

Evaluation of Phase I of the 24-Hour Snow Clearing Pilot Project

Policy and Planning Division

Department of Transportation and Works

Executive Summary

During Winter 2008-09 Phase I of a two phase pilot project that provided 24-hour snow clearing service on high-traffic road segments throughout the Province five nights a week (Sunday through Thursday) was implemented on various road segments across the island portion of the Province. Road segments selected to be included in the pilot project were portions of the Trans Canada Highway and major trunk roads. To evaluate the effectiveness, necessity, and long-term sustainability of providing 24-hour snow clearing to high-traffic road segments throughout the Province, stakeholder surveys and a focus group were conducted. Although a significant number of participants indicated that the conditions of the highway (60%) and timeliness of snow clearing service (58%) had improved since the implementation of the pilot project, a number of individuals suggested that road conditions (30%) and timeliness of snow clearing (34%) had not changed as a result of the provision of 24-hour snow clearing.

With respect to the effect that implementing 24-hour snow clearing on high-traffic sections of the Trans Canada Highway and major trunk roads had on the overall cost of snow clearing, a direct relationship is also hard to determine since many variables, such as weather severity, play a significant role in the amount of time and product spent on the Province's roads. While the Department did realize an overall cost-savings in snow and ice control for Winter 2008-09 over 2007-08, Winter 2008-09 was much less severe than 2007-08 in terms of total snowfall and thaw-freeze cycles (with the exception of the Western Region).

Analysis of the financial data and feedback from the surveys and focus group indicate that, while the overall financial effects cannot be directly determined, results of the pilot project have been positive overall and this project should be continued for 2009-10.

Background

With a population density of 1.4 people per square kilometer, Newfoundland and Labrador relies heavily on the highway system, which comprises approximately 9,400 kilometers of road, for access to goods and services as well as commuting to and from work and as a social network. The highway system is utilized throughout the year, including during the winter months when the residents of the Province are often faced with adverse weather and driving conditions. Prior to the implementation of the 24-hour snow clearing pilot project, the Department provided a very good level of service in a cost effective manner for the peak traffic hours. Weekday snow clearing service effectively covered 16 hours of the day. Scheduled snow clearing service was not provided on weekends, however it was provided on an on-call basis in the case of an adverse weather event. The Department also provided 24/7 emergency service for fire and ambulance support, which was coordinated through the Department's 24/7 winter maintenance dispatch service based out of Deer Lake and Happy Valley-Goose Bay.

Over the past few years there has been an increasing level of public discontent and media attention related to the fact that the Department was not operating snow clearing equipment on a 24-hour basis, while all other Atlantic Provinces do provide at least some form of 24-hour service. Nova Scotia and PEI have a two shift system and provide 24-hour snow clearing service to all roads during storm events. New Brunswick provides 24-hour coverage to all roads with more than 2,000 vehicles per day.

The Department first started providing 24-hour snow clearing on a trial basis for five nights a week (Sunday – Thursday nights) from January to March in 2006-07 on the Outer Ring Road, Pitts Memorial Drive, and Robert E. Howlett Memorial Drive (Goulds Bypass). From December to March in 2007-08, dedicated service was again provided on these road segments, and the service was expanded to include the Trans Canada Highway from the Corner Brook Ring Road Interchange (the most westerly entrance to Corner Brook) to Deer Lake, and on the Lewin Parkway. During these two winters, 24-hour snow clearing service was provided on these road segments without public notification. Anecdotal evidence suggested that this increased service resulted in better overnight and early morning driving conditions, especially after a substantial snowfall, and a reduction in the number of complaints received by both the regional office and the head office.

The full pilot project that was implemented from November 30, 2008 – April 3, 2009 included the road segments serviced during the trial, as well as additional routes throughout the island portion of the province. Robert E. Howlett Memorial Drive, however, was not identified as a high traffic road segment in the 2007-08 traffic counts, so 24-hour snow clearing service was not provided on this route during 2008-09. In total, just under 1,750 lane kilometres of the Trans Canada Highway and major trunk roads throughout the island portion of the Province were included in the 24-hour snow clearing pilot project in 2008-09.

Table 1 presents a visual of the onset of 24-hour snow clearing on the various snow routes by date implemented and the length of each road segment in lane kilometres.

The Provincial Government invested \$1.7 million to launch the pilot project, which provided extended snow clearing service (9:30 pm to 4:30 am in the Avalon and

Eastern Regions and 10:00 pm to 5:00 am in the Central and Western Regions) on Sunday through Thursday nights in these pre-determined areas of the Trans Canada Highway and major trunk roads on the island portion of the province from November 30, 2008 to April 3, 2009. The pilot project was not implemented in Labrador due to low traffic volumes. The goals of the pilot project were:

1. To improve the driving conditions for traffic traveling on the TCH and major trunk roads during the overnight hours
2. To improve the driving conditions for traffic traveling on the TCH and major trunk roads during the early morning hours

To evaluate the effectiveness, necessity and long-term sustainability of providing 24-hour snow clearing to high-traffic road segments throughout the Province, various research methodologies were utilized, including stakeholder surveys and a focus group. Analyses of financial and weather information were also conducted to determine the cost effectiveness of the pilot project, and to allow Government to determine if the project should be continued.

Table 1 – 2008-09 Snow Routes Included in the 24-hour Snow Clearing Pilot Project

Snow Route	Route	Dec 08 - Mar 09	Dec 07- Mar 08	Dec 06 - Mar 07	Lane Km
	<u>Avalon Region</u>				
151-01	Route 1 (TCH) – from Logy Bay Road to Foxtrap (Includes the Outer Ring Road)	✓	✓	✓	123.6
151-02	Route 2 (Pitts Memorial Drive/CBS Bypass) – from New Gower Street to Legion Road	✓	✓*	✓*	104.5
152-01	Route 1 (TCH) – from Foxtrap to Whitbourne	✓			244.0
	<u>Eastern Region</u>				
251-01	Route 1 (TCH) – from Whitbourne to Clarendville	✓			315.2
	<u>Central Region</u>				
351-01	Route 1 (TCH) – from Notre Dame Junction to Gander	✓			164.0
351-02	Route 1 (TCH) – from Notre Dame Junction to Grand Falls Windsor	✓			169.0
351-03	Route 350 (Botwood Highway) – from TCH to Botwood	✓			32.1
	<u>Western Region</u>				
451-01	Route 430 (Great Northern Peninsula Highway) – from Deer Lake to Wiltondale	✓			67.0
	Route 430 (Great Northern Peninsula Highway) – from Wiltondale to Rocky Harbour (through Gros Morne National Park – Parks Canada Jurisdiction)	✓			79.3
	<i>Route Total</i>				146.3
451-02	Route 1 (TCH) – from Corner Brook (Exit 4 – Ring Road) to Deer Lake	✓	✓		199.8
	Route 450/450A (Lewin Parkway/Ring Road)	✓	✓		50.0
	<i>Route Total</i>				249.8
451-03	Route 1 (TCH) – from Corner Brook (Exit 4 – Ring Road) to Stephenville (Exit 3 – White’s Road)	✓			131.7
	Route 460 (Port au Port Highway) – from intersection with TCH to the Stephenville Cold Brook Depot	✓			66.0
	<i>Route Total</i>				197.7
	Total TCH				1,347.3
	Total Trunk Roads				398.9
	<u>Grand Total</u>				1,746.2

* In 2007-08, and 2006-07, the subsection of Route 2 from New Gower Street to Fowlers Road, Manual (79.32 lane km) received 24-hour snow clearing. During Winter 2008-09, the entire Route 2 – from Pitts Memorial Drive to Legion Road (104.5 lane km) – received the service.

Research Methodology

Stakeholder Survey

To determine the opinions of the general public who drive on the Trans Canada Highway and other major trunk roads on the island, 246 face-to-face interviews were conducted with a number of groups of 'heavy users' of the Province's highway system. These groups were selected based on a number of pre-determined criteria. Specifically, groups selected must travel on the TCH or other major trunk roads in the Province that were included in the pilot project on a regular basis (either commuting to and from work or as part of their work) during the overnight and/or early morning hours. Based on these criteria, the following groups were identified:

- Employees of Arnold's Cove Fish Plant (which operates 24-hours a day)
- Employees of Come By Chance Oil Refinery (which operates 24-hours a day)
- RNC Traffic Patrol officers in St. John's and Mount Pearl
- RNC Traffic Patrol officers in Corner Brook
- RCMP Traffic Patrol officers in Gander
- Long distance truck drivers (specifically, those passing through Pynns Brook and Gobbies weigh scales).

Survey questions were designed by the Policy and Planning Division in collaboration with Highway Design and Construction, and Highway Maintenance and Support Divisions. Questions were designed to be short and informal since the sample population were interviewed during their working hours and hence were often restricted by time constraints.

The survey consisted of either four or six closed-ended questions (two questions asking about the individuals' commute to work were not administered to those individuals who drive on the Province's highways as part of their job (RNC and RCMP officers and truck drivers)). The final question was open-ended and asked if participants had any additional comments regarding 24-hour snow clearing. Survey questions are attached in Appendix A.

Two policy analysts in the Department administered the surveys to these groups of 'heavy users' of the highway system across the Province. Due to the large number of individuals in each group, surveys were administered to a convenient sample at each location. The survey administrators were situated at each workplace (often during shift change or lunch hour) and approached each individual and asked them if they would participate in a short survey regarding 24-hour snow clearing. The response rate was 100%; none of the individuals refused to participate in the survey. This response rate demonstrates the prevalence of the issue in the minds of individuals who drive on the Province's highways during the overnight/early morning hours.

Focus Group

To assess the opinions of those individuals providing 24-hour snow clearing service, a focus group was conducted. The group consisted of snow clearing supervisors from each of the four regions included in the pilot project. The idea was that this would enable the opinions of both the supervisors themselves, as well as those of the snow

plow operators who report to these individuals to be heard. Six individuals participated in the focus group – two from the Western Region, two from Central, one from the Eastern Region, and one from the Avalon; of these individuals there were three Operations Supervisors (OPS), two Superintendents of Operations, and one Maintenance and Engineering Project Supervisor (MEPS). The discussion group was facilitated by the Policy and Planning Division, with the Assistant Deputy Minister of Transportation and employees from the Highway Maintenance and Support Division sitting in as observers.

Focus group questions were created by the Policy and Planning Division in collaboration with Highway Maintenance and Support and Highway Design and Construction Divisions.

These questions were also informal, designed specifically to initiate a group discussion regarding the general thoughts about the pilot project, feedback from the public and those providing the service, the advantages and disadvantages associated with 24-hour snow clearing, and any specific suggestions as to how to improve the service.

Members of the discussion group were informed prior to the meeting that the purpose of the discussion was to obtain the opinions of the managers, superintendents, and supervisors regarding the 24-hour snow clearing pilot project.

Data Collection

Traffic Counts

Manual traffic counts were carried out at interchange/intersection locations across the Province selected by the Assistant Deputy Minister of Transportation in consultation with the Policy and Planning Division. Counts were conducted from 9:30 pm to 4:30 am on Thursday, February 5, 2009, Monday, February 23, 2009, and Sunday, March 22, 2009. The locations at which these counts were conducted are attached in Appendix B.

Analysis of the traffic counts examined the number of vehicles traveling on each leg of road included in the 24-hour snow clearing pilot project. The total counts obtained between 10 pm and 4 am (counts were conducted over one hour intervals, so 9:30 - 10:00 and 4:00 - 4:30 counts were not able to be included in the analysis) over the three nights were combined to produce an indication of the average number of vehicles traveling on each leg on a given night.

