Cycle-graphic Landscapes

Experiencing Honolulu Through Its Harrowed Bicycle Infrastructure

Scott Alan Viloria

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0.0_Abstract

In many cities throughout the world, the bicycle has proven its merit as a viable mode of transportation. Even in an automobile dependent nation like the United States, bicycle commuting has become a growing trend within dense urban cities. Many have experienced the benefits of cycling in terms of how it has the ability to impact the larger environment, urban infrastructure, and promote personal health.

Those who cycle know the bicycle is a viable mode of transportation, but the notion is not self-evident. Many are unaware of the bicycle as a utilitarian and cultural object. Cycle-graphic landscapes addresses this problem within Honolulu, Hawaii. The city of Honolulu is improving the capacity of its current cycling infrastructure, but has had difficulty generating higher participation rates. The encouragement of bicycle use in Honolulu needs to be made accessible physically and visually to the general public, which requires reinforcement by spatial means. This thesis shows how an architectural intervention can create an identity for the emerging Honolulu cycling system as a catalyst to generate visible bicycle culture.

Cycle-graphic landscapes is a critique of Honolulu's response to urban density and alternative forms of transportation. In the face of rising urban density, Honolulu needs to reevaluate its approach towards urban infrastructure. With Honolulu's limited choices of existing transportation modes, the interjection of new modes are unavoidable, and certainly warranted. By leveraging the benefits of the developing light-rail transit and the proposed bicycle system, cycling can become more accessible, physically and visually, to residents of Oahu. Aimed at those who have not yet adopted cycling, for transportation and pleasure, the visual experience of the Cycle-graphic station showcases the act of cycling as an art and attempts to convey confidence in the equality of cyclist and motorist, the assurance that access is continuous and safe, and to promote the coolness and fun of cycling.

Table of Contents_

1.0_Introduction

Figure 01
Cycling in the Danish context has elevated itself above “culture” to “lifestyle” status

Figure 02
CTRL+C , CTRL+V
Can we superimpose this
image in other contexts?

In many cities throughout the world, the bicycle has proven its merit as a viable mode of transportation. Even in an automobile dependent nation like the United States, bicycle commuting has become a growing trend within dense urban cities. Many have experienced the benefits of cycling in terms of how it has the ability to impact the larger environment, urban infrastructure, and promote personal health. In addition, bicycles consume far less nonrenewable resources than most other forms of transportation, with travel times that are comparable or faster than many motorized modes. With respect to their small size, bicycles require far less space to move and park. Cycling is generally very economical, and available to groups of all earnings. Included with the many practical advantages of the bicycle, it has the ability to influence culture, create social wellbeing, and facilitate a comprehensive understanding of the environment.

In recent decades, American civic authorities have pushed to have bicycling infrastructure considered in transit planning, thus encouraging larger cities to adopt a cycling master plan that establishes policy and guidelines for development. This has occurred in many highly dense urban cities outside of the US that show a high percentage of cyclists. For example, in the Dutch context, user percentages average above 20% for all demographic age groups and reach as high as 40% for those under 17 years old. In comparison, users over 16 years old in the United States account for less than 1% of trips by bicycle.[1] While this may reflect in part variables in overall density in urban areas, it nevertheless raises the question as to why the US has such a low participation. And how can we boost ridership?

1 Pucher, John and Buehler, Ralph (2008) 'Making Cycling Irresistible: Lessons from The Netherlands, Denmark and Germany', Transport Reviews, 28:4, Page 505.

Copenhagen

Amsterdam

Shanghai

Figure 03
Cycling's international popularity

Auto Dependency_

Those who cycle know the bicycle is a viable mode of transportation, but the notion is not self-evident. Many are unaware of the bicycle as a utilitarian and cultural object. Cycle-graphic Landscapes addresses this problem within Honolulu, Hawaii. The city of Honolulu is improving the capacity of its current cycling infrastructure, but has had difficulty generating higher participation rates. The encouragement of bicycle use in Honolulu needs to be made accessible physically and visually to the general public, which requires reinforcement by spatial means. This thesis shows how an architectural intervention can create an identity for the emerging Honolulu cycling system as a catalyst to generate visible bicycle culture.

The case of the low cycling participation in dense US cities may lie in the high dependence on car ownership, which has marginalized public infrastructure in favor of private modes. Cultural historians have written about the imposition that the automobile has placed on western urbanized society. *In Everyday Life in the Modern World*, the French social critic, Henri Lefebvre, refers to the automobile as "the epitome of objects," due to the fact that its existence has directed "behavior in various spheres from economics to speech," centering traffic circulation as "one of the main functions of society" and prioritizing parking, streets, and highways over pedestrian infrastructure).[2]

2 Lefebvre, Henri. 1984. Everyday life in the modern world. New Brunswick, N.J., U.S.A.: Transaction Books. Page 100.

Figure 04
Impact of American car culture

Auto Infrastructure_

Honolulu, Oahu provides an example. As the most populous city in Hawaii, it suffers from the worst traffic in the United States; with Los Angeles, CA following closely behind. INRIX, a global traffic data collector and service group, reported in 2013 that drivers in Oahu spent in excess of 60 hours in congested traffic.[3] This statistic is astounding for a city with a metropolitan land area of approximately 60 square miles. The excess of single occupancy vehicles on Honolulu's roads are demanding of urban infrastructure; a condition which is only exacerbated by a high population density, and the lack of transit options.

Interstate H-1 is the only highway that serves the Honolulu metropolitan area, which limits access routes for commuters into the region. According to the 2012 US Census, 80% of Oahu residents drive to work. This is very challenging for an infrastructural system that supports a population density of 5,574 people per square mile, which is 17th in the nation; rivaling Seattle, Washington and Sacramento, California.[4] However, in 2011, the Honolulu Authority for Rapid Transportation (HART) began construction of a new light-rail system that, when complete, will service 23 miles of coastline on southern Oahu; between Kapolei at the west, and Honolulu towards the southeast. The $5.2 billion project is projected to serve the western 10 mile stretch of the planned service route by 2017, and to be fully operational by 30 March 2019. HART has projected daily user rates to exceed 95,000 commuters for the year 2030.[5]

Until the Oahu light-rail system is operational, Honolulu will continue to have few appropriate alternatives to automobile commuting. Trailing far behind automobile commuting, in terms of users, and visibility, is the bus system named "TheBus". Only five "park & ride" facilities that have a total of 529 parking stalls service the island of Oahu. Deficiencies in the lack of routes, Park & Ride locations, and long commute time, makes Honolulu commuters apprehensive towards the notion of commuting via TheBus.

The shortcomings of these alternate modes of travel continue to exacerbate the transportation problems in Honolulu.

3 INRIX Traffic Scorecard. http://scorecard.inrix.com/scorecard/. Accessed 27 April 2014.

4 Census 2000 PHC-T-3. Population Ranking Table for the 60 largest Metropolitan Areas. http://www.honolulutraffic.com/density60.pdf. Accessed 28 April 2014.

5 Honolulu Authority for Rapid Transportation: March 2014 Quarterly Report. http://www.honolulutransit.org/media/245810/201403-quarterly-progress-report.pdf. Pg 8. Accessed 28 April 2014.

Figure 05
HART light-rail route. (2017)

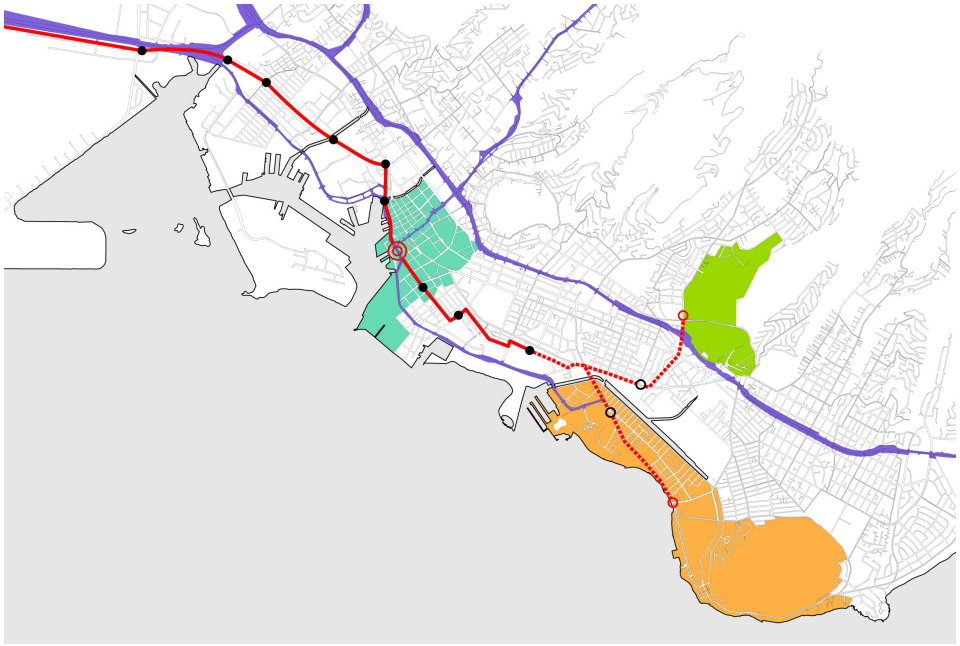


Figure 06
Neighborhoods + existing
trasportation infrastructure

Current State of Cycling_

Cycling offers a solution to these pressing urban issues. The island of Oahu has many favorable conditions for bicycle commuting. For example, Honolulu has relatively flat topography, predictably warm climate, and a high population density, that produces the type of short travel distances (less than 6 miles) that can foster a strong cycling community. The region has a large recreational cycling population that numbered approximately 406,000 registered bicycles in 2012. In recent years, the cycling population has displayed accelerated growth from 1.2% in 1990 to 2.3% in 2012. According to the League of American Bicyclists, this constitutes nearly 82% growth over the past 12 years, elevating bicycle commuter percentages in Honolulu to twelfth in the nation.[6] But this rise has resulted in little response from the city of Honolulu. The community is showing growth, but the potential of a thriving cycling culture is not yet in sight. Despite their increased numbers, the cycling community has not received improvements in bicycling specific facilities to serve their needs.

Hawaii residents who cycle continue to have to conform to an auto-centric environment since there is little bike specific infrastructure to make cycling viable and safe. Safety becomes a pressing concern since bikes often share lanes with automobiles whose operating speed may be in excess of 40 mph. The Hawaii Department of Health conducted a study on traffic-related pedestrian and bicyclist injuries with data covering the period from 2000 to 2006. Their analysis found that cyclists in Hawaii has the second highest fatality rate in the nation: averaging 23.5 deaths per million residents, compared to a national average of 12.2 per million residents.[7]

The Injury Prevention and Control Program in 2006 found that the urban context had the greatest influence on bicycle injuries. 90% of all bicycle related injuries took place on urban roads, and 65% of the fatalities occurred in speed zones below 40 mph. Clearly, the inability to safely commute by bicycle dissuades the general public, especially the novice cycler to begin to consider the bicycle as a possible mode of daily transportation.

Currently, Honolulu's bicycle system is limited in comparison

6 League of American Bicyclists. 2012. 70 Largest Cities for Bicycle Commuting. http://bikeleague.org/content/bicycle-commuting-data. Accessed 15 Sept 2014.

7 Galanis, Dan. Overview of Traffic-related Pedestrian and Bicyclist Injuries in Hawaii. Hawaii Department of Health: Injury Prevention and Control Program. hltap.eng.hawaii.edu/shsp/4_pedestrian%20_&_bike.ppt.

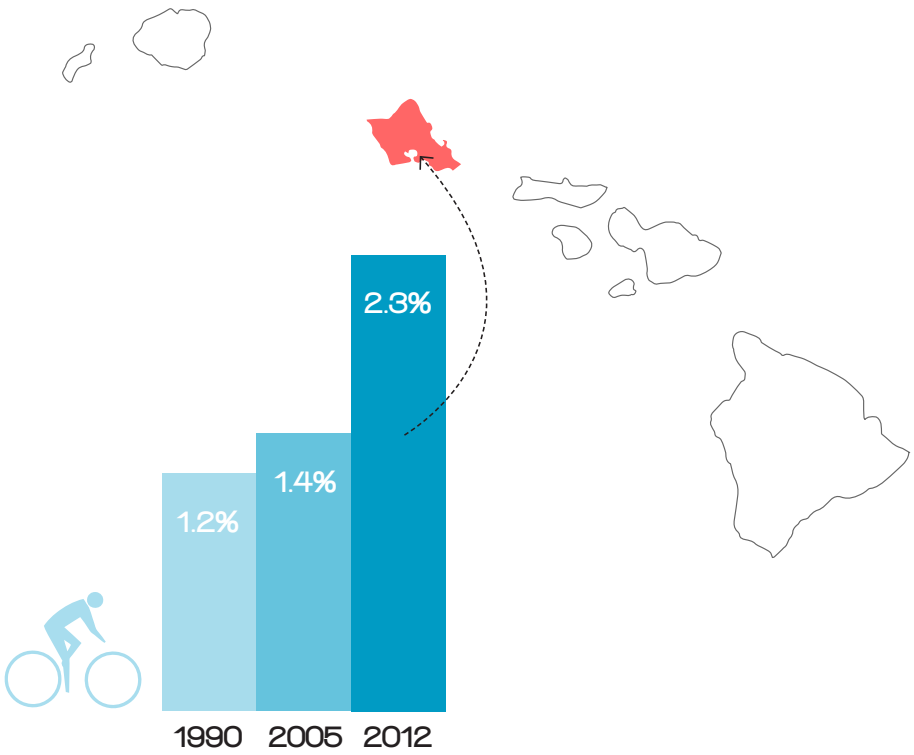


Figure 07
Growth in cycling population

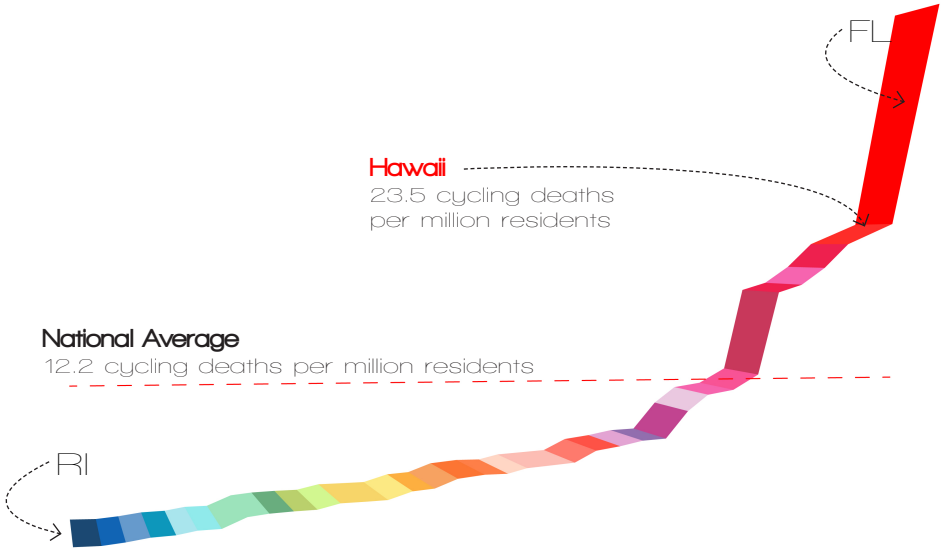


Figure 08
National cycling deaths

Figure 09
Perceptions of cycling

to other urban American cities of similar size and density. But in 2013 the city proposed its most recent bicycle master plan for Oahu that is integrated with rail transit. The vision of the plan is to make bicycling safe, viable and popular. A more comprehensive network of cycling infrastructure has the potential to activate alternative transportation modes, reduce traffic and reinforce healthy lifestyles, but also to facilitate intimate human connections with the environment. But the construction of physical infrastructure alone, bike paths, routes and lanes, cannot change the current negative impression. Cycling cannot be reserved for a select few: the professional racer, die-hard environmentalist, or risk-takers. Rather, the image of cycling needs to be changed, a challenge that must be addressed by architecture, in order to create an environment that supports, encourages, and engages all of Honolulu's residents.

Cycling in Honolulu_

This thesis investigates the architectural possibilities of bicycle commuting in Honolulu. City planners and developers have clearly responded to Honolulu's automobile dependency with structures devoted specifically for urban car ownership and operation, yet, the growing cycling population has not gained the prestige to receive a similar response. The challenge remains as to how to reverse negative perceptions of cycling by creating a spatial identity for Honolulu's cycling system. The architecture of bicycling may begin to build identity for this community.

The overall issues regarding safety and the limited visibility of the cycle system has generated negative perspectives regarding Honolulu cycling. Looking back through

Figure 10
Early 'image' of Honolulu cycling

history, the bicycle was the chosen mode of transportation for many international urban metropolises. In the American context, the advent of other alternative forms of transportation has driven cycling to be seen in a different light. Honolulu cycling culture was brought to the islands by way of sporting/competition during the mid-twentieth century. Until the first Hawaii Bike Plan in March 1977, bicycles were on the island, but there was little to no intent to integrate them into public transportation infrastructure. Given the young age of Honolulu's bicycle culture, residents have not seen the first-hand benefits of cycling. Misinformed or negative perceptions of inefficiencies, bicycle rights, and safety have hindered the growing potential of cycling culture. The image of cycling needs to be modified to influence perceptions of safety, display its many transportation benefits, and most importantly convince others it is fun to ride.

If the bicycle is used as a purely utilitarian tool, traffic mitigation is attainable, but if we use the bicycle as an instrument of experience, are we able to affect how users perceive the system? For example, how does the experience of environment and landscape influence spatial or contextual cognition? A cycle-graphic landscape for Honolulu will both clearly identify the routes and territories for bicycle users, but at the same time facilitate their experience of the landscape/surroundings.

