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CRP 463: University Area Multi-Modal Access Plan June 2016

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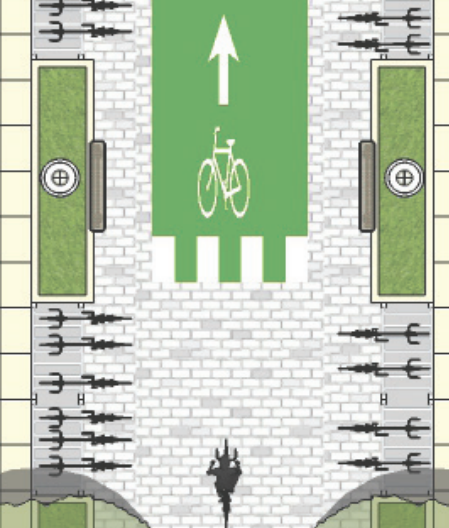
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UNIVERSITY AREA MULTI-MODAL ACCESS PLAN

JUNE 2016



STAFF BIOS



SAM ANDERSON

With nearly one year of experience working for the City of Arroyo Grande, Sam brings a strong sense for the public sector to the team. Specifically, he has experience conducting community outreach activities and he excels at public sector problem solving.



SPENCER JOHNSON

With approximately one year of private experience, Spencer brings knowledge of the private sector to the team. Having worked in both a design and a consulting firm, he has been involved with projects spanning in scope from transit-oriented development designs to economic development strategies.



GARRETT WANK

Having worked for the Community Development sector of the City of Laguna Beach, Garrett brings a strong sense of mapping and graphics to the team. He specialized in ArcGIS-related projects and has a keen eye for graphic design.



WORK PLAN

TASK 1 - BACKGROUND REPORT

The first task focuses on the comprehensive review of all background materials.

TASK 1.1 - ANALYSIS OF EXISTING AND NEW DATA SOURCES

AJW Consulting will establish a baseline assessment of campus active transportation infrastructure and determine what new data sources are necessary. We will examine key case studies and identify those in this report. The existing data analyzed will include but is not limited to: Bicycle and Pedestrian Planning Spring Quarter 2015 analysis, Poly Climate Action Plan relevant data, and University and City of San Luis Obispo Police data. Additionally, we will conduct stakeholder interviews with the Cal Poly Wheelmen, SLO Bike Coalition, and students.

TASK 1.2 - CREATION OF MAPS AND GRAPHICS

AJW Consulting will create any and all relevant maps and graphics to illustrate current resources and treatments as well as data indicating pedestrian and cyclist risk exposure.

TASK 1.3 - COMPLETION OF LEAGUE OF AMERICAN BICYCLISTS BICYCLE FRIENDLY UNIVERSITY PROGRAM DRAFT PROPOSAL

AJW Consulting will review and complete all relevant sections of the League of American Bicyclists Bicycle Friendly University program draft proposal as pertaining to the consultant's 'education' sector. This will involve the analysis of current offered courses and outreach procedures that the University currently undergoes.

DELIVERABLES

Background Report

League of American Bicyclists Bicycle Friendly University draft

TASK 2 - OPPORTUNITIES + CONSTRAINTS

The second task outlines the completion of the opportunities and constraints analysis following the background report.

TASK 2.1 - ANALYSIS OF OPPORTUNITIES AND CONSTRAINTS

AJW Consulting will utilize strong local knowledge and experience to analyze the opportunities and constraints of the university. Additionally, AJW Consulting will interview knowledgeable campus and community resources to supplement any prepared analysis.

TASK 2.2 - ANALYSIS OF SURROUNDING NEIGHBORHOODS

Included in this analysis, the Consultant Team will study the areas surrounding the campus and determine how the university positively and negatively affects motorists and parkers who interact with bicyclists and pedestrians in these areas. This will include an analysis of possible improvements for areas lacking bicycle infrastructure. Additionally, we will develop a series of goals and objectives that we want to address in our policy and design recommendations.

TASK 2.3 - POLICY AND DESIGN RECOMMENDATIONS

AJW Consulting will identify key intersections/sites and make recommendations for how these can be improved through policy and design improvements. Key intersections/sites will include, but are not limited to: Perimeter Road/University Drive corridor and the Bella Montana residential development. Additionally, this will involve a review of the Cal Poly Master Plan to better understand any possible design proposals.

DELIVERABLES

Opportunities and Constraints Analysis

TASK 3 - DESIGN PROPOSAL + CONCEPTS

This task will build upon the initial recommendations memo outlined in Task 2.

TASK 3.1 - KEY INTERSECTIONS / SITE DETERMINATION

AJW Consulting will make a final determination of key intersections/sites that should be improved and analyze these in depth. This will include an analysis of property rights, infrastructure costs, and varying interest groups.

TASK 3.2 - ANALYSIS OF SURROUNDING NEIGHBORHOODS

In the interest of putting accuracy over precision, AJW Consulting will demonstrate knowledge of the difference in magnitude of costs between various infrastructure types by outlining steps in an implementation scheme that includes drawings and analysis. This will draw directly from the background report and case studies analyzed. Additionally, the identification of timeframe and cost involved, as well as a cost/benefit analysis may be involved.

TASK 3.3 - POLICY AND DESIGN RECOMMENDATIONS

AJW Consulting will tailor this task in relation to the main identified intersections/sites, however will ensure that the takeaways can be applicable to the university at large.

DELIVERABLES

Design proposal and analysis

TASK 4 - FINAL REPORT

TASK 4.1 - COMPILATION

This task will include a compilation of the three previous deliverables into a seamless final report prepared for issuance to the university and key stakeholders.

TASK 4.2 - FINAL TRANSITION ANALYSIS

Sections will be reviewed for consistency and seamless transitioning.

TASK 4.3 - CREATION OF PRESENTATION

The final presentation will be created in PowerPoint form, including key aspects of our compiled final report.

TASK 4.4 - FINAL PRESENTATION

AJW Consulting will present a PowerPoint presentation upon the submittal of the Final Report.

DELIVERABLES

Final compiled report

BACKGROUND REPORT

INTRODUCTION

In accordance with the initial Work Plan, AJW Consulting has conducted our Background Report. The following report includes a preliminary analysis of relevant existing data, a synopsis of comparable case studies, an analysis and creation of relevant maps, and the completion of the education section of the League of American Bicyclists Bicycle Friendly University program draft proposal.

PROCESS

AJW Consulting takes a unique approach to formulate deliverables and our design perspective. We begin with a qualitative approach: analyzing the context of the site's character, researching best practices, and identifying influential themes. Our Background Report is indicative of this approach. Even though AJW Consulting has strong local experience, we began by analyzing all of the most relevant documents that directly influence the bicycle climate of Cal Poly. After this, we analyzed key case studies to identify implementable best practices that attain Cal Poly's aspirations. Following this, we collected data that could be mapped, and noted any positive or negative impacts that effect Cal Poly on a large scale. This approach is somewhat of a 'top-down' approach, meaning we begin with big picture issues and develop specific goals through our deliverable progression.

EXISTING DOCUMENTS + DATA

CAL POLY MASTER PLAN

The Cal Poly Master Plan presents a vision for a bicycle friendly campus. The authors identify the issues that have plagued Cal Poly's circulation for a long time – the campus was designed with the automobile in mind. Bikes were left as an afterthought, and have mostly been relegated to awkward and inconvenient bike paths that often do not interconnect. Bikes are mostly forced to share roadways with vehicles, which is dangerous for both vehicle and rider, and are kept out of the center of campus, forcing any bike rider to inconveniently either park or walk their bike into the campus core.

Cal Poly's master plan focuses on interconnectedness, both inside campus and outside. The master plan calls for bike routes through all the major thoroughfares of campus, with clearly marked bike lanes using special surfaces, color markings, and attractive signage. Additionally, it calls for Class II bike lanes on Highland Drive, California Boulevard, and Grand Avenue to both be constructed and attached to existing City bikeway systems. In the Master Plan's vision, bicycles should be the most convenient way to access all resources on campus.

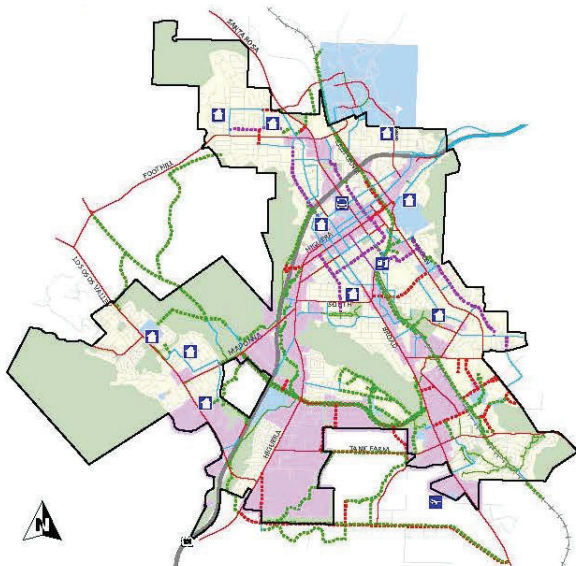
This vision achieves multiple aims. Firstly, it massively reduces the amount of cars on campus. This promotes sustainability on campus economically, environmentally, and socially. Students and professors not being forced to drive to campus save on gas, not even considering the high entry cost of purchasing a vehicle. Single occupancy vehicular trips account for a massive amount of Cal Poly's MTCO_{2e} emissions. And implied borders created by roadways inherently separate and divide the campus core into areas, instead of a proper university campus. Allowing students and bike riders to use the campus as a public space for people, as opposed to a closed off space for automobiles, promotes a healthier and more attractive campus for all constituents. All new construction on campus needs to have the human being in mind, not the unconscious automobile.



BICYCLE TRANSPORTATION PLAN

In 2013, the City of San Luis Obispo produced a plan, covering the existing bicycle network and proposed additions and amenities. These new projects give bicyclists more safety and accessibility, which is integral in encouraging more people to ride their bikes. The plan also outlines the expectations for maintenance, including fixing large cracks or uneven surfaces. It also identifies the organizations that the city has partnered with, including SLO Rideshare, SLO County Bike Coalition, League of American Bicyclists. In addition, the plan sets out to increase bike use to a 20% mode share and increase the number of class one bike paths throughout the city.

One of the innovative safety additions are the Bike Boxes (shown here on Madonna Road and Higuera Street) which put bicyclist ahead of cars, allowing for increased visibility and ease of crossing intersections.



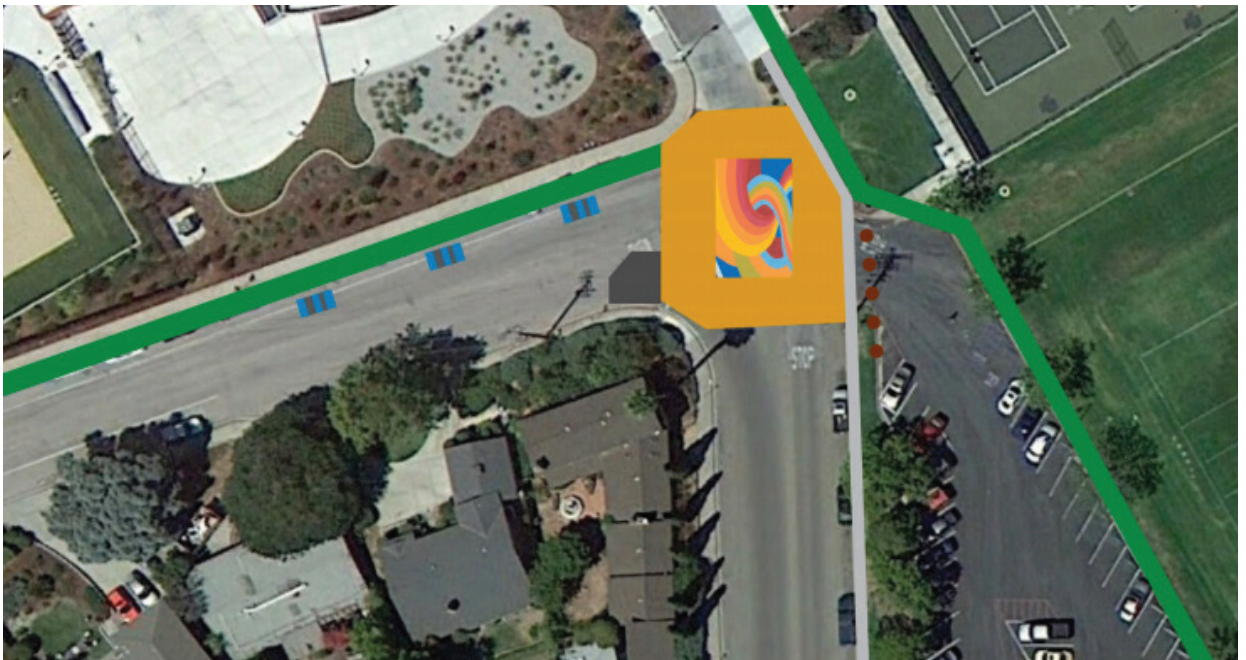
BICYCLE AND PEDESTRIAN PLANNING COURSE

In the Spring of 2015, the 'Bicycle and Pedestrian Planning' course offered through the City & Regional Planning department tackled an initial assessment of several intersections that influence the bicycle environment at Cal Poly. The data obtained by the student planners in this course served as a reference point that was utilized by AJW Consulting. The coursework completed includes preliminary indication of intersection issues, case studies, and proposals for successful design solutions. Four intersections were extensively analyzed in this course:

1. Grand Avenue and Pacheco Way - Served mainly by first-year Cal Poly students, this intersection's largest issue was illegal and unsafe pedestrian crossings. The proposed solutions are depicted below.



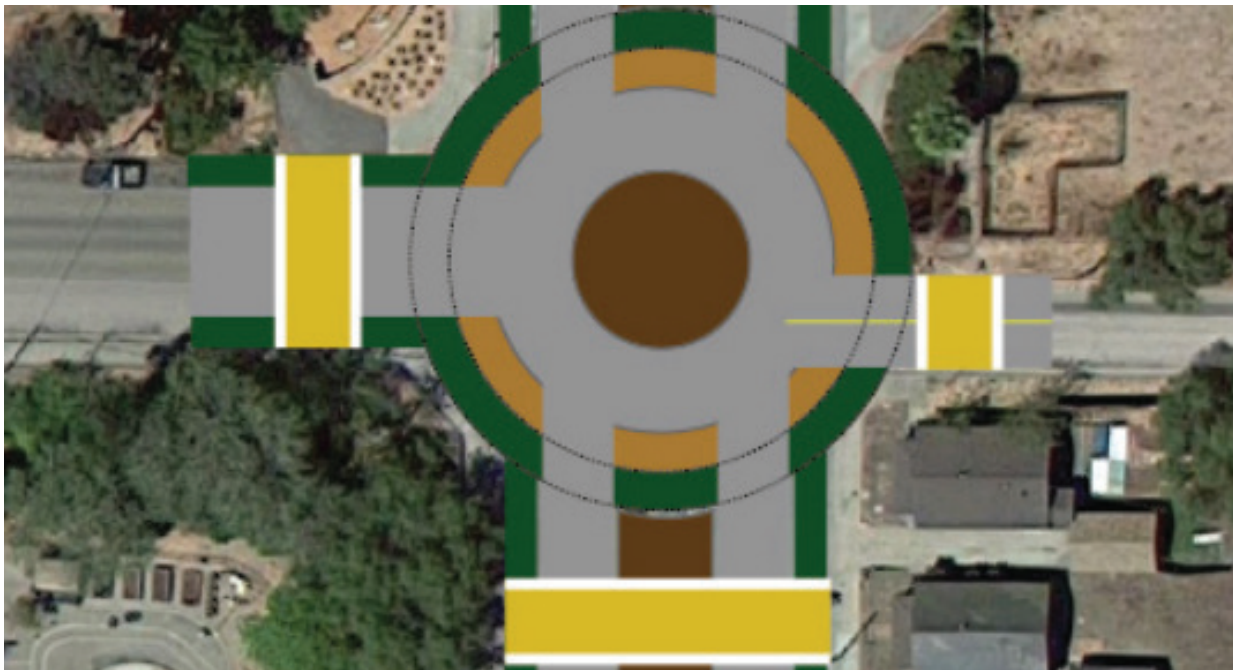
2. Hathaway Avenue and Longview Lane - The largest issue of this intersection was its inherently awkward design. With a parking lot, two streets, and a pedestrian path all converging in one area, the proposed plan sought to remedy this through a painted 'pedestrian scramble' intersection and better indication of bicycle paths.



3. Longview Lane and Slack Street - Frequented by both students accessing campus and the San Luis Obispo community, this intersection had several issues to overcome. With a large downhill slope increase vehicular speed, an awkward convergence of streets, and a lack of pedestrian and bicycle infrastructure, this intersection is quite unsafe. The proposed design included buffered bicycle lanes, wide sidewalks, and clear crosswalks.



4. Grand Avenue and Slack Street - With a very high automobile traffic volume, this intersection tackled tactics to limit the emphasis on the automobile and rework it to emphasize pedestrian and bicycle activity. The proposed redesign included a large roundabout, vegetation, and large crosswalks.



POLY CLIMATE ACTION PLAN

In 2015/2016, CRP 410/411 conducted outreach events to gather data for the Climate Action Plan the class drafted. Included in these events was an activity to create a map, on which students were asked to identify what areas they liked and disliked about campus as well as how and where they entered campus. Along with this map, there is also data of peak hours for pedestrians and bicycles, along with the number of people wearing/not wearing a helmet. This was conducted in the CRP 410/411 course, and can be used in the future to analyze individual intersections and their safety.



CASE STUDIES

UNIVERSITY OF CALIFORNIA: DAVIS

Bicycle Friendly University Award: Platinum

Student Population: 33,300

The University of California: Davis offers some very successful best practices to examine. Being regarded as “The Bicycle Capital of the U.S.”, Davis is an immaculate example of how to model Cal Poly’s bicycle plan (Takemoto-Weerts, 2012). This section summarizes key takeaways from the UC Davis Bicycle Plan.

In terms of enforcement, the UC Davis plan mandates that all bicycles ridden on campus be registered with the University Police. This requirement allows for accountability and a comprehensive system to aid finding stolen bicycles. Additionally, UC Davis has a student bicycle patrol system that maintains safety for students by students.

In order to maintain a strong sense of bicycle education, UC Davis makes a strong effort to hand out Davis bike maps at any and all events. This maintains visibility and awareness of bicycle paths in regards to the university and the city, plus the bike map is a useful document that people desire to attain. The university itself also has students create an educational video entitled “How to Avoid Face Plants” that airs on the campus circuit television station. This enables students to attain a bicycle education at several times throughout the day. For a more structured approach, UC Davis offers many bicycle repair courses that inspire students to become more active in the bicycle community. Additionally, the university often gives away coupons for discounts on bicycles, helmets, and other accessories.

The UC Davis plan touched on some tactics that Cal Poly has successfully already accomplished. For example, the importance of a bicycle-oriented city culture is outlined in the UC Davis plan. Through the SLO Bike Coalition, San Luis Obispo and Cal Poly have already achieved this to some degree. Also, the UC Davis plan communicates the importance of bicycle maintenance stations, which Cal Poly already has installed as well. This tells us that Cal Poly is on its way to success, however the university needs to continually put forth the importance of a bicycle culture.



PORTLAND STATE UNIVERSITY

Bicycle Friendly University Award: Platinum

Student Population: 28,241

Portland State University was recognized with the 'Gold' designation for a bicycle friendly campus for many years before receiving 'Platinum' in 2015. AJW Consulting used this case study as an example for how to improve programs already in place.

An interesting program the Portland State University implements is entitled the "Vik Bike" rental program. In order to achieve the 'Platinum' designation, the university increased this program from 12 bicycles to 134 bicycles within a couple of years. The program is incredibly unique and worth considering as a model for Cal Poly. It simply allows students to rent a bike, light, lock, and helmet for a single term at a time. Additionally, it includes training on maintenance and safe commuting practices to further reinstate the university's bicycle culture. It continues to gain popularity.

Portland State University also put a large emphasis on ensuring that infrastructure was provided by the school in order for there to be no deterrent for not riding a bicycle. This infrastructure improvement involved the implementation of 2200 indoor and outdoor bicycle parking spaces that allow ease for finding a parking location. This reflects that Cal Poly could continue to improve its bicycle parking infrastructure by creating a comprehensive and cohesive system of bicycle racks.



MAPS

Figure 1 is a map produced by Cal Poly that displays the existing no bike zones on campus. These zone influence the location of bicycle routes on campus and impact bicycle and pedestrian safety.

FIGURE 1



Figure 2 identifies the location and number of bicycle racks within the campus core. This information is important in order to make educated inferences as to whether cyclists are turned away by not having sufficient parking.

FIGURE 2

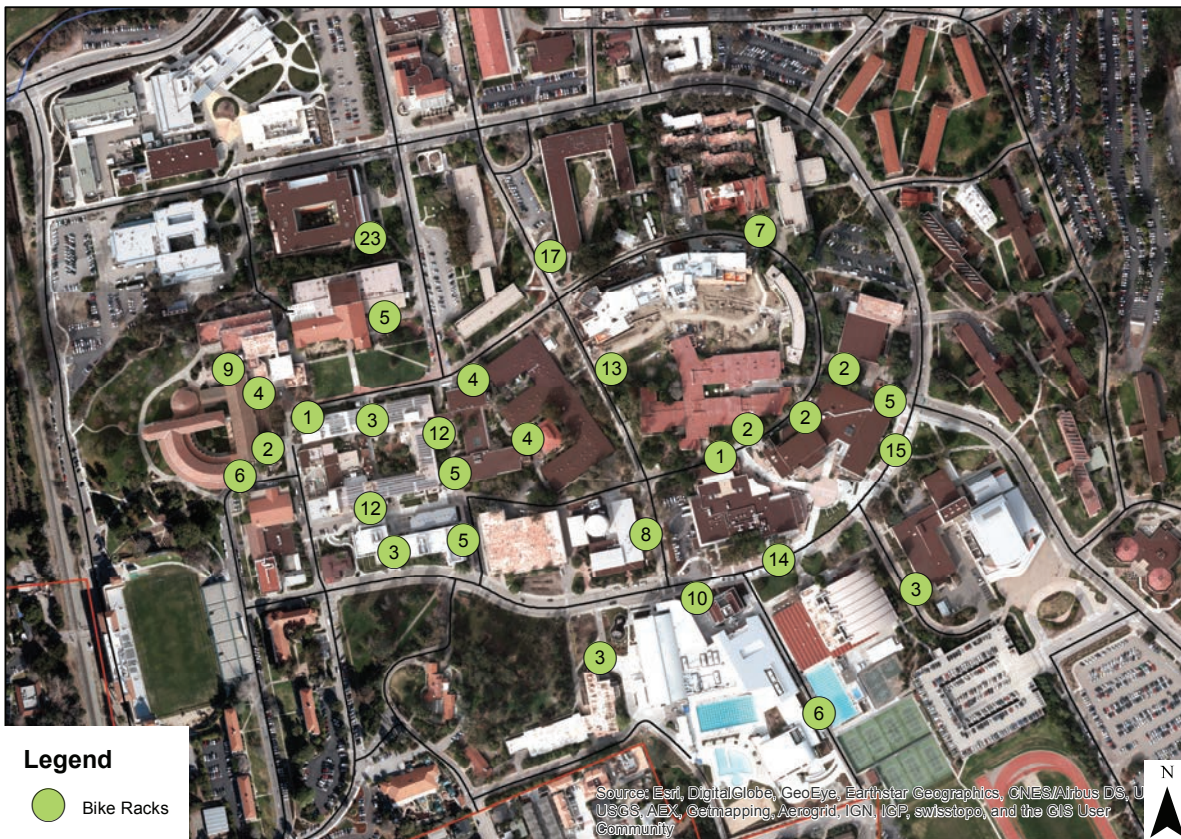
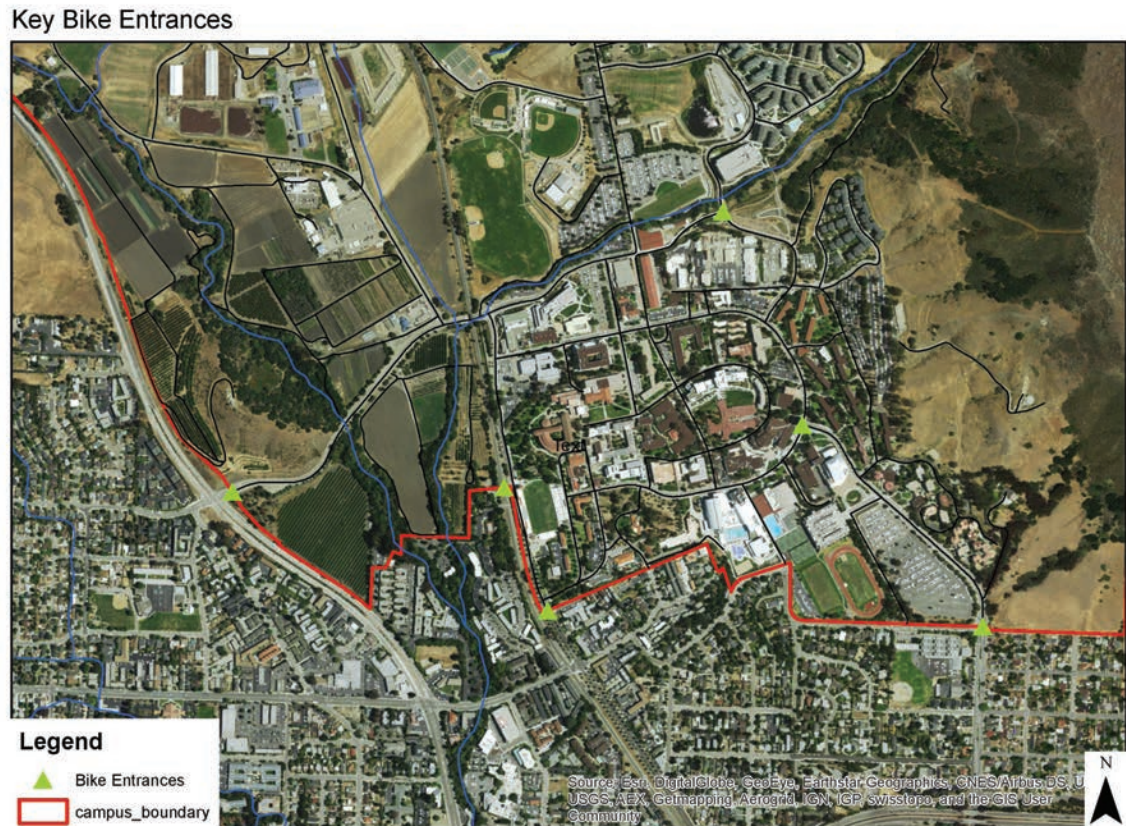


Figure 3 shows key bicycle entrances used by students. This data has been taken from one of the Climate Action Plan outreach events that occurred in Fall 2015. It pertains to our study by highlighting the most important and best utilized intersections.

FIGURE 3



KEY STAKEHOLDERS

Chief of Police - George Hughes
Professor - Billy Riggs
Cal Poly Wheelmen Representative - Matt Sluski
Bicycle Commuters

CONCLUSION

In accordance with the initial Work Plan, AJW Consulting has conducted our Background Report. The report allowed us to analyze the effects of the San Luis Obispo bicycle environment and how it positively and adversely affects the university climate. Through local knowledge and through this report, AJW Consulting began to uncover opportunities and constraints that will assist in developing a quality design proposal for the two identified sites.

OPPORTUNITIES + CONSTRAINTS REPORT

INTRODUCTION

In accordance with the initial Work Plan, AJW Consulting has conducted our Opportunities & Constraints Report. The following report includes an analysis of key positive and negative impacts that influence the university and the two identified sites. Included in this analysis are policy and design recommendations that offer existing conditions photos of the respective sites.

PROCESS

AJW Consulting takes a unique approach to formulate deliverables and our design perspective. We began with a qualitative approach that allowed us to develop impactful themes. After understanding of impactful themes, we immersed ourselves in the respective sites and gained first hand knowledge of positive and adverse effects, and how we can improve the existing conditions. We determine our recommendations based off of our local knowledge, experience, and the pertinent impactful themes.

PERIMETER ROAD / UNIVERSITY DRIVE CORRIDOR

The North Perimeter Road corridor is located near the heart of campus, between University Drive and South Perimeter Road. It creates an important connection between two of the major roads on campus, University Drive and Grand Avenue, as well as linking to Village Drive leading up to PCV. Along the corridor there are two parking lots: that of the Bioresource and Agricultural Engineering building, and that of the Alan A. Erhart Agriculture building. These elements will need to be adjusted in order to better accommodate bicycles and pedestrians.

OPPORTUNITIES + CONSTRAINTS



The Perimeter Road / University Drive Corridor (PUC) is an older corridor that has been explicitly designed for vehicular access. The roadway was never meant to be a social pedestrian space - most structures along the PUC are situated away from the street, are not accessed from the street side, and have no entrance designed to welcome pedestrians. No retail or food options exist along the corridor. Very few students use the PUC for pedestrian traffic, instead choosing to go through the more pedestrian friendly campus core. However, the site is full of opportunities to transition to a more bike and pedestrian friendly environment. Reducing vehicular access to the site could provide a large amount of design space to manipulate. The PUC's multiple connections to major off-campus thoroughfares provide an excellent amount of connectivity and potential traffic. With new parking garages going in on Highland as discussed in the Cal Poly Master Plan, students and faculty will remain being able to park on campus and walk through this area, making currently dangerous intersections safer for the Cal Poly Community. Constraints include the fact that many vehicles besides private single occupancy cars use this pathway for professional reasons. Public transportation currently uses the PUC as the connection between Grand Avenue and California Boulevard. Cal Poly Police are located directly off of the PUC. Restricting vehicle access will make many current vehicular operations make significant changes. Restricting vehicle access will also reduce parking on campus, a traditionally unpopular design choice. The lack of existing pedestrian oriented facilities will require not just construction on the PUC itself, but addition of new pedestrian resources.







OPPORTUNITIES	CONSTRAINTS
Main thoroughfare of campus	Currently supports heavy vehicular traffic
High pedestrian and bicycle traffic	Unsafe intersections
Multiple connections to off campus paths	Provides vehicular access to multiple parking lots and facilities
Suitable parking access, especially considering new parking garages intended in Master Plan update	Designed around the vehicle, not the pedestrian
Wide enough to provide landscaping options	Restriction of vehicular access could impact public transportation options
	Less navigable campus for new visitors
	Buildings not typically oriented to street
	Reducing parking on campus typically unpopular
	No easy way for cars to cross campus without access






NEIGHBORHOOD IMPACTS

North Perimeter is a highly trafficked area near the heart of campus. Nearby are essential features of the Cal Poly campus, such as the sports fields, University Police Department, Cal Poly Corporations, and the Kennedy Library. This creates a need for public transportation to be present and easily accessible. There is a lot of potential for the corridor, but the need for vehicle connection of some sort through campus creates a need for redirection. Two parking lots are situated on North Perimeter, making their closure a difficult process that will surely have an impact on the surrounding parking. Other existing streets that connect through campus in this area are hardly wide enough to support vehicle traffic, creating the need for widening of these streets, or development of a new transit route. Vehicle traffic will be pushed to other roads on campus in order for people to get around. Altogether, changes in the physical environment of Cal Poly will inevitably have an impact on the future students and faculty that wish to commute to and maneuver through campus in a vehicle.

POLICY + DESIGN RECOMMENDATIONS

POLICY RECOMMENDATION	DESIGN RECOMMENDATION	DESCRIPTION	PHOTO
Remove vehicular traffic from North Perimeter	Woonerf for public transit	The corridor places emphasis on the automotive vehicle. AJW Consulting recommends implementing complete streets in order to allow for a greater focus to be placed on the pedestrian and the bicyclist.	
	Restrict private vehicular traffic through Perimeter to Klamath	In order for vehicles to still get through campus, traffic must be rerouted to another street. AJW Consulting suggests that Klamath be widened in order to make a private vehicle crossing of campus up through PCV.	

<p>Promote environmental sustainability</p>	<p>Drought resistant landscaping</p>	<p>AJW Consulting sees a need to maintain aesthetic appeal while being conscientious of the current water conditions through the use of drought resistant landscaping. Cal Poly's campaign to stop watering lawns on campus is a great display of this environmental awareness.</p>	
<p>Improve bike amenities on campus</p>	<p>Clearly indicated bike paths through campus</p>	<p>Currently, road sharing on the North Perimeter corridor can make it difficult to identify where bike paths start, end, and intersect. AJW Consulting recommends that these paths and lanes are made more distinct and easily identifiable.</p>	
	<p>Cohesive bicycle and pedestrian connections</p>	<p>Most of North Perimeter forces bicyclist into the road and limits pedestrians to small sidewalks. Opening up the corridor to use by both modes would allow for better connections with existing paths on campus. Feed Mill Road is a great example of an existing route that could be better connected and better utilized.</p>	
	<p>Establish more bicycle maintenance centers</p>	<p>Currently, there are no bicycle maintenance stations located along the North Perimeter corridor, and none are displayed in the Master Plan update. Such stations would be great additions to improve the experience of bicyclists.</p>	
<p>Improve the pedestrian experience</p>	<p>Make roadways more friendly and open / safe</p>	<p>The intersection at Kennedy Library is highly trafficked by vehicles and the constant stream of cars make crossing as a pedestrian difficult and dangerous. Making intersections safer and easier would create a stronger campus community by making the campus more pedestrian friendly.</p>	
	<p>Remove artificial barriers from pedestrian interactions</p>	<p>AJW Consulting recommends that shared spaces be utilized in order to encourage vehicles and bicycles to drive slower, increasing the safety of pedestrians and vehicles alike.</p>	

<p style="text-align: center;">Increase campus connectivity</p>	<p>Integrate walking and biking further to PCV</p>	<p>The roadway to and from Poly Canyon Village intersects North Perimeter. This road is utilized mostly by automotive traffic. AJW Consulting recommends providing better bicycle and pedestrian routes along this road in order to integrate PCV into the rest of campus.</p>	
	<p>Extend the Via Carta path</p>	<p>Via Carta is a great show of existing paths through campus. The closure to automotive traffic makes the path more pedestrian and bicycle friendly. AJW Consulting believes connecting the closed North Perimeter to Via Carta would make for an effective public space and transit route.</p>	
	<p>Better incorporate Campus market and Ag. Engineering into the rest of campus</p>	<p>As stated above, the intersection at Kennedy Library is highly trafficked by vehicles, and the stream of traffic creates a separation between either side of North Perimeter. AJW Consulting feels that making this area more friendly to pedestrians would bridge the gap between these two sides of campus.</p>	
	<p>Establish an E-W axis on campus</p>	<p>The North Perimeter corridor has the potential to create a strong East-West connection through campus for pedestrians and bicyclists.</p>	
<p style="text-align: center;">Integrate the updated Master Plan into designs and policies</p>	<p>Incorporate Master Plan Bike paths</p>	<p>The Master Plan outlines new bike paths for campus that intersect and connect to North Perimeter. AJW Consulting feels it is imperative that designs are made with these future paths in mind.</p>	

BELLA MONTANA

Located adjacent to the Highland Drive and Santa Rosa intersection, Bella Montana is a faculty housing development with many opportunities to be reworked in such a way that caters to a bicycle and pedestrian environment.