These traffic counts were also used to test the assumption that the vehicles traveling during the overnight hours represented approximately 10-12% of the Annual Average Daily Traffic (AADT) counts. For the purposes of the evaluation, Winter night counts were conducted at 12 intersections across the Province. Based on historical trends, the 2007 AADT counts were inflated by 2% to estimate 2008 AADT counts since these counts were not conducted. The 2008 AADT counts were then compared to the Winter nighttime counts to test the assumption that the night counts represented approximately 10-12% of the day counts. This comparison is presented in Table 2.

As can be seen in Table 2, nighttime traffic actually represents substantially less than 10-12% of the AADT for each of the routes included in the pilot project. Nighttime traffic appears to account for 3-5% of the AADT in most regions.

Two sets of traffic flow maps were created to provide a visual representation of the amount of traffic traveling across the island portion of the Province. Attached in Appendix C are Rural Secretariat Region maps showing the projected 2008 AADT values for the road segments included in the pilot project. The projected AADT values for 2008 were taken in Summer 2007 and inflated 2% based on previous trends. Appendix D shows the number of vehicles traveling across the same road segments between the hours of 10:00 pm and 4:00 am during Winter 2008-09. (Note that the AADT counts represent the traffic flow over a 24-hour period, while the nighttime counts show actual traffic flow only over the 6 hour period from 10:00 pm to 4:00 am.)

Table 2 – Percentage of AADT Traveling During the Overnight Hours

Percentage of AADT Traveling During the Overnight Hours						
		AADT	NT Avg.*	%	NT PV**	NT COM***
151-01	Route 1 (TCH) from Logy Bay Road to Foxtrap	27,750	1,110	4.00%	1,021	89
	East of Route 2	12,500	392	3.14%	314	79
151-02	Route 2 (Pitts Memorial Drive) New Gower Street to Legion Road					
	East of Fowlers Rd.	20,132	1,119	5.30%	1,098	21
	West of Fowlers Rd.	11,049	939	8.50%	918	21
152-01	Route 1 (TCH) Foxtrap to Whitbourne					
	East of Whitbourne	8,152	191	2.40%	126	64
251-01	Route 1 (TCH) from Whitbourne to Clarenville					
	West of Whitbourne	8,286	186	2.25%	126	59
	East of Arnolds Cove	7,901	166	2.11%	103	64
	West of Arnolds Cove	7,857	177	2.25%	109	63
	East of Manitoba Drive	5,754	162	2.82%	98	64
351-01	Route 1 (TCH) from Notre Dame Junction to Gander					
	East of Caldwell St.	10,799	255	2.36%	175	80
	West of Caldwell St.	13,935	376	2.70%	290	86
351-02	Route 1 (TCH) from Notre Dame Junction to Grand Falls					
	East of Botwood	6,313	221	3.50%	130	91
	West of Botwood	9,176	296	3.22%	195	101
351-03	Route 350 (Botwood Highway) TCH to Botwood					
	At the TCH intersection	6,057	173	2.85%	157	15
451-01	Route 430 (NPH) from Deer Lake to Rocky Harbour					
	At TCH intersection	8,095	172	2.13%	162	10
451-02	Route 1 (TCH) From Deer Lake to Corner Brook Exit 4					
	East of Pasadena	6,926	289	4.17%	236	53
	West of Pasadena	5,845	225	3.85%	172	53
	East of Lewin Parkway	13,113	368	2.81%	324	44
	West of Deer Lake	8,451	412	4.87%	336	77
451-02	Route 450/450A (Lewin Parkway/Ring Road)					
	At TCH intersection	11,995	270	2.25%	252	18
451-03	Route 1 (TCH) from Corner Brook to Stephenville					
	West of Lewin Parkway	4,753	173	3.63%	133	40
	East of Stephenville	2,798	79	2.84%	50	29
451-03	Route 460 (Port au Port Highway) TCH to Stephenville					
	Cold Brook Depot					
	At TCH intersection	1,878	35	1.85%	34	1

*NT Avg. – average number of vehicles traveling on leg during the overnight period

**NT PV – number of passenger vehicles traveling on leg during the overnight period

***NT COM – number of commercial vehicles traveling on leg during the overnight period

Financial Information

As shown in Table 3, the total cost of snow clearing operations on the island portion of the Province in 2008-09 was \$50.1 million. To provide total material and equipment usage costs, estimates were obtained from the Highway Maintenance Management System (HMMS). Material costs include sand, salt and other products applied to the roads during snow and ice removal. Equipment usage costs include fuel consumption as well as repair and replacement of machinery. Salaries were obtained from the Report on the Program Expenditures and Revenues of the Consolidate Revenue Fund from the Department of Finance. Salaries were taken from this report as HMMS only provides financial data associated with time spent on the roads; it does not include stand-by and preparation time. Of the \$50.1 million spent across the Island in 2008-09 on snow and ice removal 30.8% was spent on labour, 29.0% on materials and 40.2% on equipment.

Table 3 – Overview of Costing for Island Snow and Ice Removal Operations (2008-09)

Region	Total Lane Km	Total Road Km	Salaries	Material Cost	Equipment Usage Cost	Total Cost	Cost Per Lane Km
Avalon	3,806.7	1,811.9	\$3,693,949	\$3,602,777.00	\$3,993,998.00	\$11,290,724.00	\$2,966.01
Eastern	3,353.7	1,682.1	\$3,344,856	\$3,146,451.00	\$4,924,071.00	\$11,415,378.00	\$3,403.82
Central	4,698.9	2,343.4	\$3,473,540	\$3,027,418.00	\$4,362,510.00	\$10,863,468.00	\$2,311.92
Western	4,549.2	2,266.2	\$4,956,112	\$4,747,695.00	\$6,857,415.00	\$16,561,222.00	\$3,640.47
Island Total	16,408.5	8,103.6	\$15,468,457	\$14,524,341.00	\$20,137,994.00	\$50,130,792.00	\$3,055.17

It should be noted that the variation in the cost of snow and ice removal operations between the regions is to be anticipated due to a number of variables reflective of regional difference in materials, weather and the heavy equipment fleet. These include:

- Variation in the mixtures of salt and sand (which have different costs) between regions. This variation in salt and sand mixtures is reflective of the differing weather conditions in the regions. Avalon Region, for example, uses a higher concentration of salt which is much more costly than the salt/sand alternative; thus, resulting in a higher material cost per lane kilometer.
- The heavy equipment fleet varies by region in terms of type and age; thus, resulting in differing equipment usage costs per lane kilometer due to varying depreciation, maintenance and fuel consumption costs.

Table 4 presents the costs associated with the snow routes during the overnight hours. As noted previously, the material and equipment usage costs were obtained from HMMS. The salaries were computed by calculating the top of the salary scale of a Highway Maintenance Equipment Operator (HMEO) and an Operations Supervisor (OPS) for 18 weeks (the length of the 24-hour snow clearing pilot project), and multiplying the number of employees by their 18 week salary for each region.

Table 4 – Overview of Costing for Nighttime Snow and Ice Removal Operations (2008-09)

Region	Total Lane Km	Total Road Km	Salaries	Material Cost	Equipment Usage Cost	Total Cost	Cost Per Lane Km
Avalon	472.1	122.4	\$137,844.96	\$198,724.18	\$140,790.44	\$477,359.58	\$1,011
Eastern	315.2	107.5	\$61,693.68	\$107,833.46	\$52,192.80	\$221,719.94	\$703
Central	365.2	120.8	\$90,608.88	\$81,234.31	\$54,745.00	\$226,588.19	\$620
Western	593.8	294.9	\$105,066.48	\$264,154.55	\$168,244.35	\$537,465.38	\$905
Island Total	1746.3	645.6	\$395,214.00	\$651,946.50	\$415,972.59	\$1,463,133.09	\$838

Note: Table 4 includes costing for nighttime only (a subset of the overall costing reported in Table 3).

The substantive difference in cost per lane km compared to Table 3 is due to a number of factors including:

- Nighttime snow and ice removal occurs only 40 hours per week (8 hours a day, 5 days a week) compared to the overall snow clearing operations which typically cover 119 hours per week (17 hours a day, 7 days a week plus nighttime operations, where applicable, and overtime).
- It should also be noted that an individual plow covers a longer segment of road in the nighttime than the daytime.

In total, 26 additional employees were hired for the overnight shift across the island portion of the Province. There were 21 additional HMEO's hired and 5 OPS's; at a total salary cost of just under \$400,000 for the overnight operations.

Table 4 also displays the cost per lane kilometer of the overnight routes in each of the 4 regions included in the pilot project as well as a provincial average. The provincial average cost per lane kilometer for the overnight shift is \$838/lane kilometer. As explained previously, much of this regional variation can be accounted for by regional differences in the mixtures of salt and sand used, snowfall levels, and the type and age of the heavy equipment fleet. The breakdown of the total cost shows that overall 27% is accounted for by salaries, 45% by materials and 28% by equipment usage costs. The total cost of the overnight routes in 2008-09 was approximately \$1.46 million, which represents 2.9% of the provincial total.

Table 5 presents the equipment usage hours obtained from HMMS for the number of hours that various snow and ice control equipment was on the road during a given season. The data indicates that the number of hours that snow clearing equipment spent on the road in 2008-09 was less than in 2007-08 despite the addition of the 24-hour snow clearing pilot project in 2008-09. As can be seen Table 5, the reduction of 34,112 hours of equipment usage in 2008-09 compared to 2007-08 accounted for a decrease of \$2.6 million in 2008-09. This difference in equipment usage hours could have been caused by a number of interrelated factors, including differences in weather severity, changes in deployment practices, and the provision of 24-hour snow clearing

service. The results of a less severe winter and the resultant decrease in equipment usage hours also lead to a decrease in salt and sand usage between 2007-08 and 2008-09 of just over 66,000 tons (approx. \$1.8 million).

Table 5 – Equipment Usage Hours

Equipment Usage Hours							
Region	2005-06	2006-07	2007-08	2008-09	1-year Change		1-year Cost Difference 2007-08 to 2008-09
					2007-08 to 2008-09	2008-09 \$/Hour	
Avalon	39,046	49,448	55,825	47,827	-7,998	\$82.58	-\$660,474.84
Eastern	51,979	63,070	74,002	63,700	-10,302	\$74.91	-\$771,722.82
Central	56,108	56,471	73,400	56,186	-17,214	\$75.43	-\$1,298,452.02
Western	68,594	81,826	94,632	96,034	+1,402	\$72.15	+\$101,154.30
Total	215,727	250,815	297,859	263,747	-34,112	\$77.08	-\$2,629,495.38

Table 6 shows the total cost of snow and ice removal throughout the island portion of the province from 2005-06 to 2008-09. Material and Equipment usage costs were obtained from HMMS and inflated by applying the 2008-09 per unit cost to the total units consumed in that year. Salaries were taken from the Report on the Program Expenditures and Revenues report and updated to be consistent with 2008-09 salaries by applying the pay scale increases found in their respective collective bargaining agreements.