Hawaii's transportation issues need to be addressed with an open mind; thus implementing a cycling system that not only provides the practical needs of users , but also becomes the generator of powerful cultural image for the cycling community. Integration of cycling on an urban scale, architectural, and socio-cultural scale has the potential utilize the bicycle as an instrument of experience to promote cycling culture and influence perspectives of non-cyclists.

A Cycling Station For Honolulu_

This thesis will build off of the larger network of bicycle infrastructure, put in place by the 2013 Honolulu Department of Transportation (HDOT) bicycle master plan, of currently existing and proposed cycling transportation routes. It proposes a connected network of paths that go beyond providing safe commuting routes, but also creates passages to influence perception and shape the users understanding of the landscape. This network needs an architectural response to provide for the needs of the cycling community and public. This will include a hub or station that provides specific program for cyclists that also initiates the branding of cycle-graphic landscape. The built intervention will create visibility of the Honolulu cycling system by physically engaging people with bicycles as well as the cycling system. The area of focus will be the downtown neighborhood and the bike station will promote cycling as an integral part of urban life.

2.0_Literature Review "Sub-systems" of Modern Lifestyle

In order to better influence bicycling culture in the US, the spatial impact of automobile dependency must be first understood. Henri Lefebvre in *Everyday Life in the Modern World* argues that the automobile has gained such a footing in the modern lifestyle that it has become its own "sub-system" of society; due to its ability to program everyday life.[8] Lefebvre classifies the "motor-car" as "the epitome of objects." The desire or need to incorporate the automobile into all aspects of the modern lifestyle has begun to govern how we interact with our environment. "Space is conceived in terms of motoring needs and traffic problems take precedence over accommodation in self-termed technical rationality; it is a fact that for many people the car is perhaps the most substantial part of their 'living conditions'." The automobile's dominance of modern living is clearly visible in the impact on the urban fabric of Honolulu. Car traffic dominates the Honolulu landscape.

Cycling needs to take the spotlight by rebranding itself similarly to how the car gained popularity. In *Cycle Space: Architecture & Urban Design in the Age of the Bicycle*, author Steven Fleming states that American consumerism has given the car a "status," elevating the object beyond its use as transportation. Fleming refers to the social issues attached to American consumerism. The consumer believes they are "buying more than an iPhone and MacBook the sense that they belong to something much bigger," as in a technological subculture that has generated enough momentum to affect the greater majority. Fleming characterizes this as the transformation from the car as a commodity/consumer product to an object of cultural influence. He relates this to the idea that architecture has the potential to promote more positive images of cycling; "spreading the message that cycling has status."[9]

8 Lefebvre, Henri. 1984. Everyday life in the modern world. New Brunswick, N.J., U.S.A.: Transaction Books. Page 100.

9 Fleming, Steven. 2012. Cycle Space: Architecture & Urban Design in the Age of the Bicycle. Rotterdam: nai010 publishers. Page 87,89.

Figure 11
The automobile as the ‘epitome of objects’

Figure 12
Culture of consumerism

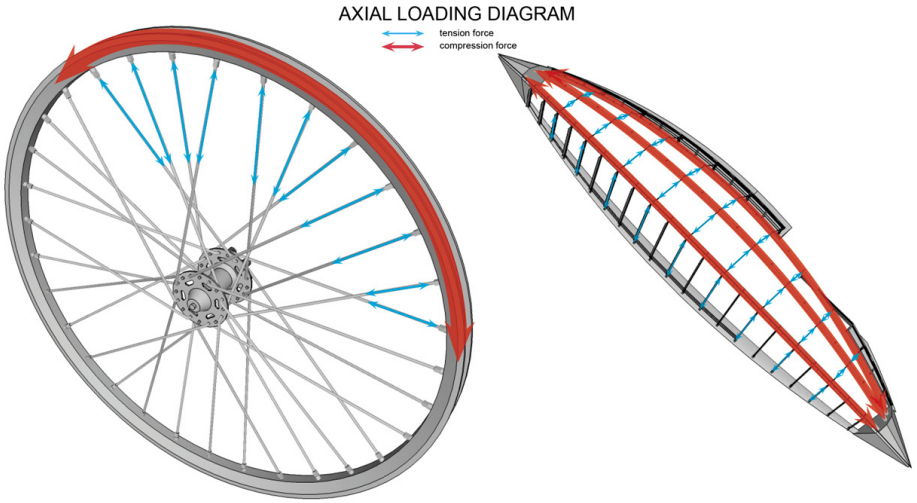
Case Study 01_Union Bikestation_Washington D.C. Bikestation

The conveyance of a positive image of cycling using architecture has been demonstrated in US cities and beyond. Fleming gives the example of the KGP Design Studio's Bikestation in Washington D.C. The project was funded completely by the District of Columbia Department of Transportation (DDOT) and carried a $3M price tag. This elaborate glass and steel structure, located adjacent to the D.C. Union Train Station, supplies 100 storage spaces for local cyclists. Although costs were high in constructing the D.C. Bikestation, the DDOT speculates that the structure will convert more than 100 D.C. drivers into cyclists. Fleming states that "expanding the empire of cycling in the USA requires more than simply an expansion of bicycle paths and the raising of public awareness."[10] In contrast, Fleming adds, "Rome had to replicate its principal buildings throughout the occupied colonies before Rome's subjects believed it was in charge."[11] The use of architecture to structure a particular change in thinking is far from new. The D.C. Bikestation has a much greater mental and social impact on its surroundings which become much more powerful than its bicycle storage capacity. Its distinguishable form is easily recognized and it is physically transparent, capitalizing on its ability to showcase itself and the trendy activity within. Therefore, the approach to cycling responsive architecture should reach out beyond cyclists to become part of popular culture and to incorporate architecture/design as a symbol of cycling sophistication. By designing architectural symbols to not only serve, but to create demand, Fleming argues that these interventions will positively influence how people respond to an emerging cycling system.

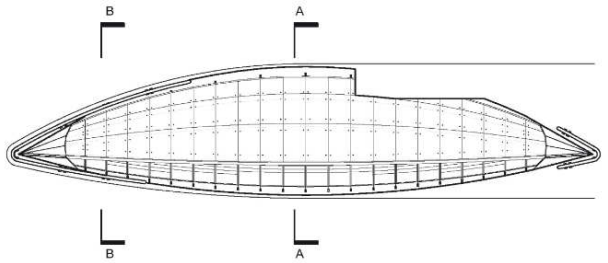
10 Fleming, Steven. 2012. Cycle Space: Architecture & Urban Design in the Age of the Bicycle. Rotterdam: nai010 publishers. Page 89.

11 Fleming, Steven. 2012. Cycle Space: Architecture & Urban Design in the Age of the Bicycle. Rotterdam: nai010 publishers. Page 89.

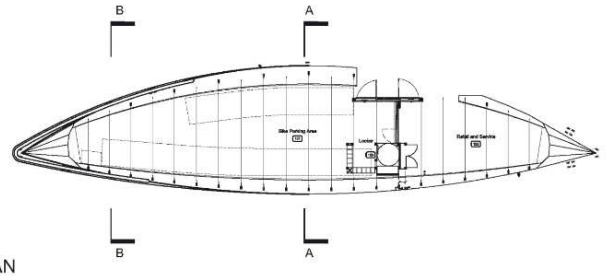
Figure 13
Union Bikestaion Washington D.C.



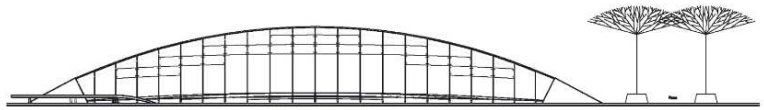
The partnership of bicycle and architecture can influence the modern lifestyle. Together they will leverage the experiential qualities of the bicycle to promote cycling. Pairing of the bicycle with experience may also be a platform to explore the many unique landscapes of Honolulu. HDOT has updated the Oahu bike plan to introduce more ground based bicycle infrastructure. The revision of the bike plan is a movement in the positive direction for the Honolulu cycling community, but HDOT is not capitalizing on the outreach potential of experience, demonstrated by the D.C. Bikestation. If we incorporate and overlay the experience of environment and landscape over a practical cycling system, the entire domain of cycling can begin to influence perception, connectivity, and image.



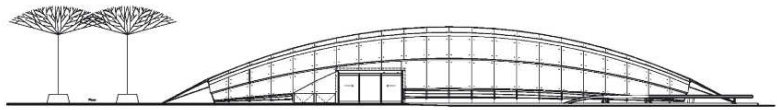
ROOF PLAN



GROUND FLOOR PLAN



WEST ELEVATION



EAST ELEVATION

Figure 14
Union Bikestation at night

Figure 15
Union Bikestation bike storage

Case Study 02_Nescio Bridge_Amsterdam,NL

The Nescio Bridge is a large elevated pathway exclusively for bicycles and pedestrians. Designed by WilkinsonEyer Architects and ARUP in 2005, the bridge stretches 720 feet in total length, with 550 feet spanning the Rijn Canal. It is the longest cycling bridge in the Netherlands. The gentle curves and incline of the structure seem to accent the fluid movement of cycling while responding to the capabilities of the cyclist. The bridge provides critical access for residents of the Ijburg neighborhood with the 'mainland' of the city while also providing public access to the green spaces of the Diemerpark.[12] The bridge is sited within close proximity of an auto bridge. It is evident that the design is clearly in favor of creating safer, more exciting cycling paths, in addition to strengthening the image of cycling.

Figure 16
Nescio Bridge at night

12 WilkinsonEyre Architects. 2005. Nescio Brug. http://www.wilkinsoneyre.com/projects/nescio-brug.aspx?category=bridges. Accessed 09 December 2014.

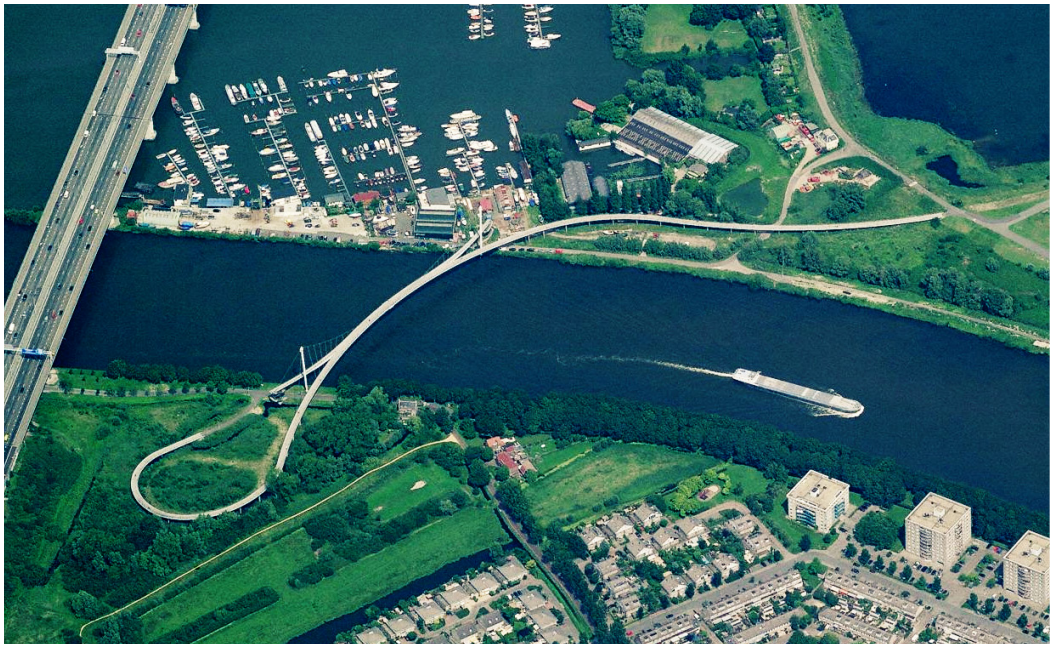


Figure 17
Connecting the Ijburg neighborhood with
'mainland' Amsterdam

Figure 18
View under bridge

Case Study 03_Cykelslangen_Copenhagen,DK

The Cykelslangen or “Cycle Snake” by Dissing+Weitling Architects was completed in 2014. This elevated pathway conveys cyclists from Kalvebod Brygge over to Island Brygge. This popular connection creates a safe, fun, and exciting pass through for cyclists. The Fisketorvet shopping center and public bath area had conflicts between pedestrians and cyclists. The city solved this logistical problem by elevating cyclists and allowing them to pass over the heads of pedestrians below.[13] Elevating the cycling path not only resolves the cycling/pedestrian congestion, but focuses viewers on the activity of cycling, displaying the fun inherent in the activity. The steel bridge’s 190 meter length is very thin in profile, creating a quality of lightness to complement the playfulness of the serpent like path.

Figure 19
Cykelslangen crossing pedestrian zone

13 Dissing+Weitling Architecture. Cykelslangen. http://dw.dk/cykelslangen. Accessed 09 December 2014.

Figure 20
Cykelslangen from above

Figure 21
Cykelslangen path at night

Case Study 04_Shanghai Expo 2010 Danish Pavilion_Shanghai,PRC

The Danish Pavilion at the 2010 Shanghai Expo, designed by BIG, integrated the bicycle and the experience of cycling into their structure. The Danish pavilion celebrates transportation and marries the associated experience with architecture. The structure uses a series of spiraling ramps to circulate visitors about a pool at its center. The pavilion offered 1500 bicycles and encouraged visitors to ride through the structure to convey the Danish cycling experience. [14]

The pavilion expresses the horizontal movement of cycling in a vertical form, creating spiraling bicycle paths that orbit pedestrian circulation at the center. Depending if the user is walking or cycling, circulation paths differ from ascension to descent. Walking was centralized in the pavilion for vertical movement. For cyclists, the ascent climbed slowly with a gradual incline. The descent was a higher paced ride along merging lanes, which twisted within the pavilion until it met the ground floor. Circulation paths are the generator of form for the pavilion, rather than site response. The paths articulate the expression of interaction and form, while the structure seems secondary. This is a product born of pure experience.

In addition to the cycling component, other programming includes visual learning stations, where visitors can read/watch large graphic displays of videos portraying Danish lifestyle. The pavilion communicates ideas through visual and physical interaction with the structure, an experience that conveys the notion that the bike is a symbol of “modern lifestyle and sustainable urban development.”[15] The learning stations are interspersed along the circulation paths: pockets of program like eddys spiraling off from the coiling bicycle paths.

14 Bjarke Ingels Group. 2010. XPO: Expo 2010 Danish Pavilion. http://www.big.dk/#projects-xpo. Accessed 14 September 2014.

15 Bjarke Ingels Group. 2010. XPO: Expo 2010 Danish Pavilion. http://www.big.dk/#projects-xpo. Accessed 14 September 2014.

Figure 22
Danish Pavilion at the 2010 Shanghai Expo

Figure 23
Ramps at pavilion interior

3.0_Methods

Figure 24
Honolulu neighborhoods + light-rail in context

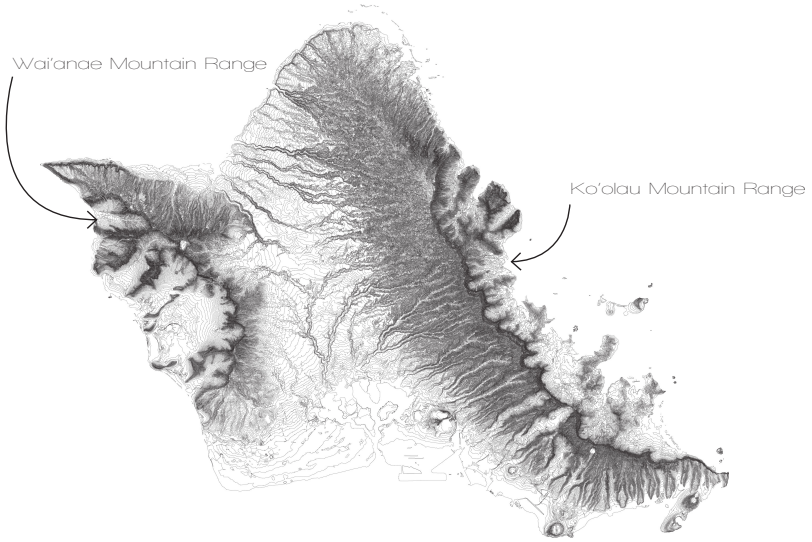
Cycle-graphic Landscapes proposes a hub for urban cycling to foster a strong bicycling community, and to create identity for this population. The Cycle-graphic station engages the surrounding downtown Honolulu population with the waterfront and engaging them with the new center for Hawaiian cycling. This facility is meant to be a model and catalyst for future bicycle facilities within Honolulu.

Honolulu needs to confront the issues of visibility, safety, and accessibility that plague the current cycling infrastructure, in order to realize bicycle commuting to its fullest potential. The proposed cycling system will leverage the developing light-rail system to bring mixed-mode commuters into the site, and bridge fractured connections of the downtown neighborhood with the nearby, neglected waterfront. The bike station will integrate "end of trip" facilities for bicycle commuting, educational and advocacy components, flexible community space, and offices. The Cycle-graphic station will create image for Honolulu cycling culture, through display of activity and integration of cyclists with non-cyclists through diverse program types.

