

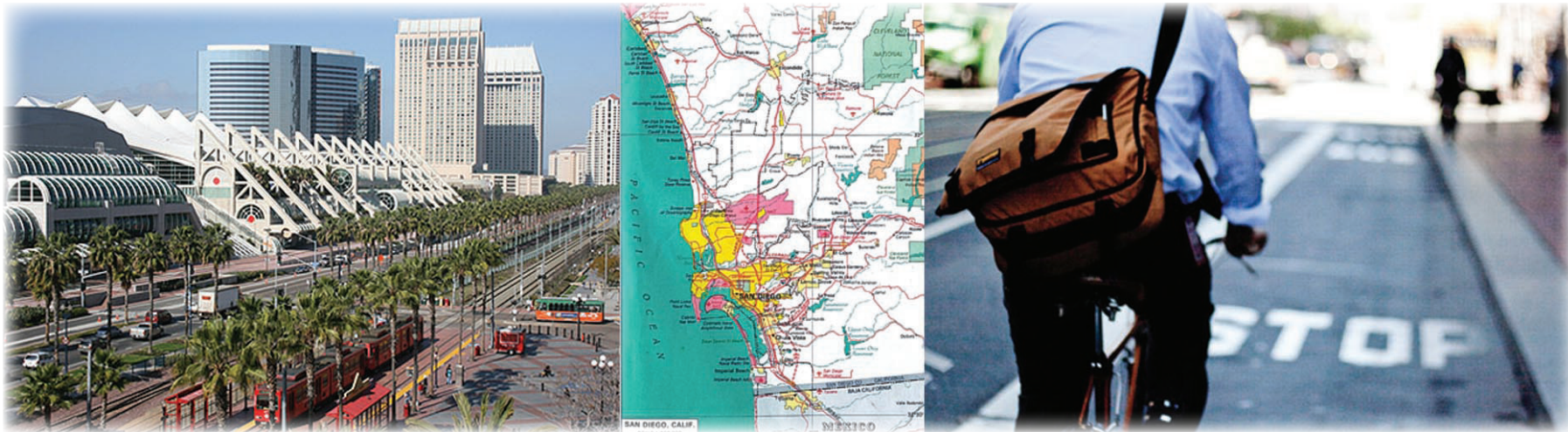
“America’s Finest” Bicycle Network

A Destination-Based Guide for San Diego

Landscape Architecture Senior Thesis

University of California, Davis

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by Jaime Sandoval

“America’s Finest” Bicycle Network

A Destination-Based Guide for San Diego

A Senior Project

Presented to the Faculty of the Landscape Architecture Program at the University of California Davis.
In Partial Fulfilment of the Requirements for the Degree of Bachelors of Science of Landscape Architecture.

Accepted and Approved by:

Mark Francis, Senior Project Faculty Adviser

Susan Handy, Committee Member

Byron McCulley, Committee Member

Jeff Loux, Committee Member



abstract

The City of San Diego has maintained a steady growth rate over the last few years and with that growth, an increase in drivers. The fact that there are more drivers on the road has led the city to have increasingly busy streets less-inductive to pedestrians and bicyclists. The goal behind this research & design project is to analyze existing conditions for destination-based that will showcase some of the different features that city has to offer. Finally, the project concludes by retrofitting a busy intersection to serve as an example for traffic mitigation as well as a destination on the San Diego.

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background

In 2008 the city of San Diego adopted a new general plan (Fig. B.1) which outlined future growth for the city.

