ACTIVE URBAN TRANSPORTATION:

THE ROAD TO A MORE COMPLETE COMMUNITY

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EXECUTIVE SUMMARY

The Village on Main Community Improvement District (VOM CID) is a commercial district Northeast of downtown Dartmouth, Nova Scotia. Many frequent the area for easy, driver-friendly access to shops and services. The district is both residential, and commercial, planning to undergo a large population increase over the next decade; increasing the current population of 687 to over 8,000. The area is heavily car-centric and provides little connectivity or accessibility to services without being dependent on a motorized vehicle. A majority of the area is dedicated to parking lot space. As the VOM CID undergoes this expansion, they plan to create an accessible, pedestrian-friendly and mixed-use community for all ages.

In order to move forward, we had conducted several analyses to identify the current barriers faced by the district. Geographic Information Systems (GIS) was used to create five maps to identify the current roads, sidewalks, greenspace, transit and parking lots of the district. These maps guided a case study analysis. The analyzed case studies provided insight on other districts facing similar issues, such as fast expansion and shifting from car-centric to walkable, pedestrian friendly neighbourhoods. This included case studies that covered the topic of green parking garages, greenspace and walkability frameworks, age-friendliness and better implementation of bus routing.

With the analyzed data, greenspace, accessibility, walkability and age-friendliness have been identified as the key barriers to the Village on Main. We have determined that the VOM CID must begin to shift towards becoming a more Complete Community. Complete Communities are defined as communities that are well-designed, offer transportation choices, accommodate people at all stages of life and have the right mix of housing, a good range of jobs, and easy access to stores and services to meet daily needs. A formal report and booklet have been created to highlight these issues, and provide recommendations for the VOM CID to shift towards becoming a complete community. The booklet is a tool to be used for business owners of the area, the public and future developers. The information in the booklet is supplemented by an extensive analysis of data provided in the booklet. This formal report is to be used as a supplemental resource.

GLOSSARY

Accessibility: Extent to which a person can obtain a good or service (i.e. Transportation) at the time that is needed regardless of their own ability.

Age-Friendly Community: A community where the policies, services and structures related to the physical and social environment are designed to help people of all ages "age actively." The community is set up to help residents of all ages live safely, enjoy good health and stay involved. This includes:

- Outdoor spaces and buildings
- Transportation
- Social participation
- Communication and information
- Housing
- Civic participation and employment
- Respect and social inclusion
- Community support and health services.[1]

Car-Centric: A region where transportation is motor-vehicle oriented and there is little space for other modes of transportation such as sidewalks, bus lanes, bike lanes, etc.

Complete Community: Communities that are well-designed, offer transportation choices, accommodate people at all stages of life and have the right mix of housing, a good range of jobs, and easy access to stores and services to meet daily needs[2].

GIS: Geographic Information Systems (GIS), and the software program ArcMap work with maps and geographic information and are used to spatially represent geographic data, create maps; analyze mapped information; share and discover geographic information in a range of applications; and manage geographic information in a database.

Green Space: An area of grass, trees, or other vegetation set apart for recreational or aesthetic purposes in an otherwise urban environment.

Grey Literature: Literature which is produced at all levels of government, academics, business and industry in print and electronic formats, but which is not controlled by commercial publishers.

New Urbanism: An urban design movement which promotes environmentally friendly habits by creating walkable neighborhoods containing a wide range of housing and job types.

Pedestrian-friendly: A pedestrian-friendly area promotes the use of active transportation (such as walking and biking) as an alternative to using motor-vehicles. This is done by the implementation of safe, walkable spaces.

Walkability: The measure of how friendly an area is to walking, regardless of age or ability.

INTRODUCTION

In September of 2016, a group of six Environment, Sustainability and Society students with varying academic backgrounds were partnered with the Village on Main Community Improvement District (VOM CID). The District's mission is to transform the Main street area into "an inclusive and sustainable community where spaces and neighbours are welcoming and connected"[3]. The term 'complete community' encapsulates the core values of sustainable urban design that the district strives to achieve. Complete communities are defined as "communities that are well-designed, offer transportation choices, accommodate people at all stages of life and have the right mix of housing, a good range of jobs, and easy access to stores and services to meet daily needs"[4]. Within the context of The Village on Main's vision, the goal of this project is to assist improving the connectivity of transportation systems, and increase the quantity of shared space. With the use of Geographic Information Systems (GIS) mapping and research, our project provides actionable recommendations for the board of the VOM CID to make the area a complete, walkable and livable, community, for all ages. Complementary to this report, our group produced a final deliverable consisting of four case studies, providing recommendations for the VOM CID's transformation to a complete community.

BACKGROUND

The demand for parking lots is directly connected to the use of private motorized vehicles. Designing infrastructure that supports active transport will reduce citizen's need for private motorized vehicles, assisting the district's goal of becoming a complete community; offering well designed transit structures and accessible transportation choices for people of all ages. By identifying and addressing the issue areas that compromise the VOM CID's transformation into a liveable community, our team aims to provide the VOM options and resources for developing their goal.