Figure 25
Nimitz highway under the H-1 freeway

Figure 26
Confused cyclists riding on Nimitz highway

Oahu, Hawaii_21.3000° N X 157.8167° W



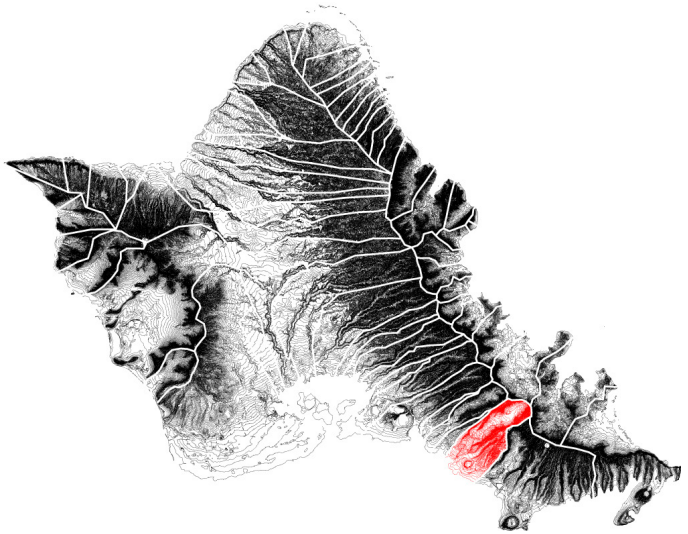


Figure 27 (left)
Oahu topography

Figure 28 (right)
Ahupua'a land division

Oahu Context_

Honolulu is located on the island of O'ahu, HI and it is the large pocket of density on the south shore. Topographically, the island is dominated by two mountain ranges: the Wai'anae Mountains at the west and Ko'olau Range to the east. Historically, the Hawaiians partnered their strong connection to the water with the mountains. This formed the basic form of land division for the native Hawaiians. Named the Ahupua'a, these long and slender parcels of land, stretch from the mountains (mauka) to the sea (makai). In more recent years, large harbors and developments have formed over traditional settlements, bringing shipping, farming, commerce and industry to the lowlands, driving high population densities along the coast and within the foothill-valleys.

Oahu has the highest population of all of the Hawaiian Islands and the city of Honolulu, which borders the south shore of the island, is a very dense urban capitol city. Oahu's mountains don't allow for urban sprawl outside of the lowlands. Thus, the city of Honolulu,

at a mere 68 square miles has peaks of population density at 50,896 inhabitants per square mile. In comparison to other metropolitan cities, Honolulu's average population density is on par with these dense urban centers. These averages are often skewed in terms of population-weighted densities, meaning that Honolulu is actually denser at its urban core than many medium sized US cities including Seattle, WA and Portland, OR.

In the face of rising urban density, Honolulu City planners and developers have solely addressed increases in density with auto-based, ground transport. Honolulu is fairly young in terms of its modern urban infrastructure and the city has removed nearly all of its urban railroad lines, thus off road or alternative transportation methods are currently non-existent.

The increase of ground-based transport has created massive highways within the city that has negatively impacted cycling integration by creating a discontinuous and disorienting experience for cyclists and pedestrians in general. The staccato nature of the existing bicycle infrastructure, not only degrades the experience of cycling, but also presents safety issues that need to be addressed by city planners.

Figure 29
Population density by Census tract (2012)

Figure 30
Honolulu traffic on Puchbowl Street

Climate

There are many climactic and geographic advantages of a tropical cycling system. Honolulu receives very little annual rainfall since it is rain shadowed by the Ko'olau mountain range. The total sum of annual rainfall is less than 20". Rainy seasons occur in the winter months, making the summer months fairly dry. Honolulu's annual temperature fluctuations are very low. This keeps the average temperature around 78°F. Solar access for the region is very high as well, totaling over 3000 hours of sunshine per year. Given the low latitude of Honolulu, the city has high solar angles, making shading devices more effective year round.

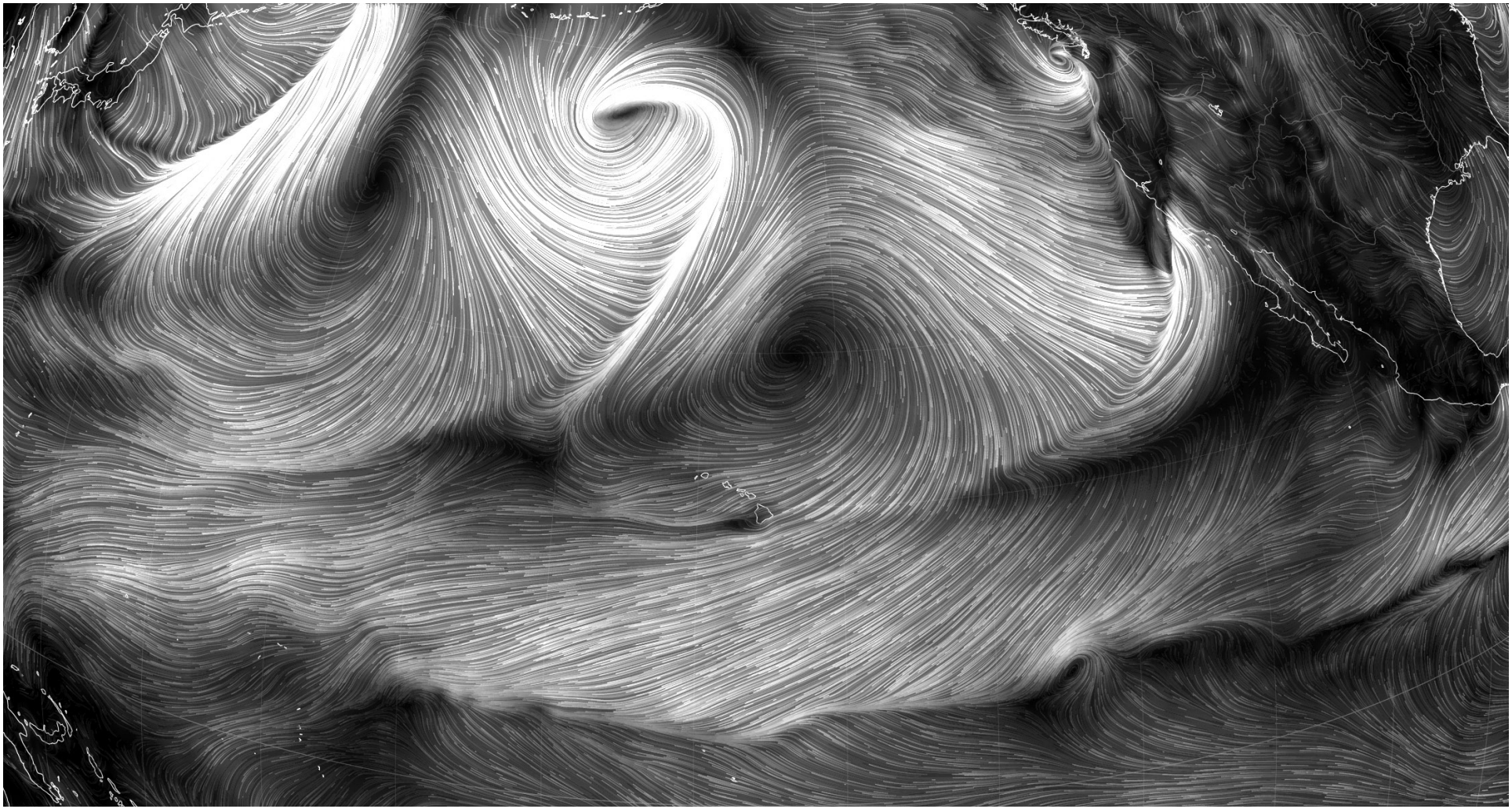


Figure 31
Pacific Ocean wind map

Figure 32
Annual rainfall

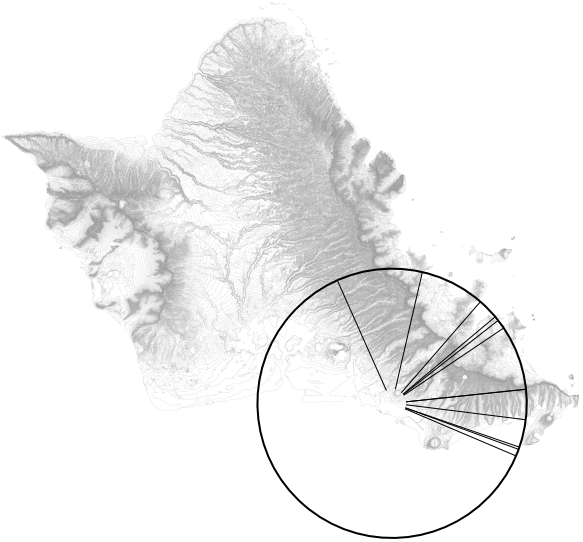


Figure 33
Average wind direction

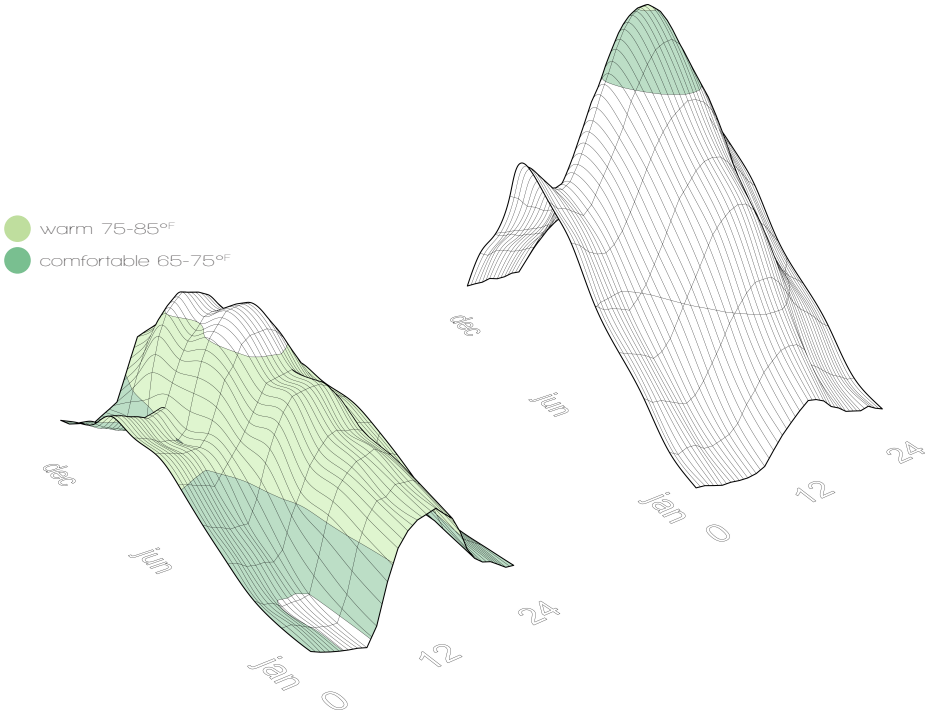


Figure 34
Annual temperature map

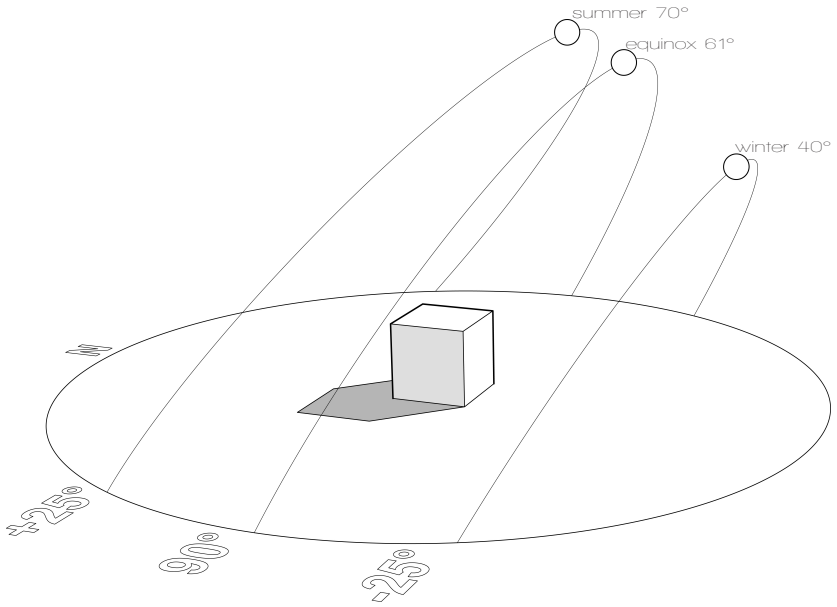


Figure 35
Solar angle

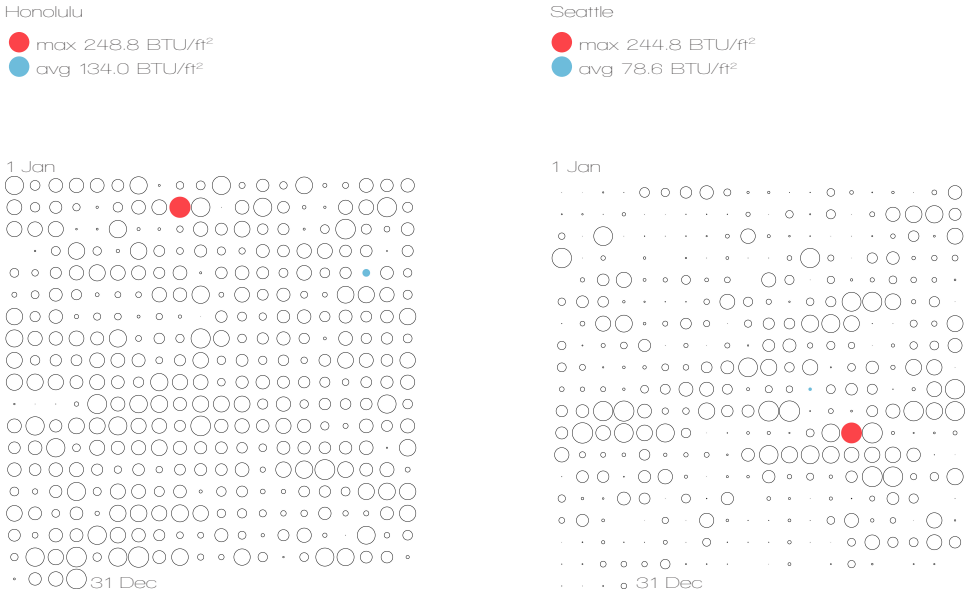


Figure 36
Direct solar radiation (daily)

Figure 37
Existing + planned cycling infrastructure

Existing
Planned

Site Selection

By examining the existing ground transportation networks of Honolulu, as well as the planned light rail development, it is evident that many of these systems converge at urban core of Honolulu. Residents from surrounding suburban developments have three avenues to enter the city. Nimitz Highway and the H-1 freeway follow the south shore coastline, and the Pali Highway is the closest access to downtown from the eastern side of the island. The existing bike network parallels the direction of auto movement, transporting people towards the downtown, Waikiki, and University district. The primary site for this investigation will be the downtown neighborhood.

According to the Hawaii Bicycle League Bike Count 2013, regions downtown have some of the highest bicycle activity in Honolulu.[16] A location close to downtown will take advantage of its close proximity to the central business district (CBD), light-rail transit stations, universities/schools, bike lanes/paths, parks/recreation, as well as tourist attractions.

16 Hawaii Bicycling League Bike Count 2013. http://hbl.org/bikecount-results. Accessed 14 September 2014

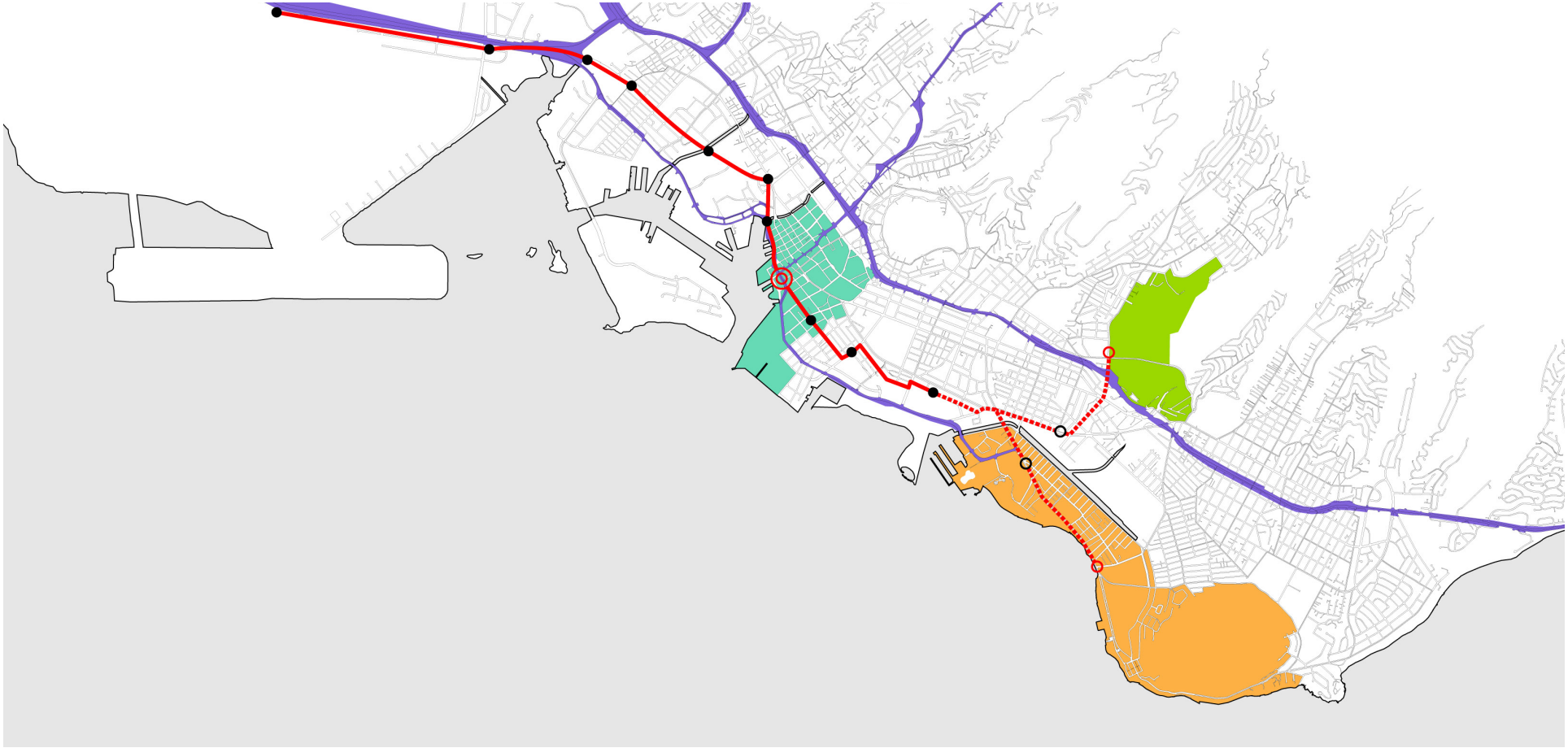


Figure 38
Auto + light-rail infrastrcuture

The station will be located on Ala Moana Boulevard, the continuation of Nimitz Highway, the main “non-freeway” into Honolulu. The site of the station sits near the coast, within a few blocks of the CBD, one block from the proposed downtown light-rail station, within two miles of six high schools, and southeast of the Aloha Tower, a major retail area. Its siting is along the path of travel to-and-from the CBD and the future light-rail will travel overhead. The site is also the terminus of the Pali Highway, which is one of three routes that cross the Ko’olau Mountain Range.

