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Iqaluit

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Transportation and Urban Design Study

ᑎᒋᐱᓇᓗ, 2005

December, 2005

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Transportation and Urban Design Study

Prepared for The City of Iqaluit
Planning and Lands Department

Prepared by Office for Urbanism
Marshall Macklin Monaghan
John Laird Associates

December 2005

Acknowledgements

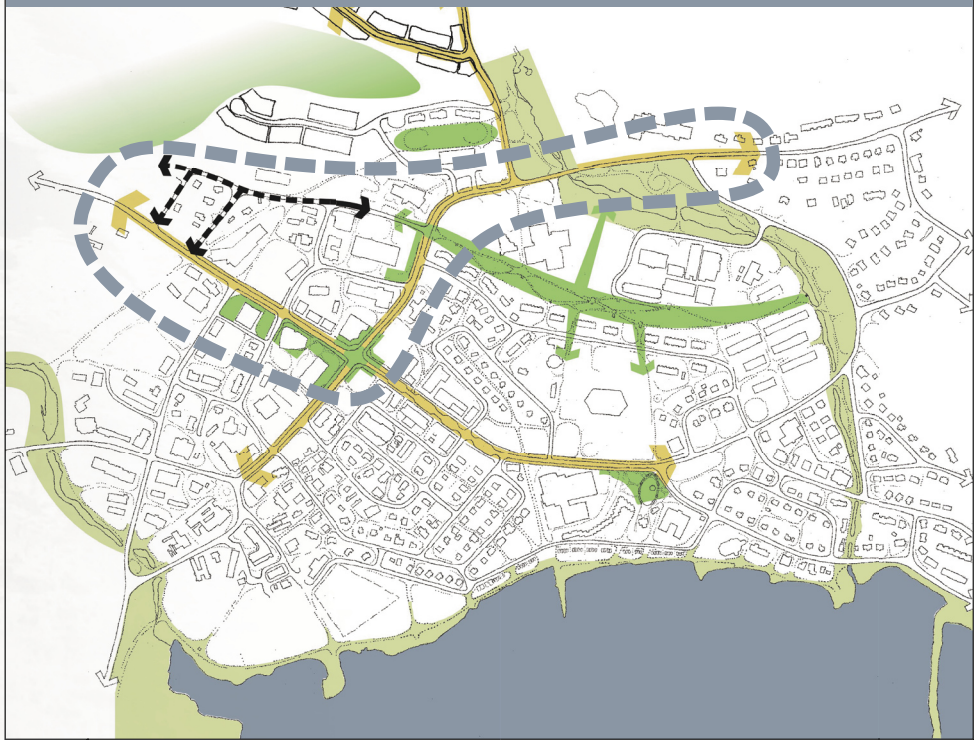
This plan is a product of extensive consultation with a wide array of stakeholders who were willing and available to meet with the consultant team on various occasions to share ideas, impressions, plans and, of course, their concerns.

At the outset of this study, the consultant team met with city staff and political representatives from the City of Iqaluit. Residents who attended the two Open House events and provided comments helped to inform the production of the plan. The consultant team's objective was to generate a plan including recommendations that were respectful to the Inuit culture and in keeping with planning for an arctic climate.

The Transportation and Urban Design Plan is a document to outline potential modifications to the existing and future road network and should direct future capital expenditures. As such, the project team created this document with the input and direction provided primarily through the Planning and Lands Department director Michèle Bertol, for which the consultant team is thankful.


Area "A"
Subdivision
Area "A" Secondary Access
Arctic College Residences
Arctic College
Hospital
Expansion
Hospital
Sapuit Rd
Niaqunngusiaq Rd
Sikituuq Crt
Masak Crt
Kangiq&miq Dr
Justice
Centre
RCMP
Building
City
Hall
Niaqunngusiaq Rd
High
School
Outpatient
Boarding
House
Federal Rd
Nunavut Dr
Ikaukuuttak Dr
Legislature
Building
Four
Corners
Queen Elizabeth Way

Study Area



This Report presents the findings of a Transportation and Urban Design Study conducted by Office for Urbanism, Marshall Macklin Monaghan, and John Laird Associates as commissioned and directed by the City of Iqaluit's Planning and Lands Department.

1.1. Study Purpose

The objective of the Transportation and Urban Design Study was to identify improvements or modifications to increase the functionality of the City's Central Area road and pedestrian network, including the off-road transportation network.

This report has focused primarily on the plan for a Bypass Road north of the Four Corners, in the Core Area of the City of Iqaluit. The study area has extended from Qikiqtani General Hospital in the east to approximately Ikaluktuutiak Drive (or Tuktu Street) in the west.

The report addresses the following critical gaols:

- Accommodate future growth
- Relieve existing congestion along important corridors and intersections
- Reduce conflicts between vehicles, pedestrians and snowmobiles
- Enhance the civic design of the community

As part of this study, an Issues Paper was prepared dated (July 6, 2005), as submitted to the Iqaluit Planning and Lands Department. The Issues Paper resulted from the analysis of various background reports, stakeholder interviews, and a site analysis conducted during May 2005 for the purposes of assessing current conditions and anticipated impacts.

Additionally, this report builds on the results of consultation conducted in early September of 2005 with respect to the viability of several transportation and design alternatives. Consultation processes included an Open House at the North Mart and the Catholic Church, stakeholder interviews, and two presentations to the Engineering and Planning Committee, and several media articles and interviews.

1.2. Areas of Focus

The study area predominantly falls within Iqaluit's Capital District Overlay within the Core Area as per the City's General Plan. A portion of Niaqunngusiaq Road is included in order to study impacts of the Qikiqtani General Hospital Expansion to the east of the Capital District. The adjacent map delineates the study boundaries as per the Terms of Reference set out by the City.

1.3. Implications of Projected Growth

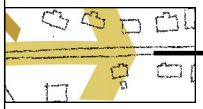
Statistics Canada reports that Nunavut's strong growth rate has been due mainly to the high birth rate among the Inuit population, and to development in its capital, Iqaluit. The population increased by 24.1% between 1996 and 2001. One-half of Nunavut's growth occurred in Iqaluit during this period. As such, the City has experienced an increased demand for specialized services related to government functions, health care, and education. This demand has materialized in the study area in the construction, approval or planning of public infrastructure projects, including, but not limited to the Nunavut Justice Centre, the RCMP Building, the hospital expansion. Plans also exist for increased residences and programming at Arctic College. With enhanced services comes added demand on the existing transportation infrastructure within the Core Area of the City. Congestion experienced at the Four Corners during peak periods and at the hospital intersection reflect the City's "growing pains". This study was initiated to respond to the impacts of these developments.

As context for this study, it is necessary to assess the impacts of the new and proposed developments. The following developments are expected to affect traffic operations along Niaqunngusiaq Road (i.e., Apex Road).

List of Projected Developments, City of Iqaluit

Name	Sector	Magnitude	Completion
Justice Centre	Government	28,000 sq. ft	June 2006
RCMP Building	Government	38,750 sq. ft	December 2007
Airport Expansion	Transportation	n/a	2014
High School	Education	Renovations / Expansions	n/a
Arctic College	Education	Expansions	Five Year Horizon
Plateau Area	Residential	260-300 Dwelling Units	Five Year Horizon
Plateau Area	Commercial	200,000 sq. ft	Five Year Horizon
Qikiqtani General Hospital	Health	Expansions	2006

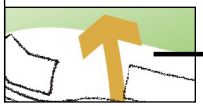
Public Realm Character



Main Streets

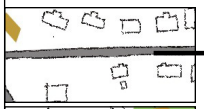
Pedestrian Walkways

Open Spaces

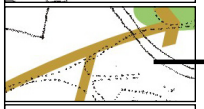


Trail System

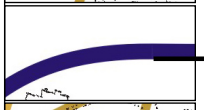
Snowmobiles



Vehicles



Pedestrian



Snowmobile Trails

Potential Snomobile Trail Connections

Areas of Pedestrian / snomobile conflict

2.1 Introduction

The number of private vehicles in Iqaluit has been increasing at a rate of approximately 28 percent per year in recent years. While this trend is not expected to continue at the same rate, more vehicles are anticipated in the near future resulting in increasing traffic congestion. In addition, the popularity of snowmobiles as an effective means of winter transportation and the lack of regulations on its usage makes travel by car, foot or snowmobile hazardous. The City is witnessing rising conflicts between these modes of travel. There is an urgent need to plan for an ordered transportation system that provides appropriate routes for both cars and snowmobiles, minimizes conflict, and relieves congestion.

2.1.1 Program Needs

Pedestrians
There are a number of factors that make pedestrian travel hazardous, thereby increasing auto dependency. These are currently no paved sidewalks or pedestrian paths on the roads in the study area. Pedestrians must walk on the road or on the shoulders. This is problematic (and potentially dangerous) during the winter months and during times when there is significant runoff in the "gutters" adjacent to the roads. Pedestrians are left without a secure, dry place to walk. This discourages walking and encourages auto dependence. To improve pedestrian safety and security the following issues need to be addressed:

- Sufficient right-of-ways need to be provided to ensure that snow accumulations along the side of the road do not interfere with sidewalks;
- Ensure pedestrian connections between important buildings;
- Improve sightlines for cars and on snowmobile routes
- Making pedestrian crossings visible;
- Provide appropriate and adequate Manual on Uniform Traffic Control Devices ("MUTCD") standards signage for pedestrian crossings;
- Reduce speeds along major routes to allow for pedestrian crossings.

Paving
Congestion on Niaqunngusiaq Road and Queen Elizabeth Way ("QEW") is in part due to the poor pavement quality of the local unpaved roads in the City, which encourages vehicles to avoid these unpaved roads. The City needs to develop an adequate paved road structure to avoid poor road conditions and the overloading of existing paved roads.

Snowmobiles
With nearly 2.5 metres of snow each winter, snowmobiling is by far the most popular winter mode of transportation in the City. However, there is an urgent need to regulate snowmobile travel to avoid conflicts with pedestrians and vehicles and improve the safety of the transportation system. Conflicts mainly arise due to poor sightline conditions aggravated because of existing snow clearing practices and unregulated, unmarked snowmobile crossings. To improve the operational characteristics and alleviate safety concerns along the snowmobile routes the following issues need to be addressed:

- Lack of information regarding the existence and close proximity to snowmobile routes;
- Unregulated crossings at sidewalks and road crossings;
- Formalize and separate snowmobile routes from roads and pedestrian walkways;
- Improve snow removal practices to minimize impacts of snow piling on snowmobile routes;
- Improve sightlines along snowmobile routes to minimize conflicts between vehicles and pedestrians;
- Provide adequate signage along routes and at crossings.

Drainage
During thaws and rainy periods, water runs along the edge of many roads in the City making them unsuitable for pedestrians. Concrete sidewalks or underground sewers are not viable options in an arctic context. Hence, there is a need to explore alternative pavement cross-sections to channel the water away from pedestrian paths.

Snow Clearance
Current snow clearance practices make snowmobiling and pedestrian activities dangerous because of sightline issues. Additionally, piled snow obscures existing pedestrian areas. Snow clearance practices need to be reviewed and guidelines established to allow the uninterrupted use of vehicles and other modes of travel during the winter months.

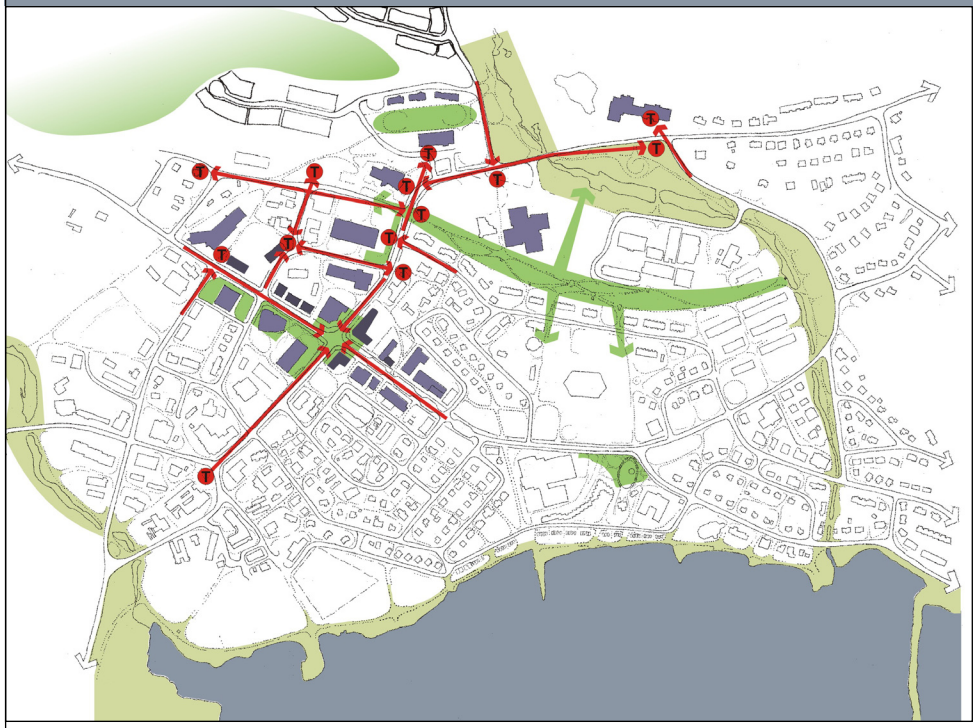
Urban Design of Niaqunngusiaq Road
Niaqunngusiaq Road is the gateway to the City of Iqaluit. It represents the main thoroughfare and announces the arrival to the City and its core area. This arrival can be enhanced through a sense of celebration with elements including:

- A public art feature defining the entry point;
- Treatments to the streetscape to celebrate the importance of the central core.

