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Design Project: Main Street as a Two-Way Street.

1. Introduction:

The City of Hamilton is in many ways defined by its two major roads; Main Street and King Street, which divide the city and limit traffic each to one way. In 2007, the city passed a “transportation plan” in which they stated the need for updates on the more than 80 one way streets that were clogging the flow of traffic and were causing out of towners to develop sudden onset road rage after having made their 8th consecutive left hand turn. These plans were reignited with future plans to implement a LRT (Light Rail Transit) system on King Street, meaning that Main Street would need to be made into a standard two way street to allow for traffic to follow east and west within the city. Main is surrounded by commercial and residential areas that would struggle to retain their appeal if they had mass amounts of traffic passing through daily because of the closure of King Street.

The LRT became a contentious issue in Hamilton, dividing neighbourhoods, classes and citizens against one another. The plan was scrapped after an initial promised 1 billion dollar grant from the provincial government was considered to be woefully insufficient as the project progressed. Supporters of the LRT suggest that it was in fact Doug Ford’s conservative government who tanked the plan, rather than real public backlash of insufficient funding.

Fortunately for the purpose of this report, we have a number of similar projects that have either been completed or are currently underway that we can analyse and interpret for the purpose of our calculation. One excellent example was the once accident ridden Queen Street South, the conversion of which was completed in mid-September of 2020.

In this report, I will present a preliminary design for how this transition can be achieved including the objectives, givens, inputs, constraints, variables, cost, timeline. Along with a brief proposal for a second design. **See image A**

1. Design Objective:

The primary objective of this design is to transition Main Street from a one way, east-bound, street into a two-way street, thus freeing up King Street for the LRT. The new street plan will need to allow for sufficient commercial and residential activity to remain open throughout the construction, as Main Street is one of the most important, if not the most important, in all of Hamilton. Furthermore, traffic will need to remain able to flow during the construction, or residents will quickly turn against the LRT project as a whole if subjugated to mass amounts of re-routed traffic from Main.

Another objective is to simplify the currently quite confusing method of street planning downtown. Many McMaster students and potential tourists are intimidated by the current system. One of my secondary objectives is to create some distinctives Hamiltonian features on the main street. As of now, there are long stretches of city that could easily be located in any depressed former steel town in North America. By simply adding some beautification methods and some small Hamilton specific symbols, Main Street could become both a source of pride and a commercial productive area. Finally, having two way street and a LRT will lead to much greater overall emission from intra-city transportation

1. Givens / Assumptions

One of the first givens/ assumptions that comes to mind when considering this project and its effect on the various stakeholders is the fact that it will most likely result in a lot of public backlash. A lot of citizens, especially the elderly and suburbanites, are strongly against the LRT, viewing it as a waste of money. Any plan for making Main Street into a two way street would have to be prepared for this form of backlash. Furthermore, it would be nearly impossible to enlarge the road, as both the north and south side of the street are locked into large commercial and residential projects, meaning the road will be confined to the approximately 15.5 meter road length throughout.

1. Design Inputs

Two lane traffic: First and foremost, the road will need to be converted into a two way route. There are a number of ways to do this, the simplest of which would be to turn the middle lane into some form of median, with the northernmost lane going west and the southernmost travelling east.

Necessary beautification of sidewalks and roads: As mentioned in our conversation with Graeme in the Project Management course, beautification is a very important priority for downtown businesses, who rely on walking traffic and visual incentives to gain customers. Any form of construction would inevitably lead to a temporary lowered beautification of the street. In my opinion, any effective new design for the street would need to increase the street’s beauty to ensure that the businesses on the street are able to thrive, and new businesses can be attracted. This need for businesses becomes

even more important as the Main street will become even more important as it literally becomes the *main street* with King Street becoming converted into the LRT line.

Pedestrian Safety: One way streets have been proven to provide greater pedestrian crossing safety due to the need to only observe traffic coming from one way. Therefore, any redesign and two way conversion would need to account for this and provide additional safety measures. One way to do this would be to use roundabouts. According to the CBC, “The study found roundabouts reduced the overall number of collisions by 35 per cent, the number of injuries from collisions by 76 per cent, and the number of fatalities by 90 per cent.”¹ Therefore, my plans for safety improvement will mainly be centered around the use of roundabouts. **See image B**

Multi method transit options: My design will implement the ability for people to engage in different methods of transport in downtown Hamilton. As of now, the roads are dominated by cars and buses, but in the new two way design, there will be significant sections that become bike friendly, safe, clean sidewalks and the omnipresent newly constructed LRT!

