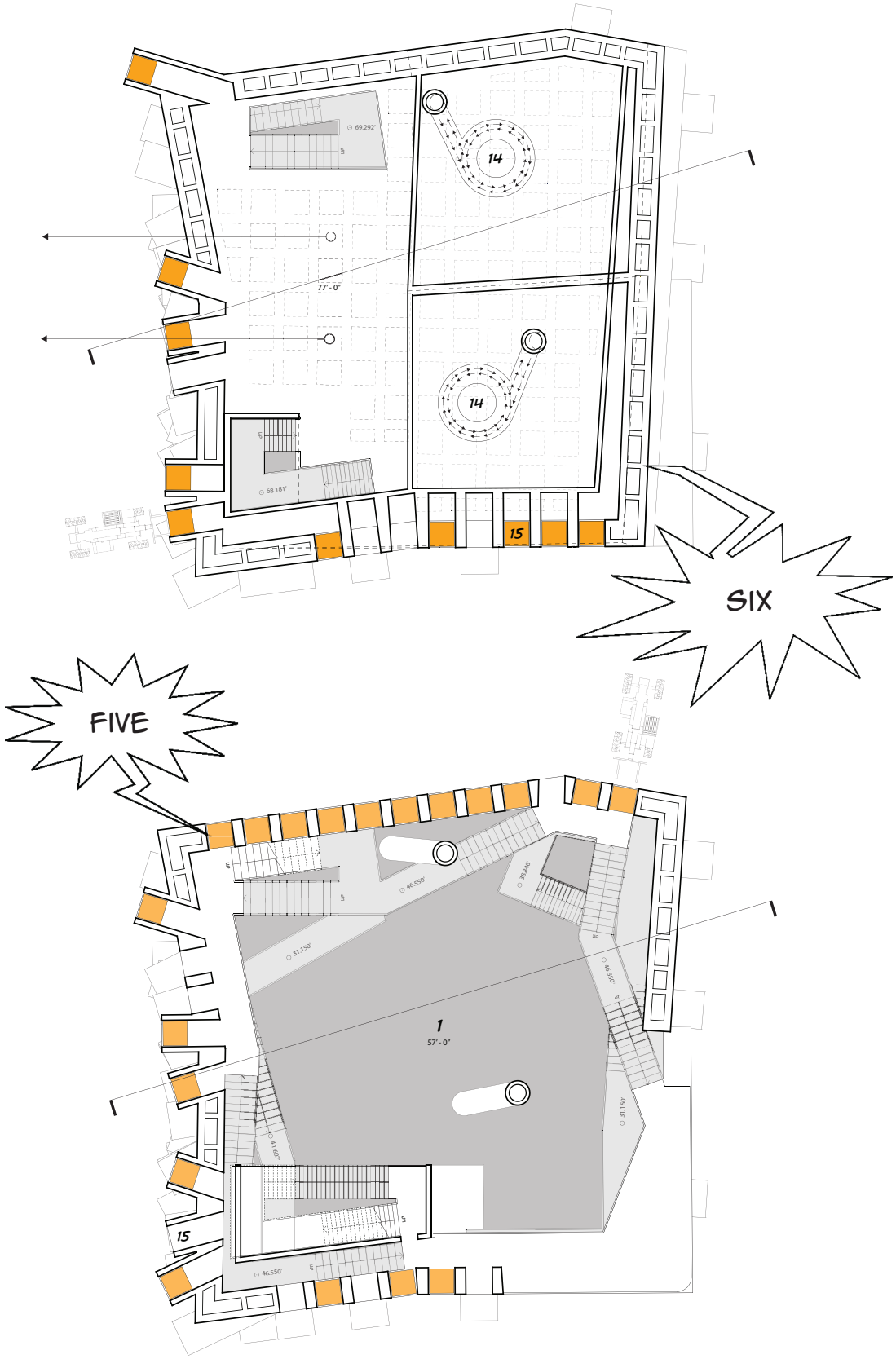

RED BEACH ONE
RED BEACH TWO
DRINKABLE WATER
ARABLE LAND

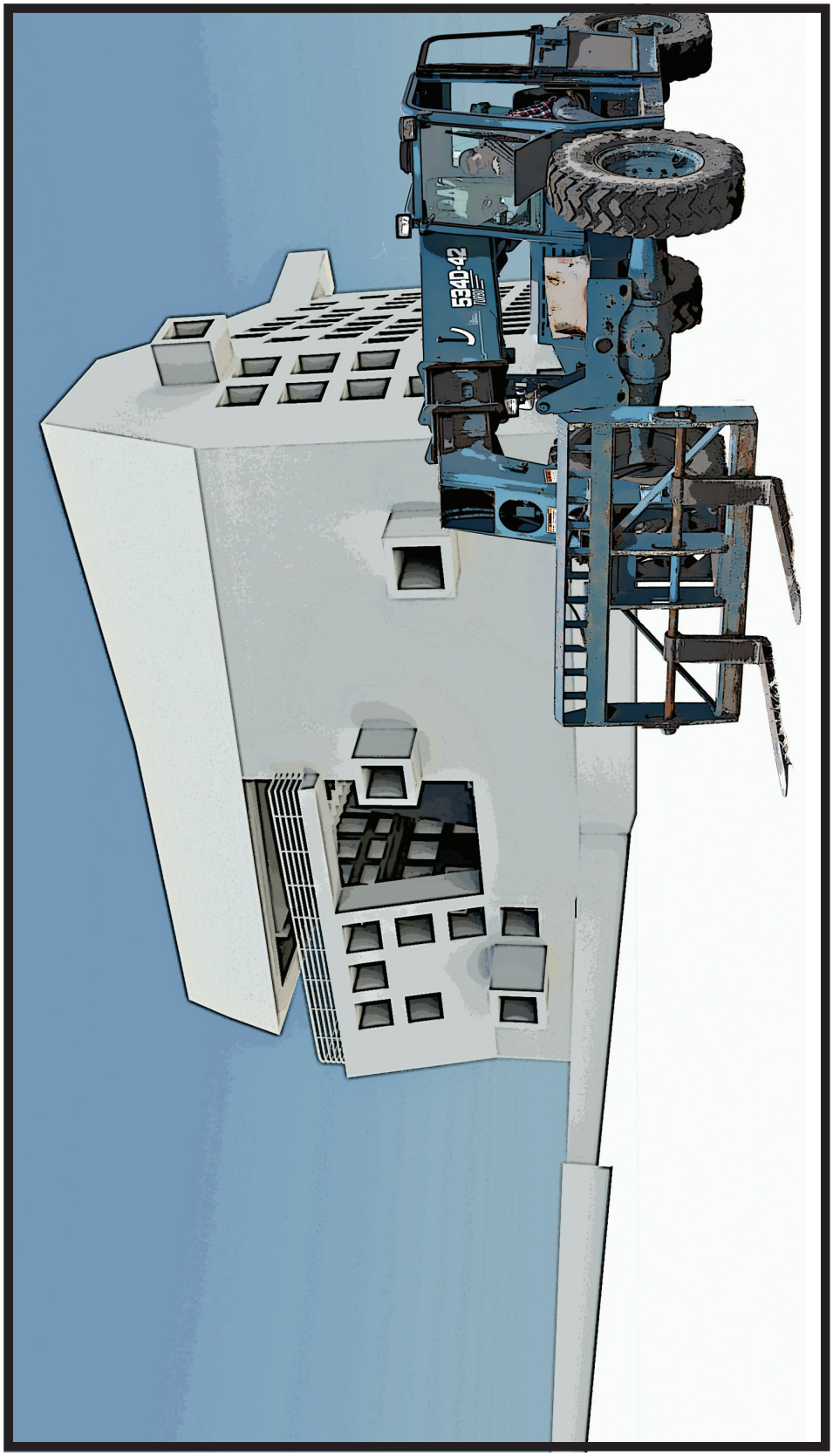

NORTH
50 FT
45'
30'
15'
5'
0'
1
2
3
4
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6
7
ONE


TWO
10
9
13
15
8


FOUR
1
50' - 0"
31.795'
15
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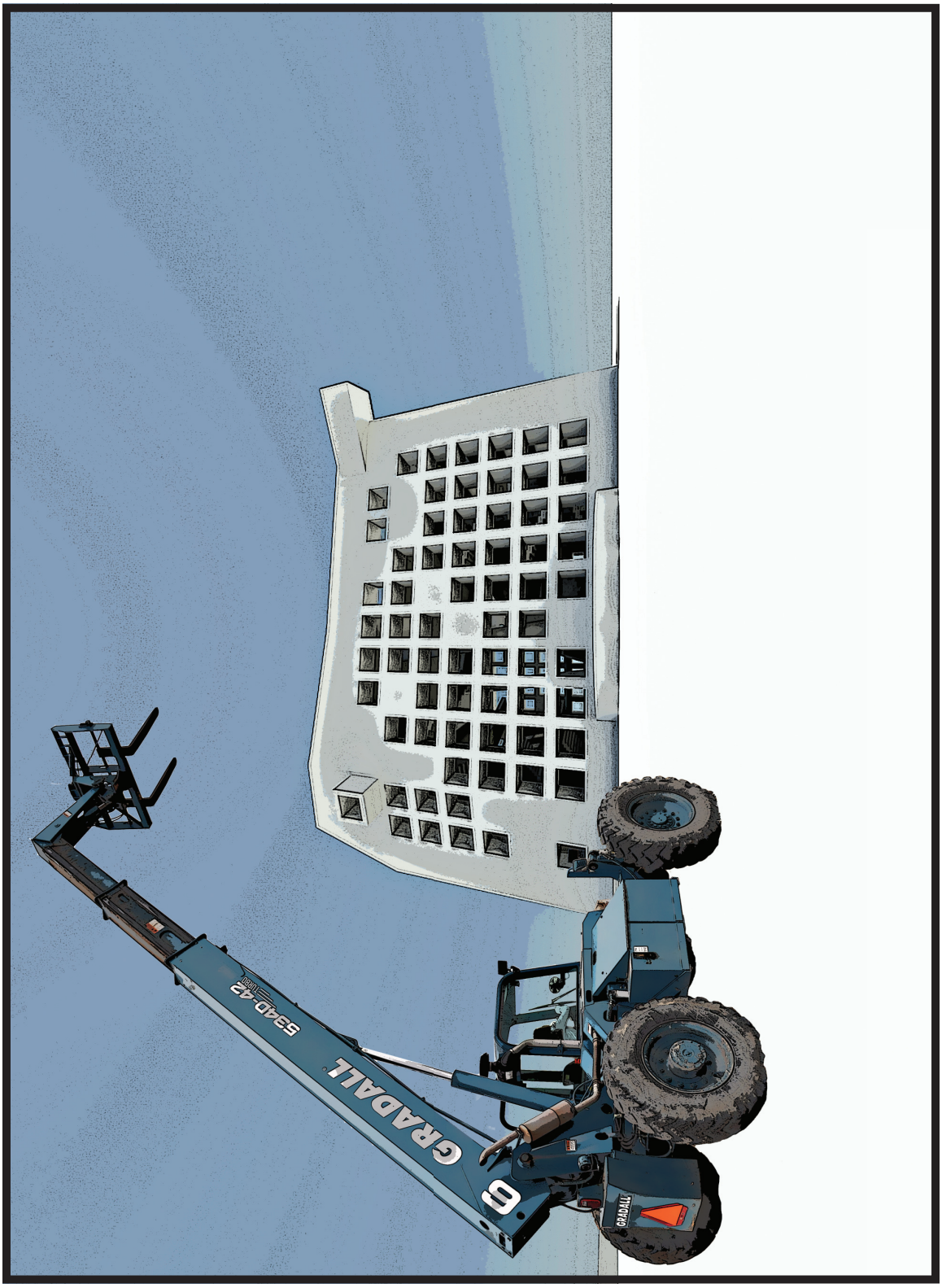

