Memorandum

To: Marie-Claude Léonard, Chief executive of the Société de Transport de Montréal
From: Emma Reddy, student at McGill University

Subject: (URGENT) Intersection Redesign Critical

Introduction

The intersection of Rue Saint-Denis and Rue Rachel (*Figure 1*) is among one of the most dangerous in Montreal for cyclists. It is urgent that this intersection be improved in order to prevent potential or further crashes.

In this memo, I will explain my observations of the intersection over a one-hour period. I will note the particular issues with this intersection and the tensions between pedestrians, cyclists, and motor vehicles. Next, I will provide multiple improvements to the design of the intersection and facilities provided. Finally, I will suggest a few enhancements to the microdesign of the space that would improve safety greatly.

Figure 1: Intersection Rue Saint-Denis (horizontal) and Rue Rachel (vertical)

Observations

Intersection design

Rue Saint-Denis, at this intersection, is four lanes of traffic. This includes two turn lanes and two straight lanes; cars cannot turn left onto Rue Rachel. Pedestrians have 30 seconds to cross Saint-Denis. There are two one-way bike lanes with respective bike lights.

Rue Rachel has two lanes of straight traffic and two small right turn lanes in either direction. To turn right onto Saint-Denis, cars must wait until a solid green circle, which appears after pedestrians have entered the intersection. There is a two-way bike lane on the Westbound[1] side of the street and no bike lights.

Pedestrians have 30 seconds to cross Saint-Denis and 40 seconds to cross Rachel.

There is are bus stops approximately 30 meters NB and SB of the intersection on Saint-Denis. The density of modal share (car, bike, pedestrian) can be found in *Figure 4*.

Tensions and Dangers

During a one-hour observation at 13:00 p.m. on March 18, 2024, I noted multiple tensions between citizens:

- near miss between cyclist and jaywalking pedestrian,
- near miss between car turning right and a pedestrian
- car parked in bus stop
- car making an illegal right turn during a red light
- illegal left turns onto Rachel from Saint-Denis
- car-car tension with turning vehicles blocking traffic

Many of these tensions and near-crashes could have been avoided with an ameliorated design of the intersection.

1 Note, for the purpose of this paper all references to cardinal directions refer to the modified Montreal equivalent

Recommendations

Below is a table of the major and minor improvements that should be made to the dangerous Saint-Denis-Rachel intersection and their anticipated costs. Next, I will explain each project and which problem it would help combat.

Major Improvements	Anticipated Cost
Add a right-turn light for northbound traffic	$100,000 CAD
Split existing two-way bike lane into two one-way bike lanes	$100,000 CAD

Minor Improvements	Anticipated Cost
Redo paint for lanes of traffic, pedestrian crossing, and bike lanes	$15,000 CAD
Install four traffic signs	$7,000 CAD
Install bike lights	$75,000 CAD

Figure 2: Deteriorating paint on crosswalk and bike lane

The first major project is to install a right-turn light for northbound and southbound traffic. These lights should turn on for ~10 seconds at the beginning of the signal cycle, then turn off while pedestrians enter the crosswalk. This light would ensure that west and eastbound traffic is not delayed by vehicles attempting to turn right. Additionally, it would discourage vehicles from inching towards the crosswalk in an attempt to turn between groups of pedestrians.

The second major project is to overhaul the layout on Rachel and transform the existing two-way bike lane into two one-way bike lanes (*Figure 3*). This would require sacrificing the parking spots currently available on Rachel in order to free up space. However, during my one-hour observation, I only counted six vehicles parked on Rachel within 100 meters of the intersection. On the other hand, there were 19 bikes crossing through the intersection within only 10 minutes. Adding to the existing bike lane infrastructure would greatly improve the safety of this intersection.

In addition to these major projects, there are some minor improvements that could be made to the intersection to regulate flow and improve safety.

As the paint has deteriorated over the years (*Figure 2*), it is becoming increasingly difficult to make out turn lanes and bicycle crossings. Therefore, the paint on the bike lanes, pedestrian crossings, and the traffic and turn lanes must be redone.

It is not clear enough that cars cannot turn left onto Rachel in this intersection, and that a right turn onto Rachel is only permitted on a green arrow light. More road signs should be added on the cantilevers to make it known. Two signs of both “No left turn” and “Right on green arrow only” should be created and installed in order to reduce confusion at this intersection.

Lastly, should the bike lane on Rachel be overhauled, there should be bike lights installed on both sides of the street, similar to how they are installed on Saint-Denis. This would reduce the risk of cyclists crossing on a red light.