CONCEPTUALIZING ACTIVE TRANSIT IN COMPLETE COMMUNITIES

ROLE OF ACTIVE TRANSIT IN COMPLETE COMMUNITIES

The prevalence of urban sprawl in the Western landscape has forced society to heavily rely on single occupancy vehicles for daily transportation. This situation is particularly problematic in small, but busy, communities like Main Street, where commercial and residential activities exponentially increase traffic in the area during the day time[5]. The VOM CID intends to mitigate ramifications of urban sprawl by designing a high-density, mix-use, connected, age-friendly community; with the goal of becoming a model complete community, as explained in previous sections. Developing a transportation network that supports age-friendly and connected modes of active transit is a significant feature for the VOM CID to achieve this goal.

Use of active or "green" forms of transit such as walking, cycling, and public transit are positively correlated with improved public health, liveability, quality of life, as well as positive economic and social outcomes[6]. Active transport in urban areas has also been found to "help reduce social inequalities, improve people's mental and physical health, prevent injury and decrease environmental pollution" [7]. Motorized transportation methods significantly impact social and environmental health[8]. Traffic-related air pollution is directly connected to increased death rates from respiratory and cardiovascular disease[9]. Traditional parking lots are inherently unsustainable and not environmentally friendly. Walking distance, cost, and safety are influential factors during the psychological process of selecting a parking spot[10]. Emissions released from cars during time spent selecting a parking spot represent a significant percentage of total pollutants attributed to transportation[11]. Altering the design of parking lots in the Village on Main district while reducing the need for cars will reduce the quantity of air and noise pollution in Main street associated to transportation; creating a more socially and environmentally healthy community. Reducing traffic congestion by optimizing parking efficiency, and limiting the necessity of cars, complete communities are fostering a healthy and vibrant environment for pedestrians as well as nature. Features of connectedness, accessibility, as well as social health, safety, and equity that characterize complete communities will be achieved in the Village on Main district largely through active transportation networks.

BARRIERS TO A COMPLETE COMMUNITY

Complete communities emphasize connected urban design, in which jobs, shops, and services are easily connected, by foot, bus, bike, or car[12]. Connectivity and shared spaces are essential ideologies of transportation networks and urban design that contribute to creating complete communities[13]. While researching model neighbourhoods that have adopted principles of complete communities, our team identified three key drivers of connectivity and shared spaces absent in the Main street area; accessibility, walkability, and green spaces. Urban design in cities that have established complete communities have fostered green spaces, and offered accessible and walkable transportation networks. However, as seen in appendix 1, the current design of Main street is not conducive to a complete community. GIS software and field work reinforced the discrepancy of accessibility, walkability, and green spaces in the Main street area. This report provides explanations and solutions for district re-design, that will accommodate accessibility, walkability, and green spaces, for all ages, to transform the Main street area into a complete community.

The Main Street area is dominated by busy roadways and parking lots, with minimal, and unconnected, sidewalks and crosswalks. The district's current residential population is approximately 687 people. Although small, thousands commute daily by car, to work and shop in the area. The Village on Main, along with developers in the area plan to build condominium and housing developments. This development is anticipated to increase the residential population of the VOM CID to over 8,000 people. Transportation capacity of the Main street area must reflect the projected rise in population. Adding more cars to the already congested streets of the VOM CID is not a sustainable solution. Traffic congestion on Main street is due to the car centric culture that has been promoted in the VOM CID by the current infrastructure and district design. Although Main Street has a diverse mix of shopping, dining, and services available, these amenities are separated by parking lots and lane medians. The VOM CID wants the neighborhood to be a place where anyone, age 8 to 80, can feel comfortable living. An increase in connectivity drives an increase in community.

ACCESSIBILITY

As defined in the glossary, accessibility is the extent to which a person can obtain a good or service at a required time regardless of their own ability. For the purposes of this report, active transit is considered accessible by [a)] level of availability and ease of use by all people, [b)] interconnectedness with other infrastructure and modes of transportation. Accessible public infrastructure and transit are essential to creating a complete community[14]. Complete communities not only provide transportation choices and services to meet daily needs, but offer people at all stages of life easy access to amenities. This is achieved by, but is not limited to, a network of publicly accessible and integrated, green spaces, sidewalks, bike lanes, and bus routes. However, within the Main street area, public services are either not connected or do not exist. As seen in the maps (appendix 1-4), walk ways, bus routes, bike paths, and green spaces are limited and detached. Consequentially, paths, businesses, and community spaces are not accessible for every demographic in the neighbourhood or by modes of active transit.

WALKABILITY

Walkability is the measure of how friendly an area is to walking, regardless of age or ability. Daily walking benefits mental and physical health, as well as community connectedness and happiness. The VOM CID has a range of age groups within the area's residential population. The measure of walkability within the Main street area must cater to all citizen demographics in order for the VOM CID to fully transform into a complete community. Currently, district design is highly car centric. In the Main street area there is minimal infrastructure to assist walkability; limited cross walks, traffic lights, electric walk signals, sidewalks, sidewalk buffers, or curb extensions. Consequentially, walking in the VOM CID is not convenient or safe for any age demographic.

GREEN SPACES

Green spaces are defined as areas of grass, trees, or other vegetation set apart for recreational or aesthetic purposes in an otherwise urban environment. Easily accessible open, shared green spaces contribute to communal happiness and benefits public mental and physical wellbeing[15]. As seen in appendix 3, the VOM CID is slowly developing green spaces in the Main street area. However, these spaces are small and not easily accessible. Additionally, the current design congestion of the Main street area limits available land for the VOM CID to build green spaces. In order for the VOM CID to become a complete community, the district must be re-designed to incorporate land available to build green spaces that are accessible, and interconnected, to active transportation networks.

