Rutgers University's College Avenue Crosswalk

An Observational Study

Michael Borsellino
15 December 2015

Table of Contents

List of Figures

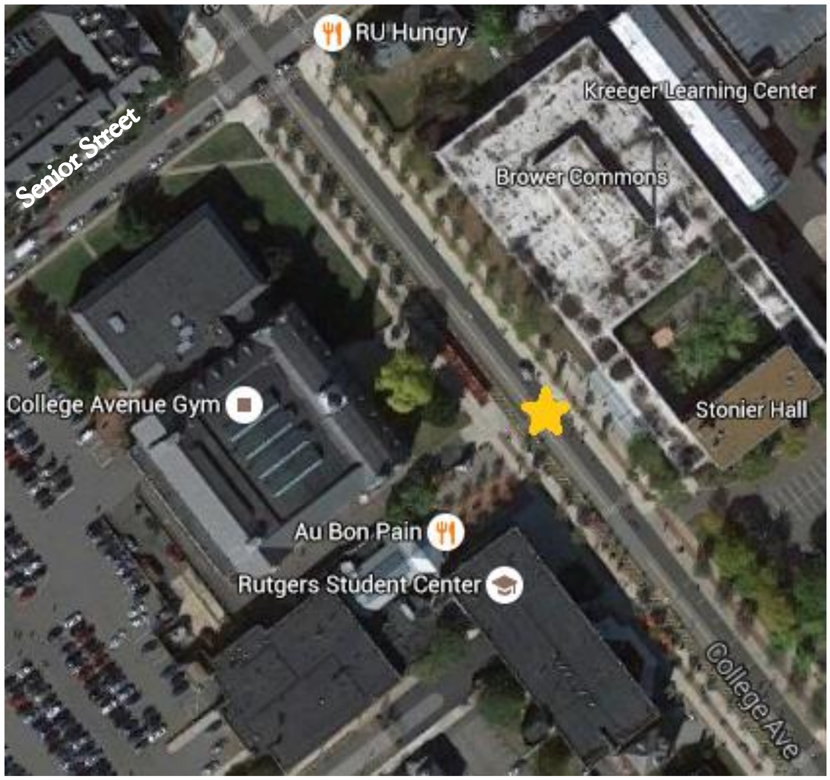
List of Tables

1. Introduction

a. Description of Study Area

The focus of this study is a crosswalk on Rutgers University's College Avenue campus in New Brunswick, NJ. The crosswalk is located midblock on the street for which the campus is named, College Avenue (Figure 1). It lies between the intersections at Senior Street (northwest) and Bartlett Street (southeast, not pictured). College Avenue is a two-lane road, approximately 12 meters wide, with no-parking lanes that run adjacent to the north and southbound lanes, respectively.

Figure 1. Crosswalk Location



Source: Google Maps

This crosswalk is one of the most frequently traversed at Rutgers University. On the south of College Avenue are the College Avenue Gymnasium and Rutgers Student Center. Brower Commons, a student dining hall, and several freshman dormitories reside on the north side of the avenue. There are several retail shops in this area, as well as a bus stop that serves as a main exchange of the Rutgers University bus system. Additionally, just north of Senior Street is one of the university's biggest libraries, Alexander library. This aggregation of mixed-use buildings in the area all contribute to the traffic that this crosswalk routinely sees.

The majority of this observational study focused on the crosswalk. I positioned myself in order to clearly identify pedestrians as they utilized this crossing area and I was close enough to observe the conditions under which they crossed. My view also revealed another crosswalk roughly 20 yards southeast of my position, however this study does not focus on that crossing point as it was noticeably less popular.

b. Planning Question

Based on my own experiences at this crosswalk, as well as the experiences of several Rutgers University undergraduate students, the focus of this study is on safety. I believe this crosswalk to be inherently unsafe, therefore, my question is: **What are the risks involved with using this crosswalk and how can they be ameliorated?**

c. Hypotheses

Before beginning, I needed to develop several hypotheses to guide this study. My hypotheses focus on the potential factors, conditions, and environments that decrease the safety of this crossing.

