Pedestrianizing Norma Eddy Lane:
An Analysis of Transport Mode and Safety

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Table of contents

Executive Summary

This study examines the numerical distribution of users of the north end of Norma Eddy Lane by travel mode. The site, located on the north end of the Dalhousie University Sexton Campus, in between the Ralph M. Medjuck building and the Halifax Central Library, currently serves as a small parking lot and loading zone, primarily servicing the Medjuck building. The site is also in close proximity to Halifax Metro Transit bus stop #8327.

Beginning with a suggestion from the Dalhousie Office of Sustainability, the study sought to examine the modal split of users of the corridor in order to determine whether the current land use, infrastructure and physical features were suitable for users. Presently, the site consists of 7 parking stalls and a series of concrete dividers which separate the paved and non-permeable portions of the site. There is no dedicated walking or cycling path that runs the entire length of the subject area.

The study found that over 3119 pedestrians passed through the subject area over the course of 24 total hours of data collection, with each 2-hour shift averaging 260 pedestrians, while vehicle capacity never exceeded 5 of the 7 available stalls, with very little deviation on which cars were parked, peaking at 2 cars in a half hour. Cycling as a mode made up a small portion of the total split, with 28 total cyclists passing through the corridor during the data collection process.

Many incidents were observed throughout the data collection process which all included vehicles in some manner, with vehicles disrupting walking paths or having near-misses with pedestrians being the majority of those recorded.

Given these results the study found that the current land uses of the site do not properly accommodate most of its usership and do not ensure their safety while traversing the site. The study provides recommendations for redevelopment or redesign as well as for further research into the subject.

Introduction

Since 2014, Halifax Regional Municipality (HRM) has promoted the use of Halifax's Active Transportation (AT) Plan to encourage bicycles, walking and more environmentally friendly forms of transportation. As such, the municipality implemented new road networks and corridors to ensure the safety and productivity of AT users utilizing the space. In some cases, without the initiative and enforcement from the HRM, outdoor areas can be used as road networks that can naturally be spaces for active transportation users, such as on Gottingen Street, where the road eventually leads to the Macdonald Bridge and the North End. Promoting walkability and biking is essential within cities for sustainability and environmental reasons, allowing a reduction in carbon emissions and increasing cleaner air quality. It would also encourage people to stay more physically active and save costs by utilizing forms of ATs (Halifax Regional Municipality, 2014).

On the Dalhousie University Sexton Campus, the corridor between the Medjuck Building and the Halifax Central Library was initially designed to enable parking spaces for those with Dalhousie University parking permits. The space is also now utilized for local pedestrians and other active transportation users. The corridor allows for easier access between Spring Garden Road and Morris Street and is used to gain access to the Sexton Campus. However, as it is designated for the use of vehicles, the corridor needs infrastructure to ensure safety for pedestrians and AT users. The Office of Sustainability vocalized concern for pedestrian and AT user safety along the corridor. This case must be addressed urgently to minimize accidents for all users. Given that students at Dalhousie University and cyclists utilize the corridor, ensuring their safety is a priority.

The inclusion of walk-bike infrastructure can be beneficial in ensuring safety for AT utilizers. According to Aziz et al. (2017), in their study of New York City's commuter data and walk-bike infrastructure, such an inclusion would be beneficial through various factors, such as the improvement in traffic safety and increase in AT users. Suggested improvements in the infrastructure for AT included the expansion of bike lanes and sidewalks length and width, with encouragement for investment to adapt surrounding buildings to such infrastructure (Aziz et al, 2017).

Greater Melbourne, Australia, was utilized to explore the infrastructure requirements for AT users, exploring road networking and behaviours. According to Jafari et al. (2022), from observations made in AT users' behaviours, the surrounding physical environmental factors played a crucial role in how they acted. For instance, the lack of width in cycling infrastructure would lead to concerns about their safety, increasing stress for users due to the lack of considerations made for bicycle users within the infrastructure layout (Knight & Charlton, 2022).

Sulistyono et al. (2022) also observed AT users' behaviour from a different perspective. The University of Jember located in Indonesia, attempted to create a "Green Campus" initiative to reduce the high traffic volume within their university and promote active modes of transportation; however, it was unpopular and did not promote the uses of AT modes. From observation, Sulistyono et al. (2022) stated that there was a necessary intention and attitude toward promoting AT modes to its residents that were lacking, stating that "*the greater the intention, the greater the behaviour of the residents of the University of Jember in using active transportation.*" Relating to the Dalhousie University Sexton Campus, more initiative and attitude are essential to address the infrastructure between the Medjuck Building and the Halifax Central Library. They must be addressed before AT users get into accidents due to the lack of infrastructure. An instance of this at the Dalhousie University campus is addressed through their Master Plan (Dalhousie University, 2010), which indicated the revisions in University Avenue that were made to provide safe alternative travel modes, including a separate bikeway to ensure cyclists' safety.