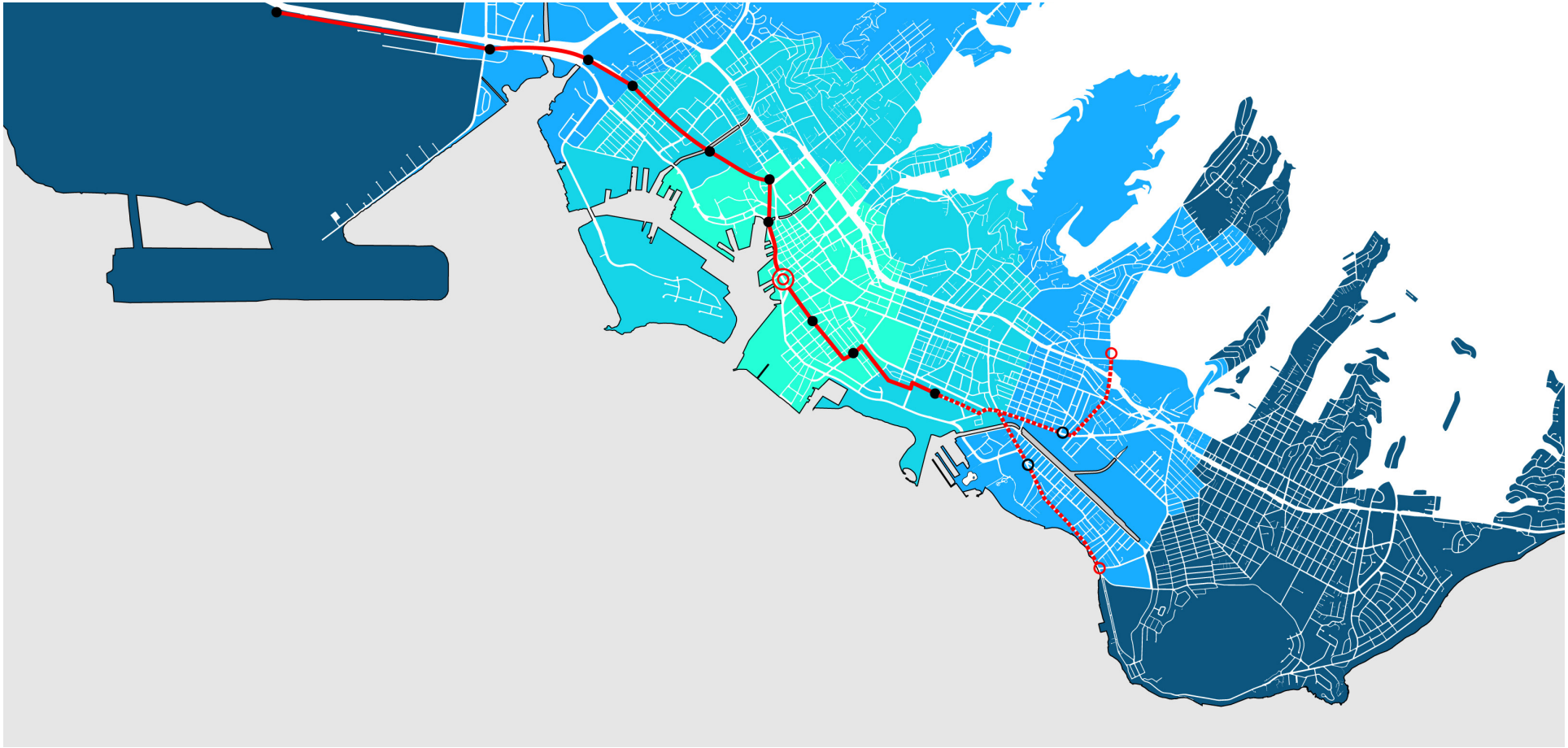


Figure 39
Bikeshed (5 minute intervals from downtown)

Honolulu's topography is primarily flat creating very short travel times across the city from downtown. From the downtown light-rail station a cyclist can traverse the city within 20 minutes. Compared to walking, the pedestrian can only travel ¼ as far in the same 20 minute interval.

Pairing the location of a bicycle hub with other modes of public transport increases accessibility and visibility. The bike station will take advantage of the elevated system to direct cyclists and pedestrians into the site and bridge the broken connections between downtown and the waterfront.

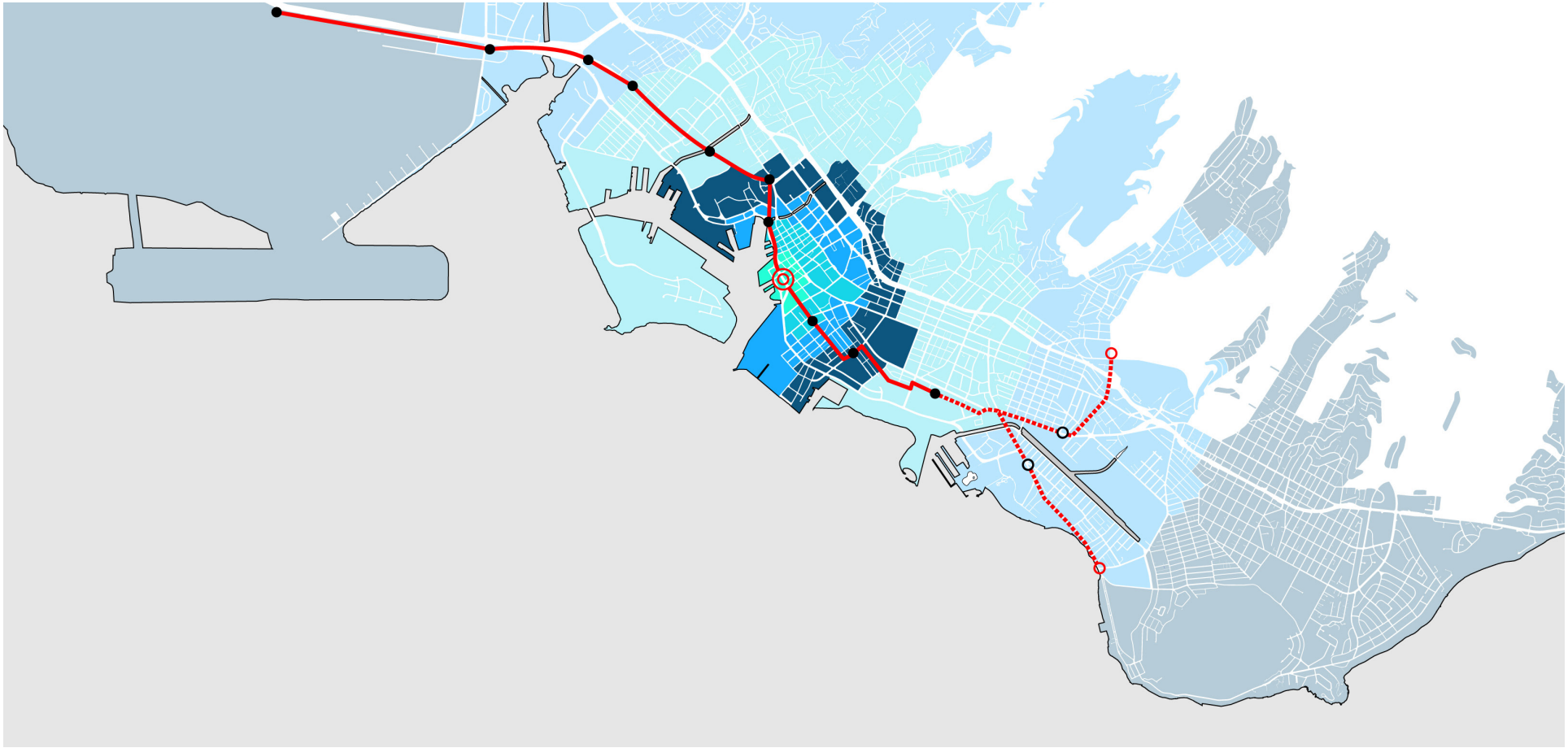


Figure 40
Walkshed (5 minute intervals from downtown)

Extensions of the light-rail system have been proposed with stations in the Waikiki neighborhood, a primary tourist/retail destination, and at the University of Hawaii, Manoa, the state's largest university. The future bike stations can service these proposed neighborhoods and contain "end-of-the-line" facilities for the light-rail.

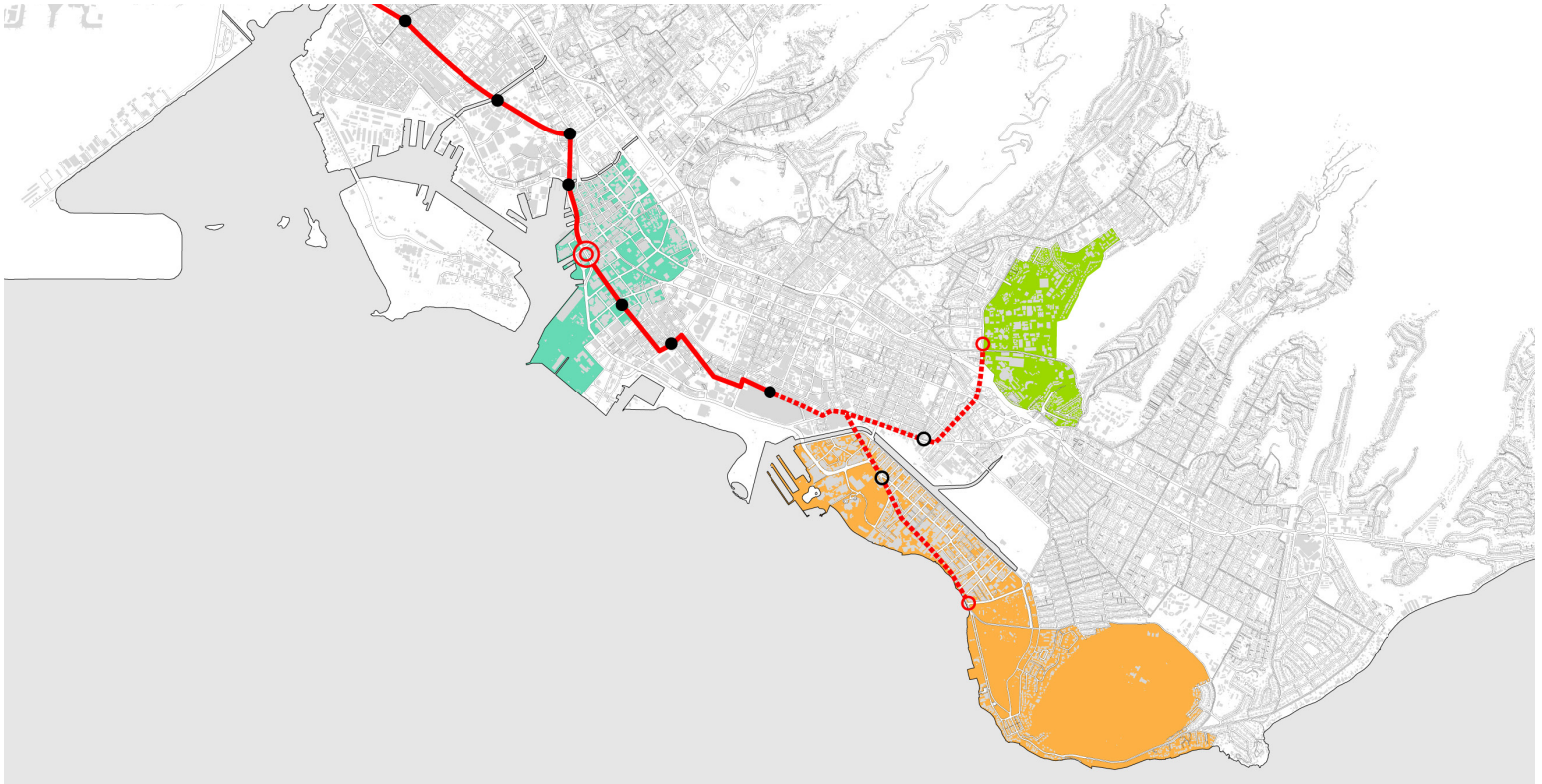
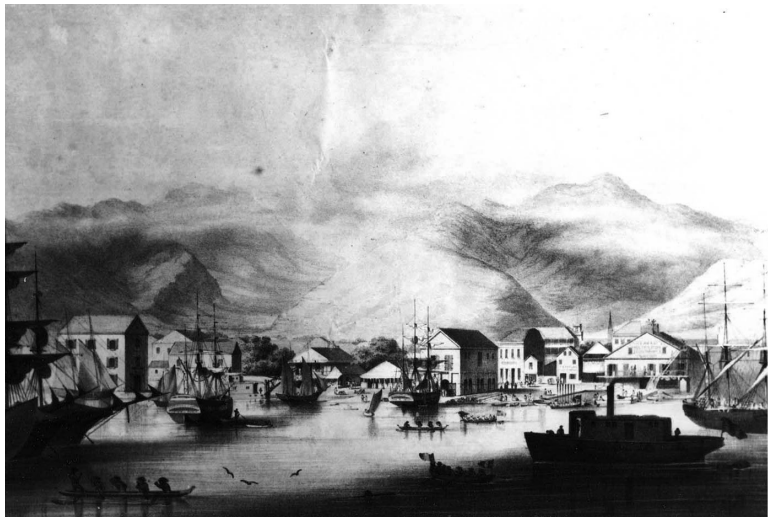
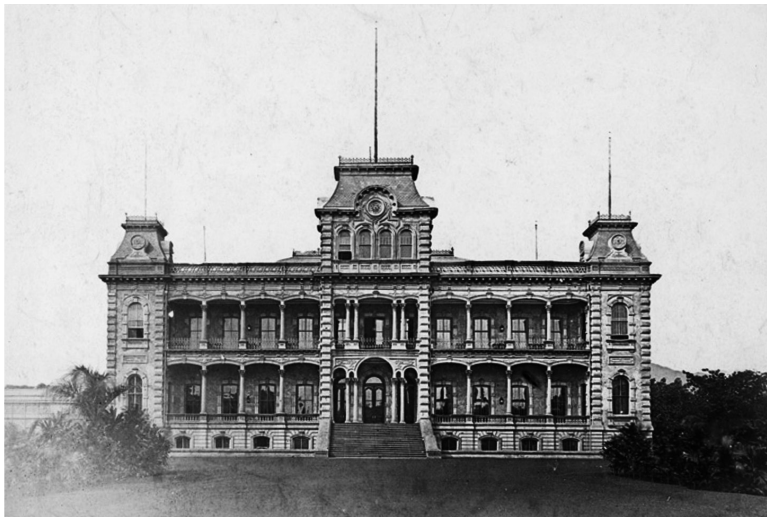


Figure 41 (above)
Potential Cycle-graphic development in context

Figure 42 (below)
HART light-rail proposed extensions





Site History

The Honolulu Bike Station is sited along the coast of the Honolulu harbor, formerly known as Kulolia until the 1800s. The deep harbor was the primary shipping harbor for the Kingdom of Hawaii. It was the primary export location for sandalwood, sugar, pineapples, as well as a supply port for whalers.

East of the project site is the historic Honolulu Capitol District. Many significant buildings are located within this district, dating back to the Hawaiian Monarchical past. Perhaps carrying the most significance is the ‘Iolani Palace, which housed several generations of Hawaiian royalty until their overthrow in 1893. The palace was then utilized as the capitol building until 1969, where a new capitol was constructed on the west side of the property.

