Traffic Flow Optimization

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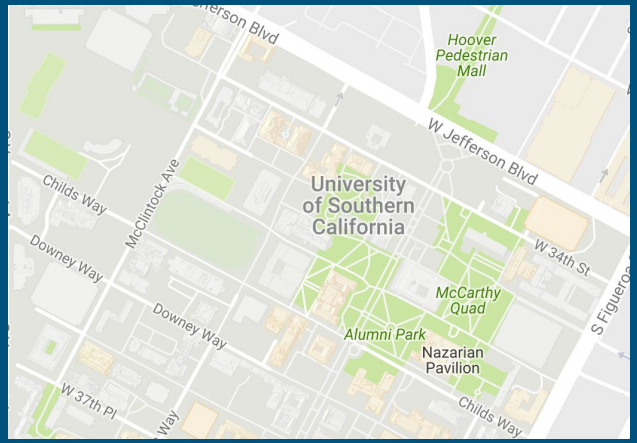
Initial Project Idea

Creating a system to improve the overall efficiency and safety of traffic flow and commuting on campus.

Overview of Project



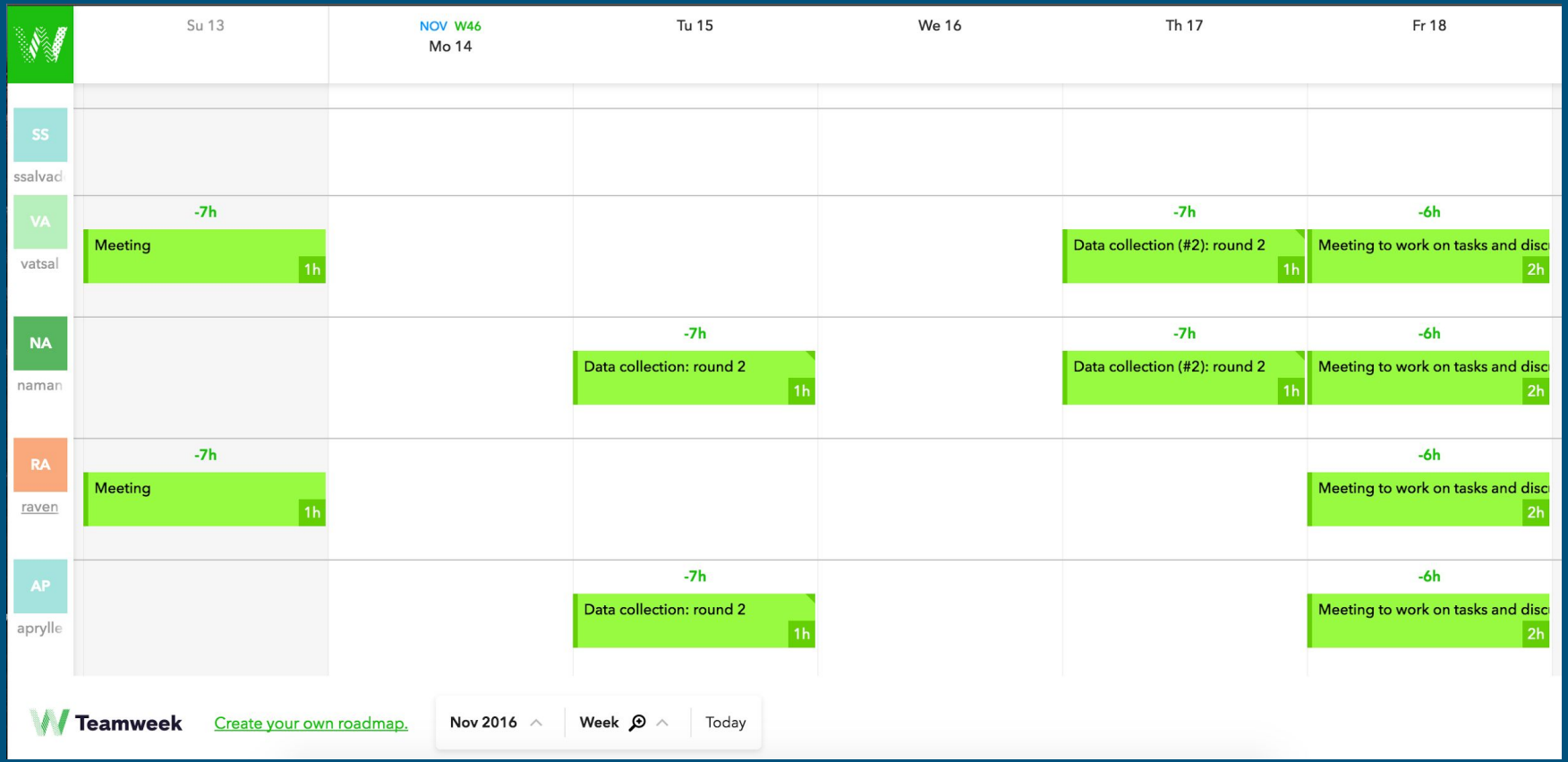
- Commuting on campus is often a hassle
- We are all affected
  - Inspired to find a solution to this problem
- Main objective - improve the system of commuting on campus
- Areas on campus where traffic is an inconvenience to pedestrians
  - 34th St. and Dean’s List Cafe intersection

