Results of Chico State Bike Path Pilot Project Study

GEOG 436 - Transportation Planning - Fall 2019
Dr. LaDonna Knigge
Dylan Batie, Elyssa Ebding, Sofia Lepore, Anthony McLaughlin,
Trevor Ramsey, Noah Sierra, and Cody Van de Vrugt
Sustainability at Chico State

- College & University Presidents Climate Commitment
  - 2007 - Chico State founding signatory
  - Commitment to more sustainable campus community by addressing climate change
  - Reduction in GHG emission
  - Accelerate research and education efforts on campus

https://www.csuchico.edu/sustainability/
Background

Students, faculty, and staff who commute to and from campus cause about 45% of Chico State’s total GHG emissions.

In 2018-19, Chico State Green Campus conducted a study of bicycle parking utilization on campus.

Constraints to bike use include lack of secure parking, location of parking and lack of bike access to campus core.

Improved infrastructure would increase bike share as mode of transportation.
Campus bike path pilot project

Summer 2019

- Facilities Management Services (FMS) delineated temporary bike path with temporary pavement markings and signage
- Fall 2019 GEOG 436 Transportation Planning students conduct study of temporary bike lane.
Why a pilot project?
League of American Bicyclists

- Mission to lead the movement to create a Bicycle Friendly America for everyone.
- BICYCLE FRIENDLY AMERICA PROGRAM
  - Awards for communities, businesses, universities & states
- Sponsor events:
  - National Bike Summit
  - National Bike Month
  - National Bike Challenge
  - Education & advocacy
- Chico State applying for Bicycle Friendly University Status in 2020

WE BELIEVE
Bicycling brings people together.
When more people ride bikes:

- Life is better for everyone;
- Communities are safer, stronger and better connected;
- Our nation is healthier, economically stronger,
  environmentally cleaner and
  more energy independent.

https://www.bikeleague.org/
Other Bike Friendly Campuses

- **Stanford University** - Showers and lockers for bikers, free bike safety classes twice a month, free bike rentals for visiting alumni, and by creating a Commute Buddy program. 21% of the university community riding their bikes every day.

- **University of California, Davis** - Biking classes, DIY bike repair and maintenance, summer bike storage, showers and lockers for bikers and maps and directions for bikers on campus. 45% of the university’s students, faculty and staff riding their bikes on campus every day.

- **University of California, Santa Barbara** - Implemented 10 miles of Class I bicycle paths with several bicycle roundabouts and campus/county bike maps along the way and also has an Associated Students Bike Shop for repair and maintenance. 49% of students and 9% of faculty and staff to commute by bike.
Pre-survey bike & ped counts

- Pedestrian and Bicyclist counts
  - Six locations
  - 20 minutes; 4 times each
  - Typically between classes
  - Categories:
    - Cyclists & pedestrians
      - Traveling east or west
      - traveling inside or outside of designated path for each
Pre-Survey Bike & Pedestrian Counts
Survey methodology

Human subjects approval by Internal Review Board (IRB)

Survey administered completely online.

Seven copies of survey created; #1 - #6 located on segments along the path >>QR code scanned by SmartPhone
Survey methodology

Participate in the Pilot Bike Path Survey!

Love it?
Hate it?
Ideas?

LET US KNOW!

Want to have a say in the design & implementation of the CSU Chico Campus bike path?

We want to know what pedestrians and bicyclists think about the pilot bike path through campus.
How do pedestrians and bicyclists use the path?
Do you support a bike path through campus?
What improvements do you suggest for the final path?

Please take part in this survey to inform Facilities Management Services about the future location and design of the CSU Chico Campus Bike Path through campus.

Take Pilot Bike Path Survey!

This survey is conducted by campus faculty, staff and students from Geography 476 - Transportation Planning.
For questions or concerns, contact: hringer@csuchico.edu
Methodology

- Posters with a description of the project, and QR codes placed at six locations along the bike path segments
  - Available Monday November 4 - Friday November 22
- Seventh survey was posted in faculty and student announcements
  - Available Monday through Friday Nov 18 - 22.
- All surveys closed on Friday November 22nd
- Data compiled and analysis began over Thanksgiving Break.
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<tr>
<th>Survey #</th>
<th># of responses</th>
<th>Administration method</th>
<th>% of total</th>
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<td>TOTAL</td>
<td>277</td>
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</table>
Data Analysis:

- Survey created to elicit opinions, insights, concerns and recommendations of public.
- Platform: Google Forms
- Questions organized into four categories

1. Demographics
2. How Path is Used
3. Safety
4. Satisfaction & Functionality
Demographics
Who Participated in the Survey?