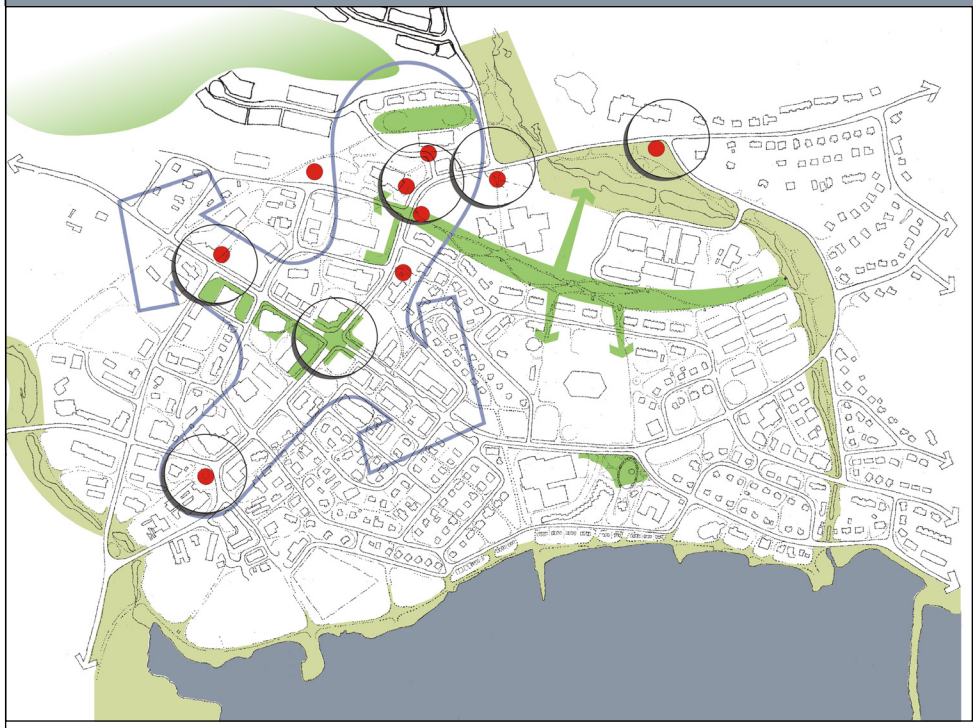
Safety
Unsafe travel conditions in the City are due to factors that include speeding along the major roads. Traffic management through traffic calming styled-design (reflecting ideas such as horizontal realignments or reducing the width of roads) is not a viable option in the City. The following ideas need to be considered:

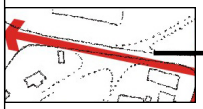
- Appropriate and adequate signage along with strict enforcement of low speed zones;
- Maintain regular traffic data to help analyze trends over time;
- Programs to educate about driver, pedestrian and

Views + Visual Termini

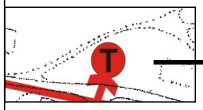


Gateways





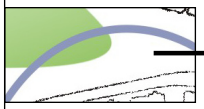
View corridor



View Terminus

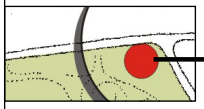
Existing Landmark buildings

Potential Landmark buildings



Capital District Area

Gateway area to Capital District



Potential site for visual marker

Open Space System

snowmobiling behaviour;
- Improved separation between pedestrians, vehicles and snowmobile routes.

Bikes
Similar to pedestrian activities, current traffic conditions are not conducive to bicycling through the City. Issues related to safety, sightline and network operations comparable to the other modes of travel need to be addressed. Bicycling is also not conducive during the winter months for safety reasons and the poor conditions of roads.

Transit
Transit would be beneficial for the mobility of senior residents and others in the City of Iqaluit. Given that public transit has been deemed cost prohibitive, the possibility of an integrated transit service with other agencies, such as the school bus and the justice centre shuttle service should be explored.

2.1.2 Road Network Demands

Traffic congestion during the lunch hour adds several minutes to in-vehicle travel time. The two main contributors to this congestion are the Inuksuk High School on Ring Road and the concentration of government and service buildings around the Four Corners intersection. Currently, some institutions in the City have introduced staggered lunch hours to minimize the congestion. However, it is estimated that the addition of approximately 435 new trips to the network due to the development of Area "A", the expansion of the airport and other projects will lead to delays and congestion at the Four Corners.

To understand the impact of the estimated new trips on the network, particularly at the Four Corners intersection, four scenarios were analyzed. Some agencies are already running staggered hours for start and end times as well as lunch times. The idea of expanding this program should be explored.

The location of the Post Office on Queen Elizabeth Way concentrates traffic in this area. The development of a postal sub-station in the south end for pick-up of mail would alleviate this congestion.

- Scenario 1 - Reflects existing peak midday traffic conditions from the Four Corners to the Saputi Road at Niaqunngusiaq Road intersection. Currently, approximately 890 trips pass through the Four Corners during the midday peak.

- Scenario 2 – This scenario reflects existing peak midday traffic conditions at the Four Corners after decentralizing the Post Office. It does not include the additional traffic volumes from the proposed expansions and developments. A total of 840 trips are expected to pass through the Four Corners.

- Scenario 3 – In addition to the peak midday traffic volumes from scenario 1, the estimated peak midday trips produced from the development of Area "A", the expansion of the airport and other developments are also included. A total of 1,325 trips are expected to pass through the Four Corners. Only the eastern access road connects Area "A" to Saputi Road.

- Scenario 4 - In addition to the peak midday traffic volumes from scenario 1, the estimated midday trips reflecting the potential staggered hours initiative, development of Area "A" and the expansion of the airport, and the potential decentralization of the Post Office are also included. These trips also represent the affect on traffic volumes due to the construction of the eastern and western access roads connecting Area "A" to the road network. A total of 990 trips are expected to pass through the Four Corners.

2.1.3 Capacity Analysis

The capacity analysis for the Four Corners intersection was carried out using the Synchro 6.0 software. Synchro incorporates analysis of intersection capacity, queuing and delay based on the 2000 Highway Capacity Manual (HCM). The HCM parameters were scaled down to reflect intersection operations observed in the City of Iqaluit. The results of the intersection capacity analysis for the four scenarios are summarized below in Table 2.

Table 2. Capacity Analysis For Scenarios 1 To 4

	ICU LOS *	CAPACITY UTILISATION (percent)	MAXIMUM DELAY (seconds)
SCENARIO 1	D	75	14
SCENARIO 2**	C	67	12
SCENARIO 3	F	100	108
SCENARIO 4	C	64	16

* The level of service (LOS) gives insight into how an intersection is functioning and how much capacity is available to handle traffic demand

** The LOS for Scenario 2 does not take into account any of the additional traffic expected to be generated due to the expansions and new developments. It can only temporarily alleviate existing congestion problems at the Four Corners with limited success.

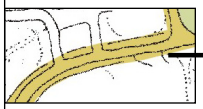
Based on the above analysis Scenario 4 is expected to have the highest impact on mitigating congestion. The Four Corners intersection is expected to witness a delay of approximately 16 seconds. This is only marginally higher than current conditions while accommodating approximately 150 additional vehicles during the midday peak hour based on future conditions for two reasons:

- The staggered hours initiative and the decentralization of the Post Office are expected to remove approximately 150 trips at the Four Corners during midday peak hour;
- The western access road will provide convenient

Frontages

Buildings with significant frontage to the public realm

Areas where significant frontages can be developed



Main Street corridor for pedestrian and vehicular focus

Open Space System

ingress and egress for traffic headed to and from businesses and government offices located to the north and west of Four Corners to Area "A". This is expected to divert an additional 185 trips from going through the Four Corners.

2.2 Urban Design and Landscape

Public Realm Character
In Iqaluit, streets and pedestrian walkways are primary components of the public realm. They help define how buildings and individual spaces relate to each other, they provide an important space for social interaction, and alongside the façade of buildings they constitute the public face of Iqaluit as a city.

The area of this study constitutes one of the higher traffic corridors in the downtown. Significant amounts of people access the Capital District through Niaqunngusiaq Road, adding prominence to significant buildings (e.g. City Hall, Arctic College, the Hospital, the High School, the new Justice Centre). Currently, however, the street is designed mostly for cars. Areas for pedestrians and the overall experience of open spaces, are noticeably bleak. The street should be much more than a transportation corridor.

Linking up to the trail system will also play a role in defining the public realm character that builds on, and makes visible, the unique arctic and Inuit heritage of Iqaluit.

Views and Visual Termini
Given the notable changes in topography and the bends of the road system, certain buildings and natural features have a higher visual prominence. Protecting these views plays an important role in respecting the traditional prominence of open spaces to the Inuit way of life. Other significant views include the open and long views to the water and land.

The new Justice Centre is an example of this, standing in a highly visible location as the road turns. The art pieces located in front of Arctic College have a similar prominence. Existing and potential landmark buildings will play an increasingly important role in highlighting these significant views.

Gateways
The Ring Road provides access to the Capital District from both the direction of the Airport and from the outer subdivisions. Announcing one's arrival into the Capital district must be celebrated and identified through a sense of entry, which may be developed through:

1. A gateway element (such as public art) that defines an edge and announces an entry point; and
2. A differential treatment of the streetscape connoting a transition between two different parts of the city.

The proposed realignment of the Niaqunngusiaq Road (see the following sections of this document) creates additional opportunities to enhance this sense of a gateway where it curves, adjacent to the Justice Centre.

Frontages
Several buildings and areas of a significant prominence are located in the Study Area, and have a landmark presence within the City of Iqaluit. Some of these include: Nunavut Square at the Four Corners, City Hall, the Justice Centre, the Arctic College, the natural areas, and the Hospital.

Areas yet to be developed with significant frontages to the public realm are highlighted in the adjacent map. The streetscapeing and urban design considerations for new development in these areas must have regard for their visual corridors and the configuration of the pedestrian realm.

2.3 Policy

Policy and program initiatives in terms of travel demand management have been considered. If the growth in traffic demands can be halted, it may be possible to defer improvements to the roads in question. Travel demand management initiatives may include:

- Changes to the magnitude of demand;
- Changes to travel modes (from auto to transit, walking or cycling);
- Shifts in peak demand time (e.g. shifting some demand from the 8:30 to 8:45 period to the 8:00 to 8:30 period).

Some policy and program alternatives have been touched on in the sections above. To recap, these include:

- Creating a postal sub-station in the south end of the City, to serve residents without forcing them to come to the Four Corners. This would reduce demands at the Four Corners;
- Implementing a program of staggered work times for government employees. This would change the time period for some trips in the morning, at mid-day and in the afternoon. Government employees would be the focus of the program ("leading by example"), but private sector employers should be encouraged to participate as well;
- Expanding shuttle services for government employees. Some institutions already run this type of service. This would potentially reduce the number of people driving to work;
- Re-introducing public transit in some form. While this is beyond the scope of this study, a joint program between major institutions (including those currently running shuttle services) and the City should be considered. Such a partnership could have a direct impact on road congestion, sustainability and quality of life.

Program Alternative 2 is quantifiable, and has been taken into account in the analysis of the alternatives presented below. The remainder of the alternatives are not quantifiable within the scope of this project. However, typically these initiatives have been found to reduce single-occupant vehicle demands by approximately 5 to 10 percent.

2.4. Current and Future Issues / Needs

The following issues and identification of future needs arise from the study analysis of existing conditions.