The site is located one block south of the Aloha Tower and adjacent marketplace. Aloha Tower has been a functioning control center for Honolulu Harbor since its construction in 1926. For nearly 90 years, the tower has been seen as a beacon for many ocean going vessels, and a destination for the majority of cruise ships that visit Oahu.[17]

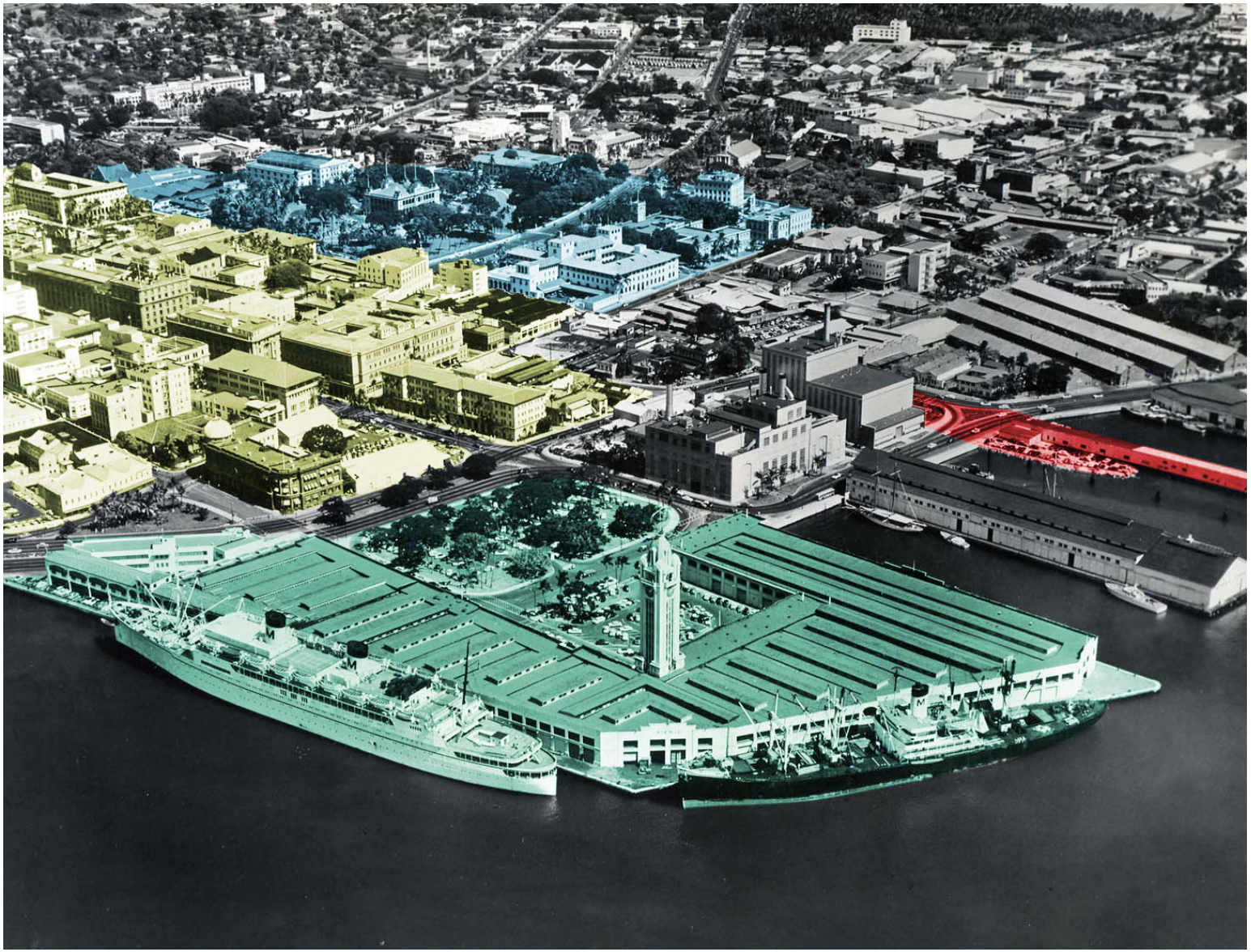
from left to right

Figure 43
Honolulu Harbor (1857)

Figure 44
Iolani Palace (1885)

Figure 45
Downtown Honolulu (c.1950)

17 The History of Aloha Tower. http://www.alohatower.com/marketplace-information/history-of-aloha-tower/. Accessed 26 May 2014.



Aloha Tower
Central Business District
Historic District
Future Site


Cycle graphic Site

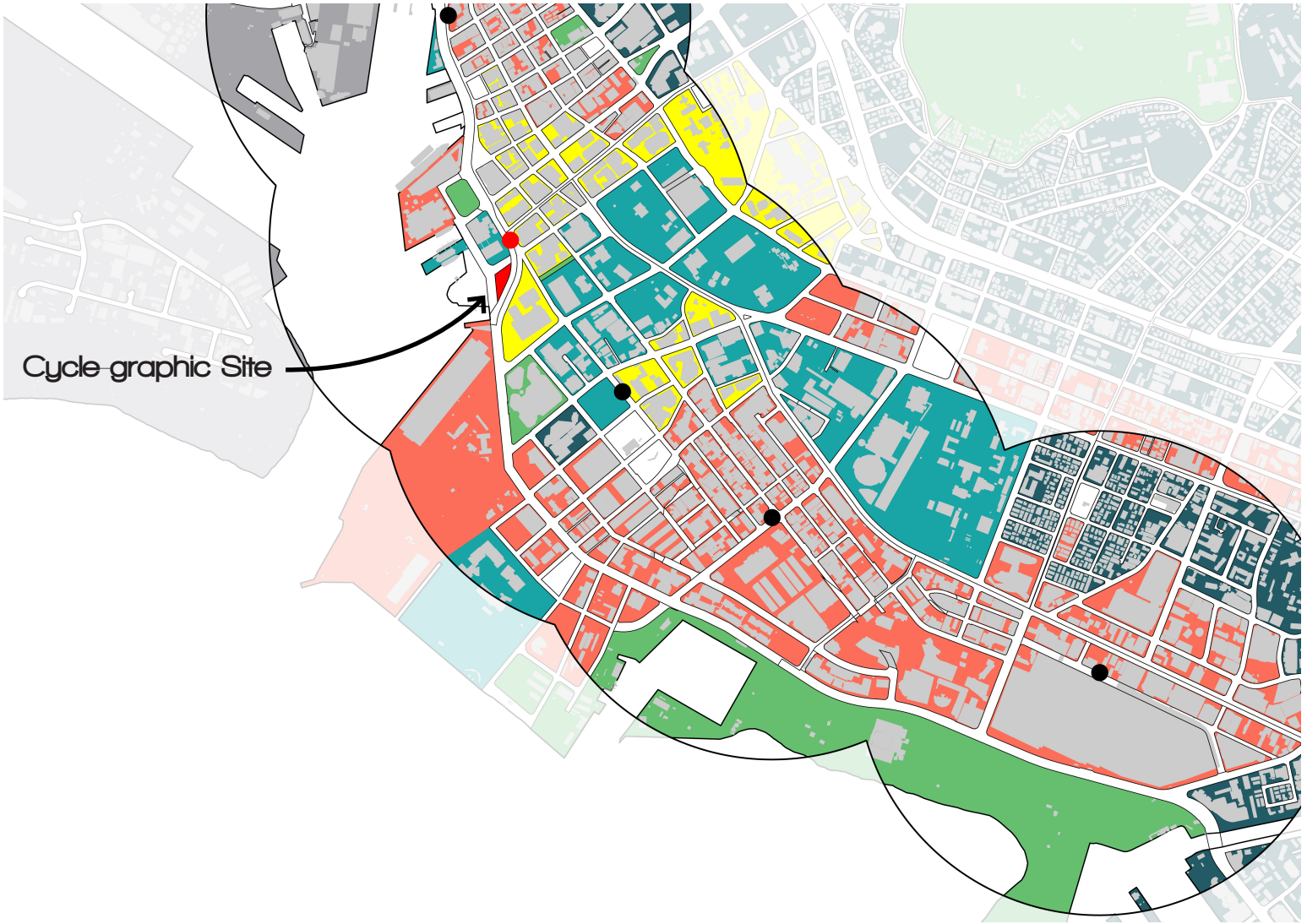


Figure 46 (opposite)
Downtown Honolulu (2014)

Figure 47
Existing downtown land use

Commercial
Semi Public/Public/Institutional
Retail
Green Space
Residential

Site Strategy

The site of the bike station is at the intersection of Ala Moana Boulevard and the proposed light-rail route. Currently bicycles can ride on Ala Moana Boulevard but the Honolulu Department of Transportation (HDOT) maps recommends against this. This part of the highway experiences heavy traffic and there is not clear identification for shared use of the road.[18] This stretch of the road also exists as a break in the continuity of the existing bicycling route that traverses Oahu's south shore.

As earlier mentioned, Honolulu has proposed bicycle infrastructure from the 2013 Honolulu bicycle plan; I am accepting this as the framework of lane and path development for the city. The new connections made within the city will help connect some areas between neighborhoods, but other methods will need to be explored to create interconnections within neighborhoods to foster interrelationships between cyclists and non-cyclists and to showcase bicycle activity.

Connecting the gaps in the existing cycling infrastructure will facilitate a smoother commute for cyclists since current routes are now broken segments of "shared use". The bike station will foster connectivity within its site, and the junction of the different forms of transportation infrastructure creates a more accessible, easily reachable location that also has visual connections, to and from, areas beyond.

Connections within downtown remain cut off from the waterfront and many of the public spaces along its shores by Ala Moana Boulevard, a six-lane highway downtown. The bike station leverages the elevated railway to relink the diverse activities of downtown with the waterfront and future waterfront public district.

Currently the site is a triangle of left-over space from the jog in Ala Moana Boulevard merging with the small street, Aloha Tower Drive. Existing site programming consists only of parking. There is some green space within the triangle, but this is underutilized since the triangular site is difficult to access from the ground.

At the waterfront, the parking lot extends to the shore. The prime location of this peninsula is occupied by parked cars and should be repurposed as a place for the public.

18 Map of Bicycle Routes Around the Island: Bike Oahu. http://hidot.hawaii.gov/highways/bike-map-oahu/. Accessed 26 May 2014.

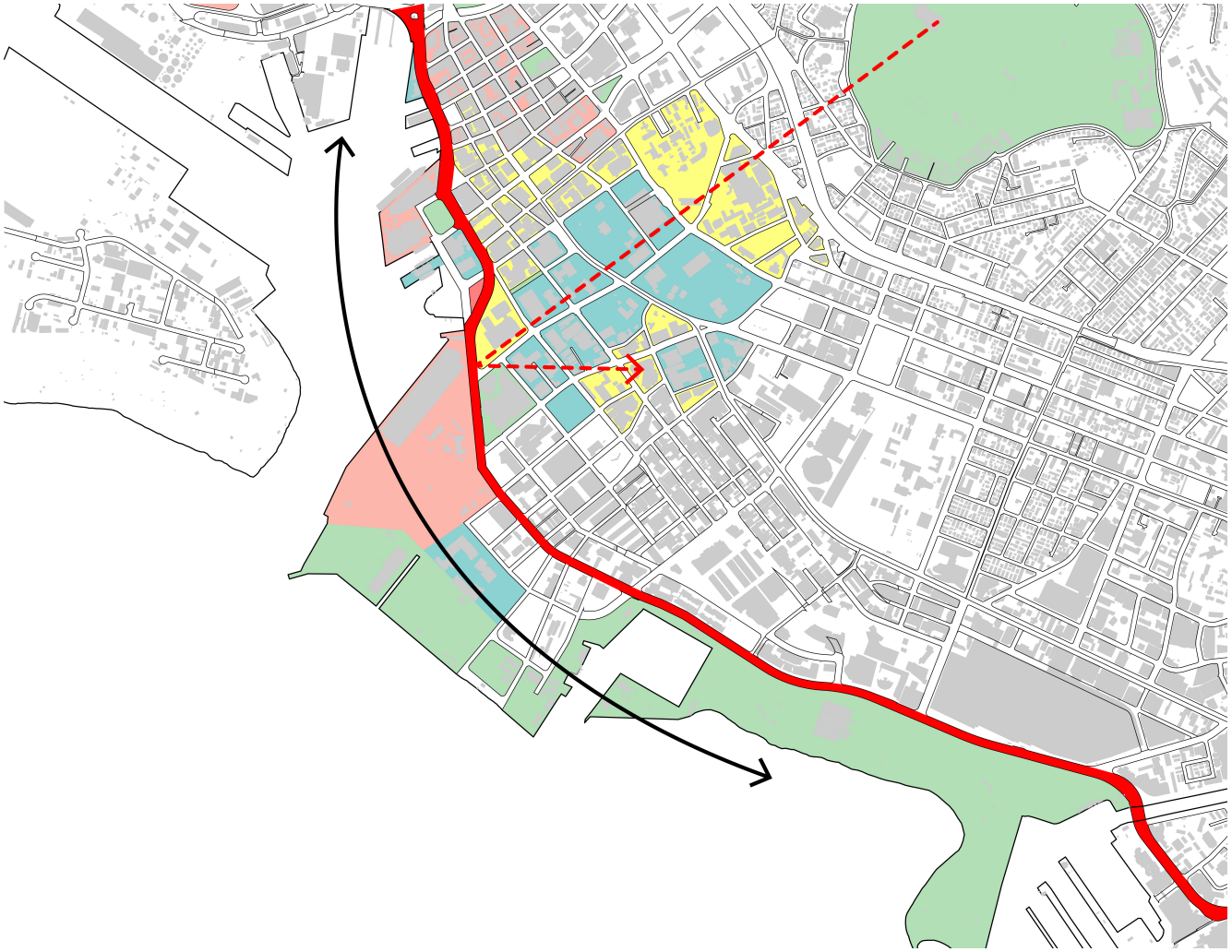


Figure 48
Ala Moana Blvd. barrier between downtown and waterfront

Figure 49 (above)
Site panorama

Figure 50 (below)
Site panorama from Ala Moana Blvd.

Figure 51 (above)
Waterfront parking lot on site

Figure 52 (below)
Waterfront panorama

Cycle-graphic Audience

In 2005, the city of Portland, OR began an ongoing study to quantify the cyclist and non-cyclist populations and categorize them into groups based on their relationship to bicycle infrastructure. The Portland Bureau of Transportation categorized four general groups and their differing needs: “The strong and fearless” (<1% of the total population), “The enthused and the confident” (7%), “The interested but concerned” (60%), and “The no way, no how” (33%). After many surveys and polls, the primary concern for cyclists who did not fall under the “strong and fearless” group, is the fear of being in the road on a bicycle. The “interested but concerned” group represents the majority of Portland’s residents. Unfortunately, Honolulu has not conducted extensive studies related to Portland’s four cyclist groups, but if we generalize these group distributions and apply them to Honolulu, approximately half of the population falls into the “interested but concerned” category. In Honolulu this would consist of about 200,000 residents. This group and existing cyclists are cycle-graphic’s target audience.