Intersection #1- Dean's List Cafe

Intersection #2- University Religious Center

Responsibilities

- Plan
  - Research
  - Survey Design
- Do
  - Data collection
    - Observation
    - Initial quantitative data collection
    - Solution implemented data collection
- Study
  - Data analysis
  - Creating charts
- Act
  - Bike Safety Quiz
  - Exploration of different routes



Section of Gantt Chart documenting our tasks

Task Procedure Flow Chart (Mapping the Group Project)

Sequence	Time (minutes)	Symbol	Frustration?	Description	Why did we do this?
1	30	Decision	Medium	Brainstorming ideas	To explore a range of potential issues we could address
2	15	Decision	Low	Choosing one of those ideas	The idea we unanimously agreed on was chosen
3	60	Operation	Medium	Background research on topic	To understand different elements and functioning of the system
4	30	Operation	Low	Preparing Survey Questions	To inquire about the problems that needed to be rectified
5	15	Decision	Medium	Plan for data collection	To collect relevant and accurately represented data
6	160	Operation	Medium	Data Collection	To quantitatively analyze the system
7	45	Inspection	High	Allocating Remaining Tasks	For efficient working of the team
8	-	Delay	High	Implementing our proposed solution	Administrative delay
9	30	Inspection	Low	Data Collection (with potential solution implemented)	To check how effective the solution is
10	60	Operation	High	Assimilation of Ideas	To structure the investigation, and create the written report
11	45	Operation	Medium	Generating PowerPoint presentation	To present the group project

Task Procedure Flow Chart

Measures Of Success

We will consider our ISE project of optimizing the flow of traffic on campus successful if we manage to:

1. Educate everyone on the campus about basic bike signals.
2. Decrease the number of biker-pedestrian crashes by at least 50%.
3. Decrease the number of bottlenecks at either sides of the Dean's List Café
4. Come up with optimized routes for people commuting to and from campus using the two aforementioned intersections.
5. Create a better understanding of the needs of the bikers and skateboarders who have limited accessibility to the walkways on campus.

Data Collection

Tuesday 1	3:55-4:15 (Dean's list)	
	In	Out
Type of Pedestrian		
Walker	47	114
Bicyclist	3	4
Skateboarc	6	14
Scooter	1	0

Wednesda	5:20-5:40 (Dean's List)	
	In	Out
Type of Pedestrian		
Walker	35	182
Bicyclist	4	10
Skateboarc	3	12
Scooter	1	0

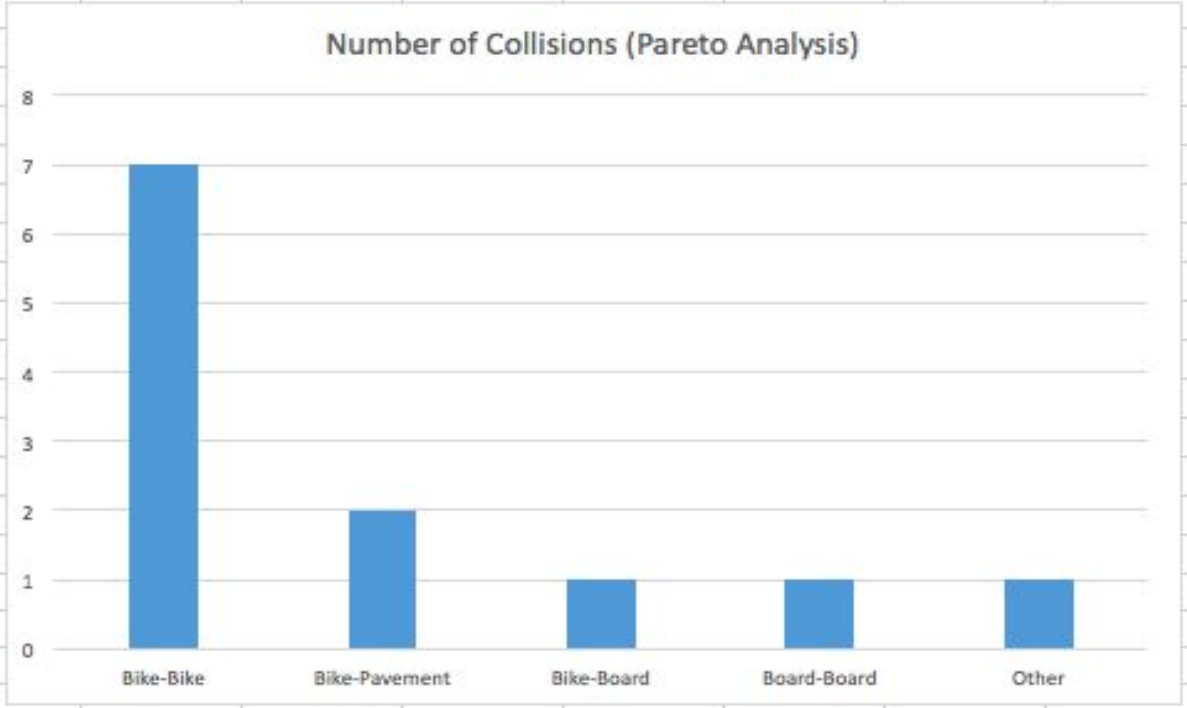
	4:20-4:45 (University Spiritual Building)	
	In	Out
Type of Pedestrian		
Walker	29	28
Bicyclist	32	35
Skateboarc	3	5
Scooter	0	0