One of the fundamental factors that make this plan special is that growth is directed inward rather than outward. In which communities began to grow on a more walk able, human scale intended to give them a more unique identity, a City of Villages. Traditionally, growth of the city could by many definitions be considered sprawl which has allowed it to spread across the county and inadvertently pushed people further and further away from the city center. It is this type of growth that has made San Diegans dependent on cars for commuting whether it be to work, the beach and anywhere in between. It appears that the rising cost of fuel , a slowed economy and increasing ridership on the city trolley is already easing traffic congestion in the city according to a study of CalTrans data by the San Diego Union-Tribune

(forceChange.com). That month, the paper reported that traffic fell between 3.3% - 9.1% depending on the

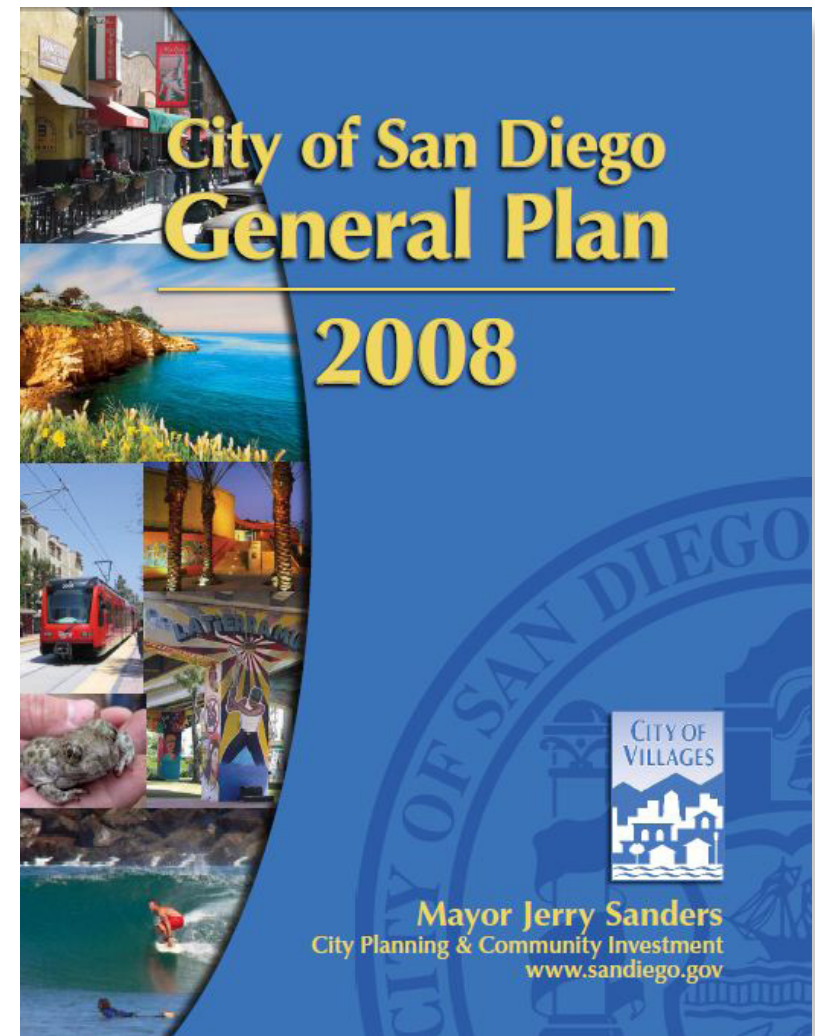


Fig. B.1 - San Diego General Plan Cover



freeway. The article continues to state that while traffic may be showing signs of decline, the alternative to not driving is staying at home due to “very limited means of public transportation.” By embracing more sustainable growth ideals, city planners should find it beneficial to adopt policies that incorporate alternative means of transportation in order to facilitate smaller scale communities that allow for people to leave their cars at home and opt for alternative means to get around. A city like San Diego is a prime place for such a



Fig. B.2 - Trolley over Eastbound I-8, San Diego (bookish in northpark)

plan with year-round temperate climate for a person to get around on a bicycle. By improving and expanding upon the cities bicycle plan, it is my goal to help bring about attention to the option of using the bicycle as a feasible means of navigating through a new and improved San Diego. “America’s Finest Bicycle Network” will coincide with the city’s recently adopted general plan as well SANDAG’s Regional Bicycle Plan to research and design a metro-wide bicycle network that would encourage commute and recreation by bicycle by using key destinations along the route(s).