Table 6 – Yearly Island Snow and Ice Removal Costs (2008 dollars)

Year	Total Cost (2008\$)	Total Cost (real \$)	Cost/lane km (2008\$)	Cost/lane km (real \$)
2005-06	\$40,037,893.01	\$28,128,591.09	\$2,440.07	\$1,714.27
2006-07	\$45,335,479.11	\$40,861,357.08	\$2,762.93	\$2,490.26
2007-08	\$53,188,488.82	\$51,379,250.24	\$3,241.52	\$3,131.26
2008-09	\$50,130,792.91	\$50,130,792.91	\$3,055.17	\$3,055.17

Note: Equipment rates were reviewed and adjusted in 2006-07; thus, resulting in a significant increase in the cost per lane km from 2005-06 to 2006-07

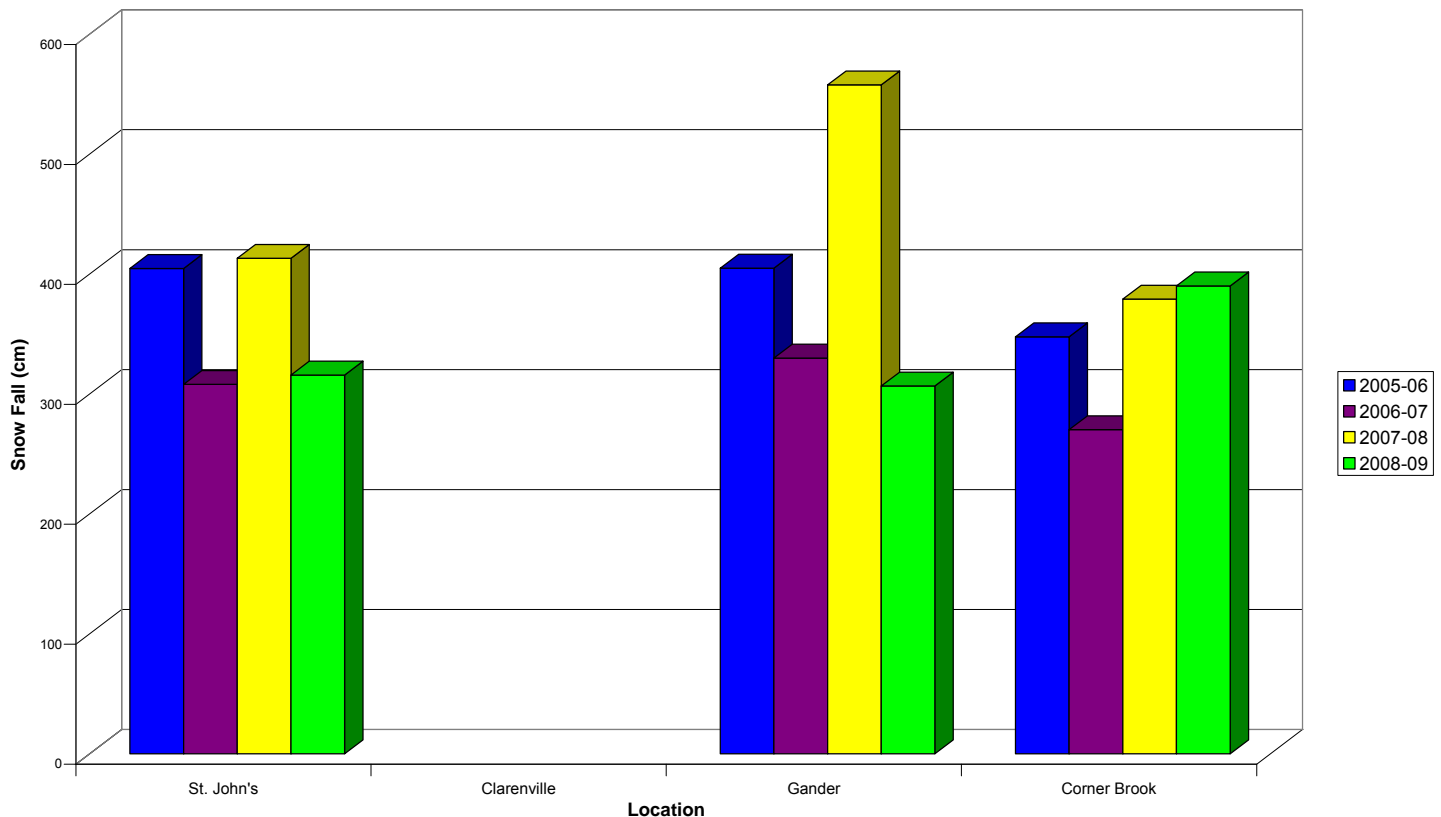
While it is noted that the total cost of snow and ice removal decreased from 2007-08 to 2008-09, many factors outside the provision of 24-hour snow clearing may have led to this decrease. One of the major contributors to this decrease could have been differences in weather severity between 2007-08 and 2008-09.

Analysis

Weather Information

Newfoundland and Labrador is known historically as one of the stormiest parts of North America. According to Environment Canada, the prime time of year for storm activity is between November and March, and during these winter months, snow is the prevalent form of precipitation. Snowfall data for the past four fiscal years was obtained from Environment Canada for St. John's and Gander and from the City of Corner Brook and is reported in Figure 1. It should be noted, however, that snowfall data for Corner Brook was obtained at an area of low elevation in the City's downtown from a different source than the other regions. Therefore, this data may not necessarily be representative of the Western Region as a whole. Snowfall data was not available for Clarenville.

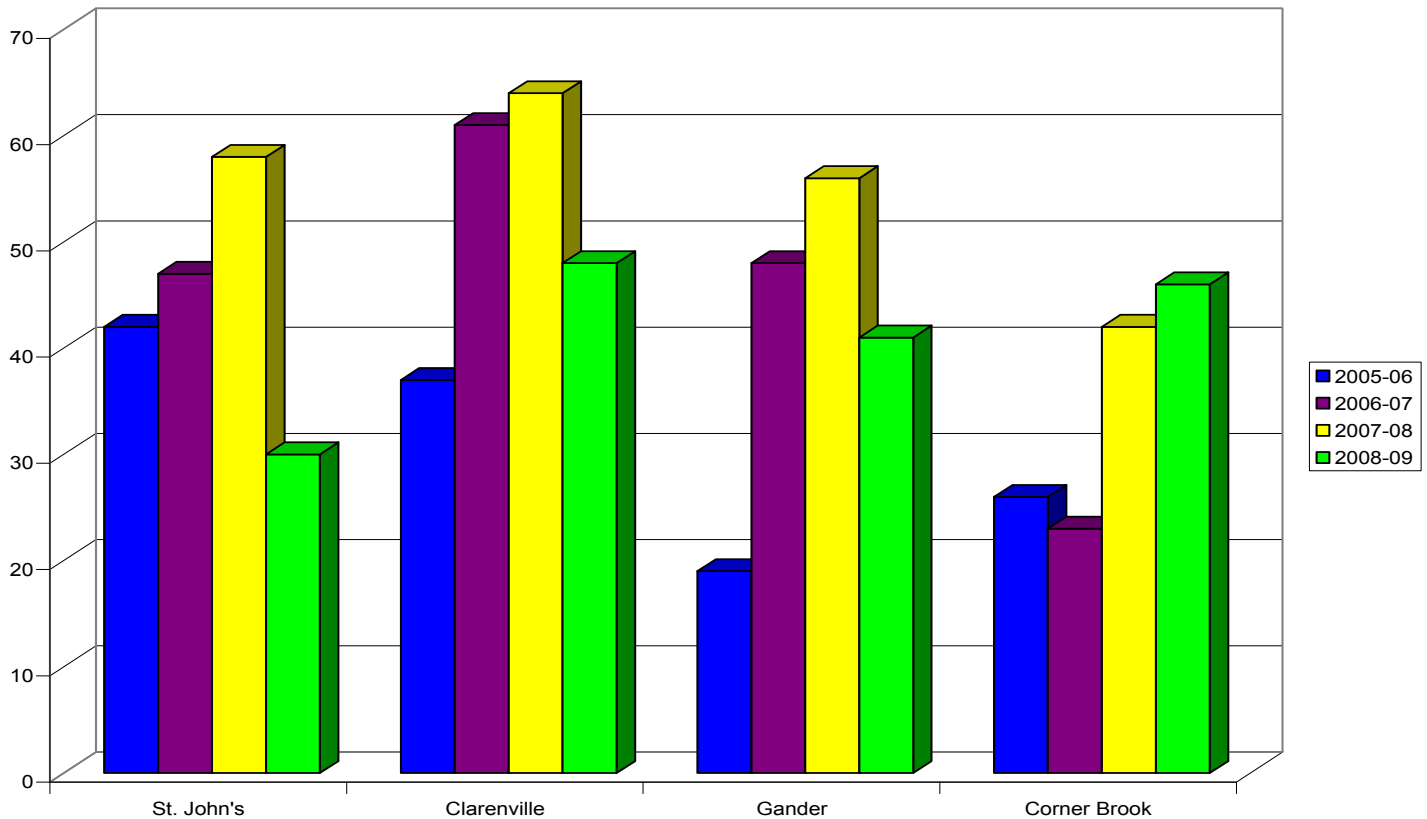
Figure 1 – Annual Snowfall (cm) by Fiscal Year



The Department of Transportation and Works also receives road condition and weather data from 18 Road Weather Information System (RWIS) stations which are located across the TCH. These systems are operated by AMEC and are used to provide information on surface conditions. The locations of these stations are shown in Appendix E. These stations record road conditions, freeze/thaw and thaw/freeze cycles, and weather conditions. Every twenty minutes, conditions are assessed and reported. Thaw/freeze cycles (defined as a cycle consisting of 4 continuous hours of thawed pavement, followed by a frost event) were obtained from the RWIS data and are reported in Figure 2. Freeze/thaw cycles were not included in the analysis as they are often the result of salt application resulting from the occurrence of a thaw/freeze cycle,

as opposed to a weather event. In cases where they are not the result of salt application no action would be required as it is an indication of improved road conditions.

Figure 2 – Number of Thaw/Freeze Cycles by Fiscal Year



Note: 2005-06 Thaw/Freeze Data was not collected until January 2006 (February in Gander)

As can be seen in Figure 2, overall there were less thaw/freezing cycles in 2008-09 than in 2007-08, with the exception of the Western Region (Corner Brook station). Similarly, for the regions where snowfall data is available, there was less snowfall during the winter season in 2008-09 than in 2007-08, with the exception of the Western Region (Corner Brook Station). Such differences in winter severity across years affect the number of hours during which plows are on the road and how much product is used, which would substantially reduce the costs associated with providing snow clearing service in 2008-09 compared to 2007-08.

Comparing Figures 1 and 2 to Table 6 suggests that there is a correlation between weather severity and the number of equipment usage hours by region; the Avalon, Eastern and Central Regions experienced less thaw/freezing cycles and less snow, and had snow clearing equipment on the roads for less hours in 2008-09 compared to 2007-08, while the Western Region experienced more thaw-freezing cycles and more snow, and had snow clearing equipment on the roads for more hours. This suggests that the decrease in the cost to provide snow clearing service from 2007-08 to 2008-09 may be due to the generally milder winter experienced in three of the four regions in which 24-

hour snow clearing was provided. Therefore, discretion must be used when interpreting the financial data; it cannot necessarily be assumed that the decrease in snow clearing cost observed was a direct result of providing 24-hour snow clearing service.

Other Considerations

While it was expected that some of the savings incurred may have been due to a reduction in overtime pay resulting from the provision of 24-hour snow clearing, when financial information was reviewed, it was determined that the difference in annual overtime paid was negligible (approximately \$58,000 less in 2008-09). However, this may have been due to limitations within the financial information system. The financial system cannot accurately separate summer and winter maintenance overtime as often overtime worked in one season is paid out in another season. Overtime can also be worked in one fiscal year and paid out in the next. Similarly, overtime paid out in April and May for a given fiscal year was actually attributable to the previous winter season (i.e. 2007-08 not 2008-09).

Because the financial system only provides the number of overtime dollars paid, it can not be determined how many hours of overtime were actually worked during a given period. Therefore, the relationship between the provision of 24-hour snow clearing and potential reduction in overtime hours cannot currently be assessed using the financial information system. In preparation for the evaluation of Phase II of the pilot project, a detailed review of attendance forms and number of hours of overtime worked will be conducted and this information will be collected on a go-forward basis to allow for a comparison of hours of overtime.

Survey Results

There were 246 surveys administered to the 'heavy user' groups selected to participate throughout the Province. Of the 246 participants, 14 indicated that they did not drive on the Province's highways during the overnight/early morning hours. These participants were not included in the following analyses, resulting in a sample size of 232. The breakdown of participants by region is presented in Table 7.

