Pedestrian Safety Capstone Project

Using engineering optimization and simulation software, the current Montreal pedestrian situation was modelled


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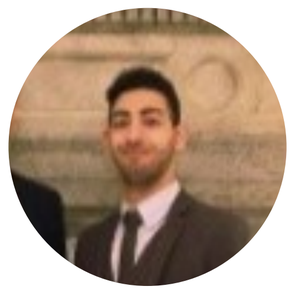
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Foundational Aspects & KPIs

Pedestrian Flow
- Number of pedestrians crossing an intersection
- Time allowed for crossing (pedestrian)

Traffic Flow
- Number of left turns
- Number of cars
- Time allowed for crossing(cars)

Accidents
- Number of accidents
- Severity of Accidents
- Number of near-misses

Key Survey Findings

63%
Are more likely to jaywalk on Mackay

69%
Of survey respondents would feel safer is the pedestrian cross times were extended

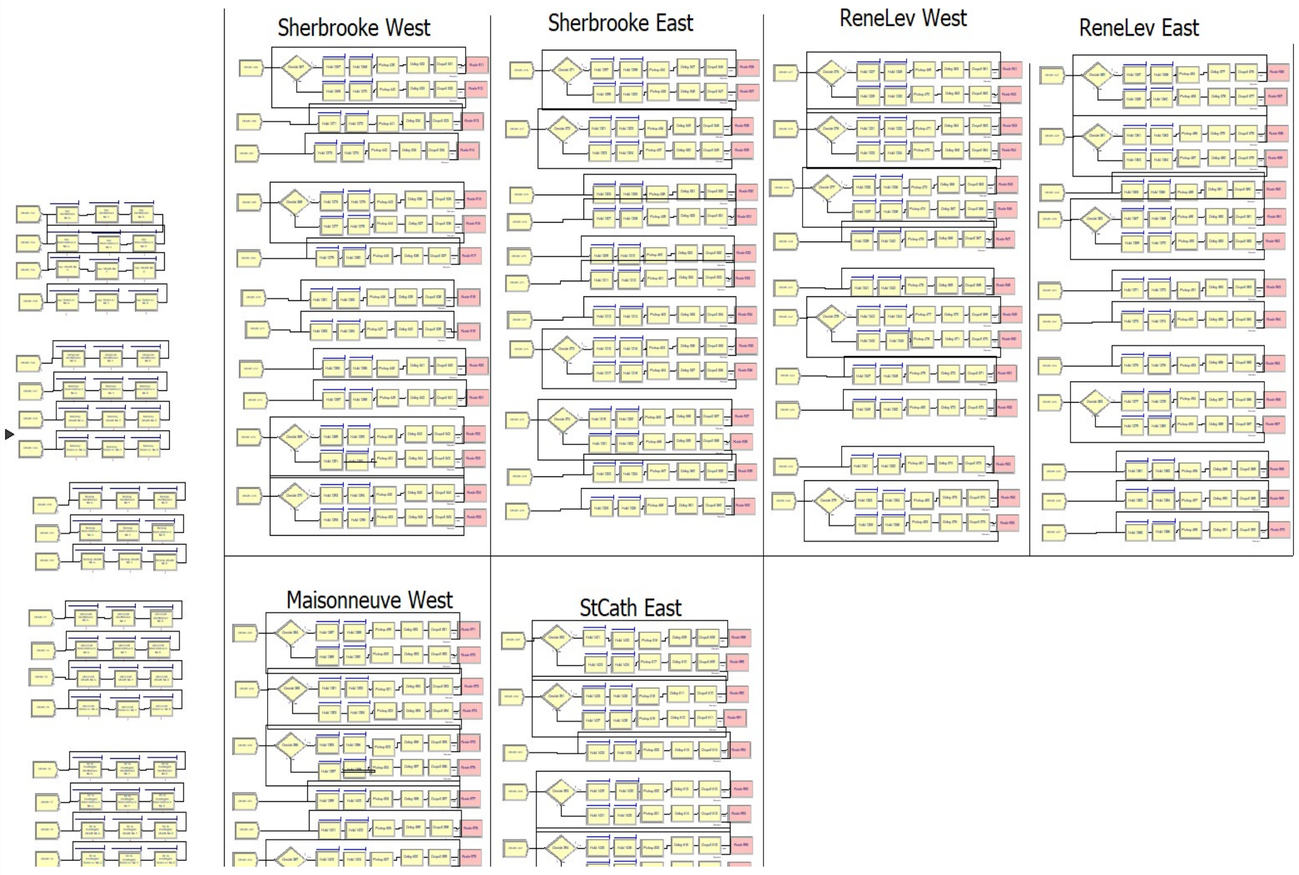
86%
Of pedestrians feel pressured by cars to quickly cross intersections