i. Crosswalk Use Behavior: It is assumed that pedestrians will wait until it is safe to cross the street. This means that there are either no vehicles present or all present vehicles have come to a complete stop with the specific purpose of allowing pedestrians to cross the street. I also predict that there will be a small subset of pedestrians who chose not to use the crosswalk.

ii. Line of Sight: I expect the largest risk at this crosswalk will be the inability for pedestrians to see oncoming traffic. I believe that loading busses at the bus stop and loading vehicles on the northeast side of College Avenue will both contribute the line of sight problems.

iii. Time of Day Variations: There are two variations: pedestrian and automobile. I expect student traffic to be bimodal, with peak usage coming at approximately noon and 6 PM. This would coincide with meals and class scheduling. I also expect automobile traffic to peak between 5 PM and 7 PM to coincide with evening rush hour. I do not believe morning pedestrian traffic to be busy due to college students' lifestyle choices. Similarly, I expect weekend pedestrian traffic to be lower due to the absence of classes.

2. Observation Methods

I observed the crosswalk from a bench approximately 20 feet from the south-side crossing point. I sat in the same spot and observed crossing behavior on four separate occasions, all of which lasted roughly thirty minutes. The observational periods were:

Tuesday, September 22, 2014: 9:50 AM – 10:20 AM
Tuesday, September 15, 2015: 2:05 PM – 2:30 PM
Tuesday, September 15, 2015: 5:10 PM – 5:40 PM
Saturday, September 19, 2015: 9:15 PM – 9:45 PM

To ensure compatible results, a spreadsheet was designed to allow for consistent data collection between sessions. My original spreadsheet intended to track each crossing as its own event. In addition to the data on view obstructions and crosswalk use, each crossing event would have a time stamp, demographics, group size, and other characteristics of note; for example, how long a pedestrian waited to cross the street, if they were using a cellphone, or mode of transportation. I underestimated the frequency of crossing events, especially during the afternoon, and this level of detail quickly became unreasonable. Further, some demographic data was deemed expendable. For example, age group was mostly irrelevant due to the high proportion of college students that utilize this crosswalk.

The new, simplified spreadsheet tracked the number of pedestrians who crossed in this area. It was split into two main categories: those who used the crosswalk and those who did not use the crosswalk. The former group was then split into two more categories: those who crossed with a clear line of sight and those who crossed without a clear line of sight. I arbitrarily defined a clear line of sight as being able to see fifteen yards into oncoming traffic from the curb. I also tracked those who waited for vehicles to stop before crossing, and total number of busses that passed by. This was all done using a tally system.

Throughout the observational periods, I took notes on pedestrian characteristics and behavior. Due to the high volume of crossing occurrences, these notes were sporadic and inconsistent. These notes included location of crossing, speed of crossing, and mode of crossing. Additionally, I tracked several variables when the information seemed appropriate; these included age, gender, and race. Again, due to the high volume of crossing occurrences, these notes were not assigned to specific crossings but rather crossing types (obstructed, unobstructed, no crosswalk) used in the tally system.