Current Issues

- Existing congestion levels at the Four Corners and the Core Area surrounding it
- Safety concerns re: Ring Road, including snow drifting and sightlines
- Pedestrian network deficiencies, related to overall issues such as inadequate separation from vehicles, poor drainage and narrow right-of-way widths, and also signage placement/design
- Need for improvements in the location and design of pedestrian crosswalks
- Pedestrian access between the Hospital and the Outpatient Boarding Home
- Parking deficiencies at the Trigram Building and the Hospital
- Growing vehicular demands due to increasing private vehicle ownership
- Collision rates
- Interaction of the Bypass Road with the utilidor
- Snowmobile conflicts with pedestrians and other vehicles

Taken together, these issues support the need to take short-term actions to address pedestrian and vehicular issues in the Four Corners and along the Ring Road.

Future Needs

- Additional demand due to development of the Plateau Area, Justice Centre, the Hospital expansion, Arctic College, potential changes at the High School, the RCMP building, and the Airport expansion (and related industrial development). These are developments expected to occur within a five year horizon
- Consideration of a potential outer ring road. This may be an issue that requires assessment of broader and longer-term issues

These additional future issues indicate the need to address the transportation and pedestrian demands in the Four Corners and along Ring Road through the addition of the Bypass road (i.e., Road Network Expansion). It should be noted that many stakeholders stated that the Bypass road would not be a true “Bypass”, and that a different name, more reflective of its function, should be considered.

3.1 Principles for Development of Road Network Alternatives

The alternatives for the road network were designed to address four major concerns:

Traffic Control
Currently the majority of traffic is concentrated on Niaqunngusiaq Road between the Four Corners and the hospital intersection. This is mainly due to the location of government, service and educational activities around the Four Corners intersection and within the Core Area. Thus, it is critical that the alternatives ensure the smooth functioning of the Four Corners intersection and the Niaqunngusiaq Road link connecting it to the Saputi Road and Niaqunngusiaq Road intersection, for the following reasons:

- The Four Corners intersection must accommodate the majority of east–west and north–south traffic in the City;
- A majority of work, school, and through trips use the intersection to and from their destinations;
- The development of Area "A" and the expansion of the Airport could potentially increase congestion significantly at the Four Corners intersection and along Niaqunngusiaq Road
- The sightlines are poor on Niaqunngusiaq Road between the City Hall and Arctic College - solutions should address this issue.

These factors have been considered in the development of alternatives. In addition, the proposed alternatives recognize the unique climatic and operational conditions in Iqaluit, to base the decision on lifecycle planning (recognizing planning, design and operation of the alternatives). Climate / permafrost conditions indicate that installation of traffic signals (specifically the ductwork required) should be avoided for as long as possible. Secondly, the technical expertise needed for operational issues related to the maintenance and programming of the signals and controllers does not exist in Nunavut presently. Both issues suggest that alternatives that rely on stop control or other signage are preferable.

Pedestrian Access and Safety
Alternatives should enhance the connectivity of pedestrian access between important buildings while providing a safe walking environment, improving sightlines, and providing adequate signage using MUTCD (Manual on Uniform Traffic Control Devices) standards. A distinct path along the roads, separate from the vehicular path, is needed. Considerations for sufficient pedestrian right-of-way should include accommodating snow accumulations during the winter months. The overarching goal for the alternatives is to reduce conflicts between pedestrians, vehicles and snowmobiles.

Snowmobile Activity
Current snowmobile routes crisscross the landscape and give rise to potentially dangerous conflicts with both vehicles and pedestrians. The large number of origin and destination points coupled with seasonal snow conditions and snow accumulation practices makes it difficult to formalize the routes. Nevertheless, it is important that the alternatives address the safety and operational concerns of snowmobile crossover points and flow of snowmobile traffic on primary routes. Crossover points are defined as locations where snowmobile trails intersect existing roads (e.g. snowmobile crossing at Niaqunngusiaq Road between the proposed Justice Centre and Arctic College). The alternatives must enhance the connectivity between the routes and improve sightlines to avoid conflicts between the various modes of travel in the City.

Sightlines
Poor sightlines are experienced on the curve adjacent to the new Justice Centre, which compromises pedestrian and vehicular safety. As such, the intersection of the Niaqunngusiaq Road and Kangiq&Iniq Drive must be planned for safe and efficient traffic operations. These conditions are worsened in the winter as snow accumulations narrow the road, and snow drifts obscure visibility. To add, the Microclimate Assessment completed for the Justice Centre (February 2004) indicates that snow drifts will continue to occur – and likely increase – thereby affecting road conditions.

3.2 Road Network Alternatives

Alternatives for the Bypass Road have been developed, taking into account the existing and planned buildings in the study area, the topography, traffic operational and safety considerations, pedestrian access and the snow drifting issue along Niaqunngusiaq Road. One potential connection point for the Bypass Road at Federal Road has been eliminated by the plan for the RCMP Building at the intersection of Federal Road at Tuktu Street. Hence, four alternative designs were considered for the potential alignment of the Bypass Road. The primary objectives for each alternative are:

- Improve sightlines along Niaqunngusiaq Road between the proposed Justice Centre and Arctic College
- Divert traffic, which is using the Four Corners intersection via the Bypass Road
- Reduce pedestrian conflicts

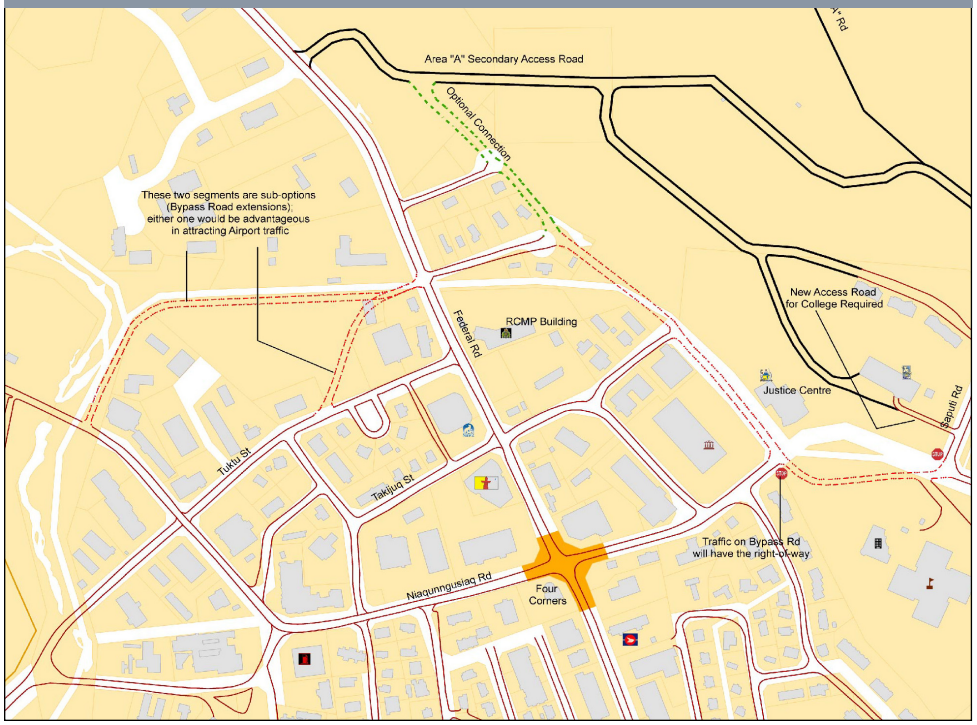
Each alternative was defined in two sections; first, section 1 from Arctic College to Federal Road, section 2, north of the Justice Centre and west of Federal Road.

Section 2, the bypass north of the Justice Centre and west of Federal Road, will be the same for all alternatives 1 through 3. The Section 1 link will extend northwards using the existing ROW of Trigram Road to connect to Masak Lane, and thereby connect to Federal Road. In case of Alternative 4, the Section 1 link will continue through between the proposed Justice Centre and Arctic College to connect to Masak Lane. West of Federal Road the bypass can follow

Alternative 1

- The new link is accommodated just south of the existing road adjacent to the fuel pipeline
- Niaqunngusiaq Road leading to the Four Corners will be the through route
- Southbound and northbound traffic headed to and from the Four Corners intersection has the right-of-way

Alternative 2



- The new link is moved further south of the existing road to form a T-intersection with Niaqunngusiaq Road connecting to the Four Corners
- Bypass Road leading to the Four Corners will be the through route
- Traffic on Bypass Road will have the right-of-way, with stop control for traffic headed east from the Four Corners intersection

two routes: first, the bypass could curve around to connect to Tuktu Street, or, the bypass could follow the route of the existing oil pipeline and connect to Airport Road.

Secondary Access Connection to the Area "A"
Alternatives 1 through 5 show options of how to connect to the Area "A" secondary access road, via an optional connection parallel to the Federal Road. This proposed connection between the Area "A" secondary access road and Masak Lane is expected to enhance the connectivity of the network.

3.3 Factors for Assessment

Eleven factors were analyzed to assess the positive and negative impacts of the proposed alternatives for the Bypass Road. The factors are based on the analysis of existing conditions, the project objectives and inputs from stakeholders. They are intended to inform a comprehensive analysis, which balance transportation access for vehicles with urban design and pedestrian access. A capacity analysis was also carried out to understand the effect of the Bypass Road on traffic operations at the Four Corners intersection.

The factors are generally self-explanatory, as presented in the adjacent figure. Some further explanation may be of benefit with respect to a few criteria, namely:

- Criterion 6, Minimizing pedestrian conflicts, encompasses the capacity for alternatives to divert traffic away from the Four Corners and the segment of Niaqunngusiaq Road between the Bypass Road and the Four Corners. This segment is particularly important in terms of improving pedestrian connections because of the major public buildings located here (e.g. City Hall, Justice Centre) and due to the poor existing condition for pedestrians. This factor also encompasses the effect on pedestrian conditions along Niaqunngusiaq Road in this area.

It should be noted that pedestrian conditions along Niaqunngusiaq Road between Saputi Road and the Hospital do differ significantly between alternatives. Alternative 3, which includes a STOP sign on Niaqunngusiaq Road at Saputi, would permit the easiest pedestrian crossings of Niaqunngusiaq Road. (Under the other alternatives, it is assumed that a signed pedestrian crossing of Niaqunngusiaq Road could be provided at this intersection).

3.4 Capacity Analysis

One of the main objectives of the Bypass Road is to attract traffic destined to and from the Airport and the industrial area along Federal Road, thereby alleviating congestion at the Four Corners. Using scenario 4 from Section 2.3 as the base, conservative estimates obtained from redistributing traffic based on the new road alternatives indicate that the Bypass Road will divert approximately 165 trips during the midday peak hour from the Four Corners intersection. The exact number of diverted trips would vary by alternatives. The Four Corners intersection is expected to operate at Level of Service "B" (63 percent capacity utilization) with a maximum delay of approximately 13 seconds.

3.5 Assessment

Alternative 1
Alternative 1 represents the least extensive change to the road network. By maintaining Niaqunngusiaq Road as the direct road connection, only a limited diversion of traffic away from the Four Corners is expected. The change is expected to reduce the snow drifting impact slightly, by moving the road away from the lee of the hill. Traffic operations on Niaqunngusiaq Road would not be significantly impacted, because there would be no additional traffic control on the link or from the Four Corners. The sightline concern between the Justice Centre and Arctic College would be improved significantly.

A slight improvement in pedestrian accessibility and security could be expected. Heavy volumes travelling to and from the Four Corners would continue.

Constructability and cost are favourable for this alternative, because of its limited extent. Construction would have to be coordinated with the fuel pipeline adjacent to the alignment. The extensions of the Bypass Road to the west of Federal Road would improve its attraction significantly. Either sub-option would attract traffic between the Airport (and surrounding industrial area) and the southerly residential sector of the City.

Under this alternative, the optional connection to the Area A secondary access road is possible. This has been illustrated as a T-intersection in the concept drawing. Further analysis would be required to define an appropriate design, with adequate sightlines at each end of this connection.

