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INFO-NEIGE – FOR EASY AND EFFECTIVE MANAGEMENT OF SNOW LOADING OPERATIONS

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SUMMARY

Snowfalls vary considerably from year to year in Montreal but on average, the City of Montreal must decree five major snow removal operations annually. Each of these operations has to be done as fast as possible in order to fulfil citizens expectations and to reduce costs to a minimum level. In order to standardize the planning and control methods used by the boroughs in this type of operation and to rely on a management tool on the cutting edge of technology, the City of Montreal has developed a system called *Info-Neige* used as a proactive management tool. The *Info-Neige* system is a user-friendly program presented on a digital map format or interface and by using laptops, supervisors and/or foremen can easily enter data which is constantly updated in real time.

KEYWORDS

PLANNING / FOLLOW-UP / CONTROL / SNOW LOADING OPERATIONS

1. INTRODUCTION

The City of Montreal has a population of 1,626,000 people and is composed of 19 boroughs which manage about 4,100 km of streets and 6,500 km of sidewalks. That is why the City of Montreal has to be proactive in managing the services offered to its residents, like for instance, snow removal operations.

To achieve this, the City of Montreal has developed a system called *Info-Neige*, an unprecedented tool designed for snow removal operations. Its main objective is to simplify the foremen's activities.

The first version of *Info-Neige* was developed during the summer of 2008 and implemented as a pilot test in three boroughs the following winter. The test was conclusive and only a few minor modifications will be made during the summer of 2009. The system will be deployed to all the boroughs in the winter of 2009-2010.

The following pages explain in more details how *Info-Neige* works. This can be summarized in three sections: a planning tool, a follow-up and control tool and a real-time information tool.

2. PLANNING TOOL

First of all, *Info-Neige* allows the setting-up of snow loading routes that are presented on a map format. These routes are divided in work shifts and can be identified in many different ways, accounting for snow accumulations and other variables such as road width. A standard snow loading operation in Montreal will usually need 6 work shifts with a 30 cm snowfall. Each snow loading route is designed and stored in the computer's memory and the number of routes created simply depends of the user's needs.

The design of a snow loading route is easy. The user selects the right territory in the stored list and clicks directly on the street sections identified on the map corresponding to the right work shift. When a street is selected, the system indicates the name of that street and its intersections as shown in Figure 1. *It must be noted that Info-Neige is only available in French for the moment.*

