

AGREEMENT – ROAD PAVING IN NUNAVIK 2010–2014



Kativik Regional Government
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1. BACKGROUND

On June 13, 2002, the *ministère des Transports du Québec* (transportation, MTQ) and the Kativik Regional Government (KRG) signed the agreement entitled *Paving Project for Public Roads of Local Interest in the Northern Villages of Nunavik*.

Given the positive impacts and spinoffs generated by this agreement for the residents of Nunavik and considering the ongoing expansion of local road networks in response to population growth, the KRG believes that road paving work should continue.

The proposals contained in this document were prepared by the KRG Municipal Public Works Department in recent months and approved by Resolution No. 2009-467 adopted by the KRG Executive Committee. This document identifies essential road paving needs for the next five years (2010–2014).

2. AGREEMENT NO. 59-020 (2002)

2.1 Scope

The agreement entitled *Paving Project for Public Roads of Local Interest in the Northern Villages of Nunavik* provided \$35.5 million for the paving of 90 km of roads in the 14 communities, including airport access roads. In October 2009, on the completion of work in the two final communities (Kangijsujuaq and Umiujaq), roughly 90.8 km of roads had been paved over seven years. Prior to the work carried out under this agreement, the only paved roads in the region were in Kuujjuaq: a 750-m section of the road between the health centre and the airport was paved in the 1980s and another 13.2 km of streets were paved between 1994 and 1996 under a project carried out by the Northern Village of Kuujjuaq.

Agreement 59-020 – Achievements			
Village	Year	Planned (km)	Completed (km)
Kangijsualujjuaq	2008	7.7	8.6
Kuujjuaq ¹	2002 and 2004	3.0	6.0
Tasiujaq	2007	4.1	5.8
Aupaluk	2006	3.1	2.6
Kangirsuk	2004–2005	6.6	5.2
Quaqtaq	2008	3.6	3.8
Kangijsujuaq ²	2009	8.3	8.3
Salluit ³	2003	13.5	9.7
Ivujivik	2002	3.0	2.7
Akulivik	2006	4.6	4.8
Puvirnituq	2004	8.0	10.0
Inukjuak	2005	12.2	11.4
Umiujaq ²	2009	4.8	4.8
Kuujjuarapik	2007–2008	7.5	7.1
TOTAL		90.0	90.8

- ¹ *Kuujjuaq: bituminous treatment – experimental technique.*
- ² *Kangiqsujuaq and Umiujaq: Work in these communities was completed recently. The paved distances have not yet been accurately determined. The paved distances indicated are therefore estimates equal to the planned distances.*
- ³ *Salluit: Much less paving was completed than planned since the relocation of an entire neighbourhood made it unnecessary to pave those streets at that time.*

2.2 Objectives

The objectives of the agreement entitled *Paving Project for Public Roads of Local Interest in the Northern Villages of Nunavik* were not specifically indicated in that document. Nonetheless, during talks and negotiations leading to the agreement, the following objectives were discussed:

Objective 1: Improve the quality of life of residents by reducing the dust generated by vehicles on sand and gravel roads. This concern was expressed by residents during public consultations held by the MTQ in the communities in the fall of 2000 and the winter of 2001 regarding regional transportation plans.

Objective 2: Extend the service life of vehicles as well as reducing maintenance and repair costs for residents and public organizations (mainly the fleets of drinking water distribution and wastewater collection trucks operated by the Northern villages).

Objective 3: Improve road safety.

Clearly, the work completed under the agreement met all of these objectives.

The work also had a major impact on local economies and employment. Although not an identified objective, the KRG made a point of purchasing supplies locally and hiring local workers insofar as possible. An estimated 17% of the cost of each project was spent in the concerned community (purchases and jobs). Regarding jobs specifically, an average of 15 local workers were hired in each community for between four and 12 weeks, depending on the scale of the project. These positive spinoffs were made possible because the agreement permitted the work to be carried out in-house, which is to say by the KRG and the Northern villages.

Moreover, by carrying out the projects in-house, KRG and Northern village employees were able to develop their administrative and technical management skills (pooling of knowledge between the Northern villages and the KRG). The experience gained in this manner also proved useful for the implementation of various internal projects, not to mention other projects covered under agreements with different Québec-government departments.

In short, the fulfilment of the objectives under the agreement fostered the development of the Northern villages and the KRG.

3. A NEW ROAD PAVING AGREEMENT FOR NUNAVIK

3.1 Scope

In order to ensure that road infrastructure in the Northern villages continues to be well adapted and meet the needs of the rapidly growing population in the coming years, the KRG carried out an assessment.