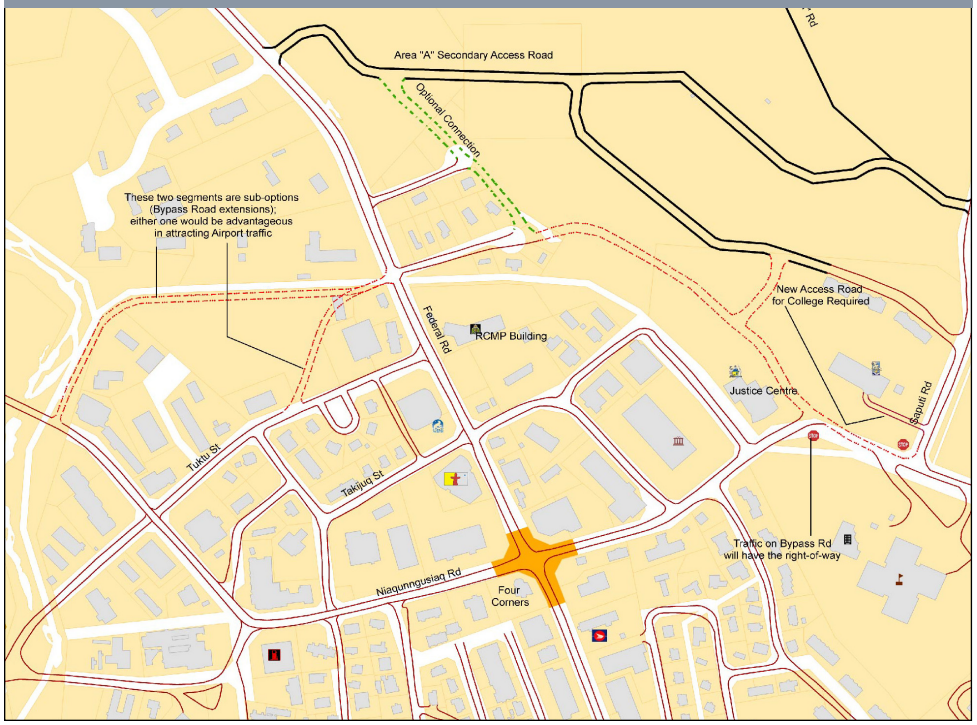
Alternative 2
Alternative 2 represents a more extensive change to the road network than Alternative 1. By reconfiguring the network adjacent to the Justice Centre, the Bypass Road would become the direct road connection between the residential concentration in the east and the industrial destinations and airport in the west. This would result in greater traffic diversion away from the Four Corners than Alternative 1. By moving the road further to the south, a greater improvement to the snow drifting is also expected. Traffic operations on Niaqunngusiaq Road would be impacted to a greater degree than under Alternative 1, because traffic destined to the Four Corners would have to turn left from the Bypass onto Niaqunngusiaq Road. The sightline concern between the Justice Centre and Arctic College would be reduced.

On the segment of Niaqunngusiaq Road between the Bypass and the Four Corners, there would be an improvement in pedestrian accessibility and security, because volumes travelling to and from the Four Corners are expected to be reduced considerably. There would be a need for pedestrian

Alternative 3

- This is the most extreme alternative in terms of changing traffic operations. In addition to meeting the primary objectives for the by-pass road, this option seeks to elminate snow drifting problems;
- In addition to meeting the primary objective for the by-pass road, this option;
- The new link is looped around close to the high school and boarding house;
- The new link forms T-intersections with Niaqunngusiaq Road connecting to the Four Corners and with Niaqunngusiaq Road connecting to the east;
- Traffic on the Bypass Road and northbound traffic on Saputi Road will have the right-of-way;
- Traffic heading eastbound from the Four Corners and westbound from the hospital will be stop controlled.

Alternative 4



- The new link would be located between the proposed Justice Centre and Arctic College, and would connect to Masak Lane;
- It forms a T-intersection with Niaqunngusiaq Road leading to the Four Corners intersection;
- Traffic on the Bypass Road will have the right-of-way;
- Traffic headed south on Saputi Road will be stop controlled.

crosswalks at the intersections of Saputi Road and Niaqunngusiaq Road with the Bypass, appropriately signed/demarcated and designed to be visible in all conditions.

Cost is slightly higher than for Alternative 1, but is still expected to be fairly low, because the changes are limited. There are no issues of constructability. A slight change in the High School/Outpatient Boarding House northerly access driveway would be needed. Road Section 2 (proposed link from the intersection of Trigram Road and Takijuq Street) of this alternative is also expected to have a slight impact on the pipeline corridor.

The extensions of the Bypass Road to the west of Federal Road would improve its attraction significantly. Either sub-option would attract traffic between the Airport (and surrounding industrial area) and the southerly residential sector of the City. Under Alternative 2, the extension to the east of Federal Road (with either of these options) becomes more important, because of the higher through traffic capacity expected on the Bypass.

Under this alternative, the optional connection to the Area A secondary access road is possible. This has been illustrated as a T-intersection in the concept drawing. Further analysis would be required to define an appropriate design, with adequate sightlines at each end of this connection.

Alternative 3

Alternative 3 represents the most extensive change to the road network in the area adjacent to Arctic College and the Justice Centre. This would effectively force all traffic destined to the Four Corners via Niaqunngusiaq Road to turn left twice, once at Saputi Road and again at Niaqunngusiaq Road. This would likely result in greater traffic diversion away from the Four Corners than Alternative 1, but it is expected to create significant congestion along Niaqunngusiaq Road to the south. By moving the Niaqunngusiaq Road's existing curve further to the south, a greater improvement in the snow drifting is also expected than under Alternative 1 or 2. The sightline concern between the Justice Centre and Arctic College would be reduced.

On the segment of Niaqunngusiaq Road between the Bypass and the Four Corners, there would be an improvement in pedestrian accessibility and security, because volumes travelling to and from the Four Corners are expected to be reduced considerably. Pedestrian crosswalks at the intersections of Saputi Road and Niaqunngusiaq Road with the Bypass would be necessary and should be appropriately signed/demarcated and designed to be visible in all conditions. Pedestrian crossings of Niaqunngusiaq Road between the Outpatient Boarding House and the Hospital are expected to become safer, because of the STOP sign at the Saputi Road intersection. This alternative would require a fairly extensive reconfiguration of the High School access. While we have shown an access on the new road link, this entrance would likely have to be signed as "right in only", due to sightline constraints.

Cost is higher than for Alternative 1 or 2. The amount of regrading adjacent to the Boarding House could be extensive; blasting could be required.

The extensions of the Bypass Road to the west of Federal Road would improve its attraction significantly. Either sub-option would attract traffic between the Airport (and surrounding industrial area) and the southerly residential sector of the City. Under Alternative 3, the extension to the east of Federal Road (with either of these options) becomes more important, because of the higher through traffic capacity expected on the Bypass.

Under this alternative, the optional connection to the Area A secondary access road is possible. As was the case for Alternative 2, further analysis would be required to define an appropriate design, with adequate sightlines at each end of this connection.

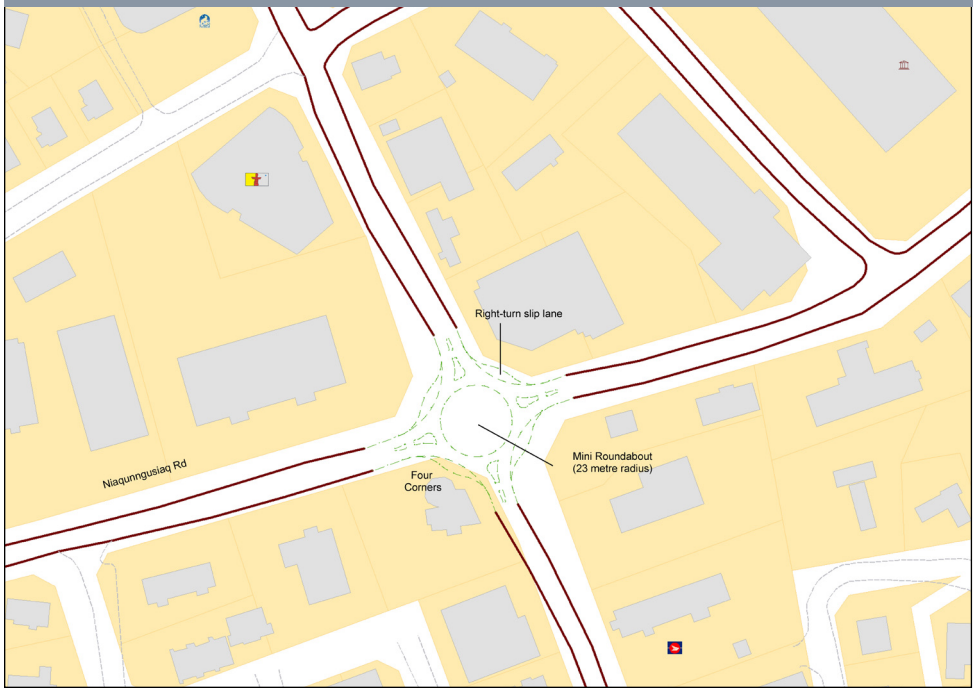
Alternative 4

Overall, Alternative 4 represents the most extensive change to the road network. The Bypass Road would be located between the Justice Centre and Arctic College, with Niaqunngusiaq Road intersecting it adjacent to the Justice Centre. The Bypass would be the direct through road connection. This would result in the greatest diversion of traffic away from the Four Corners of any of the alternatives. By moving the road to the northeast adjacent to the Justice Centre, it is expected that an improvement in snow drift cover of the road would result. However, drifting should still be expected on Niaqunngusiaq Road adjacent to the Justice Centre. Traffic operations on Niaqunngusiaq Road would be impacted to a greater degree than under Alternative 1, because traffic destined to the Four Corners would have to turn left from the Bypass onto Niaqunngusiaq Road. The sightline concern between the Justice Centre and Arctic College would be eliminated, with the greatest improvement of the four alternatives.

On the segment of Niaqunngusiaq Road between the Bypass and the Four Corners, there would be an improvement in pedestrian accessibility and security, because volumes travelling to and from the Four Corners are expected to be reduced considerably. Pedestrian crosswalks at the intersections of Saputi Road and Niaqunngusiaq Road with the Bypass would be necessary and should be appropriately signed/demarcated and designed to be visible in all conditions.

Cost would likely be double or triple the cost of the other alternatives. The extensions of the Bypass Road to the west of Federal Road would improve its attraction significantly. Either sub-option would attract traffic between the Airport (and surrounding industrial area) and the southerly residential sector of the City. Under Alternative 4, the extension to the east of Federal Road (with either of these options) becomes more important, because of the higher through traffic capacity expected on the Bypass. Under this alternative, the optional

Alternative 5



- Alternative 5 uses a single lane Mini Roundabout (speeds up to 25 km/hr and radius ranging from 13m to 25m) at the Four Corners to assist in the smooth flow of traffic operations, minimize delay and improve safety
- The Roundabout could have right-turn bypass lanes to allow the right-turning traffic to bypass the roundabout
- The right-turn bypass lanes will have yield control on the exit leg
- All exit manoeuvres will be right turns
- The Roundabout at Four Corners can be combined with any of the above alternatives

Alternative		1	2	3	4
1	Minimize sightline concerns				
2	Ease of Construction				
3	Minimize snow drifting concerns				
4	Minimize disruptions to access				
5	Minimize Pedestrian conflicts				
6	Minimize speeding				
7	Minimize traffic at Four Corners				
a	Northbound				
b	Southbound				
8	Maintain effective traffic operations on Apex Rd				
a	Northbound				
b	Southbound				
9	Minimize conflicts at snowmobile crossings				
10	Minimize cost				
Overall Score		19	23	18	21

SCORING

VERY LOW
-1

LOW
+1

MEDIUM
+2

HIGH
+3

connection to the Area A secondary access road is possible, as it is with the other alternatives.

Alternative 5

Alternative 5 is unique among the alternatives, in that it does not actually involve a Bypass of the Four Corners. This alternative is based on the concept of simply improving traffic flow or increasing capacity through the Four Corners. For the sake of completeness, the alternative of a mini roundabout at the Four Corners has been assessed. This option could also be combined with any of the above alternatives.

Roundabout manoeuvres are very similar to that of making a right-turn on red at a signalized intersection. The oncoming vehicle waits for a gap in the traffic stream coming from the left, chooses an acceptable gap and enters the traffic stream with a right turn at yield. The vehicle travels in the counterclockwise direction until it reaches its exit, and makes a right turn. Thus, roundabouts are a more effective way to manage traffic operations as compared to an AWSC (All Way Stop Control) intersection.

Currently, approximately 30 percent of the traffic is making a right turn at the Four Corners. The mini roundabout (with or without optional right-turn slip lanes) will allow the right turning vehicles to move more easily through the intersection. This is expected to significantly improve operations and reduce delays at the intersection. The right-turn slip lanes with yield control at the exit leg will force the vehicles to slow down, improving pedestrian and bicycle safety. However, an AWSC intersection performs marginally better for this criterion of pedestrian movement, because the roundabout moves pedestrian crosswalks further away from the desire lines of travel. This could have a negative effect on pedestrian safety if the pedestrians do not cross at the planned points.