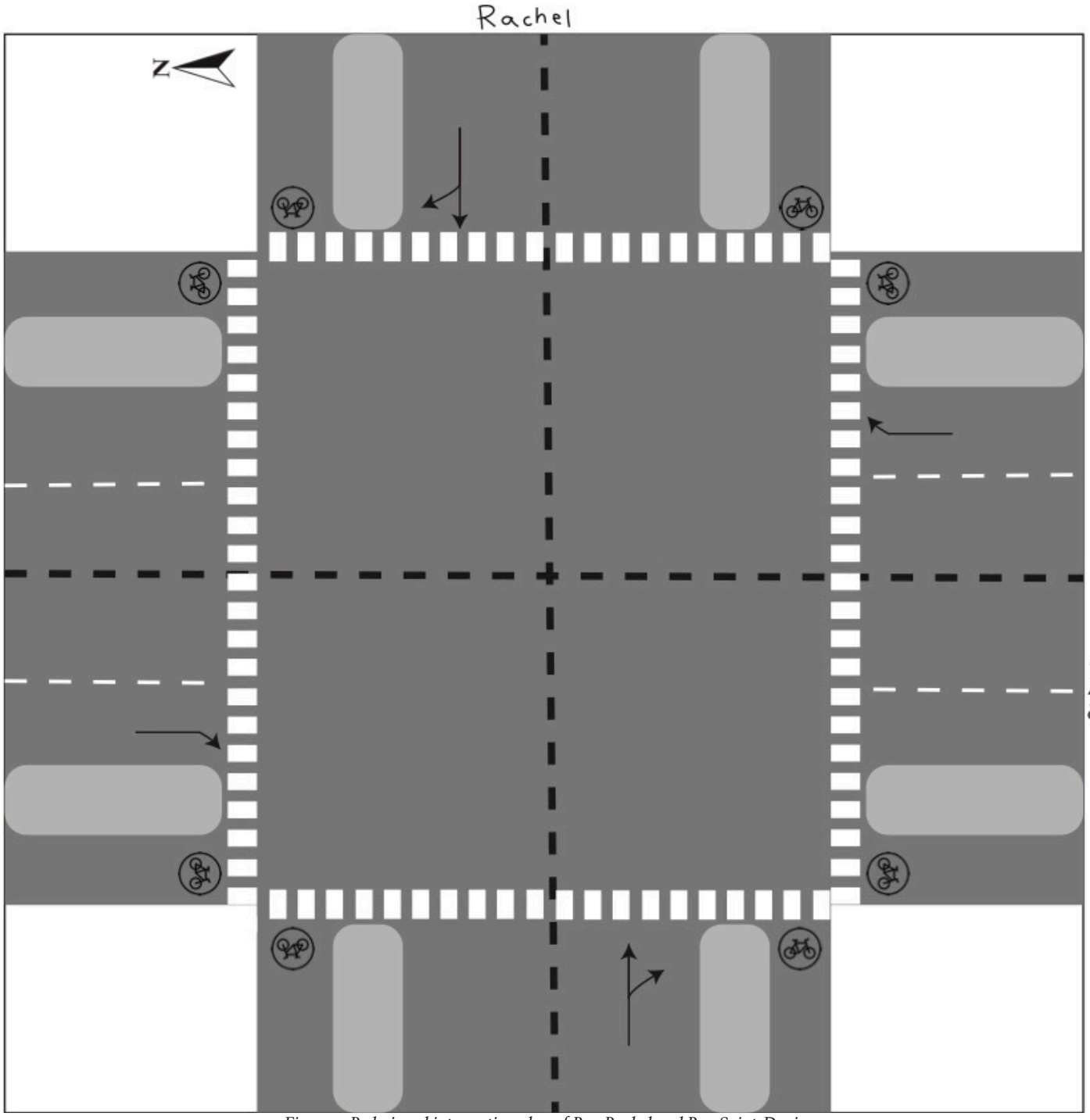

Figure 3: Redesigned intersection plan of Rue Rachel and Rue Saint-Denis

Conclusion

The redesign of this intersection is urgent, and should be completed as soon as possible to avoid further tragedies. For an approximate $300,000 CAD, this intersection could serve as a model in safe and efficient design for others in Montreal and across Canada to follow.

The following is the most efficient order of operations for my proposed recommendations:

1. Split existing bike lane
2. Install bike traffic lights
3. Add right-turn light
4. Install traffic signs
5. Redo paint

I strongly urge you to complete this project as it would best serve a majority of the community of the Plateau.

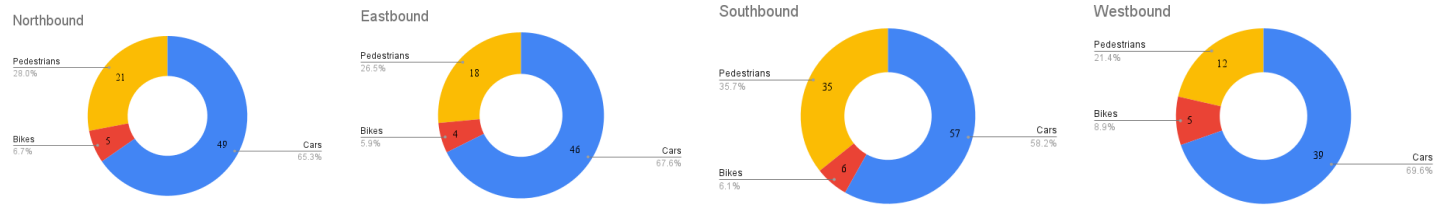

Figure 4: Modal share statistics over 10-minute counting period

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