15
1
31' - 0"
THREE

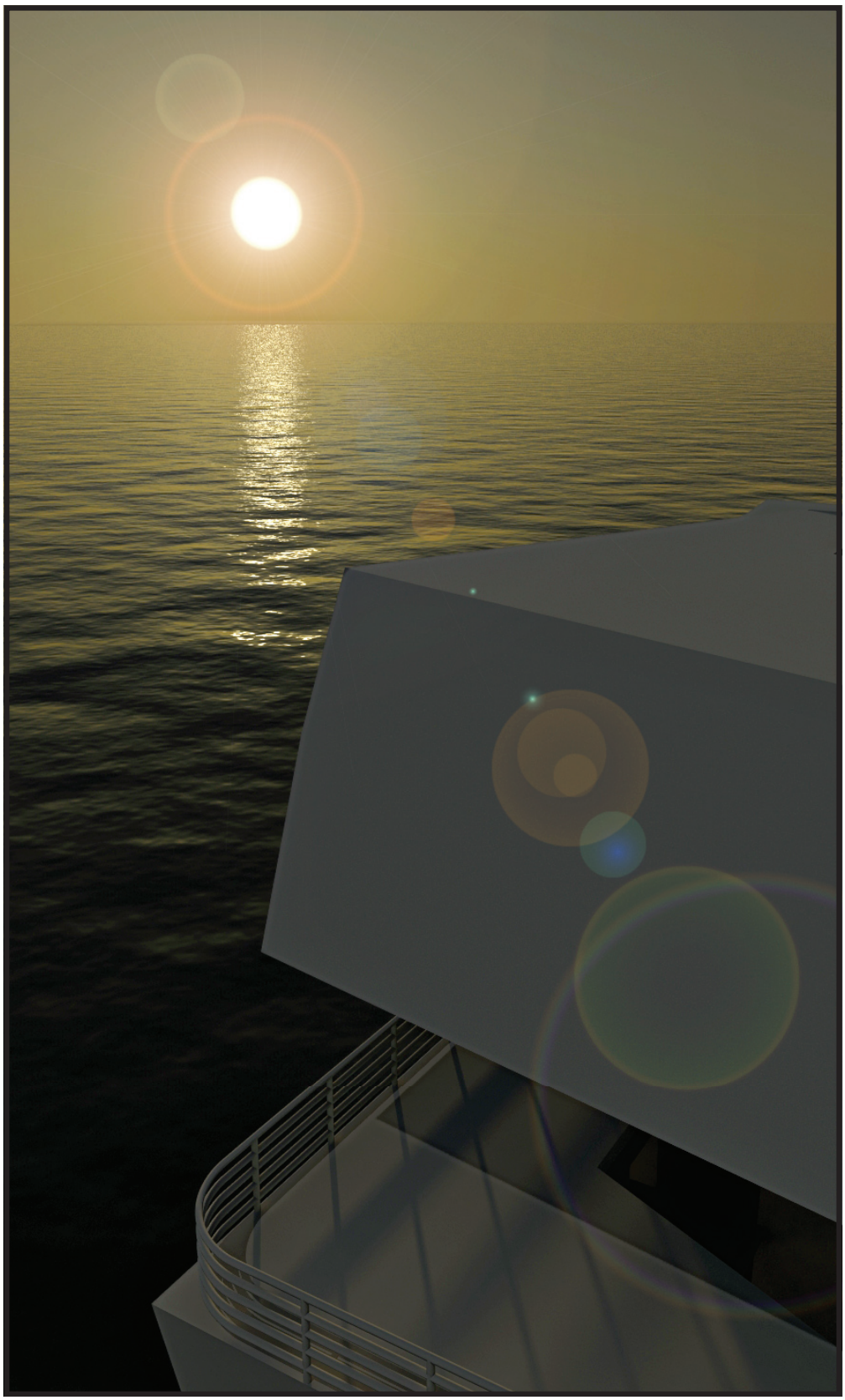

14
77' - 0"
14
15
SIX
FIVE
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57' - 0"
15