Last March, SANDAG released a preliminary draft of the San Diego regional bicycle plan in which planners detailed a set of guidelines for future bicycle infrastructure. The idea of my project is to add on to that plan by creating a specific bike route intended to give users a scenic, educational and overall commutable route by using specific locations



throughout that city. A destination-based bike route would serve in a variety of ways. For those attempting to navigate the city, the locales could potentially serve as landmarks. Those and for those with a more specific destination in mind, the this network could serve as a basis to program their own ride, choosing to include, or exclude for that matter, whichever destinations they wish.

To better understand the needs of bicyclists in San Diego and the types of infrastructure needed to accommodate them, I took a look at what other cities are currently doing with their bicycle planning and implementation. The first place that came to mind was Portland, Oregon as I know that they recently adopted their 2030 bicycle plan (Fig. R.1) which guides growth of their networks for the next 20

years, to further improve upon the existing system as well as increase the percentage of bike commuters. Having visited Portland in the past, I know that biker has become a common sight in the more urbanized downtown parts of the city convincing me that doing the same in the metropolitan area of San Diego is a possibility with the appropriate approaches. Internationally, I studied what bicycle planners in Copenhagen seemed to have been successfully doing further last two decades which is creating traffic infrastructure that fully integrates the bicyclists onto the road just as much as the car driver. To give my research some local ground, I looked no further than the city of Davis. While the scale between Davis, San Diego and the previously mentioned cities may be different, each offers their own lessons to be learned and applied regardless of scale given the fact they all shared the same denominator which is how to safely blend cars, bikes and



Fig. R.1 - 2030 Portland Bicycle Plan Cover



pedestrians for that matter into an efficient traffic network.

Davis, California

My project would not be complete without taking an analytical look at the city of Davis. Referred to as the “Bicycle Capitol of the World” by the City of Davis website, it is the goal of the city to “create and maintain an integrated system of bikeway (City of Davis).” Prior to my move, I could not remember the last time I rode a bike so I may confidently say



Fig. R.2 - Students on UC Davis Campus



Fig. R.3 - Bikers and Pedestrians using lanes at Sycamore Ave & Covell Blvd

that my project first began when I moved to Aggie town for school (Fig. R.2). I quickly eased my way into the commuter culture and from then on I found it increasingly frustrating that I could not as easily get around in San Diego anytime went back to visit my hometown. For my research to move forward, I have to cite my moving to Davis as the real starting point of my project. In 2005, Davis was the first city in



the nation to receive the Platinum level “Bicycle Friendly Community” award, from the League of American Bicyclist, for its promotion of bicycling for transportation. Since the mid-1960s, when city planners first saw the need for a bike network to accommodate a growing student population, the bike networks in Davis have evolved to consist of miles of on-street bike lanes and even more in off-street bike paths. Of all the collector and arterial streets in the city, over 90% have bike lanes (Bicycle Advisory Commission).

One the key reasons Davis has been able to successfully evolve its’ bicycle network is that planners have made it a point to “Build on Davis’ cycling past by experimenting or piloting new technology or programs for bicycles,” as stated in the city’s 2009 bicycle plan. In the Engineering section of Davis’ Bike Plan, it is the objective of the city to plan for bicycles for all new developments and road-

way construction. Of all approaches to bike planning, the latter is essential in order for a truly integrated bike network in a developing urban environment.

Portland, Oregon

During the final portion of my research I had the chance to visit the city of Portland intent on immersing myself into the bike culture as much as I could during my time there. Prior to visiting, I contacted and was able to open up e-mail conversation with Ellen Vanderslice, project manager for Portland 2030 bicycle plan. After a few e-mails she informed me that I might stand to learn a great deal by taking the self-guided bicycle tour (Fig. R.4) through Portland which emphasizes key stops throughout the city that serve as examples of infrastructure that has been put into place as a result of planning in order to improve the relationship be-



tween car and bike. Upon arrival into the city, I noticed that there seems to be an abundance of bike rental businesses in the city to cater to residents or visitors such as myself. After renting a bike and touring the city, I began to notice that the

areas where there was the most noticeable bike infrastructure was in those that needed most, busy intersections, naturally. As described by the good people over at Portland Bicycle Tours, the Willametta River splits the city into the West and East sides while Burnside Street defines the North and South sides. After hearing this, I made it a