OPPORTUNITIES + CONSTRAINTS

Bella Montana has variable existing positives and negatives. Fortunately, the development itself is well utilized, therefore it has a reasonably acceptable density. It has good existing road and green space infrastructure, which allows potential for retrofitting these into more usable areas. Also, its location is near the university, which provides the complex with a strong connection to campus and brings life in and around the site. However, being located just off of the Highland Drive and Santa Rosa intersection poses many problems, including noise from Highway 1 and sloping topography, which is the cause for the development's awkward configuration. Additionally, the existing design is cut off from the surrounding city context. The complex is oriented within itself and pertains very little to its surrounding neighborhood. With one access point and no street frontage, the complex also does little to relate to the pedestrian. Within the complex itself, the overbearing garages and lack of pedestrian and bicycle infrastructure forces tenants to rely on automobiles as the most effective way for transportation.



OPPORTUNITIES	CONSTRAINTS
Proximity to university	Awkward complex configuration
Density	Sloped topography
Highly trafficked surrounding paths	No social interaction/community space
Roadway and parking lots within complex are wide enough for retrofit	Site dominated and built for explicit use of automobiles
Green space within complex	Single access point
	Poor building aesthetics
	Buildings oriented with garages in front
	Poor pedestrian connectivity internally and externally
	No sense of place





NEIGHBORHOOD IMPACTS



The Highland Drive area is a neighborhood indicative of a post-WWII development pattern. The configuration uses Highland Drive as the main axis in which many curved streets stem from reflects this. Bella Montana is included in this type of development and has had to conform to the inefficient street pattern that surrounds it. Its single axis point connects directly to Highland Drive and it is constrained by Highway 1 to the East and Couper Drive to the West. While the complex is limited, as mentioned, the context within has opportunities for retrofit and growth.

Bella Montana functions independently from the surrounding neighborhood. Because the development is cut off from the Highland area, it does little to affect it. The main impact it has on the surrounding neighborhood is the inflow and outflow of traffic at points during the day. The faculty who live in the complex travel through the Highland Drive and Santa Rosa intersection periodically throughout the day, increasing the use of the intersection and street pattern. The density of the complex helps to add livelihood to the area and offers potential opportunities.

POLICY + DESIGN RECOMMENDATIONS

POLICY RECOMMENDATION	DESIGN RECOMMENDATION	DESCRIPTION	PHOTO
<p>Promote accessibility</p>	<p>Create access points that better connect to the neighborhood context</p>	<p>One of Bella Montana’s largest issues is its connection and relationship to the street pattern; its single access point cuts it off from the context of the neighborhood. While this may have been intentional, AJW Consulting proposes a reintegration of the development into the Highland neighborhood. Although providing access will not prove immediately beneficial, as Cal Poly expands west and housing development intensifies in the area, pre-existing connections will allow stronger neighborhood development.</p>	
	<p>Rework Highland & Santa Rosa Intersection and connect it to the rest of campus in a more meaningful way</p>	<p>Adjacent to Bella Montana is the Highland & Santa Rosa intersection. This is a key point for many traveling to and from Cal Poly. Its design directly affects those who live in Bella Montana. Currently, the intersection is large and emphasizes the busy automobile traffic. AJW Consulting proposes a reworking this intersection to include bulb outs, identifiable bicycle and pedestrian walkways and lanes, and traffic calming measures that more effectively slow down the fast traffic coming from Highway 1. Reworking this intersection will also help with connecting it to campus in a way that benefits all of those who utilize it.</p>	

<p>Ensure the built environment relates to human scale</p>	<p>Reorient buildings to achieve a more comfortable pedestrian environment</p>	<p>The development is oriented in a unique way: within itself. It does little to relate to the street pattern and is controlled by the overbearing garages looming underneath the units. AJW Consulting proposes that these buildings be reworked so they relate to the street pattern and the pedestrian in a more meaningful and comfortable way.</p>	
	<p>Push pedestrian paths to front in order to create more friendly development</p>	<p>As aforementioned, the pedestrian paths weave together behind each building. This creates a strange system of internal paths that take away from the potential of a lively street pattern. AJW Consulting proposes that the sidewalks be reimplemented along each roadway.</p>	
	<p>Create a usable community space</p>	<p>Bella Montana is an independent complex that does nothing to benefit the residents socially. There is minimal sense of place and no community space for residents to gather and converse. AJW Consulting proposes reworking the central space of the development and constructing a community space that can be enjoyed by all residents.</p>	
	<p>Update building aesthetics</p>	<p>The buildings of Bella Montana do little to add any character to the complex. They blend together and offer residents no ability to make their homes unique. This further deters from the sense of place that this complex is in need of. AJW Consulting proposes adding character elements and freedom for residents to update their exteriors to relate more to their own desires.</p>	

<p>Promote alternative transportation</p>	<p>Limit auto street widths and implement bicycle paths</p>	<p>Currently, Bella Montana utilizes a unique system of internal pedestrian paths with no true sidewalks along the complex's street system. This pulls any street activity away from the actual street and creates looming street corridors that are impossible to bike through. Fortunately, the streets are reasonably wide, therefore bicycle paths should be implemented to better the complex's environment.</p>	
	<p>Update dirt path</p>	<p>Adjacent to Bella Montana is a highly trafficked dirt path. This path is utilized by many students and faculty who live in the Highland neighborhood. It currently is unpaved, trashed, and dangerous. Given the amount of pedestrian and bicycle traffic this path endures, AJW Consulting proposes implementing safety features and paving the path to create a comfortable pedestrian and bicycle environment.</p>	

CONCLUSION

In accordance with the initial Work Plan, AJW Consulting has conducted our Opportunities & Constraints Report. This report has covered key opportunities and constraints, neighborhood impacts, and comprehensive policy and design recommendations. Based on local experience, review of existing documents, and case studies, AJW Consulting deemed the stakeholder input portion of this unnecessary at this stage. This is largely due to the fact that the consulting firm has extensive experience in and around the given sites, and the reviewed documents contain existing stakeholder interviews that are commonplace. In conclusion, the analyzed components further reinstate that the indicated sites are in need of retrofit. Through our policy and design recommendations, AJW Consulting can now create design proposals that will address all indicated issues and evolve these sites to become increasingly more efficient.

DESIGN PROPOSAL + CONCEPTS

INTRODUCTION

In accordance with the initial Work Plan, AJW Consulting has completed our final Design Proposal and Concepts. These concepts highlight tactics for improving areas of Cal Poly and Bella Montana to better cater to the pedestrian and bicyclist. The background report, opportunities and constraints analysis, and case studies researched directly affected our design process.

PROCESS

AJW Consulting takes a unique approach to formulate deliverables and our design perspective. We began with a qualitative approach that allowed us to develop impactful themes. After understanding of impactful themes, we immersed ourselves in the respective sites and gained first hand knowledge of positive and adverse effects, and how we can improve the existing conditions. We determined our recommendations based off of our local knowledge, experience, and the pertinent impactful themes. Following this, we collaborated to produce comprehensive design concepts that depict our unique perspectives.

KEY DESIGN PRINCIPLES

1. Design for the human scale
 - Designing for a human perspective as opposed to the vehicle. Many times, spaces are designed for vehicles and feel foreign and dangerous to the pedestrian. Designing in the human scale entails smaller structures and roads, more confined spaces, and safer transit routes.
2. Integrate development into neighborhood context
 - Suburban developments often can feel isolated from each other, with unfriendly facades creating a hostile environment. Integrating development into the neighborhood context means making sure that developments attach to each other, and do not feel isolated.
3. Create an aesthetically pleasing built environment
 - An aesthetically pleasing built environment makes the pedestrian happier, increases commercial value, and a whole host of other benefits. This principle should always be kept in mind when designing for any audience.
4. Design for the pedestrian and bicyclist
 - Similar to previous points, designing for the human experience is much more important than designing for the vehicle - the vehicle cannot perceive a space, does not feel emotions about it. Additionally, safety concerns encourage designing pedestrian and bicycle friendly environments.
5. Reduce traffic volumes and speeds
 - Reducing or eliminating traffic volumes opens up a tremendous amount of space for the pedestrian to explore and utilize. Unnecessarily restricting design space for the vehicle ends up creating a hostile environment.
6. Connect to existing routes and trip generators
 - Increasing efficiency in routes benefits all modes of transport. By enhancing, bicycle, pedestrian, and public transit options you not only remove single occupancy vehicles from campus but can make these routes more efficient than single occupancy vehicles ever were.

7. Promote alternative transit options
 - If traffic volumes are to be severely limited, alternative transit options need to exist to provide the much needed service of transportation. Simply restricting all traffic volume will only result in mass confusion and frustration.
8. Provide opportunities for connections to future growth
 - Providing outlets at anticipated growth points allows for future integrated development and a stronger neighborhood feel as communities expand. This combats the feeling of isolation between developments.
9. Create a safer pedestrian environment
 - This principle combines many design principles to create a safer climate for the pedestrian. Reducing traffic, widening roads, separating modes of transit, designing sustainably, and other safe design options enhance the pedestrian experience greatly.
10. Promote environmentally sustainable design
 - Promoting environmentally sustainable design increases property value as well as protecting the health and safety of your populace. As a University, Cal Poly also has the semi-unique opportunity to provide educational opportunities within these sustainably designed infrastructure improvements.

PERIMETER ROAD / UNIVERSITY DRIVE CORRIDOR

DESIGN

The North Perimeter corridor currently places the automobile as its focus. Bicycles are put on the road with buses and cars, and pedestrians are only given five foot sidewalks. North Perimeter intersections are hectic and often dangerous. The AJW Consulting Group's redesign of the corridor places an importance on safety and ease for pedestrians and bikes. The design aims to encourage the use of public transportation by having a bus only road traveling through the corridor, with other vehicle being rerouted onto Klamath.

The AJW Consulting design addresses the need for better connection and accessibility for pedestrians and bicycles along the corridor, while addressing the needs of automobiles and incorporating existing infrastructure. This allows for better connection and cheaper construction. A class one bike path is proposed, along with a bus only vehicle lane. Using planters, modes of transportation are safely separated into their own lanes of travel, with ample space for pedestrian traffic. The corridor is designed simply, in a way that is both reasonable to implement and aesthetically pleasing.

FIGURE 1 - FIGURE GROUND MAP



FIGURE 2 - STREET SECTION

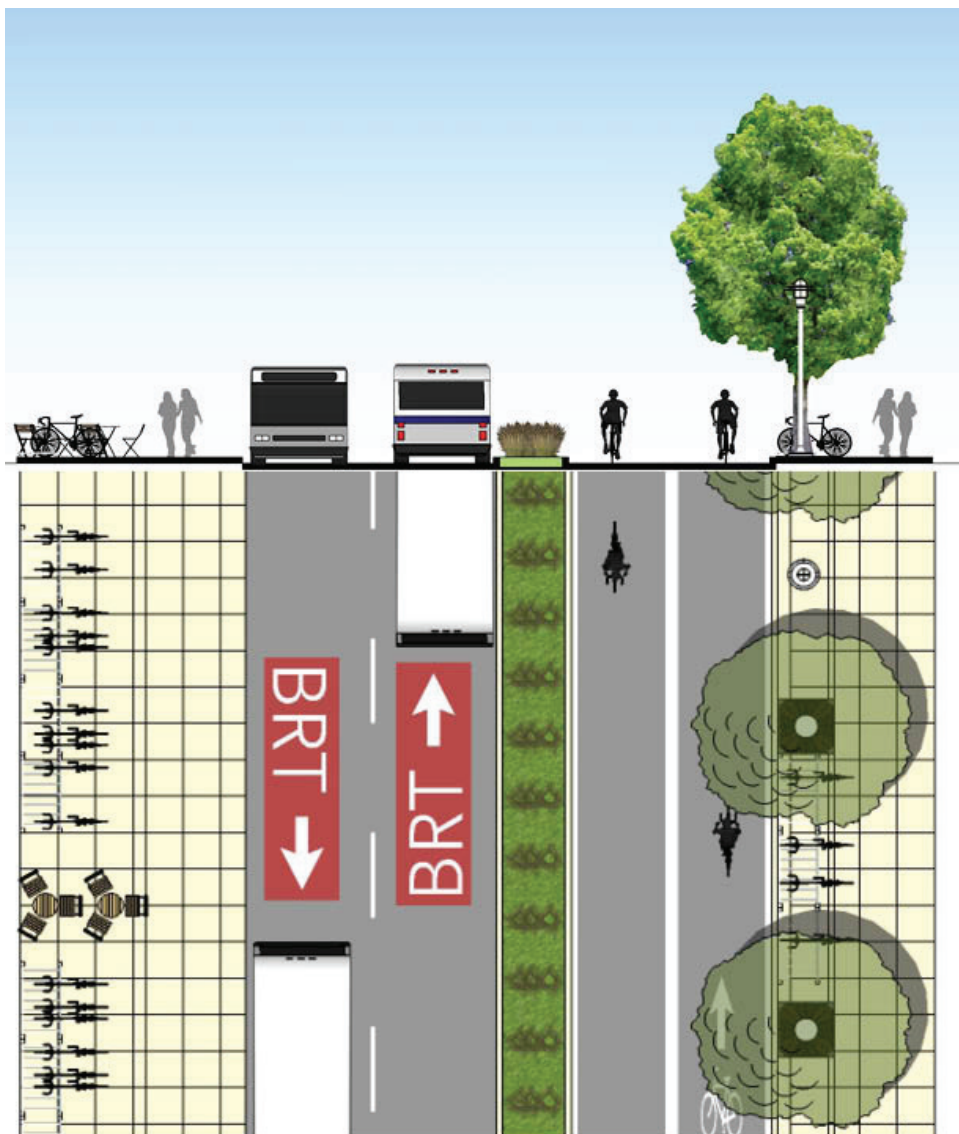


FIGURE 3 - STREET RENDER



SITE LOGISTICS + IMPLEMENTATION

Property Rights

The PUC is entirely Cal Poly property. This simplifies matters greatly - dealing with a single stakeholder removes the complication of multiple inputs conflicting over property rights. Cal Poly has a vested interest in creating the most visually appealing and pleasant experience for the pedestrian. A more attractive campus serves to attract students and faculty, and encourage them to stay longer and therefore provide more income. Due to Cal Poly being a state university, the City of San Luis Obispo does not maintain Cal Poly streets. Therefore, modifying the streetscapes should be a fairly simple process provided that the money is in place to support such a venture.

Infrastructure Costs

The AJW design proposal calls for the closure of the PUC to private vehicles. Students and faculty will no longer be able to drive low-occupancy vehicles through the campus core. Instead, the roadway will be redesigned to allow for bus transit, class I bike lanes, and new, more pedestrian friendly walking paths. According to the Ohio Department of Transportation, repaving of a two-lane road costs approximately \$120,000 per lane per mile. The design proposal calls for approximately 0.6 miles of two-lane roadway to be completely redesigned. Including costs of new pavement, expanded bike paths, additional plant life, and new pedestrian paths, AJW estimates a cost closer to \$480,000 per mile of redevelopment. This would bring the cost of redesigning the PUC to a pedestrian and public transit corridor to roughly \$290,000 of initial cost. Note this cost is solely for roadway redesigns - no buildings are recommended to be relocated at this time, and construction of new structures proposed in the Cal Poly Master Plan Update are not considered in this cost estimate.

Vehicles attempting to move through campus will now need to be diverted up Via Carta, through Canyon Boulevard, and down Klamath Road to Grand Avenue. These roadways are not currently suited to handle heavy traffic and will need to be expanded into two lane roadways. According to Capital Fax, an Illinois-based policy newsletter, additional lanes along urban arterials cost approximately \$500,000 per lane, meaning a cost of \$1,000,000 per

mile for additional lanes on either side of the street. Roughly 1.25 miles of roadways will need to be expanded, for an approximate cost of \$1,250,000.

These two major costs combine to approximately \$1,550,000. Allowing for unforeseen expenses and delays, costs are conservatively estimated to be between \$1,750,000 and \$2,000,000 for total work completed.

Interest Groups

The most obvious interest group is Cal Poly itself. Redesigning a major campus corridor and accounting for the consequences of those actions will not be an inexpensive endeavor. Cal Poly will need to be able to see positive results of the redesign almost immediately. AJW Consulting estimates benefits to be noticeable within months of completion. A more complete campus climate will be more environmentally sustainable through the reduction of CO₂e emissions being released throughout campus, more socially sustainable by integrating the campus more completely, and more economically sustainable due to increased attendance and enjoyment of the campus.

Following the University itself will be the student body. At first, AJW Consulting expects a negative response from the student body. Construction will likely take multiple years, and it will inconvenience many students accustomed to the typical routes through campus. However, as students familiar with the old system and new students see the benefits of the project, the student body is anticipated to warm to the redesign. Instead of being confined to the core of the campus as the student body typically has been, students and faculty as well will have access to a far greater amount of social space. This will be critical as the University intends to expand by up to 7,000 students and retain potentially all first and second year students on campus. The current campus core will simply be unable to comfortably hold that size of population.

Faculty will likely follow a similar route to the student body. Although the construction will be unpopular at first, AJW Consulting expect the faculty to follow a similar route to the student body. As mentioned earlier, the campus core is simply too small to support a rapidly expanding on-campus population. Connecting the campus core to the rest of the expanding campus will allow for far more social opportunities and space.

University Police will be impacted by the renovations, and will lose some degree of connectivity throughout campus. In a similar vein, especially during construction, emergency vehicles may find it more difficult to navigate the campus. However, after construction is completed, roadways are designed to still accommodate both public transit and emergency vehicles. University Police will still be accessible via Truckee Road, albeit less conveniently.

Timeframe

AJW Consulting does not identify any major concerns that would delay construction on this project. Due to the loss of parking anticipated by the proposed redesign, AJW Consulting recommends work does not begin until construction of the new residence halls on Grand Avenue completes in 2018. This will also provide an opportunity for the University and Cal Poly Corporation to gather the funds necessary to complete the project. Work is estimated to take approximately one school year, beginning September 2018 and completing by June 2019.

Cost Benefit Analysis

Initial costs for the project will be high, and a redesign of this type does not immediately deliver profit. No profit engine is included in this redesign. However, as mentioned before, the improved social atmosphere of the campus will indirectly generate revenue through the attraction of more students and faculty. Additionally, this is a necessary step to maintaining a higher campus population. Increasing the campus population directs more profit into Cal

Poly, as opposed to local landlords. Additionally, Cal Poly's commitment to significantly reducing CO2e emissions will be unattainable if they continue allowing so many vehicles on campus. The environmental benefits of this project will effectively combat the initial monetary investment required.

BELLA MONTANA

DESIGN

The Bella Montana site is designed around the vehicle. Upon entering, the neighborhood instantly conveys the feeling that if you are not in a vehicle, you do not belong. The AJW Consulting redesign of Bella Montana attempts to redesign the site with the pedestrian in mind, while remaining a cost efficient project. The redesign calls for a more community approach, with a significant increase in open and community space for residents to enjoy. The inclusion of sidewalks and bike paths into the development, as well as the associated narrowing of streets, will slow traffic and place more people onto the street as opposed to private vehicles. This creates a safer pedestrian environment, encourages alternative transportation options, and maintains a human scale to the project. Building frontages are also encouraged to be redesigned to be more inviting to the community. Currently, many of the Bella Montana homes face the streets with large garage doors and flat stucco faces. Redesigning the facades of the structures to open up to the street and relegating the majority of parking to side yard lots and side loaded garages would go a long ways into creating a stronger community feel.

The dirt path along Bella Montana is also proposed to be created into an actual pedestrian corridor. Class I bicycle lanes along Highway 1 will remove pedestrian traffic from dangerous high speed vehicles. Improvements to the path will also enhance the community feel of Bella Montana by reinforcing existing connections and providing future outlets for further expansion north along Highway 1. The site plan does not call for the reconfiguration of existing roadways, as this was seen as too great of a cost and inconvenience to residents to implement.

FIGURE 4 - SITE PLAN



FIGURE 5 - INSERT STREET SECTION

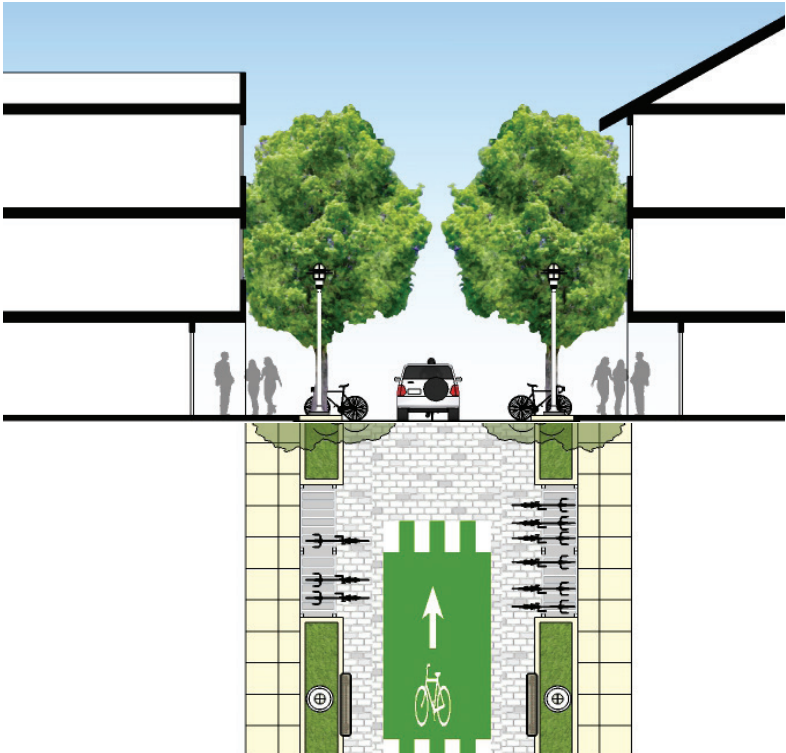


FIGURE 6 - STREET RENDER



FIGURE 7 - DIRT PATH STREET SECTION

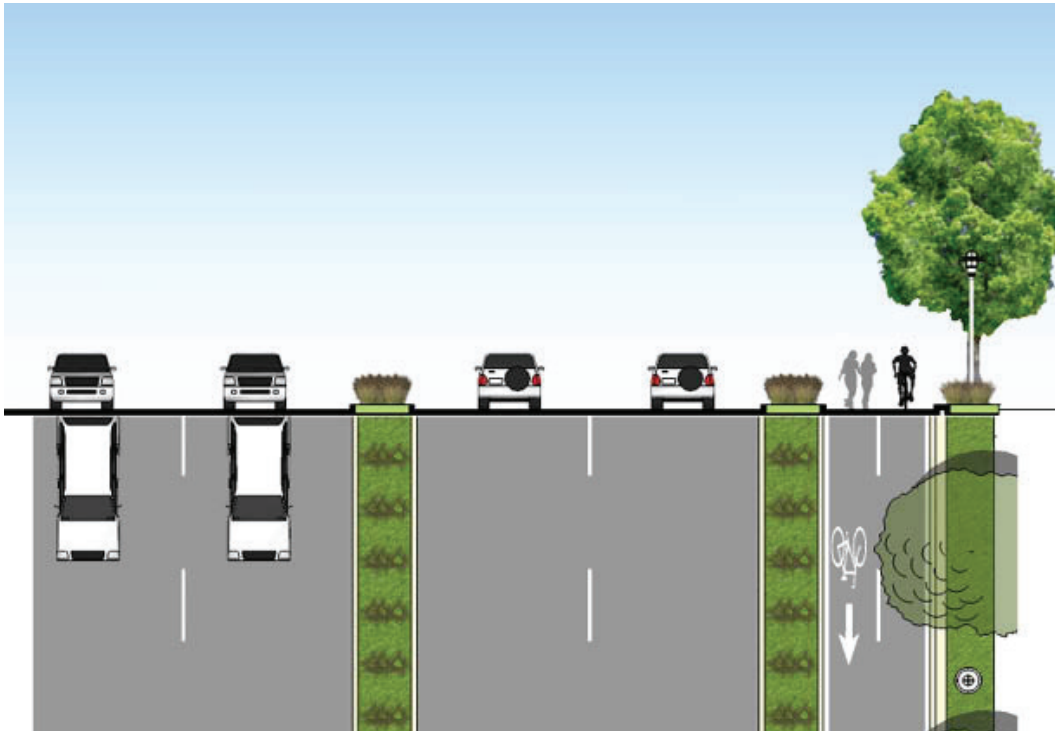


FIGURE 8 - DIRT PATH RENDER



Property Rights

The 5.3 acre plot is leased to the Cal Poly Corporation for the sole purpose of maintaining the subsidized development for faculty housing. While Bella Montana itself does not own the property, it is a successful example of a public/private partnership that will be maintained into the future. The adjacent dirt path is owned by Caltrans, therefore all design concepts that in relation to the path are contingent on Caltrans approval.

Infrastructure Costs

The AJW design proposal calls for a large retrofit in the existing complex. As noted, the redesign successfully improves the complex's circulation, sense of place, character, connectivity, and social climate. This can be broken down into three categories: building improvements, transportation infrastructure improvements, and dirt path improvements.

- Building improvements - According to a report from brickunderground.com, building facade improvements can be extremely variable in price. A section from this report explains that the cost for building improvements for a 300-unit complex is approximately \$750,000. Based off of this information, AJW Consulting has concluded that the 69-unit Bella Montana would cost approximately \$172,500 for a similar scale of renovations. However, the footprint of many of the buildings in Bella Montana need to be reworked, therefore this cost would increase significantly. According to an article from home.howstuffworks.com, moving a single family house costs approximately \$200,000. AJW Consulting estimates that the cost for moving the necessary buildings in Bella Montana will cost approximately \$300,000.
- Transportation improvements - As aforementioned, AJW Consulting expects a cost of approximately \$480,000 per mile to successfully implement our noted design. Bella Montana has 0.20 miles of roadway in need of renovation, meaning that the transportation infrastructure improvements will cost approximately \$96,000.
- Dirt path improvements - As mentioned above, AJW Consulting expects a cost of approximately \$480,000 per mile to successfully implement roadway improvements. However, the dirt path redesign does not affect Highway 1, therefore the cost would be far less. Measuring approximately 0.20 miles in length, the dirt path redesign is estimated to cost \$48,000.

Interest Groups

The most actively interested group in this project will inevitably be the residents of Bella Montana, including Cal Poly faculty and families. Their opinions and insight will be integral to the design's success. Redesigning the majority of their home will cause uproar, but will ultimately create a higher quality of life for those in and around the complex.

Residents of the surrounding neighborhood are expected to offer similar levels of engagement. Bella Montana sits nearby highly trafficked areas; its visual impact effects many on a daily basis. Because of this, the Highland neighborhood is an interest group that will also offer insight into creating a beneficial community for all.

The Cal Poly Corporation will inevitably have an extremely large hand in this project as well. The complex is only attainable with subsidies provided through the corporation, therefore all of the goings-on of the complex need direct corporation approval.

The final main interest group is Caltrans. This entity owns the dirt path land, therefore redesigning this and opening it up the Bella Montana will take a high amount of communication and approval from Caltrans. Our design ultimately betters the climate of not only Bella Montana, but also the streetscape of Highways 1; we are confident that Caltrans approval can be attained.

Timeframe

Given that all buildings need a new facade, some buildings need to be moved, and the transportation infrastructure must be improved, AJW Consulting estimates this undertaking will take approximately 1 year to complete.

Cost Benefit Analysis

The initial cost of this redesign is reasonably high. Additionally, this may be considered a low priority because there are more imminent issues that pertain directly to campus, the complex functions fine as is, and it already generates sufficient funds given its high use. These standards attribute it to being quite successful in its current state, however the complex is not designed well enough and not integrated enough to serve as an example for future public/private partnerships. It must be redeveloped soon in order to convey Cal Poly as a cutting-edge university aware of modern practices in planning.

ACTIVE TRANSPORTATION PLAN

| for Cal Poly
San Luis Obispo



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EXECUTIVE SUMMARY

The purpose of this plan is to improve accessibility to pedestrians, cyclists, and public transit users of the Cal Poly community by making design recommendations for multiple transportation conflict areas on campus.

The Cal Poly Active Transportation Plan establishes context for Cal Poly's existing transportation network and outlines policies and regulations that affect active transportation in and near Cal Poly's campus. The Plan also identifies various conflict areas based on their strengths and weaknesses as well as their opportunities and constraints for redesign. Using this analysis and design treatment precedents, the Team developed designs that foster multi-modal accessibility that favors active transportation modes such as walking and cycling.

The goal of the Plan is to implement the proposed designs alongside circulation updates included in Cal Poly's Master Plan Update.

BACKGROUND REPORT

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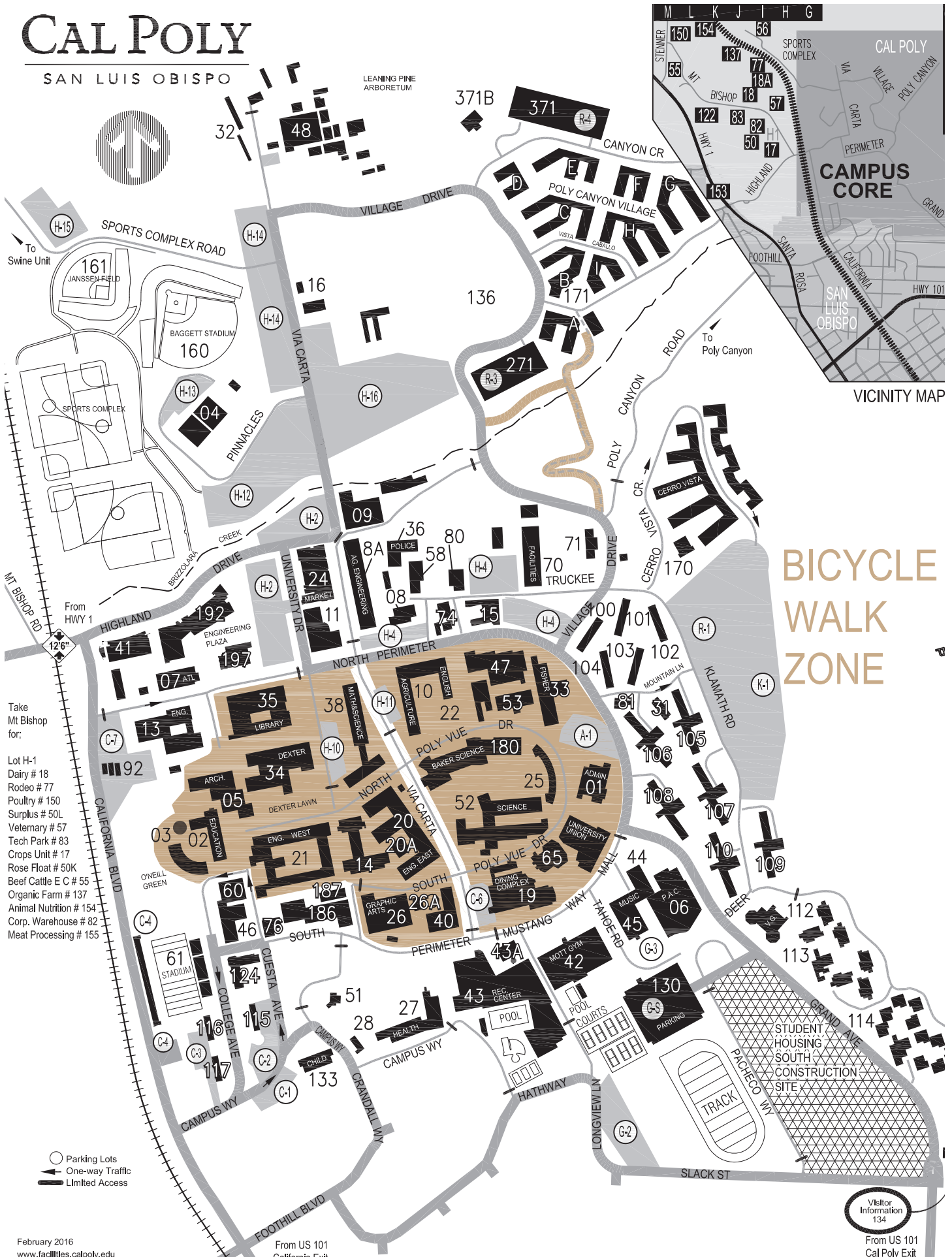
INTRODUCTION

BACKGROUND REPORT—Despite the relatively active lifestyles of San Luis Obispo residents, the majority of the Cal Poly community drive to campus. Recognizing the need to expand the mode share of cycling and walking, Cal Poly has opted to develop an Active Transportation Plan, which aims to expand and improve active transportation infrastructure on and adjacent to Cal Poly’s campus. Students, staff and faculty commute to campus by various modes: walking, biking, public transit and driving. Bicyclists are able to commute to campus on mainly Class II or Class III bike lanes; however, there is a Class I bike lane on California Street and on Via Carta on campus. Despite the different mode options, Cal Poly is dominantly a car-driven campus. In order to create a culture of active transportation, Cal Poly is prepared to examine comprehensive approaches to expanding bicycling and walking as preferred and safe modes of transportation.