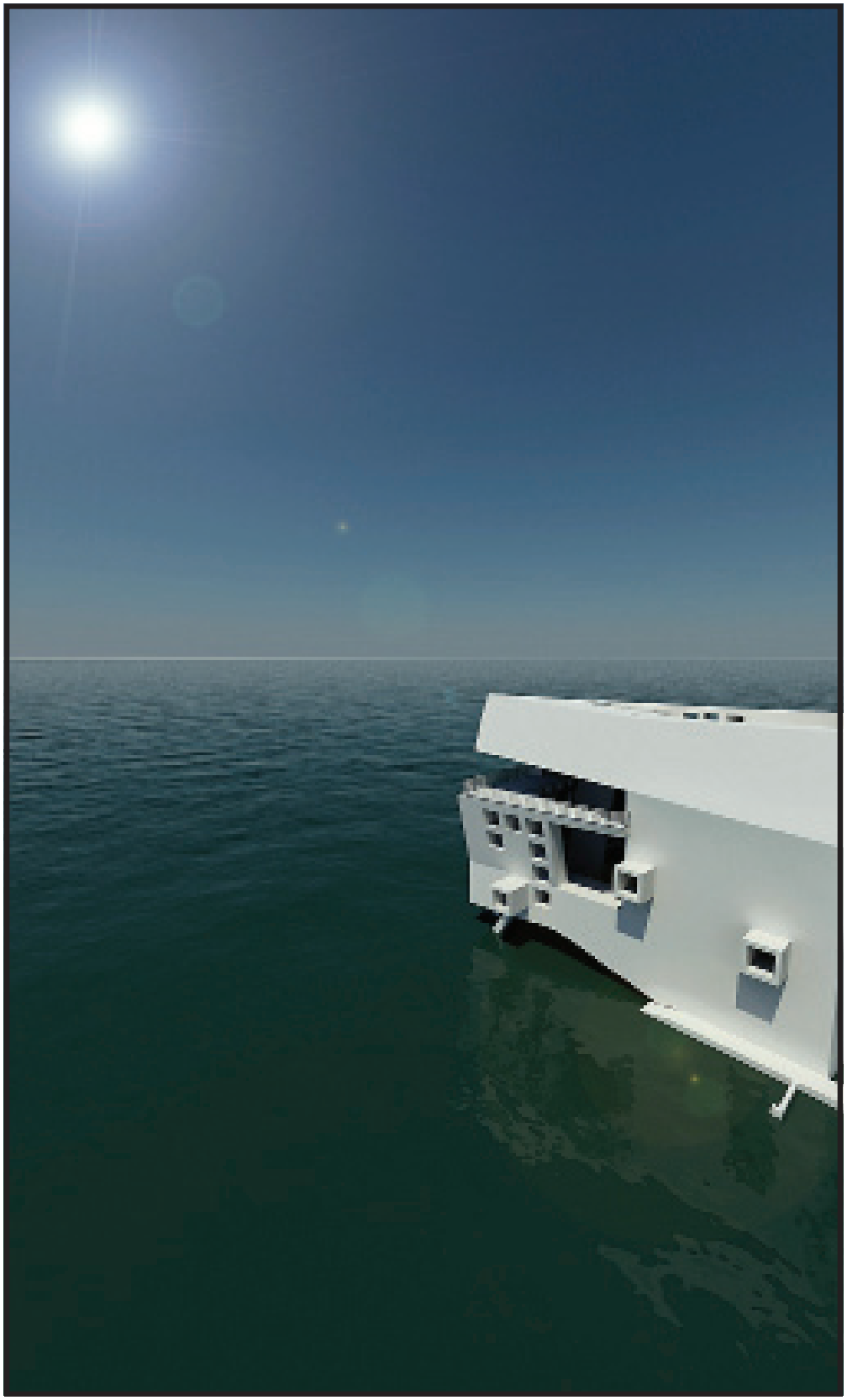

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4WD

5340-42
TURBO

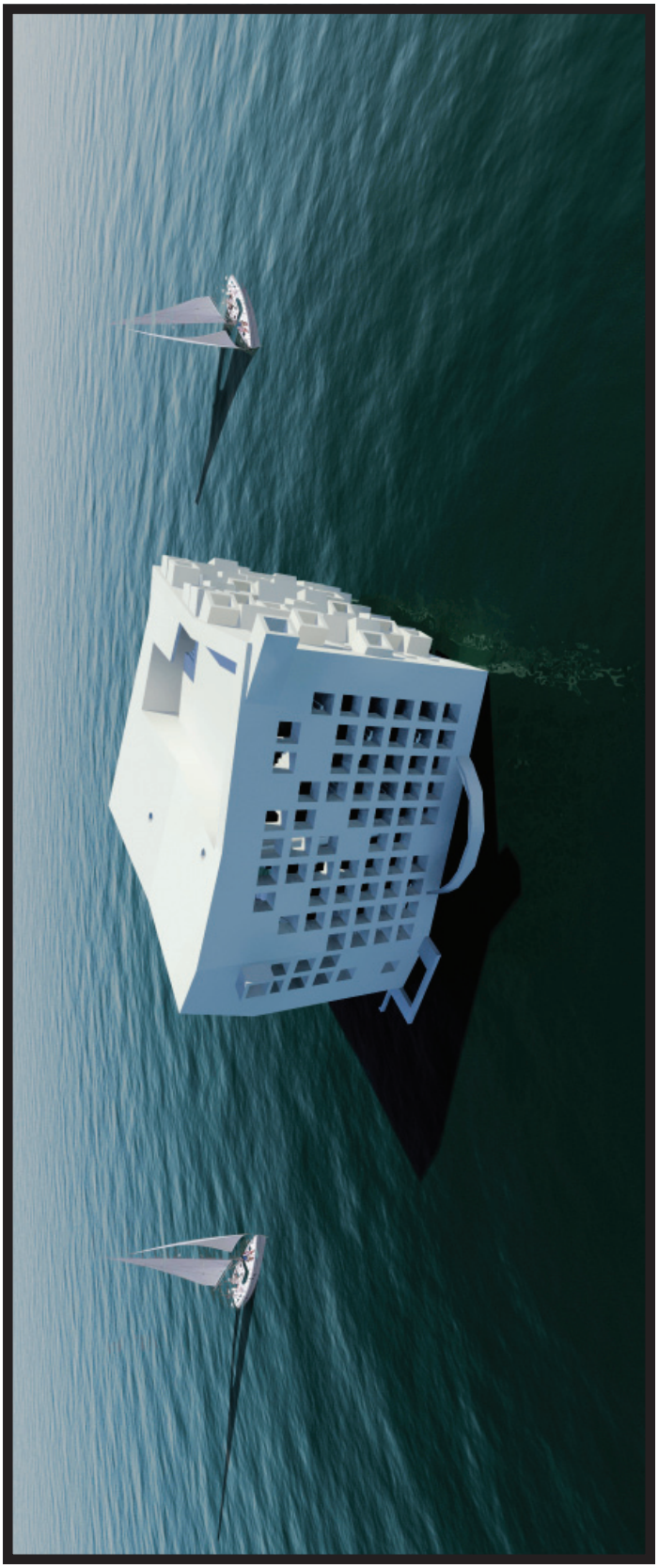

ALL
5340-42


GRADALL
S40-42
GRADALL






UNTO ALMIGHTY GOD WE COMMEND THE SOULS OF OUR BRETHREN DEPARTED.





Vietnam Veterans and families view the names of soldiers left behind in sacrifice for their country.

Set into the earth, the memorial is physically nothing more than walls of polished black granite elegantly sliced through the landscape on two axes. However, beyond a fundamental understanding are both visual and symbolic links. For example, amidst the reflections of tearful viewers are the names of those dead and missing-in-action. Receding into the distance, subtle sight lines ally the memorial with earlier commemorations of service to the nation. Even the implicit condemnation of the Vietnam War is pronounced in the controversies surrounding the memorials reductive character, blackness, and in-ground setting. The apparent catharsis is a testament to a contemplative and reflective character. Lin may never have intended her design to compel controversy but she allowed her architecture to provide opportunities to nurture the aftermath. As the architecture critic of the Washington Post wrote "Black is indeed the color of sorrow and of mourning, not of shame".[1] It is the quality of a personal understanding that eases trauma into memory and allows for a growing understanding across generations.

"Thus the war's beginning and end meet; the war is 'complete'… yet broken by the earth that bounds the angle's open side, and contained by the earth itself."

Maya Ying Lin

[1] Sulzberger, C.L. The American Heritage Picture History of World War II. New York: American Heritage Publishing Co., Inc., 1966.



The Vietnam Veterans Memorial as seen in connection with the Washington Monument.

choice is lost. Ultimately, it is the freedom of choice that compels understanding. Therefore, rather than tailoring architecture to lead the viewer, architecture should guide interpretation in a contemplative and reflective character. The solution then lends itself to no less than a compelling gesture. Consider Maya Lin's design of the Vietnam Veterans Memorial…



Veteran Fredrick William Norris, who was awarded the Military Medal, touches one of the graves of a friend from his regiment.



Gettysburg, battlefield fence on McPherson Ridge, Gettysburg National Military Park, 1863.



Carlo Scarpa, Brion Vega in San Vito d'Altivole, Italy, 1970.



Christo and Jeanne-Claude, Running Fence in Sonoma and Marin Counties, California, 1972-1976.



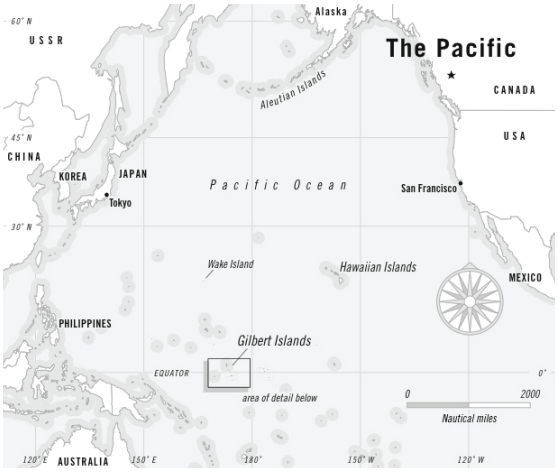
Peter Eisenmann, Holocaust Memorial in Berlin, Germany, 2004.

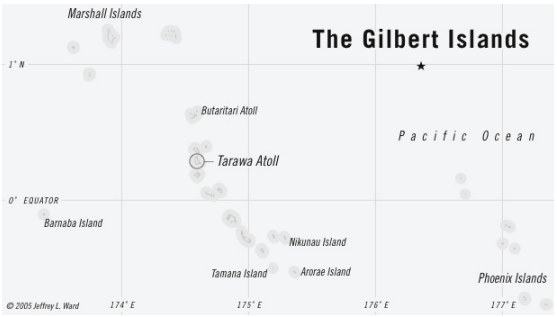


aerial view of Kiribati, Central Pacific

Tarawa is an atoll in the central Pacific Ocean. It was founded by Thomas Gilbert, captain of the East India Company vessel Charlotte, on June 20, 1788. Previously the capital of the former Gilbert and Ellice Islands, it is now the capital of the Republic of Kiribati. Tarawa consists of approximately 24 islets of which eight are inhabited. Of those eight is the island of Betio (‘besh-she-o’).

Tarawa is seated between the Tropic of Cancer in the northern hemisphere at approximately 23°26’ N latitude and the Tropic of Capicorn in the southern hemisphere at 23°26’ S latitude. As a result, the climate in Betio is tropical. Seasons in the tropic zone are dictated by the movement of the tropical rain belt (ITCZ) as it oscillates from the northern to the southern tropics during the course of a year. Rather than the vascillating temperatures and day lengths typical of the spring, summer, autumn, and winter seasons, the tropical calendar is dictated by a dry and a wet season. Despite its proximity to the equator, Betio remains in the northern hemisphere. Therefore, between the months of October and March, when the tropical rain belt lies in the southern hemisphere, the





island experiences its dry season. It is expected that precipitation is rare and days are typically sunny throughout. The remaining months dictate the beginning and end of the wet season, in which the opposite can be expected.

However varied the dry and wet seasons may be in the tropical zone, average weather data indicates that the climate in Betio is considered warm to hot and moist year-round.

The Kiribati ecosystem is typical of the tropics. Regardless of overpopulation and pollution, Betio surprisingly nurtures a dense populous of native coconut palms and various other species. The island itself is fairly flat considering its size in relationship to sea level. However, due to erosion there are noticeable grade changes near the islets coastal borders.

	1	2	3	4	5	6	7	8	9	10	11	12
average high temperature *	82	81	82	82	82	83	83	83	85	83	84	83
average low temperature *	79	79	79	79	80	80	80	80	80	80	80	80
average wind speed *	11	12	12	11	11	11	11	11	11	11	11	11
average wind direction	E	E	E	E	E	E	E	E	E	E	E	E
average morning humidity *	87	86	87	89	88	88	87	86	85	85	85	87
average afternoon humidity *	75	75	75	76	75	75	73	72	70	70	72	75
typical sky cover *	brk	brk	brk	sct	sct	sct	sct	sct	sct	sct	sct	brk
days with precipitation	15	11	14	13	12	12	11	11	8	8	9	13

* temperature measured in °F
* wind speed measured in miles per hour
* brk = break
* sct = scattered

The tropics include all areas where the sun reaches a position directly overhead (nadir) and a position directly underneath (zenith) at least once during the solar year. This is unique as the sun never sees the zenith or the nadir in temperate zones.

Betio is an island located at the extreme southwest corner of South Tarawa. To date it is home to the port of Tarawa, a shipyard, and the main power station of Kiribati. It is only about two miles long and 600 yards wide (282 acres) but by 2000 its population density rivaled Hong Kong's, making Betio and its 30,000 primarily Micronesian inhabitants the densest urban settlement in the Pacific Islands.

Over population and land shortage forces many locals to dwell in plywood-and-thatch shacks, with no sewage system, contaminated ground water, and accumulating waste. Of the 65,000 tons of solid waste produced in Tarawa each year, under half of it is transported by town council workers to one of the six surface dumps in the area. Without the means to properly dispose of waste, islanders are compelled to pile the remainder in uncontrolled heaps outside their residences, along the beach, or in the nearby lagoon.



Aerial view of Hawkins Airfield on Betio after the Battle of Tarawa.

1° 21’ 0” N, 172° 56’ 0” E



Remnants of a B-24 Bomber propeller off the northern shore of Betio.

Plastic bags, aluminum cans, and dirty diapers are just a few of the non-biodegradable items found rotting under the equatorial sun. Astonishingly, medical waste ends up in the open dumps as well.

In 1997, as garbage continued to pile and land became increasingly limited, the Kiribati's environmental director condemned historic Red Beach to the disposal of waste for the island of Betio. Located on the islands northern boundary, the primary dump zone opens toward the lagoon, west of the original jetty and extends several yards beyond the stone breakwater. Once the scene of the bloody Battle at Tarawa, Red Beach is now a putrid graveyard littered by human excrement and the remains of battered bunkers, wrecked military equipment, and the restless bones of fallen soldiers.

To contain the growing mounds of waste on Red Beach a seawall was built at the tides edge with loan money from the Asian Development Bank. However, in a place as poor and remote as Betio any affordable solution is merely a band-aid masking the reality of the problem. Despite ambitious governmental campaigning and foreign aid from the United Kingdom, Japan, and New Zealand recycling equipment and transport costs are simply too great to justify. Without significant solutions Betio runs the risk of permanently transforming the islands natural resources and further exploiting the hallowed grounds at Red Beach.