Table 7 – Number of surveys completed in each region

<i>Region</i>	Number of Surveys Completed
Avalon	54
Eastern	54
Central	4
Western	18
Provincial	102
TOTAL	232

It should be noted that all the long distance truck drivers were coded as “Provincial” as opposed to their respective regions. Most of these individuals indicated that they drive across the entire Province on each of their trips and could therefore provide an indication of the condition of the entire Trans Canada Highway. Although only four individuals completed the survey in the Central Region (of the available five Gander RCMP patrol officers), road conditions in the Central Region were also assessed by the Provincial truck drivers. A breakdown of participants by occupation is presented in Table 8.

Table 8 – Number of surveys completed by each occupation

<i>Occupation</i>	Number of Surveys Completed
Fish plant worker (Arnold’s Cove)	26
Oil Refinery worker (Come By Chance)	28
RNC/RCMP officer	76
Truck driver (Goobies and Pynn’s Brook)	102
TOTAL	232

In general, opinions regarding the overall condition of the highway were positive; approximately 60% of participants indicated that the condition of the Province’s highway system during Winter 2008-09 was either much or somewhat improved compared to previous winters, approximately 30% stated that there was no change, and approximately 10% of respondents thought the highways were in much or somewhat worse condition than in previous winters. A detailed breakdown of responses by region is presented in Table 9.

Table 9 – Responses to “How would you compare the overall condition of the Province’s highways this winter to previous winters?” by region

Region	Response					
	Much worse	Somewhat worse	Same	Somewhat improved	Much Improved	N/A
Avalon	0	5	22	20	6	1
Eastern	1	1	10	23	19	0
Central	0	0	0	4	0	0
Western	0	1	5	10	2	0
Provincial	3	11	30	31	19	8
Total	4	18	67	88	46	9

Similar results were obtained regarding the timeliness of snow and ice removal; 58% of respondents stated that the timeliness of snow removal was either much or somewhat improved during Winter 2008-09 compared to previous winters, 34% thought there was no change from previous winters, and 8% indicated that the timeliness of snow and ice removal was much or somewhat worse in 2008-09 compared to previous winters. A detailed breakdown of responses by region is presented in Table 10.

Table 10 – Responses to “How would you compare the timeliness of snow and ice removal on the Province’s highways following a storm this winter to previous winters?” by region.

Region	Response					
	Much worse	Somewhat worse	Same	Somewhat improved	Much Improved	N/A
Avalon	0	7	24	16	6	1
Eastern	1	2	13	24	12	2
Central	0	0	0	4	0	0
Western	0	0	3	9	5	1
Provincial	1	7	35	31	19	9
Total	2	16	75	84	42	13

Although a formal qualitative analysis was not conducted for the open-ended question, trends seen in the additional comments of ‘heavy users’ of the Province’s highway system included:

- The vast majority said that the entire TCH should be cleared
- Off ramps need to be cleared to be able to benefit from the additional snow clearing on the highways
- Vast improvements seen during the early morning hours compared to previous winters

- Peace of mind knowing equipment is on the highways
- West Coast is more severe (Corner Brook – Port aux Basques mentioned by a number of respondents)
- Selection criteria for inclusion in the pilot project should have been based on weather conditions and snowfall in various areas

Focus Group

Themes that emerged from the focus group questions included:

Road conditions

- Plows are back quicker and less product is used for the first run in the morning
- Providing 24-hour snow clearing keeps accumulation down overnight so there is less buildup in the morning; less hazards than previous winters
- Can get brine under the snow before people drive over it

Complaints

- Reduction in calls from stranded motorists, RCMP, emergency vehicles; overall number of complaints decreased

General Feedback

- Positive; only complaint is that more areas should be covered
- Still complaints about the two nights that are not covered (Friday and Saturday); general public not aware that it was only five nights a week

Advantages

- Flexibility to move equipment
- Increased safety
- Pressure taken off daytime drivers; no more “on call”
- Improved response times; morning shifts did not have to start up trucks – they were already warmed up and ready to go

Disadvantages

- Maintenance problems – trucks don’t get a break
- Equipment not always available for day coverage due to dedicated night shift (since any necessary repairs can no longer be done during the night, they have to be done during the day shift)
- Unequal distribution of overtime
- Increase in waiting time on the overnight shift; two hours between runs with nothing to do
- Corner Brook: some trucks ran 35,000 – 40,000 km each during the four months and had mechanical problems – sometimes had to get extra trucks to compensate for trucks getting repairs

How to Improve 24-Hour Snow Clearing

- Make it seven days a week
- Have two trucks running together on a 4-lane highway

- Don't extend the runs; have same runs on night shift as day shift (i.e. two short adjacent daytime snow routes are often combined to make one longer snow route during the night shift; supervisors felt that the night shift routes should be the same as the day shift routes)
- Don't cut off coverage on the same road; i.e. cover all of the TCH
- More trucks, more support staff and more available parts

Phase II Evaluation Methodology

In order to determine the long-term configuration for the 24-hour snow clearing service, TW will implement the following procedures for the evaluation of Phase II of the pilot project:

- **Conduct more extensive Winter nighttime traffic counts**
 - The Winter night counts were only conducted on one Monday, one Thursday, and one Sunday night throughout Winter 2008-09. To assess the need for nighttime snow clearing on Friday and Saturday nights (which is currently not provided), during Winter 2009-10, 7 sets of nighttime traffic counts will be conducted (one for every night of the week). Along with providing a differentiation between weekday and weekend nighttime traffic, this will present Government with a more accurate picture of the amount of overnight/early morning traffic on the Province's highways and trunk roads than what is currently available.
- **Extend nighttime counts to go until 9am**
 - The traffic counts conducted during Winter 2008-09 ran from 9:30 pm - 4:30 am. To get a better idea of the amount of early morning commuter traffic on the Province's highways and trunk roads, traffic counts conducted during Winter 2009-10 will be conducted from 9:30 pm - 9:00 am.
- **Conduct a nighttime count on Pitts Memorial Drive**
 - During Phase I of the pilot project, 24-hour snow clearing service was provided on Route 2 but no traffic counts were conducted on the Pitts Memorial Drive section. To capture the traffic levels that exit Route 2 prior to the intersection with Route 1 (where the nighttime traffic count was conducted in Winter 2008-09), counts should be conducted on the east end of Route 2 (before the Bay Bulls turnoff). Doing so will provide a more complete picture of the overnight/early morning traffic on Route 2.
- **Conduct a detailed review of overtime usage**
 - This involves collecting the overtime hours from the timesheets for winter maintenance staff from the regions for 2005-06 to 2008-09 as well as the development of a data collection tool for 2009-10 to be submitted by the regions for each pay period.
 - This will allow the Department to analyze changes in overtime hours pre- and post- the implementation of 24-hour snow clearing as well as its

correlation with weather. Overtime will also be analyzed for adjacent segments of road that do and do not receive 24-hour snow clearing

- **Continue/expand on data collection and analysis**
 - The analysis of traffic, financial and weather data will be continued in Phase II of the evaluation (as well as expanded where noted above).

- **Explore the potential to conduct a second set of focus groups at Snow School 2009-10**
 - To receive a more diverse range of opinions from the providers of 24-hour snow clearing, a number of focus groups could be conducted at Snow School 2010. One focus group per region, consisting of 6-8 snow clearing operators, supervisors, and other road maintenance staff, could be conducted. This would allow the Department to hear the opinions of a broader range of providers of the service to more thoroughly assess the advantages and disadvantages associated with 24-hour snow clearing from the perspective of the service providers.

Appendix A
Stakeholder Survey

1. What region are you in?

a. Avalon _____

b. Eastern _____

c. Central _____

d. Western _____

2. What is the occupation of the respondent?

a. Truck Driver _____

b. RNC/RCMP Officer _____

c. Oil Refinery Worker _____

d. Fish Plant Worker _____

3. What is the gender of the respondent?

a. Male _____

b. Female _____

1. Do you typically drive on the province's highways between the hours of 9:30 pm and 4:30 am? YES _____ NO _____

If NO, thank participant and end survey. If YES, continue to question 2.

2. Generally, when commuting to and from work, are you a driver or a passenger? DRIVER _____ PASSENGER _____

3. What community do you commute to work from?

4. How do you think that the weather this winter compares to the previous few winters?

Much Milder	Somewhat Milder	Same	Somewhat More Severe	Much More Severe
5	4	3	2	1

5. How would you compare the overall condition of the province's highways this winter to previous winters?

Much Improved	Somewhat Improved	Same	Somewhat Worse	Much Worse
5	4	3	2	1

6. How would you compare the timeliness of snow and ice removal on the province's highways following a storm this winter to previous winters?

Much Improved	Somewhat Improved	Same	Somewhat Worse	Much Worse
5	4	3	2	1

7. Do you have any additional comments?

Thank you very much for your time 😊

Appendix B

Nighttime Traffic Count Sites – Winter 2009

Region 1

- Outer Ring Road / Topsail Road interchange (Outer Ring Road and ramps only)
- TCH / Route 2 interchange
- TCH / R80-81 interchange
- Route 2 / Fowlers Road interchange

Region 2

- TCH / Arnold's Cove interchange
- TCH at Manitoba Drive

Region 3

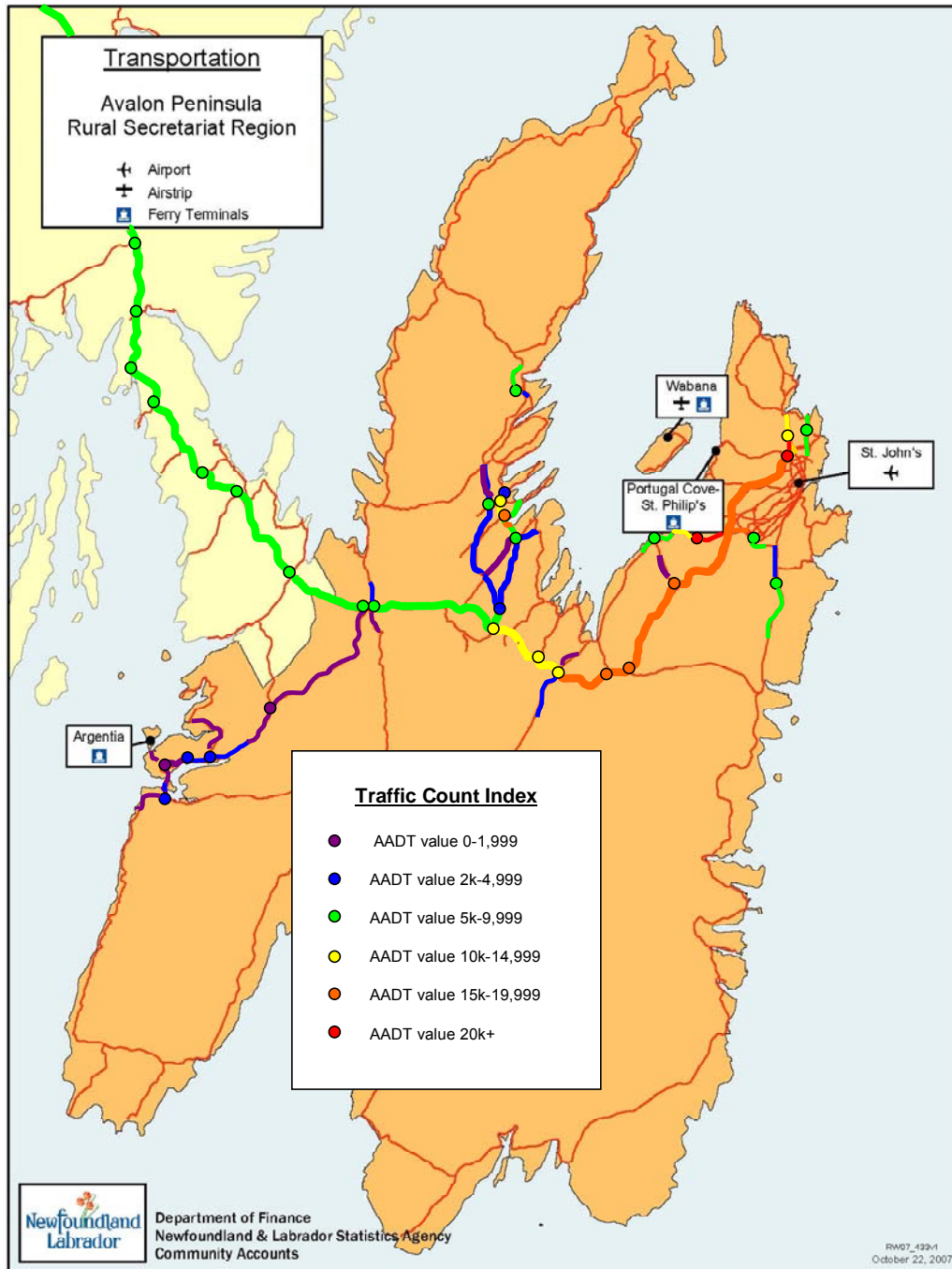
- TCH at Caldwell Street
- TCH / Route 350 interchange

