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Anna ADAMEK

AUTEUR DE LA THÈSE - AUTHOR OF THESIS

M.A. (History)

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D. Davis

DIRECTEUR DE LA THÈSE - THESIS SUPERVISOR

CO-DIRECTEUR DE LA THÈSE - THESIS CO-SUPERVISOR

EXAMINATEURS DE LA THÈSE - THESIS EXAMINERS

P. Bischoff

E. Kranakis

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INCORPORATING POWER AND ASSIMILATING NATURE:

ELECTRIC POWER GENERATION AND DISTRIBUTION IN OTTAWA, 1882-1905

by

Anna Adamek

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the Faculty of Graduate and Postdoctoral Studies
in partial fulfilment of the requirements for the
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ABSTRACT

INCORPORATING POWER AND ASSIMILATING NATURE:

ELECTRIC POWER GENERATION AND DISTRIBUTION IN OTTAWA,

1882-1905

Anna Adamek

University of Ottawa, 2003

Supervisor:

Professor Donald F. Davis

The history of electric power generation and distribution in Ottawa reflects the city's political, economic, and environmental conditions. The process of electrification of the Canadian capital was shaped by strong personalities, by municipal, provincial and federal politics, and by the city's location on the Ottawa River, an interprovincial border. The idea of electrification was introduced by municipal politicians in 1880s as a way of redefining Ottawa as a 'power capital of the Dominion' rather than as the locus of the federal bureaucracy. Yet the process was soon dominated by three powerful Liberals - Thomas Ahearn, Erskine H. Bronson and Warren Y. Soper - who gained influence among the three social groups who constituted the majority of Ottawa residents, Irish Catholics English Protestants, and Methodists. Their strong political influence in the Canadian capital allowed the three industrialists to form alliances within the provincial and federal government to permit them to build an electric empire. By 1894, the year in which they created the Ottawa Electric Company and the Ottawa Electric Railway Company, Ahearn, Bronson and Soper held a monopoly over the city's power generation and distribution.

Yet as the three entrepreneurs shaped the electric market and urban development of the city, their endeavours were influenced by the politics, location, and natural resources of the Ottawa area. The same factors that fashioned a strong monopoly, also obstructed it, leading to establishment of a municipal plant in 1905 and consequently creating an electric duopoly in Ottawa.

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I greatly appreciate the support of my supervisors and colleagues at the Canada Science and Technology Museum, particularly Mr. Geoff Rider and Ms. Louise Trottier, whose understanding and cooperation facilitated my work on this project. Ms. Sylvie Bertrand, the Readers Services Assistant at the Museum library, provided a much needed help in locating and requesting research material. I am also grateful to Mr. Serge Barbe and the staff of the City of Ottawa Archives as well as the archivists at the National Archives of Canada for their suggestions and for retrieving numerous boxes of the archival material.

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INTRODUCTION

On 14 August 2003 a massive blackout cascaded across Ontario and the Great Lake States shutting down transportation, communication and computer networks, as well as government offices, banks and industrial operations. Millions of people were left without light and home appliances. The general confusion over the source of, and solution to, the power outage demonstrated how dependent on electricity North Americans had become, and how little most people knew about the basics of its generation and distribution. Over the last hundred years, the technology of power generation and supply has become a normal part of life. The provider of electric power has been invisible, the delivery process inconspicuous, and the functioning of power generation and distribution technologies taken for granted. Only when the system has failed, as it has every ten to twenty years, has society turned its attention to the operations of the public utility and demanded immediate remedies. A search for scapegoats has ensued, it being assumed that the system was originally built to perfection -- as the very model of technical rationality -- and that only recently has some fool politician or greedy corporation messed it up. And yet, as historians of technology know, there was nothing natural or inevitable about the present electrical system.[1] As it took shape, it was, as we shall see, the embodiment of compromises, some born in politics, others in greed, and still others in the intractability of Nature. The system has never been perfect; the light has

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[1] See Joel A. Tarr and Gabriel Dupuy, eds., *Technology and the Rise of the Networked City in Europe and America* (Philadelphia: Temple University Press, 1988), Charles David Jacobson, *Ties that Bind: Economic and Political Dilemmas of Urban Utility Networks, 1800-1990* (Pittsburgh: University of Pittsburgh Press, 2000); Christopher Armstrong and Henry Vivian Nelles, *Monopoly's Moment : the Organization and Regulation of Canadian Utilities, 1830-1930* (Philadelphia: Temple University Press, 1986)

always been in danger of dying and the ageing system is forever the product of its early, formative years.

To that end, this thesis examines the origins of power generation and distribution in Ottawa between 1882, when the first electric light bulb was switched on at a lumber yard, and 1905, the initiation of public ownership. The process of electrification is analyzed in the context of, what Joel Tarr and Gabriel Dupuy have called the emergence of the *networked city*. According to the authors, technological networks such as electric power generation and distribution, though developed and diffused globally by the leading centers of innovation, had local variations. The electrification process has differed from one urban centre to another in terms of sponsorship, management culture, and technical innovations, and the consequent technological network embodies -- for decades -- the political, social and economic decisions undertaken during its construction.[2] Indeed, the electric industry in Ottawa, it will be shown, has been shaped by political, social, environmental and market conditions specific to its locale. The process in the national capital differed, for example, from the pattern in Montreal, where the idea of electrification was brought forward by Monroe Lee Ross who represented the American Electric and Illuminating Company in Canada. In an attempt to capitalize on the evolving Canadian market, he founded in 1884 the Royal Electric Company, supported by the Thomson-Houston Company, another U.S. firm.[3] Similarly, developments on Niagara

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[2] Tarr and Dupuy, *Technology and the Rise of the Networked City,* xiii-xvi.

[3] Clarence Hogue, *Québec un siècle d'électricité* (Montreal: Editions Libre Expression, 1979): 13-17. Developments in Ottawa were closer to those in Toronto, where electrification was carried out by local millwright J.J. Wright. Armstrong and Nelles, *Monopoly's Moments*, 75-76.

Falls were controlled by large American companies.[4] In Ottawa, by contrast the process was carried out by two locals, young telegraphers, who, despite their working class origins, were able to compete with established capitalists in attracting financing. Thanks to their training in telegraphy, a close relative to early electric systems, Thomas Ahearn and Warren Y. Soper possessed the necessary technical skills to create a durable and persistent system of power generation and distribution in Ottawa. Their network consisted of artifacts manufactured in Canada and of American technologies adapted to local conditions. Moreover, Ahearn and Soper established a network of companies based in Ottawa to produce electrical equipment, machinery and small appliances of their design. The two entrepreneurs, Liberals with influence among Irish Catholics and among Methodists, formed a strong relationship with Erskine H. Bronson, a local lumber baron and a politician, and all three eventually acquired powerful alliances within the provincial and federal governments. These links allowed them to build an electric empire unusually free from municipal regulation.

Their endeavours were also influenced by the interprovincial location of Ottawa and by the peculiarities of Ottawa's chief energy source, the waterpower of the Chaudière Falls on the Ottawa River. Consequently, Ahearn and Soper were continually having to renegotiate the boundaries of competition and cooperation among all the agents in this actor-network.[5] Although adept at manipulating federal and Ontario provincial

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[4] Edward Dean Adams, *Niagara Power: History of the Niagara Falls Power Company, 1886-1918* (Niagara Falls, N.Y: Niagara Falls Power Company, 1927):163-177; Merrill Dension, *The People's Power :The History of Ontario Hydro* (Toronto : McClelland & Stewart, 1960):19-26.

[5] Michel Callon, who introduced the concept of an actor-network defined it as a series of animate and inanimate entities which are linked to one another and whose mutual relationship can be redefined at any moment. In his words: "an actor network is

politicians and in excluding Ottawa's aldermen from decision-making, Ahearn and Soper's drive for monopoly was ultimately foiled by the regional ecology. Despite their best efforts, they could not surmount the constraints imposed by Ottawa's climate, location, and river.

While complex and fascinating, the study of the electrification of Ottawa is not an easy endeavour. Secondary literature on the Ottawa Electric Company and the early Ottawa Electric Railway is practically nonexistent.[6] Only John Taylor, Robert Peter Gillis and three historians of Ottawa's tramway – Fred Angus, Robert Tennant, and Donald F. Davis -- have turned their attention to electrification.[7] Taylor's illustrated history of

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simultaneously an actor whose activity is networking heterogeneous elements and a network that is able to redefine and transform what it is made of." Michel Callon, "Society in the Making: The Study of Technology as a Tool for Sociological Analysis," Wiebe E. Bijker, Thomas P. Hughes and Trevor Pinch, *The Social Construction of Technological Systems* (Cambridge: MIT Press, 1989): 92-93.

[6] The books on the history of Ottawa usually use the 'national capital' theme and focus on the federal government. See for example Canada. National Capital Commission, *A Capital in the Making: Reflections of the Past, Visions of the Future* (Ottawa: NCC, 1988). A more diversified look at the city can be found in Rolf Wesche and Marianne Kugler-Gagnon, eds. *Ottawa-Hull : Spacial Perspectives and Planning* (Ottawa: University of Ottawa Press, 1978); and in Jeff Keshen and Nicole St-Onge, eds., *Ottawa : Making a Capital* (Ottawa : University of Ottawa Press, 2001). Two studies sponsored by the National Capital Commission, Architectural and Heritage section: *Chaudière Historical Documentation* (Ottawa: National Capital Commission, 1982) and Michael Newton and Robert Haig, *Lower Town Ottawa* (National Capital Commission, 1979-1981) contain some useful information on the Chaudière buildings and location of the first lamps in the city.

[7] John H. Taylor, *Ottawa: An Illustrated History* (Toronto: Lorimer, 1986),78-81; Robert P. Gillis, *E. H. Bronson and Corporate Capitalism : A Study in Canadian Business Thought and Action, 1880-1910* (Master's thesis, Queen's University, 1975); Donald F. Davis, "A Capital Crime? The Long Death of Ottawa's Electric Railway," in *Keshen and St-Onge, Making a Capital*, 349-382, and Davis, "Technological Momentum, Motor Buses, and the Persistence of Canada's Street Railways to 1940," *Material History Review*, 36 (Fall 1992): 6-17. Also F. Angus, "Seven Hundred Days: The Story of Ahearn & Soper and the Beginning of Electric Traction in Ottawa," *Canadian Rail*, no. 377, (November-December 1983):188-216; R.D. Tennant, "Capital Traction: An Outline

Ottawa places power generation in the broader context of the city's effort to diversify its economic base. Yet Taylor only broadly outlines the reasons for electrification and does not deal with the construction of the system or its actor-network. Gillis's study, a Masters thesis, focuses on E.H. Bronson's thoughts and actions and his involvement in electric utilities in Ottawa; he does not analyze the role played by Ahearn and Soper in the electrification of the city. The transit historians have understandably told us more about the city's streetcars, tram routes, and passengers than about the electric grid they used. Indeed, they, like most Canadians in recent years, largely took the availability of electric power for granted.

As the secondary sources offer little information on the electrification of Ottawa, the process needs to be reconstructed from primary sources dispersed among various collections and institutions. The records of the Ottawa Electric Company and the Ottawa Electric Railway Company are preserved at the City of Ottawa Archives.[8] Thin, these collections include correspondence, legal documents, bills, photographs and newspapers clippings related to the early history of the electric industry in Ottawa. While these collections help to construct the narrative of power generation, distribution, and use, they offer little insight into the socio-political aspects of the process of electrification. More valuable information is found at the National Archives of Canada. The Bronson Family papers contain letters between Bronson and the Ahearn-Soper team, as well as the

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History of the Street Railway System of Ottawa," *Newsletter of the Upper Canada Railway Society*, (October 1868):118-122 and R.D. Tennant, "The Ottawa Electric Railway," *Canadian Rail*, (December 1969): 319-329.

[8] City of Ottawa Archives, MG39, Ottawa Electric Company, and MG 45, Ottawa Electric Railway Company. Together the collections consist of 5 boxes of archival material. Unfortunately, the personal papers of Thomas Ahearn and Warren Y. Soper do not appear to be extant.

minutes of their meetings, and the personal notes of Erskine Henry Bronson. The Bronson collection also includes the papers of Levi Crannell, Erskine's brother-in-law, who was involved in the establishment of the electric railway and its contract negotiations with the City Council.[9] Additional information on the politics of electrification in Ottawa can be found in the correspondence between Thomas Ahearn and Sir Wilfrid Laurier in the Laurier fond at the National Archives.[10] Photographic collections, which include images of Ottawa at the end of the 19th and the beginning of the 20th century, at the Ottawa City and the National Archives depict street illumination and public transportation and offer a look at the technological artifacts used in Canada's capital.[11]

Printed primary sources – the minutes of the City Council, the three English-language dailies (published between 1882 and 1905), the proceedings of the Canadian Electrical Association, trade magazines such as the Canadian Engineer and the Canadian Electrical News, as well as the trade literature produced by the Canadian manufacturers of the generating equipment – have provided additional material on the socio-economic development and the meanings that electrification had for the industrialists, politicians and electorate of Ottawa.[12]

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[9] National Archives of Canada, MG28-III26, Bronson Papers. This rich and well indexed collection contains 69.1 m of textual records.

[10] National Archives of Canada, MG26 G, Sir Wilfrid Laurier Fond, Political Papers. General Correspondence.

[11] National Archives of Canada, William James Topley Collection; City of Ottawa Archives, Transportation Collection and Street Collection.

[12] A complete collection of the Minutes of the City Council and various Ottawa newspapers is located at the City of Ottawa Archives. The Canada Institute for Scientific and Technical Information (CISTI) holds the Canadian Engineer and the Canadian Electrical News, and the Canada Science and Technology Museum has an extensive collection of electric trade literature.

While there is insufficient information extant to permit answers to all the questions that historians of technology, of cities, and of political economy now ask about the development of complex technological systems, this thesis will shed light on several issues that have energized academic debate internationally since the 1970s. First, inasmuch as Ahearn and Soper operated at the boundaries of four political jurisdictions – that is, of Ottawa, Ontario, Quebec and Canada – their efforts to build a monopoly help us to sort through the political-economy debates. We shall see that Nelles and Armstrong, even though they rarely referred to Ottawa in their magisterial study of public utilities in Canada, were correct to examine these in the context of national, provincial and municipal objectives and to stress the relationships among politicians, technologists, and business leaders.[13] A technical network is indeed a political construct. They erred, however, in maintaining that the triumph of one electric company over others in each municipal market had little, if any, correlation to its technological merits, managerial ability or economic fundamentals, but was instead strictly an outcome of municipal politics.[14] It will be shown that in Ottawa, Ahearn and Soper used their technical and managerial skills to create a company able to defeat even those competitors who enjoyed the backing of the City Council. As the "natural monopoly" emerged in Ottawa, the city was unable to control the opportunistic behaviour of Ahearn and Soper's through franchise-type contracts.[15] As a result, a consensus gradually grew in the Council for the

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[13] Armstrong and Nelles, *Monopoly's Moment,* 74-77; and H.V. Nelles, *The Politics of Development* (Toronto: Macmillan of Canada, 1974): 222-257.

[14]Armstrong and Nelles, *Monopoly's Moment*, 74.