Through this Background Report, a baseline of existing bicycling conditions and infrastructure throughout campus are assessed. This report also includes campus and the University Police Department’s ongoing efforts for bicycle safety and responsibility. The report also includes relevant local plans and policies for examples of and strategies for bicycling as transportation, the report highlights pieces of helpful information from San Luis Obispo’s Circulation Element, Bicycle Transportation Plan, and 2010 Annual Traffic Safety Report.

CAL POLY

SAN LUIS OBISPO



To Swine Unit

To Poly Canyon

**BICYCLE
WALK
ZONE**

Take Mt Bishop for;

- Lot H-1
- Dairy # 18
- Rodeo # 77
- Poultry # 150
- Surplus # 50L
- Veterinary # 57
- Tech Park # 83
- Crops Unit # 17
- Rose Float # 50K
- Beef Cattle E C # 55
- Organic Farm # 137
- Animal Nutrition # 154
- Corp. Warehouse # 82
- Meat Processing # 155

- Parking Lots
- One-way Traffic
- Limited Access

Visitor Information 134

Existing Active Transportation Treatments

Through a survey of existing infrastructure on campus, the following pedestrian and bicyclist amenities and treatments have been identified:

Painted Class I/Class II Bike Lanes

- Grand Ave & S. Perimeter Rd.
- S. Perimeter Rd. at “Mustang Way”

Pedestrian Zones

- The majority of campus core, except Perimeter, Via Carta, and a portion of University Dr, is designated for pedestrians

Bike-Ped Thoroughfares

- S. Perimeter Dr. spanning from the Recreation Center to the University Union
- Via Carta spanning from Building 10 to S. Poly View Dr.

Bicycle Station

- Scattered along bicycle routes, there are bicycle stations to pump tires and various tools that one might need to adjust a seat, wheel, etc.



Walk bike zone sign on North Poly View Drive (service vehicles only)



Painted bicycle lane and pedestrian thoroughfare

Cal Poly Active Transportation Map

SAN LUIS OBISPO COUNTY
CALIFORNIA PROPERTY

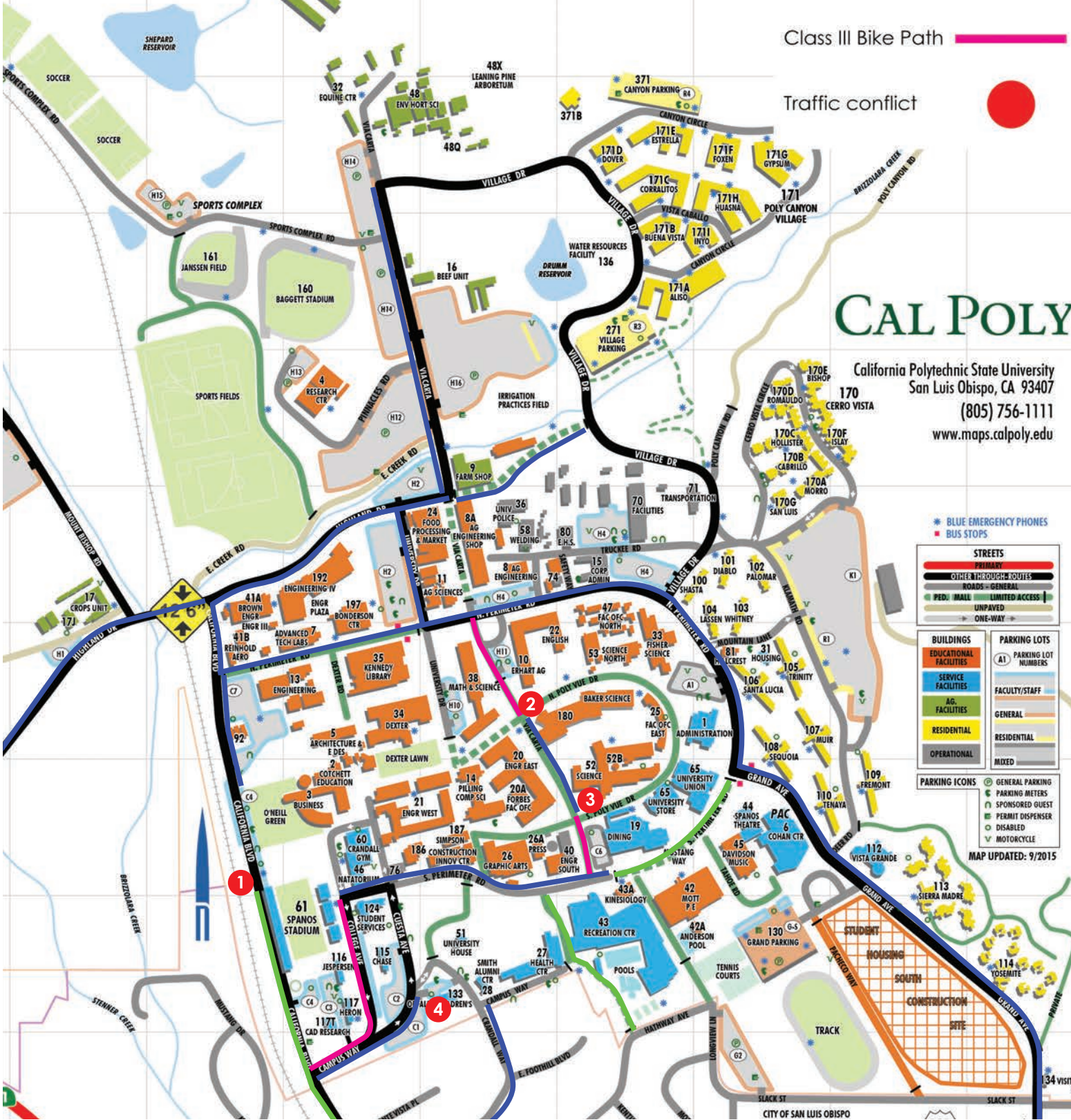
Legend

Class I Bike Path 

Class II Bike Path 

Class III Bike Path 

Traffic conflict 



CAL POLY

California Polytechnic State University
San Luis Obispo, CA 93407
(805) 756-1111
www.maps.calpoly.edu

*** BLUE EMERGENCY PHONES**
*** BUS STOPS**

STREETS	
	PRIMARY
	CHIEF & THROUGH ROUTES
	ROADS - GENERAL
	PEDE. MALL LIMITED ACCESS
	UNPAVED
	ONE-WAY

BUILDINGS	PARKING LOTS
	EDUCATIONAL FACILITIES
	81 LCREST
	SERVICE FACILITIES
	AG FACILITIES
	RESIDENTIAL
	OPERATIONAL
	PARKING LOT NUMBERS
	A1
	FACULTY/STAFF
	GENERAL
	RESIDENTIAL
	MIXED

PARKING ICONS	
	GENERAL PARKING
	PARKING METERS
	SPONSORED GUEST
	PERMIT DISPENSER
	DISABLED
	MOTORCYCLE

MAP UPDATED: 9/2015

134 VISITO IN

Active Transportation Conflict Areas

Via Carta (North to South Perimeter) & Poly Vue

Because of Cal Poly's Walk Bike Zone policy, Via Carta is the only north-south cycling route that travels through the campus core, which results in its heavy use by cyclists. During peak hours, there are traffic conflicts between cyclists using Via Carta and pedestrians using Poly Vue Drive.

Slack Street

Although on the fringes of campus, Slack Street is a highly trafficked street by bicyclist, pedestrians and automobiles. The intersections at Grand Avenue, Longview Lane and Hathway Drive are conflict areas considering the lanes are shared by bikes and cars and the sidewalks are not continuous.

California Boulevard @ Spanos Stadium

The class I bike lane on California ends abruptly, requiring cyclists to cross automobile traffic to continue towards campus. Additionally, once cyclists cross California St., there is no designated bike route until about 300 feet further down California St.

Bella Montaña

This condominium development, owned by Cal Poly Corporation, is situated at top of Highland and Santa Rosa. While the residents (faculty and staff) walk and bike to campus, the site's layout does not lend itself to be particularly bicycle friendly.

Perimeter / University / Highland Loop

These three roads form a loop highly trafficked by transit, automobiles, bicyclists and pedestrians. Bicyclists share the road with other vehicles apart from the portion of Perimeter closed to transit. Pedestrians travel via sidewalk but often jaywalk to reach their destination quicker. The intersections become congested and unsafe during peak hours with pedestrians and cyclists potentially being hit by autos.



Walk bike zone at the where Highland Drive turns into Via Carta

Complete Streets at Cal Poly San Luis Obispo

In the Spring of 2015, Dr. Rigg's CRP 470 Bike and Pedestrian Transportation Class examined the feasibility of complete streets as a design approach on certain intersections and corridors on campus. The report defines complete streets as streets that are "planned, designed, operated, and maintained to enable safe, convenient and comfortable travel and access for users of all ages and abilities regardless of their mode of transportation" (Riggs, 2015, p. 2). Focusing on highly trafficked and potential dangerous intersections, the class aimed to create complete streets that allowed for motorists, cyclists, and pedestrians. The intersections looked at were Grand Ave. & Slack St., Grand Ave. & Pacheco Way, Slack St. & Longview Ln., and Longview Ln. & Hathway Ave. These intersections serve as key points of entry into campus, but certainly are not the only highly trafficked intersections.

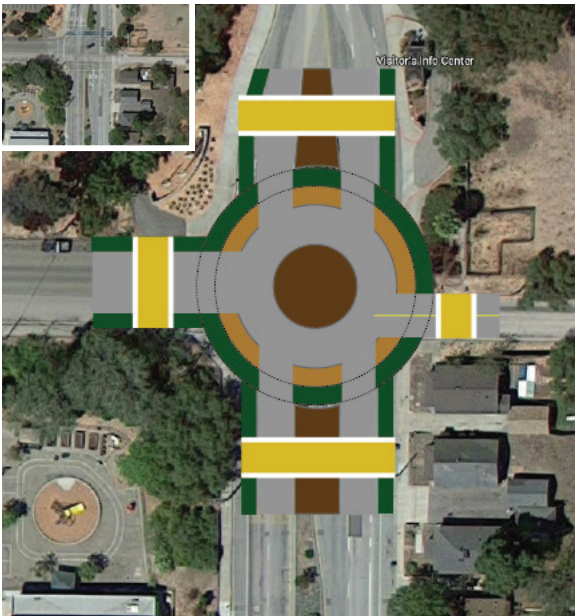


Aerial view of studied intersections



The class conducted traffic counts to monitor activity from automobiles, pedestrians and bicyclists. Counts were conducted during peak morning and evening hours (7:00 am to 9:00 am and 5:00 pm to 7:00 pm). This information was used to decide what traffic calming design elements could potentially be implemented at these intersections.

For example, the intersection of Grand Avenue and Slack Street is a very problematic intersection considering it is the main entrance to campus with a Visitor's Info Center, bus routes running along Grand and housing and an elementary school on Slack Street. Using traffic counts, case studies and firsthand knowledge of this location, a team devised a conceptual design featuring a roundabout with planted buffers, pedestrian crosswalks and barriers to separate bikes from vehicular traffic.



Before (above) and after (below) of Grand/Slack intersection

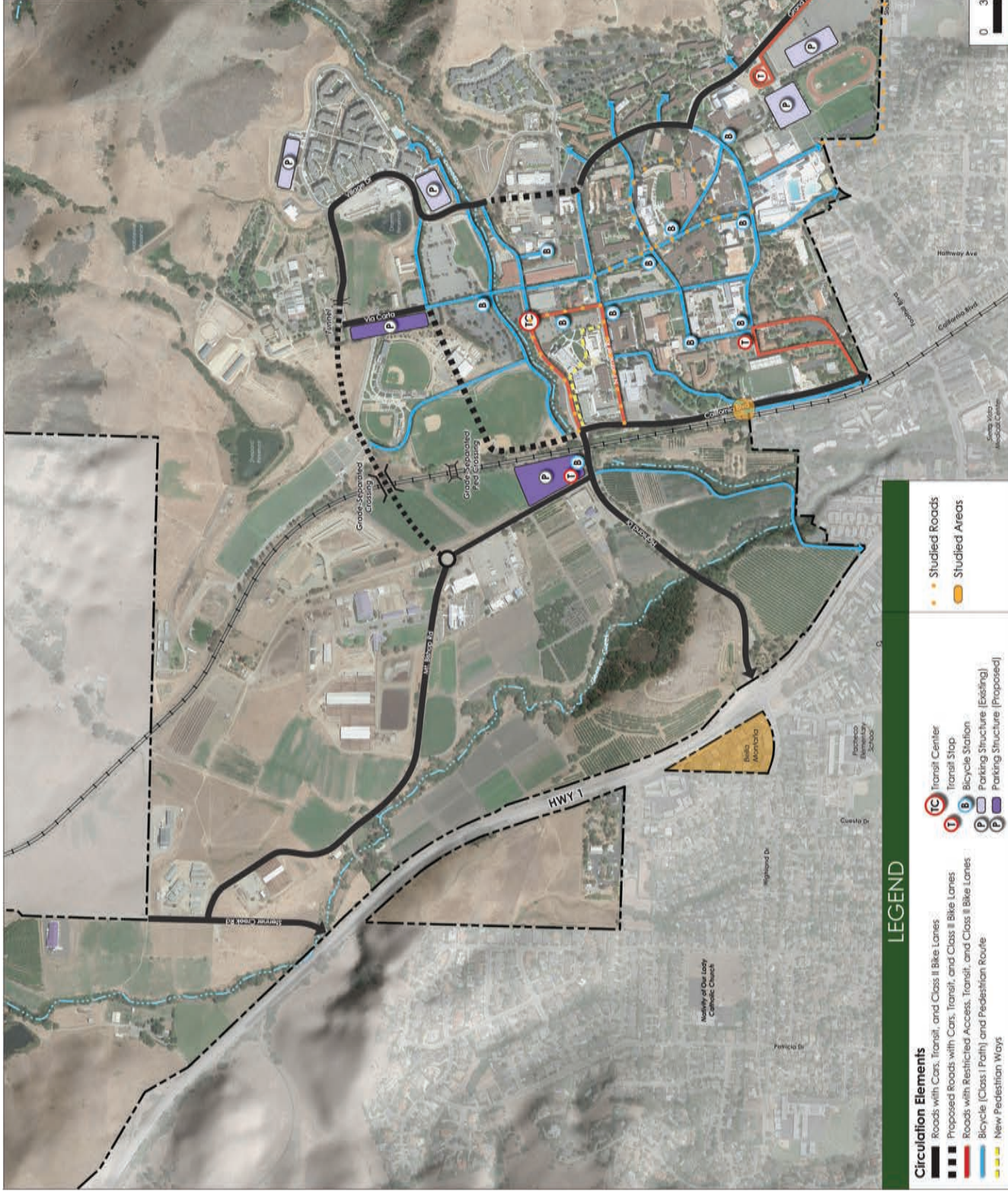


Composite conceptual rendering of proposed roundabout

CIRCULATION

Key Principles

- A. Shift modal hierarchy: 1) walking, 2) bikes, 3) transit, 4) cars
- B. Reduce trips and parking demand through restrictions, incentives, education, pricing, technology, alternatives
- C. Pedestrian core
- D. Improved bike system including bike parking nearer destinations
- E. Consider campus shuttle
- F. Access for maintenance, delivery, emergency, special needs
- G. Safety for all modes



LEGEND

Roads with Cars, Transit, and Class II Bike Lanes	Transit Center
Proposed Roads with Cars, Transit, and Class II Bike Lanes	Transit Stop
Roads with Restricted Access, Transit, and Class II Bike Lanes	Bicycle Station
Bicycle (Class I Path) and Pedestrian Route	Parking Structure (Existing)
New Pedestrian Ways	Parking Structure (Proposed)
Studied Roads	Studied Areas

CAL POLY | Master Plan Update

October 30, 2015

REFINED CIRCULATION PLAN

Expanded Core

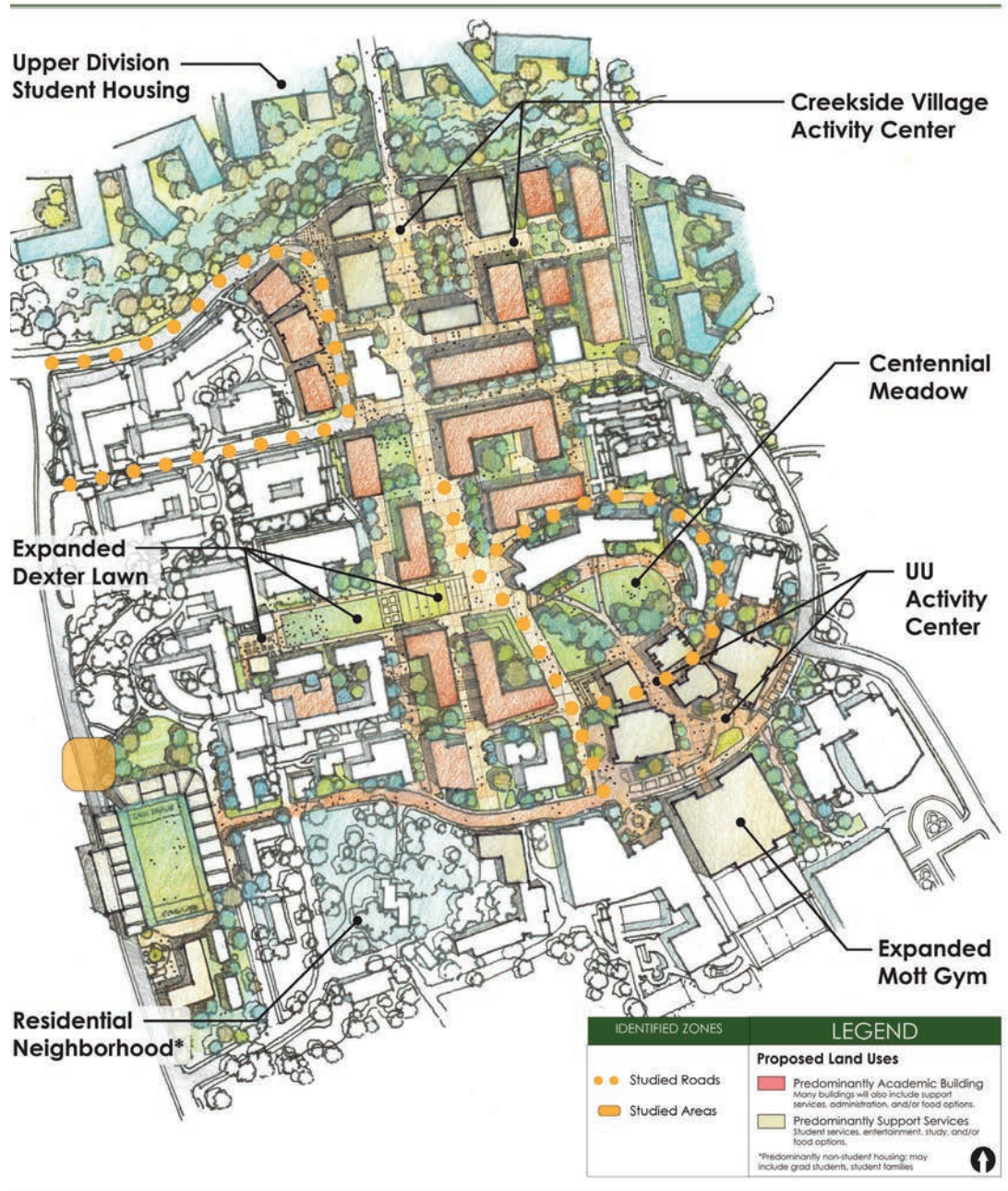
Master Plan Refined Maps

Refined Circulation Plan (left)

The Master Plan Update includes a Refine Circulation Plan demonstrating the push for a more active campus with automobiles moving to the fringes of campus and bicyclists and pedestrians at the core. The studied conflict areas are indicated on the map and are congruent with the plan.

Refined Campus Core (below)

The Update also features several conceptual maps of the campus core; the map below being the latest rendering. Three of the studied conflict areas are a part of the campus core. Although a conceptual rendering, the visible pedestrian axes and paseos will be considered in further studies and design proposals.



UPD: Bike Smart, Bike Safe

As a response to increased complaints regarding reckless bicyclists, the UPD is focusing on increasing bicycle safety to benefit pedestrians, bicyclists and motorists alike. The safety efforts are exhibited by enforcement of “walk only zones.” With the exception of the Class I bike lane along Via Carta that extends towards Poly Canyon Village (PCV), all of the campus core is a “walk only zone” (see Bicycle Walk Zone map on page 4). Even though the core of campus is closed any car other than service vehicles, the amount of pedestrian traffic and vehicle traffic on the peripheral roads make it unsafe to ride. The risks of collisions between bike and pedestrians or cars are too high to allow bicyclists to ride anywhere they want. “Walk only zone” signs are spread throughout campus in addition to “Same Road, Same Rights, Same Rules” signs. These signs are mainly placed on intersections to remind bicyclists and motorists that they share a road and a responsibility to operate their vehicles safely.

The UPD also gives the following safety tips to be practiced during every ride:

- Cyclists in the street must drive in the same direction as traffic
- Do not ride on sidewalks
- Walk bikes in designated “walk only zones”
- Use hand turn signals and stop signals
- Bicyclists are required to obey the same traffic signs, stop signs and signals, lane markings and other rules of the road
- Bikes must be equipped with a front light and red reflector in the rear while riding at night

UPD: Bike Patrol

Cal Poly has maintained an active Bicycle Patrol Program since 1993. Intensive training is required to be a certified Bicycle Patrol Officer. The five day program includes advanced riding skills, defensive and offensive riding strategies and general bike maintenance. Seven certified officers comprise the Bicycle Patrol team who have four specially equipped patrol bikes. With these bikes, the patrol team can access areas on campus that are restricted with cars or busy with pedestrians, for example, Poly Canyon. However, due to limited staffing, bicycle patrolling is only used during large events such as Open House, concerts and move-in and move-out days.

UPD primarily interacts with bicyclists while giving citations or warnings, however, they do give safety and education presentations and gladly meet with students looking to improve bicycling on campus. For those who get traffic citation while bicycling, UPD offers a bicycle diversion class if the court allows the individual to take it. This promotes safety while riding rather than simply fining for an infraction.

San Luis Obispo Land Use and Circulation Element (LUCE)

As Cal Poly moves forward with its plans to update active transportation infrastructure, it is important to understand the direction San Luis Obispo is taking in terms of active transportation. The City of San Luis Obispo's Circulation Element outlines many ways in which the City aims to become more accessible to cyclists and pedestrians. In addition, the Circulation Element emphasizes cooperation between the City and Cal Poly, a partnership that will be instrumental in making the university open to active transportation commuters.

2.1.4. Incentives for Educational Institutions: The City shall work with Cal Poly, Cuesta College, and other educational institutions to provide incentives to all students, faculty and staff to use alternative forms of transportation.

4.0.1. Bicycle Use: The City shall expand the bicycle network and provide end-of-trip facilities to encourage bicycle use and to make bicycling safe, convenient and enjoyable.

4.0.6. Bikeway Development with Road Improvements: The City shall construct bikeways facilities as designated in the Bicycle Transportation Plan when:

- The street section is repaved, restriped, or changes are made to its cross-sectional design; or
- The street section is being changed as part of a development project.

4.1.3. Campus Coordination: The City shall consider the Cal Poly and Cuesta Master Plans to better coordinate the planning and implementation of safe and convenient bicycle access and facilities to local college campuses.

4.1.4. Campus Master Plans: The City shall work with Cal Poly and Cuesta College to de-emphasize the use of automobiles and promote the use of alternative forms of transportation in their master plans.

5.0.5 Pedestrian Crossings: To improve pedestrian crossing safety at heavily used intersections, the City shall institute the following:

- Install crossing controls, where warranted by the California Manual on Uniform Traffic Control Devices (MUTCD) that provide adequate time for pedestrians to cross the street.
- In the downtown, install traffic-calming features such as textured cross-walks and bulb-outs, where appropriate.
- On Arterial Streets, Parkways or Regional Routes with four or more travel lanes, install medians at pedestrian crossings where roadway width allows.

OPPORTUNITIES & CONSTRAINTS

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INTRODUCTION

OPPORTUNITIES & CONSTRAINTS—To supplement the Background Report, the following analysis examines the strengths and weaknesses as well as the potential opportunities and constraints of the identified conflict areas. The Strength Weakness Opportunity Constraint (SWOC) analysis method gives a more in depth look at each of these areas rather than a simple pro con list. The purpose of a SWOC analysis is to identify positive or negative factors surrounding the project that presently affects or may affect the site in the future. Strengths and Weaknesses refer to the current internal aspects of the site that are positive or negative, whereas Opportunities and Constraints refer to external aspects of the site that may positively or negatively affect the site in the future. These are factors that are unlikely to be controlled or foreseen, for example, city and market demands.

SWOC Analysis helps to guide how campus should proceed with the redevelopment of active transportation infrastructure. In addition, SWOC analysis allows campus to better understand the issues presented by certain conflict areas and how to prioritize the redevelopment of transportation infrastructure.

Via Carta & Poly Vue

Via Carta is one of the main bicycle and pedestrian thoroughfares that extends from the Recreational Center towards Campus Market. Although successful and highly trafficked Class II bike lane, Via Carta has been identified for analysis because of conflicts between people and cyclists.

Strengths

The existing class II bike path on Via Carta provides a route for cyclists to travel north or south through the center of the campus core. This bike path is currently the only north-south designated bike path within the campus core, so it serves as a key circulation route for cyclists.

Weaknesses

The Via Carta bike path crosses North and South Poly Vue, streets that contain heavy pedestrian traffic at peak hours. Heavy pedestrian traffic on both North and South Poly Vue often results in traffic conflicts between pedestrians and cyclists. In addition, the bike path on Via Carta is not continuous. The class II bike path ends abruptly at the H11 parking lot to the north and South Poly Vue Dr to the south. Thru bike traffic is still permitted past both of these points, but there is no marked bicycle route, and cyclists share the road with vehicles, which is of particular concern at Via Carta and North Perimeter Dr, which is a more highly trafficked intersection.

Opportunities

Cal Poly's Refined Circulation Plan includes a class I bike path that spans along Via Carta from the Recreation Center to Village Drive. This new class I bike path would provide a designated continuous north-south bicycle route through the campus core and create a connection for cyclists from the campus core to the residence halls at Poly Canyon Village. The intersections at Via Carta and North and South Poly Vue are relatively wide and restrict vehicle use to university vehicles, allowing for easier implementation of designated bicycle infrastructure.

Constraints

Campus's Refined Circulation Plan includes a class I bike path on North Poly Vue, which perpendicularly intersects Via Carta. This addition of a bicycle route on North Poly Vue creates a traffic conflict with bicycle traffic crossing North Poly Vue on Via Carta.



Slack Street

Perpendicular to Grand Avenue and Longview Lane and ending at Hathway Avenue, Slack Street collects a significant amount of traffic during peak hours--pedestrian and vehicular. Slack Street has been identified as a conflict area because of the amount of traffic.

Strengths

Considering that Slack Street is a highly trafficked area as is, there are clearly some positive aspects. For example, the portion of Slack between Grand and Longview is a level ride. Slack street experiences a high amount of bicycle traffic that could benefit from improved infrastructure. By taking Slack Street, pedestrians, bicyclists and motorists can reach Grand to head towards the Performing Arts Center or park and access the sports fields and Recreational Center.

Weaknesses

Although many bicyclists use Slack Street, they are forced to share the road with large amounts of automobiles. With parking on both sides of the street and the 2 hour parking limit, bicyclists are at high risk of being struck by a car door. The drop-off zone at the elementary school on Slack Street also poses a problem and adds to the amount of cars on the street. When coming from Grand, many cyclists and pedestrians cut through the parking lot rather than round the corner and stop at the Longview intersection. The portion of Slack between Longview and Hathway is sloped, making for a steep ride towards Longview. Pedestrians also lack sufficient infrastructure. The westbound half of Slack has a disjointed sidewalk although people may park on either side, resulting in people walking in the street. The eastbound half of Slack has a sidewalk in need of repair as well as more street lights.

Opportunities

According to the 2015 Master Plan Update: Refined Circulation Plan, Slack Street currently does not have any planned changes. However, the update has tentative plans to extend Class I bicycle/pedestrian path on Via Carta out towards Longview. This path would connect Slack and subsequently Grand Avenue to the campus's central bike lane. As a part of the updated Master Plan, Student Housing South may also impact traffic on Slack Street. Projected completion in 2018, the project has the potential to create more cohesive bike trails and therefore alleviating the amount of bicycle traffic on Slack.

Constraints

A possible external factor is the types of housing along Slack, Longview and Hathway. These streets have a mixture of rental and market-rate housing to both Cal Poly and non-Cal Poly community members. Homeowners may have strong opinions about changes in the right-of-way.

California Boulevard @ Spanos Stadium

There is currently a shared bike and pedestrian path that runs on the western side of California Street from Hathway Ave to Spanos Stadium. When the path reaches the northern end of Spanos Stadium, pedestrians and cyclists are forced to cross California St. After this point, there is no infrastructure in place to accommodate cyclists.

Strengths

The existing bike/ped path makes it convenient and safe for pedestrians to reach the edge of campus from the south. The path separates cyclists and pedestrians from vehicular traffic on California St, which experiences significant congestion during peak hours.

Weaknesses

The California St bike/ped path ends abruptly at the north end of Spanos Stadium, forcing cyclists to dismount their bikes. After crossing the California St crosswalk at Spanos Stadium, there is no marked bicycle infrastructure continuing north on California nor on O'Neill Green. The paths on O'Neill Green are designated as walk bike zones, so cyclists there must walk their bikes, although many cyclists do not heed this policy and ride their bikes on the narrow footpaths that are not wide enough to safely accommodate cyclists and pedestrians simultaneously. If cyclists choose instead to continue north on California St, there is no separation between cyclists and vehicular traffic, which is heavy during peak hours.

Opportunities

The Cal Poly Master Plan's Refined Circulation Plan indicates campus's intention of implementing a class I bike path that continues from the California St bike/ped path through O'Neill Green, connecting the bike path to bike infrastructure within the campus core. Currently, O'Neill Green has an abundance of open lawn space, leaving plenty of space for additional circulation infrastructure. If implemented effectively, the new class I bike path would direct bicycle traffic away from California St. and create a safer and more efficient bike route from the southeast corner of campus to the campus core.

Constraints

The class I bike path indicated in the Refined Circulation Plan requires cyclist and pedestrian traffic to cross California St at grade with vehicular traffic. This same-grade crossing would slow bike and pedestrian traffic and would exacerbate congestion on California Street. In addition, the slope of O'Neill Green could prove to be a challenge for some cyclists.



Bella Montaña

Located adjacent to the intersection of Santa Rosa St. and Highland Dr., Bella Montana is an affordable community for university faculty and staff. Developed by the Cal Poly Corporation, the 69 condominiums are available for rent or purchase by Cal Poly staff and faculty only.

Strengths

At the top of Highland Drive, Bella Montana residents have the option to walk, bike or bus. Roughly a mile away they can reach Kennedy Library in approximately 22 minutes by foot or zip down in ten minutes by bike. If a resident does not want to bike or walk up the hill, the 6A bus line can transport residents from campus to the Highland at Cuesta stop, which is about 0.2 miles from Bella Montana. Aside from proximity to campus, residents are nearby the Bishop Peak trailhead as well as the Bishop Peak Elementary School, both off Patricia Drive.



No clear pathway for pedestrians or bicyclists

Weaknesses

Despite the proximity to campus via Highland, the Bella Montana development itself does not have a pedestrian or bicycle friendly layout. The condominiums are all situated with the garage doors on the alley (Paseo Bella Montana) with “front” doors positioned out of sight on the side of the home. With the private garages and small parking lots scattered throughout the site, there seems to be little need for sidewalks to walk from car to home. However, the disjointed sidewalks make it unclear as to where someone biking or walking to campus should pass in relation to cars. Following the pieces of sidewalk, residents can take the stairway or ADA compliant ramp to the Highland and Santa Rosa intersection crosswalk. Once bicyclists reach campus, the return

to Bella Montana is quite steep but rideable.

Opportunities

Outside of the bicycle/pedestrian facilities on site, Highland Drive already has bicycle friendly infrastructure. From Santa Rosa to California, Highland has an old asphalt bike lane adjacent to the sidewalk. Albeit cracking, lifting and faded, it is legal to ride on the designated path so long as the cyclist dismounts and walks the bike at the crosswalks. The city has maintained Class II bike lanes on both directions of Highland. Recently, a portion of the westbound lane has been painted green where the road curves around the hillside. Although these streets are city owned, redesign of the Class I or extension of the painted Class II bike lanes could increase ridership for residents of Bella Montana.