Overall road infrastructure on major roads, for instance, Spring Garden Road, has been slowly improved within the HRM to ensure the safety of pedestrians and active transportation users. However, the HRM should also prioritize improvements in corridor infrastructure with high pedestrian movement, like Norma Eddy Lane. *As Spring Garden Road develops over time, the corridor between the Medjuck Building and the Central Library has become a desirable path for local pedestrians and active transit users from Spring Garden Road to Dalhousie University, Sexton Campus and Morris Street. In this case, what forms of transportation do the existing walking path and parking lot support, and does that meet the transportation demand of those who use the corridor?*

Hypothesis

Our null hypothesis is that there is no difference in the average number of cars that use the corridor compared to the average number of pedestrians that use the corridor. Our alternative hypothesis is that there will be, on average, more pedestrians than cars that use the corridor.

Research Methods

Our method aims to capture the quantity of pedestrian, cyclist, and otherwise AT traffic through the corridor between the Medjuck Building and the Central Library in Halifax, Nova Scotia (Figure 1). Additionally, we aim to measure the use of the parking lot by the quantity of parked motor vehicles. Furthermore, the number of potentially dangerous or interruptive interactions caused to AT users through the area will be counted.

Figure 1 Corridor study site between the Halifax Central Library and the Dalhousie Medjuck building, outlined in red, in Halifax, Nova Scotia, Canada.

In collecting this data we aim to determine if there is a significant use of this passageway by AT users compared to motor vehicle users, that would justify a remodeling of the area to better facilitate active transport. If it is determined that there are also regular interruptions or risks to pedestrians through this area, a remodeling to better facilitate their safe travel would be further justified. In any case, by request, the data in conjunction with this paper will be delivered to Rochelle Owens of the College of Sustainability to direct decision making about site development.

Per ethical considerations of this research, data collected will be purely numerical measures of quantity; that being, number of active transport users through the area, number of vehicles parked, and number of interruptive/dangerous incidents. No identifying or demographic information will be collected from either group. Therein, our research has been determined not necessary to create an ethics application by the professor overseeing the course.

These data will be collected at three key, high-traffic times during the day: morning rush, lunch rush, and evening rush hour. For the sake of this research, we have defined these timeframes as the following:

Morning rush: 7:30 am - 9:30 am

Lunch rush: 11:30 am - 1:30 pm

Evening rush: 4:30 pm - 6:30 pm

These times are representative of the local time zone (AST) in Halifax, where the data was collected. Data will be collected for a period of two weeks on Mondays and Fridays; specifically, March 6th, 10th, 13th and 17th of 2023. Weekdays were chosen to best represent weekly commutes, and Mondays and Fridays were chosen as they were the days group members could collect data at all three times.

During each time period a pair of two people will be in the adjacent Central Library, which via a view through a large glass window, will be able to see the entire study area. If the library is closed or otherwise inaccessible, those collecting data will position themselves outside so that they can see the entire study area. Each person will keep their own count of the data, and then once the period is over, will record their count in a Google Sheet (equivalent to Microsoft Excel). This sheet will be used to track all data points counted by each person, at each time, on all days of the study. For each specific rush hour on each day, the two counts for each category will be averaged to minimize error from possible miscount of the data. Thus, the final data set should resemble Table A1 (Appendix A). For the presentation and delivery of this data, it may be transformed into different modes to be easily legible, such as graphs.

Number of walking pedestrians will be counted using a written tally; any individual walking through the area that does not fall under a later specified category, will increase the tally by one. Number of non-walking AT users will be counted using a written tally- this will count anyone on a peddled bicycle, roller blades, skateboard, etc.; if there is more than one person on a single bike, each person will be counted as their own cyclist. Number of people using mobility aids will be counted using a written tally; for this research a mobility aid will be defined as a necessary object someone is using to assist their own, or someone else's movement (crutches, cane, walker, stroller, etc.). Number of vehicles will be assessed by counting the number of motor vehicles (cars, trucks, motorbikes, etc.) parked in the parking lot, in a parking space, every 30 minutes; these counts will be tracked on a piece of paper, and then averaged at the end of the period to get a final value. Number of incidents will be counted using a written tally, with a written description for each incident (Table A2, Appendix A); for the sake of our research, an incident is defined as any potentially dangerous or interruptive interactions a pedestrian may face that deviates from a conventional experience of walking on a standard sidewalk. For example, if a wheelchair user has to go over a curb to continue their path, if a pedestrian has to walk through moving cars in a parking lot, or if a pedestrian has to pass through an active construction area, the incident tally will increase by one. Those collecting data will use their own judgment as to what qualifies as an incident, given the defined parameters above.