[15] The origins of the concept of "natural monopoly" in the Victorian Era is explored in Jacobson's *Ties that Bind,* 7-17. Jacobson explains this concept as a relationship between the demand and the technology of supply, which occurs when the entire demand can be satisfied by one firm at a lower cost than by many suppliers. To ensure the most effective

municipalization of electrical power. A local case study, this thesis substantiates the generalization that John Baldwin and Carman D. Baggaley made about the origins of public ownership in Canada – that it owed less to "socialism" than to the refusal of public utilities to fulfill their franchise obligations.[16] Furthermore, this study will lend support to the claims of political economist Glen Williams that Canadian elites aspired to create industrial centres to increase their political and economic importance within the British Empire.[17] We shall see that the urban boosters in Ottawa used electric power generation and distribution to promote the city's development as the energy capital of the Dominion.[18] In sum, the process of electrification was conducted in Ottawa by the local

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production in such circumstances the companies providing a redundant service should merge or be absorbed by the strongest competitor. The concept of "transaction costs" is crucial to understanding natural monopoly. In his classic 1937 article, Ronald H. Coase argues that even in the context of monopoly, the company needs to calculate the business costs of managing difficulties that affect profits. The efficiency of monopoly is therefore dictated by transaction costs, which influence the size of the corporation and lead to the decision either to provide the service or buy it from another company. Coase "The Nature of the Firm," *Economica* (November 4, 1937):386-405.

[16] John R. Baldwin, *Regulatory Failure and Renewal: The Evolution of the Natural Monopoly Contract* (Ottawa: Canadian Government Publishing Centre, 1989):83-93; and Carman D. Baggaley, *The Emergence of the Regulatory State in Canada, 1867-1939* (Ottawa: Economic Council of Canada, 1981):212-243. Although these books do not refer to the electric industry in Ottawa, they still provide useful information on the origins of government regulation in Canada. The emergence of economic regulations cannot be studied without a reference to an American economist, Oliver Williamson, who introduced a concept of the *transaction specific asset*, which constitutes a complicated, even fragile relationship between a monopoly and a contractor (the city). He argues that an initial bidding process introduces an element of fair competition to the monopoly situation, but once it is completed and the physical network of artifacts built and transaction costs estimated, the alliance between the seller (the electric provider) and buyer (the city) changes, and needs to be regulated by the government. See Williamson, *The Economic Institutions of Capitalism* (New York: Free Press, 1985):xii

[17] Glen Williams, *Not for Export : the International Competitiveness of Canadian Manufacturing* (Toronto: McClelland & Stewart, 1994):24-27, 88,109.

[18] On urban boosterism see G. A. Stelter and A. F. J. Artibise, eds., *The Canadian City : Essays in Urban and Social History* (Ottawa: Carleton University Press, 1984); and

elite, contrary to the conclusion of economic historian Tom Naylor that the Canadian business elite invariably allied themselves in the 1867-1914 period with foreign capital in the process of industrialization.[19]

In addition to helping us to understand better the political economy of the city at the time of its electrification, the thesis will also be one of the first studies of Canadian technology to use the theoretical approaches that have been developed internationally since the 1980s by historians and sociologists of science and technology. It is depressingly rare in the Canadian literature on technology to find references to semiotics, systems-engineering, actor-networks, gender, and social constructionism. This thesis will show the heuristic potential of these theoretical approaches to the understanding of electrification.[20]

Stelter and Artibise, eds., *Shaping the Urban Landscape: Aspects of the Canadian City-Building Process* (Ottawa: Carleton University Press, 1982):4-5

[19] R. T. Naylor, *The History of Canadian Business, 1867-1914* (Toronto: J. Lorimer, 1975):xxii-xxv. Although, Ahearn and Soper represented Westinghouse in Ottawa, there is no indication that they received any direct financing from the American company. Rather this connection allowed them to extend their 'human capital' – their knowledge and access to new technologies.

[20] Some notable exceptions among Canadian historians who draw from international theory to understand various Canadian technologies include Joy Parr, *Domestic Goods: The Material, the Moral, and the Economic in the Postwar Years* (Toronto: University of Toronto Press, 1999); H. V. Nelles and Chris Armstrong, *Monopoly's Moment*; Eda Kranakis, *Constructing a Bridge: An Exploration of Engineering Culture, Design, and Research in Nineteenth-Century France and America*. Cambridge, Mss. : MIT Press, 1997; Donald F. Davis, *Conspicuous Production: Automobiles and Elites in Detroit, 1899-1933* (Philadelphia: Temple University Press, 1988); Keith Walden, *Becoming Modern in Toronto: The Industrial Exhibition and the Shaping of a Late Victorian Culture* (Toronto: University of Toronto Press, 1997); Michele Martin, *Communication and Social Forms: A Study of the Development of the Telephone System, 1876-1920* (Ph.D. Thesis, University of Toronto, 1987); John Vardalas, *The Computer Revolution in Canada* (Cambridge, Mass.: MIT Press, 2001) and Glen Norcliffe, *The Ride to Modernity: The Bicycle Boom in Canada, 1869-1900* (Toronto: The University of Toronto Press, 2001)

The actor-network model, hitherto neglected by Canadian historians, is especially useful, we shall see, to understanding the early electrification of Ottawa. Michel Callon and John Law, reacting to the sterile debate between the technological and social determinists, developed the actor-network approach to demonstrate that the construction of technology and the construction of society should be explained in the same terms. One is not necessarily the actor or subject, the other the acted-upon or object. In other words, they argued that in the shaping of a technological network like an electric grid, the technology is no more a social product than society is a technological product. Both instead develop interactively and symbiotically, with human and nonhuman actors playing an important role in the development of technological systems and the society in which it functions.[21]

It was Thomas Hughes who taught historians (in Canada, most notably Nelles and Armstrong) to study technologies as large systems, created in specific socio-economic and political contexts. He argues that all the elements of a system, such as the actions of human actors, the system's own momentum, the reverse salients (or engineering problems) that impede its growth, and physical artifacts it encompasses are relevant to comprehending its development and ever-hardening durability (until it becomes too brittle to survive, like Ontario Hydro in the 1990s). The durable and persistent technological artifacts are particularly important, because, as we shall see, they carry forward the context in which they were created and used even after that context has

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[21] John Law, M. Callon and A. Rip, eds. *Mapping the Dynamics of Science and Technology: Sociology of Science in the Real World* (Basingstoke: Macmillan, 1986):3-15.

become obsolete.[22] In the urban historiography, Hughes' systems approach can be found in the book by Joel Tarr and Gabriel Dupuy on the networked city, where they suggested that its systems incorporated well-established, local values as well as the meanings used to remake these values to accommodate changing times and circumstances.[23]

Another approach that informs this thesis is the "social construction of technological systems" -- or "SCOT" in the shorthand of European sociologists Wiebe E. Bijker and Trevor Pinch. For them, any technology is a part of the "sociotechnical ensemble", which should be studied without *a priori* distinctions between its social, technical, political, or scientific aspects.[24] Their SCOT approach stresses the influence of the "relevant social groups" that vested their own interests in the development and diffusion of a particular technological system. These groups made themselves "relevant," according to Bijker and Pinch, by trying to impose their "interpretation" on the technology, and included engineer-inventors, businessmen, financiers and politicians in Ottawa.

There is one final approach to the history of technology that will be used in the thesis: semiotics. Understandably, historians of such hard "facts" as electrical generators and transmission wires have not been enthusiastic about the linguistic turn in recent historiography. Even so, a recent monograph by Charles Bazerman has unveiled the languages of Edison's light – that is, the various sorts of speech acts (as different in their fundamentals as a patent application and a publicity blurb) – that Thomas Edison had to

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[22] Thomas P. Hughes, *Networks of Power : Electrification in Western Society, 1880-1930* (Baltimore: Johns Hopkins University Press, 1983):15-17

[23] Tarr and Dupuy, *Technology and the Rise of the Networked City, xii-xvi.*

[24] Bijker, Hughes and Pinch, eds., *The Social Construction of Technological Systems*, 9-15.

master in order to build his electrical system. The semiotic approach will be used here to explain the symbolism of electric generation, transmission and use, as well as the negotiations between the relevant social groups to formulate a comprehensive and inclusive meaning of electrification as, for example, something inherently public, hence best regulated or owned by government, or intrinsically technological, hence something best left to private capital and engineer-entrepreneurs.[25]

All of the theoretical approaches to the history of technology can become a mental straitjacket, limiting thought, when applied mechanically and in their entirety to an historical issue. Therefore, this thesis will adapt some essential elements from each of these theories in order to explore the electrification of Ottawa. Using the actor-network approach, this dissertation will show that the process of electrification was constructed symbiotically by the interaction between human actors, technologies, and the natural resources at the Chaudière Falls. On the other hand, systems theory will be used to demonstrate that the system built by Ahearn and Soper had by the turn of the century developed sufficient technological momentum to establish a durable and persistent network of technological artifacts that reflected the socio-economic and environmental context of Victorian Ottawa and carried it well into the middle of the twentieth century.

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[25] Charles Bazerman, *The Languages of Edison's Light* (Cambridge, Mass.: MIT Press, 1999):333-350. For the semiotic approach to the study of technology see also Bruno Latour, *Science in Action : How to Follow Scientists and Engineers Through Society* (Cambridge: Harvard University Press, 1987):108-121; Walden, *Becoming Modern in Toronto,*333-340. The social meanings of electrification are also explored in David E. Nye, *Electrifying America : Social Meanings of a New Technology, 1880-1940* (Cambridge, Mass.: MIT Press, c1990):381-391; Ruth Schwartz Cowan, *A Social History of American Technology* (New York : Oxford University Press, 1997):162-165, and Dianne E. Dodd, *Delivering Electrical Technology to the Ontario Housewife, 1920-1939: An Alliance of Professional Women, Advertisers and the Electrical Industry* (Ottawa: Carleton University, 1988):447-462.

The SCOT idea of the relevant social groups will be used to identify the network of relevant political and social groups that composed their winning alliance. Finally, the semiotic approach will clarify the role of Ahearn, Bronson and Soper in promoting the social meanings of electrification. We shall see that throughout the process of electrification, Ahearn, Bronson and Soper acted as "translators" who shaped the social meanings of the new technologies as they repeatedly acted as mediators between the social, technical, political or scientific actors in the sociotechnical ensemble.[26]

We shall also see that, at the end, the first stages of Ottawa's electrification cannot be understood simply as the outcome of political and economic inputs, for as historians of technology have taught us, the involved actors include not only the humans in the power companies, city council, the legislatures, and the voting booth, but also inanimate agents such as arc street lamps and AC-transformers, and most of all, the Ottawa River. As we shall see, its mood swings, its ups and downs, often foiled the most elaborate schemes of Man. Yet it is not with the river's temper that this thesis begins, but rather with a hotel brawl. This incident will thereafter remind us to look for the emotions as well as the thoughts that guided electrification of Ottawa before 1905.

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[26] The theory of technological translators is explored by Latour, *Science in Action,* Hugh Aitken, *Continuous Wave: Technology and American Radio, 1900-1932* (Princeton: Princeton University Press, 1985) and Susan Douglas, *Inventing American Broadcasting, 1899-1922* (Baltimore: John Hopkins University Press, 1987).

CHAPTER I

ELECTRIFICATION OF STREET LIGHTING AND EMERGENCE OF ELITES IN OTTAWA POWER INDUSTRY, 1882-1890.

In 1887 a small riot erupted in the Township of Hull, on the north bank of the Ottawa River, just opposite to its Chaudière Falls. The fight begun when a Hull hotelier, who shared her electric light bulb system with a neighbouring building, and controlled the switch for both of them, repeatedly demonstrated to visitors the wonder of having electric illumination at her fingertips. She constantly flicked the lights of both buildings on and off, infuriating her neighbours who started a brawl.[1]

At the end of the 1880s, electric lighting was still an expensive novelty: Ottawans first encountered it in 1882 when Levi Young, a prominent lumber baron, installed two carbon arc lamps at the entrance to his Chaudiere yard. The bulbs were powered by a dynamo also used to run the machinery in Young's mill. The two bright electric lamps were considered a marvel of modern science and admired every night by crowds of people.[2] Erskine Henry Bronson, Young's competitor in the lumber business, soon

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[1] This event is described by F. Askwith in an unpublished paper, written in mid-1970s and titled *A Historical Sketch of the Electrical Utility Industry in the Ottawa Area*, in the City of Ottawa Archives (henceforth COA).

[2] *Loc. cit.* In 1882 the carbon arc lamps installed by Young were among very few electric lights operating in Canada. The first arc light in this country was placed in Robert Davis' hotel in Winnipeg on 12 March 1873. Five years later, J. A. Craig demonstrated a Jablachkov candle and arc technology in Montreal. The first incandescent lamps was displayed in 1879 in McConkey's Ice Cream Parlour in Toronto. For more chronological details on the earliest electric light installations in Canada see John Negru, *The Electric Century: An Illustrated History of Electricity in Canada* (Montreal: Canadian Electrical

installed an experimental Lighting Tower on the grounds of his company; he expected to extend the hours of operations and improve efficiency of the yard.[3] Bronson's tower consisted of several open-arc lamps placed on top of a high timber post. The lamps were connected through a wire, situated inside the pole, to a steam engine placed at the bottom of the tower. According to the Daily Citizen, the Lighting Tower "cast distinct shadows in the square at the market place in Hull," but it did not work well in poor weather and provided no light in fog.[4] A second tower was installed in Ottawa in the city's business district, near Christ Church on Spark Street. Inexpensive, poor quality engines that powered the towers did not produce enough current to provide good lighting, and the arc globes placed on a high pole were difficult to maintain on a daily basis. Hence the towers were impractical and soon dismantled.[5]

1. 1 A Prelude to Electrification.

In this early stage of electrification of the city, engineers employed by the Dominion Government and the Public Works officials were among the few professionals familiar with the wonders of the electric light. In 1882, several politicians from Ottawa visited the Canada Cotton Company to tour the first-in-Canada electric plant installed in Cornwall by the Canadian Edison Electric Light Company. The guests were so impressed

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Association, 1990):103-116.

[3] "The Electric Light," *Daily Citizen*, 11 October 1884.

[4] *Loc. cit.*

[5] See Askwith, *A Historical Sketch.*

that the Ministry of Public Works decided to proceed immediately with the construction of two electric plants, one for the Senate and second for the House of Commons.[6] On 1 November 1883, H. M. Byllesby from the Edison Electric Light Company received the contract for the illumination of the Senate, and the United States Electric Company, represented in Ottawa by two local young telegraphers Thomas Ahearn and Warren Y. Soper installed a small power plant in the basement of the Commons.[7] Each wing was furnished with hundred and fifty lights rated at 16 candlepower each. They were switched on for the opening of the Parliament in January 1884.[8]

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[6] See National Archives of Canada, henceforth NAC, R7328-0-2-E, Henry Marison Byllesby Papers. Byllesby fonds contain a short description of his involvement with the electrification of the Parliament, prepared especially for the National Archives. See also "Electric Ottawa," *The Electric World* (September 21, 1895): 312.