50%
Of people admit to using their personal devices while crossing intersections

80%
Of pedestrians identified Guy as the most dangerous street to cross at Concordia

92%
Of surveyors admit walking is their #1 means of transportation around the Concordia campus

Simulation Baseline



Progress:
- 44 intersections completed
- Data on light timings and foot traffic received

Process:
- Over a 2-hour period, we collected data on number of pedestrians, timing of the lights, number of cars, direction of cars, etc.

Design:
- Solving pedestrian problems might imbalance traffic flow

Simulation goal:
- Measure change in traffic after solution implemented
- See the effect on safety for pedestrians

Bounds:
- Du Fort to Peel (East/West)
- René-Lévesque to Sherbrooke (North/South)

Progress:
- 100% completed

Shortest and Safest Path Optimization

$$Minimize \sum_{(i,j)\epsilon A} [(0.9 * (Safety)_{ij} * x_{ij}) + (0.1 * (Distance)_{ij} * x_{ij})]$$

$$\sum_{k\epsilon\delta(i)} x_{ik} - \sum_{k\epsilon\delta(i)} x_{ki} = 1 \; for \; i = o$$

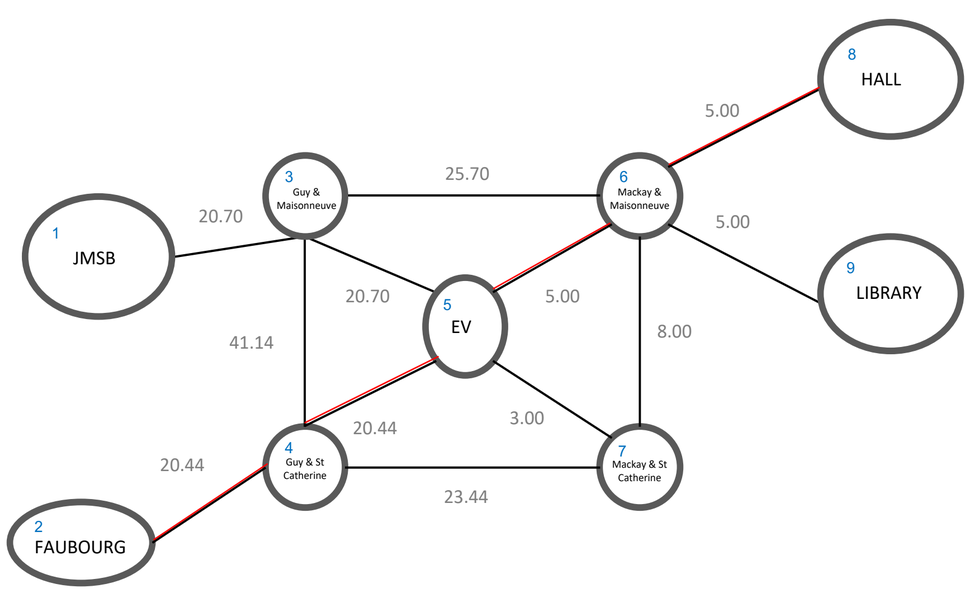
$$\sum_{k\epsilon\delta(i)} x_{ik} - \sum_{k\epsilon\delta(i)} x_{ki} = 0 \; for \; i \; \epsilon \; V \; \{o,t\}$$

$$\sum_{k\epsilon\delta(i)} x_{ik} - \sum_{k\epsilon\delta(i)} x_{ki} = -1 \; for \; i = t$$

$$x_{ki} \geq 0 \; for \; (i,j) \in A$$

$$x \in \mathbb{Z}^{|A|}$$

		Priority to Safety	Priority to Distance
1	Shortest Path	0%	100%
2	Mostly Shortest Path	10%	90%
3	Equal Priority	50%	50%
4	Mostly Safest Path	90%	10%
5	Safest Path	100%	0%



Timeline