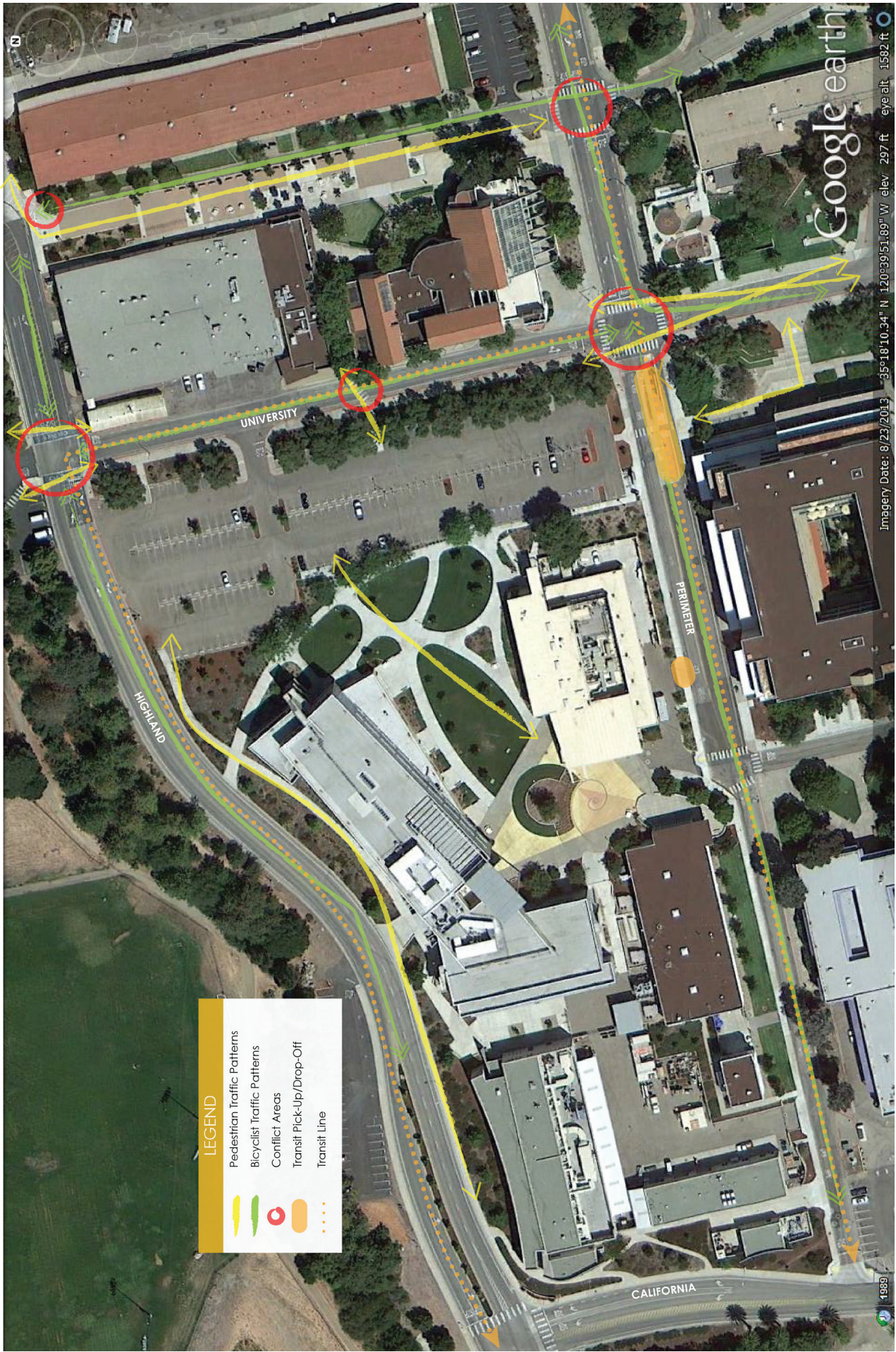
Constraints

A downside to the location is that Santa Rosa Street transitions into Highway 1 with vehicles' speed limits changing between 45 to 55 miles per hour. Even though the speed limit on Highland is 30 miles per hour, this does not prevent cars from speeding up and down the hill. Drivers' speeding is something that thoughtfully designed infrastructure can protect from but cannot directly prevent. Future traffic conditions impact on safety must be kept in mind if Cal Poly is to increase its ridership.



Shared ramp/stairway





LEGEND

-  Pedestrian Traffic Patterns
-  Bicyclist Traffic Patterns
-  Conflict Areas
-  Transit Pick-Up/Drop-Off
-  Transit Line

Google earth

Imagery Date: 8/23/2013 35°18'10.34" N 120°39'51.89" W elev. 297 ft eye alt. 1582 ft

1899

University / Perimeter Loop

From California Boulevard, the roads Highland Drive, University Drive and Perimeter Road form a loop. The portion of Perimeter between California and University is closed to private vehicles and used by transit, service vehicles and bicyclists.

Strengths

The loop is highly trafficked by all modes of transportation, meaning that any changes to street treatments will not go underutilized or unnoticed. University is perfectly situated between Campus Market and Kennedy Library with the transit station at the intersection with Perimeter. It also leads to Dexter Lawn, a popular spot for activities. A portion of Perimeter is closed to transit, cyclists and service vehicles only making it less congested for buses and safer for pedestrians and cyclists. Cyclists and pedestrians constantly travel to and from these destinations.

Weaknesses

Because this is a crucial connectivity point, automobiles are in constant conflict with other modes. Both the Highland/University and the Perimeter/University intersections are flooded with people and cyclists at peak hours with long lines of cars waiting to leave campus or trying to find parking. Despite having their own closed portion of Perimeter, buses can be delayed by cyclists and pedestrians at the Perimeter/University intersection. At the Highland/University intersection, trained students have to direct traffic at peak hours to keep the four-way stop from backing up.

Opportunities

According to the 2015 Master Plan Update: Refined Circulation Plan, this loop is planned to be closed to private vehicles. It will instead be dedicated to transit with a Class II bike lane. The remainder of Perimeter will be closed to all private and transit vehicles and will feature a Class I bike lane and pedestrian route. Campus is already open to bold changes, allowing for more creative design treatments.

Constraints

A possible constraint depends on the cooperation of SLO Transit in regards to closing Perimeter Road completely to transit. Currently, several lines use this road to pick-up/drop-off through campus. While promoting active transportation and reducing private car use, transit ridership should still be encouraged and made a viable option.

DESIGN PROCESS

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INTRODUCTION

DESIGN PROPOSALS—Through the SWOC analysis, three locations were identified as viable candidates for active transportation updates: California Boulevard at Spanos Stadium, the Bella Montaña residences and the Perimeter/University/Highland Loop.

Because the land is Cal Poly owned, there is the unique opportunity to make bold moves and the necessity to create place. Drastically differently, each site is treated individually in accordance with its strengths and weaknesses. Appropriate design treatments have been researched as precedents to demonstrate successful projects. After studies and research, the final piece of this plan is the design proposals themselves.

California Boulevard @ Spanos Stadium



Raised Intersection

This design treatment features a crosswalk/cycle track that separates pedestrian and cyclist traffic without interrupting the flow of either mode. The crossing is also raised in order to calm automobile traffic.

Seattle Bike Blog (2015). More Westlake Bikeway Design Details and Construction Will Start in the Fall.

Bella Montaña



Woonerf / Living Street

With the streets already curb level, Paseo Bella Montaña is perfect for a woonerf design. Curb-level streets, landscaping features, street furniture and stone streets foster a community environment while slowing automobiles' speeds.

West North Blog (2013). Cady's Alley, Georgetown, Washington D.C.



Brick Street Design

Instead of asphalt, stone materials or simply changing color with paint creates a visually pleasant and safer environment for pedestrians. It signifies the road is not exclusively for cars, causing them to reduce their speeds.

Kamin, B. (2014, August 27). Batavia uses Dutch concept to revitalize downtown.

Perimeter / University / Highland Loop

Cycle Track

A raised cycle track with a mountable curb separates cyclists from motorists while still giving access to pedestrians and service vehicles. The loop on campus would be an appropriate location for this treatment.

Alta Planning and Design. (n.d.). Cycle Track Lessons Learned.



Painted Intersection

Although moving slower than cars, bicyclists still need intersection treatments to keep from colliding with other cyclists or pedestrians. Paint treatments and rumble strips signal to cyclists that they are approaching an intersection and must yield to pedestrians. Pedestrians also benefit from these treatments so that they may proceed with caution.

Kevlahan, N. (2016, January 27). City to Present Charlton, Herkimer Bike Lane Designs.



Dedicated Bus Lane

Separating buses from cyclists takes safety one step further. Although buses normally travel slower than smaller vehicles, cyclists and pedestrians are still difficult to see from a bus driver's perspective. With their own lane, transit can move quicker and more efficiently with a reduced chance of collision.

Chicago Loop Alliance. (n.d.). Loop Link Bus Rapid Transit (BRT).



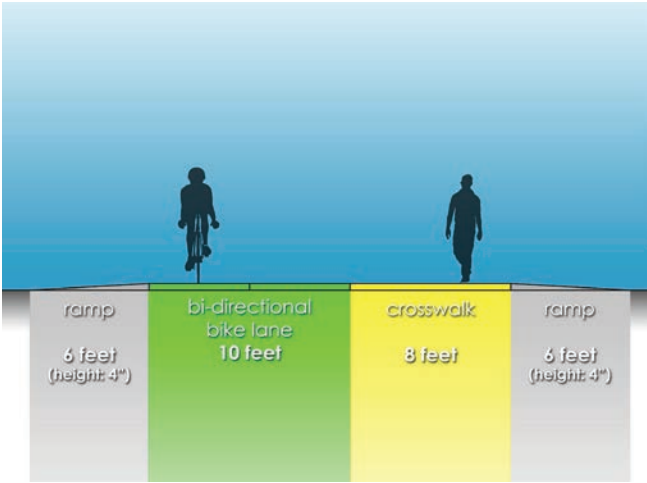
California Boulevard @ Spanos Stadium

As it currently exists, the class I bike lane on California Street ends abruptly, requiring cyclists to cross automobile traffic to continue towards campus. Additionally, once cyclists cross California Street, there is no designated bike route until about 300 feet further down California Street.

The Cal Poly Master Plan's Refined Circulation Plan indicates campus' intention of implementing a class I bike path that continues from the California Street Class I bike path through O'Neill Green, connecting the bike path to bike infrastructure within the campus core. Currently, O'Neill Green has an abundance of open lawn space, leaving plenty of space for additional circulation infrastructure. If implemented effectively, the new class I bike path would direct bicycle traffic away from California Street and create a safer and more efficient bike route from the southeast corner of campus to the campus core.



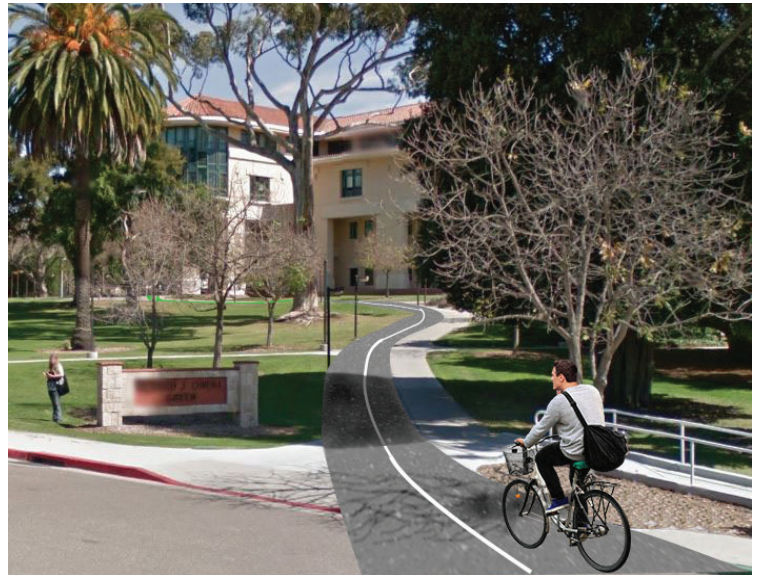
Rendering of proposed speed table with painted intersection



Section of California Boulevard showing lane separation

As indicated by the included section, the crossing will be raised four inches above California Street. The tabletop design and bright coloration will further alert vehicles to the presence of the crossing. In addition, these design elements will act as traffic calming measures for through traffic traveling on California Street.

Based on site conditions and the Master Plan Refined Circulation Plan, the most effective design treatment for the California Street crossing at Spanos Stadium is a continuation of the existing Class I bike path onto O'Neill Green and past the Business Building (Building 3). A continuous two-way class I bike path allows for cyclists to more easily permeate the campus core while also minimizing conflict between cyclists and pedestrians as well as conflicts between cyclists and vehicular traffic.



Rendering of proposed Class I bike lane along sidewalk

Bella Montaña

Bella Montaña currently favors automobile traffic and does not have a layout that allows for effective pedestrian or bicycle circulation. The street is designed without a clear space for pedestrians to occupy, which can make residents feel unsafe. A retrofit of the street would make it more functional for pedestrians, bicyclists and motor vehicles.



Existing conditions at Bella Montana

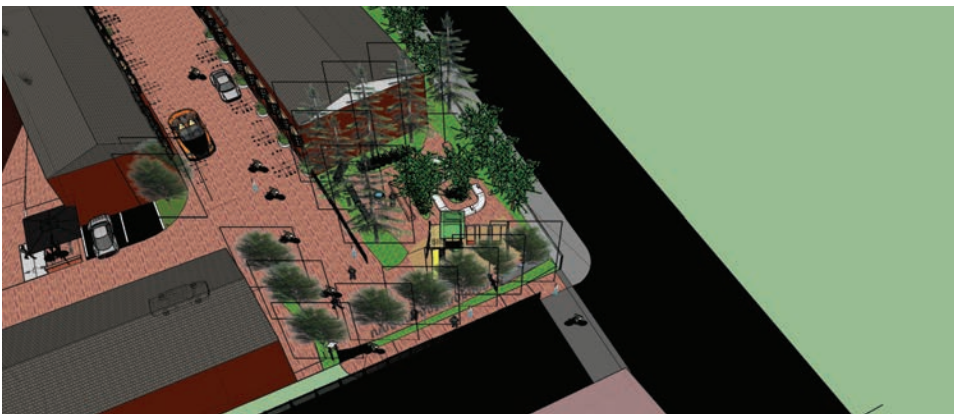


An axonometric view of Bella Montana

There are different options to improve the layout of the street: for example installing speed bumps or bringing up physical features such as street trees, planters or street furniture would enhance safety on the street.



Render of stone paving and parking lot redesign



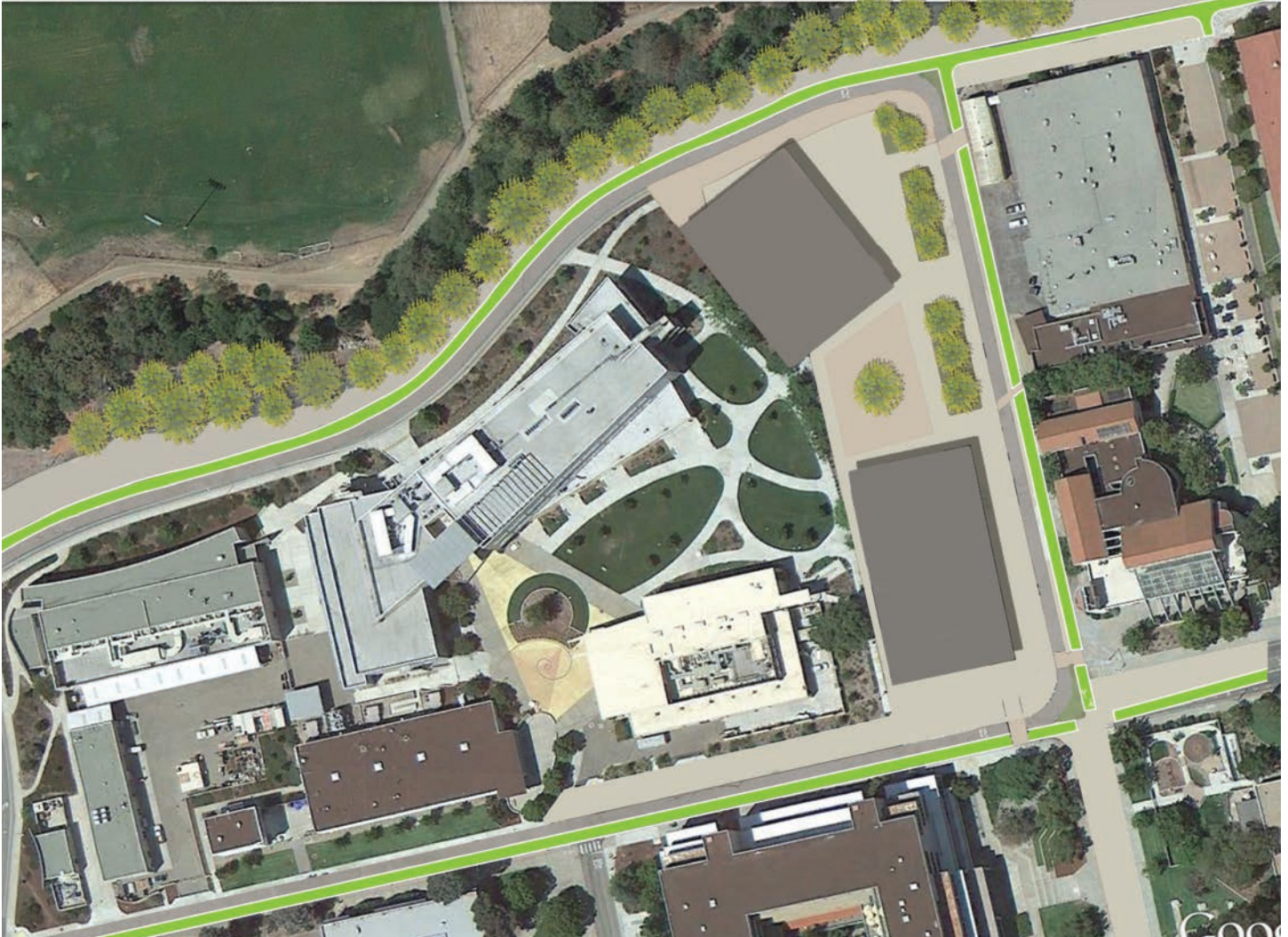
Redesign of parking lot at corner of Santa Rosa and Highland

Due to the conditions of the alley, our best option was to adopt a woonerf design and replace the asphalt street and converted into a Brick Street with no grade separation between pedestrian, cyclist, and automobile. The street redesign changes perception of the street, causing automobile traffic to calm and pedestrians/cyclists to feel more comfortable using the space.

The idea is to improve the quality of life in residential streets by creating a space that is shared equally between pedestrians, cyclists and automobiles. In addition, the replacement of a small parking lot with open park space would contribute to community social interaction. The Woonerf concept in urban planning has proven to be successful in many parts of Europe as well in the United States.

Perimeter / University / Highland Loop

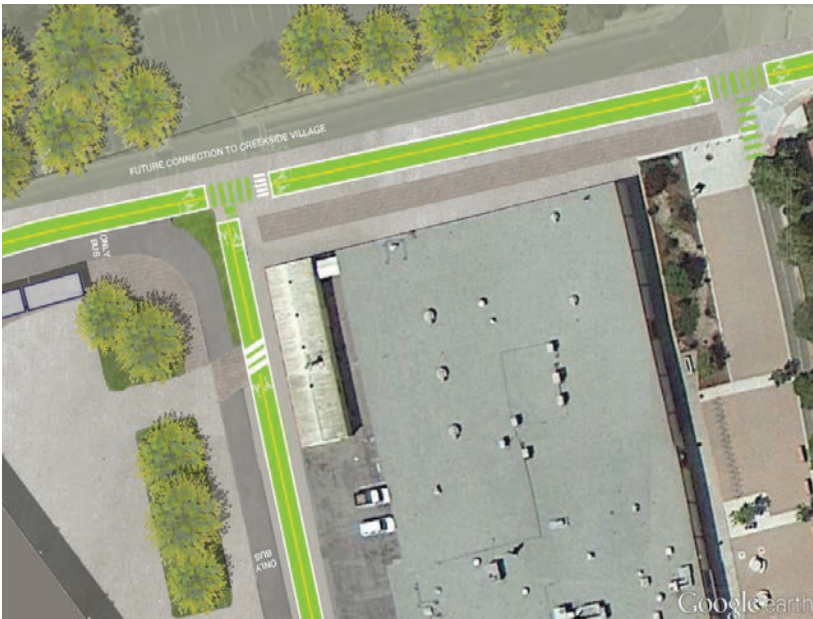
The loop from California Street to North Perimeter Road, University Drive and Highland Drive is highly trafficked by cars, pedestrians, cyclists and buses. The proximity to key locations on campus keep the intersections at University Drive busy throughout the day with pedestrians and cyclists in conflict with automobiles.



A render of the overall site plan

The Cal Poly Master Plan Update calls for the closure of N. Perimeter Road for only pedestrian and cyclist access. Existing parking lots are redeveloped into academic buildings with plazas and a creekside village.

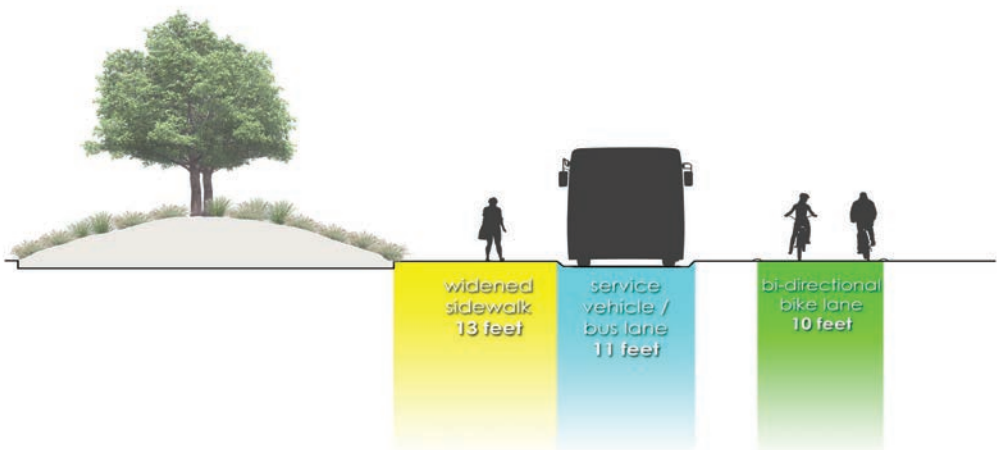
There is also an opportunity for Class IV bike lanes. Approximately 25 feet wide lanes give ample room for widened sidewalks and bike lanes. By reducing parking and removing private vehicles from the road, the new circulation plan strengthens the campus core.



Zoomed-in look at Highland/University cycle track intersection

Drawing from the Master Plan, N. Perimeter Road to University Drive to Highland Drive is envisioned as a one-way transit loop with a Class IV cycle track. With the elimination of personal cars and separation from pedestrians and cyclists, the bus can move efficiently with minimal traffic at intersections.

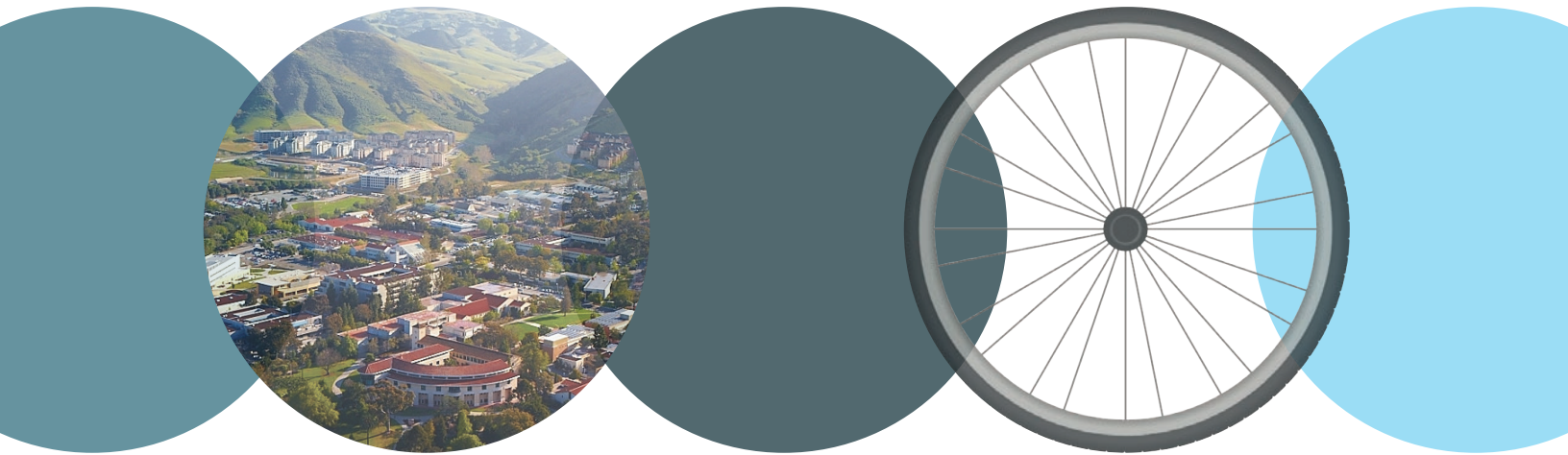
Keeping the bus on one lane allows room for a two-lane cycle track. To protect both cyclists and pedestrians, intersections are treated with striping and rumble strips to indicate cross-traffic. Enclosing these roads to transit, cyclists and pedestrians create a safer and more enjoyable environment.



Section of University Drive with dedicated bus lane and mountable cycle track




















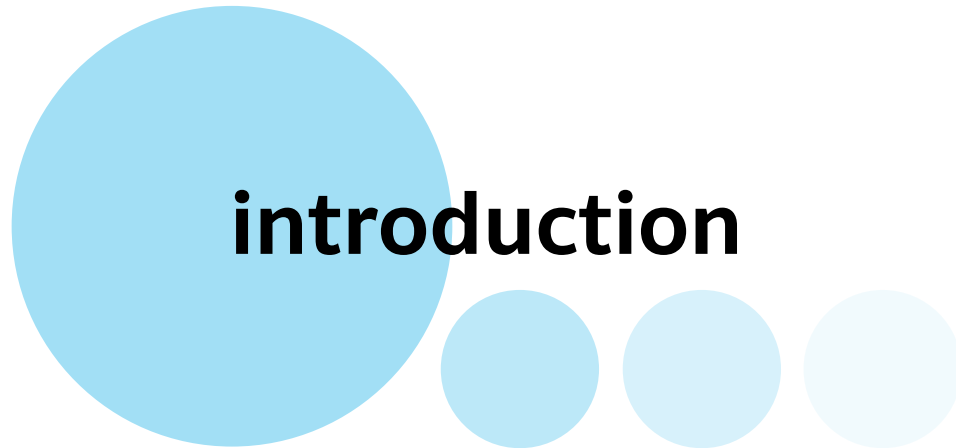
CRP 463: PROFESSIONAL PRACTICE



Mark Manha
Emma Petersen
Rebecca Wysong

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introduction

Walk-ability and bike-ability are new terms used to describe pedestrian and cyclist conditions in an area. Auto-dominated cities leave the pedestrian feeling unsafe and insecure in their environment. Municipalities are starting to integrate friendlier design practices into existing infrastructure. The focus is moving away from cars and towards the pedestrian and cyclist. The same can be said for campus'.

College campus' are normally very pedestrian friendly in design. An academic setting where the main mode of transportation is by foot, a campus is a place where the car is not the priority. However, with new design practices and ideas, improvements can always be made. The purpose of this document is to assess the pedestrian and bicycle friendliness of Cal Poly's campus, assess areas of conflict, and propose new design strategies for each. It is comprised of a **Background Report**, assessment of **Opportunities and Constraints**, and a **Design Proposal**.

As a team of three, we worked to provide Cal Poly and the City of San Luis Obispo with an idea of improvements to be made in and around campus. Our goals were to improve the safety of dangerous intersections and improve the overall feeling and aesthetic of these areas.



background report

In order to assess transportation relationships in and around campus, we assembled and analyzed all documents relating to pedestrian and cyclist behavior. We summarized documents relating to Cal Poly, the City of San Luis Obispo, and also San Luis Obispo County. Documents include current design guidelines, previous assessments of travel conditions, circulation plans, climate action plans, and future plans for transportation infrastructure among others. This information was then used in order to decide where we wanted to focus our redesign efforts.

EXISTING CONDITIONS

Summary of CRP 470 Research

Grand & Pacheco:

Existing - a T-intersection with pedestrian crossings, class II bike lanes, and transit/auto lanes. Mostly used by students who lived in the dorms, they often disregard crosswalks as a shortcut. Also used during events at the PAC.

Proposed - pedestrian beacon/crossing signals, painting class II bike lanes, add pedestrian crosswalks with table top design, speed table.

Hathway & Longview:

Existing - a 4-way intersection with a 3-way stop. A diversity of users. Many students use this intersection on their way to campus. It also grants access to a heavily used parking lot.

Proposed - painted intersection/crosswalk, bulbout for shorter crosswalk, pedestrian scramble, class II bike lanes, bollards blocking parking lot access at intersection.

Longview & Slack:

Existing - Sidewalks, bicycle lanes and crosswalks are not present, busy intersections, unsafe design for pedestrians and bicyclists, downhill grade increases vehicular speed, pedestrian traffic crosses through parking lot, and there are visibility restrictions turning right on slack street.

Proposed - incorporate bike lanes on both streets and incorporate a wide sidewalk along Slack St.



fig 1.1 proposed redesign of Hathway and Longview by CRP 470 class

Slack & Grand:

Existing: There is a 4-way spot with 2 main stops on Grand Ave. Most bikers made a left from Grand Ave. to Slack Street and there are high volumes of traffic near the top of the hour.

Proposed - vegetated roundabout, bike path separated from car traffic, barrier separating bike from vehicular traffic, pedestrian crosswalks with planter buffers, and move the visitor center.



fig 1.2 map of campus designating different design zones

Design

The 2010 Design Guidelines offer some goals and objectives for Cal Poly to become more bike friendly. They will do this through an "...increase bike use through safe and effective connections, an on campus bike system, and bike parking and storage; service roads can be used for bike routes." (Campus Land Use and Design Guidelines) Campus is broken up into several different land uses, each requiring their own set of

design guidelines. Figure 1.2 and 1.3 show where these zones are and what kind of guidelines are denoted. In redesigning corridors around campus, these zones and guidelines should be kept in mind.

Circulation

A transportation survey of commuting patterns was conducted by City and Regional Planning students in the 410 Community

Planning I class, last fall. The survey was distributed to students, faculty and staff. About 15% of respondents traveled to campus via bicycle. That 15% was comprised of 18% students, 16% faculty and 6% staff. 63.4% respondents never used this mode of transportation, 10% biked less than once per week, 6.2% biked 1-2 times per week, 6.4% 3-4 times per week and 14% 5 days a week. 95% said they either walked or biked around campus once done with their commute.

ZONE	LOCATION DESCRIPTION	PLANS
A-1	Engineering quad	Highland Boulevard and North Perimeter may be abandoned; North Perimeter and University used as a service road (north currently only service)
A-2		N. perimeter be changed to service; 2-way bike lanes planned
A-3	Library/Academic area	Redesign of library/academic area; parking eliminated; potential for biking amenities; redesign of perimeter and via carta to accommodate 2-lane bike path
A-4	Baker Science/COSAM	Via carta bike path (completed)
A-5	N. Perimeter	N Perimeter only ped/bike/service route
A-6	Dexter/CAED	Several underutilized service roads -> more pedestrian friendly
A-7	Business	Adjust pedestrian and bike paths for safety
MU-1		Needs N/S bike paths aligning with pedestrian paths; N Perimeter may be abandoned or reduced to service width
MU-S		No new buildings/Permanent uses w/o specific plan; Mostly parking
R-1	Behind Red Bricks	Eventually will be dorms, potential for bike paths
R-3	North Mountain	Existing paths
R-4	Student Housing South	Will contain bike paths
S-1	UU/Track Field/Rec	Bike paths exist, could potentially be improved upon
S-2	Spanos	College Ave in part pedestrian, connecting parking; Potential for improved cycling
OS-1		Floodplain open space, no bike path
OS-2		Grazing (really the only zone that doesn't allow bikes)
SP-1		No new buildings or permanent uses w/o specific plan
SP-2		No new buildings or permanent uses w/o specific plan
AG		Existing roads, no need for bike paths

fig 1.3 table depicting different design zones and details of what kind of design is permitted

cal poly - continued



fig 1.4 current bicycle zoning on campus

This data shows that there is great potential to increase the amount of students, faculty and staff that commute to campus via bicycle. Cal Poly has a lot of room for improvement and should seek insight into why people are opting out of cycling to campus especially when the weather is permitting. The University needs to look into design and safety improvements as well as incentive more people to ride their bikes.

Safety

There have been 0 fatalities caused by automobiles on campus in the past 5 years. However, this does not mean there are no collisions on campus - total vehicle collisions equal 65. A third of that number include a bicycle. 21 of

the bike related accidents involved pedestrians and about 6-7 involved an automobile.

Bike accidents, although most of the time are minor, are considered traffic collisions. According to Patrick Rodwood of the University Police Department, the biggest issue is awareness. A lack of bike lanes means no riding zones which leads to more enforcement. UPD must decide what cyclists are and are not allowed to do. More bicycle safety education is necessary and should be required if the University hopes to reduce these numbers. One specific problem is cyclists rolling through STOP signs. Putting STOP signs on bike lanes is a potential solution to combat law breakers.