This alternative is also favorable in addressing the issue of traffic collisions in the Core Area. The Roundabout design reduces the possibility of vehicle collisions due to its traffic flow characteristics. A standard four-legged intersection has 32 vehicle-to-vehicle and 24 vehicle-to- pedestrian conflict points. By contrast, the roundabout has only 8 vehicle-to-vehicle and 8 vehicle-to-pedestrian conflict points.

3.6 Ranking of Alternatives

To develop a more comprehensive understanding of the impact of each alternative, a ranking method was established. This method is limited to Alternatives 1 through 4. The aim of the method is to highlight alternatives that best suit the needs of the City. The scale was ranked as –1,1, 2 and 3, where –1 represents a negative impact and 3 represents a positive impact. The negative rank on the scale was used to distinctly separate alternatives with similar totals. Similar totals could result, because while one alternative addresses all the criteria with varying degrees of positive impacts (Alternative 2), the other alternative has a number of “high” and “very low” impacts (Alternative 1). Thus, the totals for the two alternatives could be very close to each other, hampering the decision making process.

Based on the above, the alternatives were ranked as follows:

Alternative	Score
1	19
2	23
3	16
4	21

Alternative 2 (re-aligning the section of Niaqunngusiaq Road north of Saputi Road so that together with the new Bypass, it becomes the “through” road) ranks the highest, followed by Alternative 4 (complete new Bypass between the Justice Centre and Arctic College).

3.7 CONCLUSIONS

Based on the transportation analysis carried out within the scope of this study, the following conclusions have been drawn:

1. The development of the Plateau Area and the expansion of the Airport are likely to have a major impact on traffic demands at the Four Corners and on Niaqunngusiaq Road.
2. The increase in the traffic volumes due to the above developments are estimated to cause the Four Corners intersection to fail (LOS F, delay of 100 seconds) and create significant delays along Niaqunngusiaq Road
3. The Staggered Hours and Post Office initiatives along with the introduction of the Bypass Road are expected to significantly reduce the congestion at the Four Corners (Level of Service B, delay of 13 seconds) and along Niaqunngusiaq Road.
4. Option 2 is the most balanced alternative for the Bypass Road because it addresses all the objectives within acceptable levels of service.
5. Option 4 would have the largest positive impact on traffic operations in the City, although cost and constructability are expected to be significant issues associated with this option.
6. The Bypass Road should be extended east of Federal Road, to maximize its capacity to divert traffic from the Four Corners. The alignment for this extension should be defined based on a review of the cost and constructability of the two options.
7. Improvements are needed in the study area to accommodate pedestrian safety and access. Safe, dry and distinct walking paths adjacent to the roads are needed. A road/sidewalk design that accommodates these needs is required.
8. Definition of the snowmobile crossing points of roads is needed, and a design should be implemented for these.
9. The policy direction for accommodation of snowmobile traffic must consider traditions in the community but also the expected evolution of the City as a modern territorial capital.
10. Solutions to the issues of crossings for pedestrians and snowmobiles need to reflect the life-cycle costs, from design and implementation through to

The Preferred Concept - Alternative 2

The By-Pass will be phased to meet demand, and alleviate traffic in the core.

The new subdivision will add noticeable new traffic. Connecting this by-pass will provide vehicles with an alternative route.

A new public space will emerge at the confluence of the new Justice Centre, Arctic College, City Hall the high school and a system of trails.

The intersection of Niaqunngusiaq Road and the creek trails offers a unique opportunity for a landscaped open space.

Vehicles moving towards the By-pass will have the right-of-way. This will encourage through traffic to move away from the Four Courners.

For increased safety, vertical barriers / indicators will define the spaces utilized by either vehicles, pedestrians or snowmobiles.

Left-turnning lanes will allow the continuous flow of vehicles along Niaqunngusiaq Road, and reduce wait times at the Stop sign.

An additional by-pass towards the south and west should be explored to further alleviate traffic along the perimeter of the downtown.

Places that terminate a street view can showcase public art.

The Four Corners will be a centre for Iqaluit's civic interactions, and pedestrian movement. It should be much more than a confluence of vehicular traffic.

A stop sign proposed for cars moving onto Niaqunngusiaq Road, will create a safer environment for pedestrians.

The streets leading into the Four Corners should be designed to support pedestrians moving between buildings, civic spaces and along the street corridor.

The rugged topography and the environmental sensitivity that characterizes the creek bed, requires cars, pedestrians and snowmobiles to traverse along a shared corridor.

4.0 RECOMMENDATIONS TOWARDS IMPLEMENTATION

Immediate Actions (Current Year)

Immediate actions should focus on opportunities to enhance the pedestrian environment and moderate the traffic demands until infrastructure improvements can be made.

1. Arrange a meeting with major employers in the City to review opportunities for both a Staggered Work Hours Program, and a Cooperative Transit Service. This should include all levels of government as well as major institutions. Building on this meeting, the City should pursue joint funding for the transit program from participating agencies, and define a detailed plan for implementation. The staggered hours work program should be defined and marketed by the City to all employers, through a letter campaign and other media.

2. Meet with the Post Office management to recommend a postal sub-station in the south end of the City, to assist in managing traffic demands in the Core Area. Building on that meeting, a plan for implementing the sub-station should be developed and carried out. The location should be south of the Niaqunngusiaq Road/Queen Elizabeth Way intersection.

3. Define which option of the Bypass Road east of Federal Road is preferred, based on cost, constructability and ease of property acquisition.

4. Proceed to detailed design, tendering and construction for the preferred Bypass Road option east of Federal Road.

5. Develop the Terms of Reference for a city-wide Transportation Master Plan study.

Short-Term Actions (2 to 5 Years)

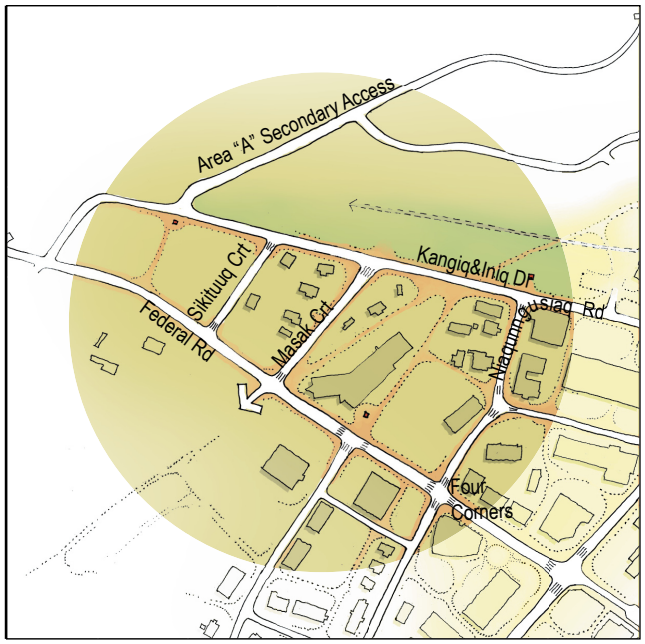
Actions within the short term horizon should include implementation of the Bypass Road link and other infrastructure improvements in the study area, with phasing identified.

1. The first phase of the Bypass Road would involve the section east of Federal Road, connecting to Niaqunngusiaq Road. As part of this project, the crosswalks along the Bypass should be implemented.

2. The pedestrian access improvements along Niaqunngusiaq Road and at the Four Corners should be implemented.

3. Prior to the implementation of the Airport Master Plan, the extension of the Bypass east of Federal Road should be complete. Also complete pedestrian improvements along Federal Road.

4. Complete the Transportation Master Plan.

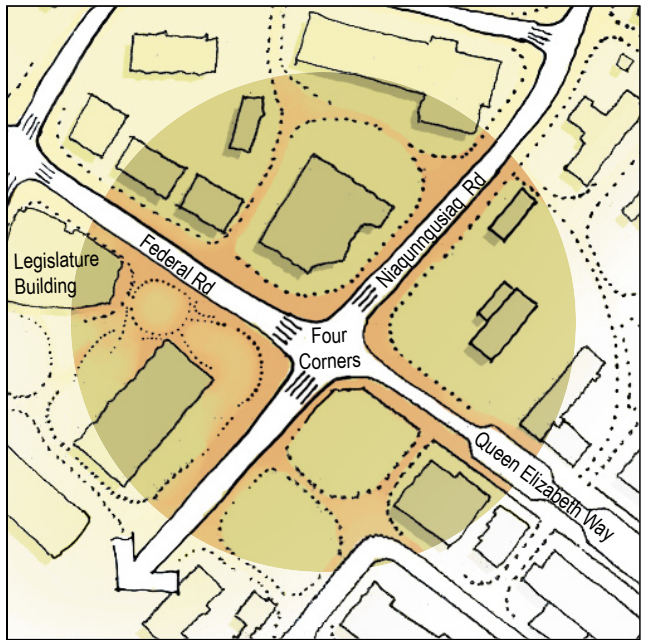


4.1.1. By-Pass connection

Of the four by-pass connection alternatives analysed, the recommended connection would extend Kangiq&Iniq Drive westbound to connect to Masak Court. This connection would run parallel to Federal Road, with optional connections towards Sikituuq Court and further westbound to the future Area "A" Secondary Access road.

To reduce the sightline issues on the existing curve adjacent to the Justice Centre, the recommended by-pass connection features a re-alignment where Kangiq&Iniq Drive intersects with Niaqunngusiaq Road forming a T-intersection. Snow drifting should improve given that the relocated intersection is further south from the lee of the hill. Traffic traveling on the by-pass connection through to Kangiq&Iniq Drive will have the right-of-way with stop control for traffic headed east from the Four Corners intersection along Niaqunnguusiaq Road.

A pedestrian crosswalk appropriately signed/demarcated and designed to be visible in all conditions is recommended at the intersection of Niaqunngusiaq Road at Kangiq&Iniq Drive.



4.1.2. The Four Corners and Nunavut Square

The recommended modifications to the road network are intended to reduce automobile traffic through the Four Corners, thus alleviating congestion experienced during peak periods. Pedestrian safety will also improve. As such, the Four Corners can become a centre for Iqaluit's civic interactions and pedestrian movement - much more than a confluence of vehicular traffic. Once implemented, the Iqaluit Pedestrian Walkways Plan (October 2004) prepared by Accutech Engineering North Inc. and Hilderman Thomas Frank Cram will provide a unique pedestrian environment in and around the Four Corners.

The Core Area and Capital District Redevelopment Plan (2005) identifies the open space adjacent to the Legislature Building and abutting Federal Road as an optimal site for Nunavut Square. Should Council adopt this site for Nunavut Square, a tendering and design process should be undertaken similar to the process for Iqaluit Square.

4.1.3. Realignment of Niaqunngusiaq Road

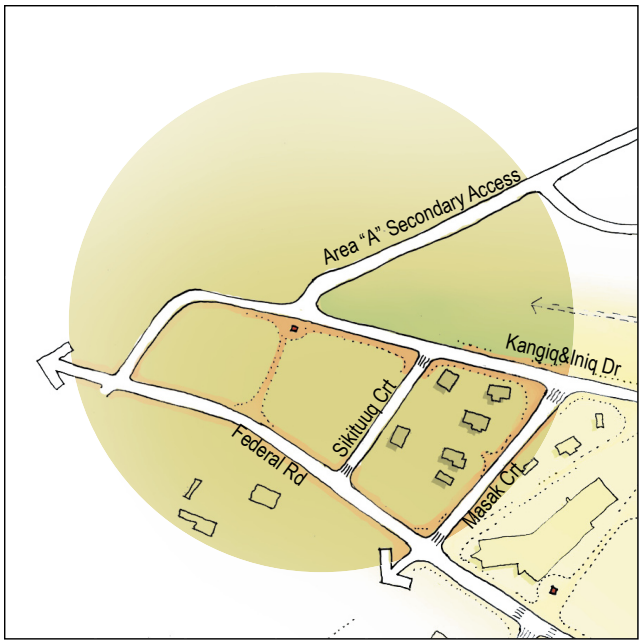
The recommended realignment of Niaqunngusiaq Rd is intended to reduce poor sightline and visibility issues along the existing curve adjacent to the Justice Centre. The recommended realignment would also serve to reduce the impact of snow drifting on the roadway, given its location south from the lee of the hill.