The proposals contained in this document are intended to follow up Agreement No. 59-020 and moreover target similar objectives:

- Improve the quality of life of Nunavimmiut (by reducing dust) and road safety.
- Extend the service life of vehicles, and reduce related maintenance and repair costs.
- Create jobs.
- Foster the pooling of knowledge between the Northern villages and the KRG.

Plus one new objective:

- Ensure the upkeep of the road infrastructure constructed under Agreement No. 59-020 and the related investments.

3.2 Needs Analysis

The needs identified by the KRG can be split up into four categories:

- a) Paving of new roads.
- b) Upgrading of existing infrastructure.
- c) Conservation work.
- d) General.

a) Paving of New Roads

The road paving work proposed between 2010 and 2014 is for roads that were built in each Northern village since the last paving project. For the most part, the new roads were built to permit the construction of housing units required to meet strong population growth. According to Statistics Canada, the rate of growth in Nunavik was 12% between 2001 and 2006, quite probably the highest growth rate for any region in Québec and Canada. In fact, the populations of certain villages grew between 17 and 24% (source: Statistics Canada, preliminary data from the 2006 Census).

Between 2001 and 2009 in Nunavik, 827 dwellings were constructed: 560 social housing units plus 267 units for regional public organizations (such as the Nunavik Regional Board of Health and Social Services, the Kativik School Board and the KRG). In addition, 30 to 40 private homes and several public buildings (such as offices, schools, businesses and garages) were constructed. While the number of building projects planned for the next five years has not been confirmed, new housing demand generated by overcrowding and the development of regional organizations strongly suggest continuing growth that may be even more significant than witnessed in recent years. It may be supposed that between 600 and 1000 units will be constructed in the next five years.

Although the KRG does not consider it cost effective to mobilize paving equipment

(asphalt plant, heavy equipment, etc.) for less than 3 km of work, all the villages with new road paving needs totalling at least 1.5 km are considered short- or medium-term projects. Based on actual construction, the 3-km threshold could be reached in any of these communities in the coming years.

Road Construction in Urban Areas (2002–2009)	
Village	Unpaved new roads (km)
Kangiqualujuaq (2008)	0.8
Kuujuaq (2004)	3.8
Tasiujaq (2007)	0.5
Aupaluk (2006)	0.3
Kangirsuk (2005)	1.6
Quaqtaq (2008)	0.0
Kangijsujuaq (2009)	0.0
Salluit (2003)	4.9
Ivujivik (2002)	1.1
Akulivik (2006)	0.3
Puvirnituaq (2004)	1.6
Inukjuak (2005)	1.5
Umiujaq (2009)	0.0
Kuujuarapik (2008)	0.0
TOTAL	16.4

Based on these needs, the KRG proposes the following work:

Paving of New Roads		
Year	Village	Proposed (km)
1 and 2	Kuujuaq	3.8
3	Salluit	4.9 ¹
4 or 5	To be determined ²	3-km minimum
TOTAL		11.7

¹ Includes the paving of the road around the airport (constructed in 2003 and 2004): 625 m.

² The selected village would most likely be Inukjuak, Puvirnituaq or Kangirsuk for at least 3 km of paving, given the strong population growth in these communities and the possibility that new sections could be added by the MTQ to airport access roads in Kangirsuk and Puvirnituaq. As this work is only proposed for years four and five, the situation will be re-assessed at a later date in order to determine if any community meets the applicable criteria.

b) Upgrading of Existing Infrastructure

Under Agreement No. 59-020, roads were paved in the first communities seven years ago. Since, adjustments have been made in some villages to correct specific problems but, generally speaking, road components (paving and drainage) are working properly.

The only major problem encountered involves the drainage system in the lower sector of Salluit. Constructed in 2003, the system was based on a traditional design with ditches and culverts. The sector is however relatively flat which meant that, to create a standard ditch gradient and install culverts at a standard depth (carrying capacity), some ditches were dug to a depth of more than 1.5 m. This situation has made it difficult for drinking water delivery and wastewater collection trucks to access certain dwellings, and increased maintenance work that the municipality is not able to fully manage. (Sand and debris accumulate much more easily in deep ditches and more culverts are needed to give access to residences.) The only other village with a traditionally designed system (2002) is Ivujivik. However, given that the road network in this community is small (2.7 km) and that the topography is steep, the system works well.

In 2004, following the road paving project in Salluit, the KRG revised its drainage-system design, opting to make more extensive use of gutters. Gutters have made it possible to significantly limit the number of ditches and replace them with shallow trenches. Trenches are easier to maintain and, without culverts, access to dwellings is improved. Gutters moreover thaw more quickly in spring, unlike culverts.