Results

A total of 3119 pedestrians, 28 cyclists and 14 mobility assisted passed through the Norma Eddy Lane corridor during data collection. All observations were made by viewing the corridor while near or inside the first floor of the Halifax Central Library. Data was collected three times a day in two-hour shifts during peak times on March 6th, 10th, 13th, and 17th of 2023. Data was collected to gather real life interactions on how community members use the corridor and what types of transportation modes are used (raw data tables located in Appendix B and C). Results from data collection can be broken into three sections: pedestrians/AT, vehicles, and incidents. 'Pedestrians/AT' includes data collected regarding how pedestrians used the corridor, 'vehicles' pertains to data collected how vehicles used the corridor, and 'incidents' are incorrect ways the corridor was used.

Pedestrians & AT

Each shift averaged 260 pedestrians. The highest number of pedestrians recorded was 320 during the morning on March 6th and the lowest was 172 during the evening of March 17th. Figure 2 display's pedestrian counts during each shift. The figure demonstrates the busiest time was the evening shift when on two occasions over 300 people passed through the corridor (the two highest recorded counts). The morning and evening shifts were fairly consistent with standard deviations of 20.67 and 29.06 respectively. The lunch shift varied the most with a standard deviation of 46.08.

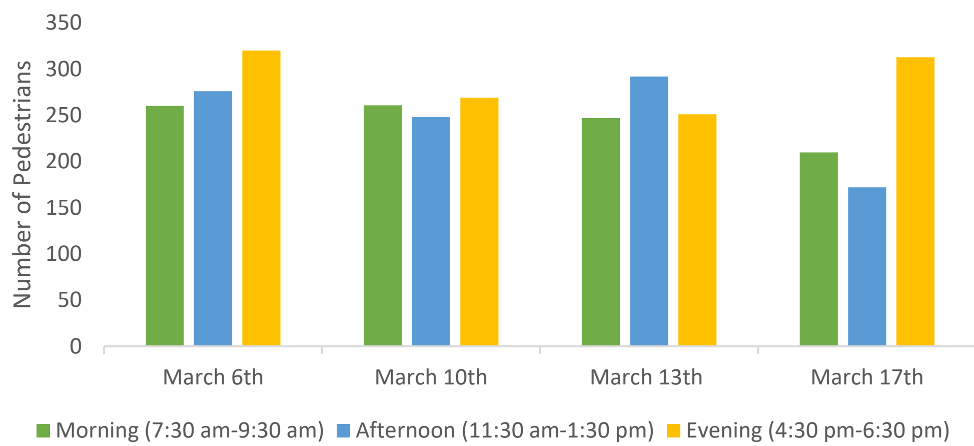

Figure 2 Graph displaying raw pedestrian count data through the Norma Eddy Lane corridor from all days during the collection period. Data has been organized to show the exact number of pedestrians observed each day and time shift.

March 6th had the most pedestrians pass through while March 17th had the least. Each shift averaged two pedestrians passing though the corridor per minute. On average 245 people walked through the corridor in the morning, 274 over lunch and 288 in the evening.

A total of 28 cyclists passed through the Norma Eddy Lane corridor. A least one cyclist passed through each shift with the highest count being 6 during the morning shift on March 13th. There were only 14 sighting of people using a mobility aid, this accounted to half the days having no encounters. The highest shift recorded of people with mobility aids was 4 during a lunch shift on March 13th.

Vehicles & Incidents

The parking lot within the corridor can hold a maximum of seven vehicles at once. The parking lot did not reach full capacity at any time during observation. The most vehicles recorded at any given day was five. There was at least one vehicle park at any given time expect for one day when there was a period of zero vehicles in the lot. The largest change within a half hour was two.

Figure 3 displays the average number of cars in the parking lot by day in half hour increments. The table displays within the morning parked cars increase as time passes. Evening cars drop after the first half hour and then slowly increase for the rest of the time period. Lunch doesn't appear to show a visible trend. Overall, the table shows there is flow in and out of the parking lot all day.