It should be noted that a slight reconfiguration of the High School access driveway would be required.

4.1.4. Street widening

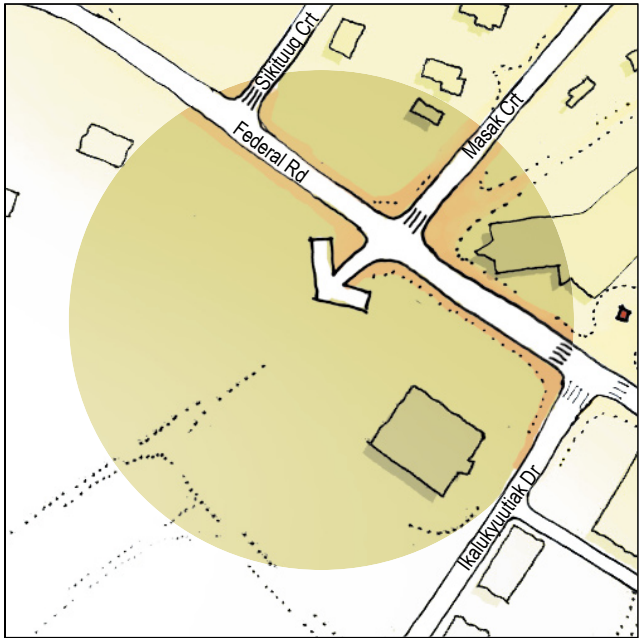
In order to minimize pedestrian and automobile conflicts along Niaqunngusiaq Road, the stretch between the Hospital and Outpatient Boarding House should be widened. During the winter months, a widened and paved right-of-way will ensure that snow accumulations along side the road do not interfere with pedestrian sidewalks.

The design elements for road delineators proposed in the Iqaluit Pedestrian Walkways Plan (October 2004) should be applied to Niaqunngusiaq Road, in order to maintain a consistent design approach throughout the Core Area.



4.1.5. Connection to Area "A" Secondary Access Road

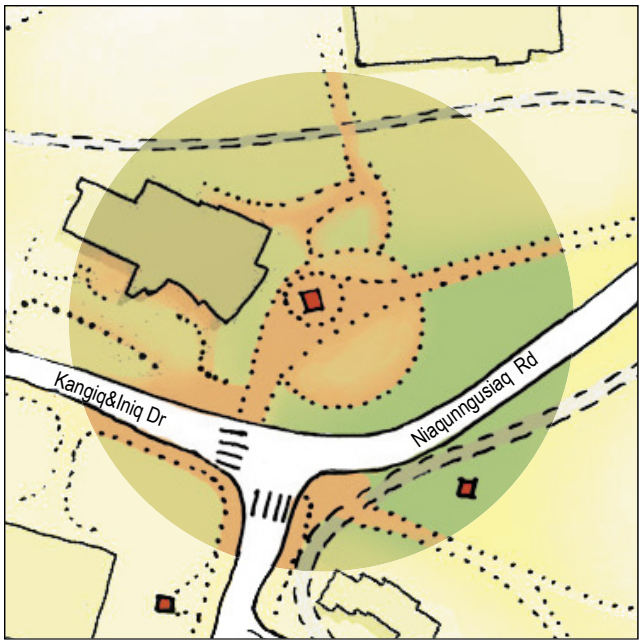
Any of the Bypass Road alternatives can be connected to the Area "A" Secondary Access Road (as shown in the alternatives figures). It would be prudent for the City to reserve the right-of-way for this link. The goal for Area "A" is to create a development close to the Core Area which is not overly dependent on the use of vehicles for travel. Thus it may not be necessary to construct even the Secondary Access to Area "A", but if that link is needed, it may also be advantageous to make the road connection to the Bypass. This is the rationale for the recommendation to reserve the right-of-way.



4.1.6. Extension of the Alternative East of Federal Road

The issue of whether the Bypass Road should extend to the east side of Federal Road relates primarily to the expansion of the Airport. The planned growth of the Airport and the industrial area around it represent a major increase in traffic volume. The Airport traffic is also one of the segments of traffic passing through the Four Corners that may be most receptive to creation of an alternative route. If the Bypass simply extends to Federal Road, it will attract some traffic from Federal Road, but this would be a small volume, based on the traffic counts. It would also attract some traffic from the industrial area east of Federal Road, but the amount would be limited by the discontinuity between the road network on the east and west sides.

The recommended Bypass Road link includes the extension to the east of Federal Road. Two sub—options have been identified. Both are feasible from a geometric design perspective. The shorter link, connecting into Ikaluktuutiak Drive, would be less costly. However, it would require acquisition of one property. The longer sub-option would follow the fuel pipeline corridor, and would not require property, but would be more costly. Should a decision be made to extend the Bypass east of Federal Road, the costs of the two sub-options (including property) should be reviewed to define the preferred alignment.



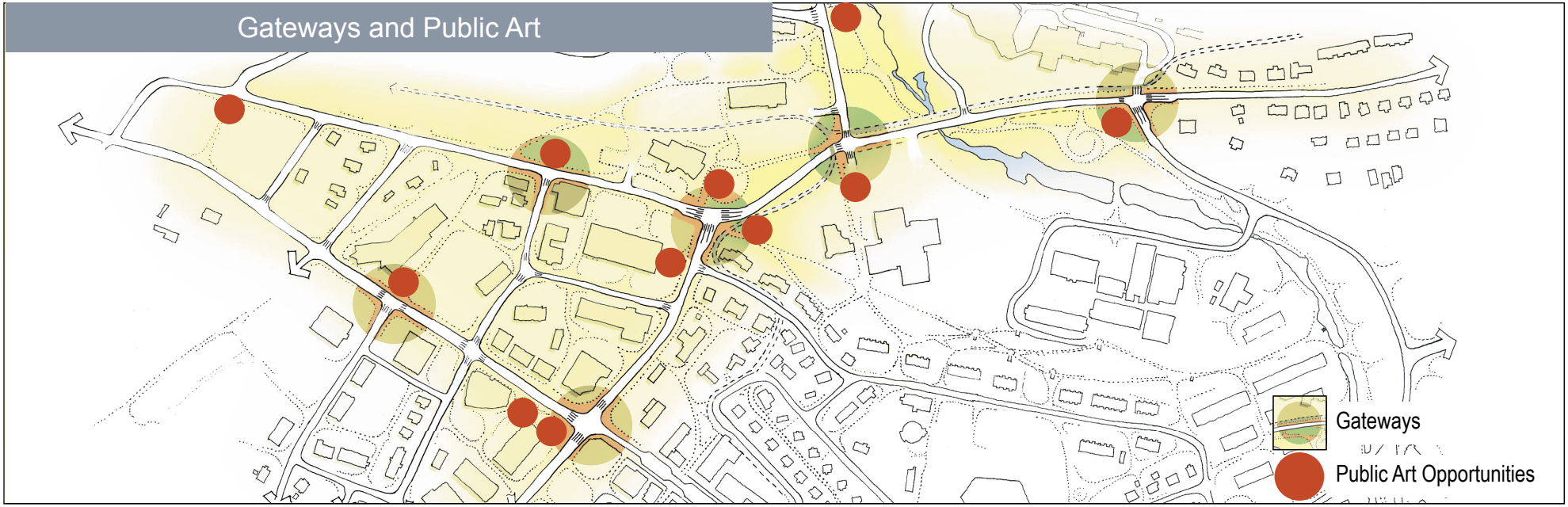
4.1.7. New Public Space

The recommended realignment of Niaqunngusiaq Rd. presents an opportunity for a new public space in front of the Justice Centre. Situated at a strategic visual terminus point, this public space should feature a prominent art piece visually attracting Core Area visitors to the space.

This new public space should also become part of the emerging public space system with implementation of both Iqaluit and Nunavut Squares. This new space should express, through design, the Inuit culture and identity.

4.1.8. Enhanced system of Trails and Landmark Open Spaces

The Design and Development of Walking Trails (2004) report prepared by Laird & Associates recommends the development of a Creek Trail connecting the Beach Gas Station waterfront near the breakwater to the hospital. The section of the Creek Trail to the south of the hospital site is a highly used pedestrian corridor, which connects several different origins to destinations. As the Creek Trail's development progresses, the corner of Niaqunngusiaq Road and Queen Elizabeth Way should be considered as an area for a visual marker or art sculpture.



4.1.9. Gateways

The Ring Road provides access to the Capital District from both the direction of the Airport and from the outer subdivisions. Arrival into the Capital district must be celebrated and identified through a sense of entry, which may be developed using:

1. a gateway element (such as public art) that defines an edge and announces an entry point; and
2. a differential treatment of the streetscape connoting a transition between two different parts of the city.

If realignment of the Ring Road is to be considered, additional opportunities to enhance this sense of a gateway may be explored where the Ring Road curves, adjacent to the Arctic College and the Justice Centre, where the existing edge of the Capital District is currently defined by policy.

4.1.10. Public Art / Furnishing

The Core Area and Capital District Redevelopment Plan (2005) recommends that art and carvings should be used to mark the landscape in order to define places where people are expected to congregate and linger. Recommended public art opportunities are delineated in the above map.

The proposed street furniture components contained within the Iqaluit Pedestrian Walkways (2004) plan should be considered for open spaces and gateway areas within the study area in order to ensure consistency throughout the Core Area and Capital District.

4.1.11. View Corridors and Visual Termini

Given the notable changes in topography and the bends of the road system, certain buildings and natural features have a higher visual prominence. The new Justice Centre is an example of this, standing in a highly visible location as the road turns. The art pieces located in front of Arctic College have a similar prominence.

Other significant views include the open and long views to the water and land. Protecting these views has an important role in respecting the traditional prominence of open spaces to the Inuit way of life.

A pedestrian promenade

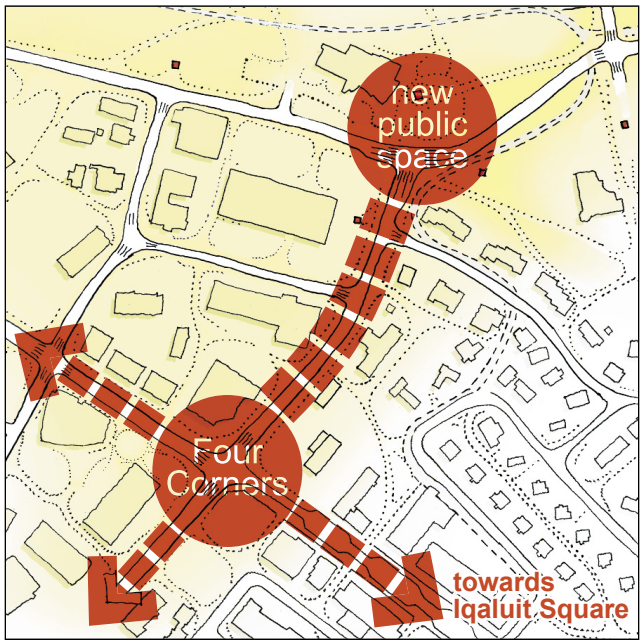
This area presents a unique opportunity to become one of the most vibrant pedestrian areas in Iqaluit. It concentrates several buildings of prominence, and connects two major civic spaces. Creating an attractive and welcoming environment for pedestrians will be an important step in shaping the identity of the Capital District.

4.1.12. Public Realm Character

In Iqaluit, streets are a primary component of the public realm. They help define how buildings and individual spaces relate to each other, they provide an important space for social interaction, and alongside the façade of buildings they constitute the public face of Iqaluit as a city.

The roadways included in the Study Area and in particular Niaqunngusiaq Road, constitute a significant part of the overall experience of the Capital District. The extension of the Niaqunngusiaq Road, moreover, functions as one of the primary entryways to the Capital District and the Core Area.

The design and streetscapeing of these roads will have a significant role in beautifying and defining the Capital District and Core Area. Elements such as the pedestrian walkways, lighting, public art, and street furniture, will be an essential part of building a unique sense of identity for the area. As such, the Core Area and Capital District Redevelopment Plan calls for an urban design that builds on, and makes visible, the unique arctic and Inuit heritage of Iqaluit.



This is especially relevant in areas of visual prominence, of pedestrian movement, and where the street provides access and frontage to buildings, such as the portion of road that connects the Justice Centre and the Four Corners. This area has a unique opportunity to become one of the most pedestrian friendly streets in the city, providing access to key buildings and civic spaces. A similar approach has been explored for Queen Elizabeth Way (extending south from the Four Corners towards Iqaluit Square).