The KRG therefore proposes in this document that the drainage system in the lower sector of Salluit be completely redone. The work would involve replacing several culverts with gutters and require the resurfacing of a number of the roads paved in 2003 in this sector. The problems described regarding the current drainage system have moreover resulted in overflowing and the erosion of certain sections of road (shoulders and pavement edges). Corrective work is therefore necessary to fix these problems too. Overall, it is estimated that 3.1 km of roads (50% of the sector) need to be repaved. It should also be noted that this work does not include paving of the airport access road: it is estimated that 2.5 km of the access road need to be repaved to correct the damage caused by structural deterioration. Once the necessary equipment is in the community, it would certainly prove cost-effective to carry out this work at the same time. It should be noted that the major structural repairs to the airport access road (not contemplated under this proposal) would also need to be carried out beforehand or simultaneously with the paving work.

In this respect, the main problem observed since the last paving projects were carried out concerns the general condition of airport access roads, specifically in Salluit, Akulivik, Tasiujaq and Kangiqsualujjuaq. Shortly after the completion of paving, serious sagging began to occur in these communities. The situation in Salluit was in fact monitored closely by the MTQ and documented. It seems that water accumulation and poor drainage along the road contributed to permafrost thawing and caused the road structure to deteriorate. KRG Transportation Department employees have indicated that deterioration was a problem even before the road was paved.

In Tasiujaq and Kangiqsualujjuaq, the sagging is occurring at the culverts. These problems may be occurring in part because some culverts have reached the end of their service lives. By way of example, a culvert replaced by the KRG in 2009 on the airport access road in Umiujaq was deformed and separated, leading to sagging. A considerable amount of runoff water appeared to be accumulating and infiltrating under the road. These observations were moreover confirmed by local airport employees: along the sections of road with broken culverts and water infiltration, repair work has

been carried out regularly for several years to correct sagging and movements. Generally speaking, airport access roads were constructed in the 1980s and require major repair work.

A problem is also under investigation in Akulivik. Although the exact cause has yet to be identified, as is the case in Salluit, Tasiujaq and Kangiqsualujjuaq, the problem seems to be structural. Pavement quality is not the issue.

The repair, construction and repaving of airport access roads, either in part or in whole, are in no way contemplated in this document. Such work will need to be covered under other agreements or contracts between the MTQ and the KRG or another contractor.

A second important upgrading project involves the adding of a second layer of pavement to the roads in Kuujjuaq. Paving work in this community was carried out in two phases:

1994 to 1996: Drainage system construction and the laying of a single layer of bituminous treatment.

2002 and 2006: Bituminous treatment.

The 13.2 km of roads paved between 1994 and 1996 under a project funded by the Northern Village of Kuujjuaq without any government assistance was completed using recycled bitumen (dating from the 1950s or 1960s). After close to 15 years of use, the pavement over a large part of the road network is beginning to show cracks (transverse and tiled) and potholes. Municipal employees work from June to September to repair these problems, but it is obvious that the pavement has reached the end of its service life. In the summer of 2009, the KRG and the Northern village took advantage of the Gasoline Excise Tax and Québec Contribution Program to fund upgrading work on the drainage system, installing additional gutters and culverts as well as replacing others.

In 2002 and 2006, the KRG applied an experimental bituminous treatment to pave 6 km of roads under Agreement No. 59-020. The quality of the final product was excellent, but the technique proved inappropriate for residential streets. The frequent sharp turning of drinking water delivery and wastewater collection trucks produced cracks, holes and partial tearing of the surface. On the other hand, along straight sections of road without intersections or service entries, this technique held up very well. Given the qualities of this technique, the KRG integrated it, in 2005, into its Isurruutiit Program for municipal infrastructure projects with the *ministère des Affaires municipales, des Régions et de l'Occupation du territoire* (municipal affairs, regions and land occupancy). Since, the technique has been used to pave roads (leading to waste disposal sites and wastewater lagoons) outside of built-up areas.

The KRG therefore proposes in this document that a second layer of pavement be added to all the paved roads in Kuujjuaq (asphalt or bituminous treatment) totalling 19.2 km.

c) Conservation Work

Over the years, the municipalities, the KRG Transportation Department and the KRG Municipal Public Works Department have identified a small number of problems in addition to those described in the preceding section of this document. Specifically:

- Potholes and cracking in pavement.
- Deterioration and ineffective functioning of drainage systems.
- Deterioration of pavement edges.

In the fall of 2009, the KRG directed an engineering consultant firm to inspect and analyze all the paving work carried out since 2002 under Agreement No. 59-020. The deficiencies noted mainly concerned drainage problems. Regarding the pavement, the

deficiencies noted were qualified as the result of normal wear and tear (cracking and potholes) and not poor quality pavement. The observations described in the report make it possible to conclude that the work carried out was generally well done and the condition of the pavement is generally good.