Wednesda	4:20-4:45 (University Spiritual Building)	
	In	Out
Type of Pedestrian		
Walker	45	28
Bicyclist	50	65
Skateboarc	7	12
Scooter	0	0

Collision Chart

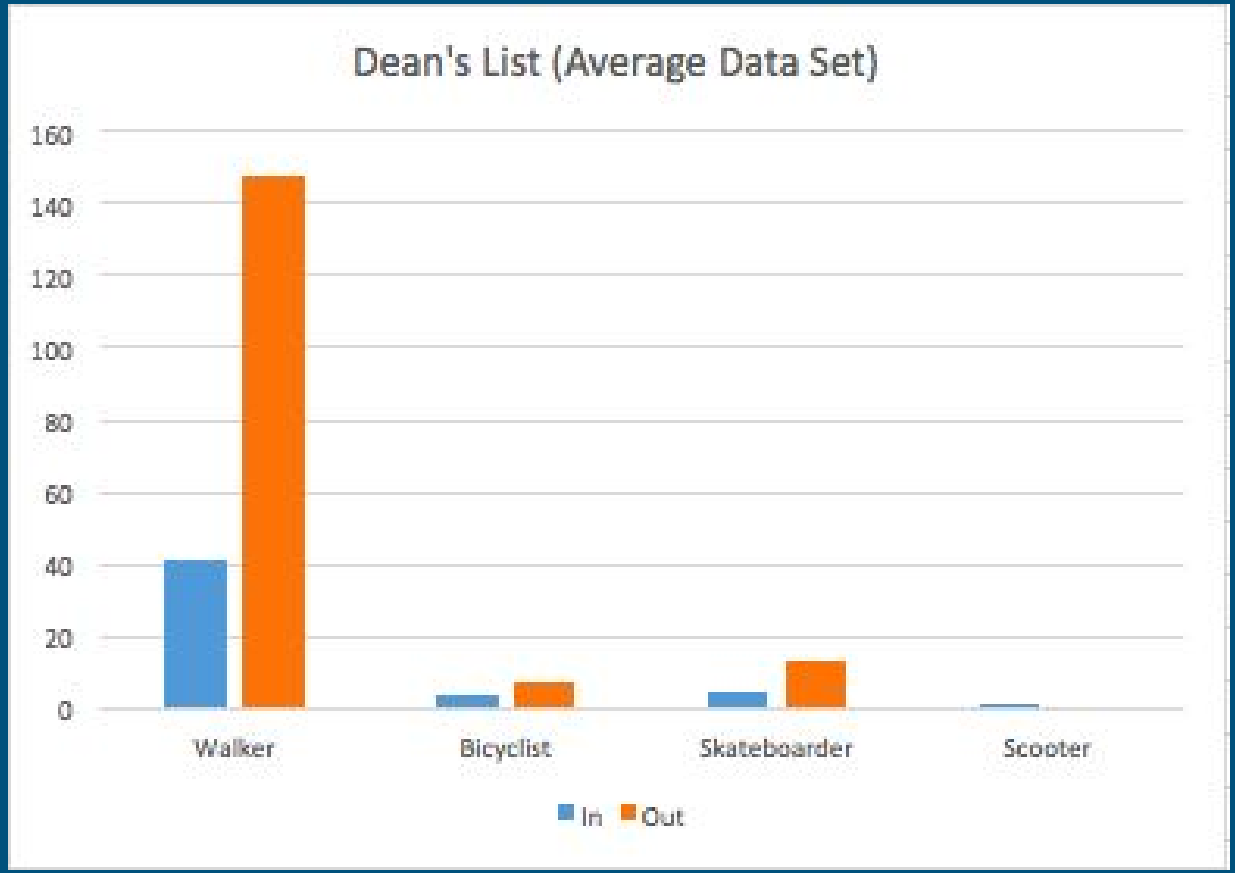
		Collision Tally			
Tuesday 10/25		Wednesday 11/02		Wednesday 11/09	
2 Bike-Bike collisions		3 Bike-Bike collisions		2 Bike-Bike collisions	
1 Bike-Board collision		2 Bike-Pavement collisions			
1 Board-Board collisio		1 Skateboarder forced to dismount			