[7] There is not much information on the personal lives of Thomas Ahearn and Warren Y. Soper. Ahearn was born in Lebreton Flats on June 24, 1855 to Irish Catholic parents. He attended the College of Ottawa, worked at the J. R. Booth's mill, and in 1873 moved to New York to work as an operator at the head office of the Western Union Company. This post exposed him to the best management strategies and technologies in the field. In 1875, Thomas Ahearn came back to Canada and soon was appointed the director of the Bell Telephone Company in Ottawa. Warren Y. Soper, an Episcopal Methodist, was born in Oldtown, Michigan in 1854. Two years later his parents moved to Ottawa to join the American lumber colony. As a young boy, Soper joined Ahearn at the offices of J. R. Booth's lumber company. After attending the Webster Institute, where he trained as a telegrapher, Soper was appointed the first manager of the Dominion Telegraph Company and a superintendent of the Canadian Mutual Telephone Company. In 1882 Ahearn and Soper formed a consulting company that still exists. Now located in Toronto, Ahearn & Soper, Inc. has changed its ownership and did not preserve any records from this era. For biographical information see H. J. Morgan, *The Canadian Men and Women of the Time,* (Toronto: Briggs, 1898): 8, 1046, and entries for Ahearn and Soper families in Canada. Department of Agriculture. *Census of Canada, 1881* [microform]. Ottawa: Public Archives of Canada, [1982].

[8] The electric lights were installed in the Canadian Parliament a year earlier than in the Capitol Building in Washington, where the first, experimental electric lamps were put up in the Senate clock room and lobby in 1885. See The Chronology of Capitol

Although the incandescent lamps were installed in the Parliament Building, the technology was practically unknown to potential municipal customers. There was only one privately owned incandescent lamp in the city, and it belonged to Ahearn & Soper, Electrical Contractors.[9] This lamp they loaned to J.J. Griffin of the College of Ottawa for testing. John Murphy, who assisted Prof. Griffin, later recollected:

> The Professor of Natural Philosophy at the College, Rev. J.J. Griffin, sent me to Messrs. Ahearn and Soper with an order for the loan of one incandescent lamp. It was wrapped in tissue paper and absorbent cotton - with much more careful handling than tungsten lamps now receive, and it was then entrusted to my care. I was warned that it was the only incandescent lamp in this part of Canada; that it was very costly; and, that it was very fragile! I frankly admit that I felt very uncomfortable until this precious burden was delivered at the College into the hands of the Professor. The lamp was then connected up to a battery of 100 cells and when the blinds were pulled down we saw that its filament was white hot and we beheld for the first time the incandescent light.[10]

In 1880s for the majority of Ottawans generation and distribution of electric power was an entirely unfamiliar process, which belonged to the realm of science and to the utopian universe of World Exhibitions.[11] Its only practical application was to illuminate the most prestigious public buildings or to entertain local lumber barons. The city streets were lit by gas and naphtha, while businesses and households used oil or

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Construction Milestones, http://www.aoc.gov/cc/capitol/capitol_chron.htm

[9] See John Murphy, *My Connection with the Development of the Electrical Industry in Ottawa.* A copy of this unpublished address is available at the Ottawa Public Library.

[10] Murphy, *My Connection.*

[11] This was also the case in other cities. See David E. Nye, *Electrifying America : Social Meanings of a New Technology, 1880-1940* (Cambridge, Mass.: MIT Press, c1990):35-47.

kerosene lamps.[12] Gas street lamps were installed in Ottawa (then called Bytown), relatively late comparing with other Canadian cities.[13] In 1854, the city placed gas lamps on Dalhousie and Cumberland, and in 1875 added several naphtha lamps to enhance downtown illumination.[14] The gas lamps were furnished by the Ottawa Gas Company, managed by F. Clemow, and the naphtha lamps were purchased from Pratt Manufacturing Corporation also represented in Ottawa by F. Clemow.[15] The Gas Company charged the city $18.00 per lamp per year and supplied the necessary gas. Naphtha came from the New York office of Pratt & Co. and was bought directly by the City Council.[16] Both gas and naphtha systems required expensive servicing and maintenance. The lights were placed around the city on high cedar posts; the burners were covered by white glass globes, which required constant cleaning in order to provide 20 to 60 candlepower (cp),

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[12] The situation in Ottawa reflects a typical in the 1880s association of electric light with scientific experiments, government buildings and residences of the elites. See Mark H. Ross, *Cities of Light and Heat: Domesticating Gas and Electricity in Urban America* (University Park: Pennsylvania State University Press, 1995): 65-89.

[13] The gas lighting system was first applied to street illumination in London, England in 1809. The technology was transferred to the North American market within the next decade. In Canada, the first gas system was installed in Montreal in 1837, followed by Toronto in 1841. Soon, gas lamps were used in Halifax (1843), Quebec City (1849), Kingston (1850) and Hamilton (1851). See Canada Science and Technology Museum Archives. Research files. Street lighting exhibit.

[14] See Michael Newton and Robert Haig, *Lower Town Ottawa* (Ottawa: Architectural and Heritage Section, Design and Construction Division, Development Branch, National Capital Commission, 1979-1981): 126-130.

[15] *The Ottawa City Directory* (Ottawa: Might Directories,1883).

[16] Editorial, *The Ottawa Citizen*, 18 August 1883.

the rating necessary to adequately illuminate roads.[17]

Ottawa residents considered the gas/naphtha system unsafe; open flame burners were perceived as prone to explosions and fires. Even though the fires caused by gas street illumination were unfrequent, household oil and kerosene lamps were one of the most common reasons for accidents.[18] Therefore, Ottawans projected their fear of open flame lamps onto the street lighting technology. As the municipal politicians began to discuss the use of electricity to the illumination of Ottawa's streets on the City Council's forum, they stressed the safety of an electrical system.[19] But newspaper editorials and letters to the editors were more concerned with the state of the streets and sidewalks and with the lack of sanitary installations in Ottawa than with the introduction of electric power. In a satirical manner, the Daily Citizen in 1884 mocked the ignorance of the population on this subject, referring to the street illumination as "street lightning." At the same time, the editor poked fun at the City Council's slow pace of work, suggesting that "lightning" might be the only form of illumination that the residents of Ottawa would ever enjoy.[20] Yet, even though proceeding slowly, the Council was inevitably turning the city's attention to electric illumination.

The councillors believed that a good street lighting system had three requirements,

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[17] *Loc. cit.*

[18] City of Ottawa Archives (COA), Annual Report of the Chief of the Fire Department, Minutes of the City Council, 1882-1883.

[19] COA, Minutes of the City Council, 1882-1884.

[20] Editorial, *Daily Citizen*, 29 October 1884.

recognized by the Victorian experts on electric lighting. First, the lamps had to provide sufficient illumination to offer safe vehicle and pedestrian movement on urban roads. Secondly, the illumination could not detract from the appearance of streets, and finally the system had to be efficient and affordable.[21] Following these criteria, the City of Ottawa decided to review its entire gas-and-naphtha lighting system. In May 1883, the City Council placed the management of its street illumination and fire stations in the hands of a newly established Fire and Light Committee. The mandate of the Committee, chaired by Alderman Wheland, and composed of Aldermen George Cherry, Jacob Erratt, and E.G. Laverdure, was either to improve the reliability of the existing system or to investigate other options.[22] The Committee decided to look for an option that would allow Ottawa to remodel its image and boost its economy.

In the mid-1880s, Ottawa was aspiring to reinvent itself. Although capital of the Dominion, the city was still considered, and moreover, perceived itself as a provincial and uninfluential town. John Taylor, an urban historian and expert on Ottawa history, explained this need to redefine the entire industrial and economic landscape of the city in order to boost its metropolitan growth.[23] Taylor emphasized the continuity of persistent themes that, in his opinion, affected the urban development of Ottawa. He argued that the city suffered from social fragmentation, marginality, and corporate oversight. Although

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[21] W. Harrison, O.F. Hass and K. M. Reid, *Street Lighting Practice* (New York : McGraw-Hill Book Company, 1930):30-32.

[22] COA, Minutes of the City Council, 1882, 1883.

[23] H. John Taylor, *Ottawa : An Illustrated History* (Toronto: Lorimer, 1986):78-81.

the economic position of the town was developed and reinforced with the arrival of the Dominion government, the metropolitan importance of the town languished with the slow growth of the industry and transportation in and around the city. Around the late 1870s municipal officials decided that the city needed a diversified economy less dependent on federal employment. Its boosters, therefore, looked into making Ottawa a rail hub - a futile ambition - given the city's proximity to Montreal and its lowly position in the urban hierarchy.[24] Next, the Ottawa councillors turned their attention to electric generation and distribution.

The hydroelectric power resources available at the Chaudière Falls seemed to offer a rich and permanent base for further industrial development. City officials trusted that inexpensive, ample electricity would attract investors and manufacturers, and consequently improve Ottawa's economy. 'Power supply' semantics fitted the city's need for symbolic self-definition. Ottawa, the capital city of the Dominion, would become Ottawa, the waterpower capital of Canada. [25] It is important to point out that the city's politicians, not the local capitalists, were the first to understand that development of a modern city depended on the transformation of its power sources.[26] The city councillors, although themselves unfamiliar with the science of power generation, were nonetheless

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[24]Taylor, *Ottawa*, 78-81. Municipal boosterism is discussed by G. A. Stelter and A. F. J. Artibise, eds., *Shaping the Urban Landscape: Aspects of the Canadian City-Building Process* (Ottawa: Carleton University Press, 1982)

[25] Taylor, *Ottawa*, p.78-81

[26] See Arnold Roos, "Electricity"in Norman R. Ball, ed. *Building Canada: A History of Public Works* (Toronto: University of Toronto Press, 1988):169-194.

experienced and pragmatic enough to encourage transfer of the necessary technology to Ottawa. They promoted the practical aspects of electric-power generation and distribution and were willing to include it as part of the city's municipal services.[27]

1.2 Electrification of Street Lighting.

In 1884 Ottawa opened a tender for an installation of electric lights to replace the entire gas and naphtha system and immediately received bids from two companies.[28] One was a local firm, incorporated in 1882 under the name Ahearn and Soper, Electrical Consultants, which offered to furnish the city with 150 lamps at the cost of $13,500.00 per year using the water resources owned by the city's Water Works Department. The second tender came from the Royal Electric Company of Montreal, whose director, M. Ross, was already acting as an advisor to the city. The Royal Electric offered to install 165 lamps of 2,000 candlepower each for $13,000.00 per year using its own water power. Each additional lamp would be provided to the city at a flat rate of $80.00 per year.[29] Their bids made, both companies were required to present the City Council with a sample system composed of at least ten bulbs by the 25 September 1884.[30]

The reputable and well-established Royal Electric had an obvious advantage over the smaller local company. However, the decisive issue in awarding the contract was

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[27] *Daily Citizen*, 29 October 1884.

[28] COA, Minutes of the City Council, 15 September 1884.

[29] COA, Minutes of the City Council, 15 September 1884 and 6 October 1884.

[30] *Loc. cit.*

access to water power.[31] The best source of water power in Ottawa was the Chaudière Falls, located between Quebec and Ontario, just west of the Parliament Buildings on the Ottawa River (see map Appendix I, Plate 1).[32] The site had been exploited for power since the establishment of Wrights' Town in Lower Canada and Bytown in Upper Canada in the early 1800s. In the 1820s and 1830s, Philemon Wright's family used the falls to power machinery in their lumber yards. Yet the primary hydraulic lots on the islands belonged to the Crown and were not utilized. In 1852, an American capitalist, Capt. J. J. Harris became interested in the land on the Chaudière Islands. He befriended the Mayor of Bytown, R. W. Scott, and enlisted the help of John Egan, an influential lumber businessman, to facilitate his purchase of hydraulic lots. After applying to the Commissioner of Crown Lands for a permit to acquire the lots and any existing buildings on the islands, Harris secured the ownership of the land and a long-term lease of water

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[31] Access to hydraulic lots, the parcels of land that allow for use and commercial production of water power differed in Ottawa from the rest of the province. H. V. Nelles argues in *Politics of Development : Forests, Mines & Hydro-Electric Power in Ontario, 1849-1941* (Toronto: Mcmillan, 1974):7-8, that American and Canadian development of the water power was significantly affected by the tradition of Crown versus private land ownership in the two countries. Although, in theory the Chaudière land belonged to the Crown, in fact, since the Crown rarely chose to act on behalf of the municipality, the ownership was much closer to the American model of private control.

[32] Rideau Falls, the second best source of hydroelectric power in Ottawa was not exploited until late 1920s. The Falls were co-owned by W.C. Edward, who also held several hydraulic lots at Chaudière and by the Singer family from Thurso. In 1928 the federal government purchased the Rideau Falls property from Edward, and constructed a small plant to power the National Research Council Wind Tunnel and Engine Testing Laboratory. The lots owned by the Singers were acquired by the Public Works in 1950. See Fred M. Clauson, *The Story of the Rideau Falls Hydro Electric Plant*. Unpublished. COA.

power on the Chaudière, Victoria and Amelia Islands on 1 September 1852.[33] The lots were assigned to J.J. Harris, and his business associates, the Bronsons and the Perley and Pattee families. These families, joined later by Levi Young and O.H. Ingram, constituted, the "American colony" in Ottawa, and for many years did not participate in the city affairs, as they focused on the United States market.[34] At the same time, the families controlled the most valuable water power sites in the capital city of the Dominion.

The self-interest of the owners and the alienation of the hydraulic lots from federal and municipal control created a serious problem. The situation was described by Robert C. Douglas in a confidential report on the Dominion water resources, submitted to Charles Tupper in 1882:

> This power is not under the control of your Department. ... The Government having expended a sum of money for hydraulic dams, and other improvements on the south side, the land adjacent to the falls was sold and the water-power leased. Now, when there is a demand for power in the city, it cannot be obtained. There is a large amount of power constantly going to waste, the situation for mills has been sold and occupied principally by saw-mill, and as piling ground for lumber. These mills only work one-half the year, the other half the power goes to waste. Their monopoly of the power is a direct loss to the productive capacity of the community.[35]

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[33] The lots were purchased for a dollar above the set price and soon after the deal was closed Harris presented Mayor with a beautiful carriage that caused some locals to gallop to conclusions. This episode is often recalled in books on the history of Ottawa; see Taylor, *Ottawa*, 52.

[34] Taylor, *Ottawa,* 52-54.

[35] Robert C. Douglas, *Confidential Reports to the Hon. Sir Charles Tupper, K.C.M.G., C.B. Minister of Railways and Canals, on the Hydraulic Powers Situated Upon the St. Lawrence and Welland Canals* (Ottawa: MacLean, Roger & Co., 1882): 11.

Any company interested in supplying the city with electricity first had to secure access to these hydraulic lots. Accordingly, Royal Electric struck a deal with the Perley and Pattee Company to lease hydraulic power worth $4,500 per year. Perley and Pattee already owned a small dynamo station furnished with a turbine, shafts and a small generator that could supply at least a portion of the needed current. In this agreement, the lumber company also consented to build a new central station on one of their lots located close to the Baldwin mill on Victoria Island.

On 4 November 1884, the city granted the Royal Electric Company a three-year contract to construct an electric street lighting system in Ottawa.[36] Under it, electrification of street illumination was to be completed by 1 May 1885.[37] Royal Electric was also required to "construct, maintain, complete and operate works for the production of electricity for purposes of light [...] under and along such streets and bridges of the City of Ottawa, as the Council of the Corporation may direct under the conditions, previsoes, and restrictions in the said agreement contained."[38]

The electric lights, rated at 2,000 cp each, were supposed to be installed as follows: in the Ottawa Ward the lamps were to be placed from St. Patrick's Street Bridge to Sussex Street; in the By Ward illumination was to be installed from St. Patrick to George Street and from Sussex to Rideau Street, then further to the Protestant Hospital

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[36] COA, Appendix to the Minutes of the City Council, 4 November 1884. By-law No. 586.