1. Design Constraints

Must be completed quickly: one of the primary sentiments that destroyed the initial construction of the LRT was the lack of patience or willingness of the residents in the areas surrounding the proposed construction zones to endure the constitution - from which many saw little personal benefit. Therefore, to avoid public backlash, the project would need to be completed as soon as possible

Must be weather resistant (-30 to +40) and wear and tear: Recent winters have caused massive damage to roads across Hamilton, with emergency funds being designated to ensure that roads are fixed promptly and effectively.² The overall cost and maintenance of roads in Ontario are simply just higher than in the other provinces, due to a combination of our harsh winters and year round constant use. For example, Ontario pays on average \$2,666 per kilometer per year on road maintenance whereas PEI only pays only \$1,762.³ This means that any form of road design will need to not only be as resistant to mass temperature fluctuations as possible, but also constant use by the over 500,000 people that call Hamilton home, which any form of long term budgeting will need to account for .

Slower Traffic: A conversion to two lanes would most likely lead to slower travel times. This could in fact lead to more congestion in the downtown area. The hope from this project would be that the LRT's construction would encourage more people to take public transit and not rely solely on cars to get downtown.

1. Design Variables

Lane width: each lane is approximately 3.10 meters wide. I would have liked to receive more accurate measurements, but I was ill this week and not able to take firsthand measurements, therefore I was forced to use the Ruler tool on Google Earth Pro. **See appendix (Images C) for photos.**

Number of Lanes: The road is primarily 5 lanes, from Dundurn Plaza to Gage Park but goes down to 3 lanes near Westdale high school and before merging with the Alexander Graham Bell Parkway.

Parking Lanes: Parking lanes also vary throughout the road, with some parts having a designated bike lane - such as the bridge overpassing the Alexander Graham Bell Parkway

Bicycle Lanes: Biking lanes also vary throughout the road, with some parts having a designated bike lane - such as the bridge overpassing the Alexander Graham Bell Parkway.

HSR Considerations: while the need for the HSR as the only method of public transport to get downtown will be drastically lowered, due to the presence of the LRT, my plan will still include appropriate room for buses. I plan on keeping all bus stops on the route, while adding parallel stops going east bound to replace those lost on King Street

Typical Intersection Conversations: As previously mentioned in my section on pedestrian safety, I plan on implementing roundabouts to replace any non-major intersection to help with the flow of traffic in the area.

¹Roundabouts cheaper, safer according to studies, CBC, January 15, 2013, <https://bit.ly/362bCfB>

² Matthew Van Dongen, *City of Hamilton in a time - and cash - crunch for road repairs*, Hamilton Spectator, April 17 2018, <https://bit.ly/305NBR7>.

³ *Estimation of the Representative Annualized Capital and Maintenance Costs of Roads by Functional Class*. Applied Research Associates, <http://www.bv.transports.gouv.qc.ca/mono/0950935.pdf>.

7. Costing/ Timeline

Cost:

It can be quite hard to estimate the cost of a public project such as this. The LRT, for example, had its estimated cost go from \$1.1 billion to approximately \$5.4 billion. In theory, the project would be substantially cheaper. The US Federal Highway Administration estimates that changing the lines on a road, the signage and the lights can cost anywhere from 20-20,000 US dollars.⁴ Turning the stretch of road from Queen and Aberdeen to Queen and King, a distance of 1.24 into two ways, could cost 1.1 million alone due to auxiliary, often hidden costs.⁵ Therefore, using some arithmetic, we can deduce that the stretch of one way road from Westdale high school to the end of Gage park would cost approximately 8.34 million dollars.

Therefore, while not cheap, in comparison to the concurrent LRT, this would most likely be a drop in the bucket financially for the City of Hamilton. The main costs associated with this project would be the loss of business and potentially decreased property values for the surrounding areas during construction.