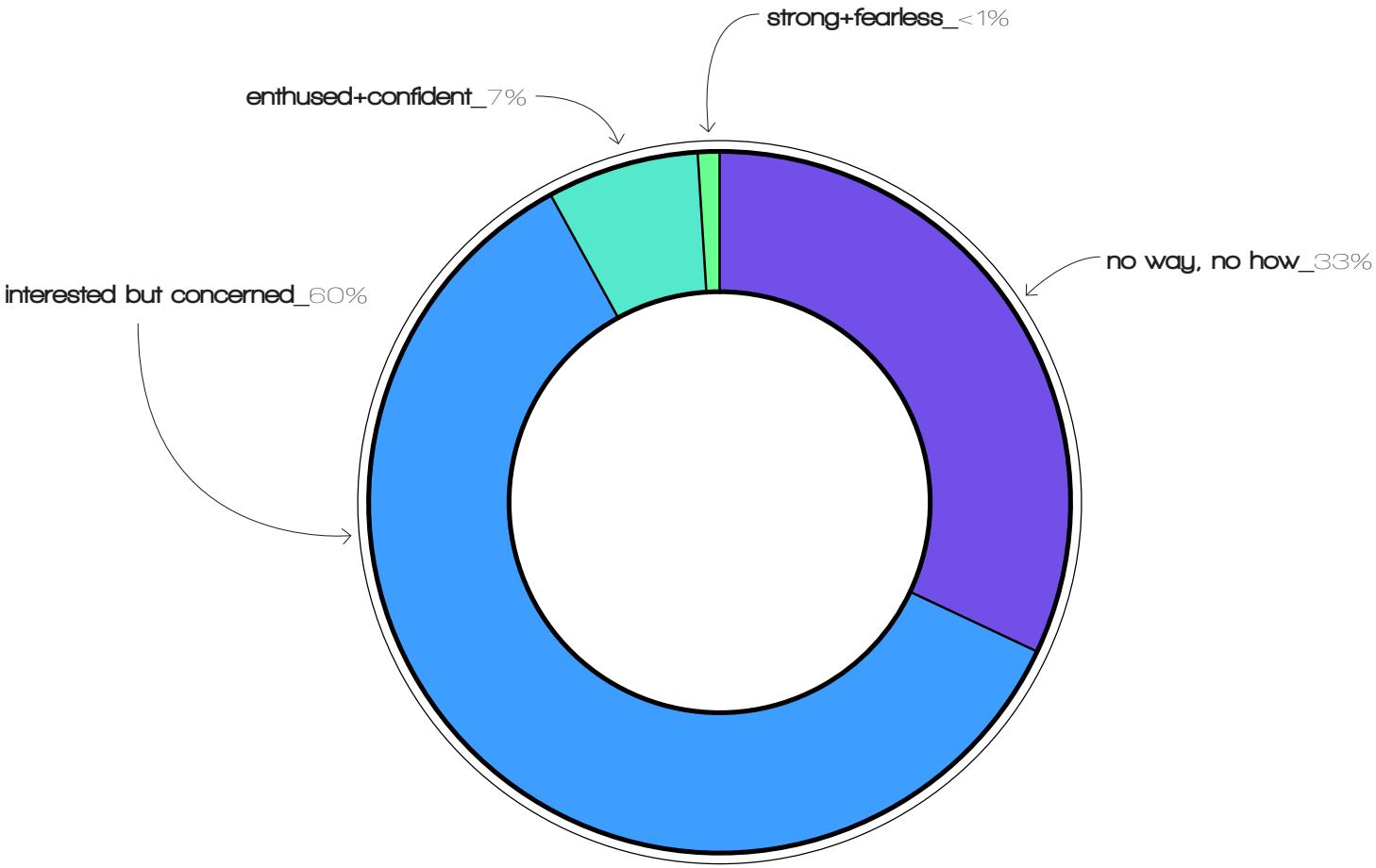


Figure 53
The 4 types of cyclists

4.0_**Design**_The Cycle-graphic Station

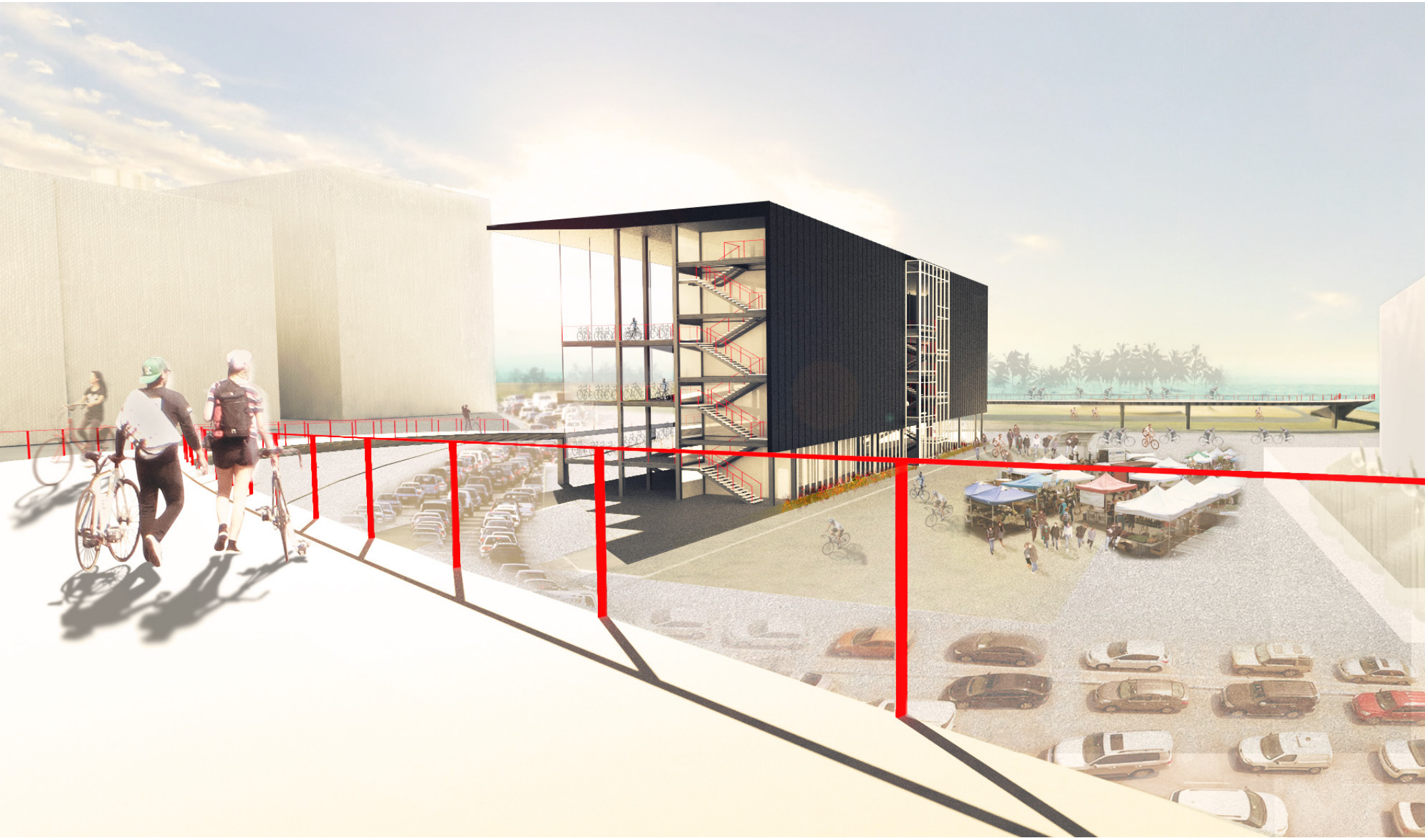


Figure 54
On the approach from the light-rail mezzanine, cyclists and pedestrians move independently of ground traffic, making it possible to bridge the connection with the light-rail to the waterfront.

The proposed connections of the new Honolulu Bike Station will bridge the light-rail with the waterfront, in turn, reconnecting downtown with the south shore. The Bike Station will incorporate program relating to “end of trip” facilities for cyclists; including bicycle repair, storage, lockers, WCs and showers. Education and advocacy will also be a primary task of the Station. Classrooms and an auditorium become places for cyclists and non-cyclists to educate themselves about cycling, commuting, and safety. Office space provided by The Station would be a desirable location for local bicycle advocacy groups to reach out to the public. The Station integrates flexible public space to create a venue for local performance and visual artists in order to develop interrelationships between the cycling community and beyond.

The bridge created by the station will bring cyclists into a park at the reclaimed waterfront. At its center, this park will include tactile learning areas for entry-level cyclists up to experienced cyclists. This will be a space to hold bicycle lessons for cyclists, as well as a platform to display this activity to the public. Aloha Tower Drive will become a pedestrian dominated street with limited auto traffic. The proposed cycling lanes from the 2012 Honolulu Bike Plan will continue along Aloha Tower Drive and cross the tactile park before converging with Ala Moana Boulevard.

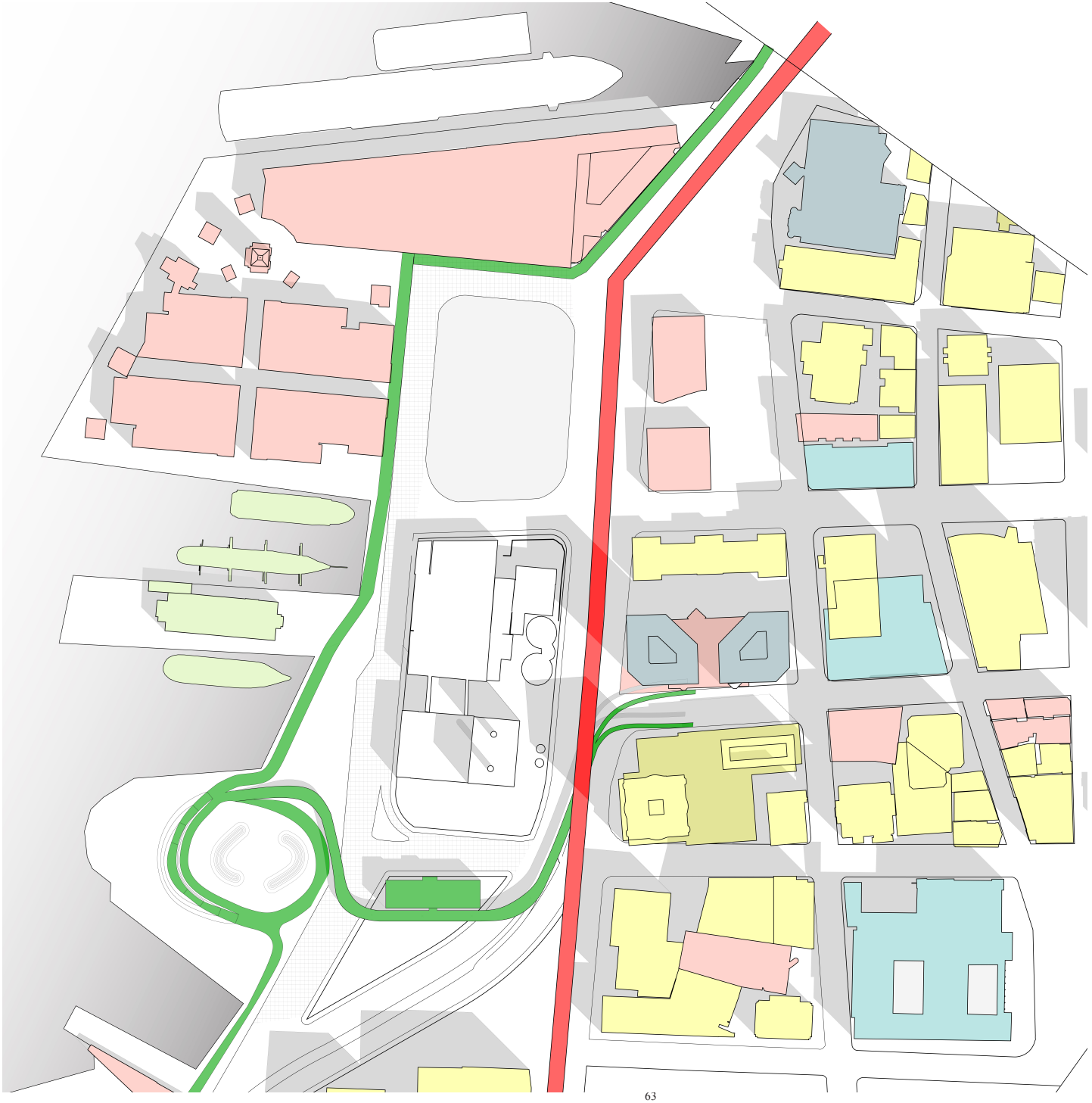


Figure 55
Site plan

Cycle-graphic Program

The program of the Honolulu Bike Station is represented by three themes: (1) Cycling the activity: the practical facilities of bicycle transportation. This includes bicycle and clothing storage, locker rooms, bicycle co-op repair and retail, and bike-share programs. (2) Cycling for social wellness: recreational groups, educational gatherings/classes, and community volunteer work. (3) Cycling as instrument of experience: interactive structure, activity spaces, and landscape integration.

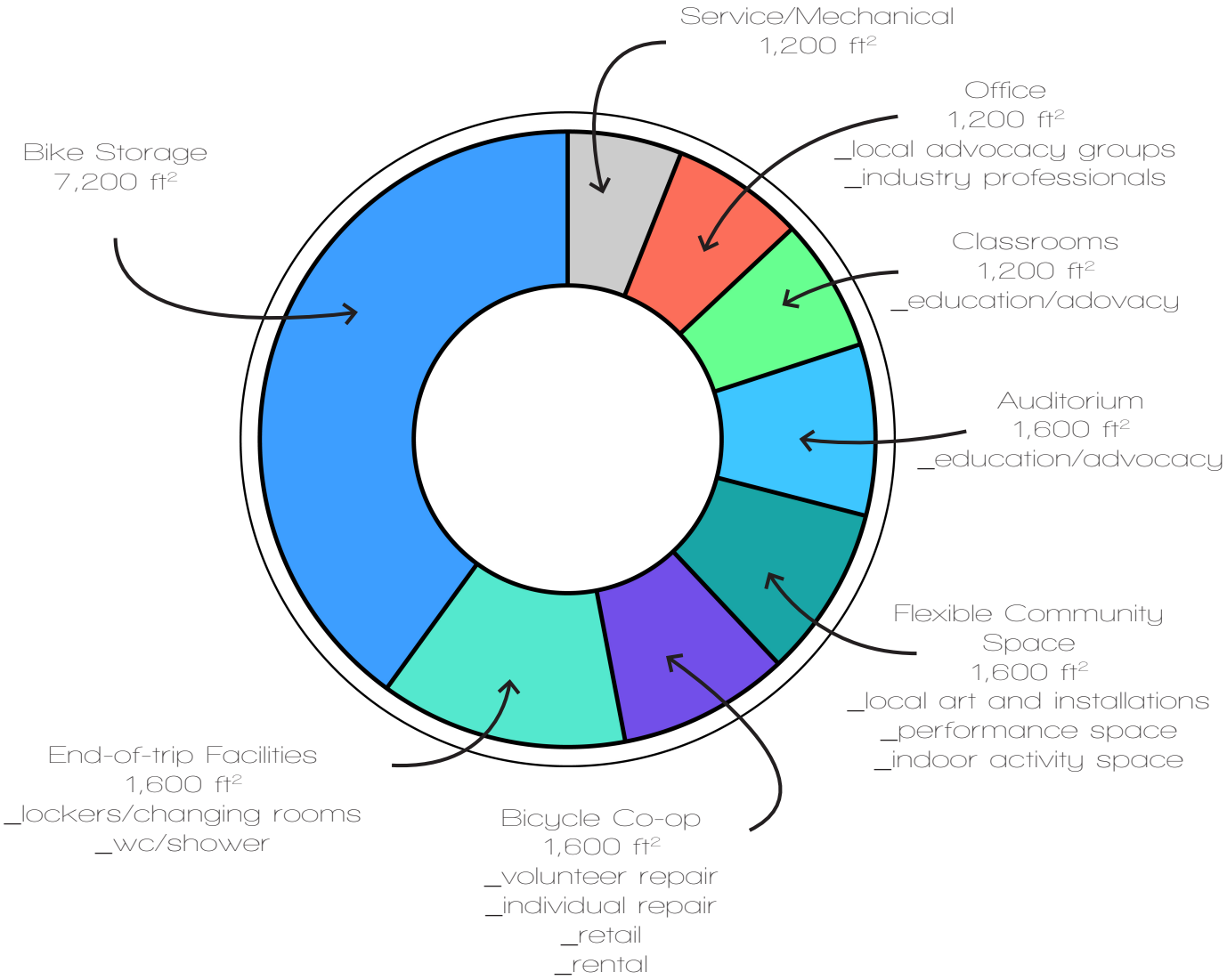
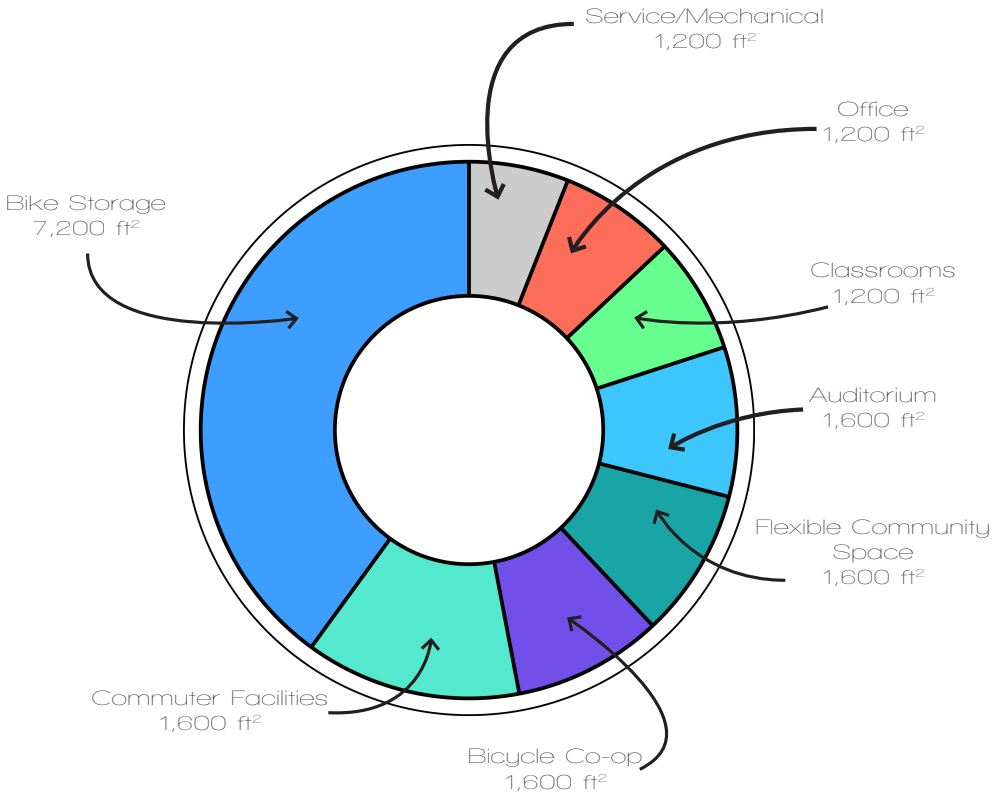


Figure 56
Cycle-graphic program

Program Distribution

Bike storage comprises the majority of the area. The 7,200 ft^2 of bike storage will hold ~550 bicycles at maximum capacity. This is sized for the future growth of the system and cycling community. Quantities were estimated by similar sized bicycle communities in the US. The bike storage is located on the southern façade of the station to create a billboard of bikes and bikers that fronts Ala Moana Boulevard and the light-rail. The "end of trip" facilities consist of 1,600 ft^2 of lockers, WCs, changing rooms, and showers. These are located on two floors to facilitate multiple levels of access from the bike storage. On the ground floor, the bicycle co-op will provide 1,600 ft^2 of volunteer repair, individual repair, retail and bike rental. This space faces the tactile park, enforcing the link with the building axis towards the park. The top floor houses the flexible community space for local art/installations, performance spaces, or a venue for indoor activities that overlook the water. The educational component consists of classrooms and an auditorium on the middle floors to promote cycling and educate cyclists and non-cyclists alike. 1,200 ft^2 of office space will become the new locations of local bicycle advocacy groups, bringing them in direct contact with the users they serve and non-cyclists they are trying to influence.