[37] *Loc. cit.*

[38] *Loc. cit.*, 264-265.

and along Nicholas Street to Theodore Street. Finally in Wellington Ward, the system was planned to run from the bridges to Broad Street and to Head Street. The first proposal submitted by the Royal Electric listed 165 lamps; however, five more lights were added at no cost to the taxpayer on the suggestion of the City Engineer. The plan called for the lamps to be placed 500 feet apart at street corners, with one lamp at the corner of each block. The City Engineer requested a placement of three lamps on long and wide streets such as Sussex or Dalhousie. Royal Electric also offered to light public buildings and the residences of private subscribers. Some terms of this first contract for the electric lights were rather vague. The agreement specified, for example, that the lamps were supposed to be lit not less than 280 nights per year from dark to daylight, except on nights when the moon was bright and the sky unclouded. In his brief history of the public utilities in Ottawa, F. Askwith suggested that this unusual clause reflected the romantic nature of the councillors as well as their thriftiness.[39]

1.3 Local Interest and the Creation of the Ottawa Electric Light Company.

As the Council prepared the electrification by-law, Francis Clemow, the owner of the Ottawa Gas Company challenged the city's contract with the Royal Electric, and decided to campaign for the local control over the illumination of Ottawa's streets.[40] His company already owned posts around the city and furnished the streets with gas and oil lamps; all it needed was the access to water power. To gain this access, Clemow

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[39] F. Askwith *A Historical Sketch.*

[40] COA, Minutes of the City Council, March 1885.

convinced G.B. Pattee to change alliances. Consequently, Clemow and Pattee, joined by Hiram Robinson, H. K. Egan, A. Gilmour and R. Blackburn, rich and powerful lumber barons, incorporated the Ottawa Electric Light Company, the first electric company in the city.[41] In March 1885 the Royal Electric had agreed to restrict itself to providing the arc lamps Ottawa's entrepreneurs needed, and the city awarded a second lighting franchise, this time to Ottawa Electric Company.[42]

Most of the terms of the municipal lighting contract stayed unchanged. The agreement with the OELC specified the payment for the first165 lamps at $13,000 per year; the next fifteen lights cost the city $40 dollars per lamps per year, and any additional lamps would be paid at a rate of $80 per year per lamps. This was a lucrative contract, but the Ottawa Electric Light Company had to proceed fast with the construction of necessary power generation and distribution infrastructure in order to comply with the city's May 1885 deadline. Perley and Pattee provided the company with access to waterpower and rented to the Ottawa Electric Light Company an old stone building located on lot M on the Chaudière Island. The building was already furnished with a water turbine that was directly connected to three DC generators with a capacity of 16 horsepower.[43] However

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[41] *The Ottawa City Directory* (Ottawa: Might Directories, 1885). It is unclear if Pattee cancelled the lease of his hydraulic lots to the Royal Electric, but it is possible since the Montreal company withdrew from its contract with the city. In any event, it is unlikely that the Ottawa Electric Light Company was set up as a local subsidiary of Royal Electric, since no one on the board of the OELC represented Royal's interests.

[42] See COA, Minutes of the City Council, 2 March 1885, 16 March 1885, 20 March 1885, and By-Law No. 600, 30 April1885.

[43] The technology of early power generation is described in details by Catherine Macdonald in an unpublished report prepared by the author in 1992 for the National

basic and temporary, this simple set-up allowed the Ottawa Electric Light Co. to generate the necessary power to operate the electric lights required by the city; in the meantime Perley and Pattee undertook to build and rent to the OELC a new, well-equipped power house.[44]

In this early system, the dynamos were connected through a system of poles and wires directly to street lamps. The generating units in the station were manually controlled by a "dynamo tender," who adjusted the brightness of lights by opening or closing the gates of the water wheels.[45] John Murphy, a dynamo tender, who in 1885 was the only employee of the OELC power station gave the following description of his workplace:

> In 1885 I was placed in charge of my first Hydro-Electric Station. (...)The electrical equipment consisted of three arc light dynamos, the capacity of the three of them totaling 16 horsepower. The three of them were driven by a little water wheel. Two wires ran from each dynamo direct to the lamps and there were no switches, ammeters or voltmeters withing 10 miles of the plant. The entire system was controlled by hand, and it rendered ideal service. If the lamps were not

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Museum of Science and Technology and titled *Water Power and the Transformation of Canada 1600-1960.* In this document Macdonald notes that many early utilities in Canada used existing hydraulic facilities such as mills as a base for the production of electric power. These, rather primitive stations were based on a direct-drive transmission technology that was also used in the early power generation schemes. The author provides an excellent overview of the types of turbines and machinery available in Canada in the 1880-1890s period and discusses the direct-drive transmission of power in a central station from water wheels to the generating equipment.

[44] COA, MG39, Ottawa Electric Company Collection (OEC), Vol.4, File 53. At the end of the 19th century, power houses were commonly called dynamo rooms, because the only type of generators used to produced hydro-electricity were simple DC machines.

[45] F. Askwith *A Historical Sketch,* p.2.

> burning brightly the water wheel gate was opened and the machinery speeded up a bit. If they were too bright the operation was reversed. If it became necessary to work on the circuits while they were in operation, one of the large brass binding screws on the dynamo was loosened with bare hands and the wire was pulled out of the post, the arc was finally broken by pulling the wire further and further away. If the arc was broken too abruptly the polarity of the generator was reversed and this would be discovered later on when the lamps were found to be burning "upside down" and the lower carbons were burning away too fast. Notwithstanding these daily performances, I managed as you see to escape complete electrocution. Luckily for us who went through these experiences the generators were small and the voltage were (sic.) low.[46]

The first electric street lighting system in Ottawa was composed entirely of open-arc lamps. Its design was based on the Thomson-Houston arc light unit distributed in Canada by the Royal Electric Company (see Appendix I, Plate 2).[47] The arc lamps were efficient, consuming less than 500 watts, but their main problem was the distribution of light. The maximum candlepower was directed downwards at an angle of about 45 degrees, creating a bright ring of light on the street near the lamps, but leaving the rest of the street in darkness. The lighting angle also caused a dark spot directly beneath the lamp. Furthermore, the level of illumination near the lamps was uncomfortably high in contrast with the dark roads, and as the carbon burnt and the electrodes became shorter, the light tended to shift and flicker.[48]

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[46] John Murphy, *My Connection.*

[47] More information on the Thomson-Houston Co. and its association with the Royal Electric Company can be found in Clarence Hogue, *Québec un siècle d'électricité* (Montreal: Editions Libre Expression, 1979):13-20.

[48] A good overview of the standard street arc illumination used across North America is provided in Harrison, *Street Lighting Practice*, 30-32.

The illumination of the open-arc carbon lamps was rated at 2,000 candlepower, and this value appeared in the Ottawa Electric Light Company's contract with the city. This rating, however, only described the type of lamp, not the actual intensity of the illumination. In fact the light meters available in mid-1880s were unable to measure the level of light provided by the open-arc lamps, and its value had to be set in court litigations.[49]

By the end of June1885 the Ottawa Electric Light Company replaced the entire gas street lighting with 181 arc lamps, earning $ 2,219.87 for the two-month period. Since the meters that would allow the company to measure the amount of consumed power were not developed until the 1890s, the operation cost, which was estimated on a per lamp basis, proved to be advantageous to the company. In addition to street illumination, the OELC also served the city markets, the fire stations, and some private consumers.

In his year-end report to the City Council, the Chairman of the Fire and Light Committee, G. O'Keefe proclaimed the installation of the street lighting to be a total success. He stated that, "There are at present 199 electric lights in the city, covering a larger area than ever was lighted by gas and naphtha, and your Committee feel safe in saying that the change has given general satisfaction to the citizens, and that the city is the best lighted one at the present time, being the only city in Canada that is entirely lighted by electricity."[50] The total cost of the endeavour by the end of 1885 reached $13,651.09,

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[49] *Loc. cit.*

[50] COA, Minutes of the City Council, 15 January 1886.

almost $ 2,000 less than the cost of the gas/naphtha illumination in previous years.[51]

During the next two years, the council frequently received petitions from residents requesting an installation of street lights in their area of the city. As electric illumination was strongly associated with safety of the city roads, safety was used as an argument when lobbying for more lamps. The residents of Ottawa argued, for example, that it was "in the interest of *life* as several *lives* were *lost*, owing to the want of proper light in the places named."[52] In 1886 twelve electric lights were added on the main streets of Ottawa and on Cumming's bridge, and a year later twelve more lamps were placed in New Edinburgh Ward. In some cases, the city applied to the Public Works for grant funds to cover a portion of the installation cost; consequently, the Dominion government paid for half of the newly fixed lights in the New Edinburgh.[53]

Since the city was satisfied with the service provided by the Ottawa Electric Light Company in the first two years of operation, in 1887 it renewed the contract with the company for seven years.[54] In the new contract, the city prohibited the Company from

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[51] *Loc. cit.* The total payment for gas and naphtha illumination in 1884 was $15,447.08. The Council was very pleased with the cost of the electric street lighting and Francis McDougal, the Mayor of Ottawa, stated that the charge for the service was "the most favorable in the interest of the city."

[52] COA, Minutes of the City Council, 12 January 1888. Italics as in the original text. It is not clear if the lighting was to prevent crime or accidental drowning.

[53] *Loc. cit.*

[54] COA, Minutes of the City Council, 26 January 1888. Interestingly enough, on the day the contract with the OELC was renewed, Charles Bancroft, a representative of the Edison Electric Light Company, applied to the city for the permit to place a system of

removing any trees and required that the poles be "straight and perpendicular, "approved by the City Engineer, and "properly" painted. The price of street lighting was estimated at $80 per lamp per year.[55] In order to limit the number of overhead wires around the city, the company was required to share its poles with any other businesses, including telephone and telegraph corporations, and with the city, upon "reasonable compensation."[56]

1.4 Chaudière Electric Light & Power Company and the Introduction of Incandescent Illumination.

The need for power in the city was increasing, encouraging other entrants into the industry. In 1887, Thomas Ahearn and Warren Y. Soper, electric consultants and representatives of the Westinghouse Company in Canada, incorporated the Chaudière Electric Light & Power Company.[57] Ahearn and Soper, who in 1885 had lost the city's contract for street lighting because they did not then have an access to water power

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underground wires for the purpose of street lighting in Ottawa. He was granted the rights, but Edison Electric never established services in the city.

[55] *Loc. cit.*

[56] COA, Minutes of the City Council, 7 July 1887, By-Law No. 747. However this clause caused some problems. As the electrification of Ottawa progressed, the distribution system became overloaded; the poles supported wires for three different electric systems and not all of cables were properly isolated. From time to time, particularly in winter, the wires would cross, producing electric fireworks.

[57] *The Ottawa City Directory* (Ottawa : Might Directories, 1887). In 1887 the Directory for the first time included a category for the Electric Light Companies listing the Ottawa Electric Light Company and the Chaudière Electric Light & Power Company as the two suppliers of the electric power in the city.

resources, had formed a partnership with Robert Hurdman, a lumberman and the first president of the Chaudière company to secure from him a lease of excellent hydraulic lots on the Chaudière Islands.

The new company installed a small station in an old building adjoined to Hurdman's shingle mill. Through their connection to Westinghouse, Ahearn & Soper were familiar with the newest technical developments in electric power generation and machinery, and unlike the owners of the Ottawa Electric Light Company, the two young electricians decided to invest in an incandescent system, it being more suitable than arc lighting to residential illumination, then virtually unknown in the city. The arc lamps were simply too large and gave too much illumination for household use. The incandescent system better illuminated small, closed places and allowed precise control over the distribution of light.[58] The design of the incandescent unit was based on a principal assumption that a heated conductor placed in a high vacuum emits light. Enclosed in a glass globe, conductors did not use oxygen to produce light; therefore, incandescent lamps were safer and cleaner than open-arc lamps. Moreover, since the filament was resistant and had a low rate of evaporation, incandescent lamps had a longer life than arcs.

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[58]The lamps gave approximately 16 cp light in horizontal direction. The work on the development of the incandescent system, the competition and cooperation between the inventors in Europe and North America and so called 'war of currents' is well covered in numerous books and articles on the history of electric power generation and therefore is not included in this dissertation. The most recent addition to the subject is Jil Jonnes, *Empires of Light : Edison, Tesla, Westinghouse, and the Race to Electrify the World* (New York : Random House, 2003).

To supply power for their incandescent-light system, Ahearn & Soper recycled some equipment such as water turbines, gates and shafts from the Hurdman's lumber yard and purchased a new 250-light generator, bought directly from Edward Weston in New York.[59] Still, the direct current system made it impossible to supply electricity over long distance, and Ahearn and Soper were only able to carry the current to the Chaudière neighbourhood. Since the Ottawa Electric Light Co. already conducted business in Ottawa, Ahearn and Soper could only make profit on the Quebec market, therefore, they incorporated the company under a federal charter, and ran the wires from Hurdman's sawmill across the river, along Main, Bridge and Wellington Streets in Hull. The system was laid down by local Bell linemen, assigned to the project by Thomas Ahearn, a director of the Ottawa branch of the Bell Telephone Company, who could not find any other workmen familiar with the electric distribution system.[60] John Murphy, who had left the OELC to join Chaudière Electric Light & Power supervised the construction. On 21 May 1887, Chaudière inaugurated its service to Hull with 125, sixteen candlepower incandescent lamps. The majority of subscribers purchased a system of five lamps; four residences shared a series of lights; and only three customers could afford to install ten lamps in their establishments.[61] The lamps were set in a light pendant, each pendant

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[59] *Hydro News* (October 1946): 20.

[60] See Murphy, *My Connection.* Peter Burke and Joe Manor were the two men who laid the wires for the first incandescent system in Ottawa.

[61] *Loc. cit.* Unfortunately, the list of first private customers of either electric company could not be located; however, the electric lighting, costing $0.20 per lamp each night, was very expensive and affordable only by large stores, mansions and bourgeois homes and deluxe hotels, which reinforced their high status by investing in the

consisting of two globes. The lower lamp was used first; when it burned out, an electromagnetic device in the socket instantly switched the circuit to the upper lamps, which continued the illumination without interruption.[62] To provide a stable current for its clients, the Chaudière Electric Light Company used a three-wire system of distribution. This type of unit was composed of three cables; two wires were connected to a 110 volt circuit each, and the third wire was neutral and common to both circuits; it controlled power on the two active wires. The three-wire system was about 60 percent more efficient than a two-wire unit and more than doubled the distance on which the current could be delivered.[63]

1.5 Expansion of the Power Generation and Distribution Infrastructure.

Within a year, the number of customers had outgrown the combined technical capacity of the Ottawa Electric Light and of Chaudière Companies. It became apparent that to sustain the acceptable level of services in the context of fast-increasing demand, the electric companies would have to build a sound, interconnected network of artifacts. This task required a profound technical understanding of generating and distribution

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latest technologies. This issue is discussed in Harold L. Platt, *The Electric City : Energy and the Growth of the Chicago Area, 1880-1930* (Chicago: University of Chicago Press, 1991):151-152 and Mark H. Ross, *Cities of Light and Heat: Domesticating Gas and Electricity in Urban America* (University Park: Pennsylvania State University Press, 1995):72-73.

[62] A. A. Dion, "Some Notes on the Consolidation of Two Systems of Electric Supply," *The Canadian Engineer* (November 1895):184.