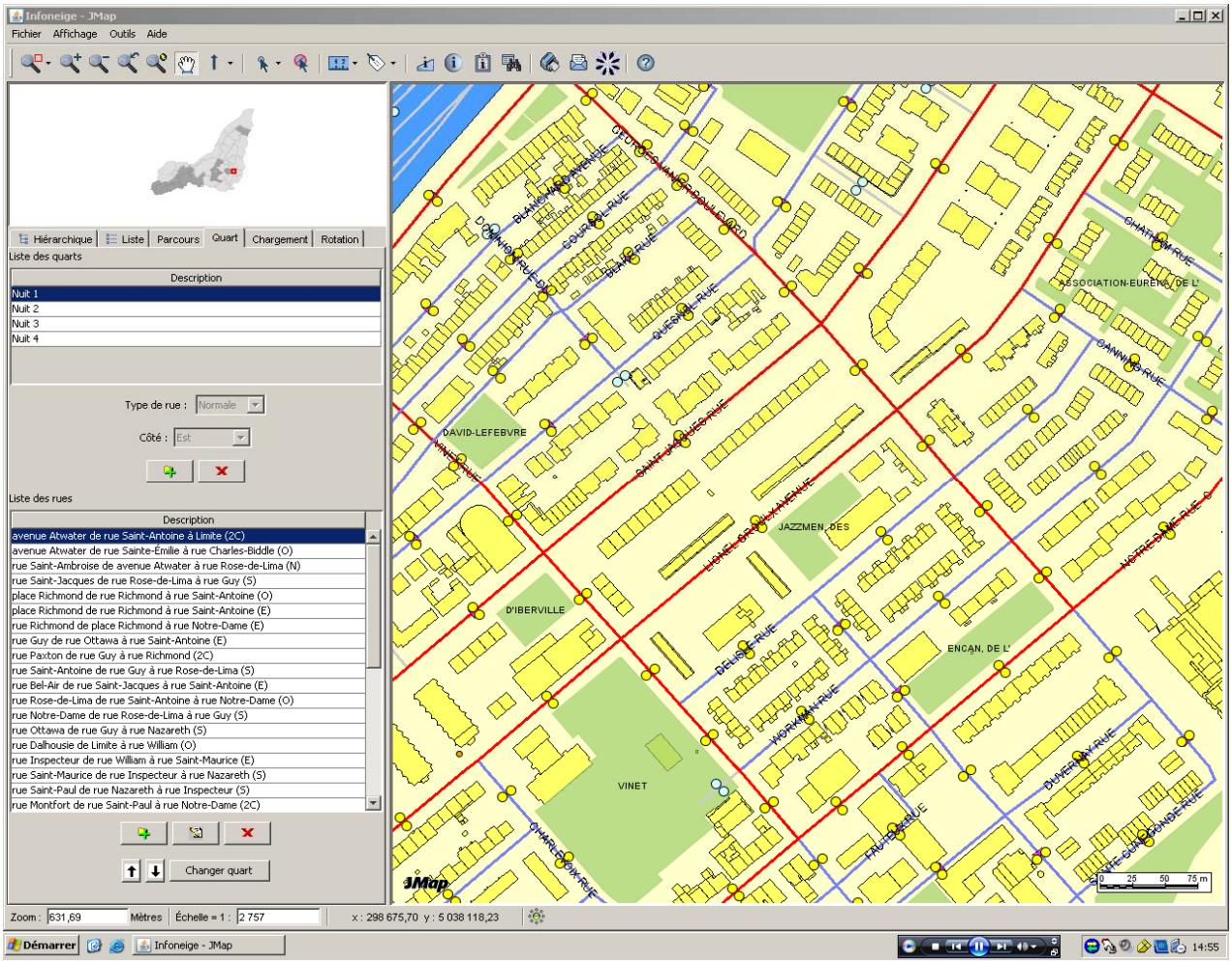

Figure 1 – Example of the user's screen creating a snow loading route

As previously mentioned, the user clicks on the street sections represented by yellow dots on the map. Each time a dot is selected, the street section turns red. The blue street sections are the ones selected for other work shifts. On the left of the screen, we notice that the first night shift is highlighted and all the streets identified to this work shift are indicated in the lower left section of the screen called "Description". When the user selects a street, he can specify the type of street such as normal, narrow or any other characteristic. In fact, some streets have particular snow loading strategies and the user can also indicates which side of the street has to be loaded during the selected shift.

It is possible to modify a snow loading route, during and after its primary design. The user has the possibility to add new shifts, change the street order of loading, transfer a street to another work shift or split a street in smaller or bigger sections. When a snow route is saved, a report is available, giving an overall view. This report can also be printed or exported to application software such as Excel. Figure 2 displays an example of a very small snow loading route:

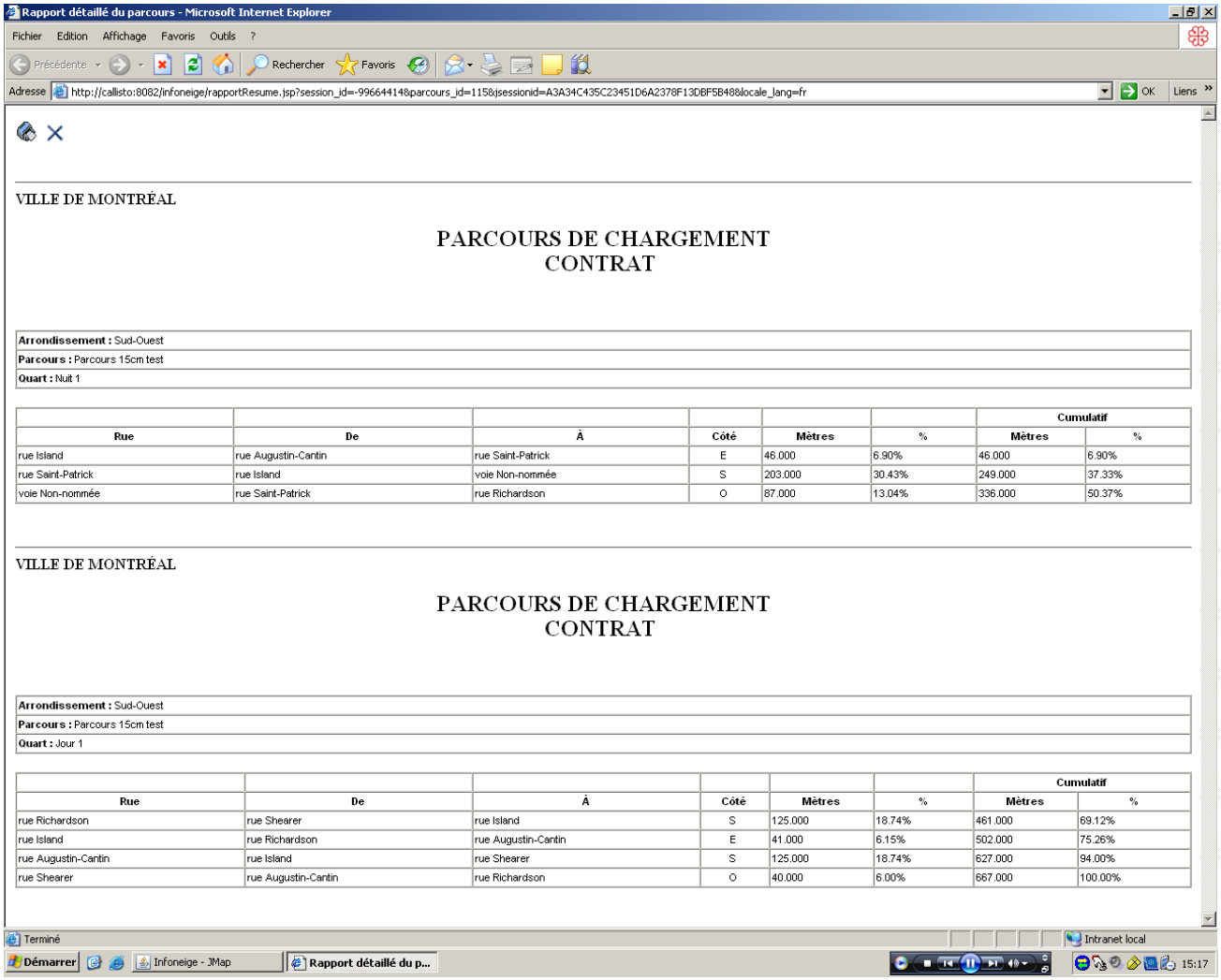

Figure 2 – Example of the snow loading route's report

To summarize, the user can create or modify as much snow loading routes as he needs, take advantage of the map format available as well as on line reports describing the activities accordingly. The process is really simple: a click on the right street section and *Info-Neige* automatically updates the planning.

It is important to note that *Info-Neige* was not developed as an intelligent system able to plan the snow loading routes. Even though the orientation of the streets is shown on the map, the system does not indicate if the user chooses the right or wrong direction or whether it would be best to start the loading route by such and such street. Nevertheless, it is possible to visualize which streets were not selected, thus making sure that a street or section of it has not been missed in the planning operation. *Info-Neige* is a management tool designed to accelerate the planning of a given route since before that, the selection of a loading route was entirely done manually.

3. FOLLOW-UP AND CONTROL TOOL

Once the snow loading routes are entered in *Info-Neige*, the system becomes mainly a follow-up and control tool. To make the reading of this text easier, the person who manage and control the snow loading operations on the field will be referred to as foreman.