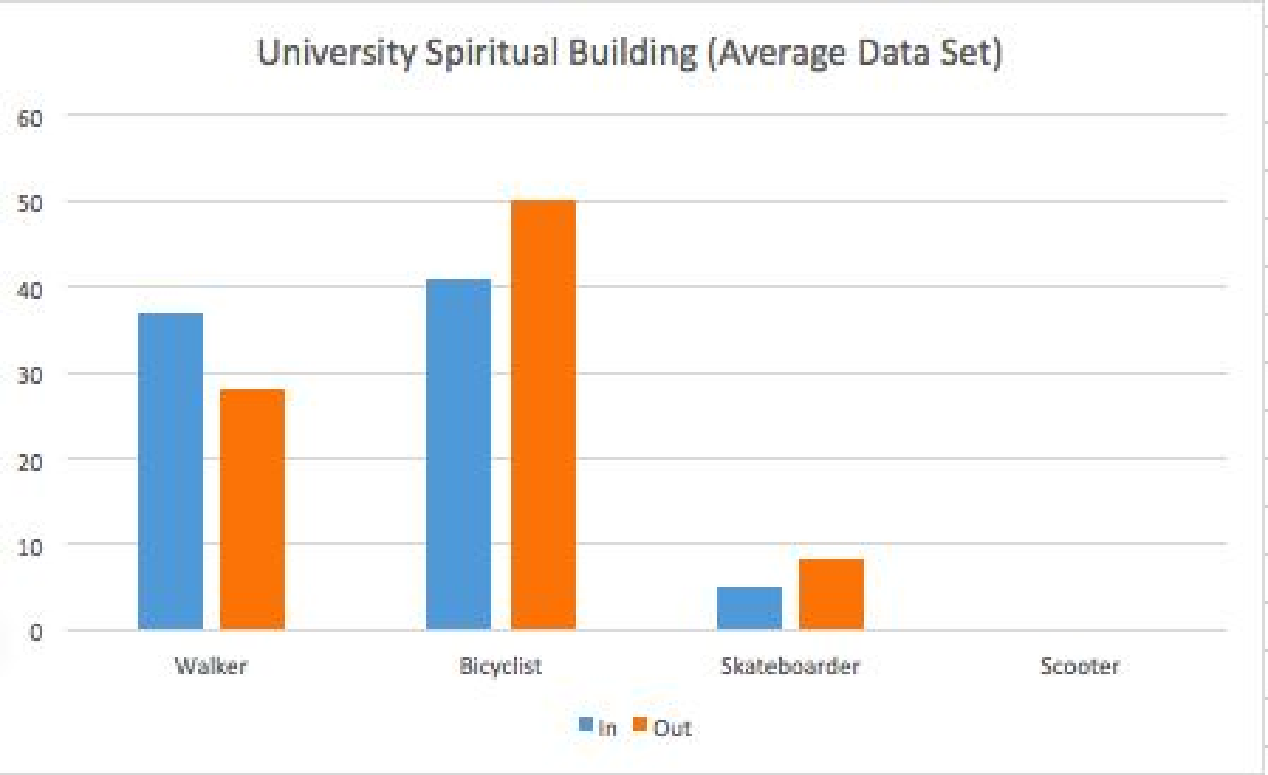
Type of Collis	Number of Collisions
Bike-Bike	7
Bike-Paveme	2
Bike-Board	1
Board-Board	1
Other	1



Average Data Set

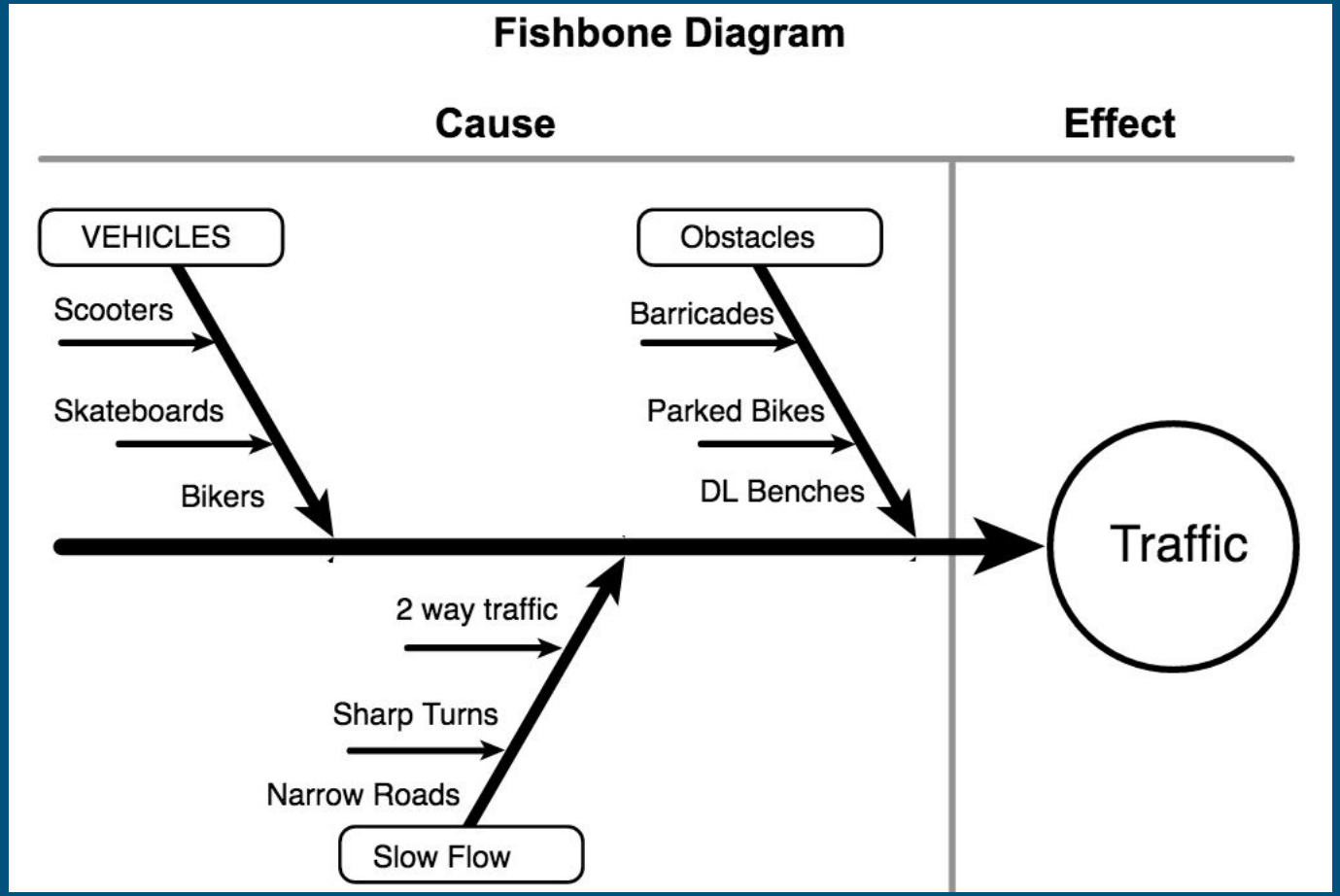
Dean's List (Average Data Set)			
	In	Out	
Type of Pedestrian			
Walker	41	148	
Bicyclist	3.5	7	
Skateboarc	4.5	13	
Scooter	1	0	
University Spiritual Building (Average Data Set)			
	In	Out	
Type of Pedestrian			
Walker	37	28	
Bicyclist	41	50	
Skateboarc	5	8.5	
Scooter	0	0	