[63] John Murphy, *My Connection.*

systems. Ahearn and Soper leased hydraulic lots from McKay Milling Company and built a second power house furnished with three 250- light generators able to produced up to 2,500 HP. They also enlisted the cooperation of other local millers, A.H. Baldwin, William Hutchison and William Scott, to secure for the company hydraulic lot L on the south side of Head Street on Chaudière Island. This deal, closed at $22,350, included the mill and machinery such as an electric dynamo with nine lamps, shafts, power hoist and foundry machine shop equipment located on the lot.[64] The Chaudière Co. now possessed a sound access to water power and had enlisted several established businessmen into their network of economic interests. While building a new power house at lot L, Ahearn and Soper made a very controversial decision to produce alternating current. This choice however, clearly showed their advanced technical knowledge. Although the AC technology, introduced by Westinghouse in 1889, offered a definite advantage over DC units by allowing for long-distance distribution, it met with a strong opposition and criticism from T. A. Edison and his supporters. They denigrated Westinghouse's system as inferior, impaired, and unsafe. Yet Ahearn & Soper recognized the qualities of the AC machinery. In 1889, within months of the introduction of the AC system, they installed at the Chaudière powerhouse a new Westinghouse-Stanley unit rated at 133 cycles fortified with a transformer able to supply 50 volt current from 1100 volt primaries.[65] With

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[64] OEC, Vol.4, File 36. These deal were made official on 19 November 1889, and 31 July1890, providing the company with enough power to supply their existing customers and to enter in 1890 electric railway business.

[65] *Hydro News* (October 1946): 20. William Stanley who started his career with Edward Weston, joined George Westinghouse in mid-1880s to design and build the first single phase, alternating current generating plant in Great Barrington, MA. In 1886,

extended access to water power resources, a new well-equipped powerhouse, and the conversion to an AC system of generation and distribution, the Chaudière Electric Light and Power Company had a strong technological advantage over the Ottawa Electric Light Company.

1.6 Powerbrokers: Ahearn, Soper and Bronson.

By the end of 1880s, Thomas Ahearn and Warren Y. Soper had established their reputation as the hardest working and best informed professionals in the field in Ottawa. It was no accident that Ottawa's infant power industry was dominated by two telegraphers, even though telegraphy gets short shrift in most histories of urban electrification.[66] Telegraphy and telephony had an ample influence on the evolving field of electric power generation and distribution. In fact, the telegraph industry gave rise to the nomenclature used by the electric industry. For example, the word *electrician* originally described a lineman who installed and maintained wires and telegraph transmitters and receivers.[67] Without any formal training for electrical engineers in

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Stanley proved the capability of power transformation and transmission at required voltage and applied his innovation to a practical operations of AC generating stations working at 133 cycles per second. See James E. Brittain, ed. *Turning Points in American Electrical History* (New York: IEEE Press, 1979):104-105.

[66] Historians such David Nye, Charles Jacobson, Harold Platt and Mark Rose have compared the development of power utilities to the gas industry and waterworks rather than to telegraphy.

[67] Thomas A. Edison, Franklin Pope, George B. Prescott, all started their carriers in the telegraph industry. For more on the connection between the two technologies see

Ottawa at the second half of the 19th century, the local telegraphers combined self-study and practical experience to become experts in the electric technology. Working in the telegraph and telephone industry, Thomas Ahearn and Warren Y. Soper gained experience in the construction of complex electric systems of interrelated components and were able to recognize the merit of fast developing electric power technologies.

Yet Ahearn and Soper realized that to extend their enterprise beyond a small company, which would have to struggle constantly for survival, they needed to create strong political alliances. Therefore, in the early 1890s they formed a close political and economic relationship with the Bronson family that gave them an access to the provincial legislature and to the Liberal Party patronage system. Ultimately, the personalities, beliefs, technical expertise and the political affiliations of Erskine Henry Bronson, Thomas Ahearn and Warren Y. Soper shaped the electric power generation and supply industry in Ottawa. Each man brought to this alliance unique ideas, abilities and knowledge that allowed the triumvirate to gain total control over Ottawa's network of power.

Thomas Ahearn believed in the aggressive and fast expansion of their technological system through take-overs of competing businesses. Warren Y. Soper, an excellent manager, was able to put Ahearn's ideas into practice. Soper was primarily responsible for securing contracts, for meeting customers, and for running day-to-day operations of the businesses co-founded with Ahearn. Soper was a skilled negotiator who

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A. M. McMahon, *The Making of a Profession: A Century of Electrical Engineering in America* (New York: IEEE Press, 1984):6-17.

often settled the differences between his partners and political allies.[68] Both Ahearn and Soper came from Lebreton Flats, an area near the lumber mills, populated by Irish immigrants and working class families. For the residents of the Flats, their roots, upbringing and careers symbolized a hard-working life rewarded by financial wealth. This, in addition to Ahearn and Soper's personal acquaintances and family relations, formed a basis for a strong influence among Irish-Catholics and among Methodists – an important political position in Ottawa's social context.

However, at the beginning of their careers, the two young men were inexperienced in politics and needed the protection and cooperation of a well-established local businessman, who could teach them how to develop their political potential to protect their business interests. Erskine Henry Bronson was just such a man. A prominent and popular businessman, experienced in local and provincial politics, Bronson had arrived in Ottawa in 1853, and had run the family's lumber yard with his brother Frank and their brother-in-law, Levi Crannell.[69] Bronson was an ambitious and thoughtful businessman who believed that the social condition of the Dominion depended upon large corporations and private capital. Since he saw a natural monopoly as a market stabilizing force, he strongly opposed the nationalization and municipalization of businesses.[70] In Bronson's opinion, market

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[68] Morgan, *The Canadian Men and Women,* 8, 1046. Ahearn and Soper kept up their telegraphic skills throughout their lives. The partners ran a wire to each other's house, which allowed them to communicate on confidential matters in a total security.

[69] Morgan, *The Canadian Men and Women,* 8, 1046.

[70] An excellent analysis of E.H. Bronson's political and social beliefs was conducted by Robert P. Gillis in his M.A. thesis titled *E.H. Bronson and Corporate Capitalism: A Study in Canadian Business Thought and Action, 1880-1910.* In this

stability and predictability depended on a socio-economic order formed by a corporate monopoly, for him the most efficient and profitable form of economic organization imaginable. Bronson believed that corporate capitalism would promote rapid urban expansion to the benefit of all social classes. Accordingly, while he served as a provincial member of the Ontario Legislature from 1886 to 1898, Bronson devoted his political career to reinforcing the corporation-dominated state and warding off government ownership and regulations. In 1890 he joined the cabinet of Oliver Mowat's Liberal government that dominated Ontario politics since 1872.[71]

Erskine H. Bronson understood Ottawa's municipal scene. He realized that political decisions in this city had to satisfy three groups: English Protestants, Irish Catholics and French Canadians. Protestants he represented. Irish Catholics were loyal to Thomas Ahearn. Ottawa's French Canadians were represented by Napoleon A. Belcourt, solicitor of Bronsons and Weston Company and a close associate and friend of Ahearn and Soper.[72] By uniting these three groups, Bronson, Ahearn and Soper, devoted Liberals, gained a strong position in federal and provincial politics, which allowed them to protect their business interests from

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dissertation, Gillis discussed the role of Bronson in the creation of power utilities in Ottawa. However, by focusing his arguments on Bronson's actions and thoughts, Gillis did not explore in-dept the role of Ahearn and Soper in the process of electrification.

[71] *Loc. cit.*, iv-v.

[72] In his letters to Laurier, Ahearn often reassured the Prime Minister of his total loyalty to the Liberal Party and commented on his support and friendship with Belcourt. See for example NAC, MG26 G, Sir Wilfrid Laurier Papers, Political Papers, General Correspondence, Vol. 93, p. 28353-28356, Ahearn to Laurier, 25 November 1898,Vol. 95, p. 29156, Ahearn to Laurier, 30 December 1898, and Vol. 203, 57871-57872 Ahearn to Laurier, 2 August 1901. A Methodist, Warren Y. Soper was popular among this religious group.

municipal control for several decades.

1.7 Conclusion.

By 1890, Ahearn and Soper were solidly established on the Ottawa power market. Although they represented Westinghouse in Canada, their business endeavours were financed by their own resources, initially gained through a contract for telegraph installation at the Canadian Pacific Railways, and they were in control of the Chaudière Electric Light and Power Company. This fact confirms that Tom Naylor was wrong in emphasizing the dependent nature of Canadian industrial development.[73] Similarly, the Ottawa Electric Light Company was owned and operated by the local businessmen. The two companies based their electric systems on the existing equipment used on lumberyards and on the poles and lamp posts used by the telegraph and gas industries. This already established network of artifacts was complemented in Ottawa by technologies transferred from the United States and by equipment made in Canada. The limited but steady demand for electric power allowed the industry to test various types of available technologies such as arc and incandescent lighting, direct and alternating current generation, and to find solutions best adapted to Ottawa conditions. However, the city's energy market changed in 1890 with the arrival of the tramway, the major consumer of electricity in Canadian cities before the World War I, and the basis for the new economic and political alliances. As we shall see in Chapter II, it was this street railway that produced the strong bond between the Bronson family, Thomas Ahearn and Warren Y. Soper.

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[73] See Glen Williams, *Not for Export : the International Competitiveness of Canadian Manufacturing* (Toronto: McClelland & Stewart, c1994) and R. T. Naylor, *The History of Canadian Business, 1867-1914.* (Toronto: J. Lorimer, 1975):xxii-xxv.

CHAPTER 2

ELECTRIC PARADISE: THE STREET RAILWAY AND THE SOCIAL MEANINGS OF POWER, 1890-1894.

In 1890 with the street-illumination system firmly in place, the city began to consider electrification of public transportation. It was a logical next step in reinforcing the presence of the electric industry in the city while promoting Ottawa's technological progress. Electric streetcars, which had already proven profitable in American cities, constituted a new market for the power generation industry; local capitalists looked upon electric traction as an excellent opportunity to expand their business and fortunes. With strong potential for financial gains, the negotiations for an electric street car service in Ottawa were dominated by power struggle between the municipality and interested industrialists.[1] Ultimately, the final product was an effect of, what economist Frank Knight has called the "human nature factor," the influence of the powerful personalities of involved actors who emerged as unquestioned leaders of the industry and whose behaviourial characteristics influenced not only electric traction, but also the entire power industry in Ottawa for years to come.[2] The most important of the alliances at the dawn of

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[1] See Christopher Armstrong and Henry Vivian Nelles, *Monopoly's Moment : the Organization and Regulation of Canadian Utilities, 1830-1930* (Philadelphia: Temple University Press, 1986):87. Armstrong and Nelles suggest that the contract for the construction of street railway in Ottawa was a result of municipal interventionism. Yet, as described in this chapter, the traction monopoly was skillful masterminded by Ahearn, Bronson, Crannell and Soper.

[2] Frank Knight, *Risk, Uncertainty and Profit* (New York : Harper & Row, 1965): 260, 450.

the tramway era was that formed between Ahearn, Soper and Bronson who brilliantly pooled their technical, managerial and political resources to prevail against some of the country's most powerful capitalists, whose earlier indifference to Ottawa's electrification quickly dissipated when they began to calculate how much they could make charging Ottawans five cents a head for a two-cent ride.

2.1 Contract Negotiations for the Electric Street Railway in Ottawa.

Compared to other Canadian cities, Ottawa ventured into the electric railway business early. In 1889, Ottawa Mayor Jacob Erratt and Alderman John Henderson participated in the Municipal Convention held in Toronto; one of the topics of discussion was the possible creation of municipal electric railways.[3] After their return from Toronto, Erratt and Henderson introduced the issue to Ottawa City Council.[4] Horse cars were slow and polluting, and the growing city needed new, efficient means of transportation.[5] The Council decided to petition the Ontario Legislature for amendments to the Municipal Act and the Street Railway Act to allow the city to construct and operate electric railways.[6] Its two petitions were referred to E. H. Bronson, the minister responsible for railway

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[3] NAC, MG28-III26, Bronson Papers (BP), Vol. 712, Memorial of the Municipal Convention.

[4] City of Ottawa Archives (COA), Minutes of the City Council, 8 January 1890, Inaugural address of Mayor Jacob Erratt.

[5] Ontario Legislative Assembly, *Journals* (Toronto: Queen's Printer,1889). See "Petition of the City of Ottawa, 12 February 1889".

[6] BP, Vol. 703, MacTavish to Bronson, 22 February1890.

matters in the provincial government.

Bronson was well aware of Ottawa's need for electric traction, but he was surprised and troubled by the city's request for rights to expropriate the Ottawa City Passenger Railway that then operated the horse-drawn cars of the capital. Any such attempt violated Bronson's firm belief in the superiority of the corporate socio-economic order to public ownership. The municipalization clause also raised serious objections among Ottawa businessmen. T.C. Keefer, who controlled the horse railway, contended the city's action and suggested that no one's property would be safe – at least not if it were judged a public utility.[7] Deeply concerned, Bronson decided he needed to gain influence over the City Council's decisions, but he recognized that he would have to act very carefully.

On 20 January 1890, the Ottawa City Council established a Special Committee on Street Railways to investigate electric traction. Bronson, who earlier convinced his brother-in-law to join municipal politics, now suggested that Levi Crannell become one of the members of the new committee.[8] Although Mayor Erratt promoted the municipal ownership of the transit system, the Council was divided on the issue, and Crannell suggested revisiting the terms of two petitions. As the Council's debates proceeded, Ottawans became impatient; they clearly wanted to see an improved service, but were not interested in paying for municipal ownership. Finally, on 29 May 1890 the city dropped its attempt to build a municipal traction system and decided to award the construction and

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[7] BP, Vol. 711, Keefer to Bronson, 27 February 1890.

[8] COA, Minutes of the City Council, 20 January 1890.

operation of the electric railway to a private corporation.[9]

When the city called for a tender on the electric railway a few days later, most of Canada's existing companies did not apply for the franchise. Although electric street cars were running in Windsor (since 1886) and St. Catherines (1887), and lines were being constructed in Vancouver and Victoria, none of these railways operated in winter. In Ottawa, the City Council demanded a year-round operation, but officials from Canadian railway companies thought it impossible to run street cars in a northern winter and too expensive to replace them with sleighs when the rails became covered with drifting snow. Moreover, the Special Committee on Street Railways prepared a questionnaire, asking any interested party for data on the radius of curves served with its equipment, the number of cars to be used that made greatest and least noise, and other technical details.[10] The questionnaire debarred many potential bidders, whose equipment did not meet the criteria set by the City Council. Still there was some interest among local businessmen, and an actual bid from W. H. Howland Syndicate, a Toronto company represented in Ottawa by solicitors Gemmill and May.[11] Howland, owned by Toronto's former mayor, offered to construct and operate an electric street railway system for $187 to $250 per

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[9] "A Spirited Discussion and a Very Little Done", *Daily Citizen,* 30 May 1890. See also COA, Minutes of the City Council, March - May 1890. The Councilors had an opportunity to see the electric cars during a visit of the Special Committee to Boston in early May 1890.

[10] BP, Vol. 724, Levi Crannell Papers, Questionnaires of the City of Ottawa.

[11] *Daily Citizen*, 30 May 1890. Although the *Citizen* did not name the Ottawa company, the Council was possibly approached by Ahearn and Soper. Also, the Bates family expressed interest in constructing the line. BP, vol. 703, Levi Crannell's notes.

kilometer ($300-$400/ mile). The negotiations were progressing well, and the company's solicitor reassured the city that his client would comply with all the technical requirements.