MASTER PLAN

The current Master Plan, from 2001, explains the state of campus at the beginning of the 21 st century and suggests ways in which campus may or may not develop over the coming years (it is currently being updated to reflect the changes to campus since 2001). This includes land use, circulation, open space, etc. Bicycle lanes on campus follow all of the vehicle routes as well as Via Carta. Entrances and exits to and from the campus core consist of California, Campus Way, Foothill, Grand, Highland, Longview, and Via Carta. Campus bike lanes need to be marked clearly and have proper enforcement as well as be separated from pedestrian and vehicular lanes in order to ensure safe passage

for bike riders. Standard Class I bike paths on campus must have a width of at least 8', but may be extended to 10-12'. Standard Class II are 4-5' with the width depending on parking and edge conditions. Some of the Master Plan's ideas for better bicycle circulation include extending the Class I bike path on California from Foothill to Spanos Stadium; connecting Class II bike lanes on Highland, California, and Grand to the City's bikeway system; establishing an internal bikeway system connecting off-campus routes and perimeter parking lots to important on-campus destinations; marking bike lanes with special paving surfaces, color markings, and attractive signage; providing convenient, safe, secure, and attractive bike storage facilities at important destinations; and considering the expansion of options and facilities for solar and electricity-powered bikes. The only idea listed that has not been implemented is the expansion of solar and electricity-powered bikes; this shows that the Master Plan needs an update in order to reflect the changing conditions on campus. Ways to increase bike usage on campus include having safe and effective bike connections to the surrounding street system, clear bike paths on campus, and convenient bike parking and storage.



fig 1.5 conceptual map of future Cal Poly master plan

city of slo

SAN LUIS OBISPO BIKE PLAN

Existing Conditions

The San Luis Obispo Bicycle Transportation Plan describes the existing conditions for bicycling in the City of San Luis Obispo and explains future actions in order to improve

bicycling around the City in order to create a more bicycle friendly community. Currently, SLO has about 60 miles of bike lanes throughout the City with a few of them connecting to Cal Poly. These lanes serve a population of about 50,000 residents, including SLO and Cal Poly residents. The seven-member Bicycle Advisory Committee oversees the planning and creation of these lanes and this document that serves as a guide for

bicycling in SLO. Bike lanes provide a convenient route for bicyclists to move around the City, connecting Cal Poly, downtown, and all the other portions of SLO.

Even though over sixty percent of SLO residents have a commute to work that is less than 15 minutes, over seventy percent of commuters drive to work alone by motor vehicle. However, there is an increase in the number of commuters who bike to work, going from 3.6% of the City's population at the 2000 Census to 5.2% at the 2010 Census. The 2008 City of San Luis Obispo Bicycle Count Data showed that not only have there been more bike riders since 1996, but that Cal Poly consistently has a greater volume of riders than the City. Benefits that come from a strong bicycling community include: tourism for the City, a healthier population, an improvement in air quality, traffic congestion relief, increased real estate values, and an overall higher quality of life. This plan supports legislation such as AB 1358, the Complete Streets Act of 2008, which "requires that complete street policies be included in Caltrans studies and the circulation element of city and county general plans when they are updated," AB 32: Global Warming Solutions Act, and SB 375: Sustainable Communities Strategy.

Circulation

SLO has 60.9 miles of biking trails divided between 7.2 miles of Class I paths, 29.7 miles of Class II lanes, and 24 miles of Class III routes,



fig 1.6 San Luis Obispo's downtown promotes cycling for families

sharrows, and boulevards that run through every area in the City. Currently, the Railroad Safety Trail on California is the only Class I bike path leading to Cal Poly. However, there are three Class II bike lanes on Grand, Foothill, and Highland and a few Class III bike routes leading to Cal Poly as well. Many of the Class II bike lanes follow major roads in the City, including Santa Rosa, Foothill, LOVR, Madonna, Tank Farm, Broad, Johnson, and Higuera. Many of the Class III bike routes branch are on roads that branch off of roads that have Class II bike lanes on them.

Safety

In order to keep bicycling in SLO safe, the City has methods that inform and protect the public. The annual Bicycling Safety Rodeo teaches children safe bike riding practices and vehicle code compliance. Safety assemblies at local elementary schools, provided by the City partnering with the SLO County Bicycle Coalition and in collaboration with the local Safe Routes to School program, teach kids basic information about safe riding practices and vehicle code requirements. Adult bicycling education workshops put on by the City partnering with the SLO County Bicycle Coalition cover “a rider’s rights and responsibilities, traffic laws, how to ride confidently in traffic, emergency riding skills, and route planning strategies.” UPD has a diversion program for bicyclists that are ticketed in SLO County that presents the laws and regulations regarding bicycling and skateboarding and focuses on the proper methods of safe bike commuting. City transit drivers must attend annual bicyclist awareness training that goes over “sharing the road

with cyclists, bicyclist’s rights and responsibilities, and how to identify and therefore avoid bicyclists that are exhibiting behavior that is common in the highest bicyclist/motorist collision patterns.” The City also tries to educate in-coming college students throughout the school year, using programs such as WOW to promote bicycling and bicycle-on-transit use.

Design

The three different bike lane classes have three different designs. Class I bike paths are separated from roadways and have signage such as STOP and YIELD in order to control bike traffic when crossing a road (CalTrans, 2015, p. 1000-4-1000-5); they act like small roadways that are not used by motor vehicles. Class II bike lanes are located on the side of the roads they are on or along the outside of parking bays and have a stripe to separate them from motorists. Class III bike routes are shared with motor vehicles on roadways with (sharrows) or without (boulevards) marked bike routes. Some bike lanes connect with each other through grade separated crossings, the main crossing in the City being the Jennifer Street Bridge on the Railroad Safety Trail. SLO has facilities that are designed to accommodate long-term bike parking, changing rooms with clothes and equipment storage, and showers, with larger employees like Cal Poly providing these for their employees who commute by bike.

CAP

The city of San Luis Obispo implemented a Bike Advisory Plan, starting in 1993. The 1993 document requires that bike parking standards; new developments must have safe and accessible bike parking and some of the motorist spots can be replaced by bike parking. The city hopes to have network including Class II and Class III bike lanes by 2017 and Class I by 2027. As of 2010, there were 39 miles of bike lanes. The city is reaching for bikes to account for 20% of the transportation mode share with the City’s Bike Transportation Plan and federal and state funding. One of the ideas in the CAP is to implement a bike-share program near parking.

CIRCULATION ELEMENT

In the Circulation Element, it states that all new developments provide bikeways, secure bicycle storage, parking facilities and showers. The city is in accordance with San Luis Obispo County is planning a regional bicycle network and acquiring right-of-ways within in the city. The goal of the element is to provide end-of-trip facilities to encouraging biking and making it safer, more convenient and enjoyable. They are creating bike paths when a street is repaved, restriped, or changes made to its cross-sectional design or changes to development project. The city also wants to create more convenient located bike parking. They are also doing this in accordance with Cal Poly Master Plan.

slo county



fig 1.7 a few friends getting active in San Luis Obispo

SAN LUIS OBISPO BIKEWAYS

Existing Conditions

The San Luis County Bikeways Plan examines the current bicycling conditions of the County and recommends actions to take in order to improve bike circulation. Its goals and objectives are to connect all communities in the County with bicycle facilities, close gaps in existing bikeways, identify and break down barriers to bicycle commuting, and prioritize projects that accomplish the aforementioned goals. A 10-member Bicycle Advisory Committee advises the County how to maintain the County's bike lanes in their current condition as well as make recommendations for how the County should improve them. There are many miles of Class I, Class II, and Class III bike lanes serving a population of roughly 275,000 residents. About 1.3% of SLO County's commuters commute by bicycle according to the 2000 Census.

Circulation

SLO County has at least 150 miles of bike trails, with an unknown amount of Class I paths, 61 miles of Class II lanes on 54 roads, and 91 miles of Class III routes on 81 roads. Currently, only some communities have Class I bike paths, including Avila Beach, Cayucos, Los Osos, the City of San Luis Obispo, and Templeton. However, there are Class II and III bikeways in every community. Future bikeway priorities include Class I bike paths going from the City of SLO to Santa Margarita, Avila Beach (the Bob Jones Trail now), Pismo Beach, Arroyo Grande, and Morro Bay; Templeton to Atascadero; and Cayucos to Morro Bay as well as various Class II bike lanes in Nipomo, Arroyo Grande, Templeton, the City of San Luis Obispo, and Cambria.

Safety

From 2005-2009, there were a total of 62 collisions in the County involving bicycles, a large majority

of them causing injuries. To keep riders safe, there are multiple groups and programs designed to protect not only bike riders, but also the environment. San Luis Obispo Regional Rideshare educates County residents about bicycling issues through Bike Month, IRideShare, Rideshare Month, Safe Routes to School, and the Workplace Bike Sharing Program. The San Luis Obispo County Air Pollution Control District has a partnership program called San Luis Obispo Car Free, which gives incentives from participating hotels, restaurants, transportation services, and attractions to travelers who pledge to travel to or around SLO without a car. The San Luis Obispo Bicycle Coalition, a local non-profit bike advocacy group, has educational and outreach programs including bicycle education workshops, Bike Forward, Bike Kitchen, Bike Valet, Bike Empowerment, Kidical Mass, and Share the Road.

Design

Each class of bikeways has a different design. Class I bike paths "provide a completely separated right-of-way designated for the exclusive use of bicycles and pedestrians with crossflows by motorists minimized." Class II bike lanes "provide a restricted right-of-way designated for the exclusive or semi-exclusive use of bicycles with through travel by motor vehicles or pedestrians prohibited, but with vehicle parking and crossflows by pedestrians and motorists permitted." Class III bike routes "provide a right-of-way designated by signs or permanent

markings and shared with pedestrians or motorists." Bicycle parking is located near "beaches, parks, bus stops, Park and Ride lots, commercial areas, libraries, and schools" that have water, restrooms, showers, and changing areas and designed to make it easier on the users to access these locations and facilities with ease.

ENERGYWISE PLAN

In the San Luis Obispo County Energy Wise Plan, one of the elements of the Transportation and Land Use Section is to create a more comprehensive bicycle and pedestrian network. One of the aspects of this is creating ordinances to create routes between land uses and developments. Another aspect is using SLOCOG (San Luis Obispo Council of Governments) to create plans that merge between different jurisdictions, such as Cal Poly and City of San Luis Obispo. Also, the Plan recommends incorporating Complete Streets into City's Circulation Element. Also, using abandoned railroad right-of-way, as bike trails is another one of the recommendations.

LUCE

In the Circulation Element, it deems that all cities within San Luis Obispo County are required to provide bike parking at schools, transit facilities, and places of employment (of which, Cal Poly incorporates all of them). Another part is providing linkages between bicycle routes and transit with the allocation of room for bikes on buses. It also states the need to provide shower/locker facilities for people who bike to school

or work. It also wants the creation of Class I bike lanes where it is possible to link residential areas and important destinations. The last part was the separation of bikes from the motorized vehicles.

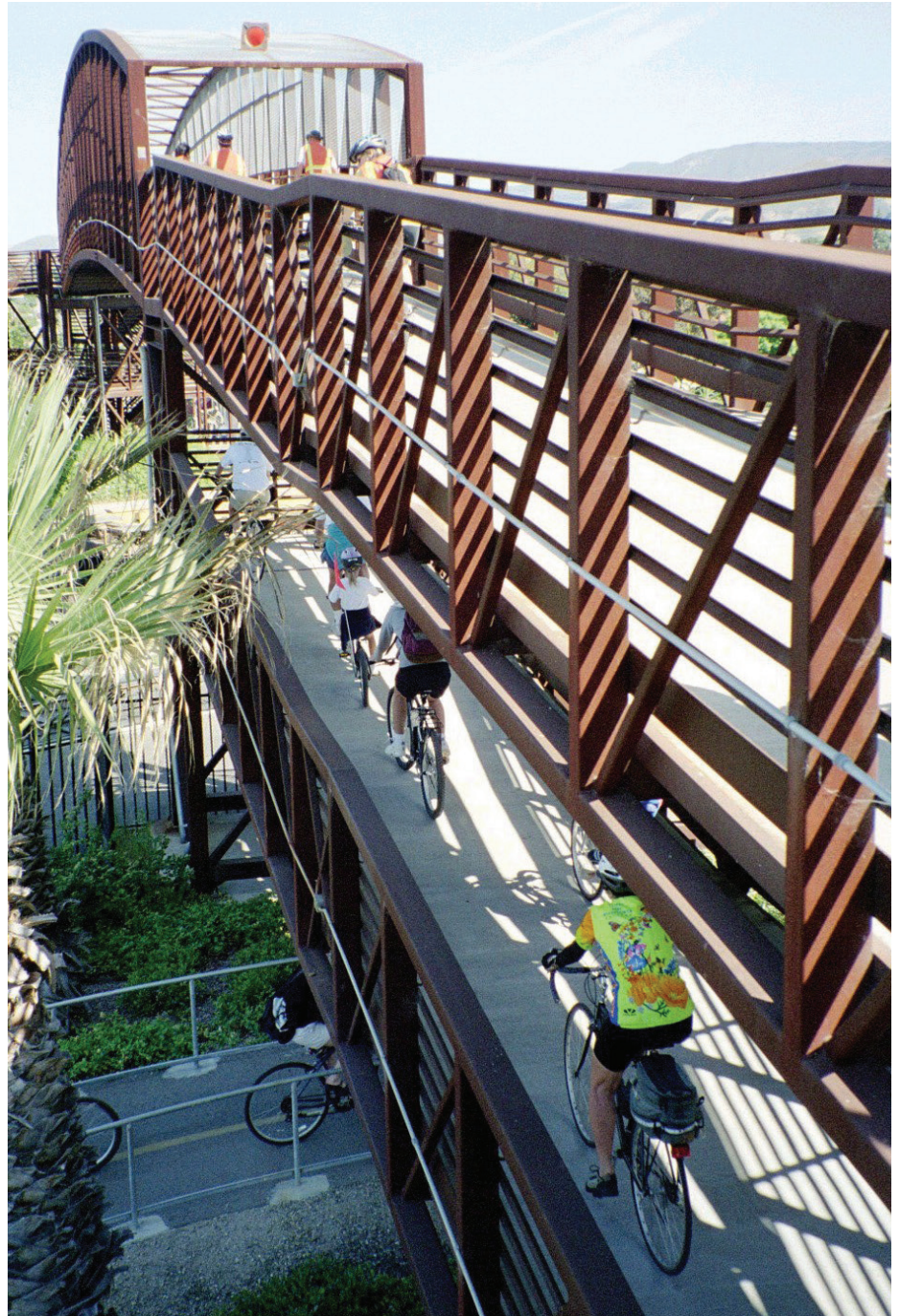


fig 1.8 bicycle bridge, there are many bicycle amenities in SLO



opportunities & constraints

The following chapter includes case studies of other campus' bicycle friendliness and cities' conflicting intersections, site analysis of our chosen intersections, a list of opportunities and constraints for each, and design treatments for different types of intersections. Three case studies, the UC Davis Bicycle Plan, the City of Pomona Active Transportation Plan, and the City of Boulder Transportation Master Plan, compliment the opportunities and constraints by providing us with ideas from those areas that may work at any of our sites. Our own site analysis and research into design treatments was used to assess exactly what problems and issues associated with each intersection and how they should be addressed.

case studies

UC DAVIS BICYCLE PLAN

Summary

The UC Davis Bicycle Plan's purpose is to encourage and improve bicycle riding conditions on the UC Davis campus. This document examines the current state of bicycling on campus through the Five E's of bicycle planning and includes possible projects and programs intended to improve cycling on campus. Examining this document is beneficial for developing Cal Poly's active transportation plan, because UC Davis is known for having excellent bicycling conditions and was awarded Platinum on the Bicycle Friendly University list put out by the League of American Bicyclists; Platinum is the highest award. This case study explores the background of this document, UC Davis' current bicycling policies and programs through the Five E's, and observations from this plan that Cal Poly can use to develop their active transportation plan.

Background

For over forty years, UC Davis has committed itself to encouraging and accommodating maximum bicycling on campus. This has led to few restrictions on campus for bicycling as well as a system of roads and bike paths that lead to every campus destination, with each location providing suitable bike parking. These efforts are what helped UC Davis win the Platinum award from the League of American Bicyclists. In 2011, when this plan was adopted, it

was estimated that 15,000-20,000 bicycles were in use on campus on weekdays with good weather in the fall and spring. With the student population expected to grow in the coming years, UC Davis must maintain and expand their current bicycling policies and programs or else bike use will decrease.

The UC Davis Bicycle Plan is consistent with other local and regional transportation plans, including: the UC Davis Transportation and Parking Services (TAPS) Long Range Access Plan Options Study, the Pedestrian and Bicycle Circulation element of the UC Davis Long Range Development Plan, the Bicycle/Pedestrian Plan Element of the UC Davis/City of Davis Joint Transportation Systems Management Plan, the guiding and implementing policies of the Davis General Plan, the goals and objectives of the City of Davis Comprehensive Bicycle Plan, the goal and policy statement of the Yolo County Bikeway Plan, and the Traffic Safety Plan of the UC Davis Police Department. It was reviewed by the UC Davis Committee on Bicycle Programs and the Transportation and Parking Work Group. The Five E's of bicycle planning, which make up the remainder of this document (excluding the appendix), are engineering, enforcement, education, encouragement, and evaluation. The following section will discuss how they fit into the planning, operation, and maintenance of bicycling on campus.

The Five E's Engineering

Engineering encompasses the infrastructure for bicycling on campus, including: bicycle parking facilities, bikeways, signage, signals, pavement markings, etc. UC Davis has bikeways that allow any bicyclist to ride all over campus. Many of these bikeways are wider than the standards set out in Caltrans Highway Design Manual in order to accommodate an increase in bicycle volumes in the future and must be durable enough to handle occasional service vehicles and multi-ton fire equipment. In order to avoid collisions between bicyclists and pedestrians on the multi-use paths on campus (which cover most of campus and are paths shared between bicyclists and non-bicyclists), the preferred construction of new paths is bike paths paralleled by separate pedestrian paths. Even if there is a street with no bike path, accommodating bicyclists and motorists has not been a significant problem; the addition of bike paths should be evaluated case by case. Roundabouts have been very effective in improving the flow of bicycling on campus at bike path and bike path/roadway intersections, especially during peak traffic periods such as class breaks. Bicycling parking includes the physical racks and lockers used for parking as well as the space set aside for bicycling parking. Many physical parking locations are spread out over the entire campus, near building entrances, and in high visibility areas in order to provide ample parking for every building on campus as

well as discourage improper parking practices and theft. To determine a good number of bike racks to provide at any location, UC Davis estimates the maximum use of the building and calculates how many might arrive by bike. These racks are designed based on theft-prevention features, ease of use, cost, durability, and appearance. There are also 76 rental all-steel lockers on campus (which are designed for theft-resistance, durability, and ease of maintenance) utilized by commuters from outside of Davis that provide users with protection from the weather and additional security as well as 12 “BikeLid™” lockers available on a first come, first served basis that are for short-term use only.

Most bike-related signs are on roadways, with signs and markings on bikeways smaller than the typical Caltrans Traffic Manual designs on roadways. Some signs and pavement markings are used to show where bikes are or are not allowed to park. Pavement markings on bike paths must be taken care of in order to reduce slipping hazards in wet weather conditions. Special bicycle signal heads that go along with standard traffic signals and move motorists and bicyclists at different times in order to reduce collisions have been installed around campus since the 1990's. UC Davis also provides public air compressors with hoses in order to allow bicyclists to fill their deflated bike tires.

Enforcement

Campus bicycling is enforced by the University Police as well as Transportation and Parking Services (TAPS), because rules and signage

are not enough to maintain a safe and legal biking environment. There are four officers (they have received standard bicycle patrol training as well as fully-equipped police bikes with the requisite accessories and uniforms) who monitor a significant portion of campus at any given time. The police also engage in crime prevention activities as well as take bike theft reports, respond to bike crashes, and maintain theft and crash statistics. TAPS has a Bike Patrol (part-time student employees) that patrols the campus, puts warnings on illegally parked or abandoned bikes, and impounds bikes if necessary; takes care of the mandatory registration of bikes on campus; and runs a bike traffic school with the University Police for anyone cited for equipment and moving violations. The mandatory registration of bikes helps return lost or stolen bikes as well as manages the large number of bikes at UC Davis. The bike traffic school reduces the normal bail of \$100 to a nominal administrative fee and educates law breakers about bicycle safety.

Education

The Davis Bike Map distributed on campus and in Davis contains all of the bikeways in the city and on campus, bike shop locations, tire air sources, bike riding tips, safety and security information, and a list of local resources for cyclists. This document is effective, because, unlike many bike safety brochures, there is a map that many people find useful and necessary. TAPS distributes a flier to incoming

students that provides basic information about being a successful bicyclist at Davis. A 19 minute video filmed in Davis, “How to Avoid Face Plants” is presented at the TAPS bike traffic school, on campus TV, and during various presentations on campus. The TAPS Bicycle Coordinator, being a certified League Cycling Instructor with the League of American Bicyclists, gives bike safety talks and has taught classes on bicycling skills and knowledge. The ASUCD Experimental College, at the ASUCD Bike Barn, has bicycle repair classes that teach students and community residents how to repair, overhaul, and maintain their bikes.

Encouragement

Encouragement encompasses ideas such as creating and maintain a welcoming environment for bicyclists, providing convenient and secure bike parking facilities, and establishing and maintaining bike paths that make bicycling UC Davis safe and efficient. Groups such as the Committee on Bicycle Programs, the UC Davis Bicycle Users Group, and the Davis Bike Church discuss bike issues on campus, advocate for better bicycle infrastructure and regulations, and provide repair stations and repair instruction. The ASUCD Bike Barn is a centralized source for bikes, parts, service, accessories, repair, and maintenance. Bike auctions held twice a year usually give away 400-425 bikes at a low cost; the proceeds go directly into the campus bicycle program.

TAPS will cut locks for students who need locks removed from their bikes. Faculty and staff who normally ride

their bikes to school and don't have regular long-term parking permits can buy temporary "A" parking permits which allow them to park closer to most campus activities on days they don't ride their bikes to school; the permits provide up to 12 day use permits per six-month period. Special events, put on by UC Davis and the City over the years in order to promote bike use, include Cyclebration, Bike Commute Day, and the Transportation Fair. Manufacturers, bike shops, and special programs have provided periodic coupons for bike helmets, bike lights, and other bike items.

Evaluation

Evaluation of the current policies and programs in place provides information for improvement. TAPS sends out regular bicycle parking utilization surveys to assess the demand for bike parking facilities on campus. There has been a Campus Travel Assessment survey that asked how the campus community gets to campus, what transportation programs they are using, what are the main barriers to travel, and if people are trying to make a difference through their transportation choices. A study in 2007-2008 was performed to assess bicycle facilities and the transit network serving UC Davis and provide information regarding necessary improvements to the bicycle infrastructure.

Observations

There are many policies and programs that both Cal Poly and UC Davis implement and provide. Some of these include providing bike parking near

building entrances and in highly visible locations, bicycling rules enforced by University Police, an on campus class for bike law violators, and at least one group on campus that provides bicycle repair facilities. However, it is clear that UC Davis has done much more bicycle planning than Cal Poly. There are no roundabouts at Cal Poly, which may help alleviate some traffic; there are very few signs dedicated just to bicyclists that show them that the rules of the road apply to them as well; Cal Poly does not have a club on campus that constantly advocates for better biking conditions (there is a bike club, but they don't focus on biking on campus as much); quite a few areas on campus have no or inadequate bike lanes; there is no easily accessible map of the bike lanes on campus; and Cal Poly provides few, if any, incentives for almost everyone to ride a bike to and from school. Cal Poly must invest more into bicycle infrastructure and programs if they want a bigger portion of the campus community riding a bike to and from school; this document provides expenditures on major bicycle infrastructure projects that UC Davis has performed in the last 20 years if Cal Poly needs an idea about how much it may cost to improve their bicycling infrastructure. A major difference between Cal Poly and UC Davis that might contribute to this difference in ridership is the elevation of each university; UC Davis is flat while Cal Poly has hills.

CITY OF POMONA ACTIVE TRANS PLAN

Summary

The purpose of the City of Pomona's Active Transportation Plan, which includes the City's Bicycle Master Plan, is to reduce Pomona's contribution to air pollution, congestion, energy consumption, and climate change, manage its transportation network better, and reduce the City's overall GHG emissions from single-occupant driving. This document examines the City's efforts to continue toward a better bicycling and walking environment by proposing a system of bikeways connecting neighborhoods to key activity centers, developing support facilities, and identifying safety recommendations. Examining this document is beneficial in order to develop Cal Poly's Active Transportation Plan, because this document is similar to the document we are developing for Cal Poly and a university similar to Cal Poly, Cal Poly Pomona, is located adjacent to Pomona. This case study explores the background of this document, the City of Pomona's current active transportation policies and programs through the discussion of the Five E's of bicycle planning: engineering, enforcement, education, encouragement, and evaluation, and observations from this plan that Cal Poly can use to develop their active transportation plan.

Background

Incorporated in 1888, Pomona today has a population of roughly 150,000 residents and an established and interconnected grid street system for stores, schools, parks, and residences. This street system connects the City with surrounding freeways and trains to move around the Los Angeles area and beyond. However, Pomona only has a few miles of bikeways and is missing miles of sidewalk throughout the City. Combined with a desire to enhance alternative modes of transportation, this led to the adoption of this document in 2012. Existing journey to work data shows that only 0.8% of residents commute by bicycle and 2% commute by walking; these percentages are similar to county, state, and national numbers. 58 bicycle crashes with at least 2 injuries were reported from 2007-2011, while even more pedestrian-related crashes were reported from 2008-2011. To receive public feedback regarding this document, Pomona held three stakeholder meetings throughout 2012. Out of these meetings, three broad ideas represent the comments from the public: "make cycling to key destinations, such as commercial districts and schools, easier and safer; identify solutions for bridging major barriers in the City, including SR-71, I-10, major east-west and north-south arterials, and Metrolink tracks; and develop a complete and integrated network that accommodates a range of cycling skills." The City also relies on existing policies and plans to help guide them through their plan. Some of Pomona's existing policies are found in their General Plan, Municipal Code, and Transportation Impact Study Guidelines. Some outside policies

and plans that helped Pomona include Caltrans' Complete Streets Policy, the federal government's Department of Transportation Policy Statement on Bicycle and Pedestrian Accommodation Regulations and Recommendations, and the bicycle plans of San Dimas, Claremont, Los Angeles County, and San Bernardino County.

The Five E's Engineering

The City has been developing its bicycle network since the 1990's and is continuing to develop it utilizing Class I, II, and III bikeways, which are designed using standards set out by Caltrans in Chapter 1000 of the Highway Design Manual as well as guides recommended by the National Association of City Transportation Officials Urban Bikeway Design Guide. Currently, Pomona does not have a bike rack placement program and no city code that requires property owners/developers to provide on-site bike parking. There are a few places for bicycle parking throughout the City, including Pomona's downtown Metrolink station (buses provide bike parking as well), the Pomona Civic Center, and major educational institutions. Shared-use paths may have staging areas that provide directional information and signage, bicycle parking, seating, waste baskets, restrooms, water fountains, and weather structures where practical and feasible. Signage should have similar designs throughout the City and be separate for bicycles and pedestrians, except at street

crossings where vehicles share the signs as well. Bicycle lane markings should have a minimum coefficient of friction of 0.3 and be on the far side of each intersection. Pedestrian walkways should follow the principles set out in Pomona's General Plan, which include: pedestrian access around the City should be safe and convenient, allowing pedestrians to walk safely to all destinations that motor vehicles can, all urban streets and thoroughfares should have sidewalks, street lighting, and safe intersections, rural highways should have wide shoulders, and high pedestrian activity areas should have streetscape features such as bus shelters, landscaping, street furniture, colored or textured pavers, street lights, trash and recycling bins, news racks, clocks, public art, banners, flags, and fountains. Crossings for pedestrians may be stop-control or signalized with some design features including advanced stop bars for cars, curb extensions, raised crosswalks, right turn channelization islands, and roundabouts, and pedestrian scramble intersections. Sidewalks should include four distinct zones: frontage zones (space adjacent to buildings), pedestrian zones (dedicated to walking), furniture zones (contains all sidewalk furniture and fixtures such as landscaping and bus stops), and curbs zones (defines space between pedestrians and cars). Some land uses require different standards for bicycle and pedestrian paths in order to accommodate heavy non-vehicular traffic including activity centers, transit-oriented developments, and urban neighborhoods.

Enforcement

The Pomona Police Department is currently the enforcer of bicycle and pedestrian regulations. However, this plan recommends programs that will help the police enforce the laws, including increased fines, bicycle traffic school for those who are ticketed for unsafe bicycling practices offered in lieu of paying a fine or appearing in court, wrong way riding signs, pedestrian sting operations where a plain-clothes officer crosses a crosswalk with a car coming that has enough time to stop and let the pedestrian cross (the driver will be ticketed if they exhibit any unsafe driving practices), a neighborhood speed watch/radar lending program, traffic complaint hotline, speed enforcement in school zones, and law enforcement officer bicycle and pedestrian training in order to have a specialized bicycle- and pedestrian-focused officer. Some City regulations that will help enforce safe bicycling and pedestrian practices include considering a police bicycle patrol downtown, conducting targeted enforcement efforts with citations and educational materials, monitoring and recording bicycle and pedestrian collisions, establishing repair, air, and bike maintenance sites, and prohibit bicycling on sidewalks in high-pedestrian areas.

Education

Pomona currently does not educate its population in bicycle and pedestrian safety very well. Some recommended programs include billboards, citywide walking and biking maps, public service announcements, Perils for Pedestrians which is a monthly television series that promotes the awareness of bicycling

and walking issues, educational signs for bicycle detectors and pedestrian signal indicators, adult bicycle education, and senior bicycle, pedestrian, and driving education. Regulations for the City to consider include promoting increased driver awareness and respect for bicyclists and pedestrians, pursuing Office of Traffic Safety grants for outreach, expanding Pomona's Active Transportation Plan website into a permanent bike and pedestrian information website, creating programs for non-English speakers and low-income communities, targeting outreach programs at popular places and events including Cal Poly Pomona, cycling shops, and farmers markets, establishing a City of Pomona Bicycle and Pedestrian Advisory Committee that concentrates on identifying key issues, crafting public outreach programs, promoting bicycle and pedestrian programs, and serving as a link between the City and the public, and establishing a Bike-Friendly Business District in downtown. The Bike-Friendly Business District would encourage merchants and customers to replace their cars with bikes as well as offer incentives including discounts for bicyclists, free bike valet, free bike tune-ups, bicycle parking, and special stickers.

Encouragement

Programs and groups in place to encourage Pomona residents to practice safe bicycling and walking practices include Safe Routes to School and the Pomona Valley

Bicycle Coalition. Pomona has used grants for the Safe Routes to School program to improve bicycle and pedestrian infrastructure. The Pomona Valley Bicycle Coalition, founded in 2012, intends to increase bicycling access, bicycling-safety, awareness, and safe routes for bicyclists and pedestrians in Pomona, provide support for the City to become more bike friendly and green, organize bike rides, provide input in the planning process, and support Bike to Work Day and Bike Month activities. Programs that the City could put in place include a partnership for bicycle training and repair with local bike stores and walking school buses and bicycle trains where pedestrians and bicyclists pick people up and drop them off on a specific route. Strategies that the City may take for encouraging active transportation include establishing a large car-free day and a bike-buddy program between experienced and unexperienced bicyclists. Encouragement also includes maintaining the paths that bicyclists and pedestrians use. Maintaining these paths include necessary surface repairs, sweeping, pavement overlays for new pavement, rail crossings, keeping vegetation trimmed, street and path markings, and keeping utility covers and construction plates out of the main section of a bike or pedestrian path.

Evaluation

The only data that this document mentions for evaluating bicycle and pedestrian conditions is collision

data from the Census in order to evaluate safety in the City. In order to evaluate bicycle and pedestrian programs and regulations, the City could conduct walk/bicycle audits as part of their outreach programs for new development projects; partner with Cal Poly Pomona Urban Planning students, the Los Angeles County Bicycle Coalition, and the Pomona Valley Bicycle Coalition to do annual bicycle and pedestrian counts, implement an annual monitoring program, or require that all traffic study counts include bikes and pedestrians to estimate bicycling levels and changes in it over time; and measure the impact of walking and biking on public health, resident and merchant perceptions, environmental impact, amount of cycling, and safety.

Observations

Cal Poly is where the City of Pomona was a few years in regards to active transportation planning; there isn't much. On one hand, Cal Poly has more miles of bikeways and has an active bicycling and pedestrian community. On the other hand, Pomona is flat and has a bicycling group designed to improve bicycling conditions in Pomona. A few ideas that Cal Poly can take from Pomona's Active Transportation Plan are including a Bicycle Master Plan within the document, founding a club or group committed to improving bicycling and walking conditions on campus, and having maps of bike and pedestrian pathways on campus distributed to the campus community and visitors. Fortunately, Cal Poly and Pomona do share similarities when it comes to active transportation planning, including having the local police enforce bicycle and pedestrian

rules and regulations and educating rule-breaking citizens about safe bicycling, driving, and pedestrian practices. Understanding this long document can help shape Cal Poly's Active Transportation Plan into a well-rounded document that influences the future of bicycling and walking safely and conveniently on campus.

CITY OF BOULDER TRANS MASTER PLAN

Summary

The purpose of Boulder's Transportation Master Plan (TMP) is to provide safe and convenient access and mobility as well as preserve Boulder's standard of living by minimizing congestion, air pollution, and noise. This document explores goals, policy guidance, and objectives for using and maintaining the transportation system as well as the strategies and programs that Boulder wants to accomplish by 2035. Examining this document is beneficial for developing Cal Poly's Active Transportation Plan, because Boulder is a college town with a large student population and is nationally recognized for its active transportation network. This case study explores the background of this document, the City of Boulder's current transportation policies and programs through the discussion of the Five E's of bicycle planning: engineering, enforcement, education, encouragement, and

evaluation, and observations from this plan that Cal Poly can use to develop their active transportation plan.