Dean's List (Average Data Set)
160
140
120
100
80
60
40
20
0
Walker
Bicyclist
Skateboarder
Scooter
In
Out


University Spiritual Building (Average Data Set)
60
50
40
30
20
10
0
Walker
Bicyclist
Skateboarder
Scooter
In
Out

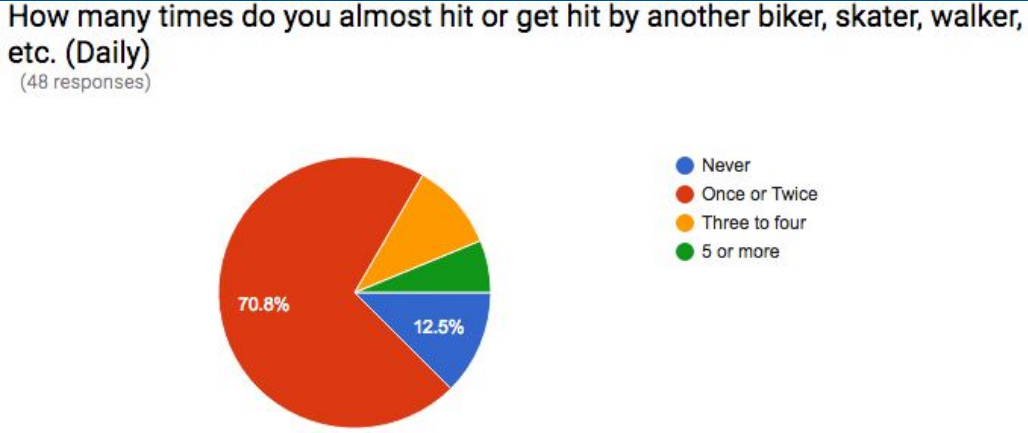
Qualitative Observations

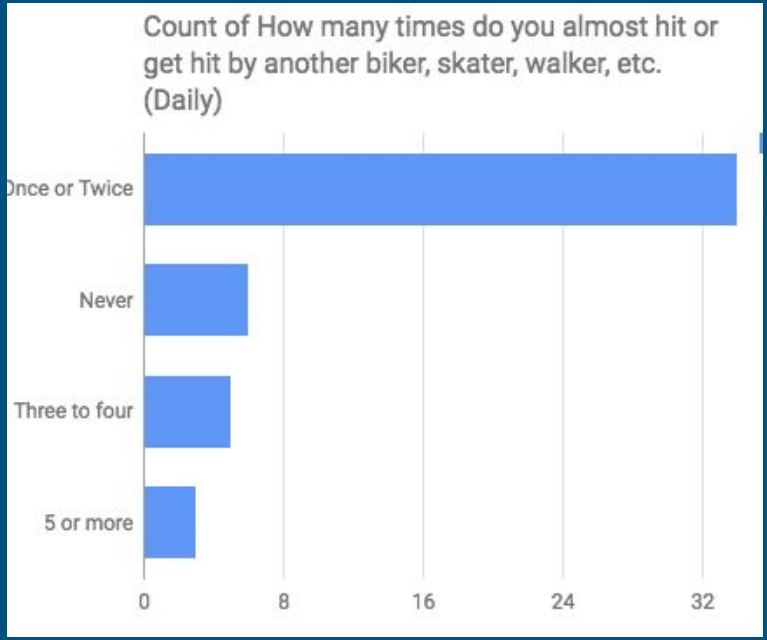
Qualitative Observations
most bikers were forced to move out of their bike and move it on their side
there were 2 barriers placed unneccesarily
the benches of Dean's List made the road narrower
cycles were parked
cyclists were moving at high speeds