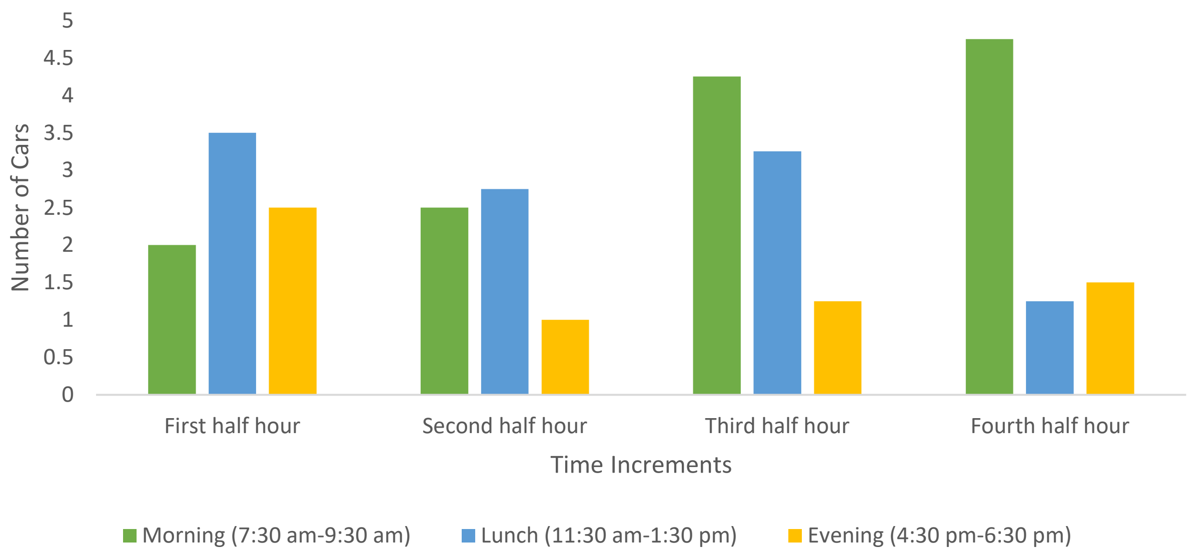

Figure 3 Graph displaying the average number of parked cars in the Norma Eddy Lane corridor parking lot during all days of data collection. Data has been arranged to show the number of parked cars in half hour increments during each time shift.

All recorded incidents involved vehicles. The most populous incidents were near collisions with pedestrians and vehicles parked incorrectly. The coding tree below (Figure 4) sums up observed incidents over the four-day collection period. Cars parked incorrectly affected pedestrians' travel; there were multiple instances of them having to walk around the vehicles to get to their destination. Other notable incidents include vehicles almost running into pedestrians.

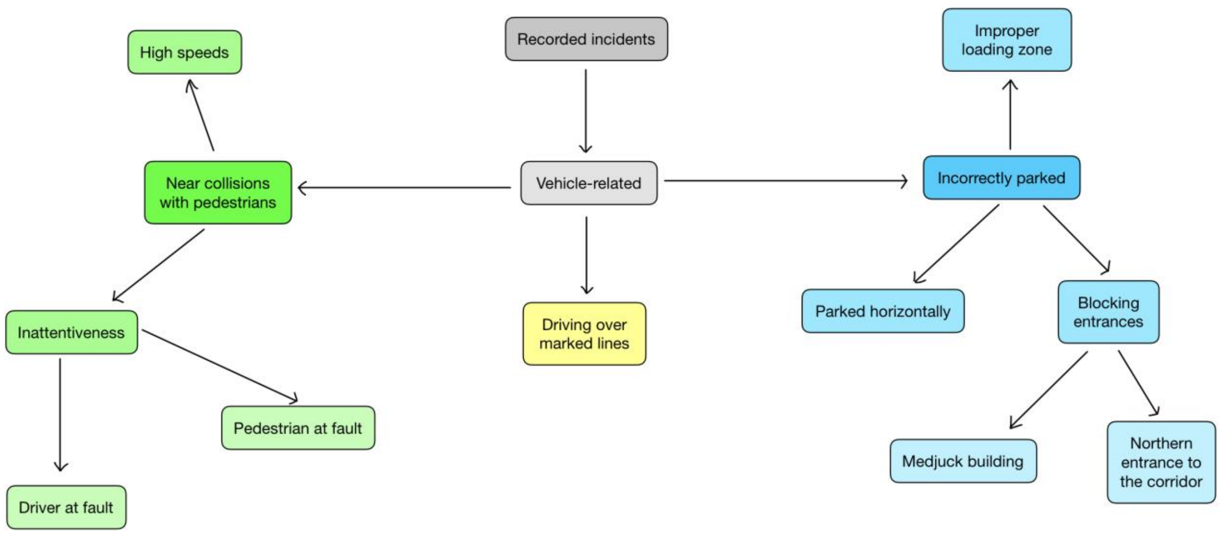

Figure 4 A posteriori coding tree of recorded incidents broken into the three most populous categories discovered during all days of collection in the Norma Eddy Lane corridor.