The attack plan divided Betio into three major beaches. Beginning at the extreme western point of the northern coast, Red 1 and Red 2 stretched across the lagoon to the eastern side of the old wooden pier. Beyond that line Red 3 continued east for another 600 yards where its boundary culminated at the eastern end of the airstrip. Secondary beachheads Green and Black fell at the western and southern shore lines and were considered unsuitable for initial landings.

Marines started their attack on the lagoon at 09:00 with the largest American invasion force yet assembled for a single operation in the Pacific. The following is a chronological account of the 76 hour battle. It analyzes military strategy from memory and site perspective in order to better understand important events.



Marines assault a heavily reinforced Japanese pillbox.

Commanding General: Major General Julian C. Smith
Asst. Divisional Commander: Brig. Gen Leo D. Hermle
Chief of Staff: Col. Merritt A. Edson

2nd Marine Regiment: Col. David M. Shoup

1st Battalion: Maj. Wood B. Kyle
2nd Battalion: Lt. Col. Herbert Arney
3rd Battalion: Maj. John F. Shoettel

6th Marine Regiment: Col. Maurice G. Holmes

1st Battalion: Maj. W.R. Jones
2nd Battalion: Lt.Col. Raymond Murray
3rd Battalion: Lt.Col. Kenneth McLeod

8th Marine Regiment: Col. Elmer E. Hall

1st Battalion: Maj. Lawrence Hays
2nd Battalion: Maj. Henry Crowe
3rd Battalion: Maj. Robert Ruud

10th Marine Regiment: Brig. Gen. T.E. Bourke

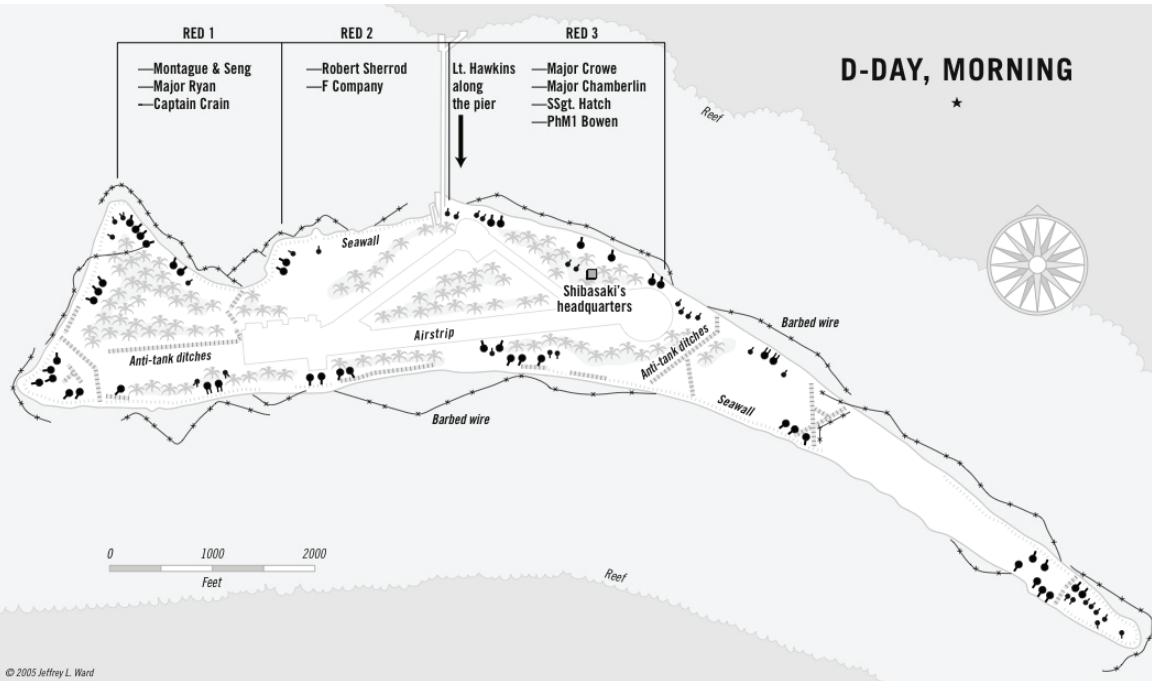
1st Battalion: Lt.Col. Presley M. Rixey (75mm pack howitzer)
2nd Battalion: Lt.Col. George Shell
3rd Battalion: Lt.Col. Manly L. Curry
4th Battalion: Lt.Col. Kenneth Jorgensen
5th Battalion: Maj. Howard V. Hett

18th Marine Regiment: Col. Cyril W. Martyr

1st Battalion (Engineer): Maj. August L. Vogt
2nd Battalion (Pioneer): Lt.Col. Chester J. Salazar
3rd Battalion (SeaBees): Commander L. E. Tull (CEC USN)

2nd Amphibian Tractor Battalion: Maj. Henry C. Drewes

2nd Tank Battalion: Lt.Col. Alexander B. Swenceski



09:00 Lieutenant William Hawkins and his team of specially trained snipers were the first Americans to advance on Betio. They landed on the wooden pier and continued towards the beach, clearing the general area of any Japanese firing on the landing craft as they passed by.

As Red Beach 1 was actually a small cove, enemy fire came from both sides as well as the front. In response, a number of amtracs veered west, coming ashore at the junction between Red Beach 1 and Green Beach. There they were met by a five-foot high seawall.

Amtrac No. 49 came ashore on Red Beach 1 first. The first wave got off with few casualties but the second and third wave suffered badly.

Major Michael Ryan had to wade ashore as his companies Higgins Boats grounded on the coral reef.

09:00 10:00 11:00 11:30

Marines on Red Beach 2 were the last to land. The amtracs that made it to the beach unloaded their Marines, who then found shelter behind a log barricade. Pinned down, they watched as Higgins Boats halted several yards from the beach and comrades fell submerged by defensive fire. F Company suffered 50 percent casualties as the waded inland to the log barrier.

On Red Beach 3, the destroyers Ringgold and Dashiell provided invaluable support to Major Henry 'Jim' Crowe and his platoon. As such, they landed with few casualties.

With advancement inland heavily contested, Major Chamberlain appeared to make the only considerable headway on the eastern end of Red Beach 3.

Colonel David M. Shoup, the regimental commander for the Second Marines, had great difficulty getting ashore. When he finally did he was wounded by shrapnel to the legs.

There was a delay in getting enough amtracs to house the next wave of Marines. When they finally neared the battlefield the Japanese put up such a concentrated fire that many of the landing craft veered west to the extreme end of Red Beach 1. There they were absorbed by Major Ryan.

12:00 Just before midday, Colonel Shoup ordered the Third Battalion to land on Red Beach 3 to support Major Crowe. Once again, they came ashore in knee deep water, under murderous fire. In order to sustain life, it was advised that no more troops be landed. This left Second Marine commander, Major General Julian Smith, with only Major Lawrence Hays battalion in reserve.

By noon the Marines had successfully taken the beach as far inland as the first line of Japanese defense.

13:30 Julian Smith asked permission to release Major Hays and his battalion from the line of departure. Failure to contact Colonel Shoup resulted in delays.

14:30 Julian Smith was given permission to launch the Sixth Marines. However, continued failure to communicate enabled Major Hays and the First Battalion from joining the fight. They remained in their landing craft for the rest of D-Day.



15:30 M4A2 Sherman tanks had been specially prepared to drive ashore with extensions to exhausts and air intakes as well as a tar-like substance waterproofing the chassis below the expected waterline. Several early attempts failed due to crippling defensive fire. Two tanks did eventually land on Red Beach 1 but were quickly knocked out of action. Another three tanks landed on Red Beach 3 and helped push the line to about 300 yards from shore. Eventually, one of these fell into a shell hole and another was taken out by a magnetic mine. The remaining tank operated for the rest of the day. A trained reconnaissance platoon guided an additional four tanks on to Red Beach 3. They suffered severe casualties but were able to operate successfully for most of the day.

By the end of the day only one tank was still operable but the arrival of the M4A2 Sherman tanks started the line moving on Red Beach 3 and the end of Red 2.

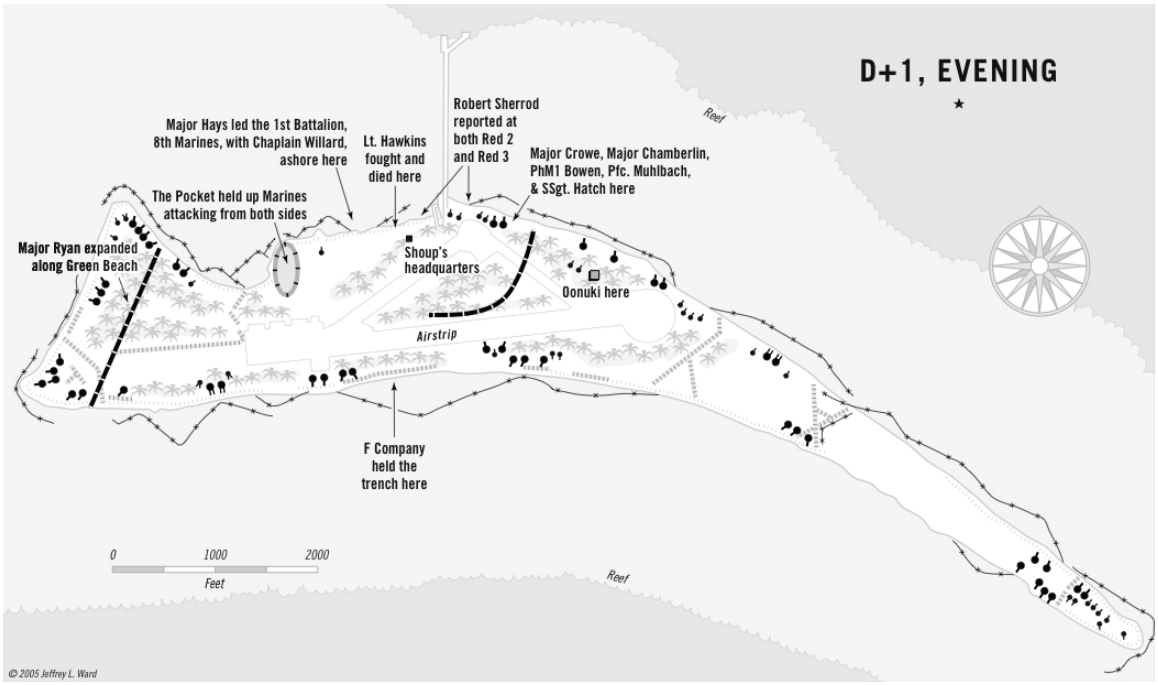
On the afternoon of D-Day, a sharp-eyed Marine spotted a group of Japanese officers moving in the open as they relocated their command bunker. The soldier quickly ordered a barrage from the destroyers Ringgold and Dashiell. The entire group was killed. Unbeknownst to the soldier, amongst those officers was base commander Admiral Shibasaki. The importance of his death cannot be overestimated for it is likely that it saved the lives of several Marines.