METHODS

Our project began with a comprehensive literature review of peer-reviewed academic papers on parking lot management, sustainability, and the development of age-friendly communities. This contextualized the Village on Main's current barriers to creating a complete community. ArcMAP was used to create five maps to identify the current roads, sidewalks, greenspace, transit and parking lots of the district. These maps guided a case study analysis which outlined area issues of accessibility, walkability, and green spaces. Our group analyzed four case studies that highlighted similar issues. These case studies addressed practical solutions that could also be applicable to the VOM CID. From this, we constructed a deliverable including a comprehensive synthesis of the four case studies outlining preliminary suggestions to reduce automobile dependency and enhance the pedestrian and age friendliness of the VOM CID. During this process we constructed a glossary of operational definitions including terms such as complete community, age friendliness, accessibility, walkability, and green space.

We used GIS technology to spatially represent the VOM CID and to display the area's features. Developers and planners use GIS as a tool to visualize the demographics of an area and create a complete community that is age inclusive and pedestrian friendly [16]. We reduced the larger Dartmouth map to show our study site: the areas within 500 metres of Tacoma Drive, Lakecrest Drive, and Main Street up to Caledonia Road. Data was collected from Dalhousie's GIS centre, and ArcMAP software was used to spatially manipulate our maps to include layers of roads, sidewalks, parking lots, bus routes, and walking trails in the area. To isolate the layers and features, we used a combination of the buffer, clip, and select by location geoprocessing tools. The final maps were created display these layers both on a complete map to provide a visual of the entire Main Street area, and showcase barriers to complete communities and age friendliness. Ultimately, we hope this visual tool will help VOMCID to implement the proposed solutions from our case studies. The individual feature maps are used to highlight how solutions from the case studies might be applied in the context of Village on Main. In the second case study, a parking lot and road feature map showcases how parking lots use space that could be used for other purposes, such as increasing green space and walkability in the area. A map with the sidewalks, walking trails, and road layers highlights the limited the walkability of the area. Finally, in the third case study, a map with bus routes and road layers shows how the accessibility of the area could be increased by reimagining the public transit routes.

CASE STUDIES

CASE STUDY 1: AGE-FRIENDLY COMMUNITY

There are currently many barriers active transportation accessibility in the VOM CID. As the area develops these accessibility barriers will hinder the attractiveness of the area for all demographics, especially seniors. Age inclusivity is a high priority for the VOM CID, and this issue must be addressed in future development plans.

One of the principles that the VOM work towards is to make their district walkable for all ages. Their vision is rooted in the global need for age-friendly communities- given the increasing aging population. This case study defines aging populations as a cluster of citizens over the age of 60.[17] The presented three-stage approach was adopted from the town of Saanich, British Columbia. Saanich is known for their work in ensuring that communities should be livable based on walkability and accessibility.

AGE-FRIENDLINESS FRAMEWORK

Senior citizens are often marginalized in the sense that, their accessibility to services is rendered by the lack of adequate infrastructure that supports walkability. The absence of age-friendly infrastructure that allow for a collective use of resources from ages 8-80 impedes on social well-being. As a response, the VOM CID should aim towards creating walkable and liveable communities for all ages. Their vision is rooted in the global need for age inclusive communities and general advocacy for safe aging environments. Concepts and infrastructure that promote the use of active transportation within the aging population demographic need to be established.

There is no one-size-fits-all solution for developing age-friendly communities, however, foundational frameworks can be put in place. As a first step to creating an age inclusive community, there is need to establish platforms where open dialogue between the aging populations and other necessary stakeholders is encouraged. In the Saanich case study, a three step approach to address the issues of age-friendliness, accessibility and absence of greenspaces. The theoretical framework can be transferrable to the issues the Village on Main faces.

The purpose of this three-step approach is to come up with solutions to rectify the problem of an aging population. The presented three-stage approach was adopted from the town of Saanich who have become the national poster child for age-friendliness. Saanich is one of the communities in the lime light for their work on ensuring the accessibility to services and resources from ages 8-80. The approach included an extensive consultation period that gave anyone above the age of 60 a platform to voice their concerns with the current access to public services and pedestrian walkway connectivity; a round table discussion between stakeholders and the municipality, to establish best practices based on current municipal programs and jurisdiction; and the final deliverable was a document detailing different initiatives developers, planners and general community members should adopt; to increase the general level of age-friendliness within communities. This approach was rooted in the six specific criterion that the American Office of Aging urge developers and planner use in increasing age-friendliness. The American Office of Aging notes that;

- "Providing affordable, appropriate, accessible housing;
- Adjusting the physical environment for inclusiveness and accessibility;
- Ensuring accessible, affordable, reliable, and safe transportation;
- Ensuring access to key health and supportive services;
- Providing work, volunteer, and education opportunities;
- And encouraging participation in civic, cultural, social, and recreational activities." [18]

These guidelines will act as the foundational pillar for the framework and will assist in solidifying the VOM's vision of having a community that is comprehensive and meets the global and national sustainability goals.