- Faculty: 34.7%
- Staff: 34.3%
- Student: 23.1%
- Visitor: 6.5%
- Other/Multi: 3.7%
Ages of Participants

- 18 - 21 years of age: 15.2%
- 21 - 25 years of age: 17.3%
- 25 - 30 years of age: 6.9%
- 31-40 years of age: 14.1%
- 41 - 50 years of age: 14.8%
- 51 - 60 years of age: 17.7%
- 61 - 70 years of age: 9.7%
- 71 and over: 0.0%
- Unknown: 0.0%
Gender of Participants

- Female: 51.1%
- Male: 35.9%
- Unknown: 13.0%
How path is used
Participants were asked to state the two cross-streets of the intersection that was closest to their home. Responses were then geocoded in order to visualize where participants start their commute.
Map symbolizes participants various travel modes used to commute to campus.
Participants
Distance
From
Campus
Perception of safety
Perception of safety on path

Survey Participant Safety Rankings

- Very safe: 9%
- Safe: 11%
- Sometimes safe, sometimes not: 27%
- Unsafe: 40%
- Very unsafe: 13%
Data: Safety

Issues:
- Lack of signage
- Width of bike path
- Misuse of bike path.
Satisfaction with Current Path
Satisfaction/ Functionality

10. How satisfied are you with current path accommodations? (Scale 1--5) *

Mark only one oval.

☐ 1 (Very satisfied)
☐ 2 (Satisfied)
☐ 3 (Just OK)
☐ 4 (Needs improvement)
☐ 5 (Disappointed)
☐ N/A

Satisfaction with Current Path Accommodations

- Satisfied: 43.3%
- Just OK: 25.3%
- Needs Improvements: 13.4%
- Dissatisfied: 15.7%
- N/A: 0%

* Mark only one oval.
Bike Path Recommendations
Current Needs

A Bike Lane is defined as “a portion of the roadway that has been designated by striping, signage, and pavement markings for the preferential or exclusive use of bicyclists”

https://nacto.org/publication/urban-bikeway-design-guide/bike-lanes/
The CSU Chico Bike Path Pilot Project surveyed 277 participants on their desired improvements.

- **Improved Pavement Markings**: 184 votes
- **More Detailed Signage**: 149 votes
- **Increased Accessibility**: 112 votes
- **Improved Safety**: 151 votes
- **Improved Infrastructure**: 92 votes
- **Better Public Education**: 125 votes
- **Parking Options**: 71 votes
- **133 votes**
National Association of City Transportation Officials
About NACTO

- Founded in 1996
- 501(c)(3) non-profit association
- 81 major city and transit agencies
Urban Bikeway Design Guide

Bronze

Silver

Gold

Urban Bikeway Design Guide

National Association of City Transportation Officials
Bike Lanes

Left: Conventional
Right: Buffered
Conventional Bike Lane

**Recommended**
- 8’ lanes to allow for passing
- Buffered
- Gutters, drainages, utility covers flush with pavement

**Required**
- Designation markings
- Exclusivity
- Directional
- 6’ from curb
- Solid white line 6” - 8”
Buffered Bike Lane

Recommended
- 4” lines angled @30-45°
- 18” buffer
- Aesthetically Pleasing buffer
- Intersections designed as through bike lane

Required
- Designation markings
- 2 Solid white lines dashed at intersections
- Interior cross-hatching if lane is 3’ or wider
Two-way

Protected one-way

Raised

Cycle-Tracks
Two-way Cycle-Track

**Recommended**
- 12’ travel lane
- Minimum 8’ in confined areas
- 3’ painted buffer in place of raised buffer
- Colored lanes at intersections

**Required**
- Designation markings
- Lane marked by word or symbol with directional arrows
- Dashed yellow lines separates lanes
Recommended

- Gutter seams, drainage inlets, utility covers flush with asphalt
- Colored lanes
- 3’ painted buffer in place of raised buffer

Required

- Designation markings
- Lane marked by word or symbol with directional arrows
- 7’ lanes in high volume areas

Protected One-way Cycle-Track
Raised Cycle-Track

**Recommended**
- 3”-5” vertical separation between sidewalk & cycle track
- Min 6.5’ lanes
- Rumble strip placed periodically to minimize speeding

**Required**
- Designation markings
- Raised above sidewalk
- Buffered Lanes
Intersection Treatment
Rumble strip & Directional Indicators

- Rumble strips
- Designation markings
- Painted intersections
Bikeway Signage & Marking

Green shall be the only color utilized in lane marking as to not confuse users with other standard traffic markings.
Colored Lanes Materials Guide

- **Colored Asphalt**
  - Durable
  - Recommended for corridor treatments

- **Thermoplastics**
  - Ideal for intersection treatment
  - Ideal for high traffic conflict areas

- **Paint**
  - Easy to apply
  - Degrades rapidly
Designed for all Ages & Abilities

- Safe
- Comfortable
- Equitable
Do you want additional bike paths on campus?