3. Results

a. Quantitative Results

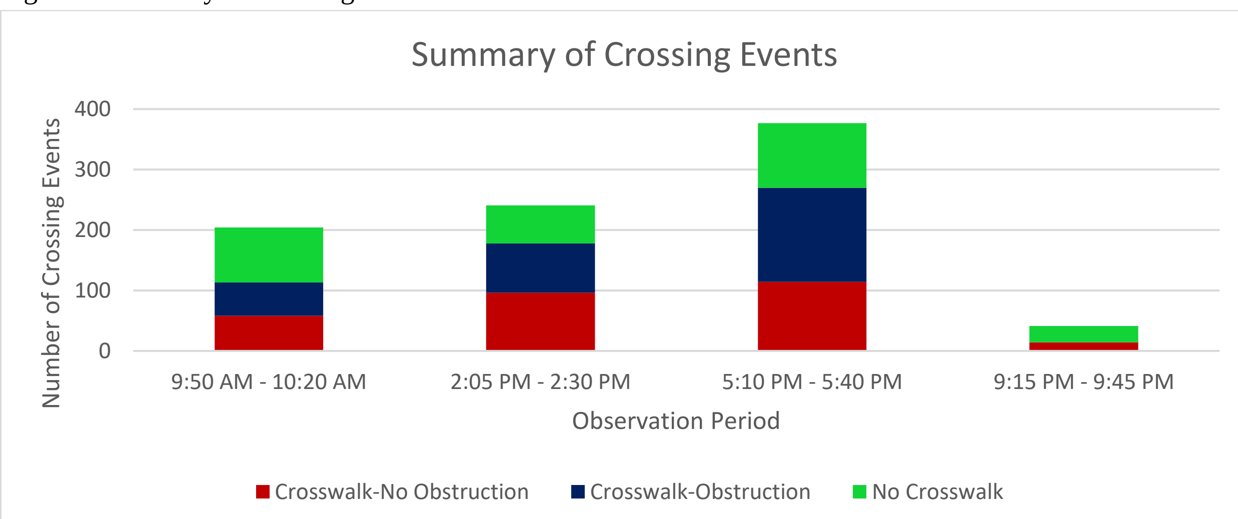
As stated in section 2, I recorded all crossing events using a tally system. Events were classified as "obstructed view crosswalk", "unobstructed view crosswalk", and "no crosswalk". A summary of the tallied data can be seen in Table 1 and visualized in Figure 2, below. Immediately, two observations can be made: the high degree of crosswalk use during the afternoon and early evening, and the uniform distribution of crossing event types.

Table 1. Summary of Crossing Events

Classification	Tuesday 9/22 9:50 AM - 10:20 AM	Tuesday 9/15 2:05 PM - 2:30 PM[1]	Tuesday 9/15 5:10 PM - 5:40 PM	Saturday 9/19 9:15 PM - 9:45 PM
Crosswalk-No Obstruction	58	96 (115)	114	**14**
Crosswalk-Obstruction	55	82 (98)	156	**0**
No Crosswalk	91	63 (76)	107	**27**
Total by Time Period	**204**	**241 (289)**	**377**	**41**

Source: Michael Borsellino

Figure 2. Summary of Crossing Events



Source: Michael Borsellino

As expected, the frequency of crossing was at its peak during the afternoon. A total of 377 crossing events took place between 5:10 PM and 5:40 PM, accounting for 41.4% of total events. This was just over one standard deviation above the average of 227.75 events per thirty minutes. On the other hand, there were only 41 events between 9:15 PM and 9:45 PM, accounting for just 4.5% of total events. This result was 1.3 standard deviations below the mean. I expected the frequency of morning crossings to be the lowest, so this was unexpected.

In contrast to the uneven distribution of crossing events by time period, crossing events by classification were surprisingly uniform. There were 301 crossing events that I classified as "no obstruction", accounting for 33% of all

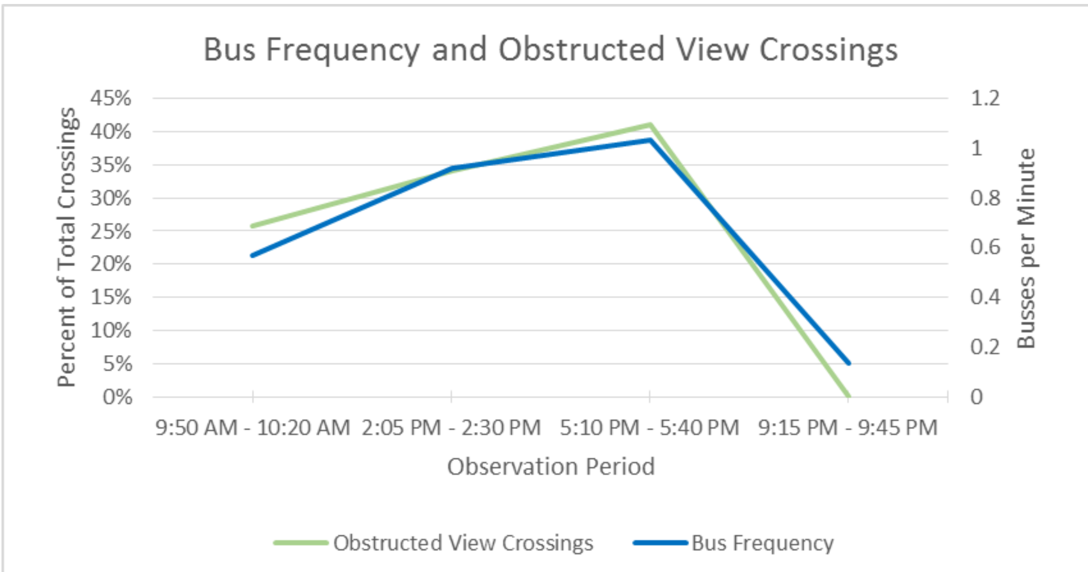
[1] The values in parentheses were adjusted proportionally to reflect events per thirty minutes. These values were used for all calculations.