Fig. R.4 - Portland Bike Tour

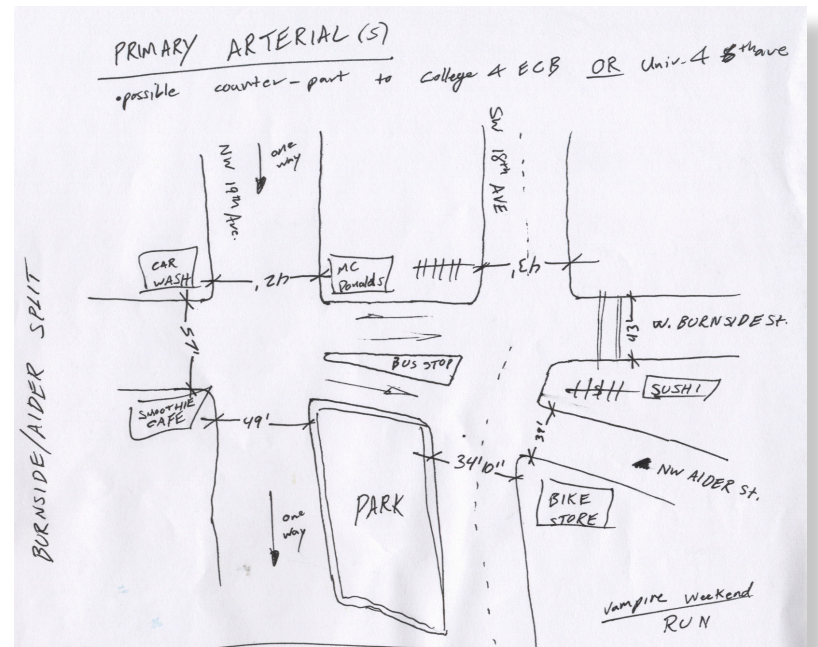


Fig. R.5 - Measurement Gathering, Portland, OR.



point to ride along Burnside as it is one of the primary if not the primary arterial street in the city. One particular intersection that caught my attention for its consistent, non-stop rhythm of bikers, cars, bus, pedestrians...bikers, cars, bus, pedestrians and so on was the confluence of Burnside Street, 18th Avenue, 19th Avenue and Alder Street (Fig. R.5, Fig. R.6). It was here that I gathered data and came to the conclusion that even though it is a key arterial street, Burnside was considerably narrower than the counterparts I am

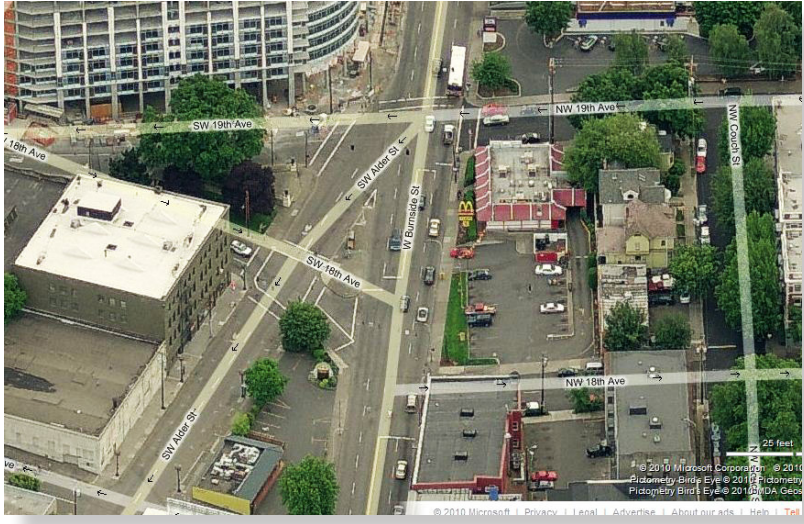


Fig. R.6 - Bird's Eye View of Burnside/18th Ave/19th Ave/Alder St

proposing to redesign in San Diego. According to the Hostels International webpage for Portland, the city has some of the short city blocks in the country as a result of developers in the 1800s who sought