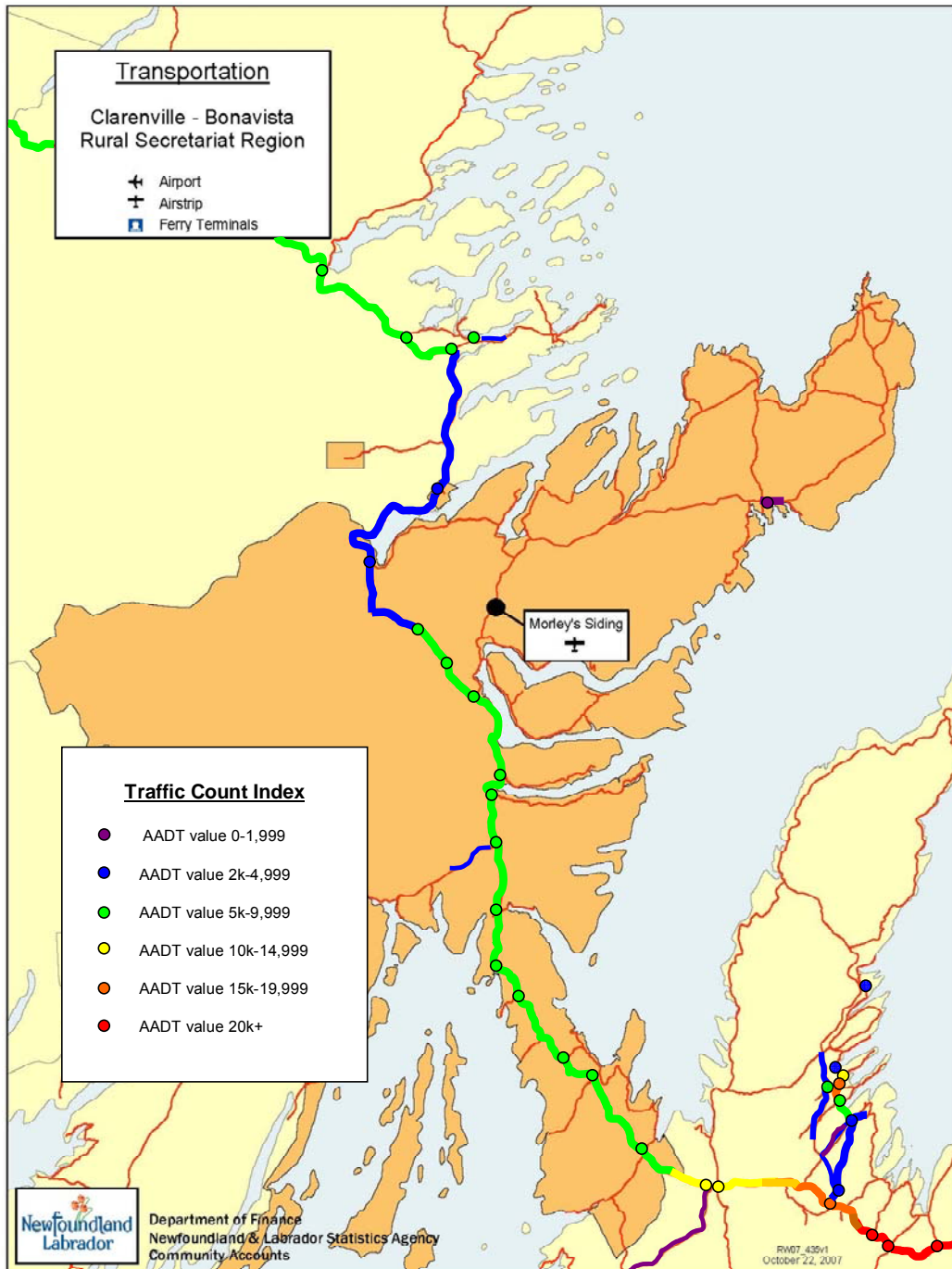
Region 4

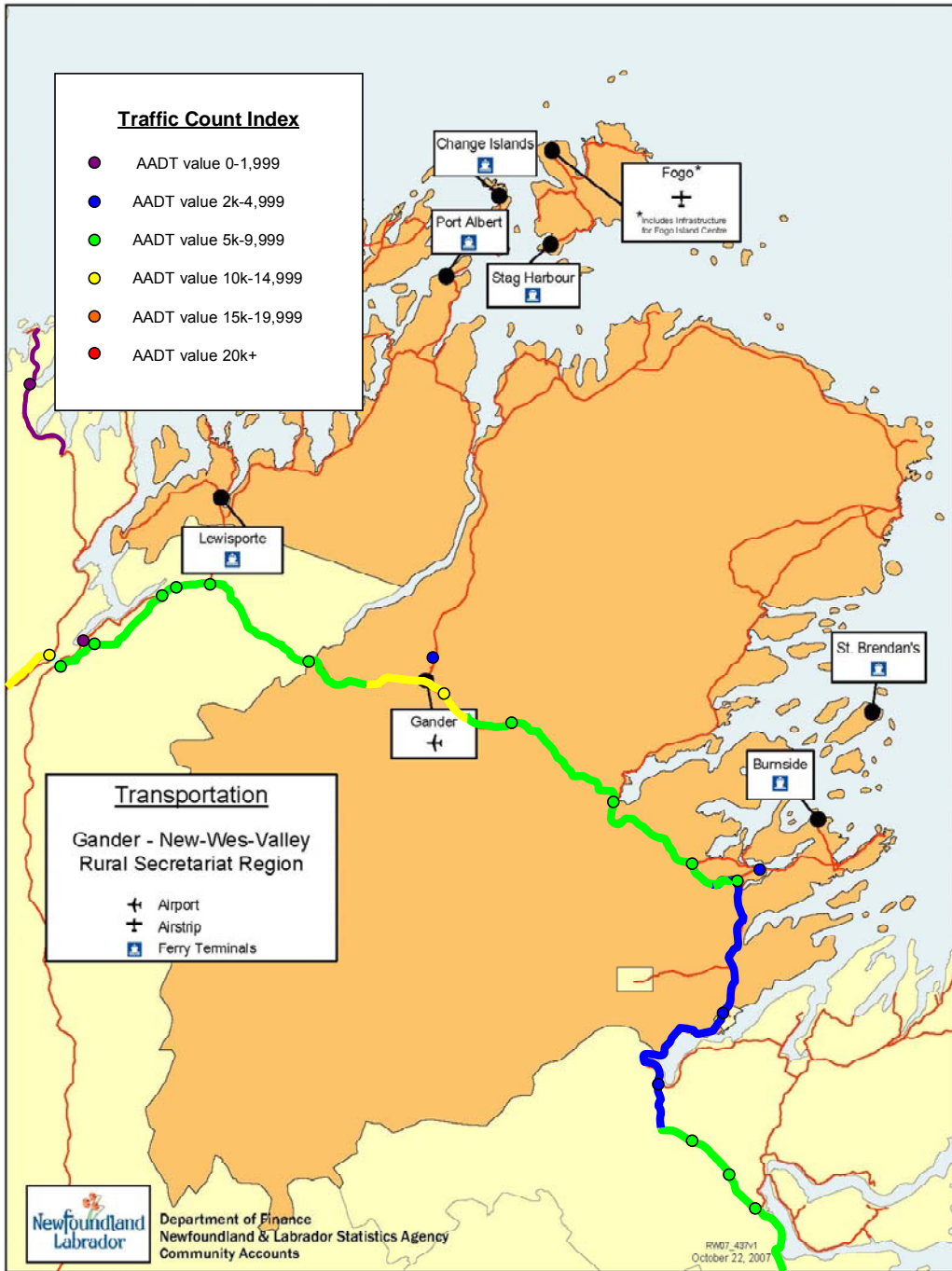
- TCH / Route 430 interchange
- TCH at Pasadena East interchange
- TCH / Lewin Parkway interchange
- TCH / Route 460 interchange