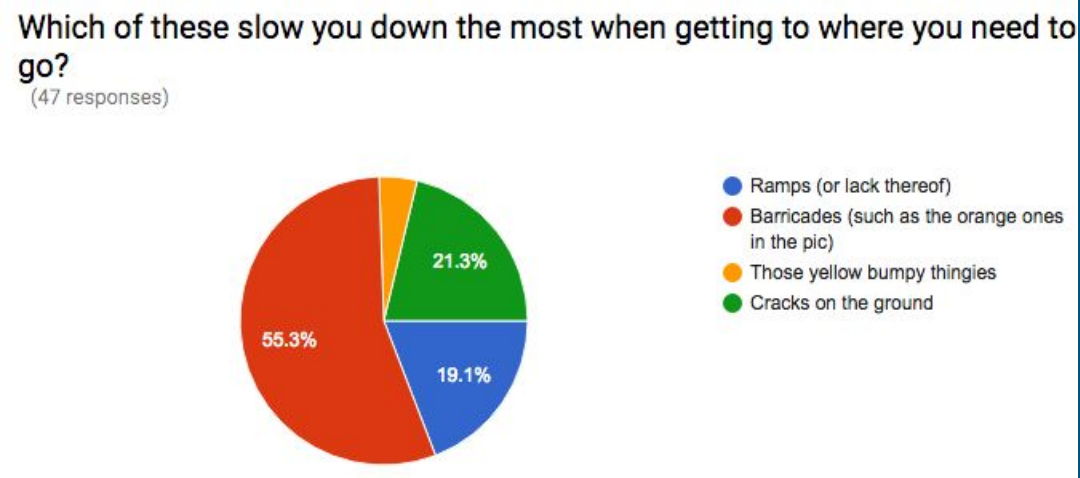

Fishbone Diagram
Cause
Effect
VEHICLES
Scooters
Skateboards
Bikers
Obstacles
Barricades
Parked Bikes
DL Benches
Traffic
2 way traffic
Sharp Turns
Narrow Roads
Slow Flow

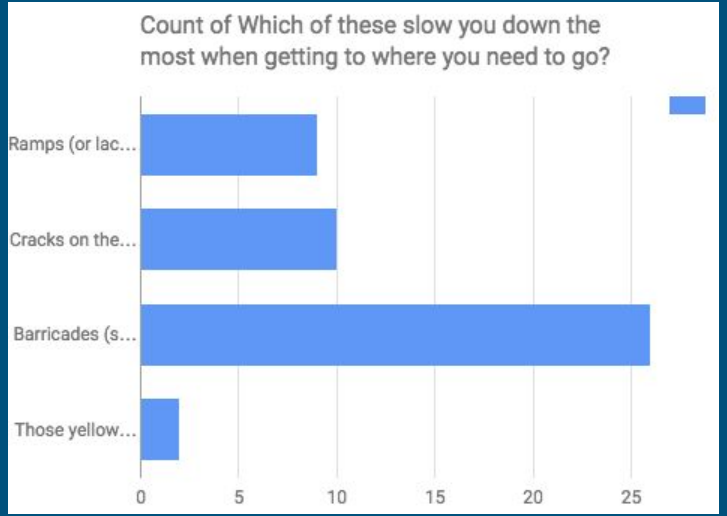
Survey

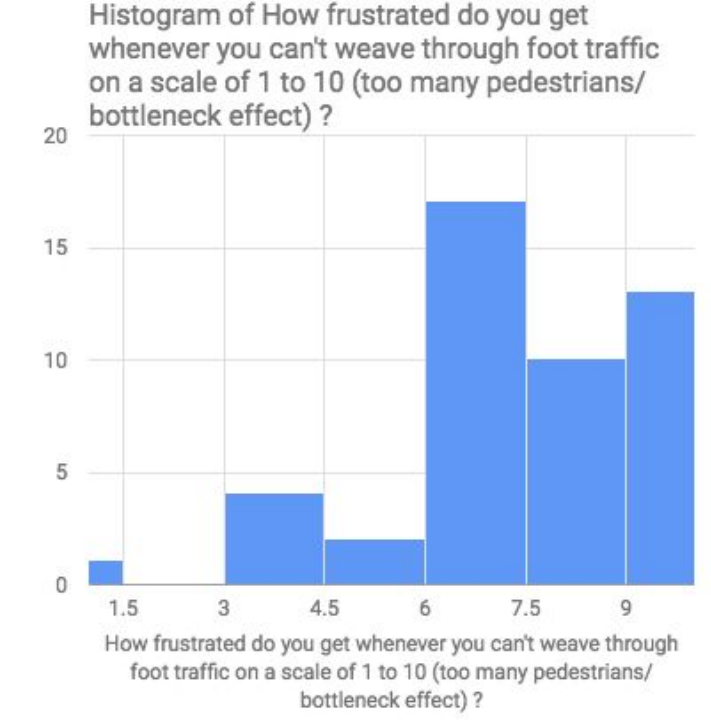
1. What mode of transportation do you most often use?
2. Which of these slow you down the most when getting to where you need to go?
3. How many times do you almost hit or get hit by another biker, skater, walker, etc. (Daily)
4. How frustrated do you get whenever you can't weave through foot traffic on a scale of 1 to 10 (too many pedestrians/ bottleneck effect) ?
5. How often do you actually use the bike paths?
6. Do you use any forms of signaling while on a bike or skateboard?
7. If you answered sometimes/never to the question above, would you start to if you knew it would improve traffic flow?
8. Besides signaling, how else would you improve traffic flow at these intersection?