Fig. R.7 - Colored Bike Lane in Portland, OR.

to create as many corner parcels as those were the most lucrative. Fast-forward to today and that is one of the reasons the city is on a scale more inclined towards the pedestrian and bicyclist rather than the car. Throughout the city there is a clear presence of bicycle infrastructure, particularly in the downtown area and around

Portland State University where students commute daily. Bicycle boxes, colored-code paths and signage help remind everyone to be aware of the presence of bikers. In 2009, the Bureau of Transportation published the Portland Bike Tour, first recommended to me by Ellen Vanderslice, as a



Fig. R.8 - "Bike Light" in Portland, OR.

self-guided tour of examples of the types of infrastructure that has been placed throughout the city. All if not most are potential techniques to be used by any city planning



Fig. R.9 - "Bike Light" in Portland, OR.

department aiming to improve the flow and interaction between bikes and cars.

Like Davis, Portland is also employing the use of bike lights which are traffic signals met solely for bicyclists. This technique could be used in San Diego, in particular near school to promote safety and thus local ridership.



Copenhagen, Denmark

Perhaps the most feature-rich city, when it comes to bike infrastructure and related innovation is Copenhagen, where 37% of all commuters choose to bike for work or school (Colville-Andersen). One of those innovations that serves multiple purposes is the use of “bike counter” (Fig. R.8) which track bicycle traffic. While instrumental in



Fig. R.10 - Bicycle Counter in Copenhagen

gathering data, the counters serve also as a symbol of Copenhagen’s leadership in bicycle planning which in turn gives dwellers a sense of pride. Since the rise of the car of the automobile began in the 1960s, planners in Copenhagen have been trying developing and implementing bike-infrastructure methods to produce a safe and efficient system. As Mikael Colville-Andersen, the person behind Copenhagenize.com, states, “If you make the bicycle the quickest way to get around the city...You’re going to get everybody and their dog to do it.” Among the other feature that Colville-Andersen talks about:

- “Pre-Greens” allow a green light for bicyclist before cars
- LED turn lanes
- Cargo-bike lockers
- “Green Wave” into city center; allows cyclists to ride into city without stopping if they maintain a particular speed to “catch all the green lights”



San Diego Bike Tour

- | | |
|---|---|
| A Seaport Village
1 To: Mission Bay (B) OR North Park (Q) | K Allied Gardens Recreation Center
3 To: San Diego State University (N) OR Lake Murray (M) |
| B San Diego River Bike Path | L Mission Trails Regional Park
4 To: San Diego State University (N) OR Lake Murray (M) OR Allied Gardens Rec Center (K) |
| C Robb Field/Rhodes Park (Ocean Beach Athletic Area) | M Lake Murray Park
5 To: San Diego State University (N) OR "Bike Intersection" El Cajon Blvd & College Ave (O) |
| D Seaworld | N San Diego State University |
| E Belmont Park | O "Bike Intersection" El Cajon Blvd & College Ave |
| F Pacific Beach Boardwalk | P City Heights Community Recreation Center |
| G DeAnza Cove - Mission Bay | Q "Bike Intersection" El Cajon Blvd/Park Blvd/Normal St |
| H San Diego Visitor Information Center & Park | R San Diego Zoo |
| I Mission Valley | S Balboa Park |
| J Qualcomm Stadium
2 To: Allied Gardens Rec Center (K) OR Mission Trails Regional Park (L) | T Downtown San Diego |

San Diego Bike Tour

A **Seaport Village**
North --> Pacific Highway
Right --> Laurel Street
Left --> India Street to San Diego Avenue
Left --> Congress Street
Left --> Taylor Street
Right --> Pacific Highway

B **San Diego River Bike Path**
South --> Sunset Cliffs Blvd

C **Robb Field/Rhodes Park
(Ocean Beach Athletic Area)**
North --> Sunset Cliffs Blvd
turns in Sea World Dr