events. There were 309 events that I classified as "obstruction", accounting for 33.9%, and another 301 events that I classified as "no crosswalk". The mean value by event classification was 303.7.

I also made several small quantitative observations. For example, just 18 pedestrians, or 2.1%, waited for traffic to stop before crossing. Interestingly, 15 of these 18 were female and all 18 were minorities.

Additionally, fifteen, or 5.1%, of obstructed view crossings originated on the north side of the intersection. Figure 3 shows that as the number of busses per minute increases, so does the proportion of obstructed view crossings. The combination of these observations suggest that busses play a major role in obstruction vision.

Figure 3. Bus Frequency and Proportion of Obstructed View Crossings



Source: Michael Borsellino

Additionally, there were only two occurrences of people traversing the crosswalk using alternate modes of transportation. One event involved a female riding a bicycle during the 2:05 PM – 2:30 PM session, the other event involved a male riding a skateboard during the 9:50 AM – 10:20 AM session.

b. Qualitative Results

One frequent occurrence was with regards to "no crosswalk" crossing events. These events largely occurred when the pedestrian had an "obstructed view". Frequently, one student would cross between busses. They would then be followed by a stream of students who continually failed to check for oncoming traffic. Each student appeared to assume that the safe crossing of the first student guaranteed their own safe passage. I did not classify these events as "obstructed" because "obstructed" was defined from the perspective of the crosswalk.

During the afternoon and night sessions, groups of people crossing were much more frequent. These groups tended to contain between four and six people and were largely male. Additionally, these groups appeared to be more responsible for "no crosswalk" crossing events than single pedestrians, perhaps due to perceived safety, or in this case, visibility, in numbers. As one may expect, the afternoon periods were also much nosier, with a noticeable amount of conversations occurring.

In the morning, however, I did not observe any groups larger than two people. Instead of groups neglecting to use the crosswalk, it was largely single pedestrians crossing in long streams. This occurred primarily as busses arrived and let passengers off. Further, noise (and conversation) was kept to minimum. This may be explained by the stereotypical lack of "wakefulness" before noon in the college community.

c. Scale Issues

I made two observations with regards to the scale issues that Jan Gehl refers to in his book, "Cities for People"[2]. First, I was approximately 14 meters from the south side of the crosswalk and 26 meters from the north side of the crosswalk. This puts me inside of Gehl's threshold for depicting facial expressions, gestures, and body language in rich detail. However, I rarely relied on this visual information for this study.

The second observation was that the size of the crosswalk often forced pedestrians into each other's "do-not-touch" zones. This may explain why pedestrians frequently walked adjacent to the crosswalk when congestion was higher rather than in it. This does not explain why pedestrians failed to use the crosswalk when it was not crowded.

4. **Analytic Conclusions**

The above observations yielded the following summary of my findings as they relate to the hypotheses in section 1c.

a. Crosswalk Use Behavior

I hypothesized that most pedestrians would wait on the curb until it was safe to cross the street. This was rarely the case, as very few pedestrians actually waited for vehicles to stop. This observation is not entirely valid, as I did not keep track of how many pedestrians stepped into moving traffic. However, I am sure that the magnitude of those who stepped into traffic is larger than those who waited.