How many times do you almost hit or get hit by another biker, skater, walker, etc. (Daily)
(48 responses)
70.8%
12.5%
Never
Once or Twice
Three to four
5 or more

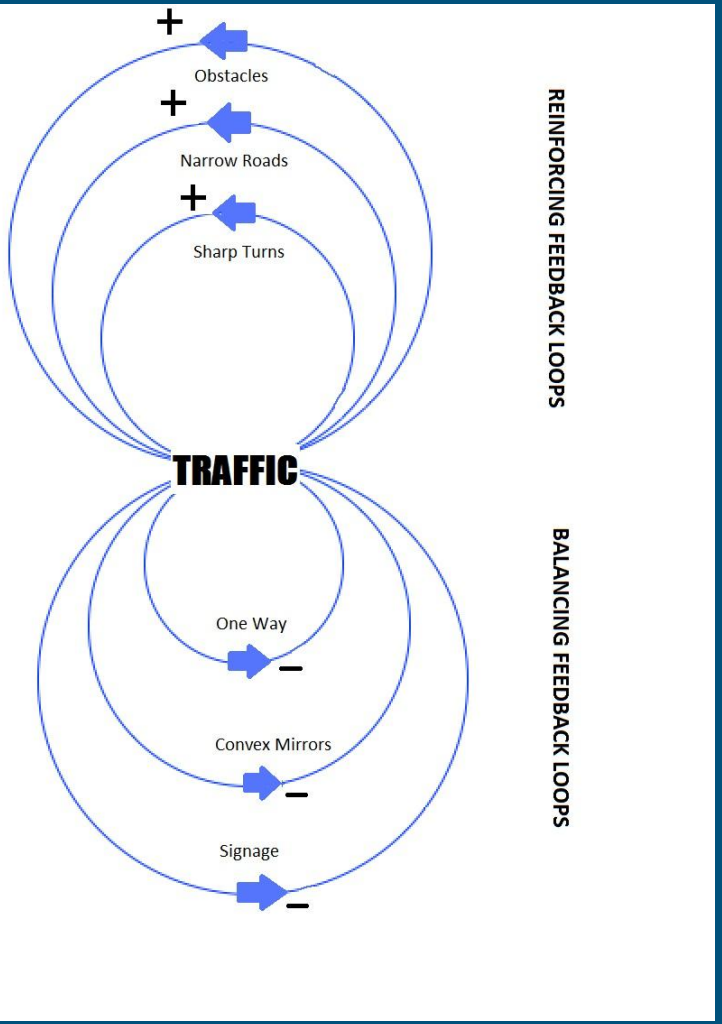

Count of How many times do you almost hit or get hit by another biker, skater, walker, etc. (Daily)
Once or Twice
Never
Three to four
5 or more
0
8
16
24
32


Which of these slow you down the most when getting to where you need to go?
(47 responses)
21.3%
55.3%
19.1%
Ramps (or lack thereof)
Barricades (such as the orange ones in the pic)
Those yellow bumpy thingies
Cracks on the ground


Count of Which of these slow you down the most when getting to where you need to go?
Ramps (or lac...
Cracks on the...
Barricades (s...
Those yellow...
0
5
10
15
20
25



SUM	348
AVERAGE	7.404255319
MIN	1
MAX	10
COUNTA	48


+
Obstacles
+
Narrow Roads
+
Sharp Turns
TRAFFIC
One Way
−
Convex Mirrors
−
Signage
−
REINFORCING FEEDBACK LOOPS
BALANCING FEEDBACK LOOPS