D **Seaworld**
Sea World Dr --> Mission Bay Dr
Right --> Mission Blvd

E **Belmont Park**
North --> Mission Blvd --> Grand Ave

F **Pacific Beach Boardwalk**
Right --> Grand Ave
Right --> Mission Bay Dr

G **DeAnza Cove - Mission Bay**
South --> Mission Bay Dr
Right --> Clairemont Dr

H **San Diego Visitor Information
Center & Park**
Clairemont Dr -->
Right --> Denver Street
Right --> Ingulf St
Left --> Moreno Blvd
Left --> Napa St
Left --> Friars Rd

I **Mission Valley**
Clairemont Dr -->
Right --> Denver Street

J **Qualcomm Stadium**
East --> Friars Rd
Right --> Zion Ave
Left --> Glenroy St

K **Allied Gardens Recreation Center**
North --> Waring Rd
Left --> Navajo Rd
Right --> Jackson Dr
Right --> Mission Gorge Rd
Left --> Father Junipero Serra Trail

L **Mission Trails Regional Park**
West --> Mission Gorge Rd
Left --> Jackson Dr
Right --> Lake Shore Dr

M **Lake Murray Park**
Lake Shore Dr --> Baltimore Dr
Right --> Lake Murray Blvd
Right--> Alvarado Rd
Left --> College Ave

N **San Diego State University**
South --> College Ave
Collge Ave --> "Bike Intersection"

O **"Bike Intersection"**
El Cajon Blvd & College Ave
West --> El Cajon Blvd
Left --> Fairmont Ave

P **City Heights
Community Recreation Center**
Back --> El Cajon Blvd
Left --> El Cajon Blvd

Q **"Bike Intersection"**
El Cajon Blvd/Park Blvd/Normal St
South --> Park Blvd

R **San Diego Zoo**
South --> Park Blvd

V **Balboa Park**
Continue --> Park Blvd
Right --> Harbor Dr

T **Downtown San Diego**

San Diego Bike Tour

The goal behind the concept is to design an interconnected bicycle network with an identity. By having an identity, an inanimate bike network becomes more relatable to users and thus more relevant. The more relevant something is to people, the more likely, I believe, they are to use it. For this project, using design features along with infrastructure retrofits, is a key tool to make the network stand out and be noticed, and used. In order to make it a multi-use network, the route spans throughout the city's different neighborhoods, each with their own, unique features.

Given their variety, parks in the city serve as destinations along a city-wide bike network. I intend to take advantage of the different types including particular ones like Balboa Park, Mission Bay Park and Mission Trails Park. Mission Trails itself cover approximately 5800 acres of natural space with over 15 miles of "bike & hike" trails all while

being located 8 miles from downtown San Diego (Mission Trails Regional Park Foundation) meaning that it can be a destination for the more active cyclist or those looking to bike to a hiking destination. Although the route map follows an alphabetical layout, there is no set starting or ending point as any location may serve as your point of departure.

The goal behind the concept is to design an interconnected bicycle network with an identity. By having an identity, an inanimate bike network becomes more relatable to users and thus more relevant. The more relevant something is to people, the more likely, I believe, they are to use it. For this project, using design features along with infrastructure retrofits, is a key tool to make the network stand out and be noticed. In order to make it a multi-use network, the layout will go through many of the different parks, schools and businesses throughout the metropolitan area of the city.

Parks

Given their variety, parks in the city serve as destinations along a city-wide bike network. I intend to take advantage of the different uses of parks including particulars like Balboa Park, Mission Bay Park and Mission Trails Park. Mission Trails itself cover approximately 5800 acres of



Fig. D.1 - Aerial View EBC Blvd & College Ave



Fig. D.2 - EBC Blvd & College Ave, Facing South



natural space with over 15 miles of “bike & hike” trails all while being located 8 miles from downtown San Diego (Mission Trails Regional Park Foundation) meaning that it can be a destination for the more active cyclist or those looking to bike to a hiking destination.

“America’s Finest” Bicycle Network

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While outreach and education are also important components to create a safe, well-used bike network, the design phase focuses on signage, path markings, and infrastructure retrofits.