I also hypothesized that a small percentage of pedestrians would avoid the crosswalk. While I anticipated that the crosswalk would not be used by some, I did not expect usage to be as low as it was. To me, this behavior indicates that college students do not believe that jaywalking is either illegal or unsafe.

b. Line of Site

I hypothesized that busses and loading vehicles would prevent pedestrians from seeing oncoming traffic, thus rendering the crosswalk unsafe. There was a significant amount of "obstructed view" crossings; Rutgers University busses were responsible for nearly all of these obstructions. This was only a problem for those crossing north, as the bus stop is on the south-side of College Avenue. For those crossing south, crossings primarily occurred with an "unobstructed view". However, on rare occasions, a loading vehicle did cause a view obstruction on the north-side of College Avenue.

c. Time of Day Variations

I hypothesized that pedestrian behavior would vary with the time of day, and specifically that pedestrian traffic would peak between 5 PM and 7 PM on weeknights. My results demonstrated that pedestrian traffic is high for most of the afternoon. There were variations in behavior based on the time of day (see above) which was likely caused by variations in automobile traffic.

---

[2] Gehl, Jan. "Senses and scale." *Cities for People*. Washington, DC: Island, 2010. 31-59. Web. 20 Sept. 2015.

5. Policy Recommendations

Due to the observations noted above, I have several recommendations that would increase the safety of this crossing point for pedestrians. All four proposals can be seen in their applied form on page 11 in the Appendix.

a. Curb Extensions

I believe a curb extension that extends into the no-parking zone on either side of College Avenue would yield the most immediate results in making this crosswalk safer. This would prevent pedestrians from having to step into the road to see oncoming traffic while also increasing pedestrian visibility to drivers. It would also decrease the length of the crosswalk, and thus decrease the amount of time pedestrians remained vulnerable to collisions.[3] As there is already a no-parking lane on both sides of the intersection, this improvement would not impact traffic or parking along College Avenue.

b. Crossing Lights

Due to the fact that pedestrian visibility is a major issue in this area, the addition of lights that signal drivers of crossing pedestrians would make this crosswalk safer. Using strobe lights embedded in the crosswalk which are activated by a button on the sidewalk are one such example. Another example may be a pedestrian traffic signal, which would allow pedestrians to cross frequently, but not frequently enough to cause major traffic disruption. This solution has already been implemented at another crosswalk on Rutgers University's College Avenue Campus.

c. Fence

Due to the high degree of pedestrians that failed to use the crosswalk, the addition of a fence along College Avenue may serve to prevent future jaywalking occurrences. The fence would run alongside the street with openings at each crosswalk, thus making it more convenient for pedestrians to cross at designated crossing points. Not only will this prevent potential injuries, but the right fence could also increase the aesthetic value of College Avenue.

d. Wider Crosswalk

In some occurrences, pedestrians avoid the crosswalk due to congestion. A wider crosswalk would enable more pedestrians to cross safely, and implementing it would come at little cost to the city.

---

[3] Bochner, Brian S, et al. *Designing Walkable Urban Thoroughfares: A Context Sensitive Approach*. Rep. no. RP-036A. Institute of Transportation Engineers, 2010. Web. 20 Sept. 2015.