On Red Beach 1, Major Ryan had absorbed quite a mixture of men. With Japanese defenses on the eastern side of the cove still intact Ryan proceeded to advance south along Green Beach, knocking out enemy pillboxes along the way. With the darkness of night setting in and limited heavy weapons at hand, Major Ryan consolidated his position and set in.

06:15 By nightfall, the line was only a short distance from the main runway. Although Marines held a precarious beachhead at best, the death of Admiral Shibasaki meant that the night was fairly uneventful.

08:00 After spending twenty-four hours without food, drink, or amenities Major Hays and his men received the order to head for Red Beach 2. Like so many before them, they ran aground on the reef. Wading out into open water the Japanese put up another intense welcoming barrage of fire.

15:30 06:15 07:00 08:00



Major Hays reported to Colonel Shoup with what remained of his battalion and their equipment. In the frenzy, a lot of the heavier equipment had been lost in the water. However, as the day wore on the tide rose and much of it started to flow into the beachheads.

The Japanese had used the cover of darkness to consolidate their defensive positions and those Marines who had made it over the western taxiway of the airfield found themselves trapped. Once relieved by a concentrated sea and air bombardment Colonel Shoup sent these Marines to occupy the ground between the airfield and the sea. Effectively cutting off the garrison in half, this position became known as 'the pocket'. Marines continued to resist viscous Japanese counterattack at a high cost before reinforcements arrived.

Despite killing a large number of the enemy, Major Crowe's attempts to advance on Red Beach 3 were frustrated by a complex of pillboxes and a large bombproof shelter.

10:00 On Green Beach, Major Ryan and his assorted force were reinforced by another M4A2

08:30 09:00 09:30 **10:00**

Sherman tank and a platoon of American war dogs was inserted into the conflict to help clear caves and bunkers. In the end, a well coordinated naval attack and continuous ground fire took the beach to a depth of 100 to 150 yards in what proved to be a short period of time. This allowed for the Sixth Marines to commence on an uncontested beach. Major Ryan was prepared to move eastwards but was ordered to consolidate his position.

While attacking an enemy pill box Lieutenant Hawkins was badly wounded in the chest by shrapnel from a skillfully thrown grenade. Despite his wounds he continued fighting with little regard for his own safety. Of his exploits, he skillfully cleaned out six machine gun nests with two to six Japanese soldiers in each.

10:30 A Japanese soldier shot Lieutenant Hawkins in the shoulder, severing a main artery. His scout-snipers carried him back to the beach where he died moments later.

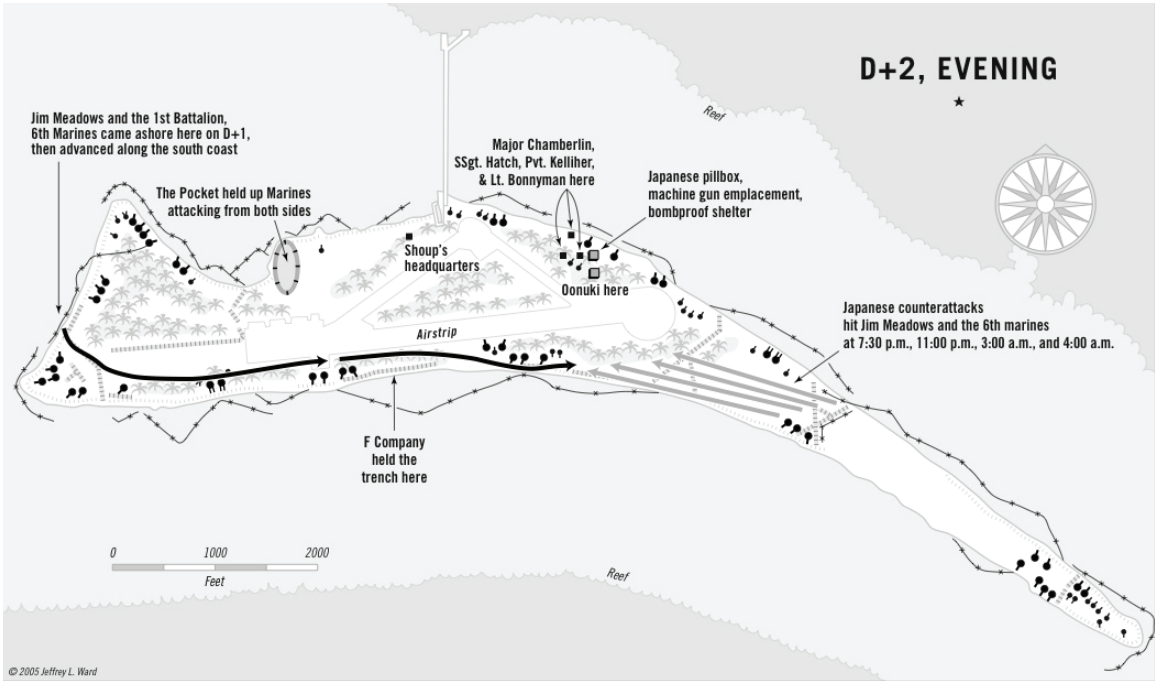
12:30 Several Japanese soldiers fled across the sandbars on the extreme eastern end of the islet to Bairiki. Portions of the Sixth Marines were sent to seal off their retreat.

By the end of the day, the entire western end of the island was secured, as well as a fairly continual line between Red Beach 2 and Red Beach 3 around the airfields perimeter. F Company had cut across the airfield and set up a position at Black Beach 2. With the U.S. gaining advantage, Colonel Merritt Edson arrived to relieve wounded Colonel Shoup. After treatment, he returned to duty as Colonel Edson's assistant.

07:00 Major Hays and his men attacked 'the pocket' between Red Beach 1 and 2. Despite support by M3A1 Stuart tanks and two M3 half-tracks, they were unable to successfully clear the position. Advancing only 100 yards, stiff opposition from a complex of pillboxes rendered their efforts useless.

08:00 Major Crowe started to push eastward from the Burn-Philp wharf. However, stern resistance delayed their efforts. A steel pillbox, a coconut log machine gun emplacement, and a concrete bunker were dug in. Marines attacked with mortar barrage, a Sherman tank, and skilled engineers with grenades, explosive charges, and flamethrowers. After securing each obstacle, men advanced rapidly to the end of the runway.





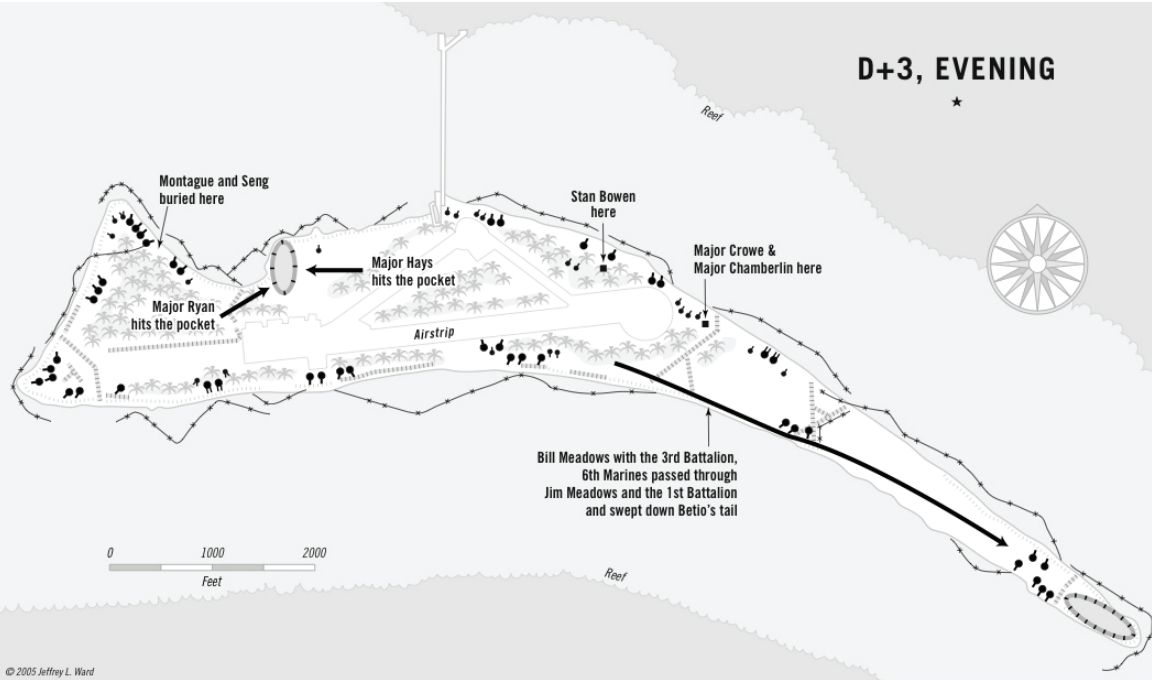
Jim Meadows and the First Battalion, Sixth Marines passed through Major Ryan's force along Green Beach and continued to attack eastwards along the southern edge of the airfield. By late afternoon their efforts formed a continuous line to Red Beach 3.

By evening the western two-thirds of the island were taken. The remaining Japanese forces were either squeezed into small areas of land east of the airstrip or located in 'the pocket'.

With the task of clearing up the dead at hand Marines began burying comrades in temporary graves while throwing Japanese bodies in mass graves or at sea.

08:00 A full scale assault finally took place in the same location as a probe five hours earlier. Marines successfully fought it off with the support of naval gunfire form the destroyers Schroeder and Sigsbee. When the dust finally cleared, 200 Japanese Marine paratroopers were found dead at the front line.