When a snow loading operation is required, the foreman chooses in the list the snow loading routes that answer his needs. The system makes a copy of this route, which allows the foreman to modify it, if necessary, without changing the original version. Thus, the foreman can change the street order, create new work shifts and transfer streets from a work shift to another.

Once the snow loading route is up to the foreman's needs, a report designed to manage the installation of panels prohibiting parking (called "pose-planches") is printed and distributed to workers, who fill it out manually every time they install a no-parking restriction on the designated streets. At the end of their shift, the workers give the report back to the foreman who checks the streets in the screen that were created for that purpose. If, for some reasons, the workers were unable to install a no-parking restriction on a street, the foreman moves that street to another work shift.

When a street is checked in the system, it turns red on the map, allowing the foreman to have a visual overview of the work progression regarding the installation of the no-parking restrictions. Figures 3, 4 and 5 show an example of the report given to the workers and of the map display of streets with no-parking restrictions.

VILLE DE MONTRÉAL - PARCOURS DE CHARGEMENT

CONTRAT

Arrondissement : Sud-Ouest	**Date de pose planches :** 15.01.2010
Chargement No : 68 **du** 16.01.2010	**Quart de pose planches :** 7h-16h
Date du quart de chargement : 16.01.2010	**Panneaux installés :** 7h-16h

						Cumulatif		Type de signalisation				Heure de pose	
Rue	**De**	**À**	**Côté**	**Mètres**	**%**	**Mètres**	**%**	**Lexan**	**Mange.**	**Feux**	**Perm.**	**De**	**À**
rue Richardson	rue Shearer	rue Island	S	125.000	18.74%	125.000	18.74%	☐	☐	☐	☐		
rue Island	rue Richardson	rue Augustin-Cantin	E	41.000	6.15%	166.000	24.89%	☐	☐	☐	☐		
rue Augustin-Cantin	rue Island	rue Shearer	S	125.000	18.74%	291.000	43.63%	☐	☐	☐	☐		
rue Shearer	rue Augustin-Cantin	rue Richardson	O	40.000	6.00%	331.000	49.63%	☐	☐	☐	☐		

	Matricule :	Nom et prénom :
Contremaître de pose planches :		
Contremaître de chargement :		
Préposé au stationnement :		
Chauffeur :		
Poseurs de planches :		
Remarques :		

Figure 3 – Report given to the operation workers (small snow loading route)