6. Appendix

Figure 4. View of Crosswalk from My Vantage Point

Source: Michael Borsellino

Figure 5. View of Crosswalk from Northside of College Avenue

Source: Michael Borsellino

Figure 6. Example of View Obstruction

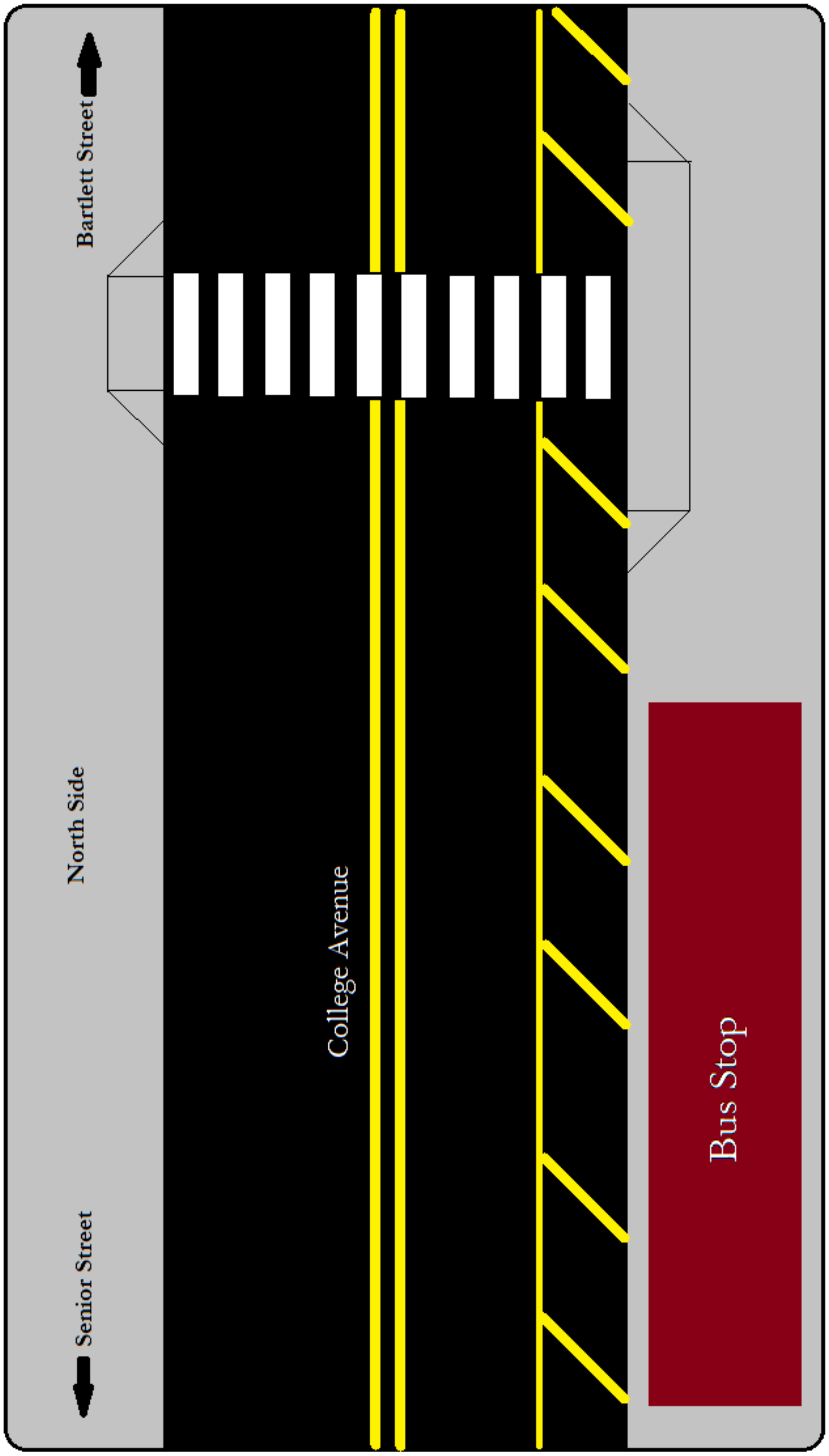
Source: Michael Borsellino

Table 2. Summary of All Data

Event Type	Tuesday 9/22 9:50 AM - 10:20 AM	Tuesday 9/15 2:05 PM - 2:30 PM	Tuesday 9/15 5:10 PM - 5:40 PM	Saturday 9/19 9:15 PM - 9:45 PM	Total by Event Type
Crosswalk- No Obstruction	58	96	114	14	282
Crosswalk- Obstruction	55	82	156	0	293
Orginated on Northside	10	1	4	0	15
No Crosswalk	91	63	107	27	288
Total by Time Period	214	242	381	41	878
Waited for Cars	1	8	9	0	18
Busses	17	23	31	4	75