Infrastructure

During site analysis in San Diego, I wanted to focus the design retrofits in places where I felt they are needed most.

Given the parameters of the project and timeline, I focused



Fig. D.3 - East-facing Panorama of EBC Blvd/Park Blvd/Normal St.



Fig. D.4 - East-facing Panorama of EBC Blvd/Park Blvd/Normal St. - Bird's Eye on two locations that would serve as design pilots to serve as examples on the bike network. One of the spots I focused in particular was the intersection of El Cajon Boulevard (EBC) & College Avenue due to its' locale and size. About one mile from the San Diego State campus and part of a heavy use arterial street, this intersections has lengthy crosswalks (4)



Fig. D.5 - Bike Locker in New Jersey

that average 100 feet.

The first design treatment would be to add bike lanes leading up to, through and leading away from the intersection to make drivers aware of the presence of bicyclists as well as to guide cyclist to their designated areas in the intersection. A way to bring even more attention to the otherwise typical bike lane is the use of color. Color

coding bike lanes not only adds attention to but also leads to a design aesthetic which leads back to my advocacy for a network with more identity. For a substantial distance before and after the intersection, the far right lane will be noted as a shared bike lane, or “sharrow,” so that both driver and bicyclist can essentially flow together so that when the time comes to cross the intersection both can do so at moderate speeds.



Fig. D.6 - “Bike Box”



Fig. D.7 - Proposed Bike lane Layout - EBC Blvd & College Ave

Given the fact that this intersection is surrounded by a mixture of both commercial and residential, making changes to improve the safety and flow would directly coincide with the city’s general plan. In the section on bicycling, the plan states that “of all the trips taken by all transportation modes, the average length is five miles...Many of



these trips could be taken by bicycling, provided adequate consideration has been given to cycling infrastructure.”

The second intersection up for retrofit would be that of University Avenue, Park Boulevard and Normal Street, particularly because it is a 3-way confluence that can be

confusing to navigate. After analyzing the space, I came to the conclusion that the cause for confusing comes from that fact that Westbound travelers on EBC are splitting into two streets (Park & Normal). These two streets also have traffic going in the opposite direction, forcing the crossing of



Fig. D.8 - Proposed Bike Lane Layout - EBC Blvd & College Ave



3 streets with two directions each all of which results in 9 different crossings of traffic. Another reason that makes this space stand out is the potential to use it as a utility station for bicyclist needing to do minor repair and/or store their bikes in lockers. The design of the site could tie back to the theme of an identifiable space that is part of the larger network of bike lanes and facilities throughout the city.

The retrofit for EBC Blvd & College Ave took off from the beginning. I kept in mind that one of the purposes of this location was to serve an example of infrastructure for bicycles at one of the city's busier intersections which is why I allowed the bike lanes to "take over" from the design perspective. Another important reason for doing this was due to the shape of the intersection. More so a diamond shape than a square, the intersection presents a challenge in particular for West and East bound cyclists as the turn is a long, decreas-

ing radius turn. Without some kind of guidelines, anyone attempting to make the turn would have to more or less create their own path while avoiding cars. Leading up to the intersection, bike lanes to the right of the road break off to the left as they approach the intersection. This diverted lane directs cyclists to a "bike box" in the right-most left-hand turn lane.

Aggie: UC Davis mascot; UC Davis students often refer to themselves as Aggies’.

Arterial Street: A main route, channel, or other course of flow or access

Bicycle Network: A collection of interconnected bicycle path.

Bike-scaping: The design/redesign of streets and intersections to safely accommodate bicyclists.

City of Villages: a strategy that “focuses growth into mixed-use activity centers that are pedestrian-friendly districts linked to an improved regional transit system.”

Complete Streets: Complete streets are designed and operated to enable safe access for all users. Pedestrians, bicyclists, motorists and transit riders of all ages and abilities must be able to safely move along and across a complete street (National Complete Streets Coalition).

Post-Occupancy Evaluation (POE): Post-construction evaluation done so to determine the success of a design.

SANDAG: San Diego Association of Governments

Sharrow: A street lane intended to be shared between cars and bicycles

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