It is also obvious that, despite training delivered to municipal employees during local paving projects, pavement and drainage system maintenance is inadequate. Although the resulting problems are generally minor, they can sometimes grow to huge proportions. (For example, a crack that is not repaired properly and quickly will grow year after year and eventually require new paving work; a blocked culvert can cause flooding and then erosion and deterioration of pavement edges; etc.) In order to preserve the work and investments completed to date, the KRG therefore also proposes in this document to organize an itinerant team of qualified workers to visit all the communities not identified in the preceding sections for new paving projects. With municipal employees, the team would carry out pavement repair and conservation work, while simultaneously delivering training. These activities would not include correcting the major problems described in the preceding section regarding airport access roads. It would rather involve repairing cracks, filling potholes with cold asphalt, repairing pavement edges, resurfacing shoulders, as well as cleaning and repairing drainage systems.

It is proposed that this repair and conservation work be carried out over five years, with special emphasis placed on this work in the final year.

d) General

To complete the work described in the preceding sections of this document, certain investments in existing and new equipment should be made.

Regarding existing equipment, funding will mainly be needed for asphalt plant maintenance required due to normal wear and tear.

Regarding new equipment, a bitumen spreader truck (binder) will be needed for the application of a second layer of pavement.

Funding will also be needed for professional services (engineering) in addition to the preparation of paving plans for each village. Professional services could include general consultations concerning, for example, asphalt production, installation techniques or the drafting of reports.

3.3 Summary of Costs

Five-Year Proposals (2010–2014)						
Phases	Kuuujuaq		Salluit	TBD	11 villages	Total
	Year 1	Year 2	Year 3	Year 4	Year 1–5	
Mobilization (plant and equipment)	\$360,000		\$360,000	\$360,000		\$1,080,000
Paving of new roads, section 3.2 a)	3.8 km / \$1,500,000		4.9 km / \$1,800,000	Min.3.0 km / \$1,000,000		11.7 km / \$4,300,000
Upgrading of existing roads, section 3.2 b)						
- Installation of a second layer		19.2 km / \$3,000,000	3.1 km / \$500,000			22.3 km / \$3,500,000
- Drainage			\$225,000			\$225,000
Conservation work, section 3.2 c)	11 communities @ \$100,000 each:				\$1,100,000	\$1,100,000
General, section 3.2 d)						
Equipment maintenance	\$100,000					
New equipment	\$350,000					
Professional services	\$50,000					
Subtotal, section 3.2 d)	\$500,000					\$500,000
Subtotal	\$2,360,000	\$3,000,000	\$2,885,000	\$1,360,000	\$1,100,000	\$10,705,000
¹ Inflation: 2% to be applied annually beginning in the first year. The amounts shown in the table are for 2009.	Inflation ¹				2% / year	\$559,100
² Contingencies and management fee are based on the subtotal of the preceding amounts.	Contingencies ²				10%	\$1,126,410
³ Pursuant to Agreement No. 59-020.	Management fee ³				6%	\$743,430
TOTAL (not including taxes)						\$13,133,940

4. CONCLUSION

The paving work carried out over the last seven years generated many positive impacts for the Northern villages and Nunavimmiut in general:

- Improvement of air quality by reducing dust.
- Reduction of vehicle mechanical repairs and related costs.
- Job creation, etc.

It is highly likely that the investments proposed in this document will extend these very same impacts.

The KRG possesses a thorough and unique expertise regarding the production and installation of asphalt in the North, both on worksites and in terms of administration. A solid knowledge base was developed and remains in place for the time being. Given the positive impacts of the paving program, the current situation and, especially, future needs, the KRG feels that it would only be beneficial to continue the program under a new agreement beginning as soon as the summer of 2010.

Should it prove impossible to reach a new agreement, paving needs will only continue to grow larger and significant start-up costs will also have to be taken into account. For example, the KRG currently owns two asphalt plants and complete sets of related heavy equipment (paver, roller, etc.). All of this equipment is in Nunavik and would be remobilized under a new agreement. However, if a new agreement can not be reached in 2010, this equipment will have to be sold and eventually new equipment repurchased. Moreover, since the work proposed in this document could be completed with a single set of equipment, the second set would likely be sold. However, during the time it takes to reach a new agreement, paving needs could grow to the point of requiring the operation of a second asphalt plant and set of heavy equipment. Under such a scenario, repurchasing costs would be significantly more expensive. As well, the KRG currently has a very strong administrative and worksite team in place. The suspension of paving projects for even a single year could eventually require the KRG to rebuild this team, with the result that key human resources might no longer be available.

For these reasons, the KRG believes that the public roads paving program should be renewed immediately.

As all the funding provided for under Agreement No. 59-020 has been spent and all the planned work has been completed, it is important that the KRG and the MTQ immediately undertake talks to allow a new paving program to start as soon as the 2010 construction season.