Landmark Elements

Several buildings and areas of significant prominence are located in the Study Area, and have a landmark presence within the City of Iqaluit. Some of these include: Nunavut Square at the Four Corners, City Hall, the Justice Centre, the Arctic College, the natural areas, and the Hospital.

The streetscapeing and urban design considerations must recognize the importance of these structures to the City, as well as highlighting and providing access to them through design elements, visual corridors, and the configuration of the pedestrian realm.

4.2. Broader Transportation Issues

During the course of this study a number of broader issues related to the transportation needs of the City have come to light through discussions with the stakeholders, observations of existing conditions and future projections. These issues are beyond the scope of this study, but merit consideration.

Road Network Planning
Growth in development and vehicle ownership is expected to continue in Iqaluit. To better accommodate travel demands in the City and provide for the long-term growth of the City as a whole in an orderly way, it is important to look beyond the Bypass Road. It is estimated that the realignment of the Bypass Road coupled with the staggered hours initiative will alleviate congestion along Niaqunngusiaq Road and the Four Corners intersection for an interim period. However, it is also important to understand the impact of this traffic and longer-term growth on intersections and network links outside the study area.

Some stakeholders suggested that an “outer bypass road” would be needed to truly accommodate growth in the City. That would be one key issue in the larger study of road needs that is required - a Transportation Master Plan. Related to the question of road needs are the issues of how much demand can be met by transit and/or others modes, and how much demand can be controlled by travel demand management initiatives (such as the staggered working hours).

Public Transit
A public transit service was recently tried in the City, but discontinued. Stakeholders informed the study team that this has affected the mobility of some older residents. Other stakeholders noted that the Justice Centre and Hospital currently run shuttle services for their employees/visitors.

Re-starting the public transit service as a joint venture between the institutions currently operating such services (and perhaps others, such as the Territorial Government) could be more economically feasible. To assess the potential for this cooperative service, a comprehensive study should be carried out to establish guidelines, realistic operational characteristics and participants. The exploration of this initiative should be part of a Transportation Master Plan.

Snowmobiling
Snowmobiling provides the quickest means of travel during the winter season. However, due to the nature of its use, snowmobiling is difficult to regulate. The snowmobiling routes depend on winter conditions, which can vary widely from one year to the other, which further complicates the process of regulation. For the City to efficiently integrate snowmobiles in the transportation system, a comprehensive study should be carried out to analyze the numerous origin and destination points, continuity of the routes, density of snowmobiles on the routes and their conflicts with other modes of travel, in order to define an appropriate path system.

A Transportation Master Plan would incorporate such an analysis, together with a policy assessment of options for control of snowmobile activity in the City.

Pedestrian Trails

Snowmobile Trails

4.3. Pedestrian Network

Pedestrian network improvements are identified in this Section, focusing specifically on the preferred alternative for the Bypass (Alternative 2, including the extension east of Federal Road) and the other roads within the study area.

Safety Initiatives

Pedestrian safety is critical to the residents, as walking is an important mode of travel in the City. The walkways serve as transportation routes to destinations in the City (particularly the Core Area) and to recreational areas on the fringes of the City (small lake near The Road to Nowhere). Currently, speeding and poor sightlines, combined with the lack of identified pedestrian paths, are the main safety issues. Additionally, the lack of signage and awareness, poor drainage, current snow clearance practices and the unregulated use of snowmobiles combine to make walking a dangerous and less attractive alternative to vehicles. The following framework is proposed to address these safety concerns:

Speeding and Sightlines
The majority of vehicular and pedestrian conflicts take place along Niaqunngusiaq Road and at the Four Corners intersection. This is mainly due to speeding and poor sightlines on Niaqunngusiaq Road between Saputi Road and Trigram Road, and a heavy concentration of traffic at the Four Corners. In combination the Bypass Road and a realigned Niaqunngusiaq Road should reduce speeding along Niaqunngusiaq Road and minimize congestion at the Four Corners intersection.

Signage, Pedestrian Paths and Drainage
Adequate and appropriate pedestrian signage should be provided using the MUTCD standards. A road cross section is proposed which will include appropriate pedestrian paths and an improved drainage system. The "gutters" incorporated in the design will provide an appropriate space for collecting the water run-off from accumulated snow during thaws. Additionally, the vertical elements (designs based on the *Core Area and Capital District Redevelopment Plan*) along the edge of the drains will act as posts to accommodate the signage and help drivers identify the location of the edge of the driving surface, and protect the pedestrian facilities along the roadsides.

Snow Clearance
With the introduction of pedestrian walkways, the City's snow clearance practices will need to adjust, to avoid dumping snow on areas used by pedestrians. The boulevards along the sides of the road can be used to accommodate some of the snow accumulation, which will thaw into the drains, keeping the walkways safer for pedestrian usage.

Management of Stormwater and Snowmelt
It is acknowledged that the practice of sanding the roads and the amount of snow will create ongoing challenges for the City, in terms of both maintaining a clear path for pedestrians and keeping the gutters clear for drainage. The City should review its staffing to ensure that sufficient personnel are available to undertake this maintenance.

Another challenge will be dealing with the runoff from the proposed road cross-section. By creating a more organized path for the water to flow in, the water will flow more quickly and may accumulate at corners. The design for the Bypass Road and any revisions to Niaqunngusiaq Road and/or Niaqunngusiaq Road must include the design for handling the water flow from the gutters. This is likely the beginning of a continuing process of upgrading of the stormwater management system in the City, in terms of regrading to direct runoff to the watercourses within the City.

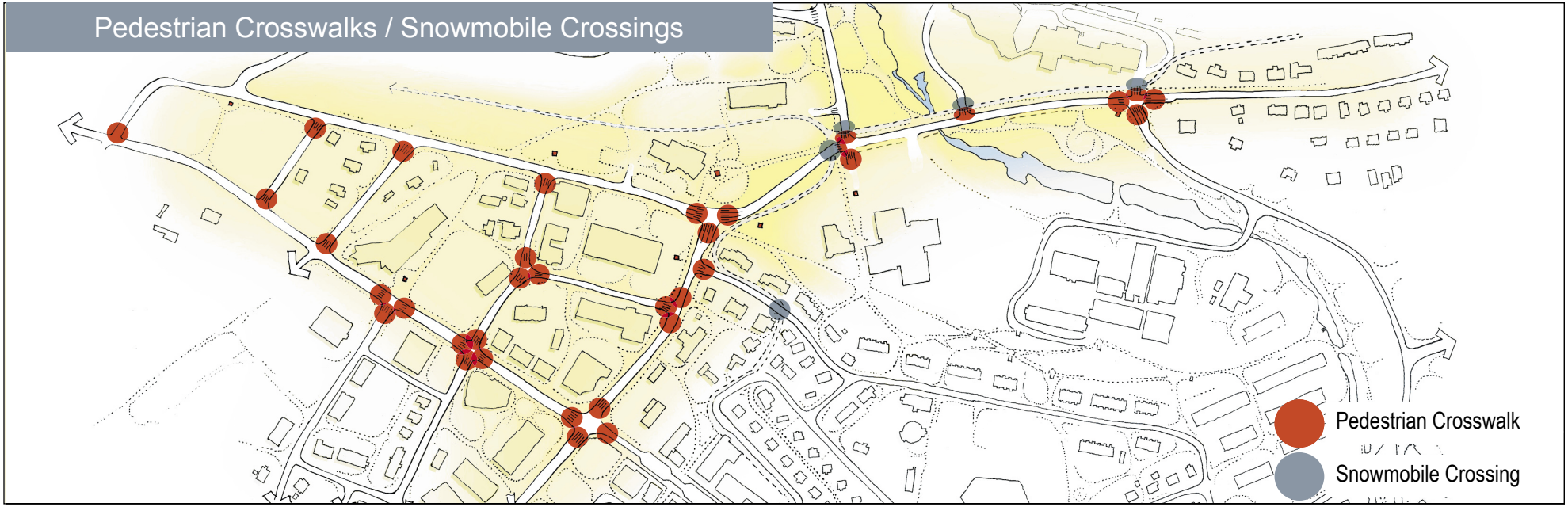
Snowmobiles
The issue of snowmobile paths and snowmobile crossings of roads is complex, because the snowmobiles have to date essentially made their own paths through the City, based on their destinations, the presence of the gas station on Niaqunngusiaq Road, and the snow cover. However, the recent experience of collisions and conflicts with other vehicles and pedestrians clearly indicates that some form of control over snowmobiles is needed to maintain safe operating conditions for snowmobile users and other citizens.

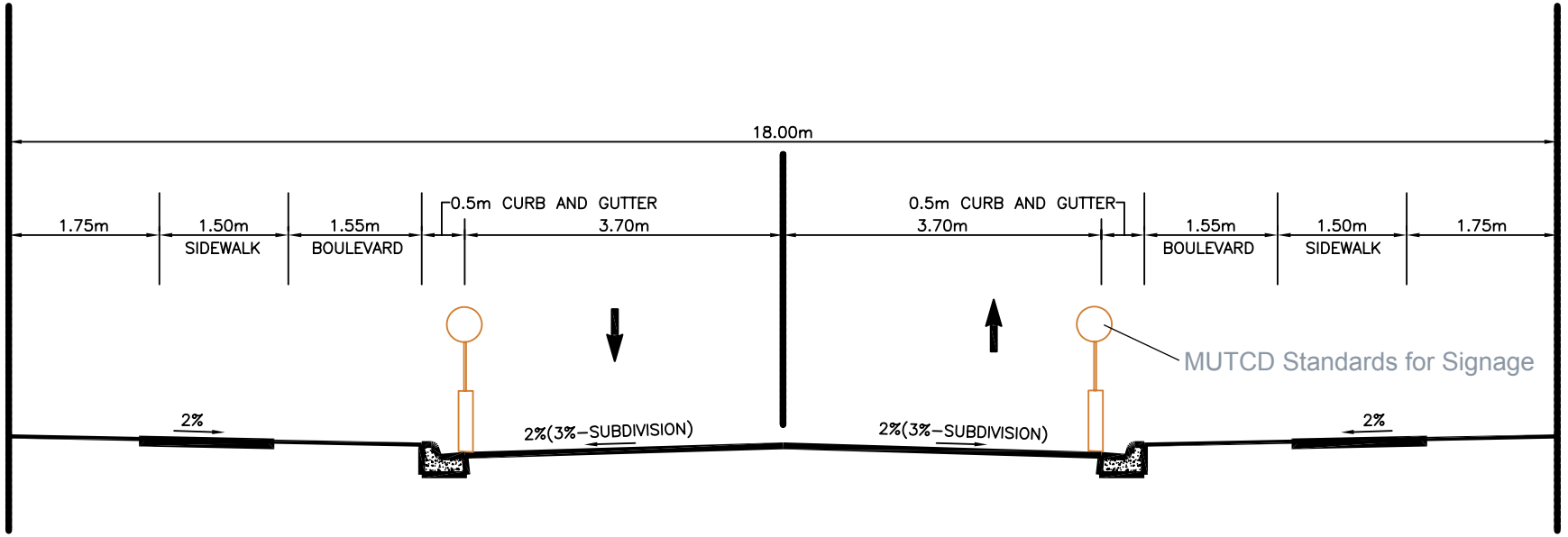
The issue of defining the entire snowmobile network in the Core Area is beyond the scope of this study (it is one that should be addressed through a city-wide Transportation Master Plan). One initiative that can be included in the plan for the Bypass and the other roads in the study area is identification of snowmobile crossing points on the roads under study. The analysis of current conditions has indicated a number of snowmobile crossing points on Queen Elizabeth Way and Federal Road. One crossing should be formalized on each link, to impose some control over snowmobile routes.

It is recognized that enforcement will be required, to ensure that snowmobiles cross only at these points. The City will need to review the availability of bylaw enforcement staff to ensure that there is sufficient capacity to cover this duty. Additional staff may be required. Bylaw enforcement staff have indicated that pursuit of snowmobile drivers is hazardous; it is not recommended that pursuit be included in the enforcement.

Snow clearance practices should have the goal of not limiting the sightlines for snowmobiles, in order to minimize the risk of conflicts with pedestrians and vehicles. Additionally, formalizing important snowmobile routes and using the appropriate signage to identify the snowmobile, pedestrian and vehicle routes will help separate the travel modes.