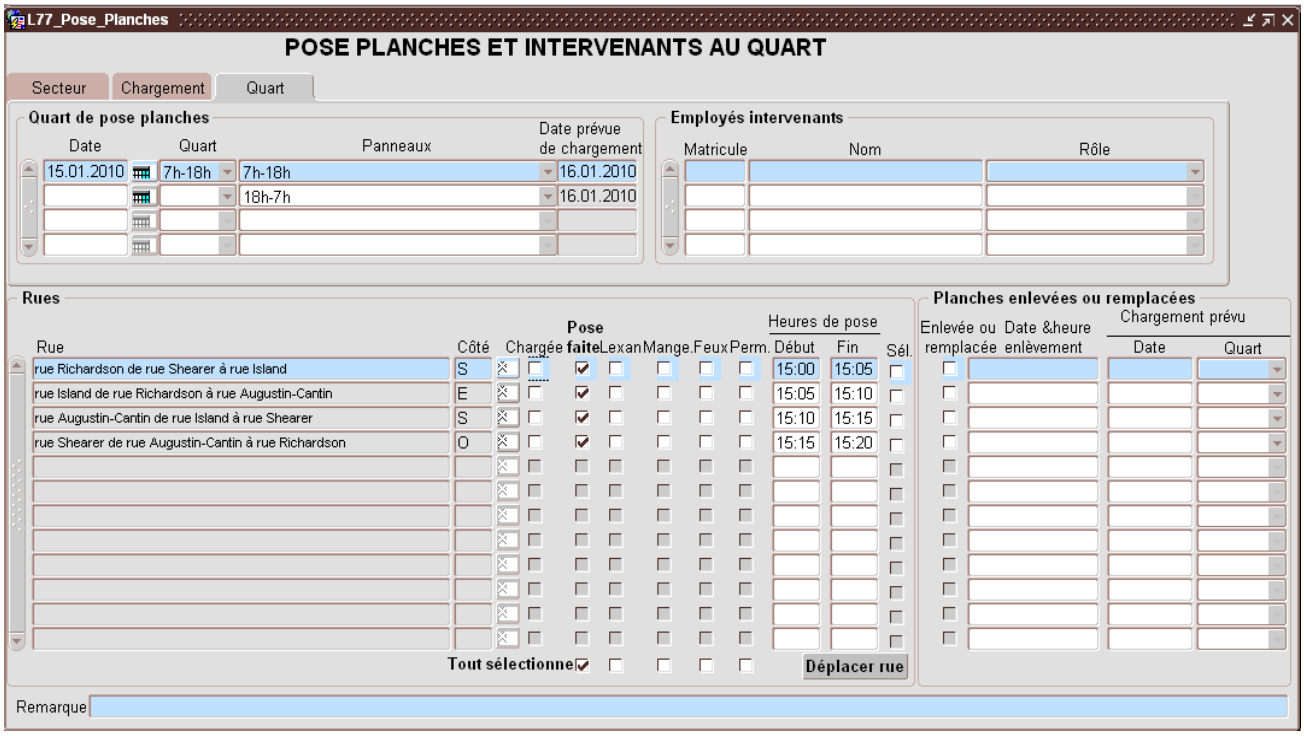

Figure 4 – “Saisie de pose planches” screen (for no-parking restrictions)