Statistical Analysis Comparing Pedestrians and Vehicles

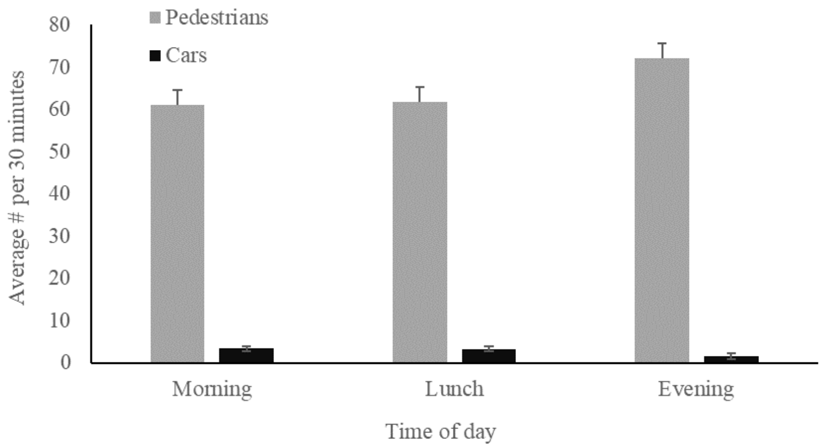

Figure 5 Mean (+Standard Deviation) number of pedestrians and cars per 30 minutes, during morning, lunch, and evening rush hours. Data collected through the corridor between the Medjuck Building and the Central Library in Halifax, Nova Scotia, Canada, on March 6, 10, 13, and 17, 2023.

Unpaired t-tests were used to examine if there was a difference in the average number of pedestrians per 30 minutes relative to the average number of cars per 30 minutes through the Norma Eddy Lane corridor (Figure 5; Appendix D). For all rush hours, the number of pedestrians was on average 2662.42% higher than the number of cars, differing significantly in the morning ($t_3 = 53.123$, p = 2.99E-09; Fig. 5), at lunch ($t_3 = 21.469$, p = 6.66E-07; Fig. 5), and during evening rush hour ($t_3 = 23.789$, p = 3.62E-07; Fig. x). Therefore, we reject our null hypothesis that there is no difference in the average number of cars that use the corridor compared to the average number of pedestrians that use the corridor. Additionally, our alternative hypothesis is proven true: that there will be, on average, more pedestrians than cars that use the corridor (Figure x).

Discussion

During the data collection process, we noticed the diverse range of uses along the corridor including its use as a transit hub by active transport users. As well, it is a place of activity, loading zone, and parking lot.

Corridor as a Transit Hub

Demonstrated by the Results section, pedestrians are the dominant users along Norma Eddy Lane during peak hours. This is because the corridor connects Spring Garden Road, the busiest road in downtown Halifax with Dalhousie's Sexton Campus. As well, along Spring Garden Road, bus stop 8327 connects routes 1, 8, 9A, 9B, and 10 to the area. The use of the corridor by transit users is seen through Figure 6.

Figure 6 Demonstrating the use of Norma Eddy Lane as a transit hub as pedestrians walk through the corridor after getting off the bus. Date and location.

As the corridor is located along Spring Garden and connects Sexton Campus with the rest of Downtown, one can identify the corridor as a hub for transit users and pedestrians.

Types of Active Transportation

During data collection, the team identified cyclists as well as slow-use pedestrians who would require more infrastructural accommodations to ensure safe and comfortable use of the corridor. Through Figure 7, one can see a person with a child and a person on crutches. Although there were no photos taken of cyclists, the team observed 28 during data collection.

Figure 7 A person carrying a child on their shoulders (left) and a person walking on crutches (right). Photograph is taken from the Halifax Central Library of Norma Eddy Lane, Halifax, NS on March 13th, 2023 at 5:38pm.

It is important to account for the mode and mobile ability of users as the corridor is on a steep slope. This may cause cyclists to ride at high speeds which can be a danger to pedestrians. As well, slow-use pedestrians like those pictured in Figure 7 require infrastructure to accommodate their use of the corridor. Infrastructure to accommodate all ages and abilities include separated bike lanes and walkways. As well, sufficient street lighting, tactile surfaces, and braille signage would accommodate safety, visibility, and access for those with visual impairments.

Loading and Parking

Norma Eddy Lane is also used as a parking lot and loading zone which is a cause of danger for pedestrians and cyclists. Through Figure 8, one can see the lack of safety measures considered in the corridor's design.

Figure 8 shows a truck and pedestrian along the Norma Eddy Lane corridor. There is little space between the two, causing danger through a potential accident. Photograph depicts Norma Eddy Lane, Halifax, NS on March 6th, 2023 at 8:41am.

Architecture firm Fathom outlines the 2017-2018 Master Plan for Norma Eddy Lane, revealing the current design which supposedly accommodates vehicle and active transportation use. Figure 9 demonstrates their design for the corridor.