In terms of the timeline for the project, the aforementioned Queen and Aberdeen conversion took from late May until mid-September to complete (roughly 4 months). While this is useful information, it is still very difficult to determine the timeline for a project like this. There are many factors that determine the speed of the project. Primarily, the amount of traffic that you are able to redirect plays a crucial role. In an ideal world, the entire road would be closed, and work could be done full time, but practically that is not possible. It is for these reasons that I think it is safe to assume that the total conversion of Main Street into two ways would take approximately one year to complete.

1. Aspects for Secondary Design / Summary

With this plan, I attempted to construct the safest, simplest and fastest way to complete the project due to the lack of public support and funding that would inevitably be associated with the project. If I were to attempt this design again, without these constraints, there are a number of things that I would do differently. First and foremost, I would have added bike lanes.

Furthermore, there is also the consideration of changing technologies. Unfortunately, for public works projects such as this, there is no guarantee that the technologies and strategies used won't become obsolete right after construction. A flying car could be invented next month, making ground based roads a thing of the past. Furthermore, as roads themselves become more technologically advanced, such as the rapidly developing "smart roads", these roads could quickly become insufficient for a rapidly developing technological society.

In summation, this is in many ways a uniquely Hamiltonian problem and project. Sandwiched between provincial and municipal bureaucracy and infighting, the LRT and Main Street conversion projects are multilayered and difficult issues. That being said, I strongly believe that it is one of the key projects needed to make Canadian a more accessible, safer and more environmentally sustainable city!

⁴ *Road Design, Federal Highway Administration, Accessed Sep 23rd*, <https://bit.ly/3iYTYNvtm>

⁵ Matthew Van Dongen, *Hamilton on the road to more two-way traffic conversions*, Hamilton Spectator0, March2nd, 2020. <https://bit.ly/2Hvx7LL>

Works Cited:

- Background Report: Street (One- to Two-Way) Conversions*. City of Hamilton. Accessed September 22nd
<https://www.hamilton.ca/sites/default/files/media/browser/2018-06-06/draft-tmp-backgroundreport-streetconversion-8.pdf>
- Roundabouts cheaper, safer according to studies*. CBC. January 15, 2013. <https://bit.ly/362bCfB>
- Estimation of the Representative Annualized Capital and Maintenance Costs of Roads by Functional Class*. Applied Research Associates, <http://www.bv.transports.gouv.qc.ca/mono/0950935.pdf>.
- Van Dongen, Matthew. *City of Hamilton in a time - and cash - crunch for road repairs*, Hamilton Spectator. April 17 2018. <https://bit.ly/305NBR7>.
- Matthew Van Dongen, *Hamilton on the road to more two-way traffic conversions*, Hamilton Spectator0, March2nd, 2020. <https://bit.ly/2Hvx7LL>

Image A:

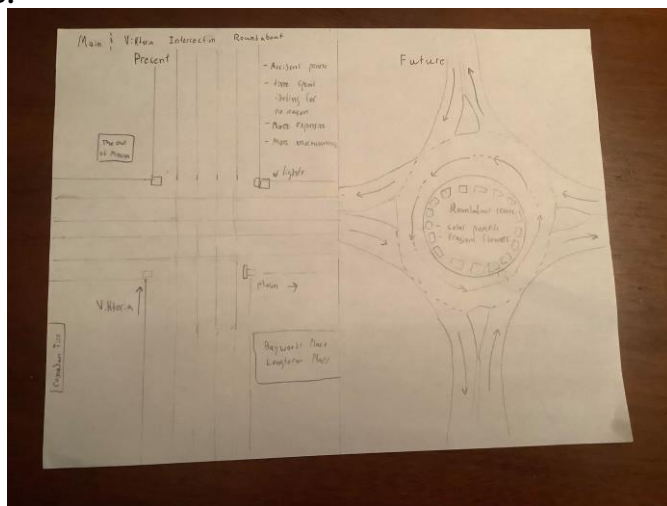


Image C:



CityLAB SIR Design Assignment Grading Rubric

(to be included as the final page in all submitted pdf files)

Component	10- Exceeds	9- Meets/Ex	8- Meets	7- Mts/Mg	6- Marginal
1. Boiler Plate					
2. Introduction					
3. Design Objectives					
4. Givens/Assumptions					
5. Design Inputs					
6. Design Constraints					
7. Design Variables					
8. Costing, Timeline					
9. Aspects for Secondary Design					
10. Summary					

Boiler Plate = Cover Page(Title, Date, Name, Number, Email, Course, Graphics); References;
Appendix