Image: https://www.montana.edu/disc/datacomp/index.html

Data Challenge 2016

BIKING SOLUTIONS FOR MSU

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INTRODUCTION

Montana State University is a rapidly growing campus with an ever-increasing demand for transportation accommodations. The university set an enrollment record in 2015, and again in 2016. As a result, Montana State has had to address some of the problems that come with an increasing enrollment. There is a need for modern facilities and appropriate infrastructure, all while maintaining the campus's visually and aesthetically pleasing reputation. A new engineering building, parking garage, dining hall, and dormitory have all been on the list of additions to the campus.

One issue that often goes overlooked is the feasibility of having more and more bikes on campus. It is an appealing means of transportation for many students. They save money normally spent on gas or parking while attaining easy, convenient access to many of the campus buildings. Additionally, it provides exercise and reduces one's carbon emissions. From a recent survey, about 9.6% of students reported not driving a vehicle to campus. Not all of these respondents ride bikes, but many do, and it is important to make sure that the campus is accommodating for these students. Many central areas on campus often have full bike racks, making it difficult to find parking and discouraging students from riding their bikes. Also, some bike racks may look like a clutter, and may make things difficult for snow removal. It is also important to think of bicycle security and pedestrian safety. This report will examine a possible approach to optimize our campus bike parking, in a feasible and an expandable way. It is a model that any campus could use to provide a safe and reasonable biking environment.

APPROACH

According to the data given, it is estimated that about 9.6% of students do not drive a vehicle to school. Using this statistic, the university can estimate how many bike racks will be needed at each hall on campus. By multiplying the capacity of each hall on campus by 9.6%, the total number of bike spots needed can be calculated. This is the base number of bike spots needed. For example, Wilson Hall, according to the data, has a capacity of 1732 people and 9.6% of 1732 is 166.2, which when rounded to the nearest whole number 156. That is the minimum number of bicycle spots needed by Wilson Hall when using this model. Instead of rounding every calculation up to the highest whole number, the number of bike racks will just be rounded to the nearest whole number.

Some halls, however, are more congested than others because they are at the center of campus and are areas where students like to park their bikes due to being an equal distance to multiple areas on campus. To account for this congestion around the center of campus, the number of bike spots needs to be increased by a higher percentage. It is estimated that taking around 12% of the capacity of buildings around the center of campus will provide enough bike spots to account for the congestion. 12% was chosen because we were looking at values between 10% and 15%. 10% is too close to 9.6%,

but we felt that 15% would require a number of bike rakes that would not be ideal for creating space for. If 12% is not enough, the university can consider a higher percentage depending on the university's size and population. Halls that are known for supporting most of the universities classes were increased to 12% as well. For Montana State University, the areas where bike spots will be increased include Renne Library, Reid Hall, Wilson Hall, Barnard Hall, Jabs Hall, and Leon Johnson Hall, and the SUB. Table 1 shows the proposed bike parking capacity for each of the halls based on the calculations proposed above.

Table 1: Building occupancy, current bike capacity, and the proposed bike capacity needed for each building

Building	Occupancy	Current Capacity	Proposed Capacity
Animal Biosciences	391	20	38
A.J.M. Jonhson Hall	325	134	31
Barnard Hall	1153	110	138
Black Box Theatre	127	54	12
Chemistry and Biochemistry	290	30	29
Cobleigh Hall	701	140	67
Culbertson Hall	319	**	30
Gaines Hall	1230	80	118
Hamilton Hall	201	136	19
Haynes Hall	284	6	27

Herrick Hall	312	18	30
Howard Hall	523	54	50
Jabs Hall	571	62	69
Leon Johnson Hall	757	30	91
Lewis Hall	521	18	50
Linfield Hall	882	204	85
Reid Hall	1873	154	225
Renne Library	1100	130	132
Roberts Hall	958	60	92
Romney Gym	257	18	25
Sherrick Hall	195	10	19
Taylor Hall	39	10	4
Traphagen Hall	273	**	26
Visual Communication	460	72	44
Wilson Hall	1732	98	208

SUB	1000	**	120
Total		1648	1779

**There is no data on the current number of bike racks available to students.

Because the number of bike spots needed is based off the hall capacity, that is how the increase in population over the next few years will be accounted for on campus. As the population increases, more halls will be built to accommodate the student population. As the number of buildings increase, the capacity will increase and the number of bike spots will increase.

FEASIBILITY

When looking at Table 1, there are some buildings, like Visual Communications, that have more bike racks then we recommend. To save on costs of buying new bike racks, the existing racks can be moved to areas on campus that need more bike racks. In areas with high bike spots needed or areas with few places to put bike racks, the university could consider two leveled bike racks to save on space. These racks would also require less maintenance when considering aspects like snow removal because they eliminate the number of bike racks that the university will have to work around. Due to limited space on campus, bike racks of any kind could be placed around parking lots as well.

LIMITATIONS

There are multiple limitations when approaching this model. First of all, we had limited data, and were not sure of the data we had on building capacity. For example, Renne Library was listed for having an occupancy of 148, which is clearly too low of a number. We estimated the actual capacity to be 1100. Also, the occupancy for the SUB was unavailable, and we estimated it to be 1000. These numbers were approximations found on the MSU web page and were found to be more accurate than the data given for the challenge. These two buildings are centrally located on campus and are bike parking hubs, so having accurate data for these locations is crucial.

One other limitation was our estimate of how many students actually ride their bikes consistently to campus. The given survey data stated that "9.6% of respondents depend on Streamline bus, walking, or biking to get to campus". This statistic gives information on a wide audience, but it does not give us an accurate number for how many students actually bike to campus. We believe our estimates are reasonable, because they reflect a slight increase in bike racks across the campus.

CONCLUSION

Due to a variety of factors, many students at Montana State University, along with other universities around the country, are riding bikes to school. This creates a need for bike parking to eliminate congestion on campus. Through the approach listed above, universities can find a solution to addressing this congestion and provide students with opportunities to safely park their bikes. Because bike racks will be moved to different locations the total number of new bike racks needing to be purchased will be eighty-one.