There is no direct evidence that Ahearn and Soper, who could not conform to the city's questionnaire, presented the Council with a similar offer; however, the subsequent proceedings of the City Council and final award of the contract to Ahearn and Soper proved that they were ready to take over the electric traction in Ottawa. During the 1890 election to the Council, Ahearn and Soper had supported Levi Crannell's candidature, and Crannell was now looking after their interests. As a member of the Special Committee, he was present during the talks with Howland, but he needed a sound excuse to stall the city's negotiations with the Toronto Syndicate.[12] On 4 September the perfect opportunity occurred as Crannell received a personal note from John A. Gemmill, Howland's solicitor, informing him, in absolute confidentiality, that his Toronto client was unlikely to offer the best possible service in Ottawa. The company was about to introduce a technological change to its contract with the city; the original agreement called for installation of girder rails, which required expensive equipment, the cost of a single car being estimated at $4000. Of course, Howland did not want to invest in such expensive machines and intended to use T-rails, less expensive to install and operate, but impossible

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[12] BP, Vol. 724, Soper to Crannell, 31 December 1891. There is little evidence that links Ahearn and Soper to E.H. Bronson and Levi Crannell during the 1890 debate over electric street car service in Ottawa. However, this comment proves that Ahearn and Soper offered their support to Crannell in the 1890 and 1891 elections in exchange for protection of their interests: "We read of your nomination with pleasure" – wrote Soper – "and shall do all we can to assist your election... . We are not unmindful of your fair treatment in the past, and have no idea of asking anything different in the future."

to cross by wagons.[13] This information allowed Crannell to reopen the company's contract with the city, and when the councilors insisted on the girder line across Ottawa, the Howland Syndicate threatened to withdraw its offer. This threat did not impress municipal politicians.

The negotiations were delayed and the City Council debates over the technological differences between the girder and T-lines were going nowhere. Finally under pressure from the local newspapers, which reported daily on the progress of talks with Howland, the Council was forced to change its specifications for the electric railway contract.[14] The Syndicate would now have to agree to install the girder rails only on the central streets, with T-rails being permitted on less frequented roads. The issue was resolved, but now the councilors were less enthusiastic toward the Toronto company. Alderman Cox moved to investigate usage of storage batteries rather than overhead wires to run the cars. Again, the Howland Syndicate refused to invest in such an expensive and untested technology.[15]

These delays in the contract talks with Howland allowed Crannell to enlist the cooperation of other aldermen such as J. Henderson and W. Hutchison. When the rail and storage batteries issues failed to end the talks with Howland, Henderson remembered

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[13] BP, Vol. 724, Gemmill to Crannell, 4 September 1890.

[14] The *Daily Citizen* strongly recommended that councilors continue negotiations with Howland. During September and October 1890, the newspaper printed detailed accounts of the discussions among the councilors, which reflected disagreements and confusion in the City Council.

[15] Editorial, *Daily Citizen*, 6 October 1890.

that the Toronto Syndicate was required to present the city with $5000 as a bond that the line would be in operation by 1892.[16] The money had not been deposited. Immediately, Crannell contacted Gemmill and requested the hefty cheque as a guarantee that the agreement would be carried through.[17] The deadline for the deposit he set at 3 pm on 20 October 1890. On 10 October, Howland signed the contract for the construction and operation of the electric railway and left with his solicitor a cheque for $5,000. Since Mayor Erratt was away, the cheque was not deposited with the city, but put in a bank account at the Imperial Bank of Canada. On Gemmill's recommendation, the bank issued a receipt, which the solicitor presented to the Council.[18] Once again, the Special Committee on Street Railways halted the ratification of the contract on a technicality – the city required a cheque, not a bank receipt. Now the Howland Syndicate was insulted. The City Council explained that Ottawa was still committed to an electric railway, but had to negotiate the best possible deal; the Syndicate insisted that it had complied with the contract. In fact, as the Councillors were well aware, Howland could withdraw the money at will.

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[16] F. Askwith suggested in his unpublished paper, *A Historical Sketch of the Electrical Utility Industry in the Ottawa Area*, that Ahearn and Soper may have bribed the councilors; there is probably a grain of truth in this suggestion, since on 4 January 1902, P.D. Ross publicly denied on the pages of the *Evening Citizen* apparent allegations that he worked for the Electric Railway Company. However, it is also possible that Ahearn and Soper's association with Bronson convinced some city politicians that it was worth their while to ally with the two young entrepreneurs; for example W. Hutchison was already involved with Chaudière Electric Light and Power Company.

[17] "The Street Railway," *Daily Citizen* 16 October 1890.

[18] Editorial, *Daily Citizen* 10 October 1890.

This struggle between the Council and the Toronto company was conducted in the public forum. When in 1885 aldermen had discussed electric lighting, the residents of Ottawa had not been particularly interested in the issue and had not followed councilors' endeavours. Yet five years later the problem of electric transportation was mobilizing Ottawa. The possibility of cheap, and efficient means of transportation in a growing city, with a dense population living miles apart in New Edinburgh and Lebreton Flats, and work places centered around downtown federal offices and the distant Chaudière lumber yards, appealed to the public. Suddenly, electricity was more than an expensive, inaccessible novelty. It could improve the quality of everyday life in a busy city. Moreover, Ottawa's working class had a high ratio of unemployment, and an electric street railway, itself a source of new jobs, would allow the men to commute to work in other parts of the city. The residents also expected that the electric cars would be less expensive, since unlike horses, the machines did not need to be fed, sheltered and protected for epizootics.

During the conflict between the municipality and the Syndicate, Ottawans urged the politicians to find a solution.[19] On 19 October 1890, the Council assembled for a special meeting to discuss an extension of the deadline for the Howland Syndicate, but after a short discussion the motion was rejected. That evening, Warren Y. Soper sat quietly among the spectators, observing the negotiations from the back of the City Hall; the next day he presented the Council with a cheque for $5000 and an offer to take over

[19] See letters to editor in *Daily Citizen* for September and October 1890.

Howland's contract.[20] His bid was supported by Crannell, Henderson, Hutchison, and nine other aldermen. The subsequent contract for the construction of the electric railway was signed with Ahearn and Soper on 5 November 1890. It sealed Ahearn and Soper's economic position in the city, as well as their business and political relationship with Crannell and the Bronson family.

2.2 Traction Infrastructure and the Creation of the Ottawa Electric Railway.

Ahearn and Soper incorporated the Ottawa Electric Street Railway Company on 13 February 1891, under a municipal charter with capital of $500,000 divided into 5000 shares.[21] The directors of the company offered to elect Ahearn as the president of the Ottawa Electric Street Railway (OESR), but he preferred a position of a Managing Director, which gave him an access to direct planning and building of the street railway system. In his place, J. W. McRea was elected the President; George P. Brophy was

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[20] *Daily Citizen*, 20 October 1890.

[21] Ottawa Electric Railway Company. *Acts of Incorporation and By-laws of the Ottawa City Passenger Railway Company, the Ottawa Electric Street Railway Company, and the Ottawa Electric Railway Company* (Ottawa : Printed for the Ottawa Electric Railway Company, 1895). Although a monograph history of the Ottawa Electric Railway is still unpublished, three articles deal with the chronological developments of the company: F. Angus, "Seven Hundred Days: The Story of Ahearn & Soper and the Beginning of Electric Traction in Ottawa," *Canadian Rail*, no. 377, (November-December 1983):188-216; R.D. Tennant, "Capital Traction: An Outline History of the Street Railway System of Ottawa," *Newsletter of the Upper Canada Railway Society*, (October 1868):118-122 and R.D. Tennant, "The Ottawa Electric Railway," *Canadian Rail*, (December 1969): 319-329. This dissertation focuses on the issues not covered in the articles, such as technological details of the generation and distribution of electricity for traction, further cooperation of the directors with the Bronson Family, and Ahearn and Soper's skillful promotion of their company.

appointed a Vice President; J. D. Fraser became the Secretary-Treasurer; and Colonel J. E. Hutcheson served as Superintendent. Warren Y. Soper, Thomas Workman, D. C. Dewar, William Scott, Redmond Quain and Peter Whelen joined the Board of Directors.[22]

After the franchise was granted, the directors appealed to the established businessmen in Ottawa to purchase stock and so provide the new company with the finances necessary to construct tracks and purchase equipment. Their appeal met with a bland refusal. Most capitalists, still believing that it was impossible to provide the winter car service requested by the city, did not want to risk an investment. The directors of the street railway were extremely disappointed and never forgot who was unwilling to support their efforts. When a few years later, one of the local millionaires approached Ahearn trying to join an already well-established company, he was rejected and told that he would never be allowed to enjoy any capital gains from the company, which he did not support at its beginnings: "Now you desire to be let in on the ground floor," Thomas Ahearn told the man, "You can't get in even at the attic window."[23]

And so, the directors used their own capital and the backing of small investors to gather finances to lay the tracks and to construct a new power station on Victoria Island at the Chaudière Falls. The power house was installed in a wooden building, reinforced with

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[22] Ottawa Electric Railway Company. *Acts of Incorporation.*

[23] Fred Cook, "Hon. Thos. Ahearn as I Know Him" in the *Ottawa Citizen*, 28 June 28, 1938, p.14. Some local businessmen, who initially refused to invest in the company and were not allowed to join it later tried to undermine the electric railway in the city by calling the company "the Electric Hog" and complaining about the poor maintenance of way and noise made by cars. See "This Man Wants to Know," *Daily Citizen*, 1 September 1892.

a steel structure. However, the location of the power house was not ideal. The water head at this point of the Ottawa River constantly fluctuated between 5.6 and 7.9 meters, forcing the Street Railway Company to situate its turbines above the high-water mark to avoid occasional drowning of the equipment.[24]

The generating machinery at the station consisted of four 66-inch turbines made by Kennedy & Sons, one of the best Canadian manufacturers of water wheels; these were supported by one 66-inch machine made by Victoria Foundry in Ottawa. The turbines were belted via two countershafts to two 400 HP Westinghouse generators and one 700 HP dynamo. Aware of the water head problems, Ahearn changed the traditional way of interconnecting various pieces of machinery. He ensured that the turbines and generators could be cross-connected however desired, giving the company more flexibility in generating and directing the power. Ahearn also adapted the equipment purchased in the United States to the environmental conditions of the station and local needs for electric power. Using an old dynamo driven by an independent turbine, he rearranged governors to excite separately the field coils of generators. This arrangement supplied current to the three sets of field coils, arranged in parallel, at a pressure of 500 volts, kept at a constant magnetization. The gate of a turbine, which drove the exciter was controlled by a Fruen mechanical governor; the other gates were opened and closed manually. In case the operator lost control of the gates, a safeguard coil of iron wire was submerged in the river and connected to the main streetcar controller; this allowed the operator to manipulate the gates mechanically and to place them quickly in the required position. Ahearn's design

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[24] "Electrical Ottawa," *Electrical World* (September 21, 1895): 311.

worked well, supplying the street cars with steady, controllable current.[25]

In early 1891 the company began to lay tracks, a combination of girder and T rail. Since some of the main streets such as Spark Street were still serviced by the horsecars of Ottawa City Passenger Railway, the new rails were placed on Wellington Street, the main locum of the Dominion Government, over the protests of the Department of Public Works.[26] Even though the Ottawa Electric Street Railway and the Ottawa City Passenger Railway serviced different streets, it soon became obvious that cooperation between the transport companies would not be possible. Ahearn and Soper were determined to monopolize Ottawa's traction and Keefer, the director of the OCPR, fought for every meter of his railway. Both companies met in Toronto with Ottawa's new mayor, Thomas Birkett, Alderman John Henderson, Provincial Secretary J. Gibson and Erskine H. Bronson to discuss the ever increasing competition. During this meeting the OCPR theoretically agreed to abandon its objections to the construction of an electric railway, but in fact it continued to interfere with the progress of work.[27] When in 1891 the OCPR applied to the Dominion Government for a federal charter, Warren Y. Soper convinced Keefer to sell to him his stake in the railway, and holding the majority of shares, Soper took over the control of the Ottawa City Passenger Railway.[28] Although the horse railway continued to operate, traction in Ottawa was now effectively in the hands of Ahearn,

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[25] *Loc. cit.*

[26] F. Angus, "Seven Hundred Days."

[27] COA, Minutes of the City Council, 2 February 1891.

[28] BP, Vol. 712, File 306, Ottawa Electric Railway files.

Soper and their associates.

This virtual monopoly troubled the City Council, as did the fact that Soper did not withdraw the OCPR's application for federal incorporation. They recognized that such a charter would place the company effectively beyond municipal control. Moreover, the OCPR was seeking a perpetual character for all its new installations; if granted, this clause would prohibit the city from any renegotiation of the company's contract. The actions of the two railway companies thus posed a problem to Crannell, now chairman of the Special Committee on transport. He did need Ahearn and Soper's cooperation, but did not want to see public transportation under federal control. Crannell approached Soper with a suggestion that the two companies merge, keeping a municipal charter. The city would then sign a lucrative contract with the new street railway corporation.[29] However, both, Ahearn and Soper understood the advantages of a federal charter in a city dominated by the Dominion Government and located at the border of two provinces. In case of any dispute with the municipality, federal incorporation would allow the traction companies to appeal directly to the Parliament. Furthermore, the federal charter permitted the electric railway to conduct business in the entire Ottawa/Hull region.[30] Inasmuch as Ahearn and Soper were not prepared to accept Crannell's offer, negotiations between the two companies and the city continued for two years. The city raised objections in the Parliament, but Ahearn and Soper steadily gained support among the federal politicians. Inevitably, on 12 September 1894 the OCPR and the OESR merged as the Ottawa

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[29] BP, Vol. 724, Crannell to Soper, 3 December 1892.

[30] See also R. P. Gillis, *E.H. Bronson and Corporate Capitalism*, p.135-143.

Electric Railway Company, the only street car enterprise in Canada to receive a federal charter.[31] The company was granted a 30-year contract, and agreed to rent the streets from the city for $450 per mile ($281.25 per kilometer) for the first fifteen years and $500 per mile ($312.50 per kilometer) for the next fifteen years. The lease of the paved streets was set at $1000 per mile ($625 per km).[32]

2.3 Inaugural Run, Winter Services and the Power of Promotion.

While the two companies were conducting their political campaign for consolidation, the electric cars of the Ottawa Electric Street Railway initiated their first run on 29 June 1891 at 2:00 pm. Ahearn and Soper, masters of self-promotion, used this opportunity to impress the city with their services, thereby reinforcing the position of their company. The directors of the electric railway invited one hundred and forty guests – municipal and federal politicians, local businessmen and journalists – for the inaugural run to Lansdowne Park.[33] At Lansdowne the guests were entertained with dinner and drinks; they generously toasted Ahearn and Soper, the city, and the Dominion.

The aldermen used the spectacle to deny the city's economic depression and to vocalize the idea of electrification as a booster of urban development. One of the federal

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[31] Ottawa Electric Railway Company. *Acts of Incorporation and By-laws of the Ottawa City Passenger Railway Company, the Ottawa Electric Street Railway Company, and the Ottawa Electric Railway Company* (Ottawa : Printed for the Ottawa Electric Railway Company, 1895).