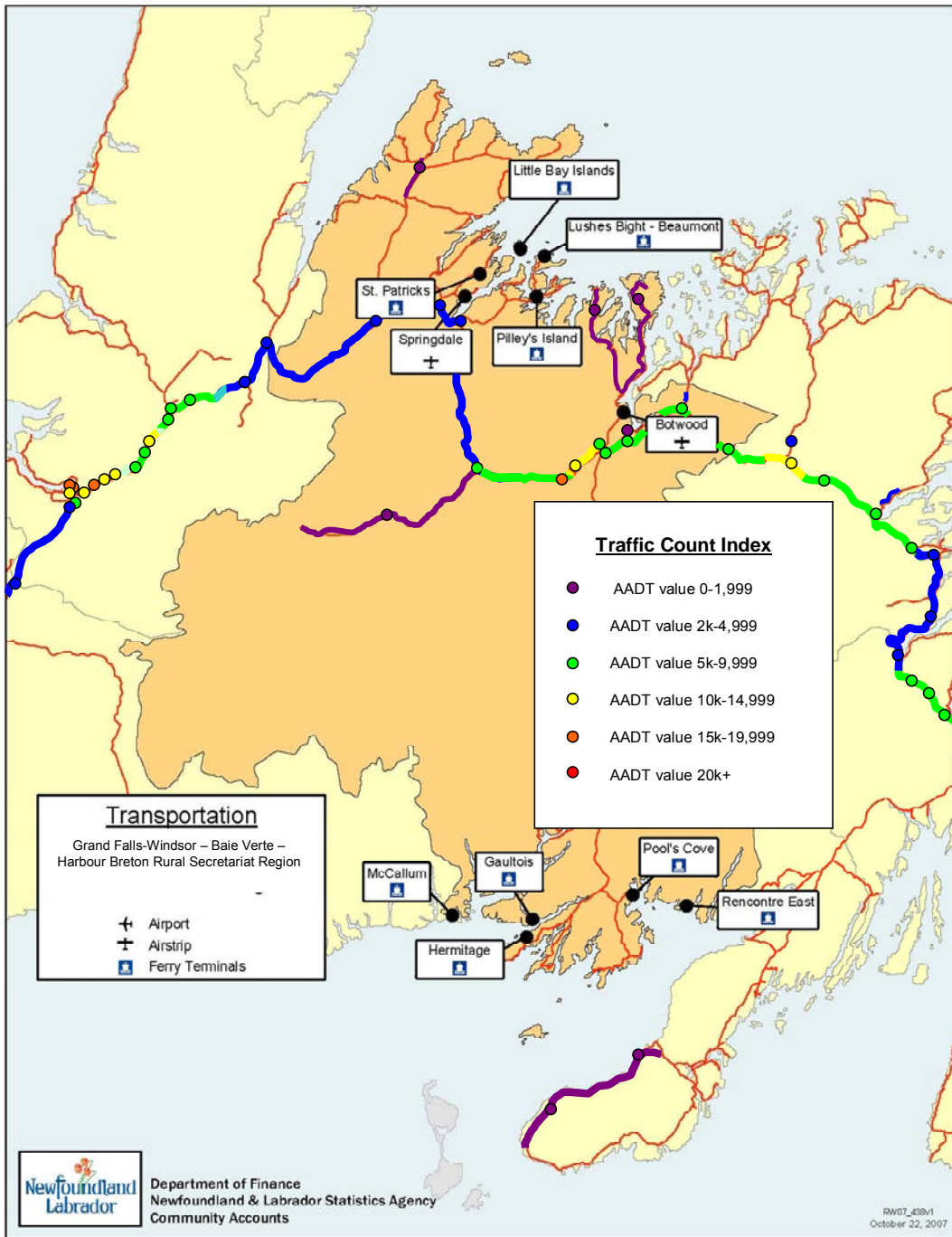
Appendix C

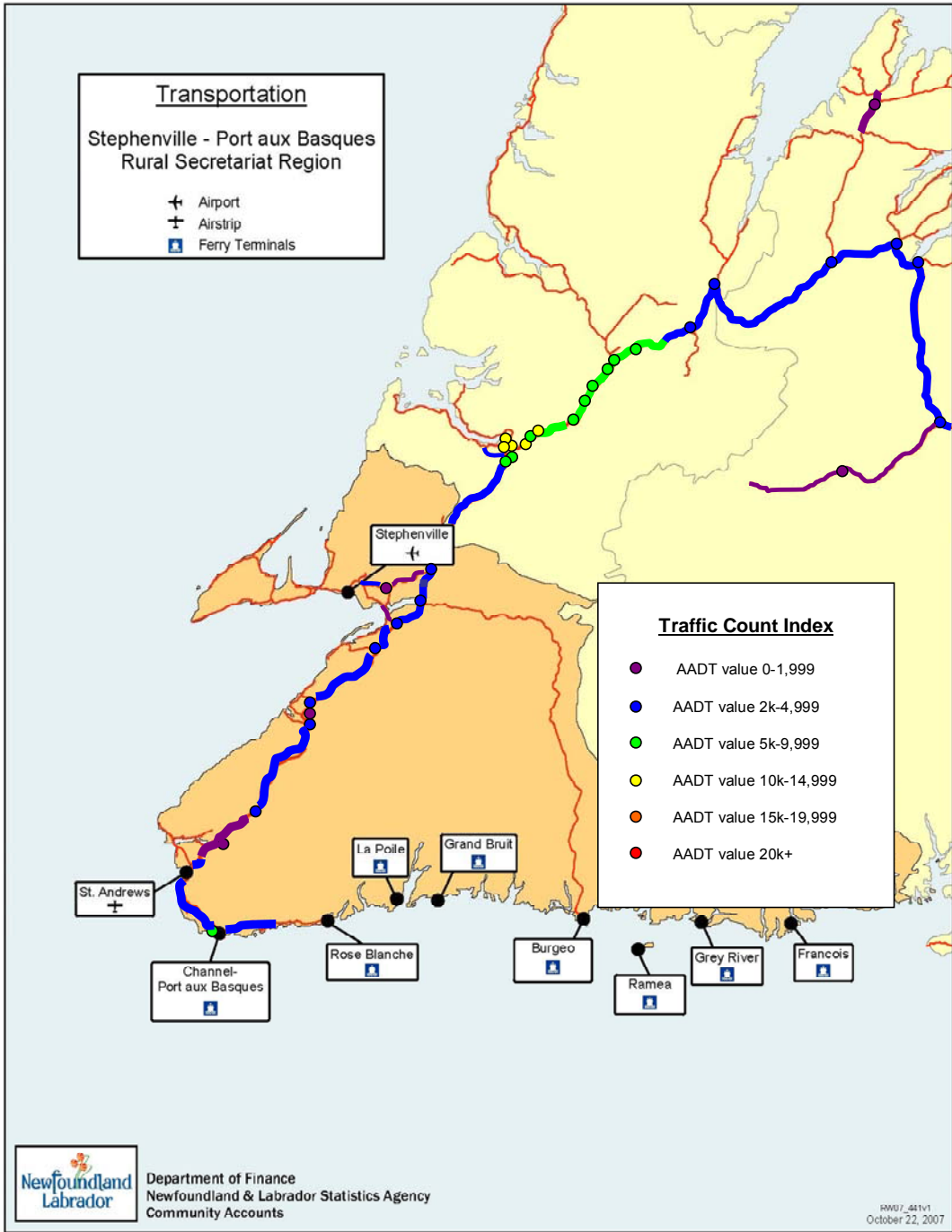
Summer 2008 Traffic Count Maps

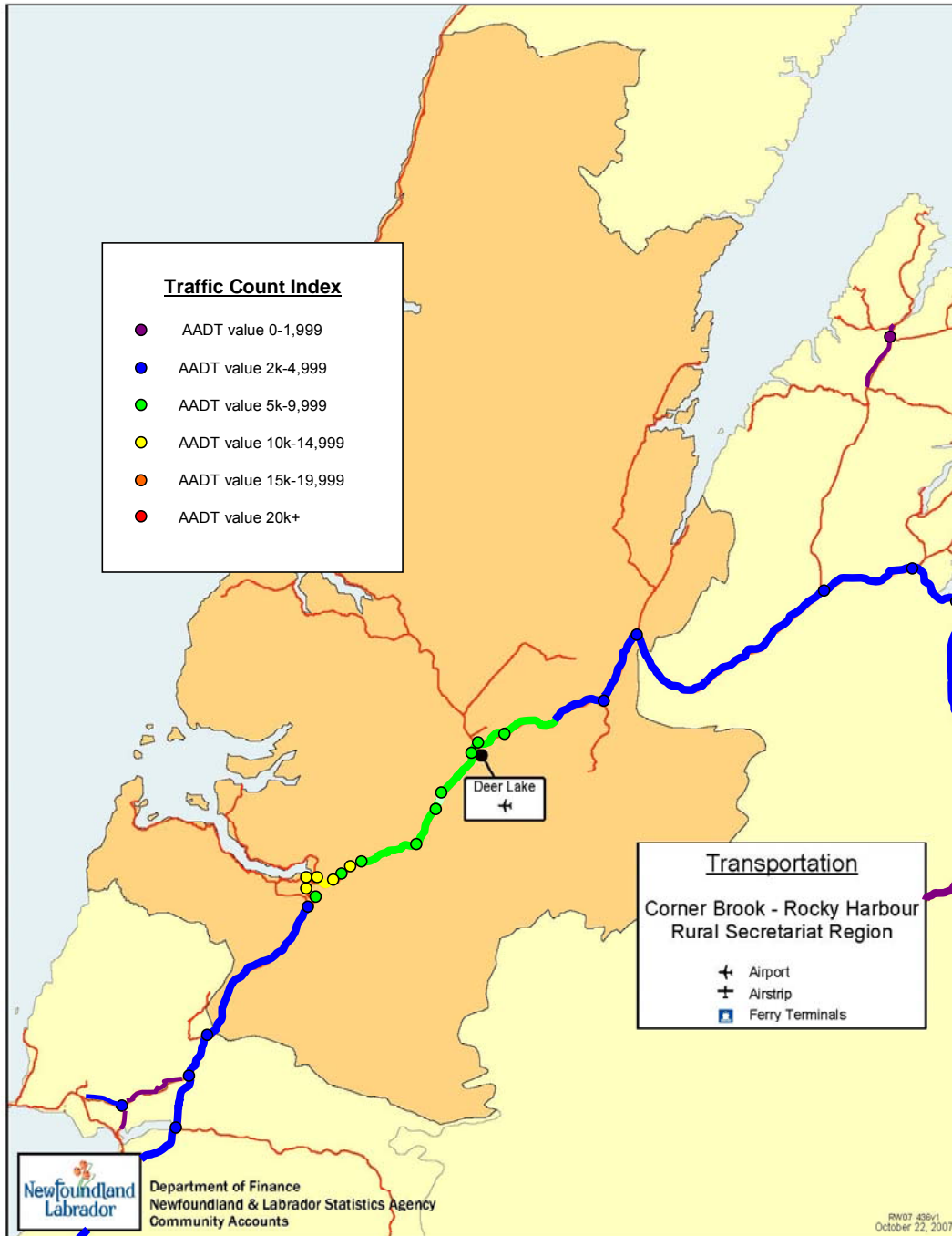






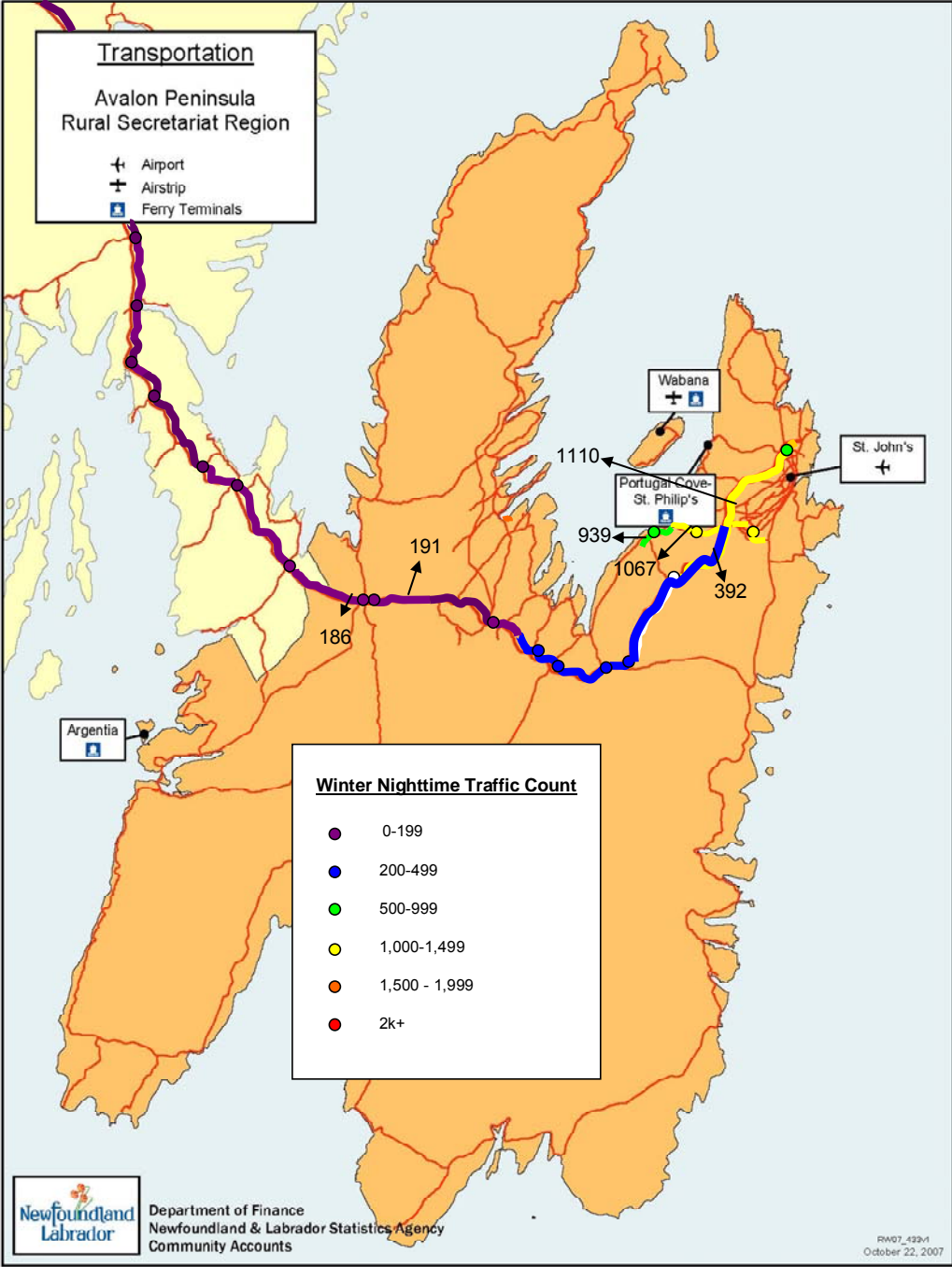