- Yes: 114, 42%
- No: 70, 26%
- Depends: 66, 24%
- Don’t know: 23, 8%

If yes, where?
Additional Path Recommendations
Recommended Improvements

- Improved Pavement Markings for Pedestrians (14.6%)
- More Detailed Signs (12.1%)
- More Public Education (12.3%)
- Increased Path Maintenance (10.8%)
- Wider Path (11.5%)
- Improved Lighting (10.2%)
- Separated Lanes (7.6%)
- Increased Connectivity (6.0%)
- Use Enforcement (5.8%)
- Increased Bike Parking (9.1%)
The CSU Chico Bike Path Pilot Project surveyed 277 participants on their desired improvements.

- **Improved Pavement Markings**: 184
- **More Detailed Signage**: 149
- **Better Public Education**: 180
- **Increased Accessibility**: 112
- **Improved Safety**: 151
- **Improved Infrastructure**: 92
Existing conditions

Bike path have varying conditions.

For purpose of study:

- Divided into 6 segments
- Conducted counts of pedestrians & bicyclists by segment
- Safety concerns of importance
Segmented Pilot Path
Segment 1: Tennis Courts to east side of Warner Street

- Pavement Conditions:
  - Excellent pavement quality with little to no cracking. No maintenance required for existing condition.

- Visibility:
  - Fair visibility: Sight line is obstructed by curve.

- Obstructions/Hazards:
  - Only one obstruction to be noted: Radius of curvature is too tight coming out of curve on this section. Could be a potential hazards for two cyclists traveling at this location at the same time.
Segment 1

- Delineated bike path - clear markings
  - Painted lanes
- 5’ wide each lane
- Gold Standard:
  - Aesthetically pleasing barrier
Segment 2: East side of Warner Street to Butte Hall Area

- **Pavement Conditions:**
  - Excellent pavement quality with little to no cracking.
  - Pathway is too narrow to accommodate path. Will require special considerations.

- **Visibility:**
  - Great visibility: Sight line is unobstructed until the intersection with the Mall Bridge.

- **Obstructions/Hazards:**
  - Area is hazardous to cyclists due to light poles in the cycling lane. Placement of lighting could easily cause a serious accident between cyclists traveling opposite directions. Immediate attention required as injuries seem imminent.
  - Conflict zone with cross traffic at Mall Bridge.
Segment 2

• Move light posts
• Extend pavement towards creek
• 3.5’-4’ lanes, thin physical barrier w/ ped
  - NECESSARY
• Physically separate bike and ped path via
  poles, art or other features
• Conflict zone - appropriate markings
• Painted lanes
Segment 3: Butte Hall to Holt Hall

- **Pavement Conditions:**
  - Fair to poor pavement quality consisting of uneven structure as well as sprawling transverse cracking. In addition, pavement width is about four feet for the majority of this section creating potential for cyclist-pedestrian collision. Immediate attention required before permanent bike path is installed.

- **Visibility:**
  - Fair visibility: Sightline along path is relatively unobstructed, however there are several bridges that tie into this portion of the path. Existing conditions make it difficult for cyclists to see crossing pedestrians and vice versa.
Segment 3

- Delineated bike path - clear markings
  - Painted lanes
- Create new ped path on grass side of trees
- Pavement upgrades
- 4’-5’ wide lanes
Segment 3

**Conflict Zone**

- Major potential for injuries here
- Increase visibility to cross traffic
- Conflict zone - appropriate markings
- Bow out path - space for peds to stop/assess before crossing bike path
Segment 4: Holt Hall to Physical Science Bridge

- Pavement Conditions:
  - Poor Pavement quality. Area is riddled with longitudinal and transverse cracking as well as densely populated alligator cracking.

- Visibility:
  - Good-Fair visibility. Some bridges have poor sightline for pedestrians.