DEVELOPED FRAMEWORK

Figure 1

POSSIBLE APPLICATION

The three-stage approach presented in Figure 1 is an example of structural pillars the organisation needs to start considering when planning with developers to ensure multi-generational living. Statistics show that there shall be a 10.3% increase in elderly people within the province[19]. The presented three-stage approach was adopted by the town of Saanich, who have worked to become a leader in age-friendly community development. The approach included an extensive consultation period that gave elderly people a platform to voice their concerns; a round table discussion between stakeholders and the municipality and the final deliverable was a document detailing different initiatives for developers, planners and general community members.

Case Study 2: Green Spaces on Main Street

The current design of Main street discourages public use of green/active transportation and inhibits the infrastructure that would contribute to developing a complete community. Through GIS mapping, field work assessments, and literature reviews, our team has concluded that parking lots are a major barrier for the VOM CID to build green spaces. Currently, there are more parking lots than green spaces in the district. The abundance of parking lots within the VOM CID fosters a car-centric culture. Parking lots on main roads divide communities as well as transportation networks. Large masses of land currently occupied by parking lots are vacant throughout the day. These parking lots occupy land that can be redesigned as green spaces. Two case studies in Spain demonstrate the limitless possibilities that arise when parking lots are removed from main roads[20]. Building green certified parking garages on Main street will accommodate the parking needs of drivers, while removing parking lots from the roadside.

Complete communities prioritize pedestrian traffic, cyclists, and public transportation on the roads[21]. Safe, desirable, and convenient access to non-motorized travel on Main street must be developed in order for the VOM CID to attain the goal of becoming a complete community. Case studies of urban cities transitioning into complete communities involve either the limitation or prohibition of motorized vehicles on streets[22]. Although the complete removal of privately owned vehicles on Main street is not immediately feasible, current solutions are available to aid this transition in the future.

Green Certified Parking Garages

Parksmart, formerly Green Garage Certification, is an opportunity for the VOM CID to relocate parking and build sustainable infrastructure. Parksmart is a sustainable parking garage certification program, similar to the LEED (Leadership in Energy and Environmental Design) program, administered by Green Business Certification, Inc [GBCI][23]. Parksmart is a "rating system designed to advance sustainable mobility through smarter parking structure design and operation"[24]. The Parksmart certification provides opportunities for drivers, tenants, building owners, and property managers to be economically, socially, and environmentally sustainable. Building a single or multiple Green certified parking garages within the Main street area will aid the sustainable transformation of the district has envisioned. The Westpark Corporate Center in Tysons Corner, Virginia, is one of the first Green certified parking garages[25]. Parking garages that have received Parksmart certification

demonstrate the positive impact green parking garages have on sustainable development in a community[26]. Green parking garages can directly contribute to creating a high-density community that will be able to accommodate the boom in citizen population and commercial businesses the VOM CID is anticipating. The St. Joan Boulevard and the Slovenska Boulevard case studies demonstrate the community transformation that can result from moving parking off the main roads[27]. Parking lots were replaced with green spaces, bike paths, wide sidewalks, and other infrastructure that contributed to developing a complete community[28]. Removing parking and reducing the level of car-traffic from main roads provides opportunity for space to be transformed into a safe, connected, mix-use, age-friendly community[29]. Building green certified parking garages is an economically, socially, and environmentally sustainable compromise that accommodates the needs of drivers, stakeholders, and community development while prioritizing pedestrians, cyclists and public transit on the road.

Advantages of Building a Green Certified Parking Garage

- Encourages mixed-use building
    - Green certified parking garages provide mixed-use space for retail services, restaurants, residential, and commercial services
    - Encourages commercial business expansion in the district
    - Opportunity for vertical development instead of urban sprawl
    - Centrality of location and services provided in parking garages reduce need for private vehicle use on Main Street

- Relocates parking from main roads in the VOM CID
    - Opportunity to transform parking lots into green / community spaces
    - Provides space to develop widened and connected walking paths and bike lanes

- Encourages sustainable transportation within the VOM CID
    - Green certified parking garages accommodate alternative forms of transportation
        - Car sharing spaces
        - Bike racks
        - Electric vehicle charging stations
    - Discount for drivers of alternative fuel vehicles

- Promotes sustainable development
    - Green certified garages are often built with more sustainable materials
    - Design intended to reduce energy usage and cut operational costs

POSSIBLE APPLICATIONS

The VOM CID should investigate Parksmart certification with their advisory board. The VOM CID should also create a design to proposal to investors. Although building this infrastructure can be expensive, they are built as economically sustainable investments to increase energy efficiency and performance[30]. The sustainable design of Parksmart garages offers opportunities for parking structure to reduce operational costs by twenty-five percent[31]. If development or full certification is too costly, initiatives from the certification program can be applied to current parking garages or smaller ones planned to be built in the area. The VOM CID sharing the Parksmart certification program to investors, developers, and business owners will create a pool of information for sustainable development. Lastly, the VOM CID should contact current and prospective businesses to invest in retail space for the building.

CASE STUDY 3: WALKABILITY AND COMMUNITY ENGAGEMENT

The VOM CID currently faces issues with the walkability of the area—it is car-centric with little walkable connectivity to the businesses and services provided by the area. This not only creates an issue concerning accessibility, but may also affect the success of the businesses in the area. Parking lots are abundant, and a highway runs through a majority of the district, decreasing pedestrian safety. If no action is taken to increase the current walkability of the area, the planned population increase will simply perpetuate the current car-centric culture.