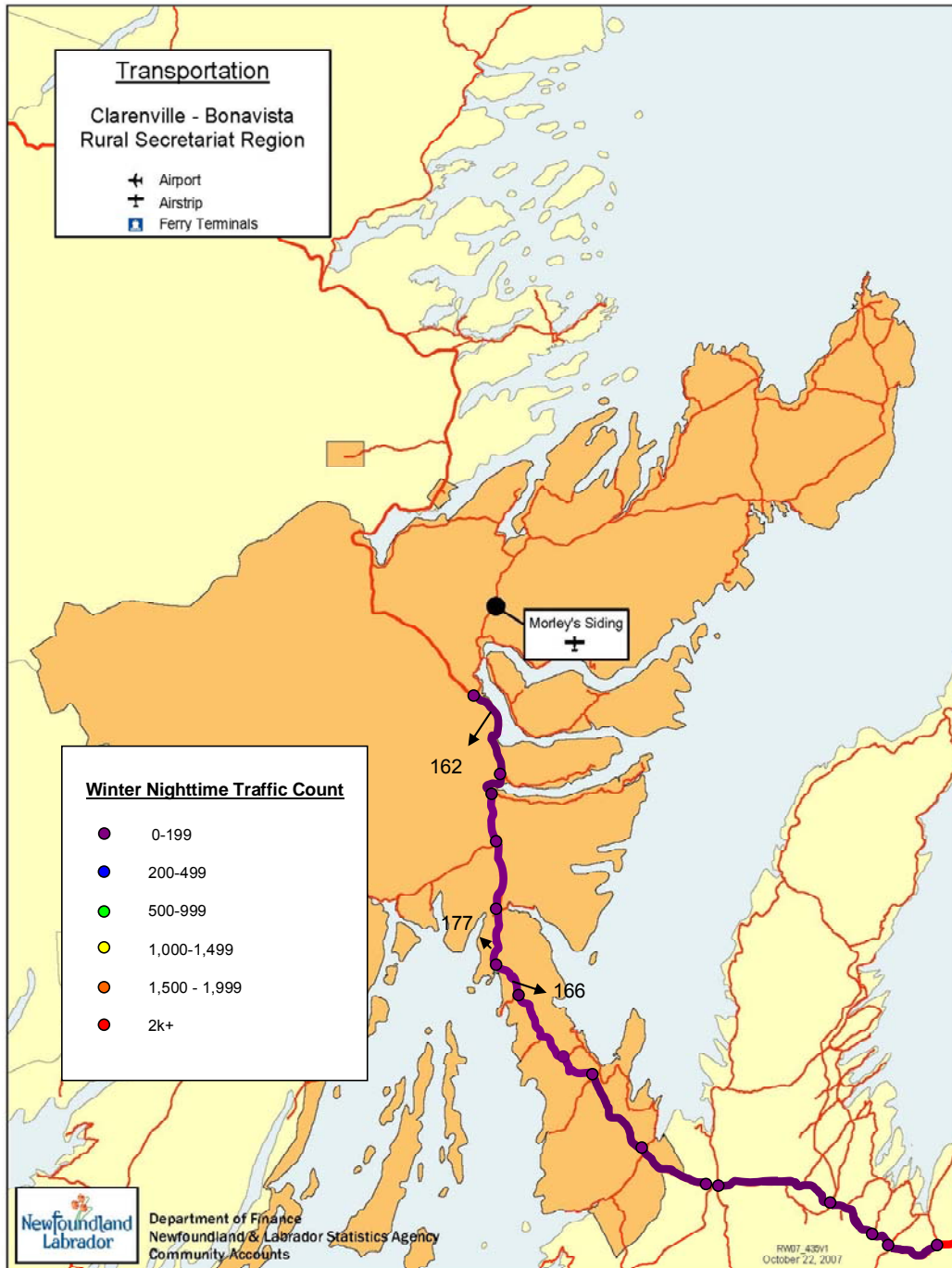


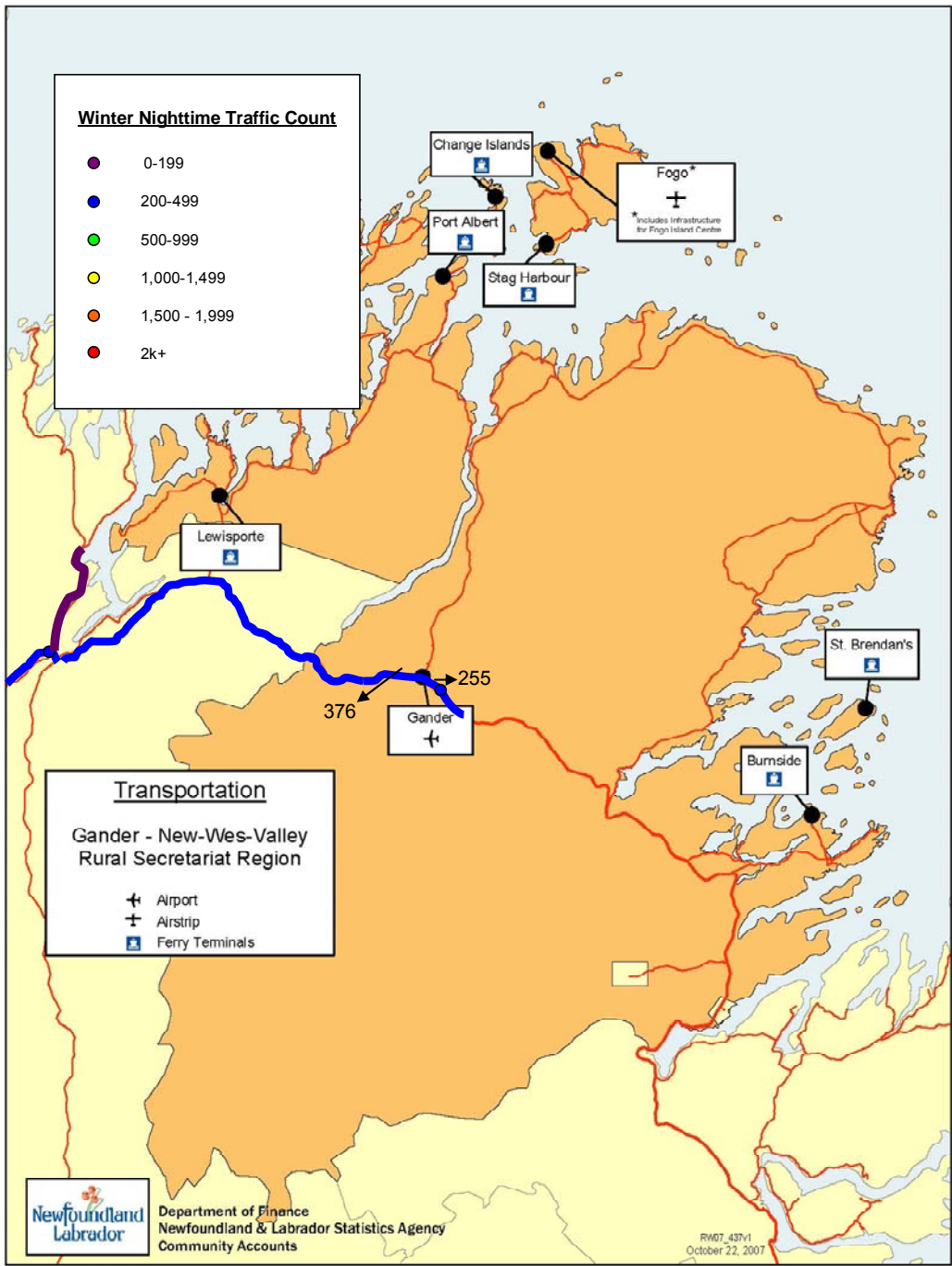


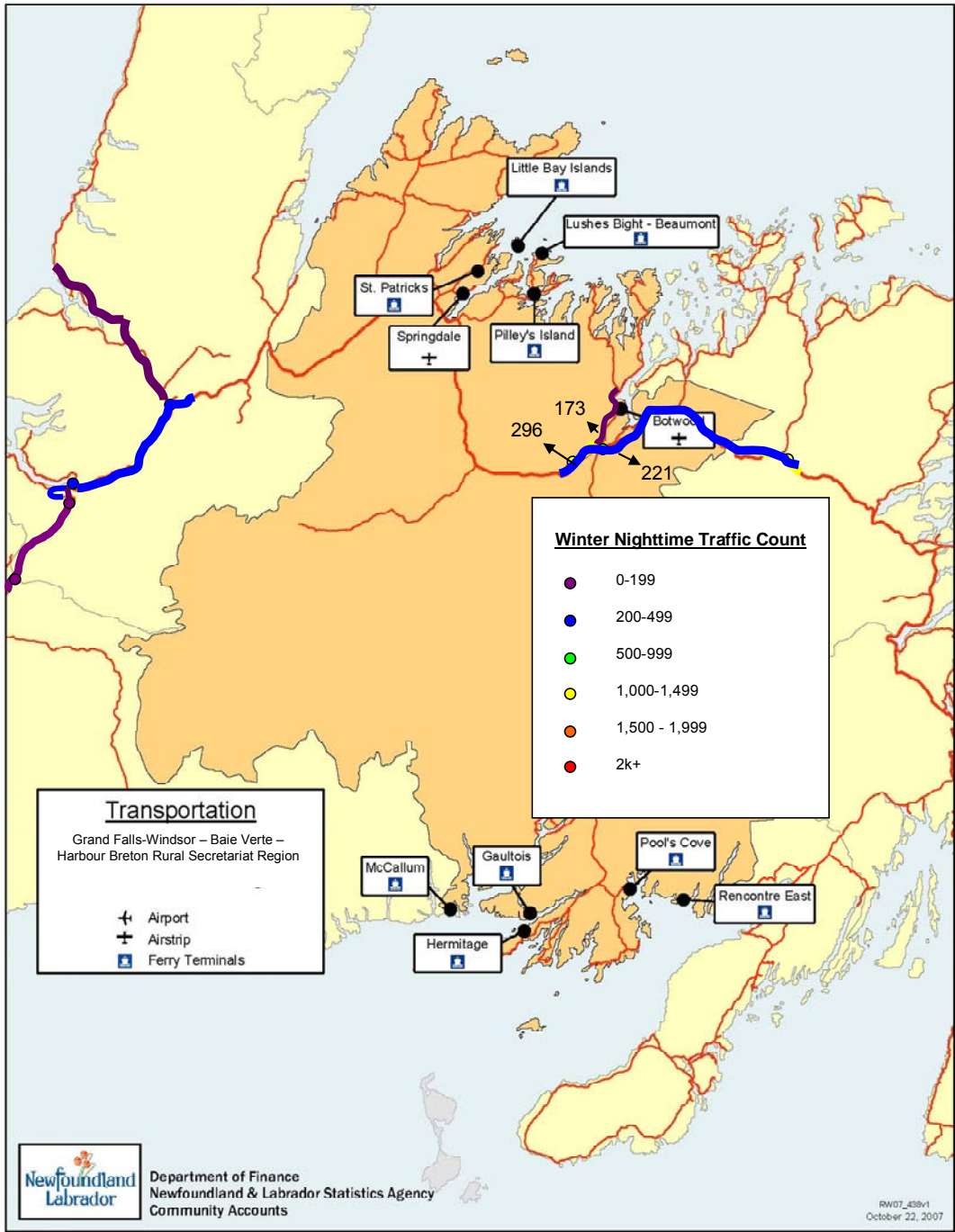
Appendix D

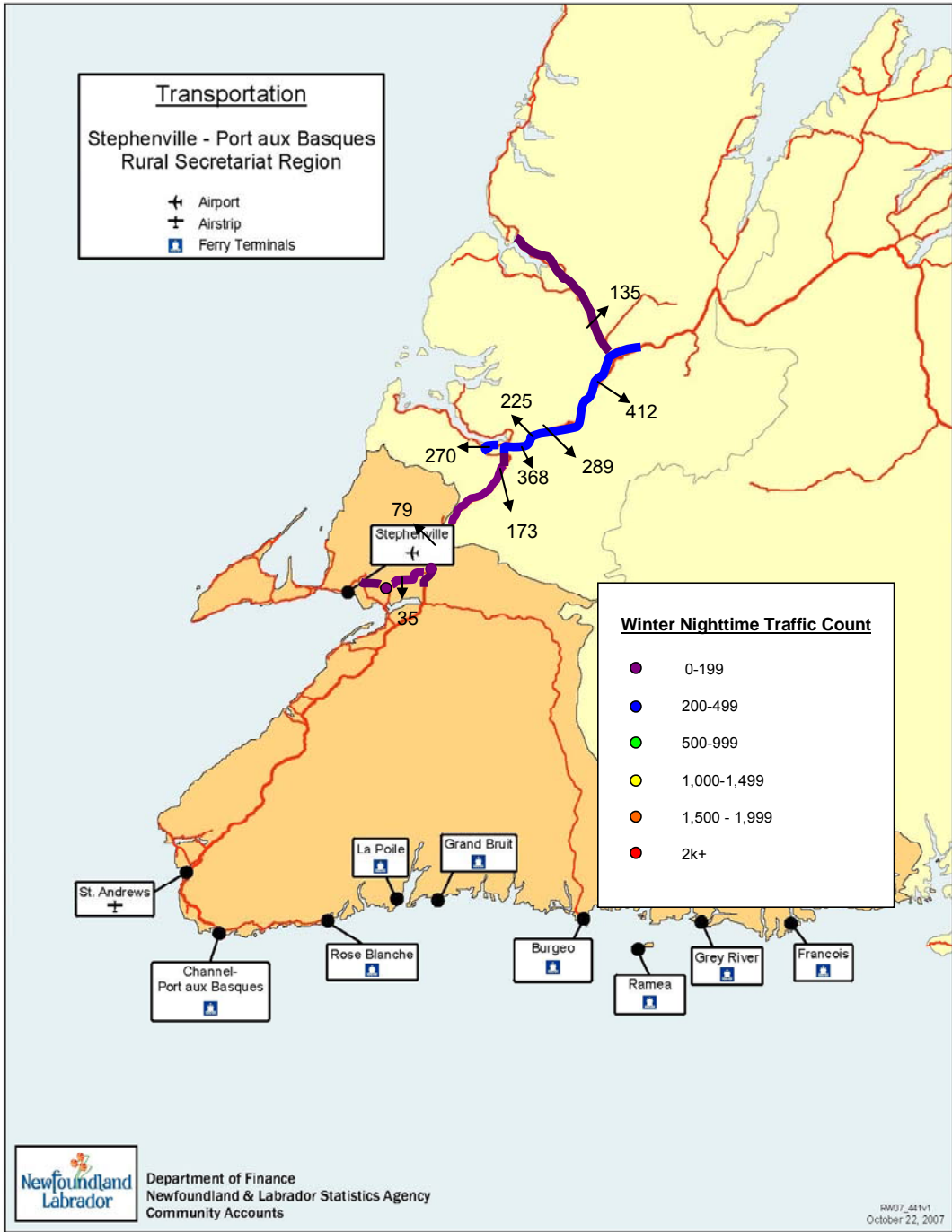
Winter 2009 Traffic Count Maps