Solutions

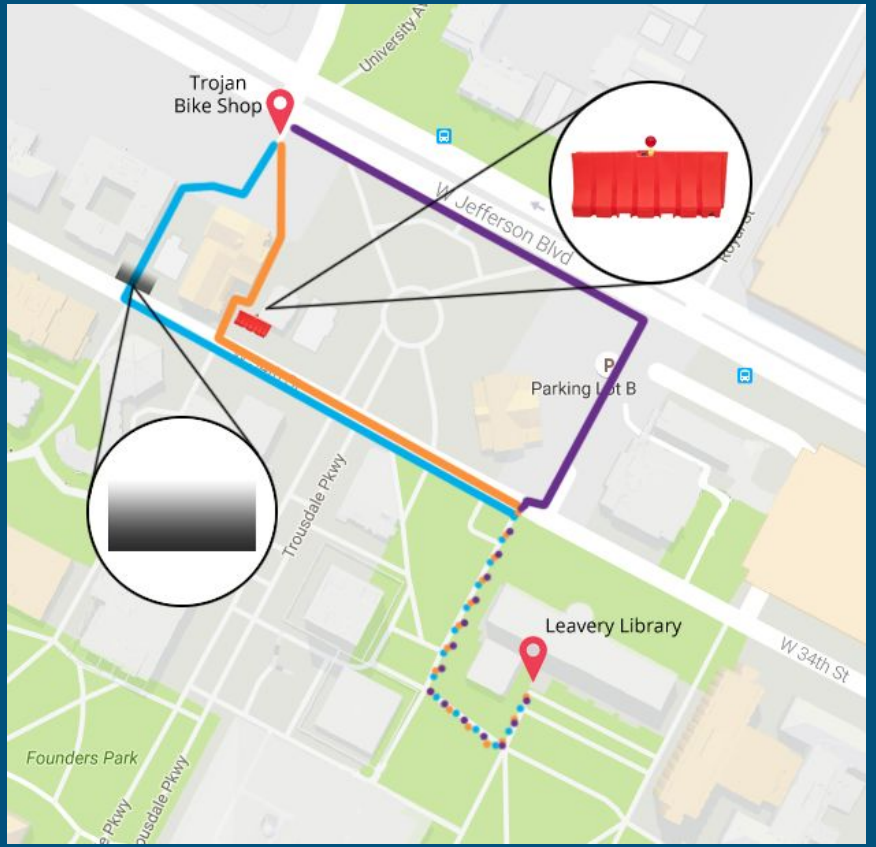
- ➔ Clearing Obstructions like barriers and parked cycles
- ➔ Signs for commuters stuck on the sides of the pathways
- ➔ Use of convex mirrors to prevent sharp turns from causing accidents
- ➔ One way system
- ➔ Separate lanes for walkers and bikers
- ➔ Bike safety education and quiz
- ➔ Working with DPS to prevent accidents

Data Collection for Solutions

	Total Numbe	Rate of Traffic Flow (pedestrians/minute			
Dean's List	218	10.9			
University Sp	169.5	8.475			

Route Optimization

- Blue Line - (University Religious Center)
- Orange Line - (Dean’s List)
- Purple Line - (Social Work Building)



Orange Line (Least Efficient Route)

- Average time for Biking: 98.07s
- Average time for Skating: 122.67s
- Average time for Walking: 311.33 s

Blue Line

- Average time for Biking: 96.0 s
- Average time for Skating: 90.67s
- Average time for Walking: 304.3 s

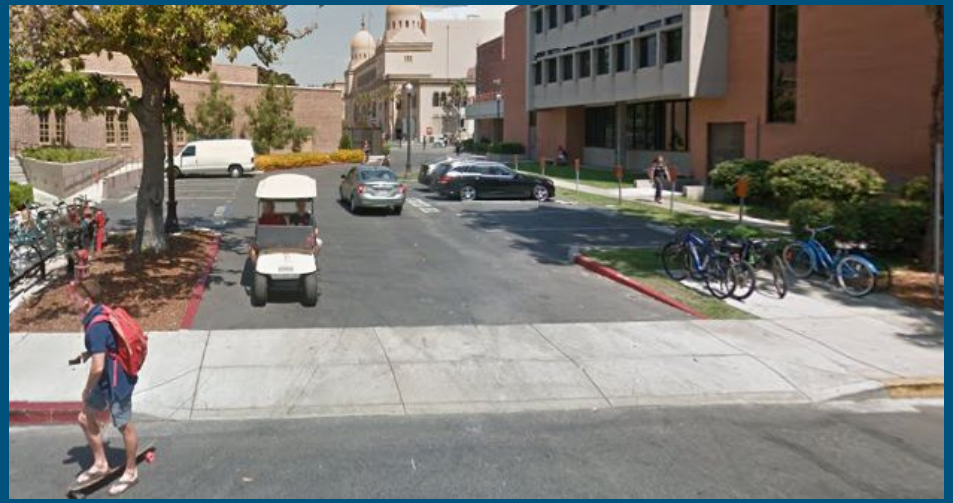
Purple Line (Most Efficient Route)

- Average time for Biking: 78.67s
- Average time for Skating: 88.67s
- Average time for Walking: 267.33 s

How much time, on average, will you save going through here instead of the least efficient route?

- Biking: 98.67 min
- Skating: 179.17 min
- Walking: 223 min

//Extrapolated for traveling 300 times ~ 1 month of crossing through campus



BIKE SAFETY QUIZ

Let’s see how well you guys know your bike safety!

ISE Concepts

- Plan-Do-Study-Act
- Process Improvement by Statistical Methods
- Check Sheets
- Causal Loops
- Fishbone Diagrams
- Pareto Charts
- Task Procedure Flowchart
- Surveying Techniques
- Lean Thinking
- Operations Research Principles (route optimization)

Questions?