12:00 14:00 19:30 **03:00**



At dawn Bill Meadows with the Third Battalion passed through Jim Meadows and the First Battalion and advanced along the tail of the island. Supported by Sherman and Stuart tanks, they encountered little resistance until passing an anti-tank ditch. With few tanks clearing the sizeable ditch, ground forces continued on.

The Third Battalion reached the far end of Betio, encountering moderate resistance along the way.

13:00 'The pocket' was the last position on the island to fall. Both Major Hays and Major Ryan committed to a final assault. With the support of M3 half-tracks, Marines gradually wore the remaining defenders down and claimed the island.

Semper Fi...

4:00 10:00 11:30 **13:00**

"I am young, I am twenty years old; yet I know nothing of life but despair, death, fear, and fatuous superficiality cast over an abyss of sorrow. I see how peoples are set against one another, and in silence, unknowingly, foolishly, obediently, innocently slay one another."

Erich Maria Remarque



The President of the United States takes pride in presenting the

MEDAL OF HONOR

posthumously to FIRST LIEUTENANT ALEXANDER BONNYMAN, JR.

UNITED STATES MARINE CORPS RESERVE

for service as set forth in the following citation:

"For conspicuous gallantry and intrepidity at the risk of his life above and beyond the call of duty as Executive Officer of the 2d Battalion Shore Party, 18th Marines, 2d Marine Division, during the assault against enemy Japanese-held Tarawa in the Gilbert Islands, 20-22 November 1943.

Acting on his own initiative when assault troops were pinned down at the far end of Betio Pier by the overwhelming fire of Japanese shore batteries, 1st Lt. Bonnyman repeatedly defied the blasting fury of the enemy bombardment to organize and lead the besieged men over the long, open pier to the beach and then, voluntarily obtaining flame throwers and demolitions, organized his pioneer shore party into assault demolitionists and directed the blowing of several hostile installations before the close of D-day.

Determined to effect an opening in the enemy's strongly organized defense line the following day, he voluntarily crawled approximately 40 yards forward of our lines and placed demolitions in the entrance of a large Japanese emplacement as the initial move in his planned attack against the heavily garrisoned, bombproof installation which was stubbornly resisting despite the destruction early in the action of a large number of Japanese who had been inflicting heavy casualties on our forces and holding up our advance.

Withdrawing only to replenish his ammunition, he led his men in a renewed assault, fearlessly exposing himself to the merciless slash of hostile fire as he stormed the formidable bastion, directed the placement of demolition charges in both entrances and seized the top of the bombproof position, flushing more than 100 of the enemy who were instantly cut down, and effecting the annihilation of approximately 150 troops inside the emplacement. Assailed by additional Japanese after he had gained his objective, he made a heroic stand on the edge of the structure, defending his strategic position with indomitable determination in the face of the desperate charge and killing 3 of the enemy before he fell, mortally wounded.

By his dauntless fighting spirit, unrelenting aggressiveness and forceful leadership throughout 3 days of unremitting, violent battle, 1st Lt. Bonnyman had inspired his men to heroic effort, enabling them to beat off the counterattack and break the back of hostile resistance in that sector for an immediate gain of 400 yards with no further casualties to our forces in this zone.

He gallantly gave his life for his country."



The President of the United States takes pride in presenting the

MEDAL OF HONOR

posthumously to FIRST LIEUTENANT WILLIAM DEANE HAWKINS

UNITED STATES MARINE CORPS RESERVE

for service as set forth in the following citation:

"For valorous and gallant conduct above and beyond the call of duty as commanding officer of a Scout Sniper Platoon attached to the Assault Regiment in action against Japanese-held Tarawa in the Gilbert Island, 20 and 21 November 1943.

The first to disembark from the jeep lighter, 1st Lt. Hawkins unhesitatingly moved forward under heavy enemy fire at the end of the Betio Pier, neutralizing emplacements in coverage of troops assaulting the main beach positions. Fearlessly leading his men on to join the forces fighting desperately to gain a beachhead, he repeatedly risked his life throughout the day and night to direct and lead attacks on pillboxes and installations with grenades and demolitions.

At dawn on the following day, 1st Lt. Hawkins resumed the dangerous mission of clearing the limited beachhead of Japanese resistance, personally initiating an assault on a hostile position fortified by enemy machineguns, and, crawling forward in the face of withering fire, boldly fired pointblank into the loopholes and completed the destruction with grenades.

Refusing to withdraw after being seriously wounded in the chest during this skirmish, 1st Lt. Hawkins steadfastly carried the fight to the enemy, destroying 3 more pillboxes before he was caught in a burst of Japanese shellfire and mortally wounded. His relentless fighting spirit in the face of formidable opposition and his exceptionally daring tactics served as an inspiration to his comrades during the most crucial phase of the battle and reflect the highest credit upon the U.S. Naval Service.

He gallantly gave his life for his country."



The President of the United States takes pride in presenting the

MEDAL OF HONOR

posthumously to COLONEL DAVID MONROE SHOUP

UNITED STATES MARINE CORPS

for service as set forth in the following citation:

"For conspicuous gallantry and intrepidity at the risk of his life above and beyond the call of duty as commanding officer of all Marine Corps troops in action against enemy Japanese forces on Betio Island, Tarawa Atoll, Gilbert Islands, from 20 to 22 November 1943.

Although severely shocked by an exploding enemy shell soon after landing at the pier and suffering from a serious, painful leg wound which had become infected, Col. Shoup fearlessly exposed himself to the terrific and relentless artillery, machinegun, and rifle fire from hostile shore emplacements.

Rallying his hesitant troops by his own inspiring heroism, he gallantly led them across the fringing reefs to charge the heavily fortified island and reinforce our hard-pressed, thinly held lines. Upon arrival on shore, he assumed command of all landed troops and, working without rest under constant, withering enemy fire during the next 2 days, conducted smashing attacks against unbelievably strong and fanatically defended Japanese positions despite innumerable obstacles and heavy casualties.

By his brilliant leadership daring tactics, and selfless devotion to duty, Col. Shoup was largely responsible for the final decisive defeat of the enemy, and his indomitable fighting spirit reflects great credit upon the U.S. Naval Service."



■ Admiral Shibasaki's headquarters
Emplacement

* site location is approximate

After the battle was won and the dead buried, American forces continued along their campaign of island-hopping. With much of their use spent, the equipment destroyed during the battle was left to rust in the aftermath. Among the wreckage a B-24 Bomber, several broken LVT's, dilapidated Sherman tanks, and stranded Higgins boats.

Perhaps more significant than broken metal scattered across the sand was the elaborate concentration of Japanese pillboxes and fortified command posts. Built to withstand heavy bombardment, several of these massive concrete bunkers remained intact.

The magnitude of those emplacements coupled with the fragility of broken equipment has left an island littered with historical relics echoing a bloody past. Coupled with the analysis of the battles strategic land advances and significant events those relics chosen below are important landmarks for consideration.





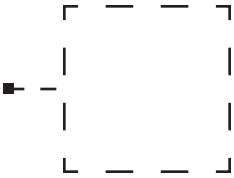
Shot down during the initial bombardment of Betio, a B-24 Liberator rests in the lagoon just off of Red Beach 3. Broken sections of both wings lie exposed under the equatorial sun as crabs and local fisherman alike pass by the carcass routinely. Patches of surface skin have been stripped away from the frame as the metal is valued by the native women of the island for its malleability and use as a comb.





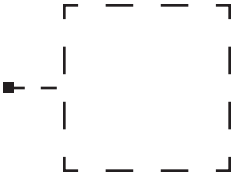
A version of the LVT-1 can be found on Green Beach. Its straight six-cylinder engine and random tread sections lie in jagged heaps on the sandy shore.

Further out to sea are the remains of an LVT-2. Possibly the only recognizable component of the craft are two rows of cups lining its tread.





Admiral Shibasaki's headquarters still stands off Red Beach 3. Riddled with craters and holes from American shelling, the concrete structure is readily occupied by most passerbies.





50-caliber machine guns decaying atop broken concrete foundations scatter the islands beaches. Some, seemingly undamaged, rise above their swiveling steel mounts while the muzzles of others lie down shore with there shattered steel shields. Designed for a singular purpose, it has been six decades since any of them have been fired. Undoubtedly damaged beyond use, these giant emplacements have only to remain ineffective.



Bodies sprawled out on Red Beach testify to the ferocity of the struggle for this stretch of sand.

The memoriam this thesis strives to become isn't consistent with the common spaces and familiar orders of popular archetypes. As in every memorial, it answers to a different set of rules. The quality of the immeasurable harkens at this notion by surmising that spatial quality is beyond a surface understanding. Instead of impacting the built environment the built environment assumes risk and demands control. It performs uniquely by molding emotion in a direction that links the impersonal with the personal; the sacred with the profane:

This thesis not only works to ease the trauma of man's inhumanity to man on Red Beach but it struggles to memorialize the idea of a hopeful future through action. The organizations of these actions address elements of controlled degradation and are necessary criteria for developing that future. Those elements are as follows: livable area, arable land, and drinkable water.

As water levels rise livable area and population will decrease proportionate to a standard quality of living within each named district. The districts work to separate, organize, and manage peoples into groups that share the awareness of their districts life expectancy.

"A great building must begin with the immeasurable, must go through measurable means when it is being designed, and in the end must be immeasurable."

Louis Kahn

Arable land serves as an important function to the municipal waste management facility as well as the primary means for creating capital to fund the district relocation program.

Salt water is constantly jeopardizing Betio's drinkable water. Out of necessity, many islanders have taken matters into their own hands by drilling homemade wells and tapping into protected fresh water supplies. As a result, these make-shift wells have polluted aquifers further. The control of a centralized island well promotes safety from encroaching salt waters, allows for equal distribution to districts, and ensures the health of the supply.

By mediating the success and failure of each element over fifty years the deterioration of Betio is controlled until it is no longer prudent to do so. The process of controlling livable area, arable land, and drinkable water is subject to overarching modifying conditions that are a part of a projective analysis that works to organize further each element into processes of controlled degradation. Most importantly, those modifying conditions are to stimulate motive, sustain infrastructure, and engage degradation.

1

To stimulate motive is to provide an incentive. The incentive is to clean-up Red Beach not because it is the right thing to do but because cleaning-up Red Beach provides immediate sustenance that affords islanders a ticket off the island. To imagine doing it any other way would be to assume that the Kiribati government and its people dumped their trash on one of the several beaches that weren't burial sites for WWII soldiers. Despite their limited resources, the fact of the matter is that it happened and now the incentive to clean it up is to build a municipal waste treatment facility that stimulates an economy and an infrastructure, while establishing a plan for the future in each. That plan includes organizing districts as a strategy for population density management where population is directly proportional to depleting livable area. In turn, the organization of those districts birth a district relocation program that transports homeless islanders to the administrative district of Manatuto in East Timor.