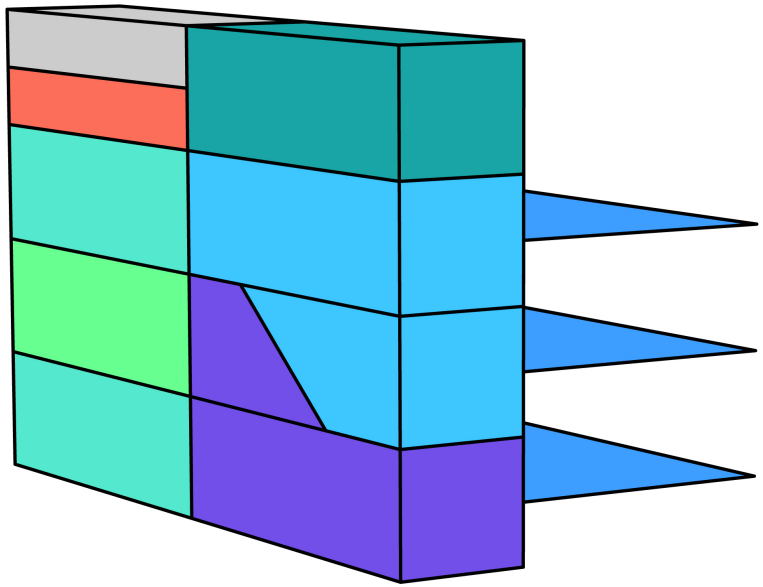
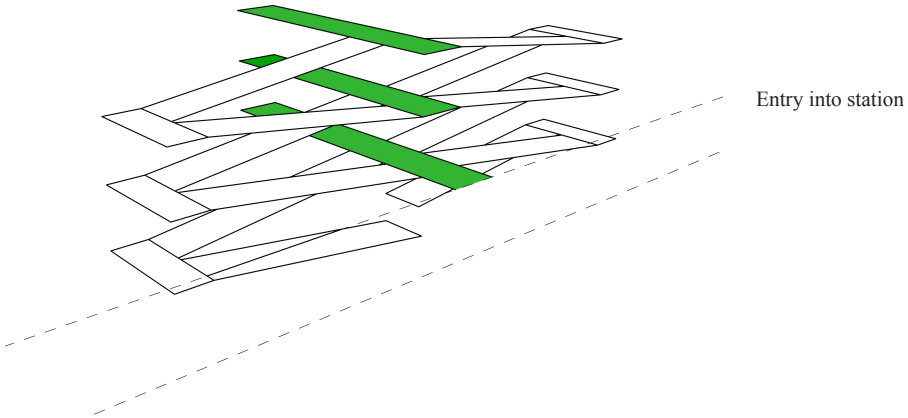


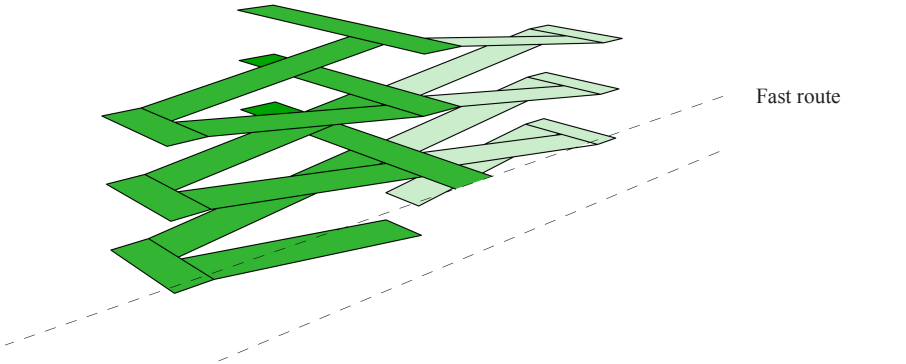
Figure 57
Program distribution

The Cycle-graphic Station

The structural language of the Cycle-graphic Station responds to bicycle culture, climactic conditions, and regionally sustainable method of construction. Building materials cannot be sourced locally, therefore steel will be used as the primary construction material. In order to responsibly build structures in architecturally remote locations such as Hawaii, steel will be preferred over concrete since shipping cement/aggregate is no longer a sustainable option. Design cues are generated by qualities of lightness, kineticism, and minimal excess; driven by characteristics of the bicycle and the act of cycling. Lightness is attributed to agility, but it also generates a sense of openness, allowing views that display cycling within the structure, and vice versa. Kineticism is found in the ability of the structure to harness movement and encourage activity. Internal and external circulation will physically engage the users, bolstering interaction with the structure as well as the environment to covey the strengths of the cycling experience. The structure and siting of the bike station will accent passage and procession through Honolulu. The station on its site will direct visitors to framed views of cycling, activity, landscape, as well as engage riders with the structure

The circulation within the bike storage has entries into the station on all levels. The path itself has two modes of circulation depending on the user. A fast route that expedites the climb to the top floor, or the slower route that circulates riders along the full perimeter of the bicycle storage.





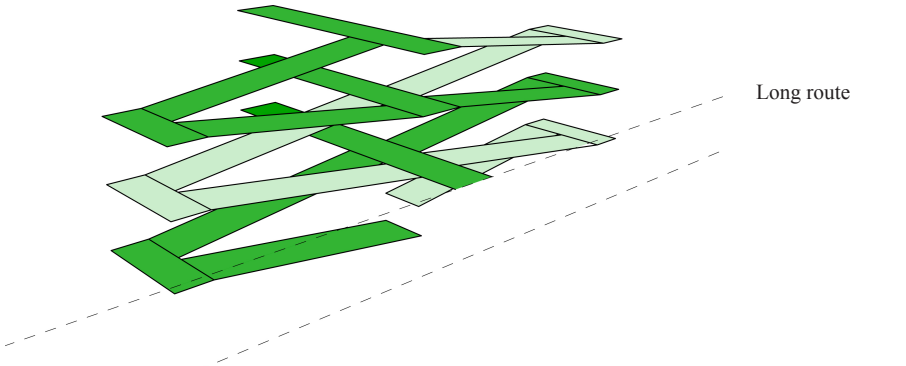


Figure 58
Circulation diagram

Figure 60
Second floor plan

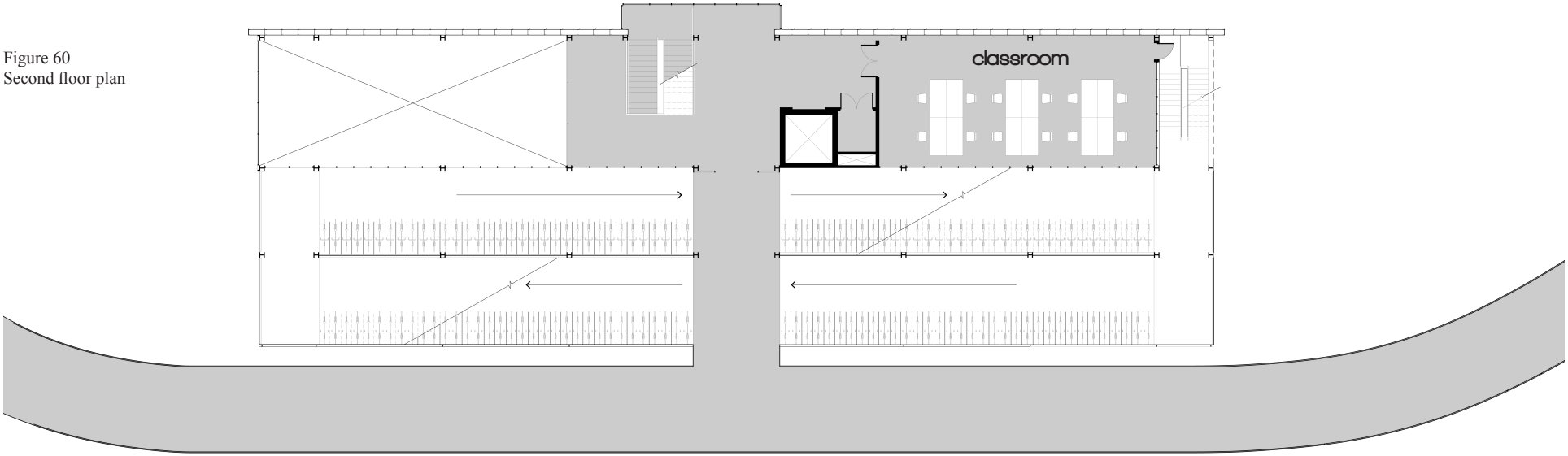
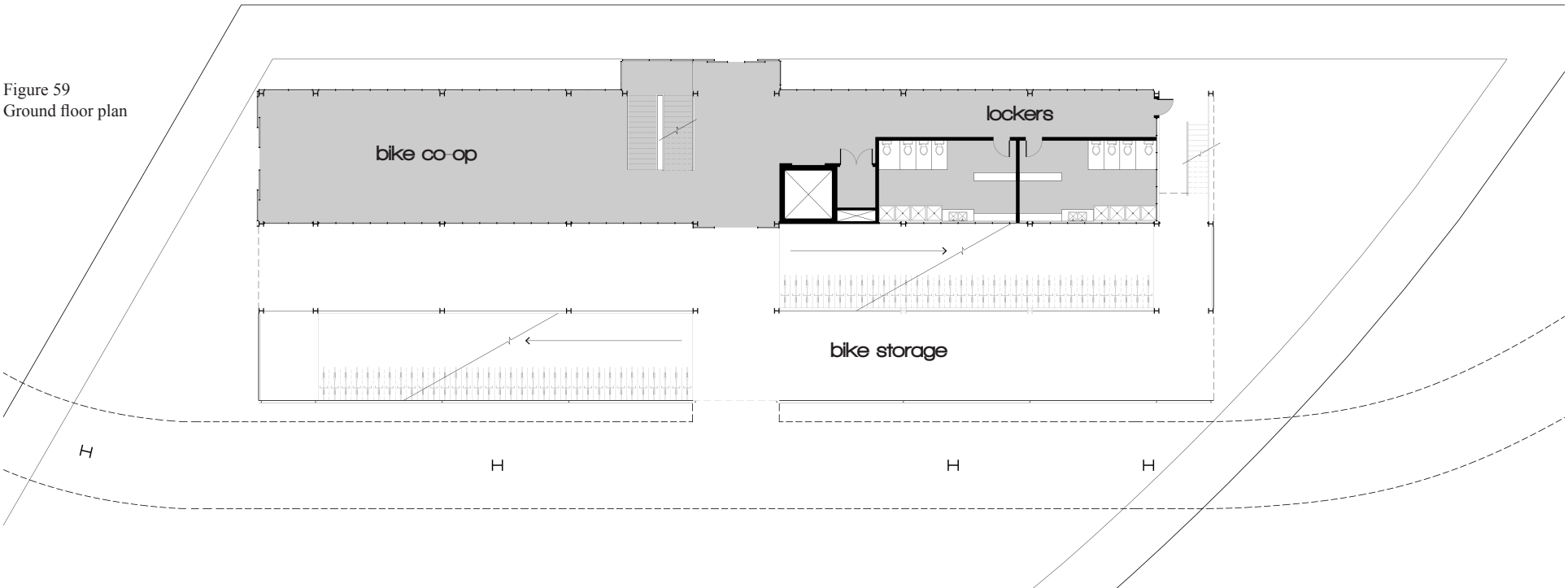