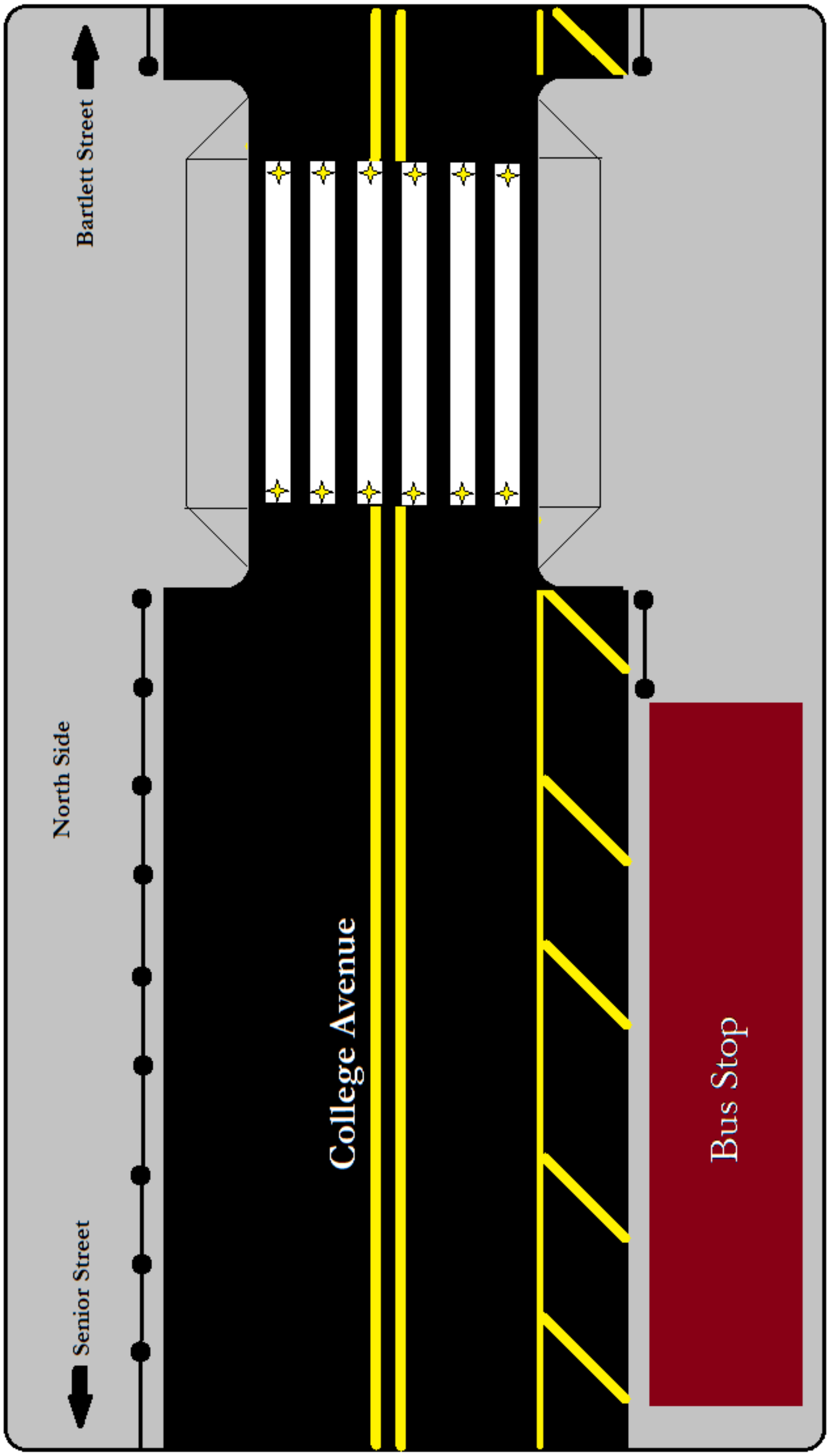
Source: Michael Borsellino

Figure 7. Current Layout of Crosswalk



Source: Michael Borsellino

Figure 8. Proposed Layout of Crosswalk



Source: Michael Borsellino