Background

Boulder's first Transportation Master Plan was adopted in 1989 with the goal of reducing single occupant vehicles on the road by 15%. Since then, the TMP has developed key concepts with some of them being: walking is the fundamental way to travel, Boulder will maintain and support the Community Transit Network, and transportation improvements will focus on five policy Focus Areas (Complete Streets, Regional Connections, Transportation Demand Management, Funding, and Integration with Sustainability Initiatives). The current plan also plays a role in helping the community reach its current Climate Commitment goal of an 80% reduction in GHG emissions by 2050. The TMP is viewed as a living plan, a plan that's updated in order to remain relevant and consistent with other city documents. The main document is consistent with the Boulder Valley Comprehensive Plan; otherwise, the City just tried to make sure that this document reflects other, general documents including area plans and corridor studies as well as other decisions that affect Boulder's multimodal transportation system.

The City also reached out to the public for comments at local events and on social media. These comments include: make health a central message, collaborate with community partners, improve north-south bike corridors, expand the Community

Transit Network, manage parking, connect to the regional transportation system, introduce a “fully-featured” US 36 BRT service, align TMP outcomes with the Climate Commitment goal, provide workers the opportunity to live and work in compact and walkable neighborhoods, improve Boulder’s land use policies and patterns, plan for changing demographics, provide real-time arrival information, implement new local transit connections, and improve transit access to schools. This document also includes specific goals and objectives which include: reducing VMT in the Boulder Valley by 20% by 2035, reducing single occupant vehicle travel to 20% of all trips for residents and to 60% of work trips for non-residents, achieving a 16% reduction in GHG emissions and continued reduction in mobile source emissions of other air pollutants, not allowing more than 20% of roadways to be congested at Level of Service (LOS) F, expanding cheaper transportation options for all Boulder residents and employees, increasing transportation alternatives in proportion with the rate of employee growth, continuously improving safety for all modes of travel, increasing the share of residents living in complete neighborhoods to 80%, and reducing daily resident VMT to 7.3 miles per capita and non-resident one-way commute VMT to 11.4 miles per capita.

The Five E’s Engineering

While the street system is developed, pedestrian and bicycle systems are only partially developed and require greater investment to reach completion, including grid-based bicycle system of

primary and secondary corridors intended to accommodate all levels of users. Complete streets will help Boulder develop their non-street systems for bikes and pedestrians, because they provide safe and easy connections for multiple modes of transportation. These multimodal corridors may contain real-time traffic information, corridor timing plans, pedestrian crossings, access ramps, and bike lanes. In order to connect complete streets for pedestrians, the City needs a continuous network of safe and convenient walking paths. They also need a safe and convenient network for bicycling. Off-street, multi-use paths are an alternative for bicyclists that don’t want to ride on the streets. Bicycle paths in Boulder will receive enhanced crosswalks, overpasses, and underpasses for safer travels. Transportation Demand Management may implement strategies that improve the system’s capacity and demand such as long-term bicycle parking and preferential parking for ridesharing.

Enforcement

Boulder makes sure its residents are safe and following the law through policies and programs. The Safe Streets Boulder report identifies areas with a high number of bicycle and pedestrian accidents, which helps guide enforcement towards these areas to prevent future accidents. The Boulder Police Department has targeted enforcement campaigns at key intersections/crossings timed to follow educational programs. The City is trying to strengthen

its partnership with CU-Boulder Transportation and Police through programs that support enforcement activities.

Education

Boulder has safety education materials with maps that are distributed during CU-Boulder orientation and are available to the public. Safe Routes to School programs are available in most elementary and middle schools. Organizations and clubs outside of school are offering children opportunities to learn cycling skills. The Heads Up Boulder campaign educates bicyclists and pedestrians on crosswalk safety and rules of the road. The City is planning and launching “an etiquette campaign to raise awareness of multi-use path rights and responsibilities,” other crosswalk safety education programs for middle school students, and a collaboration with CU-Boulder in order to improve pedestrian safety on campus and in the city. Outreach is being planned by agency partners and local bike shops to help bicyclists understand their rights and responsibilities. A Bicycle Education Coalition composed of local agencies and local organizations will guide and identify future priority initiatives, which include hosting bicycle commuting 101 and “train the trainer” cycling instructor courses. A Bicycle Ambassador program and the Lighten Up Boulder bike light campaign highlight how bad it is to ride a bike without a light at night. Encouragement Boulder’s encouragement programs

are intended to disperse information on non-auto options. The Boulder Walks program encourages walking, highlights historic and cultural resources, and emphasizes community and health benefits received by walking. Community walkabouts bring members together to promote walking as a great transportation option. The City has walking route maps to encourage locals and visitors to explore Boulder. Boulder has a Bike Month, Bike to Work Days, and Bike to School Day with a multitude of events and programs during each time. Boulder wants to expand their bike sharing program that serves residents, employees, and visitors as well as support community social rides and events to promote bicycling as a viable transportation option.

Evaluation

Since 1996, Boulder has had a Transportation Metrics program to monitor and assess progress of TMP policies. The program includes surveys, count activities for vehicles, bicycles, and pedestrians and travel time surveys; the product of this program is the Transportation Report on Progress which is a compilation of the results. The major surveys included in the Transportation Metrics program are the American Community Survey, an annual survey done by the U.S. Census Bureau to determine population, housing, journey to work, and other demographic data that helps compare Boulder to other peer cities, the Travel Diary, which has examined long term trends in residential transportation behavior since 1990, and the Boulder Valley Employee Survey, which uses data on the work commute trip, trips taken during the day, and commute

benefits provided by employers to understand the travel behavior of employees in the Boulder area. Boulder is constantly looking for new ways to evaluate the travel patterns of its residents and visitors, with a potential new method being the use of data collected by GPS devices and smart phones to track the starting point and destination of trips.

Observations

Boulder is doing a lot to improve their non-auto transportation systems. With a lot of planning comes a lot of funding for these projects, which the City focuses on for a lot of the remainder of the document. Having strong biking and walking systems and connections as well as laying out a funding plan are two key strategies from this plan that will assist with developing Cal Poly's Active Transportation Plan. Other programs that Boulder has that will help Cal Poly include organizing groups that focus on improving policy surrounding active transportation methods, organizing community walkabouts to encourage walking around town and to and from campus, and sending out a school-wide annual survey that questions students, faculty, and staff about their regular transportation patterns. Boulder's policies and programs can be applied to Cal Poly in a similar manner, because Boulder has a varied topography similar to Cal Poly in parts of the city. This document serves as an essential document for developing Boulder's non-single occupant vehicle transportation systems, which is what Cal Poly's

Active Transportation Plan should do for Cal Poly.

site analysis

NORTH PERIMETER AND UNIVERSITY

North Perimeter Road is extremely important to the flow of transportation in and around Cal Poly. It runs around the core of campus to ensure that travelers can get anywhere they need to be. The western portion of N. Perimeter is used solely as a service route for various Cal Poly vehicles and city buses. University Drive serves as a pathway to one of the busiest parts of campus - the library. The southern portion of University Drive grants access to the library, leading to a parking lot adjacent to Dexter Lawn. The parking lot itself is pretty small. Pedestrians and bikers cross at will here as traffic is very limited. The intersection of these two roads is arguably the most utilized on campus. Students use this intersection to travel to and from parking lots, PCV, or campus market to access

the library and all of campus. During class changes this intersection is laden with pedestrians and cyclists while cars wait in backed up lines for their turn to move. The Level of Service for this intersection is very high.

In terms of amenities, there are sidewalks and clearly denoted crosswalks on all sides. North Perimeter serves as a bus stop to many routes and is heavily utilized by students, another route was added this year to try and accommodate demand, although buses are still crowded during peak hours. Ease of access to buses is also a great commodity for students without cars or bikes. Class II bike lanes exist in most directions. The southern half of University, in front of the library is a one way street with parking on one side. This is

the only road without bike lanes, however, due to width and low level of service it is safe and heavily utilized by most cyclists. The vehicle lanes never exceed three. The area is safe for pedestrians and bikers, however, due to the overall high level of service, there is sometimes confusion in right of way, making it dangerous for everyone. According to the 2010 Design Guidelines, the entirety of N. Perimeter could be changed into a service road as well as portions of University Drive. This would grant access only to service vehicles, buses, pedestrians, and cyclists. Eliminating cars from this area would definitely reduce the risk of collisions. The University should keep looking at ways to make this area safer for all using it.

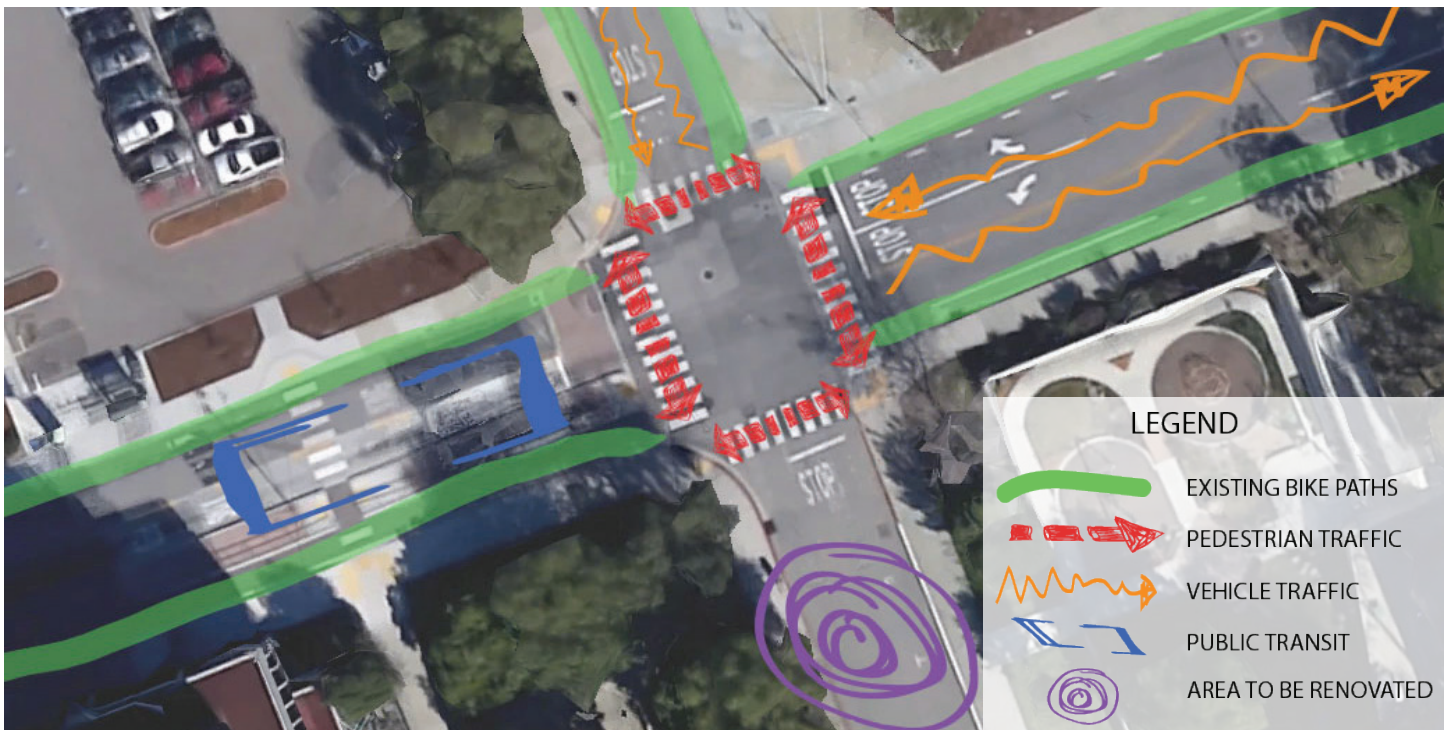


fig 2.1 site analysis of university and perimeter

opportunities



PEDESTRIAN DOMINATED.

A large number of students, both walking and cycling, use this intersection between classes to travel to and from classes.



EXISTING BIKE PATHS.

3 of the 4 roads leading to the intersection contain bike paths. However, they are small and due to chipping paint, signage is unclear. There is a lot of room for improvement.



HALF OF UNIVERSITY AVE. IS SCHEDULED FOR CLOSURE.

The road adjacent to the library will be closed off to vehicular traffic and made into a pedestrian walkway.



REDESIGN IS ALREADY BEING CONSIDERED.

An improved campus Circulation Plan will move the transit center, close off Perimeter to all vehicle traffic, and turn the through-way into solely a pedestrian and cyclist passageway.

constraints



THE INTERSECTION IS HIGHLY CONGESTED. A large volume of cars, cyclists, and pedestrians clog the intersection, making it difficult to cross.



IMPLEMENTATION COSTS ARE HIGH. Changing the existing infrastructure will be expensive.



LACK OF SPACE FOR BIKE LANES. Roads on campus are narrow, there is little room to add bike paths in existing infrastructure.

site analysis



fig 2.2 site analysis of Bella Montana and Santa Rosa and Highland

SOUTHERN EDGE OF CAMPUS

BELLA MONTANA

Bella Montana, a residential area intended for Cal Poly faculty and staff, is located just west of the Santa Rosa/Highland intersection. The Highland neighborhood lies at the base of Bishop Peak and is comprised of mostly residences, so it is generally a quiet area. The noise pollution from Santa Rosa (or Highway 1) sometimes compromises that quiet for those residences immediately adjacent to the road.

The streets inside the residence are relatively quiet due to low traffic volumes, however they are auto dominated. There are little pedestrian and bicycling amenities. Because of this, automobiles are not discouraged from traveling at higher speeds. Higher speeds are directly correlated with a decrease in pedestrians and cyclists.

Bella Montana sits in a prime location for the majority of residences to use alternative transportation to commute

to campus.

HIGHLAND/SANTA ROSA

The intersection itself is quite busy, as it also serves as an entrance into campus. Santa Rosa runs in a North/South direction and contains 5 lanes while Highland runs in an East/West direction and contains 4 lanes. It is a very large intersection with limited pedestrian amenities. No sidewalks exist on the northern half of Santa Rosa, only dirt paths for pedestrians to walk on. There is also no sidewalk on the north-eastern portion of Highland coming from Cal Poly campus. This is unsafe for anyone choosing to walk to and from campus. There are only two opportunities to use a crosswalk to navigate through the intersection. One on the southern part of Santa Rosa and on the western part of Highland. This is extremely limiting for all pedestrians and gives the intersection an automobile-dominated feel.

Bicycles also are not exactly

welcome. There are no class I bike lanes on any of the streets. Highland running in a westerly direction has a class II bike lane as does the half of Santa Rosa running in a southerly direction. A bike lane exists heading towards campus, but the poor signage and old paint makes it unclear where exactly cyclists should be. However, with the large width of the street and many lanes, vehicles are not very friendly and there are not many cyclists on the road at any given time.

The daunting intersection at Santa Rosa and Highland impedes the safety of those willing to do so. An improvement to this area could result in a rise in the amount of people cycling to campus.

opportunities

bella montana



LARGE ROADS WITH ROOM FOR MORE PEDESTRIAN AMENITIES. Wide streets allow ample opportunity for the addition of public amenities to improve transportation and safety.



LIGHT TRAFFIC AREA. The section of Highland Dr. leading to Bella Montana has relatively light vehicle, bike, and foot traffic.

highland/santa rosa



WIDE STREETS ON HIGHLAND AND SANTA ROSA. Again, there is a lot of room to work with to add more public amenities.



EXISTING BIKE PATHS ON HIGHLAND AND SANTA ROSA. Bike paths connect the western half of Highland and Santa Rosa to campus.

constraints

bella montana



LACK OF VISIBILITY. The amenities and hills in the area make it hard to see around some corners, for example the entrance to Bella Montana.



NO SIDEWALKS IN BELLA MONTANA. There is a lack of accessibility, especially from Santa Rosa to Bella Montana.

highland/santa rosa

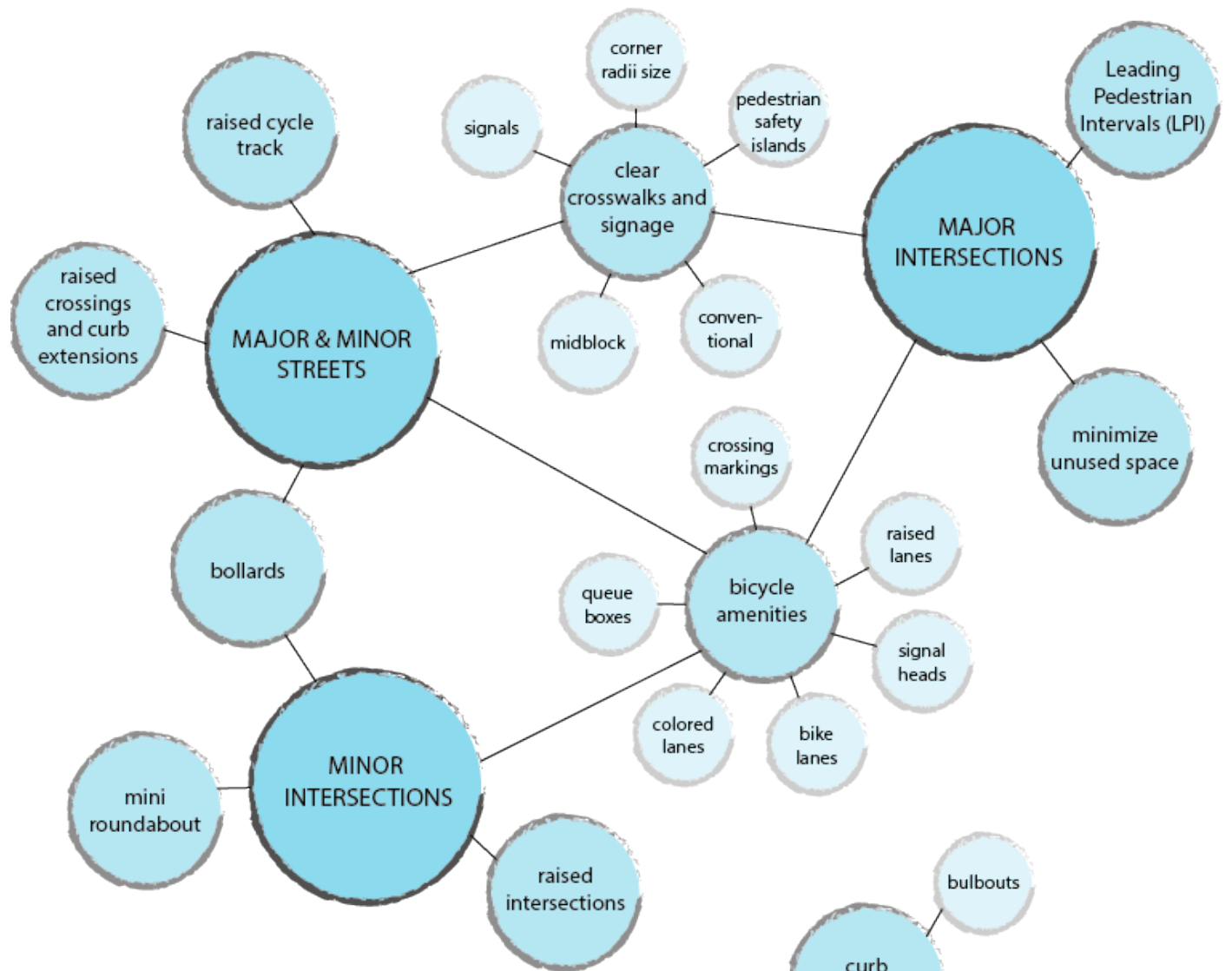


SANTA ROSA IS A HIGHWAY. After Bella Montana, Santa Rosa turns into Highway 1, meaning that vehicles are traveling at speeds up to 70 mph.



HIGH TRAFFIC VOLUMES. Cars, pedestrians, and bikes frequent the intersection, especially during peak hours. The light at the intersection is also 2-3 minutes and crossing is only about 30 seconds.

design treatments & best practices



DESIGN TREATMENTS FOR DIFFERENT TYPES OF INTERSECTIONS

This diagram was created using information from the National Association of City Transportation Officials' (NACTO) *Urban Street Design Guide*, *Transit Street Design Guide*, and *the Urban Bikeway Design Guide*. Conflict treatments and explanations were given for several different types of intersections. The diagram shows which treatments should be used with which intersections. The following page describes each treatment in more detail.



Major & Minor Street Intersections Santa Rosa & Highland

1. Clear crosswalks and signage

Ensuring that crosswalks, bike lanes, and other signage is easy to read and easy to see will promote safety among pedestrians, cyclists and drivers.

2. Raised crossings and curb extensions

These limit turning speeds and increases visibility.

3. Raised cycle track

A raised cycle track or bike lane clearly differentiates the road from the bike lane, separating the two modes of transportation.

4. Bollards

In the event that a vehicle or even cyclist loses control, bollards act as a transparent barrier to increase pedestrian safety.

5. Bicycle amenities

crossing markings - clear markings will help cyclists know where to go and what to do, decreasing confusion and increasing confidence.

signal heads - very similar to crossing markings, signal heads or lights will clearly tell cyclists when to stop and yield to other traffic whether it be auto or pedestrian.

queue boxes - these boxes are located in front of stopped traffic at intersections. They save a space for cyclists to get in front of stopped traffic and forces vehicles to wait for them to start moving through and intersection.

bike lanes - a clearly denoted space for cyclists to move. There are three kinds; conventional, barred, and contra-flow.

Class I - completely separated right of way for exclusively bicycles with minimal pedestrian crossings

Class II - striped lane for one-way bike travel on a street or highway adjacent to auto travel lanes

Class III - shared use with pedestrian or motor traffic

Class IV - are completely separated and bicycle traffic flows both ways colored lanes - bike lanes are often painted bright green to differentiate them from the road.

raised lanes - bike lanes are at a different height than the road and the sidewalk, reducing the amount of vehicles and pedestrians using the same route.

Major Intersections Santa Rosa & Highland

1. Clear Crosswalks and Signage (see Major & Minor Streets)

2. Bicycle amenities

(see Major & Minor Streets)

3. Leading Pedestrian Intervals (LPI)

LPI's allow pedestrians to start crossing an intersection 7-10 seconds before the traffic light turns green for traffic flowing the same way. This allows pedestrians to cross safely ahead of vehicles, minimizing the amount of accidents in large intersections.

4. Minimize unused space

In the event that a vehicle or even cyclist loses control, bollards act as a transparent barrier to increase pedestrian safety.

Minor Intersections Perimeter & University

1. Mini Roundabout

Roundabouts are often used in busy intersections to try and increase the efficiency of traffic flow. They also slow down the overall speed of cars, increasing safety for pedestrians and cyclists.

2. Raised intersections

Intersections that are flush with bike lanes and the adjacent sidewalks force traffic to slow down. Because the line between road/bike lane/ and sidewalk is blurred, vehicles will slow down due to uncertainty. This will allow pedestrians and cyclists to move around with more confidence and safety.

3. Bicycle Amenities

(See Major & Minor Streets)

4. Bollards

(See Major & Minor Streets)

Neighborhood Streets Bella Montana

1. Curb extensions

bulbouts - often used on streets with parking, bulbouts extend street corners to the width of the parking lane. This increases visibility and safety for pedestrians about to cross and intersection by limiting lane width for vehicles.

2. Vertical street elements

Speed humps, Speed tables, and speed cushions all force vehicles to slow down when coming up to heavily used pedestrian intersections or streets. They are often used where pedestrians most often cross a street or in quiet and small residential streets.

3. Stormwater Management

Bioswales are both beneficial for the environment and pedestrians. By diverting runoff to permeable surfaces, road maintenance is improved. They also can serve as a barrier separating road from bike lane or sidewalk.

design treatments & best practices

Campus Bicycle Planning and Program Development

- Adopt a bike rack standard in order to address the issue of outdated/inadequate bicycle parking facilities
- Assess bicycle parking demand in order to establish minimum bicycle parking requirements for new buildings
- Provide long-term bicycle parking in order to meet the needs of students concerned with theft, bad weather, and/or long-term storage
- Bike sharing programs are energy efficient and provide safe, convenient access to bicycles for short trips
- Bicycle programs that promote education, encouragement, enforcement, and evaluation and planning help increase bicycling rates
- Collect bicycling data over time in order to track the evolution of bicycling on campus over time through methods such as campus cordon counts (counting bicyclists at each entrance to campus), bicycle parking utilization (counting parked bikes on campus), an online commute survey (self-reported data from the campus community), and automated counts (use of methods such as infrared scanners, pneumatic tubes, video detectors, slab sensors, and embedded loop detectors)

Best Practices- Sacramento:

- Larger the street, faster the speed on the road
- Higher on-street parking lowers the speed of the road
- Streets longer, faster the speed on the road and increase the likelihood of jaywalking
- Pedestrians and bikes are more affected by the environments (widths and lengths)
- Shading and planting

In Sacramento:

Minimum width of road reduced
Bike lanes required on arterials
Traffic calming methods encouraged for pedestrians
Planter strips in the median

In Eugene:

Street connectivity required and cul de sacs not encouraged
Local street width varies dependent on expected usage

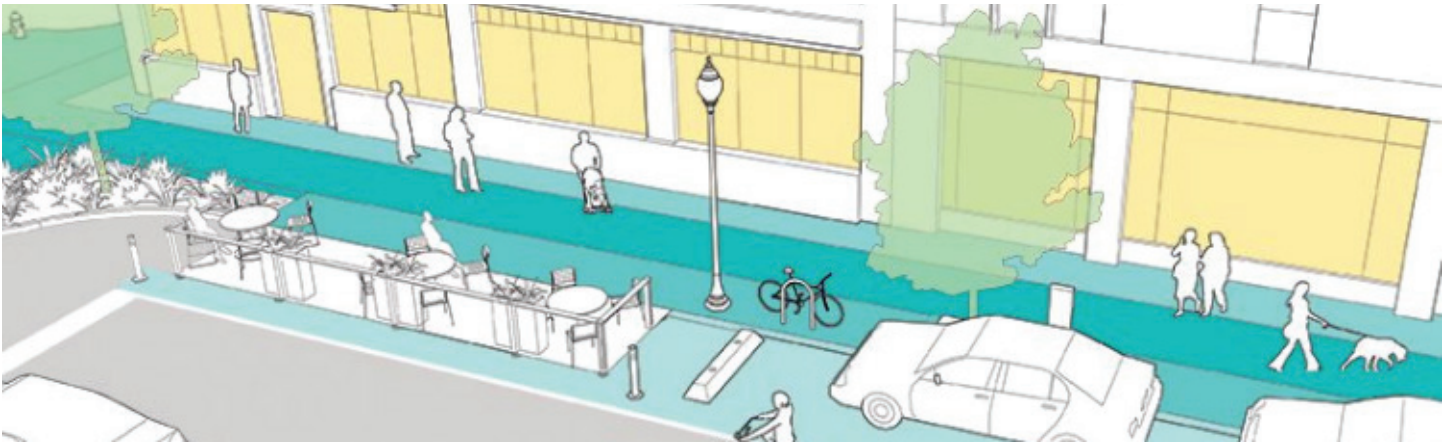


fig 2.3 NACTO's streetscape design, placing a bike path in between parked cars and the sidewalk

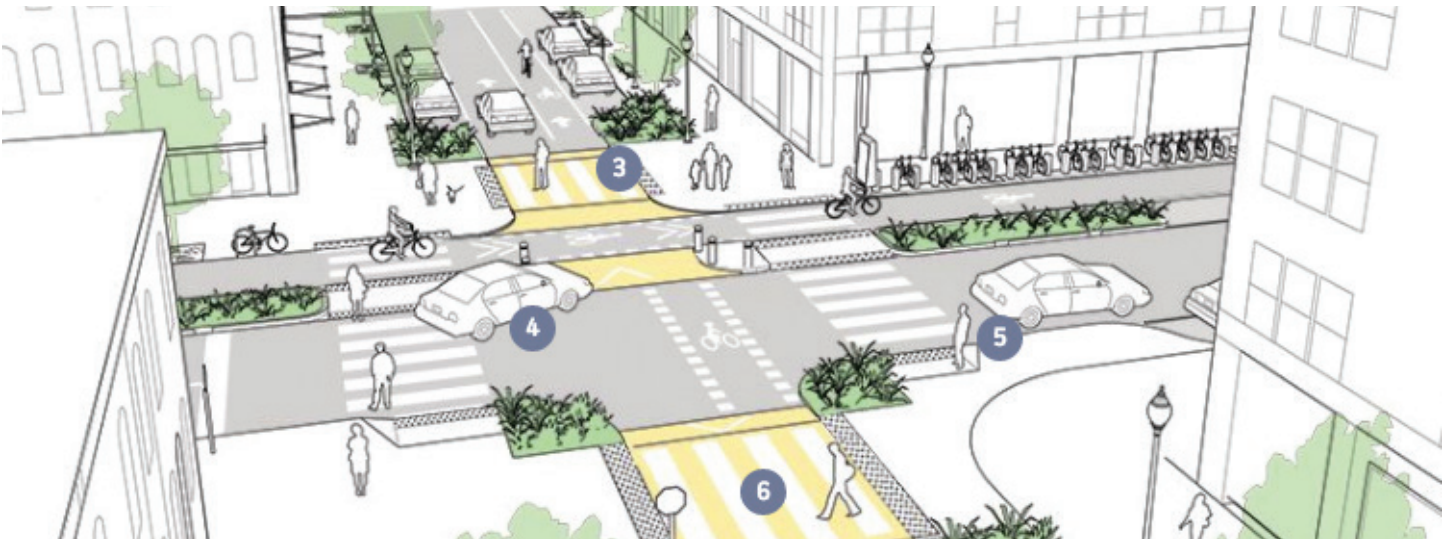


fig 2.4 NACTO's redesign of a major intersection

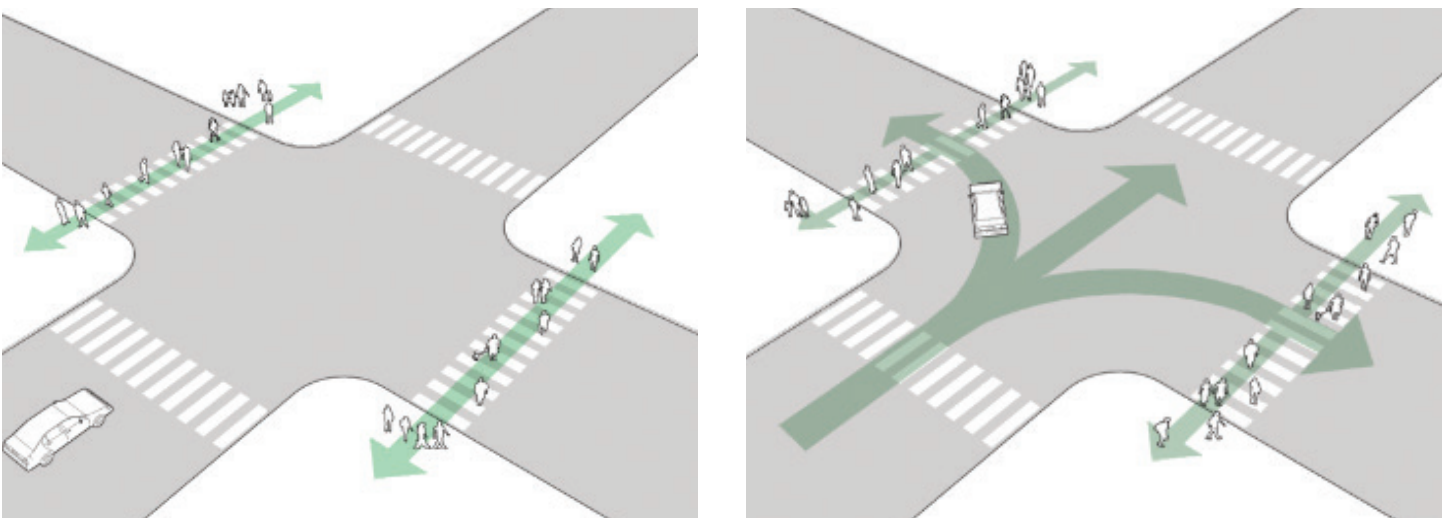
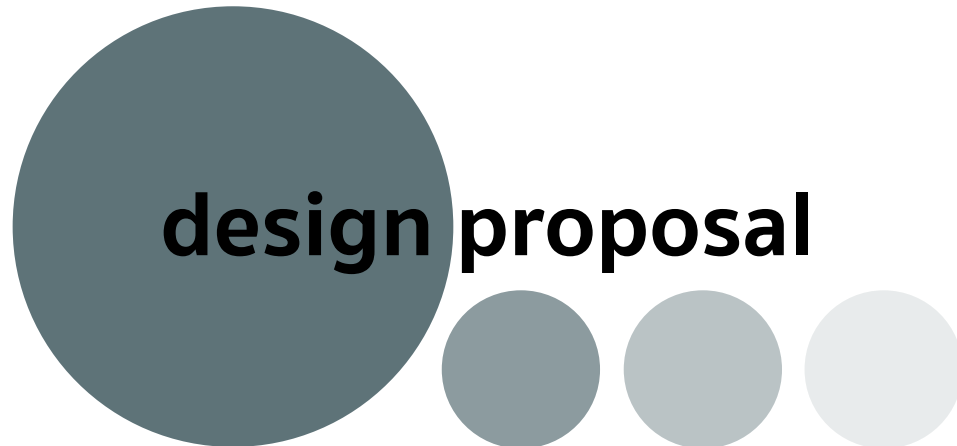


fig 2.5 NACTO's depiction of a Leading Pedestrian Interval system, giving the pedestrian full right of way



design proposal

The following chapter contains our design recommendations for the intersections at University and Perimeter, Santa Rosa and Highland, and Bella Montana. Designs were a team effort, based on the knowledge attained in the two previous sections. An implementation scheme and cost analysis are also included.

university @ n. perimeter



fig 3.1 aerial of proposed University and Perimeter redesign

The southern portion of University and the eastern portion of Perimeter do not allow motor vehicles anymore. These roads have a new path texture and accessories such as tables; trash, recycling, and compost bins; benches; bike racks; and bollards to ensure that no large vehicles can access these paths. Pedestrians and bicyclists share these paths, because they are now multi-modal. This path continues into the intersection in order to create a connection between both sides of the new path. The northern portion of University is only a service road, primarily in use by SLO Transit and RTA buses and Cal Poly service vehicles. The two bike lanes are adjacent to each other on the right side of the road heading away from the intersection, which pushes each car lane a few feet west. The western portion of Perimeter continues to be a service road. A new separate bike lane is adjacent to the current bike lane between Kennedy Library and its closest bus stop, which pushes each car lane north. The intersection is raised in order to make it level with the sidewalk and to provide a traffic calming measure in the form of a curb for the buses and service vehicles to drive over in order to remember to go slow in case anyone is crossing the intersection. There are three new overhead street lights placed near three of the corners of the intersection.