Figure 59
Ground floor plan



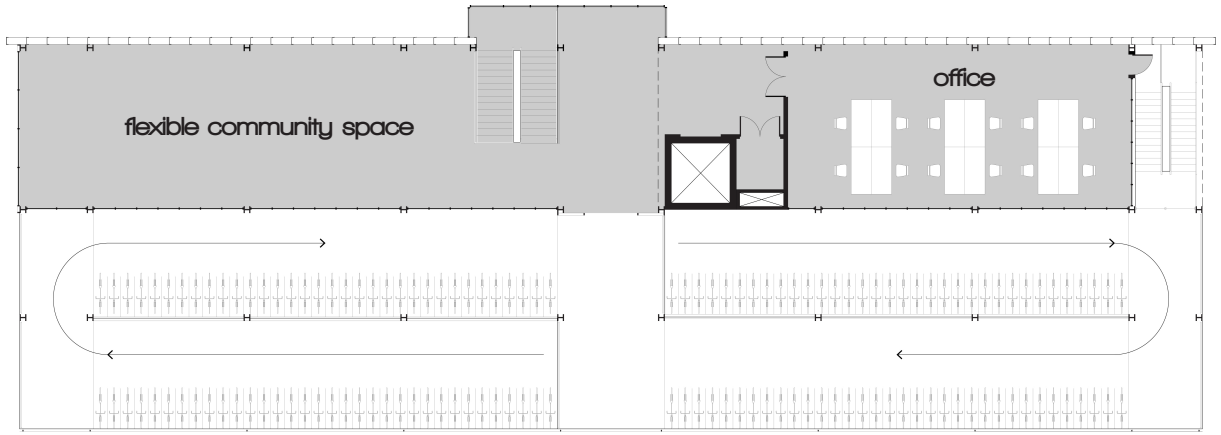


Figure 62
Fourth floor plan

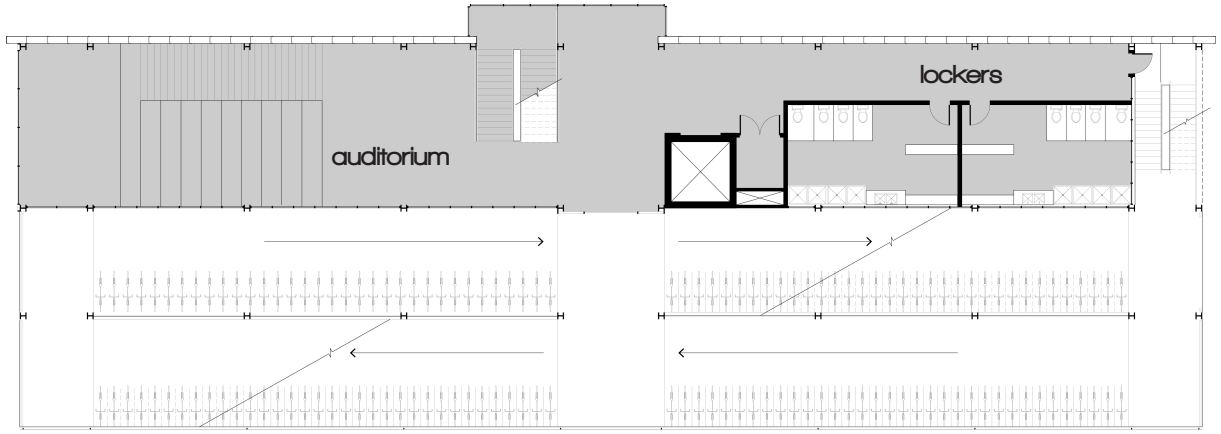


Figure 61
Third floor plan

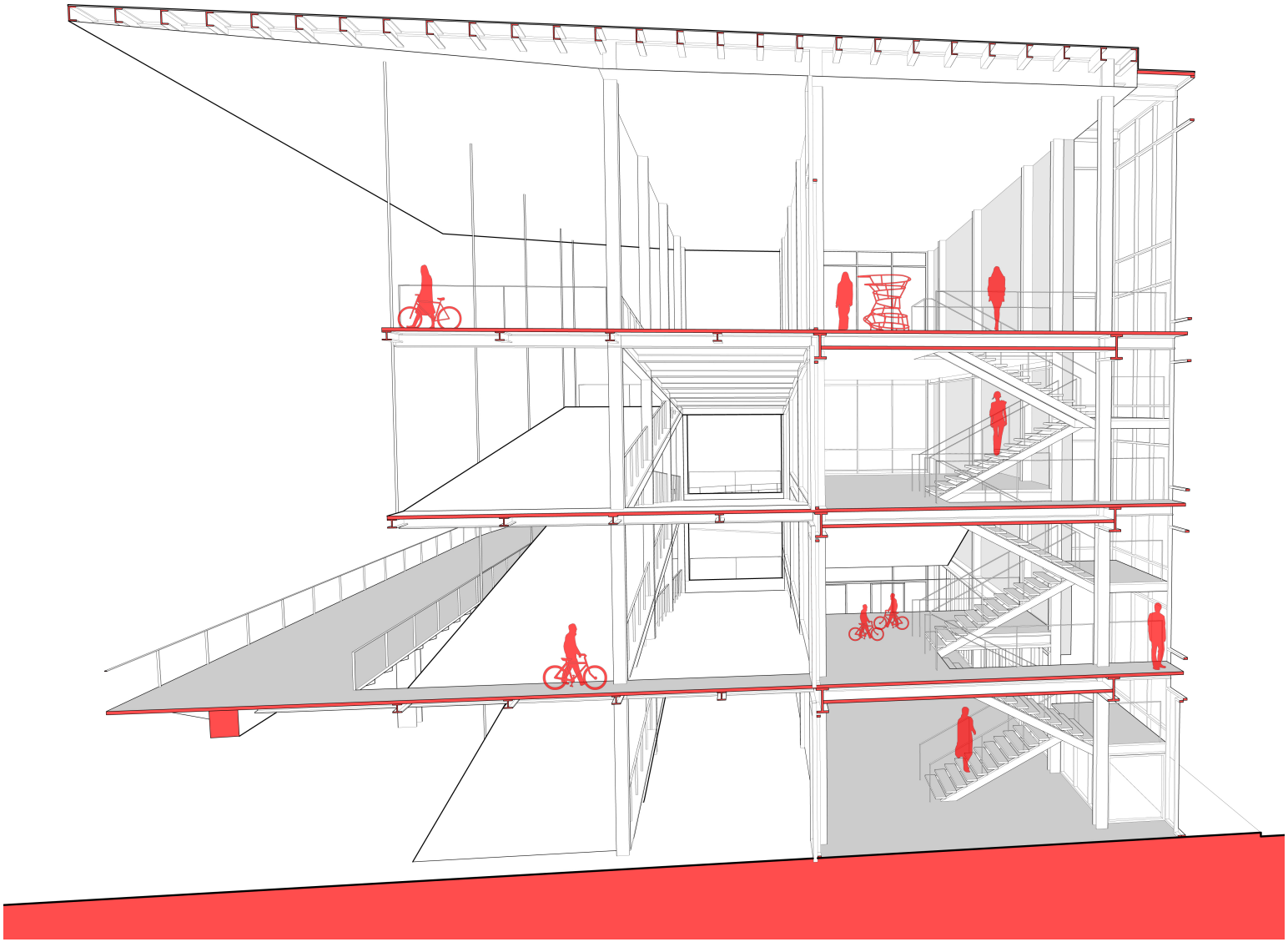


Figure 63
Transverse section

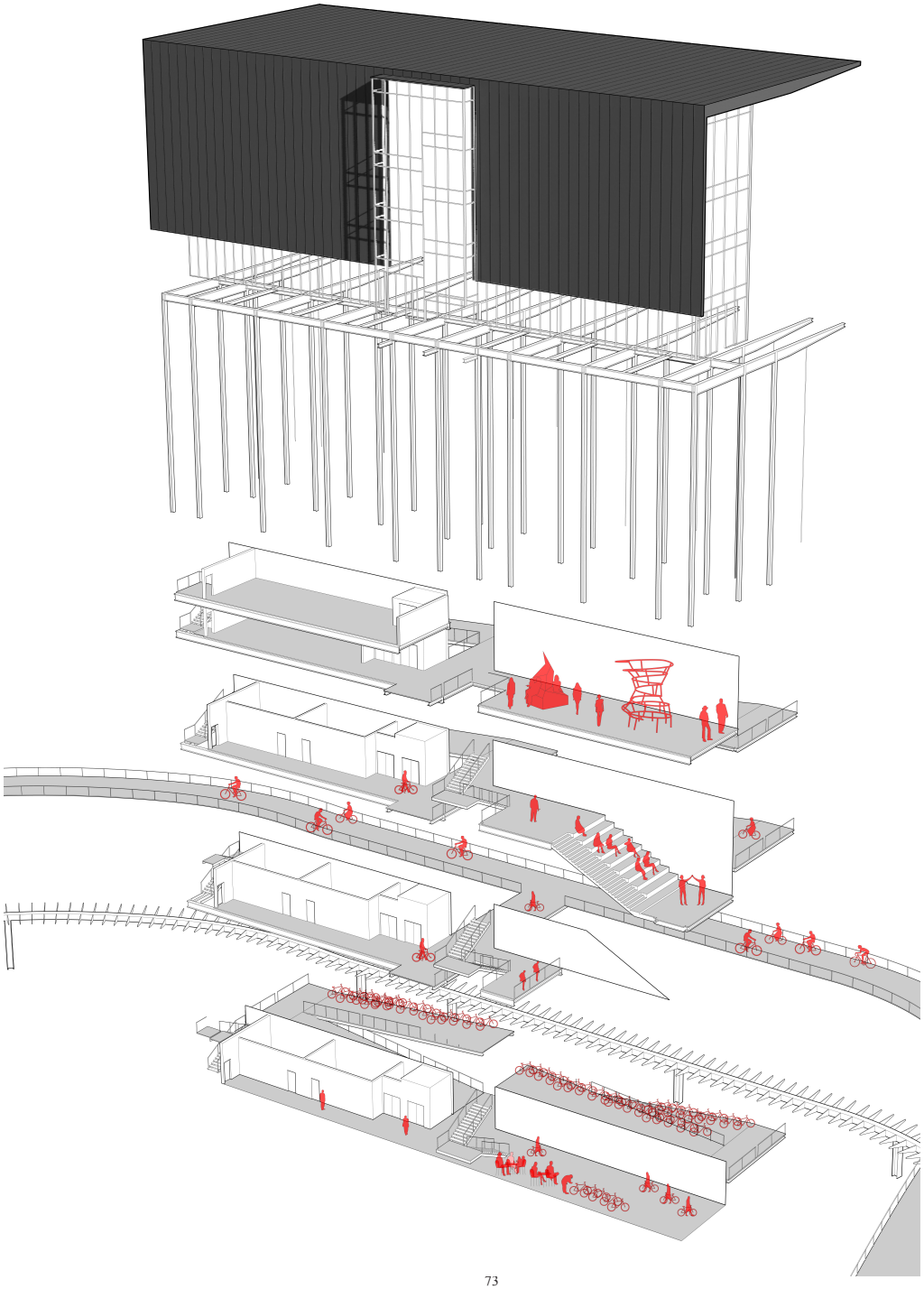


Figure 64
Exploded Axonometric

Figure 65
At Night, light from the station plays with shadows of stored bicycles and cyclists, creating scenes of movement on the metal mesh ‘canvas’. In a land where billboards are illegal, this southern façade becomes the new image of the Honolulu cycling community.

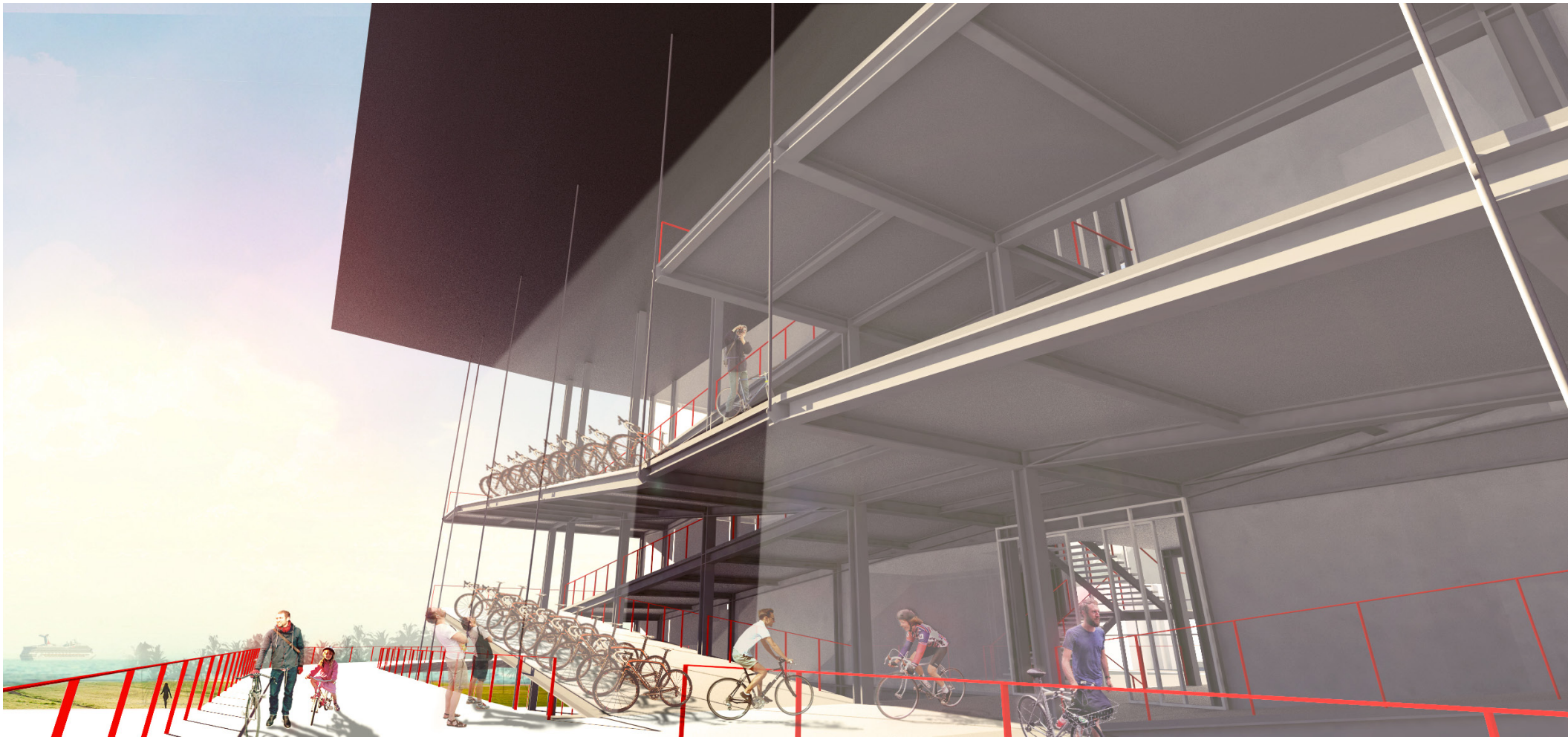


Figure 66
From the elevated path, users can look through the metal mesh and view bikes in storage. The translucent glazing of the station reveals activity within the structure.

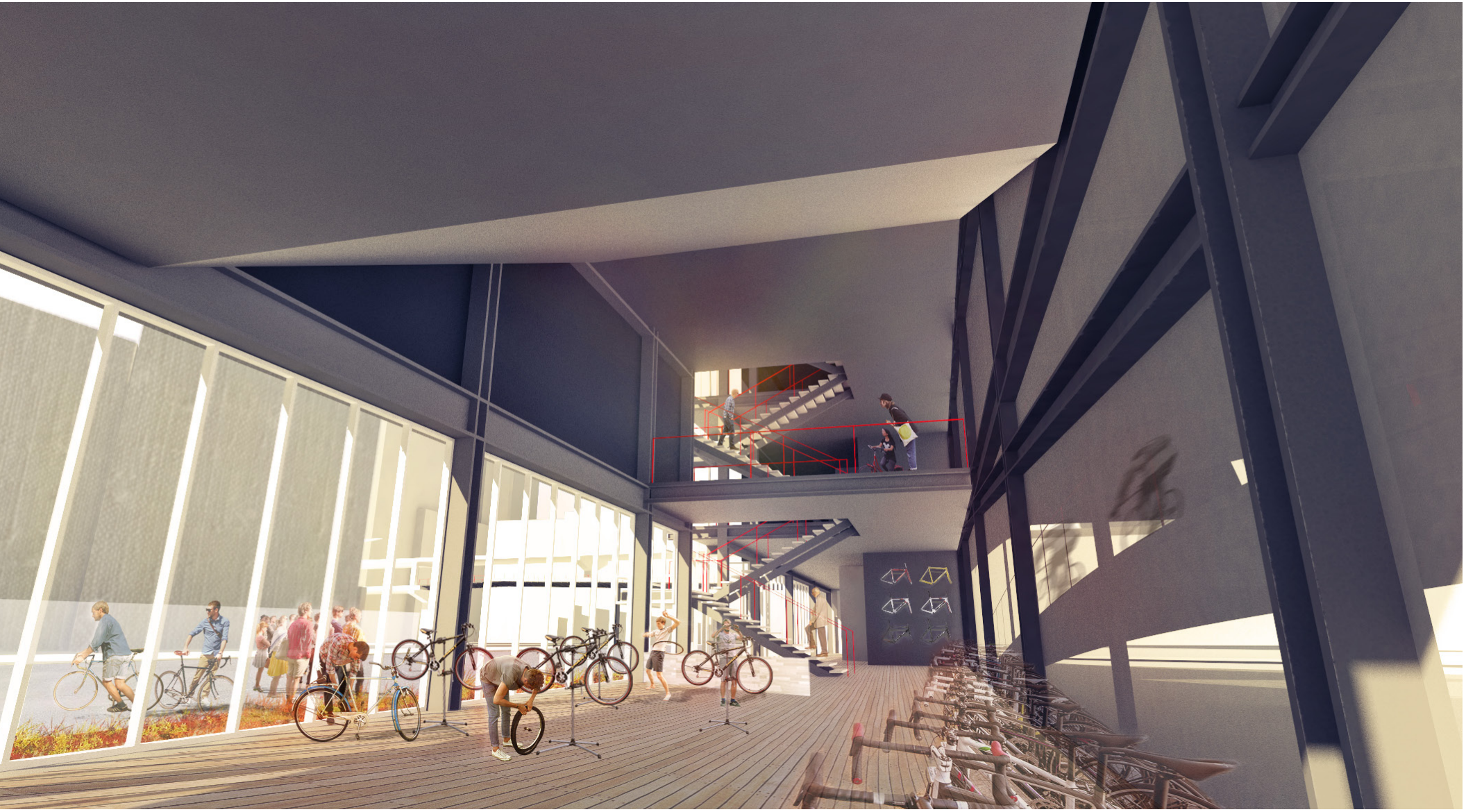


Figure 67
Looking into the bike co-op, individual and volunteer led repair spaces occupy the ground floor with retail intermixed. The southern walls of the station are glazed in semi-transparent glass, filtering out details of stored bikes beyond. The movement of cyclists are visible through this glazing, creating imagery of activity while within the co-op.

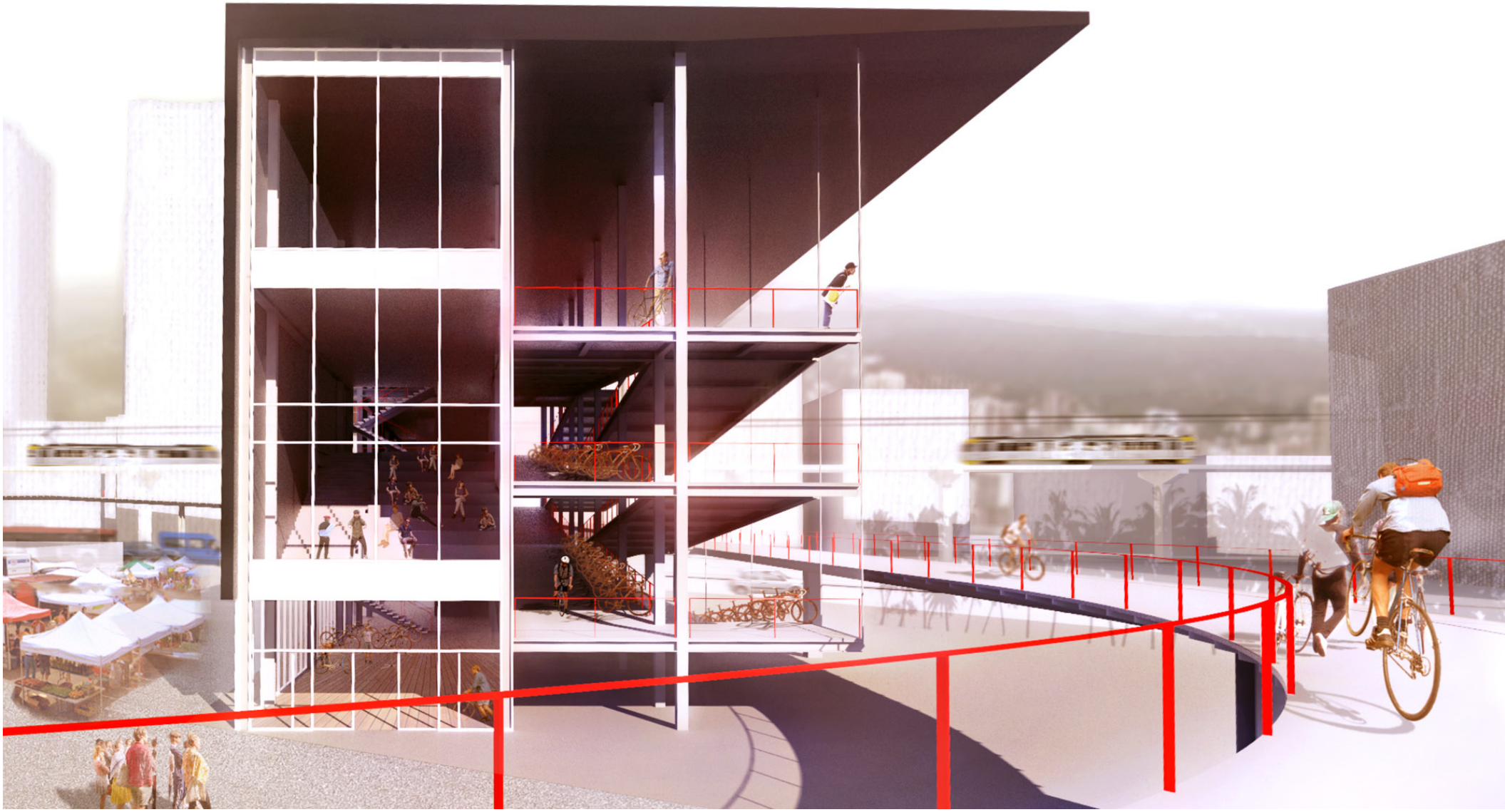


Figure 68
From the path, users can look into the western half of the Cycle-graphic station. The west facing program is centered on the public, thus visibility to-and-from these spaces are critical. Views into the bike co-op, auditorium, and the flexible public spaces showcase activity within the station, while the view from the station, focus on the activity of the elevated path and tactile park.

Figure 69
The view back from the tactile park shows the varied activities that may take place within this area. Spaces for physically educating cyclists are present in the center, with rideable objects, similar to a skatepark are available to cyclists to explore different ways to utilize their bicycle. The park also provides space for the public. Leisure areas for barbecuing and relaxing with friends are incorporated into the park, brining non-cyclists in close proximity with the activity of cycling.

5.0_Conclusion

Cycle-graphic landscapes is a critique of Honolulu's response to urban density and alternative forms of transportation. In the face of rising urban density, Honolulu needs to reevaluate its approach towards urban infrastructure. The city has begun to address these issues, but their methods seem too shallow to create lasting impact. The reorganization of trends in transportation mode choice requires more attention than providing the basic necessary elements. Users need to believe in their transportation choices in order to feel a part of something larger than themselves: a culture. The location of Honolulu provides an interesting context for this issue since it is an 'ideal' cycling environment, yet it still lacks such culture. Aimed at those who have not yet adopted cycling for transportation and pleasure, the visual experience of the Cycle-graphic station showcases the act of cycling as an art and attempts to remove exclusivity, stigma, or reservations and instill the elements of viability, coolness and fun into cycling.

With Honolulu's limited choices of existing transportation modes, the interjection of new modes and choices are overdue. By leveraging the benefits of the developing light-rail transit and the proposed bicycle system put forth by the 2013 Bike Plan, cycling can become more accessible, physically and visually, to residents of Oahu. The potential for integration of these two systems within the downtown neighborhood creates opportunities to not only improve urban transport, but impact how people experience this neighborhood and how they interact with their environment. Even pedestrian circulation in the downtown neighborhood has become fragmented since pedestrian engagement with the waterfront has been marginalized by auto infrastructure. Unabridged connections are reconstituted by the Cycle-graphic station by using the light-rail and bike system as armature to bolster the change towards pedestrian friendly environments.

6.0_List of Figures

7.0_Works Cited

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