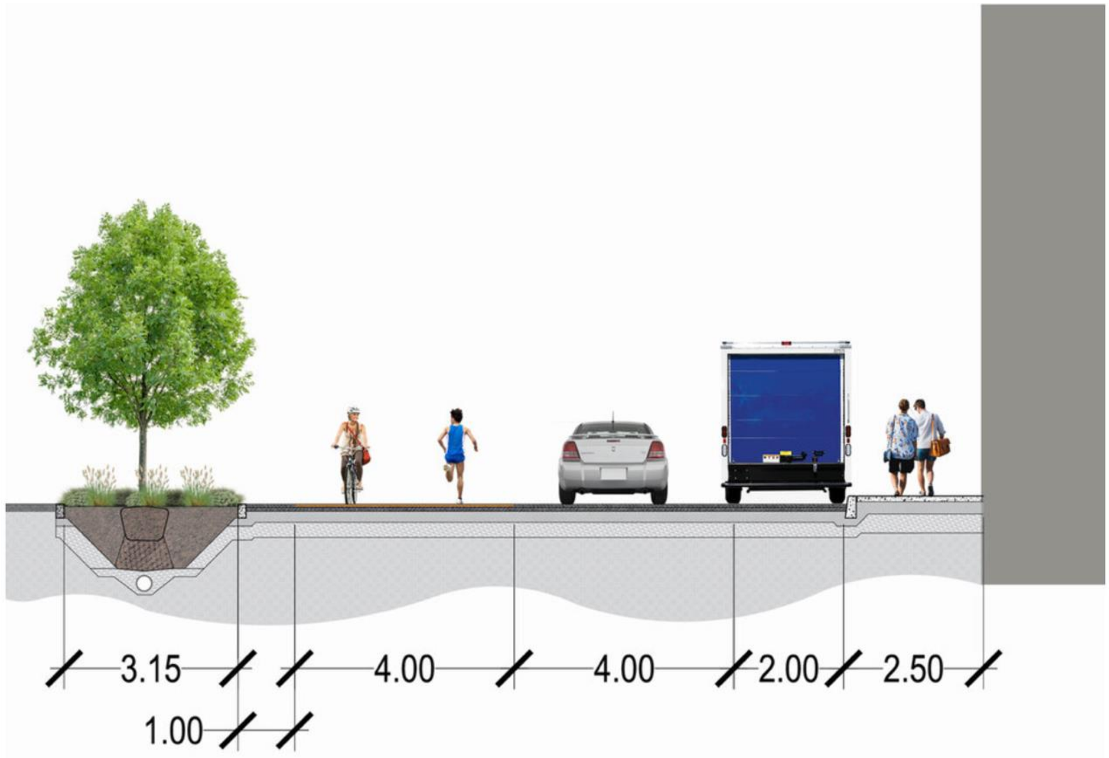

Figure 9 demonstrates Fathom's design for Norma Eddy Lane which shows the coexistence of active transport users and vehicles (Fathom, 2017).

Unlike the site, the design shows enough space and sufficient infrastructure to support active and vehicle-based transportation modes.

Recommendations

Given the findings of the study, it is evident that the current design of the subject area does not suit most of its users. With a vast majority of users being pedestrian, active transportation, or mobility-aid users the allocation of the space as an auxiliary parking lot seems out of place.

It is recommended that steps be made to adapt the subject area and see renewal in its design to better accommodate the needs of its users. Adjacent land uses and travel demands have changed with the construction of the central library, and the zone should adapt to meet that change.

It is recommended that redevelopment of the area into a zone more suitable for pedestrian use occur. It was found during the data collection process that people would stop within the area for various reasons: children playing in snow banks, smoking, or just general stops to talk were all observed activities. While studies and consultations into what features should be implemented it is recommended that basic placemaking designs such as seating or improved greenery be undertaken.

It is also important to recommend the prioritization of the safety of all users. It was found that all incidents observed during the data collection process included vehicles, so this study will recommend a proper separated lane for AT, pedestrian and mobility-aid users or potentially multiple to separate pedestrian users from AT users. The creation of an environment that permits and facilitates co-existence between all modes of travel should be pursued.

Future Research

One of the largest hindrances in the research process was the time window available to collect data, occurring over the month of march and heavily dependent on the available time of group members. Given this, additional research on the subject is recommended to examine different time windows; this could include different seasons or times of year such as how use and mode split is shared over the course of the spring, summer, fall, and winter months. Additionally a study could be done tracking quantitative user data over the course of a day to see which times saw peak usership of the space, or over the course of a week to see how mode split differed day by day. This data could be used to inform potential programming decisions, such as restricting vehicle access during times of day with large pedestrian traffic. Future studies may also wish to examine other components of Norma Eddy Lane to measure similar quantitative data.

With the findings of this study finding very limited use of the region by mobility-aid users, future research may seek to look into the built form of the environment and examine the interactions different travel modes have with different features in the site, and what may need to be added or removed to improve conditions for various modes. This may involve seeing which features on the site hinder ease-of-use for mobility-restricted users or if there are features needed to improve ease of use.