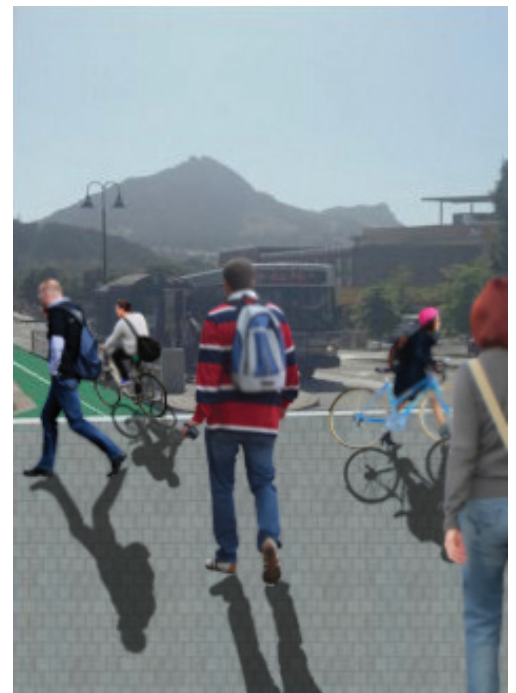


fig 3.2 students will be able to walk safely



fig 3.3 the new N. Perimeter will be very pedestrian friendly



fig 3.4 painted bike lanes on University

highland @ santa rosa

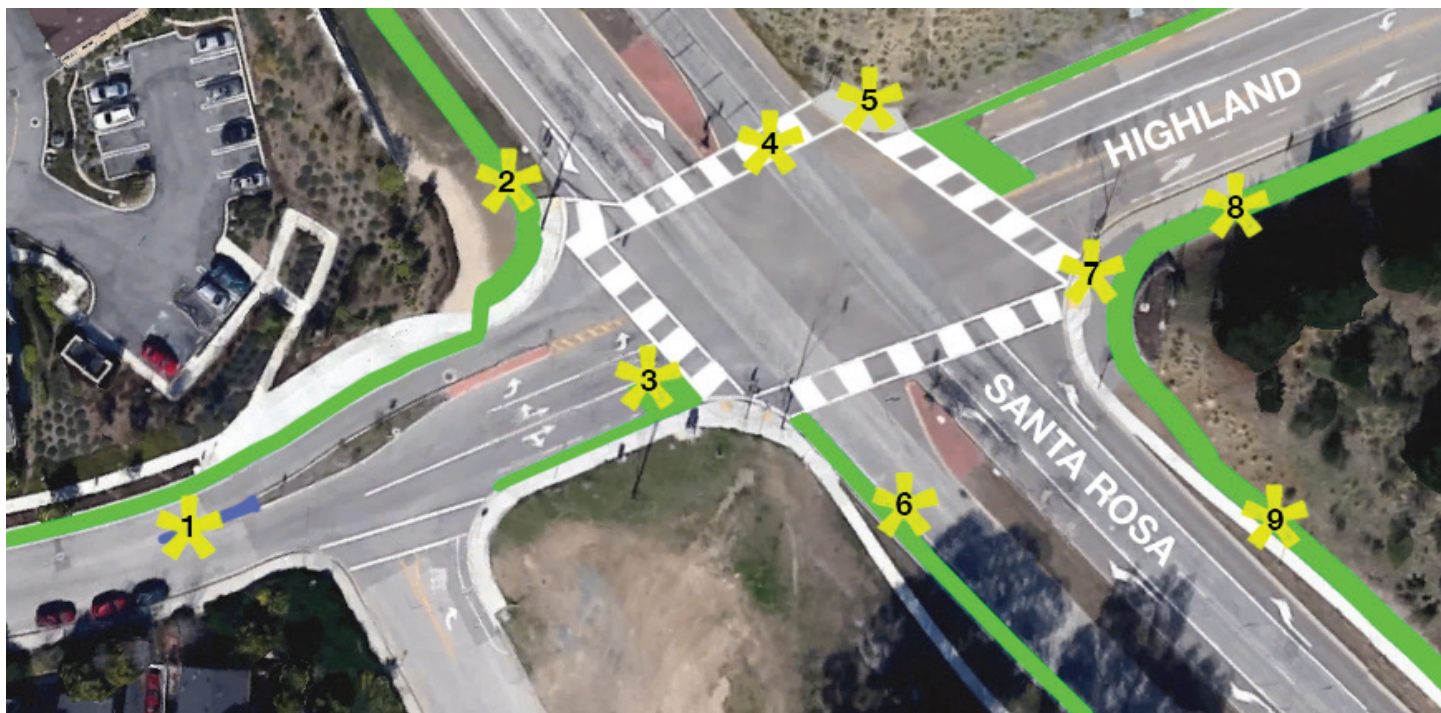


fig 3.5 aerial of proposed Santa Rosa and Highland redesign

Several actions were taken to combat the high auto speeds and lack of safety for pedestrians and cyclists at the Santa Rosa and Highland intersection. **(1)** The bioswale on the western half of Highland Drive will be extended in order to combat illegal left turns often made from North Chorro Street. **(2)** A Class III bike lane/pedestrian pathway will be placed over the existing dirt path on the northern half of Santa Rosa. It will be separated from the road and bollards will be placed alongside for added safety. **(3)** Queue boxes will be added on both sides of Highland, excluding the left hand turn lane on the western half of Highland. **(4)** All sidewalks will be painted to clearly denote where pedestrians should walk. New crosswalks will be added to eastern Highland and northern Santa Rosa. **(5)** A small sidewalk area will be added to the intersecting crosswalks to ensure pedestrian safety. **(6)** Green paint will be added to the existing Class II bike lane to increase safety. **(7)** Bike lane signals will be added in order to ensure that cyclists are crossing the intersection safely and at appropriate times. LPI's will also be added to each signal for pedestrian safety at the large intersection. **(8)** The existing bike lane will be turned into a Class IV bike lane with the addition of green paint and bollards. **(9)** This bike lane will be extended down the southern half of Santa Rosa.



fig 3.6 view towards campus on Highland



fig 3.7 the existing dirt path on Santa Rosa will be changed to a class III bike lane, safe for all pedestrians and cyclists



fig 3.8 more crosswalks will be added to the intersection



fig 3.9 the existing class I bike lane will be painted on Santa Rosa



fig 3.10 a section of the proposed redesign on Highland, heading towards campus

bella montana

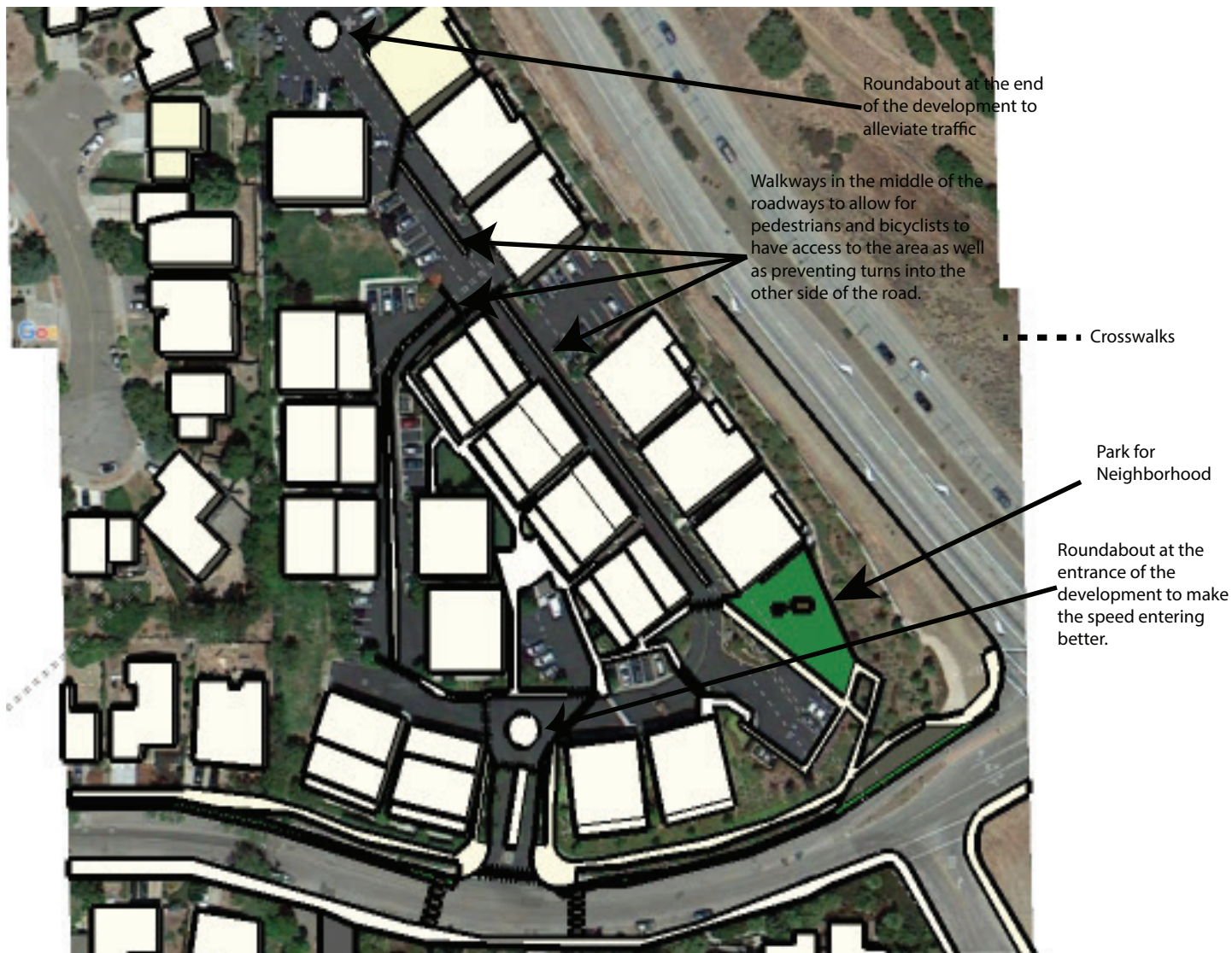


fig 3.11 aerial of proposed Bella Montana redesign

The idea of the redesign was to emphasize the multi-modal use of the development. The area was underdeveloped for bikes and pedestrians and was designed with a focus on automobiles. The redesign includes numerous raised crosswalks that allow for pedestrians to be able to cross easily. In the middle of the two side streets, there are pathways that allow for pedestrians and bicyclists to be able to move freely through the area and the cars will not be able to interact with the pedestrians because it will be a barrier for autos to not cross over to the other side of the road. There will be two roundabouts, one in the front and one in the very back, that will be there to guide the traffic.



fig 3.12 the redesigned entrance to Bella Montana



fig 3.13 crosswalks will be clear in Bella Montana



fig 3.14 Bella Montana will be much safer

implementation scheme

MAIN GOALS

1. Increase intersection friendliness for both cyclists and pedestrians
2. Improve safety and well-being of students and community
3. Improve aesthetics and create a welcoming environment

5YRS

BELLA MONTANA

paint bike lanes heading west on Highland
add solar lights
add speed cushions
add crosswalk in front of entrance
add signage
add two bike racks

10YRS

SANTA ROSA AND HIGHLAND

paint all bike lanes
add queue boxes
bike lanes traveling to campus will be class I
add crosswalks where there are none
dirt path will become a class III bike lane
add streetlights
extend bioswale
implement LPI system

AMENITY	COST
Bike Lane paint/infrastructure	Cost for city
Bike racks	\$500/rack
Crosswalk	Cost for city
Signage	\$20 w/o pole \$250 w/ pole
Bioswale extension	\$5.50/sq. ft.
Bulbouts	Variable
Bollards	\$300/bollard
Solar Lights	\$1600/light w pole \$1200/ light w/o pole

20YRS

UNIVERSITY AND PERIMETER

master plan approval
 closing of university and perimeter
 curved barrier between foot/bike traffic and motorized traffic
 paint bike lanes, improve signage
 repave closed portions of university and perimeter
 add bike racks and plants



final thoughts

This document provides some of the information necessary to aid the campus community and Caltrans in redeveloping campus' and surrounding roads and pathways to be safer and friendlier for bicyclists and pedestrians. As Cal Poly develops its new master plan, this plan helps serve as a guide for developing the future conditions of Cal Poly's roads and pathways in order to accommodate future bicyclists and pedestrians that come here. Implementing this plan requires efforts from and the support of the campus community, residents of the City of San Luis Obispo, and Caltrans as well as the appropriate allocation of funds and time in order to execute these ideas successfully. In order to have a bigger active transportation community on campus, the University must make the necessary changes to its roads and pathways in order to create a more comfortable and enjoyable journey for its travelers. Hopefully, this plan serves as an inspiration for many future generations of bicyclists and pedestrians that come to Cal Poly.



references

Background Report

Cal Poly Administration and Finance Department. (2014). Campus Land Use and Design Guidelines. Retrieved April 20, 2016 from https://afd.calpoly.edu/facilities/docs/campus_zoning_design_guidelines_2010.pdf

Caltrans. (2015, December 30). Highway Design Manual. Retrieved April 20, 2016, from <http://www.dot.ca.gov/hq/oppd/hdm/pdf/english/chp1000.pdf>

City of San Luis Obispo. (2013, November 5). Bicycle Transportation Plan. Retrieved April 20, 2016, from <http://slocity.org/home/showdocument?id=3785>

City of San Luis Obispo. (2014, December 9). Circulation Element. Retrieved April 20, 2016 from <http://www.slocity.org/home/showdocument?id=6637>

City of San Luis Obispo. (2012). Climate Action Plan. Retrieved from http://www.slocleanair.org/images/cms/upload/files/SLO_CAP_WEB.pdf

County of San Luis Obispo Bicycle Advisory Committee, & Department of Public Works (Transportation Division). (2010, November 23). County Bikeways Plan (2010 Update). Retrieved April 20, 2016, from <http://www.slocounty.ca.gov/Assets/PW/Traffic/BAC/2010+Bikeways+Plan.pdf>

County of San Luis Obispo. (2011). EnergyWise Plan (Climate Action Plan). Retrieved from <http://www.slocounty.ca.gov/planning/CAP>

County of San Luis Obispo (2013, August 8). Land Use and Circulation Element (San Luis Obispo Area).

Knox, L., Riggs, W., and Schwartz, J. (2015, Fall). Cal Poly 2015 Transportation Survey Report: Facts & Talking Points.

Rockwood, P. (2016). Personal Communication.

Opportunities & Constraints

Corbett, S., Gilpin, J., & Renfro, R. (n.d.). Best Practices in Campus Bicycle Planning and Program Development. Retrieved May 1, 2016, from http://hec2011.wiki.usfca.edu/file/view/Campus_Bicycle_Planning_Best_Practices.pdf

Transportation and Parking Services. (2011). UC Davis Bicycle Plan. Retrieved May 1, 2016, from <http://taps.ucdavis.edu/sites/taps.ucdavis.edu/files/attachments/BikePlanUCDCampus.pdf>

Home - National Association of City Transportation Officials. (n.d.). Retrieved June 08, 2016, from <http://nacto.org/>



Active Transportation

at Cal Poly, San Luis Obispo

May 4th, 2016

Prepared for Billy Riggs, CRP 463

Prepared by Shannon Boston, Augustus Grochau, Matthew Wiswell, and Jerome Wu



Photo source: admissions.calpoly.edu

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Chapter 1 - Background Report

1.1 Introduction

Cal Poly is one of the largest landholding universities in the nation, ranking second in California with a main campus sized at 1,321 acres. 155 of those acres are considered to be the campus core.

Cal Poly has about 20,000 enrolled students, 1,300 faculty, and 1,500 staff. Cal Poly has about 8,700 parking spaces on campus. How do the other roughly 12,000 people commute to campus? Cal Poly has partnered with the local bus system, SLO Transit, and the regional bus system, SLO RTA to offer the Cal Poly community free, or low cost, transportation via bus. This does not account for all students, staff, and faculty though, as many choose to ride a bike or walk to campus.

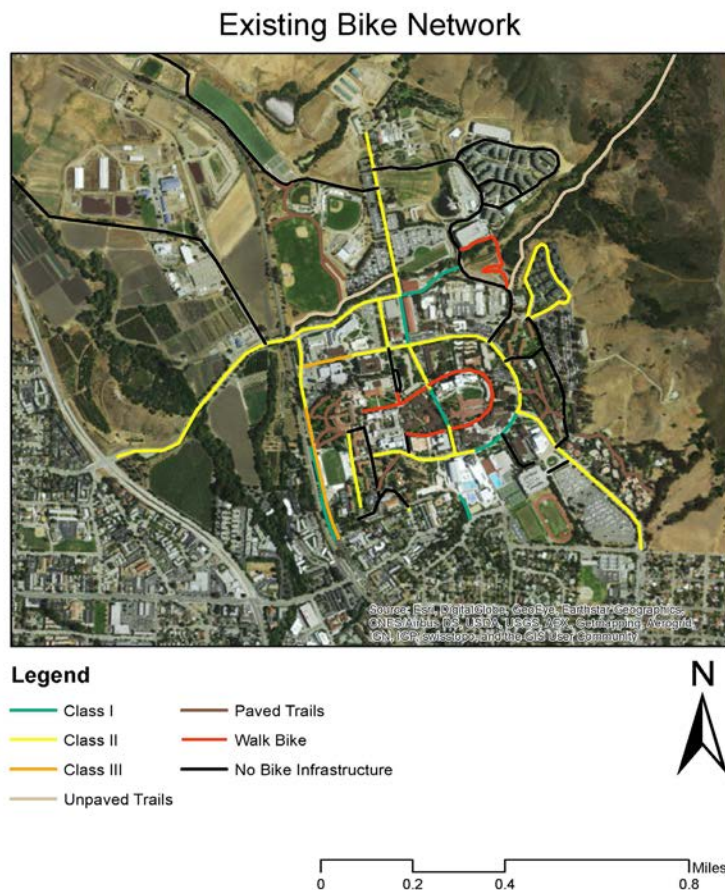


Figure A shows the existing bicycle network on campus, and Figure B shows the existing bike racks. Based on the map, there are 0.42 miles of Class I bike lanes on campus, 2.1 miles of Class II bike lanes, and 0.27 miles of Class III (sharrows) bike lanes, for a total of 2.8 miles of bike lanes on campus. While the total centerline network of roads at Cal Poly is almost 37 miles, most of this is outside of the campus core, in areas that the average member of the Cal Poly community does not use. This map does reflect recent improvements too, specifically the expansion of the class II bike lanes along Highland and Grand Avenue, and the class I bike lane in front of Baker Math and Science. These improvements were implemented via the Cal Poly Master Plan, which will be discussed later.

Figure A: Existing Bike Network on campus.

Chapter 1 - Background Report

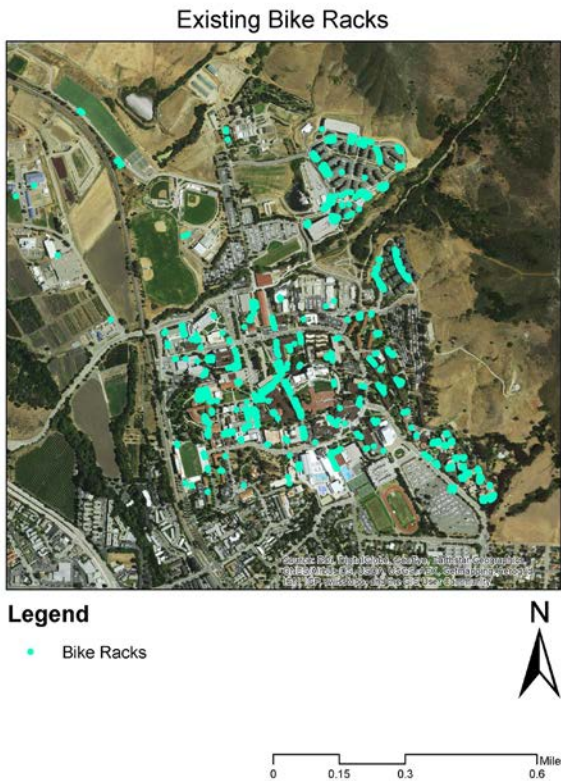


Figure B: Existing bike racks on campus.

As you can see in Figure C, almost every road in the campus core has a sidewalk for pedestrians. A pedestrian can get virtually anywhere on campus using a sidewalk or dedicated path. Cal Poly has made an effort to prioritize the pedestrian, providing sidewalks to every major activity area on campus. The campus core is also closed off to automobiles (with the exception of service vehicles), making it easy for a pedestrian to get around easily. The recent closure of Mustang Way to automobiles has furthered this cause.

Figure B shows the existing bicycle racks on campus. Bike racks are located in high density in the core of campus, where most of the classrooms and activity centers are located. Bike racks are also provided at all of the residence halls and fringe uses, like the Sports Complex and Agriculture units. When compared to Figure A, it is clear that the bike racks are clustered around areas where riders would normally get off their bikes, i.e. intersections of bike lanes and 'Walk Bike' areas. An increase in the amount of bike infrastructure on campus will need to correspond to an increase in bike racks as well. An important part of increasing bike ridership is providing the necessary amenities. Cal Poly has an opportunity to provide bicyclists other bicycle facilities as well, including bike showers, long term bike lockers, and increased bicycle repair stations.

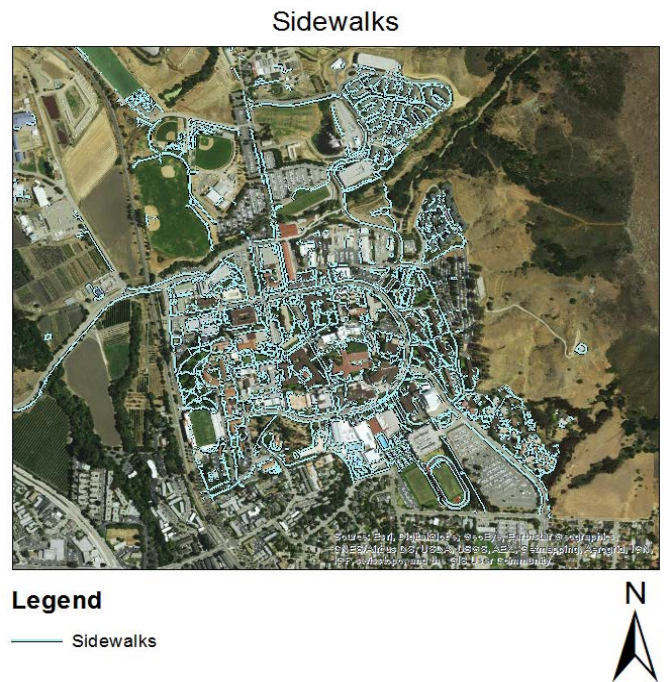


Figure C: Existing sidewalks on campus.

Chapter 1 - Background Report

Figure D combines data from the Transportation Injury Mapping System (TIMS) with Cal Poly and the surrounding layers to show the areas of exposure for campus. It should be noted that Caltrans states that some TIMS data may be inaccurate or out of date for decision-making. Notice that these areas are not only on campus, but in the areas outside of campus that serve campus users as well. The areas of exposure

are broken down into four different types: High Collision Density, Fatal Collisions, Collisions on Campus, and Collisions Near Campus Boundary. Each of these data points represents both pedestrian and bicycle collisions with automobiles, and with each other. High Collision Density refers to the areas in this scope with the most bicycle and pedestrian collisions. These are potential areas of focus, especially the ones closer to campus.

There have been no reported Fatal Collisions on campus, which in itself is a positive.

This plan will continue those efforts, helping to improve pedestrian and bicycle safety. Collisions on Campus are what this plan hopes to limit, if possible. These intersections are also areas of potential focus, as well as the Collisions Near Campus Boundary. These collisions may or may not have involved members of the Cal Poly community, but it is imperative that campus take all measures possible to ensure the safety of anyone using the transportation network adjacent to it. A mixture of uses on the same right-of-way is most likely the cause of most of these collisions. This plan will not call for the complete separation of uses, instead it will aim to make intersections where uses come together more safely for all who use them.

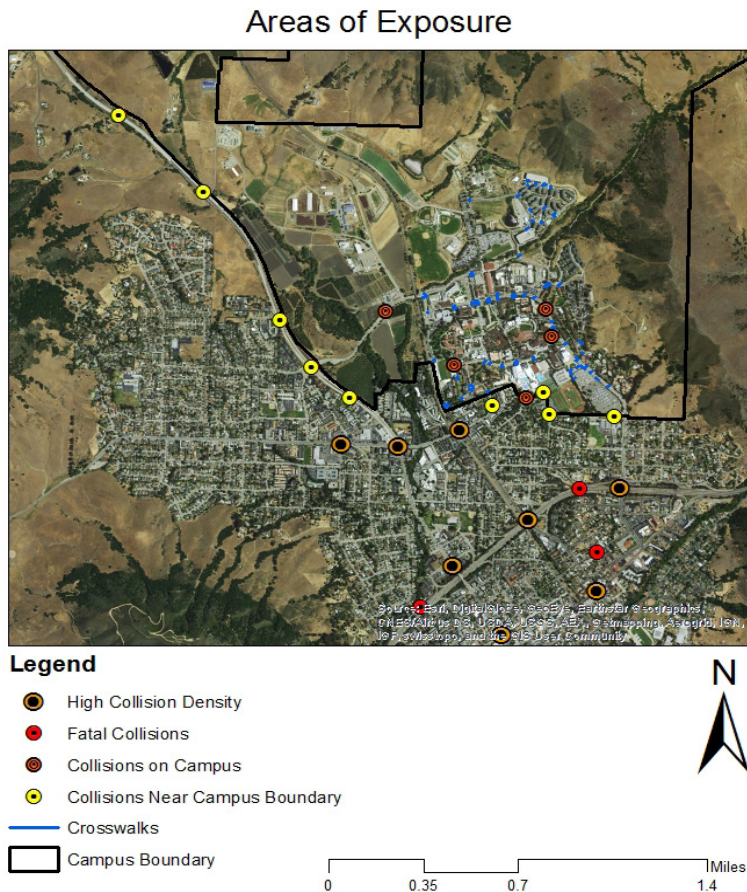


Figure D: Areas of exposure on campus.

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1.2 Intersection Data

In “Complete Streets at Cal Poly, San Luis Obispo,” by Riggs and Schwartz, four of the intersections on, or close to campus were analyzed. These intersections are Grand & Pacheco, Longview & Slack, Longview & Hathway, and Slack & Grand. Below is traffic count data from “Complete Streets” as well as recommendations for improvements to each of the intersections.



Figure E: Aerial view of Pacheco and Grand intersection.

Pacheco & Grand

AM (7am - 9am)

Pedestrian: 332

Bike: 55

Automobile: 1,082

Note: Most students who live in the freshman residence halls would not use the crosswalks and would cross in a diagonal line between Grand onto Pacheco as a shortcut.



Figure F: A street view of the Pacheco and Grand intersection.

PM (5pm - 7pm)

Pedestrian: 610

Bike: 143

Automobile: 1,518

Note: The use of the Grand and Pacheco intersection increases when there is an event occurring at the PAC.

The recommended changes for this intersection include speed tables to keep pedestrians safer and slow traffic down,

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Class II bike lanes connected to surrounding bike lanes, a diagonal crosswalk to help pedestrians, and a pedestrian beacon installed to stop ongoing traffic when pedestrians are present.

Longview & Slack

AM (7am - 9pm)

Pedestrians: 27

Bikes: 14

Automobile: 348

PM (5pm - 7pm)

Pedestrian: 85

Bike: 0

Automobile: 584

The recommended changes for this intersection are incorporating bicycle lanes on slack and longview incorporating a protected bicycle lane along Slack Street closest to Cal Poly, and incorporating a wide sidewalk along Slack Street.

Note: Slack has recently changed from free parking all-day to 2-hour free parking.



Figure G: Aerial view of Longview and Slack intersection.



Figure H: A street view of the Longview and Slack intersection.

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Hathway & Longview

AM (7am - 9am)

Pedestrian: 225

Bike: 79

Automobile: 389

PM (5pm - 7pm)

Pedestrian: 419

Bike: 78

Automobile: 617

The recommended changes include a painted intersection/crosswalk, bulb-out for shorter crosswalk, pedestrian scramble, class II bike lanes, and bollards blocking parking lot access at intersection.

Note: Since completion of the new Recreation Center, this intersection has become highly used by pedestrians, bicyclists, and automobiles alike. Part of this problem is due to the orientation of the parking entrance near the tennis courts.



Figure I: Aerial view of Hathway and Longview intersection.



Figure J: A street view of the Hathway and Longview intersection.

Slack & Grand

AM (7am - 9am)

Pedestrian: 124

Bike: 85

Automobile: 1,775

PM (5pm - 7pm)

Pedestrian: 105

Bike: 107

Automobile: 2,274



Figure K: Aerial view of Slack and Grand intersection.

The recommended changes for this intersection include a vegetated roundabout, a bike path separate from car traffic, a barrier separating bike from vehicular traffic, pedestrian crosswalks with a planter buffer, and the visitor center moved.

These four intersections could potentially be an area of focus, based on the data presented above as well as the TIMS data. This data and these recommendations for improvements could be used not only in redesign or improvement of these intersections, but also as framework for other potential areas of exposure on and around Cal Poly. These four intersections all have features found in other intersections in the scope of this plan. The design guidelines from “Complete Streets” can also apply to other intersections, providing the geometry and setting of the intersections are similar.



Figure L: A street view of the Slack and Grand intersection.

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1.3 Policy Audit

A policy audit was conducted to find relevant policies for active transportation on and around campus. Three documents were analyzed, the Cal Poly Master Plan, the Master Plan EIR, and City of San Luis Obispo Land Use and Circulation Element of the General Plan. The following policies and programs were identified as potentially having an affect on campus transportation.

Cal Poly Master Plan

March 21, 2001

Section	Policy	Implementation
Campus Bicycle System (p. 176)	Extend the Class I railroad recreational trail from Foothill Boulevard north to the new recreation sports complex	This is proposed as part of the current Cal Poly Master Plan Update
	Provide Class II bike lanes on Highland Drive, California Boulevard, and Grand Avenue and connect these bike lanes to the surrounding City bikeway system	This measure has been completed
	Establish an internal bikeway system for the campus core linking the off-campus route to key on-campus destinations	This is currently being completed
	Establish clearly marked bike lanes on campus through the use of special paving surfaces, color markings and attractive signage	This is currently being completed
	Establish clear bike routes from perimeter parking lots to key destinations on campus	This measure has been completed
	Provide conveniently located safe, secure, and attractive bicycle storage facilities at primary destinations and activity centers	This is currently being completed as Cal Poly is implementing more bike racks
	Consider expansion of options and facilities for solar and electricity-powered bicycles	Implementation of this measure is unknown at this time

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Section	Policy	Implementation
Campus Connection to Public Transit System (p. 177)	Adjust transit routes to follow new campus roadway alignment	This policy has been implemented
	Locate transit pullouts and shelters at strategic locations providing convenient access and connections to destinations on campus	This policy has been implemented
	Use state-of-the-art technologies to add to the convenience and efficiency of transit use	This policy has been implemented. The SLO Transit app is still being updated

Cal Poly Master Plan EIR
March 21, 2001

Section	Policy	Implementation
Circulation, Mitigating Measures (p. 282)	Mount Bishop Road/Highland Drive will need to have the all-way stop removed to decrease delay during peak hours. Possibly the implementation of traffic signals or a roundabout, dependent upon roadway slopes, intersection geometry and future traffic volumes	Traffic police are currently in the intersection during peak hours to help the flow of traffic
	California Boulevard/Highland Drive is a likely location for traffic signal control	This policy has not been implemented yet
	Signalization may or may not be necessary at Via Carta/Highland Drive, but due to the slope a roundabout design would not be appropriate for this location	There is currently no signalization at this intersection

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City of San Luis Obispo, Land Use and Circulation Element December 9, 2014

Section	Policy	Implementation
Chapter 2, Section 4: Bicycle Use (p. 2-16)	4.1.1: The City shall expand the bicycle network and provide end-of-trip facilities to encourage bicycle use and to make bicycling safe, convenient, and enjoyable.	N/A - Campus does not have the power to implement these
	4.1.2: The City shall encourage the use of bicycles by students and staff traveling to local educational facilities	N/A
	4.1.7: The City shall support education and safety programs aimed at all cyclists and motorists	N/A
	4.2.1: The City shall evaluate a bike share program in coordination with Cal Poly and other educational institutions	N/A
	4.2.3: The City shall work with Cal Poly and Cuesta College to de-emphasize the use of automobiles and promote the use of alternative forms of transportation in their master plans	N/A
Chapter 2, Section 5: Walking (p. 2-18)	5.1.1: The City shall encourage and promote walking as a regular means of transportation	N/A
	5.1.2: The City should complete a continuous pedestrian network connecting residential areas with major activity centers as well as trails leading into city and county open spaces	N/A

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	5.2.2: For areas outside of the Downtown, the City shall implement its program for the installation of a continuous and connected pedestrian network giving areas with the heaviest existing or potential pedestrian traffic priority in funding	N/A
	5.2.4: The City shall continue to coordinate with SLOCOG and local schools to pursue Safe Routes to School programs and grant opportunities	N/A

1.4 Externalities and Exposure

Pedestrian Crossing on Santa Rosa/Highway 101

Many Cal Poly students who live west of Santa Rosa/Highway 1 choose to walk or bike to school. These are usually students who live in the College Gardens Apartments, the Villa San Luis development, Alta Vista Park, Alta Vista Woods, Creek Apartments, Danish Chalet, and other apartments and single family homes in the area. Unfortunately, many of these students choose to cross Santa Rosa/Highway 1 in an unsafe manner. Many students cross near the entrance to Mustang Village II to Boysen Avenue. Being Highway 1, the speed limit is 45 mph. With cars traveling at high speeds, and limited visibility for pedestrians and bicyclists due to the increase in slope going north on Highway 1, this creates a dangerous intersection to cross.