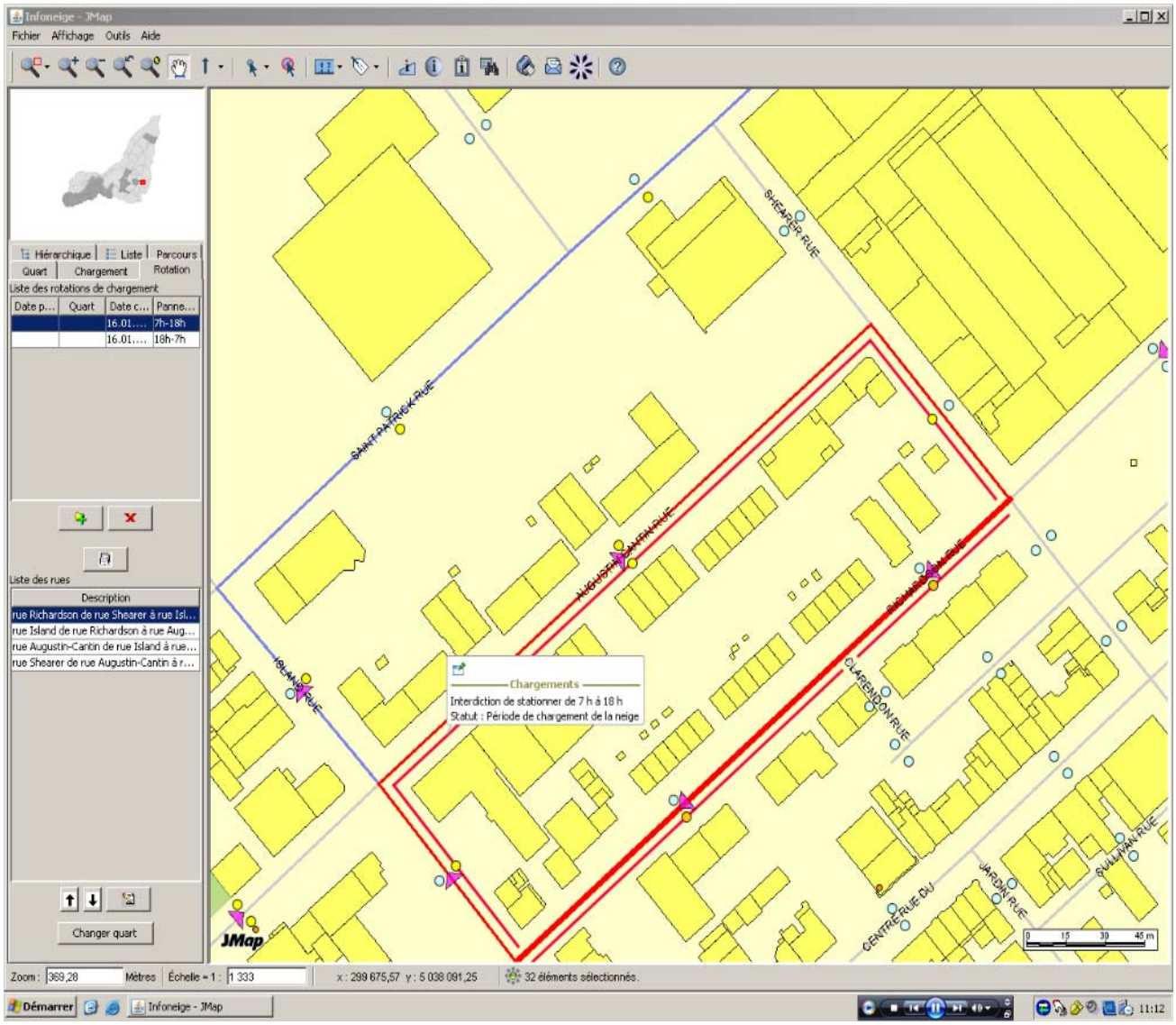

Figure 5 – Map showing streets with no-parking restrictions

A close examination of Figure 5 shows that no-parking restrictions are installed on the four streets that were initially planned on the report given to the workers (Figure 3). It's a small snow loading route, but the idea is the same with bigger and more complex routes. Usually, the no-parking restrictions are installed sixteen (16) hours prior to snow loading operations, allowing enough time for residents to move their vehicles.

Once the snow loading operation has started, the foreman only has to indicate in the system which streets were loaded. To do this, he simply has to go back in the "Saisie de pose planches" screen shown on Figure 4 and check the according streets in the "Chargée" (loaded) column. If, for some reasons, the planned street could not be loaded, the foreman can move it to another work shift. It's also possible to load a street in the system even if parking restrictions were not installed. The foreman simply clicks the streets sections directly on the map using the yellow dots.

If the foreman wants the information to be available in real time during a snow loading operation, he uses a laptop when on the field. If he doesn't have any laptop, he can simply update the data in the system when he goes back to his office or call a colleague and tell the information by phone.

When a street is loaded, it turns green on the map. Figure 6 shows that three streets from the previous example were loaded.