WALKABILITY FRAMEWORK

There are different motivations for walking that require different elements from the built environment. Behavioral scientists have identified two primary motivations for walking: recreation and transportation.

Northeast Markham is located in the Regional Municipality of York within the Greater Toronto Area of Southern Ontario. Cornell, is a new subdivision of Northeast Markham, where the oldest homes were built in 1997. Cornell has 1,300 houses and small commercial areas to service them. The connectivity of the area is a key facilitator for increasing the walkability[32]. Cornell currently has plans to register another 2,000 more residential units, and hopefully increase to 10,000 residential units over the next decade. Even with plans for expansion, Cornell is still able to allocate green space and communal spaces to complement its walkability[33]. Many residents will leave their larger homes from elsewhere to move into smaller residential spaces in Cornell because of the increased connectivity of the neighbourhood, and the sense of community.

Advantages of to a Pedestrian-friendly area

Increased Accessibility to Business, Services and Transportation

- Dividing the district into distinct areas
- Increases transportation walkability
- Ensures higher levels of connectivity to facilitate walking

Ensuring Adequate Greenspace

- Increases recreational walkability and overall aesthetic
- Increases pedestrian safety and walkability

Ensuring Community Spaces

- Measures the presence of spaces that facilitate social interaction and that encourage participation in community affairs (e.g., community centers, plazas, churches).
- Neighborhoods that combine elements from the above categories are thought to be more walkable
-

Possible Application

A walkability framework can be used to conceptualize issues such as walkability and connectivity of any car-centric district.

Connectivity

Connectivity can be increased by creating distinct neighbourhoods within the district in order to provide connectivity of residential areas to services.

Land-Use

Transitioning into a diverse residential and commercial district increases land-use diversity, which increases overall walkability. Businesses and services should be within 0.8 kilometers of each other to increase walkability. Including bicycle lanes will also improve active transportation.

Density

The VOM CID plans on increasing its residential density. When choosing residential development, it's important to capture design elements that increase active transportation. This can be done by building single-family housing, townhomes and apartment buildings.

Traffic Safety

Ensuring there is adequate greenspace to separate the district from highway activity. Also ensuring there are adequate traffic lights, sidewalks and crosswalks to increase accessibility to services and residential areas.

Surveillance

Surveillance can be difficult to address in a parking-lot dominated area. Placing buildings (either commercial or residential) so they can observe the street and sidewalk encourages walkability by enhancing the perception of safety from crime.

Parking

Walking through a parking lot is considered to be universally undesirable. Placing parking spaces behind buildings is more desirable. It is important to note that it is possible to decrease parking lots by using car-share systems, where the community has access to select vehicles for transportation.

Experience

Clear signage, trees, sloping streetscapes and overall aesthetics improve a community experience and enhance walkability.

Greenspace

Adequate greenspace can provide a barrier to protect the neighbourhood from highway activity, and overall aesthetics. It is more desirable to have close proximity (within ten minutes walking) to greenspace.

Community

Creating spaces to facilitate social interaction encourages community engagement, creates a sense of safety, and has the ability to increase elements of walkability.

Case Study 4: Public Transportation in Main Street

When we met with Andrew Murphy, a developer in the north end of Halifax, he talked about problems with bus routing, and how any changes made have to be approved by all districts, especially those areas with greater population density, and larger tax bases. The Main Street community in Dartmouth is a low population density area with a high commercial density. Few people live in the area, but many people rely on access to it for their goods and services. Halifax Transit is the public transportation service operating busses and ferries in the HRM. Bus routes in the area need to be better planned to bring people in and out of the neighborhood, from Halifax, downtown Dartmouth, and the communities outside of the Dartmouth area. With a lack of a tax base, and people from many different districts needing access to the area, the political will to make transit changes in the area is weak.

Flexible Bus Routes

The Richmond-Windsor neighborhood of Sydney, Australia faced a similar problem to the Village on Main. Though the population is small, the area is in need of effective bus routing in and out of the neighbourhood. The current routing provides little connectivity for those living outside the neighbourhood, and to those living within it. The lack of public transit in Richmond-Windsor lead to an over-reliance on personal transportation, and a diminished sense of community in the area[34]. The solution presented in the case study is flexible bus routing, where the bus system changes based on time of day and the day of the week. First, the timing of the busses can be flexible, running more often during peak hours and less often during down time. This is already occurring in lots of bus routes, but flexibility in both time of day and day of week would lead to more efficient bus routing all across the city. Routing itself can be flexible depending on the requirements for the time of day. Because there are many businesses and services in the Main Street area, including many healthcare services, there would need to be increased bus traffic going into the VOM district in the morning, and outbound in the evening when work lets off. Routes going to and from area schools can also be adjusted, as mentioned in the case study.