- Obstructions/Hazards:
  - Pavement conditions could be hazardous for those traveling on skateboard, scooter etc. Area is densely populated with pedestrians at peak hours. Path needs to be more well defined to separate the two modes of transport.
Segment 4

- Serious pavement upgrades
  - Giant potholes
- Delineated bike path - clear markings
  - Painted lanes
- Plentiful space
  - 5’ bike lanes
  - 2” raised pavement or physical barrier
Segment 5: Holt Hall to Physical Science Bridge

- **Pavement Conditions:**
  - Fair to poor pavement quality with large transverse cracking.

- **Visibility:**
  - Fair visibility: sightline to adjacent traffic is skewed as one approaches roadway

- **Obstructions/Hazards:**
  - Cyclists are sent through pedestrian path and into street. Collisions are likely.
Segment 5

To the left is Holt Hall

To the right is Physical Science

Buffered Lane

Painted intersections
Segment 5

- Serious pavement upgrades
  - Giant potholes
- Delineated bike path - clear markings
  - Painted lanes
- Plentiful space
  - 5’ bike lanes
  - 2” raised pavement or physical barrier
Segment 6: Physical Science Bridge to East Side of Physical Science Building

- **Pavement Conditions:**
  - Fair to poor pavement quality. New bridge surface is in perfect condition. However, the section running adjacent to the Physical Science building is far too narrow and in poor condition.

- **Visibility:**
  - Fair to poor. Can be difficult to see a cyclist traveling from Physical Science building across the bridge

- **Obstructions/Hazards:**
  - Bike path crosses into pedestrian domain with no warning signs for either party.
Segment 6

Existing location too narrow. Doors leading out of classrooms increase chance of conflict
Conclusions

Location of pilot project is variable - path quality, space and requirements vary

- Divided into segments to address variations
- Safety of cyclists & pedestrians a concern

Recommendations vary

- Gold (best)
- Silver (very good)
- Bronze (minimum required)

Recommendations are up for open discussion.
Conclusion

Campus community is excited to incorporate bikes into campus core.

Many want more bike routes.

Safety is a concern for many.
Thank you for your attention
Questions!

Thank you to Jeff Schwein & Cheri Chastain
Chico State Bike Path Pilot Project Survey

The purpose of this survey is to ask pedestrians and bicyclists about the bicycle path pilot project through campus shown on the map below. We want to know your opinion and how you use the path, if you support a bike path through campus, and for suggested improvements to the path in its final design. Please take part in this survey to better inform campus faculty/staff and the students from Geog 436 - Transportation Planning concerning the pilot project of the CSU Chico campus bike path!

Informed Consent
The purpose of this research is to gather feedback about campus bike path during the pilot project phase. This is a research project conducted by faculty, staff and students in the Geography & Planning Department and Facilities Management Systems at California State University, Chico.

You are invited to participate in this research because you are a potential user or are impacted by the bike path pilot project. Your participation in this research study is voluntary. You may choose not to participate. If you decide to participate in this research survey you may withdraw at any time. If you decide not to participate in this study or if you withdrawal from participating at any time, you will not be penalized.

The procedure involves completing an online survey that may take approximately 10 to 15 minutes. Your response will be confidential, and we do not collect identifying information such as your name, email address or IP address. The survey questions will be about your opinions and use of the campus bike path. There are no foreseeable risks associated with the study. There are no direct benefits to you from this study. Possible indirect benefits may include the construction of a permanent bike path and improved accessibility to campus.

If you have any questions about the research study, please contact me via email at lknigge@csuchico.edu and I will respond in a timely matter. This research has been reviewed according to California State University, Chico IRB procedures for research involving human subjects. If you have any questions about your rights as a participant, you may contact the Human Subjects in Research Committee at 530-898-3145 or IRB@csuchico.edu

Thank you for your participation.

*Required
2. Are you a: *
   - Student
   - Staff
   - Faculty
   - Visitor
   - Other

3. How do you use the path designated on the map above? *
   Mark only one oval.
   - Walking
   - Biking
   - Both walking and biking
   - Neither
   - Other:

4. What day(s) of the week do you use the path? [check all that apply] *
   Tick all that apply.
   - Monday
   - Tuesday
   - Wednesday
   - Thursday
   - Friday
   - Saturday
   - Sunday
   - N/A

5. What time(s) of day are you on the path? *
   Tick all that apply.
   - Early Morning (5am - 9am)
   - Morning (9am - Noon)
   - Afternoon (Noon - 5pm)
   - Evening (5pm - 10pm)
   - Night (10pm - Early Morning)
   - N/A