It is only a matter of time before a serious or fatal incident occurs here. Students choose to cross at this intersection because they feel it takes too long to go all the way to the Foothill & Santa Rosa intersection to cross the street, and then walk back up to Boysen Avenue.

Students who use this point to cross have clearly made it known that this is where they want to cross. While the term “desire path” mostly refers to paths across lawns or shortcuts on trails, it may also apply here. As Tim Halbur from the Congress of New Urbanism states “No matter how well we plan, no matter how many pedestrian studies we conduct or comprehensive plans we create, the human element is going to find its own way...We need to go back to the places we create and see how they work in real life.” (Halbur, 2008). The students of Cal Poly have made it clear that this is their desired path.

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When it comes to assessing potential safety measures for this crossing area, one of two directions must be chosen. The first is enforcement, trying to stop Cal Poly students from crossing at this intersection, and force them to use the established crosswalk and safety measures already in place at Foothill & Santa Rosa. This direction brings up a special challenge and opens another discussion: whether or not automobiles should be able to access Boysen Avenue while going north on Santa Rosa/Highway 1. If automobiles are not to be limited, how do you still limit pedestrian access? Do you provide an underground underpass for cars, and then construct a wall? This would be far too expensive, and the geometry of Santa Rosa/Highway 1 does not currently allow for it. A police officer (either marked or unmarked) could occasionally be placed around this area. A marked police car could stop these crossing behaviors before they happen simply through their presence, while unmarked would ticket those who crossed at these areas. While ticketing offenders may be one of the best ways to stop this behavior, it could also be argued that this would be wasting police officers time. There is the potential for this type of program to be conducted once or twice a month, or every other month, with varying dates.

If you do limit automobiles, will it create displeasure from those whose use this turning

area? Could this be as simple as completing the median through this intersection and filling it with vegetation, as to discourage walking through it? Would students still walk through it, killing the vegetation? A wall could be constructed along the median, but how long would this wall have to be? This direction also requires an agreement between the City of San Luis Obispo (“the City”), and Cal Poly, as it is a direction action of Cal Poly that affects the City.

The second direction would be accommodation, or allowing students to cross there, but providing some sort of infrastructure to keep them safe. How would this look though? A signalized intersection would not be appropriate. There are already traffic signals on Foothill & Santa Rosa/Highway 1 and Highland & Santa Rosa/Highway 1. A third signal would be severely detrimental to the current traffic flow in the area. A pedestrian bridge could be an option, but this would be expensive, and would require easements from the surrounding business to use portions of their land for the potential ramps. Either of these two directions will require cooperation between the City and Cal Poly. There have been approximately 13 collisions at this intersection between 2004 and 2014, according to TIMS. It is time that something be done about this intersection, as someone’s life could depend on it.

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Pedestrian Safety on the Southern Pacific Railroad crossing on Foothill Rd.

Pedestrian and bicycle safety has always been a major point of concern in San Luis Obispo. With a train running through very populated areas, there is a definite need to be safety oriented. In light of recent tragic events along the Union Pacific Railroad (UPRR) crossing at California, it is far past time to start doing something about the safety of pedestrians and bicyclists at this intersection. This is not to say that nothing is being done however, the city is currently running a campaign on the SLO Transit buses cautioning pedestrians of the danger of crossing a railroad. Unfortunately, students who live close to the railroad crossing generally walk to campus, and may never see these signs.

The need to help keep pedestrians and bikers safe is extremely important in this location. The City Public Works Department is currently working on a project to add overhead beacons and a bicycle and pedestrian gating system at this intersection. The City has submitted 50% scoping plans to the California Public Utilities Commission (CPUC) and UPRR for review. According to Brian Wheeler from the City's Public Works Department the plans "are consistent with CalTrain standard crossing plans, which the PUC indicates as 'excellent examples' of rail crossings." (B. Wheeler, personal communication, May 2,

2016) As a part of the review, UPRR will also provide the City with an estimate of the cost.

Bella Montaña Development

Bella Montaña is a small community with 69 condominiums designed exclusively for Cal Poly faculty and staff. The development is located adjacent to Hwy 1, across from the west side of campus and has one entrance and exit on Highland Drive. This single entrance creates a pocket which prevents through traffic and would present a safety hazard if it were a larger community. Pedestrians and cyclists living near the property are either exposed to the heavy traffic of Hwy 1 or must take a long route through the more open residential communities near Bella Montaña if they want to travel past it. It is important to

Figure M: Bella Montaña site plan.



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note, however that some residents have said that the pocket-like nature of the community is preferred, because it offers an enclave away from the college town atmosphere that most of San Luis Obispo offers. Walking paths and open space within the community are scarce within this car-centric community. Parking spaces are placed haphazardly throughout the development, despite the garages beneath each unit. Overall, the space could be utilized more effectively with a redesign including an additional exit.

1.5 Analysis

It is very clear that the Cal Poly community has a profound affect on the surrounding transportation network. This is something that Cal Poly simply cannot turn a blind eye to. Instead, it is imperative that Cal Poly work hand-in-hand with the City, and any other necessary agencies, to help promote the safety and well-being of all citizens, whether they're part of the Cal Poly community, San Luis Obispo residents, or both. It is imperative that all types of transportation (automobile, pedestrian, bicycle, etc.) work cohesively to create a safe transportation network for all who use it.

Cal Poly must work hand in hand with both on and off campus groups to ensure that safety is a main priority when it comes to transportation around campus. As we delve

deeper into this plan we will hone in on important areas for campus to address. This may include intersections, areas of concern like the Santa Rosa/Highway 1 crossing , and potentially some behavioral aspects of campus.

Chapter 2 - Opportunities & Constraints

2.1 Introduction

There are many unique opportunities and constraints associated with the development of this plan. Cal Poly has an interesting relationship with the area surrounding it, as it directly affects it, yet does not have direct control over it. As mentioned in the previous section, Cal Poly ends up externalizing much of the affects of transportation to and from campus. Below, you'll find a list of opportunities, constraints, and design and policy suggestions, and a small discussion of their importance, for Cal Poly and surrounding areas.

2.2 Opportunities

2.1.1: Any improvements to bicycle/pedestrian infrastructure can create a safer and healthier environment. This will make it easier to garner support for potential changes to infrastructure.

2.1.2: There is support on campus for an increase in bicycle infrastructure. This includes support from the President to move towards a more sustainable campus, and support from documents including: The Cal Poly Master Plan, Master Plan EIR, The Draft PolyCap, and Complete Streets at Cal Poly, San Luis Obispo.

2.1.3: Cal Poly classes and projects have the potential to address these issues in further detail. This can include class projects addressing issues identified in this plan, classes or professors competing for grant opportunities, and senior projects along with independent studies can also address issues.

2.1.4: Potential for the City to expand the current railroad safety program on to campus. Campus can help the City expand their efforts in promoting railroad safety by posting the same ads in public areas, including the University Union, Recreation Center, Dining Commons, and others.

2.1.5: Cal Poly owns Bella Montaña, and therefore can redesign the development without requiring approval from the City. This makes a redesign much more feasible.

2.1.6: The City is currently working on a pedestrian/bicycle safety barrier on the Union Pacific railroad crossing on California & Santa Rosa. Cal Poly has an opportunity to support this project financially.

2.1.7: Bicycle advocacy clubs/groups are currently active on campus. These groups include

Chapter 2 - Opportunities & Constraints

the Cal Poly Triathlon Team and Cal Poly Cycling Team.

2.1.8: Cal Poly has already begun upgrading bicycle infrastructure. These improvements include the class I bike lane on Mustang Way & in front of Baker Science, and painted class II bike lanes on Highland Drive and Grand Ave.

2.1.9: Students change transportation patterns fairly regularly. Students change the times and ways they travel nearly every 11 weeks, as it primarily revolves around their class schedules.

2.3 Constraints

2.2.1: Cal Poly cannot directly control the public right of way directly adjacent to Campus. This will require an agreement with the City, or a proposal, to change anything in the public right-of-way. This would require additional work from Campus Planning.

2.2.2: Behavior of automobiles/bicycles/pedestrians could be difficult to change. Although students change transportation patterns fairly regularly, they do not change the mode they typically use. It will be especially tough to get students out of cars and onto bikes, buses, or their feet.

2.2.3: People live in Bella Montaña year-round, which could potentially slow the implementation of a site redesign. Unlike the residence halls, any potential construction has the possibility to affect residents at all times.

2.2.4: People living in Bella Montaña like the level of security provided by its lack of through streets and its surrounding fences. It is an enclave, a pocket away from the college town atmosphere. This perspective came directly from a resident living in Bella Montaña, and should be considered.

2.2.5: Implementation may have to limit access automobile access in some areas, which could decrease public support. This could potentially be on Santa Rosa/Highway 1.

2.2.6: Cal Poly has limited funds, so not all possible interventions can be implemented due to opportunity costs. This will require feasibility analyses for all potential projects, and prioritization of spending.

2.2.7: Implementation of future infrastructure would take extended amounts of time. Construction time (including bidding and proposals) and funding would be the main factors in determining length of projects.

2.4 Design and Policy Intervention Suggestions

2.3.1 Cal Poly shall partner with the City of San Luis Obispo, where it can, to create safe intersections through the use of bicycle safety measures at intersections used heavily by the Cal Poly community

2.3.2 Any new residential development at Cal Poly shall emphasize easy pedestrian and bicycle access

2.3.3 Cal Poly shall implement complete street design where feasible

2.3.4 Cal Poly shall invest in pedestrian and bicycle safety infrastructure where it directly or potentially affects Cal Poly students

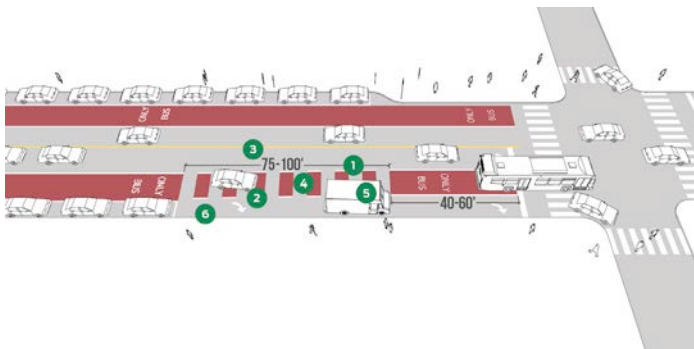
2.3.5 Cal Poly shall implement the use of “Sharrows” wherever possible to raise automobile awareness of bicyclists using the roadway

2.3.6 Cal Poly shall use traffic calming measures, where applicable, to increase pedestrian safety



2.3.7 Cal Poly shall strive to create an interconnected bicycle system, while limiting the potential for automobiles to “cut through” campus

Chapter 2 - Opportunities & Constraints

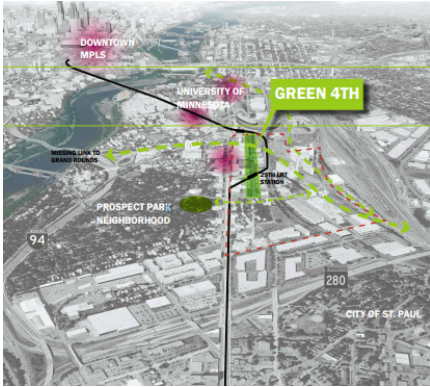

2.4 Case Studies

Policy Suggestion	Summary	Case Studies
Public Partnerships	Students and faculty regularly use the intersections leading to Cal Poly. Cal Poly shall work with the city to promote safe bicycle infrastructure at neighboring intersections.	<ul style="list-style-type: none"> National Association of City Transportation Officials The National Association of City Transportation Officials has a design guideline document that offers recommendations for city's that want to emphasize alternative transit and active transportation.  How Colleges are Stepping up Walkability The University of Kentucky has implemented the Walk [Your City] program on their campus to help encourage students to walk more on and off campus. This can help students and other community members find new things on campus, and be able to get there by walking. This can also have a positive effect on human health, as it can help students get more exercise by encouraging them to get out of their cars.
Connectivity	Cal Poly shall make the effort to create an interconnected bicycle system and limit the potential for automobiles to cut through campus.	<ul style="list-style-type: none"> Avoiding 12 Foot Traffic Lanes The article mentions several studies that show that narrower street widths correlate to a reduction in vehicular accidents and safer pedestrian/cycling environments.

Chapter 2 - Opportunities & Constraints

<p>Complete Streets</p>	<p>Complete Streets offer safe access to all modes of transit. In order to promote active transportation Complete Streets planning shall be a priority.</p>	<ul style="list-style-type: none"> Safe Intersections for Cyclists Protected intersection design has garnered the attention of several North American cities. In addition, city planners have begun to implement mixing zones and dynamic signal timing in order to safely move cyclists through intersections. 
<p>Bike/Ped access</p>	<p>Since Cal Poly is slated to construct new residential and support facilities the new developments should incorporate active transportation features where feasible</p>	<ul style="list-style-type: none"> Seattle Woonerf Woonerf translates to “Living Yard” and is a parklike area where pedestrians and bicyclists are given priority. This design strategy has been implemented in the Netherlands and Seattle.  <ul style="list-style-type: none"> How College Campuses create Bike-Friendly Spaces This article starts off by identifying four factors that make colleges especially good at creating bike-friendly spaces. These are (1) universities breed 20 minute neighborhoods, (2) they create car free spaces, (3) they use public space to create more density, and (4) they charge for car parking. The biggest success comes from thinking of the campus as people-friendly first, instead of car-friendly..

Chapter 2 - Opportunities & Constraints

<p>Sharrows</p>	<p>Sharrows raise awareness of cyclists, assist cyclists in lane positioning and promote safety.</p>	<ul style="list-style-type: none"> San Luis Obispo Bicycle Transportation Plan The City of San Luis Obispo 2013 Bicycle Transportation Plan lists the areas in which there should be specific types of bike lanes. Under each of these there are specific suggestions for how these areas should implement these bike lanes, with specific treatments and policies for how the lanes should interact with other areas
<p>Traffic Calming Measures</p>	<p>Traffic calming measures incorporate physical design elements that reduce vehicular speed to increase safety for cyclists and pedestrians.</p>	<ul style="list-style-type: none"> Green Fourth The project covers 2 blocks and will feature 2-foot wide blue-painted stripes running across both the roadway and sidewalks which will slow traffic and define on-street parking spaces. 
<p>Bike Ped Infrastructure</p>	<p>Bicycle infrastructure includes signals, signage lanes and storage facilities necessary for active transportation.</p>	<ul style="list-style-type: none"> City of Chesapeake Design Guidelines The City of Chesapeake, Virginia has published a document filled with design guidelines online. Chapter II of their Design Guidelines document focuses on streetscape and open space. Some of these design measures include effective streetscaping furniture and shade trees. Stanford University Stanford is rated a 'Platinum' Bike Friendly University. Stanford has achieved this, in part, by excelling in the enforcement section. Stanford offers a bike safety class and offers over 18,000 bike racks on campus. 

Chapter 3 - Design Proposals & Concepts

3.1 Introduction

While many areas on and around campus could benefit from active transportation treatments, there are three sites that would benefit the most. These sites are the Perimeter Road corridor, and intersection with University Drive, the Bella Montaña development, and the Pacheco and Grand intersections. The Perimeter Road and University Drive, and Pacheco and Grand sites were chosen because they are currently areas of high use and have high potential for incidents between different modes of transportation. Both of these sites may also see changes from the new Cal Poly Master Plan, especially at Perimeter and University. Bella Montaña was chosen because of its poor design for pedestrians and bicyclists.

3.2 Perimeter Road and University Drive

Perimeter Road and University Drive are fully contained on campus, making Cal Poly the sole proprietor when it comes to decision-making. Cal Poly has full control over the form and function of these roads and their intersection,

Figure N: Pedestrian Hybrid Beacons on Perimeter Road and University Drive

which is what this design proposal will focus on. This intersection is one of the most used by all modes of transportation on a daily basis due to proximity of transit stops, the library, classrooms, and Campus Market. This causes a problem for pedestrians, bicyclists, and automobiles. Often, especially during peak times around the top of the hour, pedestrians will flood these crosswalks, causing incidents with automobiles and bicyclists. At times, automobiles may not be able to move because of the mass crowds of pedestrians. After implementation of the pedestrian and bicycle only pathway on Perimeter Road, this will happen to this corridor as well. For this reason, a Pedestrian Hybrid Beacon (PHB) would be appropriate at the Perimeter Road and University Drive intersections, and a new bike path along the Perimeter Road corridor, to help keep pedestrians safe from incidents.



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According to the most recent updates of the Cal Poly Master Plan, Perimeter road will be closed off to automobiles from the Cal Poly Corporation Buildings near Safety Way, down to University Drive. This area is planned to be a mixed-use path area for pedestrians and bicyclists. With the addition of a bike-only lane on this path,

similar to what has already been done on Mustang Way, incidents between pedestrians and bicyclists can be reduced greatly. At the Agriculture/English building the new bike path would split to connect to the existing path adjacent to Baker Math and Science, and Via Carta, as well as continue straight to the Perimeter and University intersection.

The PHB system has benefits for all interest groups involved. Pedestrians, bicyclists, and automobiles will benefit from the decrease in incidents. Cal Poly Facilities will benefit from an increase in safety at a lower cost, and no major construction needing to be done. In these renderings in can be seen how these signals would fit into the intersection.

A PHB system can provide the same benefits as a traffic signal, but for less cost, and without sacrificing the efficiency of stop signs during periods of low activity. The PHB works with



Figure O: Pedestrian Hybrid Beacons shown in maroon on Perimeter Road and University Drive alongside proposed bike lane in dark green, overlaid on a Master Plan Conceptual Map

a three-light system, activated solely by pedestrians. Once a pedestrian pushes the button, the first yellow light starts to flash, alerting drivers they need to slow down. Once the yellow light becomes solid, drivers need to finish driving through the intersection, or slow to a stop if they have not yet entered the intersection. Next, two solid red lights come on, as well as a pedestrian beacon, alerting pedestrians it is time to cross. Next, the red lights start to flash alerting cars that they can pass through the intersection if it is safe. Finally, the lights turn off, and the intersection returns to functioning as normal. A pedestrian does not need to use the PHB when there are no cars around though, as they can safely cross the street as normal. Two signals would be used at this intersection. One going South on University Drive and one going East on North Perimeter Road. The signals could

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act independently or together, depending on the time of day (i.e. together during peak use hours, independently at all other times).

Cost of installing the PHB system would be fairly expensive. Each signal costs about \$50,000 on average, and with two signals, the total cost would be \$100,000. These are just averages though, and it would be expected to cost more for installation. This system would also require education as well. Signs around campus could be used to educate pedestrians, bicyclists, and automobiles how these systems work. Instructions could also be included when a parking pass is bought, a bike is registered, or on the SLO Transit buses. While \$100,000 or more may seem expensive, this option is much cheaper than changing the typology and design of the intersection, or adding a full stoplight system.

Cost of installing the bike path would be far more expensive than the PHBs. The median cost for a paved multi-use trail is \$261,000. In distance, the proposed bike lanes would be about half a mile, which would include connection to existing bike lanes. For just the bike lane, the cost would be about \$130,500. However, due to the work needed to be done to change the road into this pedestrian and bicycle area, this cost is expected to be much higher.

3.3 Bella Montaña

Cal Poly is the sole owner of the Bella Montaña development, giving it the ability to make any changes without needing permits from the City. However, the same cannot be said for the right-of-way adjacent to the site (Highway 1) which is owned by the City. The biggest issue with the Bella Montaña development is that it is not inviting or friendly for bicyclists or pedestrians. There is very limited access to the site, either on the Southeast corner via a ramp or staircase, or through the main entrance where the cars have to enter. Once inside the development, there are limited sidewalks, and it is very clearly oriented for cars. To remedy these issues, two more access points shall be added, and the entire road surface of the development shall be changed to a woonerf-like environment, giving pedestrians and bicyclists the same priority as automobiles.

Residents living in the Northern section of Bella Montaña who want to walk or bike to Cal Poly currently have to use one of the two existing exits at the South or Southeast part of the development. With the addition of a staircase and ramp at the North part of the site and a staircase at the Eastern part, it will make it easier for residents in this area to get in and out of the development. One of the biggest parts of this plan is improving the path along Highway 1 adjacent to the development. This

Chapter 3 - Design Proposals & Concepts

will require partnership with the City of San Luis Obispo and CalTrans. Envisioned is a mixed-use path for pedestrians and bicyclists to use, with a vegetation buffer between the path and Highway 1. This will make it easier for Bella Montaña residents to access their homes. Finally, to help pedestrians and bicyclists in the development, there will be a resurfacing of the existing pavement to give all modes equal priority on the surface, just like a woonerf. Where feasible, curbs will be removed making pedestrians and bicyclists more comfortable. By giving equal priority, pedestrians and bicyclists will be safer and feel more welcomed.

The residents of Bella Montaña will benefit from this because their access to the site will be greatly increased, and they will be able to



Figure Q: Proposed Woonerfs, paths, and open space in Bella Montaña

walk and bike around the site much easier. Also, there will be no moving or tearing down of any residences, meaning no one needs to give up their house. The only negative for the residents would be the noise and crowd during construction. The City can benefit from this plan by increasing its bicycle and pedestrian infrastructure. This path can be expanded to the apartment complexes further North on Highway 1, giving more people a safer ride or walk to campus, or to the rest of San Luis Obispo. This site plan shows the approximate location of the proposed improvements.



Figure P: Example of woonerf in a residential space.

Source: <http://chi.streetsblog.org/2013/10/07/woonerfs-are-great-but-lincoln-park-deserves-a-car-free-kenmore/>

Chapter 3 - Design Proposals & Concepts

The most expensive part of this plan will be the construction of the multi-use path adjacent to Highway 1 and the new staircases and ramps. These will be expensive because of the earthwork that is required for implementation, as well as convincing the City that the multi-use path is a necessity. Repaving the surface of the development will be a low-medium cost, with the biggest cost being an opportunity cost, as residents will either have to leave for a certain amount of time, or not be able to leave. As for the actual surface itself, it should cost somewhere around \$10-\$15/ft of material.

3.4 Grand Avenue

Grand Avenue is one of the most used corridors on campus, and will only attract more use when Student Housing South is completed. Because it is the entrance to the parking garage, Pacheco Way off of Grand Avenue is subject to high traffic during AM and PM peak hours. Combine this with students going to and from classes, the Recreation Center, and other activities, and the result is the potential for a lot of incidents between automobiles, pedestrians, and bicyclists. This corridor can also be highly used at night as well, as students may be returning from events when it is dark. The intersection currently has two standard crosswalks, one going across Pacheco Way, and the other crossing Grand Avenue from

the corner of the G1 parking lot. This corridor could benefit from a major overhaul, with the potential to create a new gateway for campus incorporating Student Housing South.

Increasing safety along this corridor can be very simple. From the beginning of campus at Grand Avenue and past its intersection with South Perimeter Road will be a woonerf, a space shared between automobiles, pedestrians, and cyclists, where the emphasis is taken away from cars, and placed on other users. This would involve raising the roadway to the same elevation as the curb, changing the material of the roadway, placing many obstacles in the road (i.e. bike racks, planters, and parking spaces) and implementing signs instructing automobiles to give priority to other users. The woonerf will create a more desirable path for pedestrians who usually cross in the crosswalks. As noted in “Complete Streets

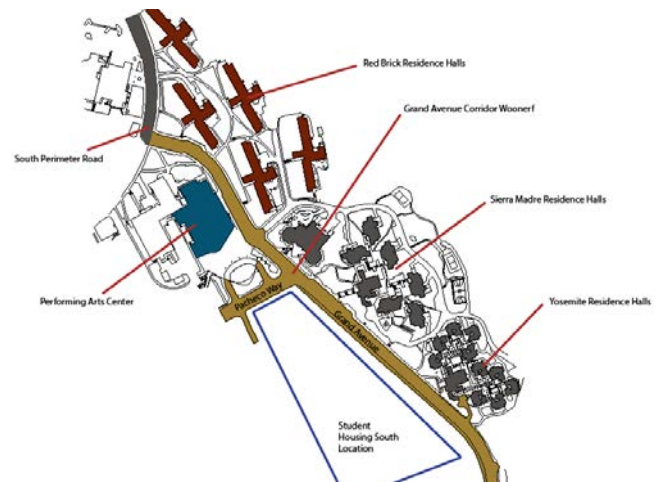


Figure R: Proposed woonerf site plan on Grand Avenue

at Cal Poly San Luis Obispo” students have a desire to cross in a diagonal fashion. This will help them do that in a safer manner. The woonerf will also help bicyclists access this area, and the connection to Mustang Way will help them be able to ride to classes, the Recreation Center, the University Union, etc. easier and safer. The woonerf will also help to slow down cars, reducing the potential for incidents along the road.

Another effect of the woonerf, combined with the Student Housing South development, would be a gateway signaling the entrance to campus. This, along with the road design purposefully causing confusion, will cause drivers to slow down. The woonerf creates a social space along one of the major corridors on campus, sandwiched between the Sierra Madre, Yosemite, and Student Housing South residence halls and leading down to the PAC and red brick dorms. This woonerf will flow into the Mustang



Figure S: Example of a woonerf on a public street
Source: <http://www.svrdesign.com/bellstreetpark/2014/7/2/2wk-crcabk59rntklpaz7bxlcjwsy9p>

Way, leading into the core of campus.

Pedestrians and bicyclists will benefit from these treatments by having a safer space to cross Grand via the woonerf. Automobiles will benefit by still being able to access campus from this area, and also from the reduced potential for incidents.

The woonerf area will easily be the most

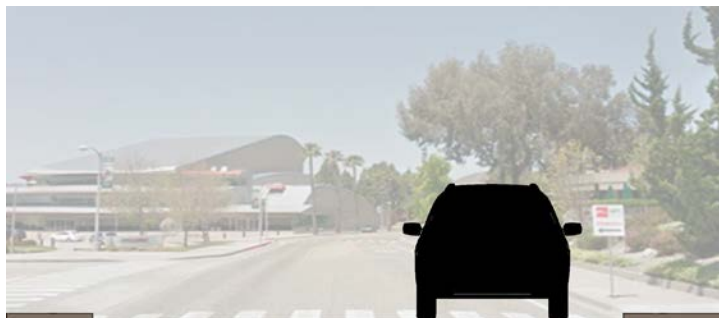


Figure T: Current conditions on Grand Avenue cross-section view



Figure U: Proposed woonerf and conceptual gateway on Pacheco Way and Grand Avenue cross-section

expensive part of this treatment. In “The Woonerf Concept: Rethinking a Residential Street in Somerville” a 660 ft woonerf is proposed to cost nearly \$1 million. This section is much longer than that, but provides an idea as to what the cost may be. While it is the most expensive proposal, the benefits for the future of Cal Poly could easily outweigh the costs.

All cost estimates in this section were taken from the “Costs for Pedestrian and Bicycle Infrastructure Improvements” report prepared by the UNC Highway Safety Research Center and “The Woonerf Concept: Rethinking a Residential Street in Somerville” by Natalia Collarte, M.A. Tufts University.

3.5 Conclusion

With the implementation of these design concepts Cal Poly can greatly increase the safety and efficiency of active transportation on and around campus. Perimeter and University will continue to be a heavily used intersection, now providing more safety to pedestrians and bicyclists. Bella Montaña will become more inviting to residents by making the inner roadways into a woonerf, and providing easier access to the site. Finally the Grand Avenue Corridor will become the “Grand” entrance to campus, combining

the social and safety aspects of a woonerf with the site design of Student Housing South. This “Grand” entrance will slow automobiles down and give all users the feeling that they have just entered campus.

References

- Beekman, D. (2015). Woonerf? It means pedestrians, bikers and SLU developer win. *The Seattle Times*. Retrieved May 16, 2016, from <http://www.seattletimes.com/seattle-news/politics/woonerf-it-means-pedestrians-bikers-and-slu-developer-win/>
- Bliss, L. (2016, April 18). Identifying the Safest Intersection Designs for Cyclists. Retrieved May 16, 2016, from <http://www.citylab.com/design/2016/04/protected-bike-lanes-intersection-trec/478332/>
- Bushnell, M., Poole, B., Rodriguez, D., & Zeeger, C. (October, 2013). Costs for Pedestrian and Bicyclist Infrastructure Improvements. *Federal Highway Administration*. Retrieved from http://www.wsdot.wa.gov/NR/rdonlyres/B17848CF-3D69-4151-972A-2C66DECDC2EC/0/CountermeasureCosts_Report_Nov2013.pdf
- Cal Poly Master Plan Team (March, 2001). Cal Poly Master Plan & Environmental Impact Report. Retrieved from <https://afd.calpoly.edu/facilities/masterplan/plan/vol1.pdf>.
- Cal Poly Master Plan Team (October, 2015). Master Plan Conceptual Maps. Retrieved from <http://masterplan.calpoly.edu/master-plan/#b>
- City of San Luis Obispo. (2013). City of San Luis Obispo, 2013 Bicycle Transportation Plan (United States, City of San Luis Obispo, Public Works).
- City of San Luis Obispo (May, 2015). City of San Luis Obispo General Plan. Retrieved from <http://www.slo2035.com/library/documents-reports/50-general-plan-may-2015.html>.
- Collarte, Natalia (December, 2012). The Woonerf Concept: Rethinking a Residential Street in Somerville. *Tufts University*. Retrieved from http://nacto.org/docs/usdgwoonerf_concept_collarte.pdf
- Fisher, T. (2015, November 19). Streetscapes: At the corner of 4th and Innovation. *Star Tribune*. Retrieved May 16, 2016, from <http://www.startribune.com/streetscapes-at-the-corner-of-4th-and-innovation/362944451/>

Halbur, T. (June, 2008). Watch for desire paths. *Planetizen*. Retrieved from: <http://www.planetizen.com/node/33290>.

Hurd, D. (2014). How College Campuses Create Bike-friendly Spaces. *MomentumMag* Retrieved May 16, 2016, from <https://momentummag.com/how-college-campuses-create-bike-friendly-spaces/>

Jaffe, E. (15, March 3). 6 Places Where Cars, Bikes, and Pedestrians All Share the Road As Equals. *CityLab* Retrieved May 16, 2016, from <http://www.citylab.com/cityfixer/2015/03/6-places-where-cars-bikes-and-pedestrians-all-share-the-road-as-equals/388351/>

National Association of City Transportation Officials. (2016). Transit Street Design Guide Retrieved May 16, 2016, from <http://nacto.org/publication/transit-street-design-guide/>


Riggs, W. & Schwartz, J. (2015). Complete Streets at Cal Poly, San Luis Obispo. Retrieved from <http://works.bepress.com/williamriggs/42/>

Safe Transportation Research and Education Center. (2014). Transportation Injury Mapping System (TIMS). *UC Berkeley*. Retrieved from: <http://tims.berkeley.edu/>

Speck, J. (2014, October 6). Why 12-Foot Traffic Lanes Are Disastrous for Safety and Must Be Replaced Now. *CityLab*. Retrieved May 16, 2016, from <http://www.citylab.com/design/2014/10/why-12-foot-traffic-lanes-are-disastrous-for-safety-and-must-be-replaced-now/381117/>

Speck, J. (2016, April 22). The Simplest Way to Avoid Bad Street Design: Copy the Ones That Work. *CityLab* Retrieved May 16, 2016, from <http://www.citylab.com/cityfixer/2016/04/street-design-models/479343/>

Stanford University. (2016). Bicycling at Stanford. Retrieved May 16, 2016, from http://transportation.stanford.edu/alt_transportation/BikingAtStanford.shtml#introduction



Stevens, A. (2015, December 7). How Universities Are Stepping Up Campus Walkability. Retrieved May 16, 2016, from <http://www.citylab.com/navigator/2015/12/how-colleges-are-stepping-up-campus-walkability/419220/>

United States, City of Chesapeake, Planning Department. (2007). Design Guidelines (pp. 2-1-2-23). Chesapeake, VA.

Group A – Design Proposals

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Perimeter & University

- Vehicle standstill during a peak points of the hour
- Changes to south and east portions as part of Master Plan
- Pedestrian Hybrid Beacons
- Bike lanes



Bella Montaña

- Car oriented
- Not welcoming to pedestrians and cyclists
- One exit
- Add new exits in
- north and east
- Woonerf



Grand and Pacheco

- One of heaviest used intersections on campus
- Student Housing South will increase use of the intersection
- Diagonal desire line
- Raised crosswalks
- Rectangular Rapid Flashing Beacons
- Woonerf