Advantages

Flexible Bus Routing

- Increased public transportation in the community
- Decrease reliance on personal car transportation
- Increased ridership can lead to better bus servicing by Halifax Transit

Increased Sense of Community

- Public and active transport increase social interaction
- Creates pedestrian-friendly space for increased walkability and accessibility

Improved Air Quality

- Decreases air emissions
- Increases air quality by providing alternative modes of transportation

Possible Application

The first step in applying the flexible bus routing program to the Main Street area is to convince the municipality of the benefits of the bus routing program. The city will have to adjust the bus routing in the area anyways as the community grows, as is the current development plan, so an exciting new program like this may be welcome. More research into other cities that have undertaken similar programs can be evaluated, and a true cost-benefit evaluation should be undertaken, taking into account the triple bottom line of social, environmental, and financial benefits. If it makes sense to implement in the area, and is a success, this is the sort of program that is easily transferable throughout other communities in HRM that have similar needs and challenges as the Main Street area.

SUPPLEMENTARY CASE STUDIES

Reviewing the causes of success and failure in past active transportation case studies provides insightful information for the VOM CID. Utilizing the wisdom gained from past case studies will allow the VOM CID to design and plan more successful transportation networks to facilitate a population increase in the use of active transit.

An important concept encouraging communal use of programs and infrastructure is connectivity; citizen engagement in active transit methods is significantly increased when programs and facilities are connected to one-another[35]. Research conducted by Reis et al. (as cited in Becera) focused on how to engage Curitiba's adult population to engage in active transit and physical activity programs[36]. The study found that the adult population has a higher participation rate in physical activity programs and active transit, when the two are connected[37]. Creating programs and facilities that encourages physical activity and inter-generational interaction promotes the use of connected active transit infrastructure. Specific programs and infrastructure that the study focused on includes walking paths, plazas, community centers, and cycling paths. Connected roadways, paths, facilities, green spaces, and so on, encourages inter-generational use of designed transportation networks.

Research has also demonstrated the importance of pedestrians' individual sense of both physical and personal safety in order to participate in active transportation. Physical safety refers to an individual's sense of security in relation to the physical environment. Personal safety is "evaluated as [the] perception of crime nearby and perceived safety when walking or cycling at night and during the day"[38]. Infrastructure such as speed lights, cross walks, and bike paths are imperative for increasing physical safety. A study by Pucher et al. (as cited in Becera) found that "the construction of separate bike paths connected with the public transport system, social and educational programs encouraged cycling"[39]. Research conducted by Rodríguez et al. (as cited in Becera) argues that aesthetics such as green spaces and crossing aids contribute to a friendly pedestrian environment and increase the use of public transportation[40]. In addition, creating a sense of community and building social trust increases people's sense of personal safety; encouraging citizens to utilize infrastructure for active transit methods.

RECOMMENDATIONS

GREEN PARKING

The VOM CID can increase the amount of green and community spaces in the area by consolidating parking lots into garages like those in Spain. Consolidating a large parking lot like the one at Sobeys into a centralized garage could allow for space to be transformed into a public area; this can include green spaces, footpaths, sidewalks, and facilitate a redesigned road network in the future. The parking garages could also be developed as mixed-use buildings, allowing for commercial and public space on the lower floors. The Village on Main could network with commercial and local businesses to invest in property within the garage.

PUBLIC & MUNICIPAL ENGAGEMENT

Theoretical frameworks have been implemented to address walkability and active transportation issues in Canadian and global communities. The Village on Main could have a public meeting to develop their own framework and implementation plans, depending on the specific needs of the community and businesses. During these meetings, we recommend incorporating concepts and ideas found in the frameworks from the case studies. Public engagement will be valuable to address concerns about age-friendliness and public transit.

An extensive consultation period with senior citizens and young families should take place to hear their concerns. In addition to these consultation sessions, meetings with the Halifax Regional Municipality can take place in an effort to make clear the Village on Main's vision, and how it fits in with HRM's plans for the area. Having a solid baseline for what the community wants and needs will allow conversations with HRM to be much more productive and meaningful.

In terms of public transit, it would be best to recruit an independent professional to gather statistics on the transportation flow in the VOM area. Demographics, peak times, most utilized routes and stops are all important components to consider. After the research phase, consultations with the public about the Village on Main's ideal bus routing and related infrastructure can be initiated. Through this research and consultation, a plan can be put forward to HRM.

IMPROVE INFRASTRUCTURE FOR ACTIVE TRANSIT

There are plenty of major, infrastructural changes that can be made to the Village on Main to foster a culture of active transportation. Some of the concepts from the frameworks that the Village on Main should consider are diversifying land use, merging residential and commercial spaces within buildings, increasing residential density and incorporating active transportation infrastructure such as bicycle lanes and footpaths into community design.

A short term recommendation would be installing benches, water fountains, and other park accessories to encourage residents to walk to amenities instead of driving. The VOM can also advocate for accessibility improvements such raised, textured sidewalk corners so visually impaired individuals can recognize when they're done crossing the street. Increased snow removal can also facilitate active transit in the winter as well.

CONCLUSION

The purpose of this report is to provide contextual information that the VOM can utilize to facilitate productive discussions between residents of all ages, business and land owners, and the HRM. The final deliverable is a booklet with information about how other communities addressed connectivity. This will provide insight for the VOM CID in their pursuit to a complete community. Both the report and the booklet were created to be fully transferable, so not only can it be used to improve the Main Street community, but places around the world looking to become more complete communities.