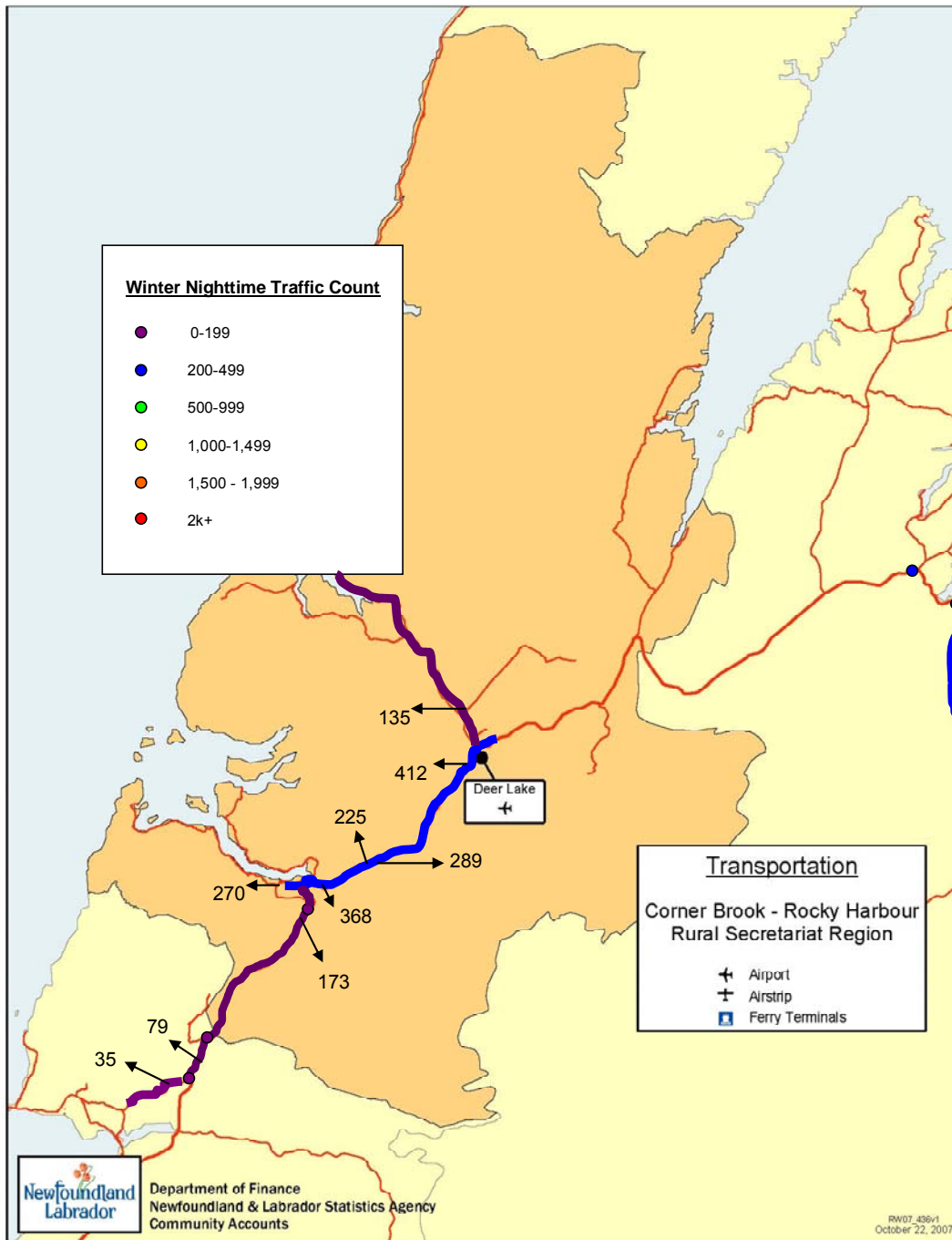




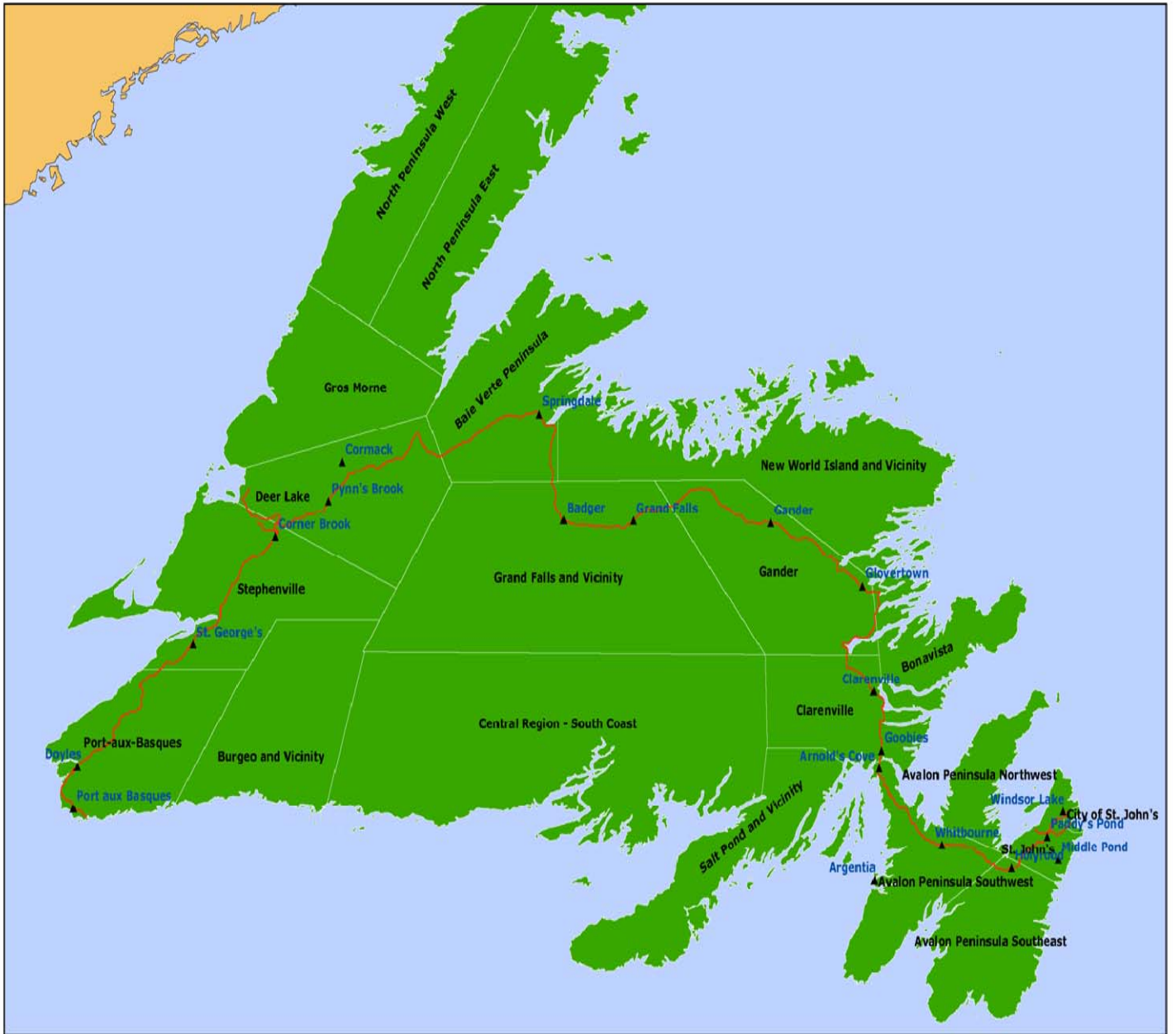








Appendix E Location of Provincial Road Weather Information Systems



Appendix F – Journey to Work Maps