2

To sustain the infrastructure stimulated by the incentive to relocate, all trash on Red Beach must be disposed of and the primary function of the waste treatment facility transformed from municipal incinerator to a dual system relying more on biological reprocessing than thermal treatment. At this juncture, the two week process of composting waste provides nutrient rich soil to sustain arable land concentrated for growing sweet potato. The sweet potato is a common export in the Philippines. Used frequently because it is low-lying and capable of filtering salt water. The existing flora removed to expand arable land area allows the sweet potato to improve aquifer health and sustenance. Therefore, a centralized well is tapped that sustains the islands drinking water. Lastly, imported goods are regulated to sustain the composting process. As a result, only biodegradable packaging and food sources are acceptable imports.

3

To engage degradation and finally except the conditions of the island as failing every islander must be relocated, ground water polluted, and the municipal waste treatment facility inundated.

In keeping with a unique character, materiality choice is reflective of a historical fabric already in place at Betio. Kept without regard for preservation, concrete bunkers or emplacements are mere obstacles in and amongst the landscape. There rusted shells and battered slabs dot sandy shores with stories of strategy and sacrifice. History books may quantify battles won and lost but the battle relics at Betio compel an aforementioned understanding that transcends reality through the textures of broken timbers and the appearance of bullet punctured walls.

The projects material choices are as follows…

Primary Structural Materials: pre-cast piles
cast-in-place concrete walls
waffle slab floor and ceiling

Primary Detail Materials: trolled concrete ceiling tiles
insulated fire brick
untreated steel railings

Primary Natural Elements: fire, earth, and water



The Japanese pillbox was a heavily fortified concrete structure dug into the earth for protection.

The municipal waste management facility will incinerate, store, and compost waste at the eastern end of the island. It is supported by a fleet of equipment including but no limited to several 544D10-55 GRADALL's, a CAT 226B2 Skidsteer, several four ton garbage trucks, and a CAT 930G Wheel Loader.

Memorial Stone:

Incinerator:	1,500 sf
Crematorium:	900 sf
Citadel:	11,500 sf
Mechanic Shop:	850 sf
Yard:	1.5 acres

The 57'-0" tall facade is designed to volumetrically house an array of 5'x5'x5' compost storage units on its four sides. The number of units per side are adequately sized to accommodate the islands maximum population density before relocation.

Service:

Restrooms:	420 sf (women) 700 sf (men)
Office Space:	990 sf
Weigh Station:	144 sf
Propane Access:	100 sf
Total Program:	85,504 sf

Parking is to accomodate twelve spaces, of which two will be handicap accessible. Land work will also conform to handicap accessible specifications

Restrooms will accommodate one water closet and sufficient lavatories for both male and female occupants. One handicap accessible stall will also be included for each.

Each janitorial closet will accommodate one service sink.



Taking the slim protection that a blasted tree affords, this Marine fires at a nearby Japanese pill box.

Code Adherence:
International Building Code (IBC 2006)

(texts in italics are direct quotes or paraphrases of the code text

Chapter 3 USE AND OCCUPANCY CLASSIFICATION

SECTION 303 Assembly Group A

303.1 Assembly Group A *Assembly Group A occupancy includes, among others, the use of a building or structure, or a portion thereof, for the gathering of persons for purposes such as civic, social or religious functions; recreation, food or drink consumption; or awaiting transportation.*

Specific Assembly Group A-3 *Assembly uses intended for worship, recreation or amusement and other assembly uses not classified elsewhere in Group A.*

Chapter 5 GENERAL BUILDING HEIGHTS AND AREAS

SECTION 601 General

Table 601 Fire Resistance Rating Requirements for Building Elements:

For Type IIA Construction:

structural frame:	*1 hour*
exterior bearing walls:	*1 hour*
interior bearing wall:	*1 hour*
interior nonbearing walls and partitions	*1 hour*
floor construction	*1 hour*
roof construction	*1 hour*

SECTION 602 Construction Classifications

602.2 Types I and II Type I and II construction are those types of construction in which the building elements listed in Table 601 are of noncombustible materials, except as permitted in Section 603 and elsewhere in this code.

Table 602 Fire Resistance Rating Requirements for Exterior Walls Based on Fire Separation Distance:

603.1 Allowable Materials The allowed combustible materials that are allowed in the building applications listed in Table 602 are listed in Section 603.1.1 through 603.1.3

Chapter 7 FIRE-RESISTANCE-RATED CONSTRUCTION

SECTION 704 Exterior Walls

704.2.1 Type I and II Construction *Projections from walls of Type I or II construction shall be of noncombustible materials or combustible materials as allowed by Sections 1406.3 and 1406.4.*

704.8 Allowable Area of Openings *The maximum area of unprotected or protected openings permitted in an exterior wall in any story shall not exceed the values set forth in Table 704.8.*

SECTION 705 Fire Walls

Table 705.4 Fire Wall Resistance Ratings

Group A requires fire resistance ratings of three hours in fire walls.

705.8 Openings *Openings will not exceed 120 square feet and the aggregate width of openings on any floor level will not exceed 25 percent of the length of the wall.*

SECTION 706 Fire Barriers

Table 706.3.9 Fire Resistance Rating Requirements for Fire Barrier Assemblies Between Fire Areas

Group A requires fire resistance ratings of two hours in fire barriers.

706.7 Openings *Openings will not exceed 156 square feet and the aggregate width of openings on any floor level will not exceed 25 percent of the length of the wall.*

Chapter 9 FIRE PROTECTION SYSTEMS

SECTION 901 General

901.2 Fire Protection Systems *Fire protection systems shall be installed, repaired, operated and maintained in accordance with this code and the International Fire Code.*

SECTION 906 Portable Fire Extinguishers

906.1 General *Portable fire extinguishers shall be provided in occupancies and locations as required by the International Fire Code.*

SECTION 907 Fire Alarm and Detection Systems

907.2.1 Group A *A manual fire alarm system shall be installed in Group A occupancies having an occupant load of 300 or more. Portions of Group E occupanices occupied for assembly purposes shall be provided with a fire alarm system as required for the Group E occupancy.*

907.2.1.2 Emergency Power *Emergency voice/alarm communications systems shall be provided with an approved emergency power source.*

Chapter 10 MEANS OF EGRESS

SECTION 1003 General Means of Egress

1003.1 Applicability *The general requirements specified in Sections 1003 through 1013 shall apply to all three elements of the means of egress system, in addition to those specific requirements for the exit access, the exit and the exit discharge detailed elsewhere in this chapter.*

1003.2 Ceiling Height *The means of egress shall have a ceiling height of no less than seven feet six inches.*

1003.5 Elevation Change *Where changes in elevaton of less than 12 inches exist in the means of egress, sloped surfaces shall be used. Where the slope is greater than one unit vertical in 20 units horizontal (five percent slope), ramps complying with Section 1010 shall be used. Where the difference in elevation is six inches or less, the ramp shall be equipped with either handrails or floor finish materials that contrast with adjacent floor finish materials.*

1003.6 Means of Egress Continuity *The path of egress travel along a means of egress shall not be interrupted by any building element other than a means of egress component as specified in this chapter. Obstructions shall not be placed in the required width of a means of egress except projections permitted by this chapter. The required capacity of a means of egress system shall not be diminished along the path of egress travel.*

SECTION 1004 Occupant Load

1004.1 Design Occupant Load *In determining means of egress requirements, the number of occupants for whom means of egress facilities shall be provided shall be determined in accordance with this section. Where occupants from accessory areas egress through a primary space, the calculated occupant load for the primary space shall include the total occupant load of the primary space plus the number of occupants egressing through it*

from the accessory area.

Table 1004.1.1 Maximum Floor Area Allowances Per Occupant

Per exception 1004.1.1 The space will be designed for no more than 35 people to inhabit it at a single time whether individually or in a gathering capacity.

Occupant Load = 35 people

Table 1005.1 Egress Width Per Occupant Served

Inches Per Occupant: .03 Stairs
Inches Per Occupant: .02 Other Egress Components

Due to low occupancy load, calculations yield numbers below stipulated minimums. I will follow the pre-stated minimums for egress width.

SECTION 1006 Means of Egress Illumination

1006.1 Illumination Required *The means of egress, including the exit discharge, shall be illuminated at all times the building space served by the means of egress is occupied.*

1006.2 Illumination Level *The means of egress illumination level shall not be less than one foot-candle (11 lux) at the walking surface level.*

SECTION 1007 Accessible Means of Egress

1007.3 Exit Stairways *In order to be considered part of an accessible means of egress, an exit stairway shall have a clear width of 48 inches minimum between handrails and shall either incorporate an area of refuge within an enlarged floor-level landing or shall be accessed from either an area of refuge complying with Section 1007.6 or a horizontal exit.*

1007.6 Areas of Refuge *Every required area of refuge shall be accessible from the space it serves by an accessible means of egress. The maximum travel distance from any accessible space to an earea of refuge shall not exceed the travel distance permitted for the occupancy in accordance with Section 1016.1. Every required area of refuge shall have direct access to an enclosed stairway complying with Section 1007.3 and 1020.1.*

1007.6.1 Size *Each area of refuge shall be sized to accommodate one wheelchair space of 30 inches by 48 inches for each 200 occupants or portion thereof, based on the occupant load of the area of refuge and areas served by the area of refuge. Such wheelchair spaces shall not reduce the required means of egress width. Access to any of the required wheelchair spaces in an area of refuge shall not be obstructed by more than one adjoining wheelchair space.*

1007.6.2 Seperation *Each area of refuge shall be separated from the remainder of the story by a smoke barrier complying with Section 709 or a horizontal exit complying with Section 1021. Each area of refuge shall be designed to minimize the intrusion of smoke.*

SECTION 1008 Doors, Gates and Turnstiles

1008.1.1 Size of Doors *The minimum width of each door opening shall be sufficient for the occupant load thereof and shall provide a clear width of not less than 32 inches. Clear openings of doorways with swinging doors shall be measured between the face of the door and the stop, with the door open 90 degrees. Where this section requires a minimum clear width of 32 inches and a door opening includes two door leaves without a mullion, one leaf shall provide a clear opening width of 32 inches. The maximum width of a swinging door leaf shall be 48 inches nominal. The height of doors shall not be less than 80 inches.*