Pedestrian Crosswalks / Snowmobile Crossings





4.3.1. Pedestrian Walkways and Trails

The City has an extensive trail system, which is an integral part of the transportation network. This signifies a way of life for the people of Iqaluit. Hence, it is important to develop and improve the existing system for the following reasons:

- Improve the overall aesthetic quality of the City
- Establish important pedestrian connections
- Preserve the way of life of the people
- Define the Core Area and Capital District of the City

The recommended changes to the road network have incorporated criteria relating to reduction of pedestrian conflicts and enhancing the pedestrian friendliness of the Core Area. The fundamental change which can improve the pedestrian environment in the Core Area is the diversion of traffic away from the Four Corners intersection, which will be accomplished with the introduction of the Bypass Road.

Enhancement of Pedestrian Access along Niaqunngusiaq Road / Bypass Road

The Bypass Road/Niaqunngusiaq Road should include enhanced provision for pedestrian by implementing the cross-section (on opposite page), between Qikiqtani General Hospital and Niaqunngusiaq Road at the Justice Centre. Niaqunngusiaq Road from the Bypass Road to the Four Corners should also be enhanced through introduction of this cross-section. The improved pedestrian connection extending as far south as the Hospital is important to accommodate residents of the Outpatient Boarding House, students and staff at the High School, and students and staff at Arctic College.

Pedestrian Crosswalks

There are four areas where enhanced pedestrian crosswalks are recommended:

- The pedestrian cross-over of Niaqunngusiaq Road at Arctic College is currently in a location that is problematic from the perspective of safety, due to the horizontal and vertical curvature on Niaqunngusiaq Road. It is recommended that this crosswalk be relocated to the intersection of Saputi Road at Niaqunngusiaq Road, to facilitate crossings between the College and High School, in recognition of the expected increase in use of the School's facilities by the College. The stopping of traffic on Niaqunngusiaq Road to accommodate pedestrians will also facilitate left turns in and out of Saputi Road. The crosswalk should be located on the north side of the intersection, because this would be the logical travel path. A more formal crosswalk should also be introduced along Niaqunngusiaq Road at Saputi Road;

- The segment of Niaqunngusiaq Road between the Four Corners and the Justice Centre will become more important for pedestrians once the Centre opens. This link currently has very poor pedestrian facilities, particularly on the north side, where space is limited. Enhanced pedestrian crosswalks are recommended in this section, along and across Niaqunngusiaq Road.

- Along Federal Road, a crossing at Takijuq Street should be introduced, to facilitate pedestrian crossings between the Federal Building and the Legislature (on the east side) and City Hall and the Justice Centre (on the west side).

- Enhanced pedestrian crosswalks are recommended at the Four Corners, on each leg of the intersection. The design of these should be integrated with any concept for Nunavut Square.

The crosswalk design must provide for the safe movement of pedestrians and vehicles. They must be readily understandable to both drivers and pedestrians. The crosswalk signage and design must be visible at all times of the year, in the varying light conditions, and in varying snow depths. Standard sign heights prescribed in the Manual for Uniform Traffic Control Devices are difficult to maintain year-round as the road height changes due to lack of snow clearing. The design must also be durable for local weather conditions.

A flashing light to indicate a pedestrian's intent to cross is an option that may increase his/her visibility and overall safety. A button mechanism can be installed to a light post, which will activate the flashing light. Well pronounced signage has more effectiveness and credibility as traffic control devices. Any new electro-mechanical devices considered should be easily maintained and take into account the technical skill set available in Iqaluit (or within the realm of potential training of existing staff). Any structural design elements should be able to withstand the range of conditions expected.

Signage and Lighting

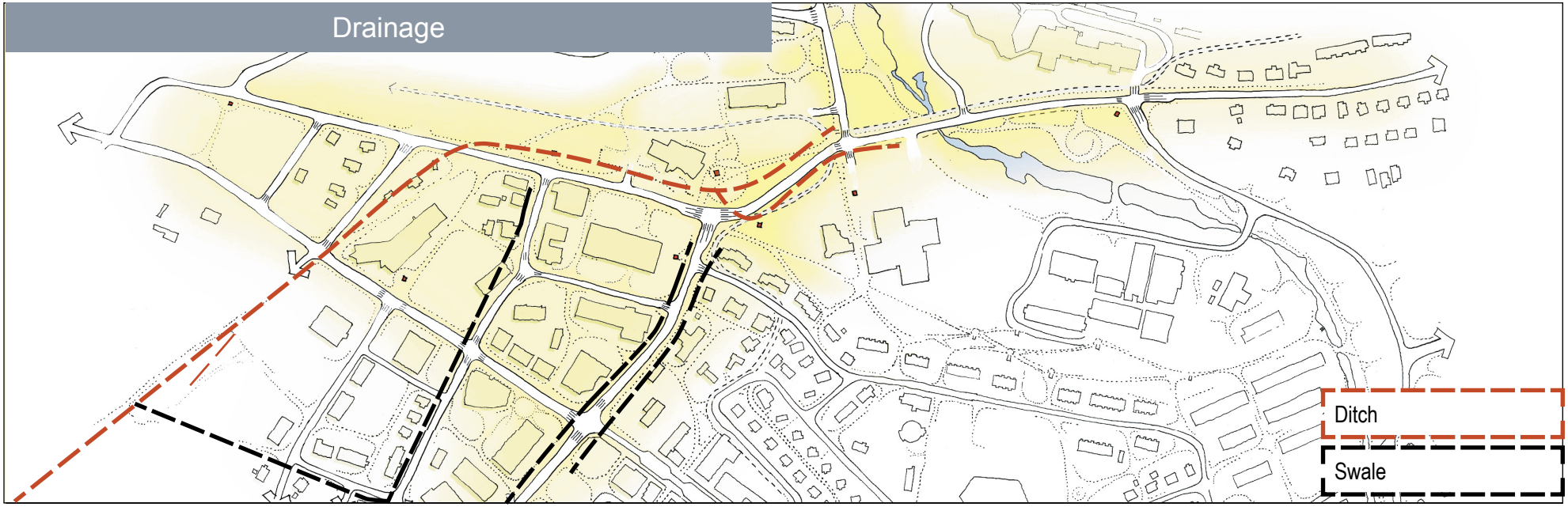
The issues of signage and lighting needs to be addressed in the design. Signage should reflect the Manual of Uniform Traffic Control Devices, but also be responsive to conditions in Iqaluit. Colour for the signs should be the light-reflective green-yellow now accepted under the MUTCD. This will be much more visible than the white signs currently in use. Given the issues posed by snowdrifting, an overhead sign should be part of the design.

Ideally, the crosswalk should be lit to ensure that pedestrians are visible as they enter and use the crosswalk. Providing a power source to light the crosswalk would be expensive and difficult to maintain. Discussions with suppliers of solar-powered crosswalk lighting suggest that they believe solar power would be sufficient during nine months of the year, but this does not provide a solution for the dark winter months. If providing a power supply is not feasible or is cost-prohibitive, it is recommended that the design be based on reflective signage alone.

Education

Education on the proper use of the crosswalks is essential. Drivers should yield to pedestrians waiting to cross. This should be included in the school curriculum. Also, it should be the focus of a media campaign to educate the entire population.

Drainage

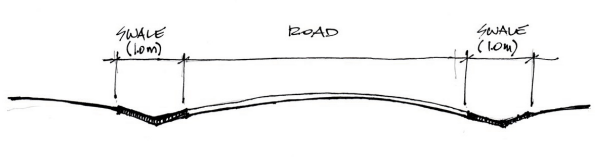


There are two types of storm water drainage systems in use in Iqaluit; ditches and swales.

Ditches will be located along both sides of the road right of way in front of the Qikitani General Hospital, Arctic College, Justice Centre and along the proposed by-pass road connecting to the pipeline ditch (in the vicinity of the new R.C.M. P. building). These ditches empty into the creek near the airport. Swales are required along both sides of the street in heavily built-up areas, such as Niaqunngusiaq Road from City Hall to the Navigator Hotel. Other streets in the Downtown Core and Capital District, such as Nunavut Drive, require swales to connect to ditches or creeks.

Ditch detail

Swale detail

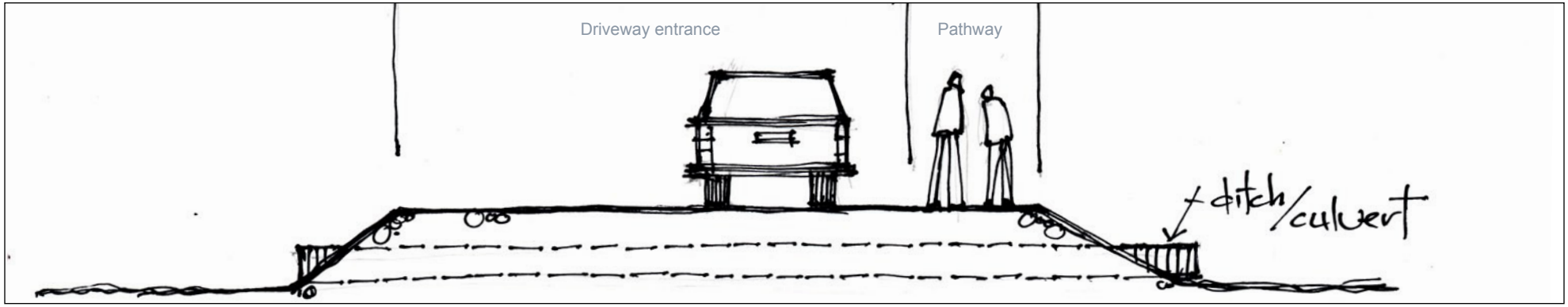


Ditches

Ditches are found along the road right of way in locations where deep drainage channels are not a danger to vehicle or pedestrian movement. Traffic flows safely from the public right of way to private property at clearly defined access points or driveways without any danger of falling into a ditch.

Swales

A swale is a shallow depression with positive drainage that carries away storm water run-off and is located at the edge of the travelled surface. The swale enables free movement of pedestrians and vehicles from the road right of way to private property through the drainage area.



Section: Driveway entrance and pathway

4.4. Drainage

Storm water drainage may become an increasingly difficult problem for pedestrians and motorists with increased development in the downtown core. More roads and parking areas are being paved with asphalt reducing infiltration and increasing the volume of run-off from storm water and snow melt. Poorly drained areas that were once seldom accessed are becoming major activity areas, such as the proposed by-pass extension along Kangiq & Iniq Drive. To alleviate major drainage issues in the future existing drainage conditions need to be reviewed and upgraded now.

There are two types of storm water drainage systems in use in Iqaluit; ditches and swales. Upgrading and extending the drainage system will be required in some areas to ensure the streets are adequately drained.

Ditches are found along the sides of the road right of way in locations where deep drainage channels are not a danger to vehicle or pedestrian movement. Traffic flows safely from the public right of way to private property at clearly defined access points or driveways without any danger of falling into a ditch. Driveways must be wide enough to allow for pedestrians and vehicles to access private property. A culvert under the driveway connects ditch segments, allowing for continuous flow of storm water.

A drainage assessment is required of ditches located along both sides of the road right of way in front of the Qikitani General Hospital, Arctic College, Justice Centre, along the proposed by-pass road as well as the pipeline ditch (near the new R.C.M. P. building). These ditches drain to the pipeline ditch that empties into the creek near the airport. In the vicinity of the Hospital, Arctic College, and Justice Centre new developments may have disrupted drainage that was not anticipated at the time of construction. Ditches in these locations should be reassessed for potential problems. Ditches may need to be upgraded along the base of the rock out crop below the Plateau subdivision. Connections to and along the pipeline ditch may require upgrading. Also, at some locations culverts may be required under the road right of way to connect the ditches.

In more built up areas where long continuous driveways or roads create large surfaces connecting the road right of way to private property deep ditches are not practical. Swales are recommended for these areas. A swale is a shallow depression with positive drainage that carries away storm water run-off and is located at the edge of the travelled surface. Swales enable free movement of pedestrians and vehicles from the road right of way to private property through the drainage area. Swales are required along both sides of streets in built-up areas, such as Niaqunngusiaq Road from City Hall to the Navigator Hotel. Other streets in the Downtown Core and Capital District, such as Nunavut Drive, require swales to connect to ditches or creeks.

Both ditches and swales require positive drainage to ensure free flow of storm water and to avoid areas where run-off collects. Some existing ditches and swales in the Downtown Core and the Capital District are not clearly defined; consequently storm water collects at various locations, especially intersections. The problem is further aggravated by some swales in this area that do not connect to outlets or ditches.

A Core Area Storm Water Management Plan is recommended in order to fully assess the drainage issues in the Downtown Core and Capital District. Problem areas need to be identified and drainage solutions need to be found to ensure the ditches and swales in the vicinity of the by-pass road drain freely and the storm water drainage system is not a danger to pedestrians and motorists.

Consultation for this Study

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