Finally additional studies may wish to look into qualitative perspectives on the areas to help formulate new designs or plans for the subject site. Methods such as surveys or questionnaires may be undertaken to acquire data on how and why people use the site, and what they may wish to see done with the area, such as design futures or placemaking efforts.

Conclusion

The promotion and utilization of AT methods for traversing urban environments is a key requirement for a sustainable and environmentally friendly city. Since 2014, HRM has been promoting the use of AT methods throughout the city and has begun developing infrastructure such as bike lanes and shortened crossings to do so.

This study has found that undeniably the vast majority of users of the subject corridor traverse by foot, and as such it should be adapted to accommodate that. Presently despite the many modes of transportation used to traverse the site, it is designed specifically to only accommodate vehicle traffic, lacking basic features such as an established sidewalk.

Should redevelopment of the subject site occur, the findings of this paper urge the development of features and infrastructure that promote a co-existence between all forms of transportation while ensuring the safety of all users of all ages and abilities, such as bike lanes, separate paths, and physical buffers between spaces allocated for people and for vehicles.

Acknowledgements

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Bibliography

Aziz, H. M. A., Nagle, N. N., Morton, A. M., Hilliard, M. R., White, D. A., & Stewart, R. N. (2017). Exploring the impact of walk–bike infrastructure, safety perception, and built-environment on active transportation mode choice: a random parameter model using New York City commuter data. *Transportation*, *45*(5), 1207–1229. https://doi.org/10.1007/s11116-017-9760-8

Dalhousie University. (2010). *Campus Master Plan Framework Plan*. https://www.dal.ca/dept/facilities/campus-development/about-master-plan.html

Fathom. "Figure #: Image of Fathom's Eddy Norma Lane Corridor Design," *FathomStudio.ca*, 2017, fathomstudio.ca/our-work/dalhousie-university-active-transportation-corridor.

Halifax Regional Municipality. (2014). *Making Connections: 2014-19 Halifax Active Transportation Priorities Plan*.

Jafari, A., Both, A., Singh, D., Gunn, L., & Giles-Corti, B. (2022). Building the road network for city-scale active transport simulation models. *Simulation Modelling Practice and Theory*, *114*, 102398. https://doi.org/10.1016/j.simpat.2021.102398

Knight, A., & Charlton, S. G. (2022). Protected and unprotected cycle lanes' effects on cyclists' behaviour. *Accident Analysis & Prevention*, *171*, 106668. https://doi.org/10.1016/j.aap.2022.106668

Sulistyono, S., Kriswardhana, W., & Arianto, J. B. (2022). Behavior Model Analysis of Pedestrians and Cyclists Mode Selection Base on Active Transportation on Universitas Jember Tegalboto Campus. *IOP Conference Series: Earth and Environmental Science*, *1000*(1), 012021. https://doi.org/10.1088/1755-1315/1000/1/012021

Appendix A

Table A1 Number of pedestrians who walk, have mobility assistance, use non-walking active transport, motor vehicles, and incidents, during morning, lunch, and evening rush hour on March 6, 10, 13, and 17, 2023. Data collected through the corridor between the Medjuck Building and the Central Library in Halifax, Nova Scotia, Canada.

Time	Type of data	Date			
		March 6th	March 10th	March 13th	March 17th
Morning	# of walking	[avg. value]	[avg. value]	[avg. value]	[avg. value]
	# of mobility assisted	[avg. value]	[avg. value]	[avg. value]	[avg. value]
	# of non-walking active transport	[avg. value]	[avg. value]	[avg. value]	[avg. value]
	# of motor vehicles	[avg. value]	[avg. value]	[avg. value]	[avg. value]
	# of incidents	[avg. value]	[avg. value]	[avg. value]	[avg. value]
Lunch	# of walking	[avg. value]	[avg. value]	[avg. value]	[avg. value]
	# of mobility assisted	[avg. value]	[avg. value]	[avg. value]	[avg. value]
	# of non-walking active transport	[avg. value]	[avg. value]	[avg. value]	[avg. value]
	# of motor vehicles	[avg. value]	[avg. value]	[avg. value]	[avg. value]
	# of incidents	[avg. value]	[avg. value]	[avg. value]	[avg. value]
Evening	# of walking	[avg. value]	[avg. value]	[avg. value]	[avg. value]
	# of mobility assisted	[avg. value]	[avg. value]	[avg. value]	[avg. value]
	# of non-walking active transport	[avg. value]	[avg. value]	[avg. value]	[avg. value]
	# of motor vehicles	[avg. value]	[avg. value]	[avg. value]	[avg. value]
	# of incidents	[avg. value]	[avg. value]	[avg. value]	[avg. value]

Table A2 Date, time, and description of recorded incidents

Incident #	Date and Time	Description
1		
2		
3		
4		
5		

Appendix B

Appendix B Completed data table of pedestrians, incidents, cyclists, and mobility aids observed during all days (March 6th, 10th, 13th, and 17th) and times (7:30 am-9:30am, 11:30 am-12:30pm, and 4:30 pm-6:30pm) of data collection of the Norma Eddy Lane corridor in Halifax, NS.