[32] *Loc. cit.*

[33] "The Electric Opening," *The Evening Journal*, 30 June 1891.

politicians, Sir James Grant remarked that "the growth of this city had been somewhat remarkable, and no city in Canada had a brighter future before it than Ottawa." He admitted that 'there were croakers who say the city is very much depressed," but he reassured the elites that "Ottawa had as good a degree of prosperity as any city anywhere."[34] Other speakers focused on the technological progress and further opportunities for the growth of the city. Senator Clemow, the Journal reported "paid a high tribute to the genius and ability of the builders. He was glad to say they were Ottawa boys having been born in the city (applause) and had raised themselves up from being messenger boys in the telegraph office. The building of the road was just another evidence of what could be done."[35]

The first months of operations were successful. The company operated six cars, made by William Wylie an Ottawa carriage builder, and ordered thirteen more from Patterson and Corbin of St. Catherines. The cars ran on four routes: Downtown Main Line, Bank Street Branch, New Edinburgh and Elgin Branch (See map in Appendix I, Plate 3).[36] However, since the very beginning of its operations, the OESR had to struggle with a problem that no amount of diplomacy, negotiations and lobbying – the art of which the company directors had mastered – could resolve: Ottawa's sub-arctic winter weather. When Thomas Ahearn and Warren Y. Soper first announced that they were

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[34] *Loc. cit.*

[35] *Loc. cit.*

[36] Angus, *Seven Hundred Days,* p.197. For chronology of the Ottawa Electric Railways see Angus, pages 196-197.

prepared to offer a year-round operation, more experienced railway officials had been skeptical. Unlike those for horse-drawn vehicles, the wheels of the electric street cars were not designed to be replaced with sleighs. Moreover, the rails had to be kept perfectly clean to maintain good traction. The street railroad shareholders from Montreal and Toronto followed the enterprise of the OESR with particularly interest. The president of the Montreal Street Railway (MSR), Jesse Joseph was convinced that a year-round service was impossible to achieve. On 4 November 1891, at the directors meeting, he stated boldly: "It will not do."[37] Despite this statement, the MSR officials voted to introduce an electric service as soon as Ottawa had proven that winter service was feasible.

The return on the capital invested in the OESR by the company directors, their friends and relatives, including "widows who staked a good part of their savings without any guarantee of an immediate profitable return,"[38] depended upon the uninterrupted and satisfactory operation of the electric street cars during the first winter, from January to April 1892. Ahearn and Soper were aware of the snow removal technologies being developed by American companies, and were experienced in the process of transfer and adaptation of technology to the local conditions. On Ahearn's recommendations, the OESR ordered two horse-drawn, double-ended snowploughs. The ploughs alone, which were regularly used in Canadian cities to remove snow from the streets and sidewalks, could not keep the tracks clean of small debris and snow dust. That task was

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[37] *Loc. cit.*

[38] *Evening Citizen*, 28 June 1938.

accomplished by two snow sweepers, a new invention designed and built by Lewis and Fowler of New York, ordered by the OESR in October 1891.[39]

The sweepers arrived in the city on 8 November via the CPR tracks, and attracted considerable attention. For the directors of the Street Railway their arrival was yet another opportunity to promote their company. The sweeper number 1, its crew and the company directors were photographed as the machine left a shop on Albert St. for its first run (see Appendix I, Plate 4).[40] Ahearn, Soper and the OESR Superintendent, J. E. Hutcheson proudly posed with the group of mechanics and the sweeper conductor on the front platform of the car. One of the mechanics, a tough, strong man, rolled up his sleeves, oblivious to the winter cold and ready to battle the snow with his new, powerful machine. Another employee took out a simple household broom, to emphasis the size of the sweeper's brushes or perhaps to clean the snow from the tracks in front of the mighty machine.

The photograph shows some construction details of the early sweepers. The rotary brooms were made of rattan and the body of wood and cast iron. The extensive ornamentation, so typical to the late 19th century, was evident in the fancy sign placed across the front of the car. Unfortunately, this black and white photograph cannot display bright colours that most likely were used to decorate the sweeper and to make it more visible to bystanders. Unlike the later cars, this first machine had an open front platform,

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[39] D. Knowles, *The Ottawa Car Company* (Ottawa: Bytown Railway Society, 2002).

[40] COA. Photographic Collection, Transportation Series, CA-1554.

exposing the crew to the night cold and wind. A large electric lamp placed on the roof, provided some illumination, but it is unlikely that the light was strong enough in winter storms. Still, the photograph well depicts the meaning attributed to the first sweeper by its owners. The directors of the company wanted to promote the sweeper as a symbol of progress, a powerful machine superior to nature that symbolized the technological and economic prowess of any company that owned such modern equipment. Certainly – the photograph seemed to imply – this electric railway would perform at the highest level, provide an excellent service, and therefore valorize its common stock.

The sweepers, which inaugurated their work on 15 December 1891, were regularly praised in Ottawa newspapers over the first months of 1892. Ahearn and Soper also sent telegrams to other major Canadian newspapers to advertise their accomplishment.[41] On 3 January 1892, a Daily Citizen reporter was invited for a ride on one of the machines. "[J]ump on, but blame yourself if you have a rough time " – the Superintendent, J. E. Hutcheson told the reporter.[42] It was 1:00 a.m. on Sunday night, and the machine and its operators were ready to work. Next day, the Daily Citizen published the following account of this trip:

> The genial Superintendant [sic] in his big fur coat covered with snow and ice from head to foot looked like a belated Santa Clause driving an electric reindeer.[43] The snow was falling thick and fast and as the sweeper turned on to

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[41] F. Angus, *Seven Hundred Days*.

[42] *Daily Citizen*, 4 January 1892.

[43] This remark may have given an idea to T. Ahearn and W. Y. Soper, who on Christmas 1898 rode atop the fabulous "Santa Clause Special" street car; taking turns as

> Wellington Street the east wind seemed to howl as it swept up from the bridges. Even at that hour great drifts of snow had formed across the intersections of streets and threatingly blocked the way, but the Superintendant turned on the current, notch after notch, the immense rotary brooms spun around with a deep whirring noise, and the sweeper leaped out upon the track seemingly conscious of its power. Through the drifts it sped, the snow flying from the brooms in great white clouds and filling eyes and ears of the solitary passenger, who by this time had begun to realize where the "rough" part of the trip came in. With gongs ringing, brushes whizzing and snow everywhere, on across Dufferin Bridge the sweeper rushed - in front a blind unbroken waste of snow - behind a cleanly swept track, with its polished rail tops glistening under the electric lights, and so on without interruption until the top of Rideau Street was reached.[44]

In this description, the machine, unlike humans, was unaffected by physical discomforts and could not be overwhelmed by environment. Therefore, the anthropomorphized sweeper assumed a superior role in the fight with nature. It dominated over people, whose primary function was to ensure that the machine was furnished with enough power to proceed with its work.

Although the company probably commissioned many photographs of its first winter operation, few images have actually survived. An interesting picture was taken in late January 1892 by William James Topley.[45] The photograph depicts a sweeper buried in snow; its side windows were covered with ice, yet the beautiful decorated sign "Sweeper 1" was clearly visible. The entire city was covered in snow; the buildings, people and the machine disappeared in the white background. Any contemporary viewer looking at this image would question how the early sweepers were ever able to complete

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Santa, they threw candies and oranges to children lining its route.

[44] *Daily Citizen*, 4 January 1892. See also Angus, *Seven Hundred Days*.

[45] NAC, William James Topley Collection, PA-008420.

their jobs. Yet for a 19th century journalist, the image was a triumphal symbol of victory over nature:

> This morning, Mr. Soper, Mr. Hutcheson, and a number of friends ... assembled on Wellington St., in front of the Langevin block, to witness the interesting process of photographing the powerful and triumphant sweeper fresh from her memorable and victorious tussle with the first typical snowfall of the present winter. ... It was amusing in that thoroughfare to see pedestrians following the sweeper. The sweeper looked as fresh as a daisy after her work, with scarcely a trace on her of the fight.[46]

The attribution of a female gender to a sweeper was quite typical of the 1890s. In one sense, the object of such strong male affection had to be female. Yet the gender also suggests simplicity of the operation: sweeping the tracks was as "easy" as the housework in the domain of women. Moreover, the female gender may imply that, even though graceful and eye pleasing, the machine had to be guided by a man.[47] In any event, during the 1892 winter, the Ottawa Electric Street Railway triumphed over the environment, and its pennyworth of stock rose to $150.00 per share in less than a year.[48]

In fact, the snow removal was very expensive, reaching $8,000 for labour alone in1893. Furthermore, the company found itself in a difficult position created by the city's By-law No.1076 that required people to clear their sidewalks and spread snow evenly on

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[46] The article was found by Fed Angus in a scrapbook kept by Warren Y. Soper on the Ottawa Electric Street Railway. See. Angus, *Seven Hundred Days*.

[47] The author of this thesis would like to believe that the sweeper was female because she had the job done well and on time.

[48] See *Canadian Electrical News* (December 1894): 171.

the streets. Therefore, after each snowfall the law-obeying citizens of Ottawa threw the snow on the cleared tracks and the company had to resend its crews, increasing the cost of snow removal.[49] Finally in February1893, the OESR forced the city to change its By-law by threatening to use sleighs and to lay off its winter workers, who would have consequently required the city's financial assistance.[50]

As Ottawans got accustomed to the winter service and came to expect it, the articles describing sweepers disappeared from the front pages of daily newspapers. Snow removal changed into a functional operation, conducted behind the scenes, to ensure a smooth run for the passengers and steady profits for the company. It ceased to belong to a popular discourse, and became a concern of engineers. One of the sweepers produced c.1920s by the Ottawa Car Company and used on the Ottawa Electric Railway tracks is now preserved at the Canada Science and Technology Museum. This artifact shows that by the mid-1920s the sweeper had lost its symbolic meaning. The company, affected by the war, economic depression and strikes, was not looking for symbols, but needed cheap, working machinery that provided fast and efficient service. Most of the decorative and expensive elements such as ornamental signs and castings were removed, the design was simplified, and equipment was recycled from retired cars.

2.4 Electric Railway and Social Meanings of Electrification in Ottawa.

Most Ottawans were proud of the electric railway and pleased with its services in

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[49] COA, By-Law No. 1076, Minutes of the City Council, 1893.

[50] COA, Minutes of the City Council, February 1893.

the early 1890s. Only local hackmen and farmers staged a weak protest against the electrification of public transportation. Hackmen lamented their lost business. Farmers complained that the cars were blocking their way, scaring horses, and that T-rails were difficult for wagons and carriages to cross. Farmers would often drive right in front of a car, slowing down the traffic, even throwing some hay on the ground to affect the traction and stop the car. This persistent protest forced the city to pass a bylaw in 1895 prohibiting farmers from using the tracks and obstructing traffic.[51]

Despite these quarrels, the electric railway system was normally perceived as a symbol of Ottawa's progress. The Electrical World, the leading trade magazine for the industry in North America, reported that, "It is the proud boast of the people of Ottawa that their street railway system stands second to none in America, both in point of equipment and operation. The citizens take a great interest in this road; when an Ottawa man goes abroad he forms his opinion of a street car service by comparing it to that of his native place as a standard of excellence."[52]

Indeed, in the 1890s Ottawa's electric street railway was relatively inexpensive, fast and comfortable.[53] At night each car was lighted with five incandescent lamps and in winter the passengers were kept warm by small electric heaters installed under the seats -

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[51] COA, MG 45, Ottawa Electric Railway Company Papers (OER). Vol.1, File 182, 361.

[52] "Electrical Ottawa," *The Electrical World* (September 21, 1895): 310.

[53] In the first twelve months the electric railway carried 1,520,000 passengers and the OCPR served 575,000 customers. The income of the OESR in 1891 totaled 71,698 and in the first year after the amalgamation increased to $193,991. See "Electrical Ottawa," *Electrical World* (September 21, 1895): 312.

a great improvement over a thick layer of straws used to insulate horse-drawn cars.[54] The service also facilitated a commute to the downtown. Ottawa lines carried the traffic from the outlying areas to the business district centered around Spark Street. Lowertown, the residential neighborhood located between the Rideau River and the Canal, was served by two lines running on St. Patrick Street and Theodore to the Rideau Street loop. The Somerset and Richmond line to Hintonburg linked the suburban area with Ottawa's downtown, improved commuting to work from this working class district.[55] The Canadian Atlantic Railway depot was connected to the city via the Elgin Street line, and the Canadian Pacific station was served by the Wellington and Albert lines. Chaudière district, the second largest employment center in the city, was served by the street cars running on Wellington and Albert, and the Bank Street line was extended to Lansdowne Park and Exhibition grounds.[56]

To encourage commuting, the company offered a reduced ticket price for working men riding the car from the first trip in the morning till 7.00 am, and from 5 pm to 6.30 pm, charging $1.00 for 33 tickets, or $0.25 per eight tickets.[57] Yet the directors of the

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[54] The technical details of the heaters are provided in "Electric Heating," *Canadian Electric News* (October 1892): 141.

[55] See C. Newell, *Hintonburgh : a Working Class Streetcar Suburb at the Turn of the Century* (Ottawa : Historical Society of Ottawa, 1995).

[56] "Electrical Ottawa," *Electrical World* (September 21, 1895): 312.

[57] COA, OER, Memorandum, 28 April 1893. In comparison, the Toronto Street Railway charged adults 25 cents for six tickets or $1.00 for 25 tickets. The children's fare was the same in both cities. Toronto Transportation Commission, *Wheels of Progress* (Toronto: The Commission, 1953) :106.

OER realized that the commute to and from work was only one way to attract possible customers, and the company wished to extend its services and to attract other clientele. In 1894, the OER received a lucrative federal contract to carry mail in especially-designed cars. Children, who took the electric railway to school received a discount price of $1.00 for 40 tickets and could board the streetcar from 7 am to 9.30 am, from noon to 1.30 pm, and from 3.30 pm to 5 o'clock in the afternoon.[58] Women were encouraged to use streetcars while shopping; the company even coordinated a campaign aimed at increasing ridership and sales in downtown stores, convincing the retailers to distribute free streetcar tickets as an incentive to make a purchase. Thus, Woodburn Furniture Store offered 5 tickets for every $5.00 spent in the store, and the Two Macs store at Sparks and Bank Streets compared its made-to-order clothing to the cheap and fast service of the electric railway.[59]

Since very few families in Ottawa in the 1890s could afford a carriage for trips outside the city, the Ottawa Electric Railway extended its New Edinburgh line to Rockliffe Park. Their property in Rockliffe was transformed into a delightful recreational park with rails winding through beautiful river-view woods, an electric merry-go-round, impressive arc and incandescent illumination, and live music.[60] In 1900, when the company introduced a Sunday service, Ahearn and Soper invested in a Britannia Bay property and built a second amusement park, which became a favourite location for

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[58] *Loc. cit.*

[59] *Ottawa Daily Free Press*, 18 July 1891 and *Ottawa Journal*, 27 July 1893.

[60] "Electrical Ottawa," *Electrical World* (September 21, 1895): 311.

weekend family picnics.