6. What direction do you commute to campus from? *
   Tick all that apply.
   - East (Bidwell Mansion)
   - Northwest (Nord Avenue)
   - North (north of campus and railroad bike path)
   - South (Orange, Cherry, Ivy, Hazel, Chestnut, Normal, Salem)
   - Southwest (Walnut/Pomona - west of Walnut)
   - N/A

7. How far do you live from the Chico State campus?
   Mark only one oval.
   - I live on campus
   - <1/2 mile
   - >1/2 mile to 1 mile
   - >1 mile to 2 miles
   - >2 miles to 3 miles
   - >4 miles to 6 miles
   - >6 miles to 20 miles
   - >20 miles

8. The existing bike path shown on the map was developed as a pilot project. Are you in favor of a permanent bike path through campus in the existing location?
   Mark only one oval.
   - Yes
   - No
   - Maybe
   - Not sure

9. Please explain your answer.

   __________________________________________________________
   __________________________________________________________
10. How satisfied are you with current path accommodations? (Scale 1-6) *
Mark only one oval.

☐ 1 (Very satisfied)
☐ 2 (Satisfied)
☐ 3 (Just OK)
☐ 4 (Needs improvement)
☐ 5 (Disappointed)
☐ N/A

11. Would the following improvements influence you to use the path more often? [check all that apply] *
Tick all that apply.

☐ Improved pavement markings for bikes
☐ Improved pavement markings for pedestrians
☐ More detailed signage
☐ More education, encouragement
☐ Increased maintenance, asphalt repairs
☐ Wider path
☐ Improved lighting
☐ Separated/buffered lanes
☐ Better connectivity/Additional bike paths
☐ Enforcement of improper use of path
☐ More secure bicycle parking

12. Justification for ranking of bike path satisfaction:

_______________________________________________________________________
_______________________________________________________________________

13. Do you feel safe on the path? (Scale 1-6) *
Mark only one oval.

☐ Very safe
☐ Safe
☐ Sometimes safe, sometimes not...
☐ Unsafe
☐ Very unsafe

14. Please explain:

_______________________________________________________________________
_______________________________________________________________________
_______________________________________________________________________
_______________________________________________________________________
15. How did you get to campus today?
Tick all that apply.
- Bike
- Walk
- Skateboard
- Public Transit
- Carpool
- Drive alone
- Scooter
- Motorcycle
- Ride-share (Uber, Lyft)
- Dropped off
- Live on campus
- Other: ________________________________

16. What are the average number of days per week that you ride bike to campus? *
Mark only one oval.
- 1-2
- 3-4
- 5-6
- 7
- 0 - I do not ride bike to campus

17. If you rode your bike today, where did you get on the bike path? *
Tick all that apply.
- From railroad bike path near tennis courts to west of campus
- Warner Street & north of campus
- Citrus & Mansion Avenue area
- Arcadian Avenue or Sol-Wili-Le-No Avenue near Bidwell Mansion
- Downtown and Children’s Park
- N/A
- Other: ________________________________

18. If you live in Chico, please list the two cross-streets of the intersection that is closest to your home. If you do not live in Chico, list the name of the town or city where you live.

____________________________________
19. Do you want additional bike paths on campus? 
   Mark only one oval.
   [ ] Yes
   [ ] No
   [ ] Depends
   [ ] Don't know

20. Explain your response.

___________________________________________________________
___________________________________________________________
___________________________________________________________

21. If yes, where would you like additional bike paths to be located?

___________________________________________________________
___________________________________________________________
___________________________________________________________

22. Have you ever had or witnessed an accident on the path while biking?
   Mark only one oval.
   [ ] Yes
   [ ] No

23. If yes, please describe:

___________________________________________________________
___________________________________________________________
___________________________________________________________

24. Have you ever had or witnessed an accident on the path while walking?
   Mark only one oval.
   [ ] Yes
   [ ] No
25. If yes, please describe:

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

26. Has the bike path encouraged you to ride your bike to campus more?
Mark only one oval.

☐ Yes
☐ No
☐ N/A

27. Your age
Mark only one oval.

☐ 18 - 21 years of age
☐ 21 - 25 years of age
☐ 25 - 30 years of age
☐ 31-40 years of age
☐ 41 - 50 years of age
☐ 51 - 60 years of age
☐ 61 - 70 years of age
☐ 71 and over

28. Gender
Mark only one oval.

☐ Female
☐ Male
☐ Prefer not to say
☐ Other: ____________

29. Ethnicity
Tick all that apply.

☐ Asian
☐ Black/African
☐ Hispanic/Latina
☐ Native American
☐ Pacific Islander
☐ White
☐ Prefer not to answer
☐ Other: ____________

30. Other comments
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
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