1008.1.1.1 Projections Into Clear Width *There shall not be projections into the required clear width lower than 34 inches above the floor or ground. Projections into the clear opening width between 34 inches and 80 inches above the floor or ground shall not exceed four inches.*

1008.1.2 Door swing *Egress doors shall be side-hinged swinging.*

1008.1.4 Floor Elevation *There shall be a floor or landing on each side of a door. Such floor or landing shall be at the same elevation on each side of the door. Landings shall be level except for exterior landings, which are permitted to have a slope not to exceed 0.25 unit vertical in 12 units horizontal (two percent slope).*

1008.1.7 Door Arrangement *Space between two doors in a series shall be 48 inches minimum plus the width of a door swinging into the space. Doors in a series shall swing either in the same direction or away from the space between the doors.*

SECTION 1009 Stairways

1009.1 Stairway Width *The width of stairways shall be determined as specified in Section 1005.1, but such width shall not be less than 44 inches.*

1009.3 Stair Treads and Risers *Stair riser heights shall be seven inches maximum and four inshes minimum. Stair tread depths shall be 11 inches minimum. The riser height shall be measured verically between the leading edges of adjacent treads. The tread depth shall be measured horizontally between the vertical planes of the foremost projection of adjacent treads and at a right angle to the tread's leading edge.*

1009.3.1 Winder Treads *Winder treads are not permitted in means of egress stairways in Group A buildings.*

1009.3.2 Dimensional Uniformity *Stair treads and risers shall be of uniform size and shape.*

1009.4 Stairway Landings *There shall be a floor or landing at the top and bottom of each stairway. The width of landings ahll not be less than the width of stairways they serve. Every landing shall have a minimum dimension measured in the direction of travel equal to the width of the stairway. Such dimension need not exceed 48 inches where the stairway has a straight run.*

1009.6 Vertical Rise *A flight of stairs shall not have a vertical rise greater than 12 feet between floor levels or landings.*

SECTION 1010 Ramps

1010.2 Slope *Ramps used as part of a means of egress shall have a running slope not steeper than one unit vertical in 12 unites horizontal (eight percent slope). The slope of other pedestrian ramps shall not be steeper than one unit vertical in eight units horizontal (12.5 percent slope).*

1010.3 Cross Slope *The slope measured perpendicular to the direction of travel of a ramp shall not be steeper than one unit vertical in 48 units horizontal (two percent slope).*

1010.4 Verical Rise *The rise for any ramp run shall be 30 inches maximum.*

1010.6 Landings *Ramps shall have landings at the bottom and top of each ramp, points of turning, entrance, exits, and at doors.*

1010.6.1 Slope *Landings shall have a slope not steeper than one unit vertical in 48 units horizontal (two percent slope) in any direction. Changes in level are not permitted.*

1010.6.2 Width *The landings shall be at least as wide as the widest ramp run adjoining the landing.*

1010.6.3 Length *The landing length shall be 60 inches minimum.*

1010.6.4 Change in Direction *Where changes in direction of travel occur at landings provided between ramp runs, the landing shall be 60 inches by 60 inches minimum.*

SECTION 1012 Handrails

1012.2 Height *Handrail height, measured above stair tread nosings, or finish surface of ramp slope shall be uniform, not less than 34 inches and not more than 38 inches.*

1012.4 Continuity *Handrail-gripping surfaces shall b e continuous, without interruption by newel posts or other obstructions.*

SECTION 1016 Exit Access Travel Distance

1016.1 Travel Distance Limitations *Exits shall be so located on each story such that the maximum length of exit access travel, measured from the most remote point within a story to the entrance to an exit along the natural and unobstructed path of*

egress travel, shall not exceed the distances in Table 1016.1.

Table 1016.1 Exit Access Travel Distance

Occupancy Group A With Sprinklers = 250'

SECTION 1017 Corridors

1017.2 Corridor Width The minimum corridor width shall be as determined in Section 1005.1, but not less than 44 inches.

1017.3 Dead Ends *Where more than on exit or exit access doorway is required, the exit access shall be arranged such that there are no dead ends in corridors more than 20 feet in length.*

SECTION 1019 Number of Exits and Continuity

1019.1 Minimum Number of Exits *All rooms and spaces within each story shall be provided with and have access to the minimum number of approved independent exits required by Table 1019.1 based on the occupant load of the story.*

Table 1019.1 Minimum Number of Exits

Minimum Number of Exits for Occupant Load < 500 = two per story

Chapter 11 ACCESSIBILITY

Section 1104 Accessible Route

1104.1 Site Arrival Points *Accessible routes within the site shall be provided from public transportation stops; accessible parking; accessible passengers loading zones; and public streets or sidewalks to the accessible building entrance served.*

1104.2 Within a Site *At least one accessible route shall connect accessible buildings, accessible facilities, accessible elements and accessible spaces that are on the same site.*

1104.3 Connected Spaces *When a building or portion of a building is required to be accessible, an accessible route shall be provided to each portion of the building, to accessible building entrances connecting accessible pedestrian walkways and the public way.*

1104.4 Multilevel Buildings and Facilities *At least one accessible route shall connect each accessible level, including mezzanines, in multilevel buildings and facilities.*

1104.5 Location *Accessible routes shall coincide with or be located in the same area as a general circulation path. Where the circulation path is interior, the accessible route shall also be interior. Where only one accessible route is provided, the accessible route shall not pass through kitchens, storage rooms, restrooms, closets, or similar spaces.*

SECTION 1105 Accessible Entrance

1105.1 Public Entrances *At least 60 percent of all public entrances shall be accessible.*

SECTION 1106 Parking and Passenger Loading Facilities

1106.1 Required *Where parking is provided, accessible parking spaces shall be provided in compliance with Table 1106.1, except as required by Sections 1106.2 through 1106.4. Where more than one parking facility is provided on a site, the number of parking spaces required to be accessible shall be calculated separately for each parking facility.*

Table 1106.1 Accessible Parking Spaces

Total Parking Spaces: 10
Required Accessible Spaces: 2

1106.6 Location *Accessible parking spaces shall be located on the shortest accessible route of travel from adjacent parking to an accessible building entrance. In parking faciliteis that do not serve a particular builidng, accessible parking spaces shall be*

located on the shortest route to an accessible pedestrian entrance to the parking facility. Where buildings have multiple accessible entrances with adjacent parking, accessible parking spaces shall be dispersed and located near the accessible entrances.

SECTION 1109 Other Features and Facilities

1109.2.2 Water Closet Compartment *Where water closet compartments are provided in a toilet room or bathing facility, at least one wheelchair-accessible compartment shall be provided. Where the combined total water closet compartments and urinals provided in a toilet room or bathing facility is six or more, at least one ambulatory-accessible water closet compartment shall be provided in addition to the wheelchair-accessible compartment. Wheelchair-accessible and abulatory-accessible compartments shall comply with ICC A117.1.*

1109.3 Sinks *Where sinks are provided, at least five percent but not less than one provided in accessible spaces shall comply with ICC A117.1.*

1109.5 Drinking Fountains *Where drinking fountains are provided on an exterior site, on a floor or within a secured area, the accordance with Sections 1109.5.1 and 1109.5.2.*

1109.5.1 Minimum Number *No fewer than two drinking fountains shall be provided. One drinking fountain shall comply with the requirements for people who use a wheel-chair and one drinking fountain shall comply with the requirements for standing persons.*

Chapter 11 PLUMBING SYSTEMS

SECTION 2902 Minimum Plumbing Facilities

2902.1 Minimum Number of Fixtures *Plumbing fixtures shall be provided for the type of occupancy and in the minimum number shown in Table 2902.1. The number of occupants shall be determined by this code. Occupancy classifications shall be determined in accordance with Chapter 3.*

Table 2902.1 Minimum Number of Required Plumbing Fixtures

For A3 Occupancies (chosen occupancy subset places of worship)

water closets:	male 1/150	female 1/75
lavatories:	male 1/200	female 1/200
drinking fountains:	occupants 1/1000	
other requirements:	1 service sink required	

Occupant Load: 35

water closets:	1 male	2 female
lavatories:	1 male	1 female
drinking fountains:	2 mounted outside	
other requirements:	1 service sink	

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Aerial photograph of Hawkins Field, Betio Island, in March 1944. 1944. US Navy. <http://commons.wikimedia.org/wiki/File:Hawkins_Field_Betio_Tarawa_March_1944.jpg> *

Aerial view was taken looking north toward "The Pocket" as seen from a Douglas SBD-5 Dauntless aircraft. "The Pocket" was the last place of Japanese resistance. 1943. US Navy. <http://commons.wikimedia.org/wiki/File:Tarawa_aerial_view_24_Nov_1943.jpg>

During the fighting on Tarawa in November 1943, a Marine rifle man pauses for a drink of water. 1943. USMC. <http://www.ww2gyrene.org/Division_structure.htm>

Bodies sprawled out on Red Beach testify to the ferocity of the struggle for this stretch of sand. 1943. US Navy. <http://commons.wikimedia.org/wiki/File:Tarawa_beach_HD-SN-99-03001.JPEG> *

Japanese engine and propeller on Betio Reef. TIGHAR. < http://www.tighar.org/Projects/Histpres/HistPres.html> *

General Douglas MacArthur, President Franklin Delano Roosevelt and Admiral Chester W. Nimitz on board the USS Baltimore. 1944. <http://www.mishalov.com/roosevelt-obit.html>

Leon Cooper points to the piles of garbage littering Red Beach. 2008. <http://www.sizzlingpopcorn.com/movienews/leon_cooper...>

Marines assault a heavily reinforced Japanese pillbox. 1943. US Navy. <http://commons.wikimedia.org/wiki/File:Marines_storm_Tarawa.jpg> *

Marines take cover behind a sea wall on Red Beach 3. 1943. US Navy. <http://commons.wikimedia.org/wiki/File:Marines_take_cover_behind_seawall_at_Red_Beach_no._3,_Tarawa.JPEG>

Taking the slim protection that a blasted tree affords, this Marine fires at a nearby Japanese pill box. 1943. US Navy.<http://commons.wikimedia.org/wiki/File:Marine_in_action_at_Tarawa.JPEG> *

U.S. Marine inspects Japanese tank used as a pill box. In the foreground a dead Japanese soldier lies grotesquely frozen by death as he fell. 1943. Real War Photos. <http://www.realwarphotos.com/wwii-famous_battles>

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