Time	Type of data	Date			
		March 6th	March 10th	March 13th	March 17th
Morning (7:30-9:30 am)	# of pedestrians	260	261	247	210
	# of incidents	2 (2 large vehicles temporarily used the corridor as a loading zone)	1 (car almost hit person)	3 (2 stopped vehicles blocking entrance, 1 car nearly hit a group of 3)	1 (truck blocking)
	# of cyclists	0	1	6	4
	# of mobility aids	0	1	2	0
Lunch (11:30 am-1:30 pm)	# of pedestrians	276	248	292	172
	# of incidents	0	1*	2	0
	# of cyclists	1	1	5	2
	# of mobility aids	0	0	4	0
Evening (4:30-6:30 pm)	# of pedestrians	320	269	251	313
	# of incidents	0	3 (2 cars nearly hitting someone, 1 parked horizontally across entrance	0	4 (2 near hits, 1 blocked exit, 1 car driving off of the marked line to exit)
	# of cyclists	1	3	1	3
	# of mobility aids	0	3	1	3

Appendix C

Date	Type of data	Time			
		7:30 am-7:59 am	8:00 am-8:29 am	8:30 am-8:59 am	9:00 am-9:30 am
March 6th	# of cars	2	2 (no change)	4 (+2)	5 (+1)
March 10th		2	3 (+1)	5 (+2)	5 (no change)
March 13th		3	3 (no change)	4 (+1)	5 (+1)
March 17th		1	2 (+1)	4 (+2)	4 (no change)

Figure C1 Vehicle counts in the Norma Eddy Lane parking lot every half hour between 7:30 am and 9:30 am on March 6th, 10th, 13th, and 17th of 2023.

Date	Type of data	Time			
		11:30 am-11:59 am	12:00 pm-12:29 pm	12:30 pm-12:59 pm	1:00 pm-1:30 pm
March 6th	# of cars	4	3 (-1)	3 (no change)	4 (+1)
March 10th		5	3 (-2)	5 (+2)	5 (-3,+3)
March 13th		4	3 (-1)	3 (no change)	4 (+1)
March 17th		1	2 (+1)	2 (no change)	2 (+1, -1)

Figure C2 Vehicle counts in the Norma Eddy Lane parking lot every half hour between 11:30 am and 1:30 pm on March 6th, 10th, 13th, and 17th of 2023.

Date	Type of data	Time			
		4:30 pm-4:59 pm	5:00 pm-5:29 pm	5:30 pm-5:59 pm	6:00 pm-6:30 pm
March 6th	# of cars	1	1 (no chnage)	2 (+1)	1 (-1)
March 10th		3 (+1)	2 (-1)	3 (-1, +2)	3 (no change)
March 13th		4	1(-3)	0 (-1)	2 (+2)
March 17th		2 (-2, +1)	0 (-2)	0 (no change)	0 (+2, -2)

Figure C3. Vehicle counts in the Norma Eddy Lane parking lot every half hour between 4:30 pm and 6:30 pm on March 6th, 10th, 13th, and 17th of 2023.

Appendix D

Appendix D The results of statistical tests for unpaired t-tests comparing number of pedestrians and number of parked cars per 30 minutes at morning, lunch and evening rush hours. Use of log(x+1) shows that the data has been transformed to meet the test assumptions, - indicates no data present, Df = degrees of freedom. A significant t-test ($p \leq 0.05$) is indicated in bold. Data collected through the corridor between the Medjuck Building and the Central Library in Halifax, Nova Scotia, Canada. All Analyses performed through RStudio Cloud.

Data	Test	Df	Test Statistic	P-value
Morning	Equal variance	3	F = 0.8138	0.8695
	Shapiro-Wilks (Ped.)	-	W = 0.7990	0.1005
	Shapiro-Wilks (Cars)	-	W = 0.8608	0.2632
	T-test log(x+1)	**6**	**t = 53.123**	**2.99E-09**
Lunch	Equal variance	3	F = 0.6432	0.7257
	Shapiro-Wilks (Ped.)	-	W = 0.8578	0.2523
	Shapiro-Wilks (Cars)	-	W = 0.8678	0.289
	T-test log(x+1)	**6**	**t = 21.469**	**6.66E-07**
Evening	Equal variance	3	F = 0.09324	0.08237
	Shapiro-Wilks (Ped.)	-	W = 0.8888	0.3778
	Shapiro-Wilks (Cars)	-	W = 0.9944	0.9787
	T-test log(x+1)	**6**	**t = 23.789**	**3.62E-07**