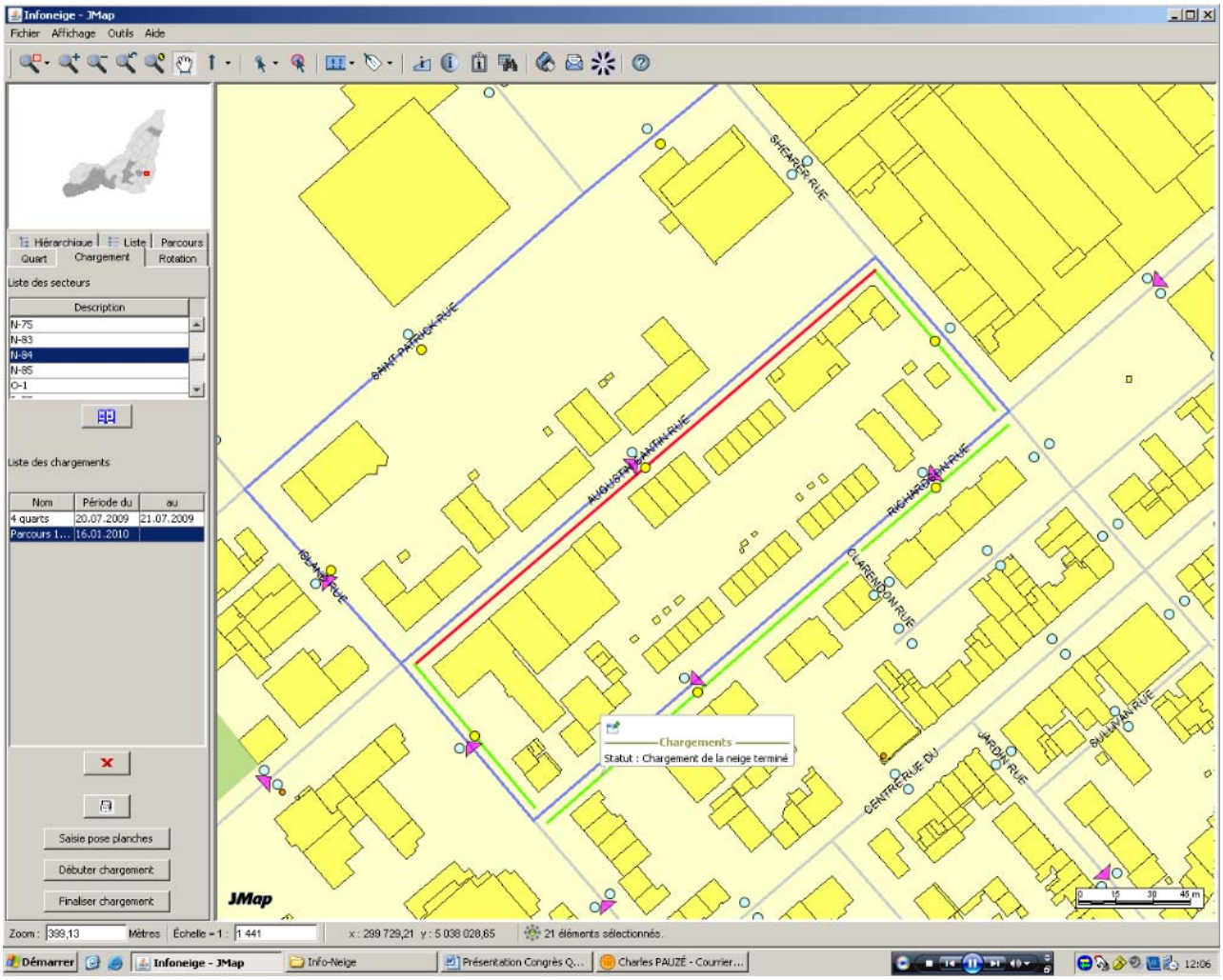

Figure 6 – Map showing loaded streets

The snow loading operations are stored in memory in the *Info-Neige* system. This way, it's always possible to refer to them if needed. For example, a foreman could be interested in seeing what was done previously on a particular snowfall or a particular street or sections of it.

In short, *Info-Neige* allows the foreman to easily plan his snow loading routes and to efficiently control the activities on the field, mostly because he can count on a visual overview provided by the digital interface. Moreover, the system was developed to be user friendly. Indeed, in most cases, the user simply has to click in the right boxes and the data is instantly updated.

4. REAL-TIME INFORMATION TOOL

Although *Info-Neige* is an efficient planning and control system designed for snow loading operations, it is also a real-time information tool.

In fact, the map interface is available on the Intranet (with a different look than the one used by the foreman) to track the progress of snow loading operations and to have information regarding the no-parking zones.

Moreover, this online information can be really useful for civil protection personnel, helping them to coordinate emergency responses in case of major events occurring during a snowfall. The information provided by the map allows an increased mobility of emergency or quick response vehicles helping drivers of these vehicles to use already loaded streets in any type of emergency. *Info-Neige* can also assist other public utilities, such as *Hydro Québec, Gaz Métropolitain, Vidéotron* or *Bell Canada* in the planning of their own working routes. Many cables or pipelines are underground and it becomes difficult for these companies to have access when a street is covered in snow.

5. CONCLUSION

To conclude, the City of Montreal is proud of its *Info-Neige* system and is honoured to have the opportunity to present it at the XIIIth International Winter Road Congress in Quebec. This unique project represents the starting point of other similar systems. Information technologies are really becoming necessary for efficient operation management methods and *Info-Neige* is fully oriented toward this goal.