The VOM area has great potential for becoming a complete and connected community. The passion and drive of the community will most certainly make this dream a reality. The Village on Main are only a few steps away from becoming the most exciting new community in the Halifax Regional Municipality. To move forward, we recommend that the VOM CID further pursues the research provided by our case studies. Many of the solutions and theoretical frameworks presented can take a significant amount of time and capital. Active community engagement and cooperation with land and business owners, developers, and the HRM can ensure a bright future for the VOM. Short-term measures such as installing benches and installing a sense of unity with residents in the Village on Main can make a big difference toward instilling connectivity.

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APPENDICES

APPENDIX 1

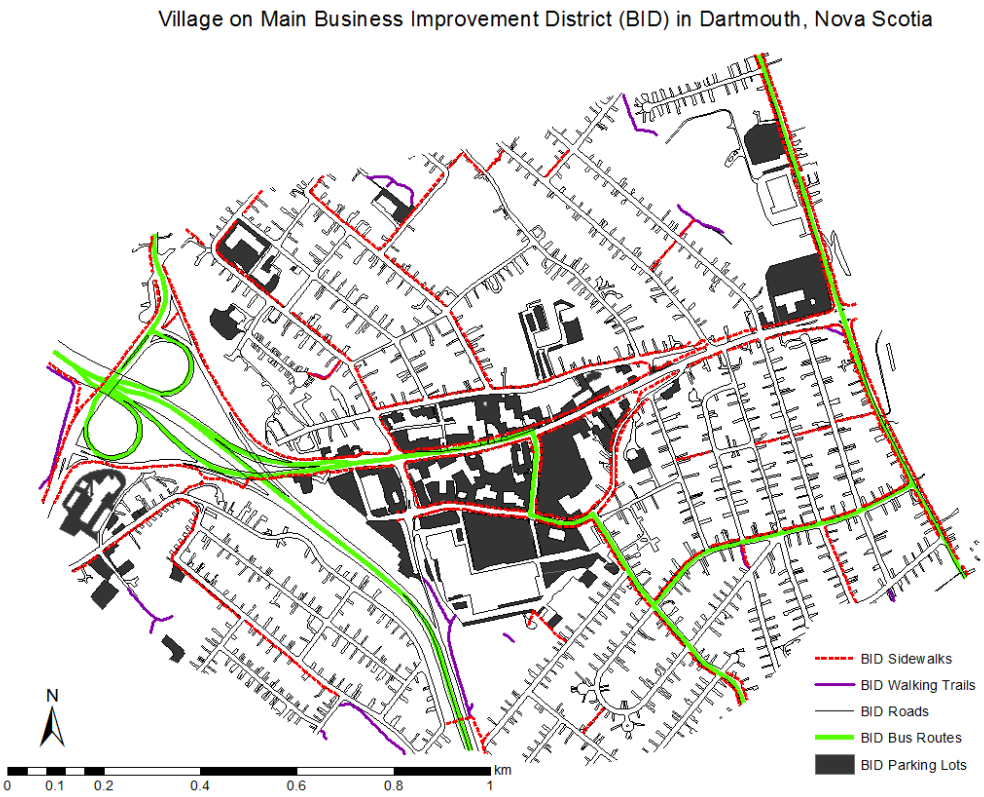

FIGURE 2:

LAYERED MAP DISPLAYING SIDWALKS, WALKING TRAILS, ROADS, BUS ROUTES AND PARKING LOTS IN THE VILLAGE ON MAIN COMMUNITY IMPROVEMENT DISTRICT.

APPENDIX 2

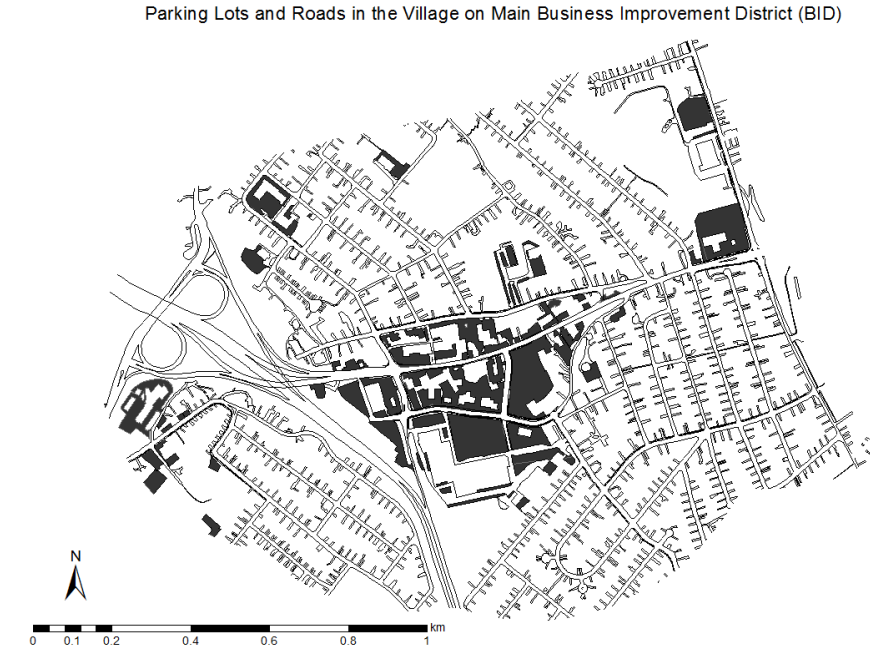

FIGURE 3:

MAP HIGHLIGHTING ROADS AND PARKING LOTS IN THE VILLAGE ON MAIN COMMUNITY IMPROVEMENT DISTRICT

APPENDIX 3

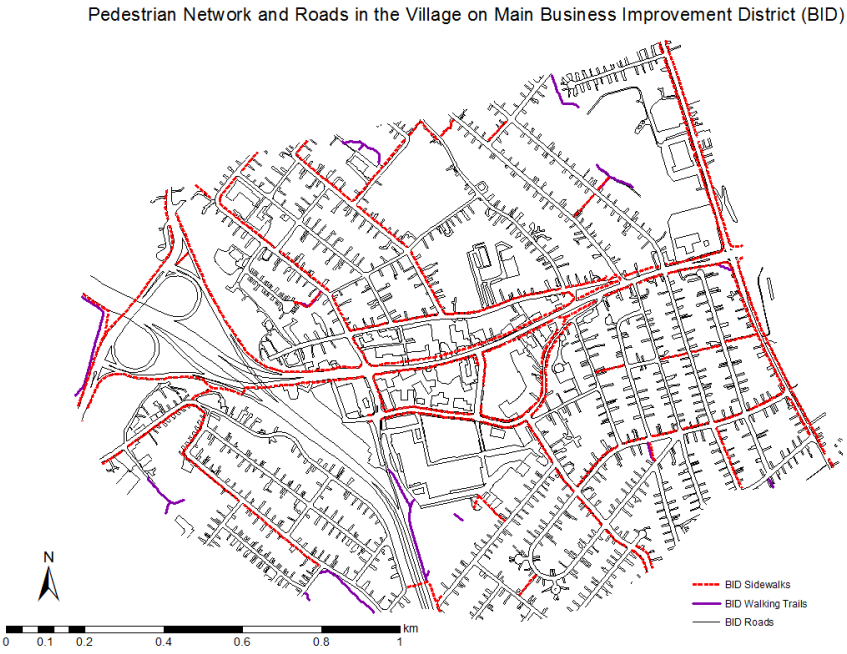

FIGURE 4:

MAP HIGHLIGHTING PEDESTRIAN NETWORK AND ROADS IN VILLAGE ON MAIN COMMUNITY IMPROVEMENT DISTRICT

APPENDIX 4

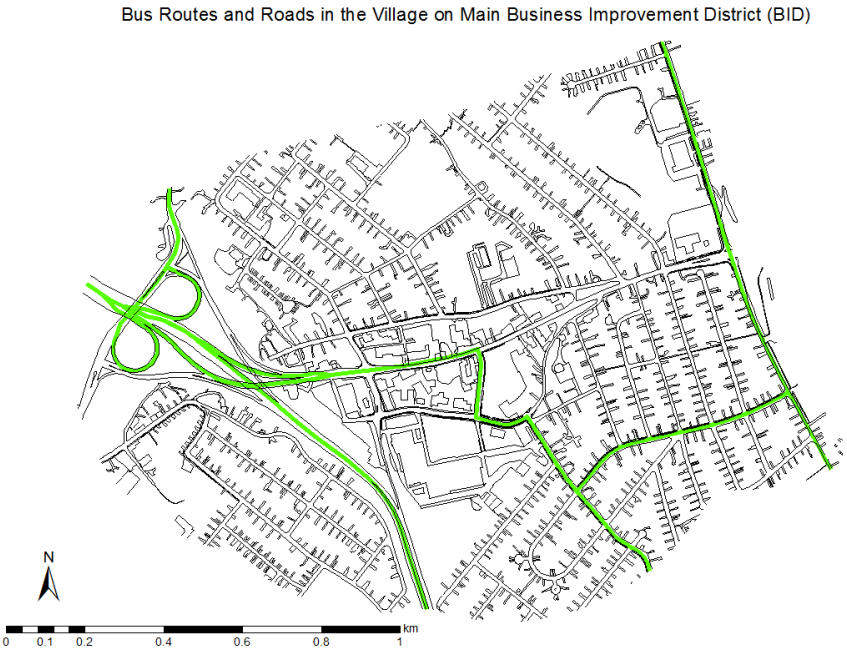

FIGURE 5

MAP HIGHLIGHTING THE BUS ROUTES AND ROADS IN VILLAGE ON MAIN COMMUNITY IMPROVEMENT DISTRICT

APPENDIX 5

FIGURE 6:

MAIN STREET OF THE VILLAGE ON MAIN COMMUNITY IMPROVEMENT DISTRICT

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[8] Becerra et al., “Transport and Health.”
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[11] Ibid.
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[13] Ibid.
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[19] STATSCAN
[20] Domenech, “Passeig De St Joan Boulevard.”
[21] Ministry of Infrastructure, “Growth Plan.”
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[23] Parksmart, “About.”
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[27] Domenech, “Passeig De St Joan Boulevard”; Scapelab, “Renovation of Slovenska Boulevard in Ljubljana.”
[28] Domenech, “Passeig De St Joan Boulevard”; Ljubljana For You, “Traffic”; Scapelab, “Renovation of Slovenska Boulevard in Ljubljana.”
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[36] Ibid.
[37] Becerra et al., “Transport and Health.”
[38] Ibid., 236.
[39] Ibid., 658
[40] Becerra et al., “Transport and Health.”