The entire city caught an electric fever in 1890s.[61] The customers of the Warnock's bakery on Sussex Street were encouraged to try its electric bread; the Capital Laundry on Rideau Street offered an electric laundry services. Doctor Sanden advertised electric belts, the latest invention that would heal all weaknesses with no medication, and Dr. Thomas promoted an equally effective electric oil. Yet another miraculous cure, the Polson's Nerviline Electric Light was supposed to penetrate "the most remote nerve, every bone, muscle and ligament, to feel its beneficial power."[62] Senator Clemow transfigured his property at 635 Bank St. into an Electric Park, a summer concert hall and exhibition grounds, where over 1,000 visitors were entertained on a warm evening by jugglers, magicians, bands and vocalists, while local militia showed off its fencing skills and rifle shooting.[63] Even the local baseball club and hockey club were both called the Electrics. Each year, during the Ottawa winter carnival the city contracted R. Anderson, a local electrician, to decorate the streets with several kilometers of lamps hanging on overhead wires, electric signs and sparkling ornaments.[64] On Christmas day 1891, St.

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[61] On the myth of hydroelectric power in Canada see H.V. Nelles, *The Politics of Development* (Toronto: Macmillan of Canada, 1974):215-255.

[62] This services and products were commonly advertised in local newspapers. See for example *Ottawa Free Press*, 6 January 1893, *Ottawa Daily Free Press* 15 December 1891; *Daily Citizen*, 14 January 1893, *Ottawa Daily Free Press*, 16 November 1891.

[63] Local newspapers frequently described the Electric Park entertainments in summer issues. See *Daily Citizen*, 31 August 1892 and *The Ottawa Free Press* 7 June 1893.

[64]"Electrical Ottawa," *Electrical World* (September 21, 1895): 313.

Patrick Church was decorated with several hundred incandescent bulbs and "a brilliant electric star of the first magnitude which would have dazzled the Magi on their journey to Bethlehem."[65] The church actually charged admission to see the star during the midnight mass.

On 29 August 1892, Ahearn and Soper invited Ottawa elites to an electric banquet, the first dinner ever cooked entirely by electricity. The banquet was co-organized by Samuel Daniels, the proprietor of the Windsor Hotel. An entire meal was cooked by electric appliances designed and constructed by Thomas Ahearn, who supervised the preparation of the dishes in a kitchen installed especially for this occasion at one of the Chaudière power houses. The hot meal was delivered to the Windsor dinning room in a street car. Apparently, the dinner was so delicious that His Worship Mayor Durocher suggested that the sin of gluttony would have to be forgiven if more meals were cooked by electricity.[66] A similar party was held at the Russell House during the Canadian Electrical Association Convention in Ottawa in 1895. The dinner was again entirely cooked by electric appliances, and the electricians exhibited a great sense of humor by including in the menu items such as low potential brandy sauce, sherry wattage of '95 and electrocution.[67] Ladies' seats were decorated with evergreens and incandescent lights, waiters carried a miniature lamp powered by small batteries on their shirts, and desserts were shaped as electric cars, insulators, telegraph poles, telephones,

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[65] *Ottawa Daily Free Press*, 23 December 1891.

[66] "An Electric Banquet," *Daily Citizen*, 30 August 1892.

[67] "The Banquet," *Canadian Engineer* (October 1895): 165.

and dynamos.[68]

Thomas Ahearn was the first man in Ottawa to drive a car, it being powered of course by electric storage batteries. Similar cars were then exhibited by Ahearn and Soper at the local fair.[69] The newspapers continually ran articles on the use of electric power: in the kitchen, on farms, in postal services, medicine and dentistry.[70] Some articles were rather whimsical, for example the Ottawa Daily Free Press, on 7 January 1893 suggested that an electric motor could do all the farm work, except the lifting of the mortgage.[71] Other articles were quite bizarre: a journalist in disguise approached the Ottawa Street Railway to arrange her last trip to the better world in a street car and later mocked the company's refusal.[72]

In 1894, Albert E. Dion composed a waltz titled "Trolley car " and dedicated it to the directors of the Ottawa Electric Railway. A vignette on the cover of the music sheet depicted a streetcar in idyllic Rockliffe scenery. Its wires nicely covered by clouds, the car was encircled by maple leaves decorated with incandescent lights. This image perfectly encompassed Ottawa's desired to become an electric Paradise (see Appendix I, Plate 5).

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[68] *Loc. cit.*

[69] *Daily Citizen*, 12 September 1899.

[70] See for example *Daily Citizen*, 27 September 1990, *Ottawa Daily Free Press,* 15 December 1891, *Ottawa Journal* 27 February 1893.

[71] Rural areas near Ottawa did not enjoy any electric services well into 1930s.

[72] *Ottawa Daily Free Press*, 23 December 1891.

Yet, the fascination with electricity was nonetheless blended with fear of wires, electrocution and streetcar accidents. On 30 May 1893, the city was shocked by the death of two children on the tracks. The grief was mixed with anger toward the railway company. Ahearn was cited as saying that: "It is miraculous that there are not more accidents. Children have now become so careless in crossing the tracks that the motormen have all they can do great part of their time to avert accidents."[73] The city conducted a detailed investigation; the motorman was cleared of any blame, but it was suggested that the street cars always stop before a street crossing and reduce speed in the busy areas of the city. Although the Company officials constantly reminded residents to be aware of the streetcar traffic, in practice not much was done to make the tracks safer and accidents involving young children remained common.[74]

Even as the tramway emptied Ottawa's streets of playing children, it filled them with adult commuters. The number of revenue passengers carried in a year was already by 1892 approximately 1,520,000, with 35 riders per capita, and a ratio of 1:1 seats to passengers.[75] Thereafter, the number of clients increased rapidly. In 1895, the Ottawa Electric Railway carried 4,583,000 passengers; in 1898, 5,200,000; and by 1905,

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[73] "Killed on the Electric Track," *Ottawa Journal*, 1 June 1993.

[74] The very high number of accidents involving children forced the industry to adopt some changes in the street car design such as front guard and improved brake system. See George W. Hilton, *The Cable Car in America* (Berkeley: Mowell-North Books, 1971):92-98. Yet safety campaigns such as "Good Lighting" and "Safety First" were only introduced in Ottawa in the second decade of the 20th century.

[75] Canada. Federal Plan Commission. *Report of the Federal Plan Commission on a General Plan for the Cities of Ottawa and Hull* (Ottawa : Federal Plan Commission, 1915): 145. For the population of Ottawa see Appendix II.

7,649,850.[76] The direction of traffic was radial, toward the business district, bringing the passengers from the residential to the core employment and retail areas such as Sussex, Rideau Street, Elgin, Sparks and Bank Streets (See map in Appendix I, Plate 3). The concentration of the traffic during the first decade of the OER operation was manageable and only became a problem around 1915.[77]

With a monopoly over mass transit, the company had the luxury of extending its lines and services as it saw fit. New rails were laid only in well-populated areas, and for many years the OER refused to expand its services to rural communities. Even so its lines to the Experimental Farm, Britannia, Rockliffe and Hintonburg allowed for some distribution of the Ottawa population into these areas.[78] With an affordable transportation system, working-class families moved farther from the expensive downtown and directed the urban growth of Ottawa outside of its business and old residential core. As the people moved away from centre town, businesses and shops followed creating smaller commercial centers like Westboro along the electric railway lines.[79]

By 1895 Ahearn and Soper had built an electric empire in Ottawa. They owned a manufacturing and supply company, which made control equipment and small electric

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[76] See "Ottawa Electric Railway Company," *Electrical News* (February 1906): 47, *Canadian Electrical News* (February 1899): 35 and *Canadian Electrical News* (January 1905): 8.

[77] Federal Plan Commission. *Report,* p.143

[78] *Loc. cit.* In 1890s Britannia district enjoyed the largest economic activity. See also C. Newell, *Hintonburgh.*

[79] See Bruce S. Elliott, *The City Beyond: The History of Nepean, Birthplace of Canada's Capital, 1792-1990* (Nepean, Ont.: City of Nepean, 1991)

appliances, and distributed Westinghouse products in Ontario. Ahearn and Soper managed the Ottawa offices of the Bell Telephone Company; controlled Chaudière Electric Light and Power Company, the largest producer and distributor of electricity in the city, and operated the Ottawa Electric Railway. Moreover, in 1893 Ahearn and Soper invested in an old Ottawa carriage-building shop being run by William W. Wylie. It became the home of the Ottawa Car Company, which occupied two large shops on Slater and Kent Streets and employed up to forty men.[80] The production of the OCC was geared towards the needs of the Ottawa Electric Railway and other street railway companies in Canada. It manufactured electric street cars, locomotives and snow removing equipment. OCC street cars were furnished with electric heaters produced by the Ahearn Electric Heating and Manufacturing Company.[81] The company also produced street lamps, often designed by Ahearn and Soper themselves, and used by the Ottawa Electric and the Ottawa Electric Railway Companies. Immediately profitable, the company yielded an 8 percent dividend in its first year. In 1895 Ahearn and Soper further extended their vertical integration by creating the Ottawa Porcelain & Carbon to supply their electric companies with caster wheels, insulators, battery jars, arc light carbons, motor brushes and other

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[80] "Electrical Ottawa," *Electrical World* (September 21, 1895): 312.

[81] There is little information on both companies. The Ahearn Electric Heating and Manufacturing Co. Ltd was incorporated in 1892 with a capital stock of $250,000. Shareholders included Robert Blackburn, William Scott, J.W. McRea, G. P. Brophy, Thomas Workman and Peter Whelan. It exploited Ahearn's patents (number 39507, 39508) for electric heating systems. The Ottawa Car Company was for many decades the largest manufacturer in Ottawa. Unfortunately, its records have never been located, but a short, chiefly illustrated history of the company was prepared by David C. Knowles and published by the Bytown Railway Society in 2002.

small electric articles.[82] With a strong financial and business position in Ottawa, and capital securely diversified between various companies, Thomas Ahearn and Warren Y. Soper were by the mid 1890s ready to take over the electric market in the city and monopolize the entire power generation and distribution in Ottawa.

2.5 Conclusion.

The introduction of electric traction to Ottawa opened a second phase in the process of electrification of the city. It provided the power industry with a new, profitable market and reinforced the presence of power generation and distribution in Canada's capital. This stage of electrification between 1890 and 1894 was dominated by a political struggle to control the traction in Ottawa. During this time Thomas Ahearn, Erskine H. Bronson, and Warren Y. Soper used their technological, managerial, and political skills to emerge as unquestionable leaders of the local electrical industry. According to Armstrong and Nelles, Canadian capitalists often used their political influence to ensure protection for their businesses.[83] The creation of the Ottawa Electric Railway reflected this pattern of corporate behaviour. Ahearn and Soper, supported by Bronson, appealed first to the provincial government to assure private ownership of the electric traction, then manipulated City Council's proceedings to receive a contract, and finally, by securing a federal charter, protected their business from municipal regulation. As John R. Baldwin suggested in his 1989 study of Canadian regulation, the franchise-type contract was the

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[82] "Electrical Ottawa," *Electrical World* (September 21, 1895): 313.

[83] Armstrong and Nelles, *Monopoly's Moment,* 74-77.

only instrument of regulation available to municipal politicians.[84] This was clearly the case in Ottawa. The City Council faced with the traction monopoly and opportunistic behaviour of Ahearn and Soper used the franchise to effect some control over public transportation. Yet a long-term franchise did not provide incentives for the company to extend its service to less populated and therefore less profitable areas of the city.

At the end of the nineteenth and the beginning of the twentieth century, the Ottawa street cars attained what Thomas P. Hughes has called "technological momentum." That is: "Men and institutions [had] developed characteristics that suited them to the characteristics of the technology. And the systematic interaction of men, ideas, and institutions, both technical and nontechnical, [had] led to the development of a supersystem – a sociotechnical one – with mass movement and direction."[85] This momentum persisted in Ottawa until 1959. It embodied the social fabric of the city; the municipality based its policies and regulations on the assumption of its durability; and Ottawans cherished its cultural values such as efficiency and profitability.[86]

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[84] John R. Baldwin. *Regulatory Failure and Renewal: The Evolution of the Natural Monopoly Contract* (Ottawa: Canadian Government Publishing Centre, 1989):83-93.

[85] Thomas P. Hughes, *Networks of Power : Electrification in Western Society, 1880-1930* (Baltimore: Johns Hopkins University Press, 1983):140.

[86] See Donald F. Davis, "A Capital Crime? The Long Death of Ottawa's Electric Railway," *Ottawa: Making a Capital*, Jeff Keshen and Nicole St-Onge, eds. (Ottawa: University of Ottawa Press, 2001): 349-382, and Davis, "Technological Momentum, Motor Buses, and the Persistence of Canada's Street Railways to 1940," *Material History Review*, 36 (Fall 1992): 6-17.

Ahearn and Soper worked tirelessly to reinforce this momentum in the society. Therefore, the second phase of electrification was characterized by a construction of a culture supportive of the technology, which reinforced the social meanings of electric power for the residents of Ottawa. Ahearn and Soper, who acted, to use Bruno Latour's terminology, as translators of technology, used the semantics of power to promote their companies.[87] They broadcasted elaborated tropes identifying their railway enterprises with *progress*. To resist Ahearn and Soper in 1894 was to oppose progress itself. Or so it seemed. Even so, in chapter 3, we shall learn that the municipal government, believing that power corporations were incapable of delivering true progress to Ottawans, was already poised to strike a blow against them. With the help of Erskine Bronson, the companies warded off the municipality's blow and, as we shall see, did their best to prove that monopoly was the most progressive way of conducting business. They might even have succeeded had the Ottawa River not been so adamantly resistant to the entrepreneurs' ideal of progress.

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[87] Bruno Latour, *Science in Action : How to Follow Scientists and Engineers Through Society* (Cambridge: Harvard University Press, 1987):108-121.

CHAPTER 3

GEOPOLITICS OF POWER: THE CREATION OF THE OTTAWA ELECTRIC COMPANY AND EFFORTS TO CONTROL THE HYDRAULIC RESOURCES OF THE CHAUDIERE FALLS.

By 1893 the Chaudière Electric Light and Power Company, run by Ahearn and Soper, was the largest and best equipped power generator and distributor in Ottawa. Ahearn's inventive spirit and practical skills allowed the company to adapt its machinery to the local water power environment.[1] Innovative, flexible arrangement of the generating equipment was especially designed to connect various pieces of machinery between the company's lighting and street-railway power houses, increasing their efficiency. Moreover, by creating a network of associated companies such as the Ottawa Electric Railway and the Ottawa Car Company, Ahearn and Soper had strengthened and diversified their financial resources. The erstwhile telegraphers had become household names in the city; their political influence in the Lower Town Irish working and middle class communities had risen with their fortunes. Ahearn's political ties extended to the

[1] By this time Ahearn owned seven patents for items ranging from an electric oven, to an iron, to a water bottle warmer, to street car heating system. In total he patented 11 inventions, produced by his companies. See for example, patents number: 39917 (an iron), 39506 (a heater), 39916 (an oven), 39915 (a warming bottle), 38976 (a water heater), 39508 (a method of heating an automatic water supply electrically), 39507 (a system of warning cars by means of electrically heated water) and a later patent, dated 1921, number 208058 (a buffer for needles of sound reproducing machines). Yet, rather than patents, it was Ahearn's ability to find technological solutions to reverse salients that gave his company an edge over competition.

top and his acquaintance with Wilfrid Laurier became a close friendship.[2]

Even so, the Chaudière still shared the Ottawa market with two other power generators and distributors: the Ottawa Electric Light Company (the OELC) and Standard Electric. OELC's business was confined to arc lighting; it illuminated the city streets, a task which consumed almost the entire power it generated. It had installed and maintained a total of 446 lamps, the least among all three businesses; of these 316 were street lights, thirty lamps were in government buildings and one hundred in private homes and businesses.[3] To increase its power output, the OELC invested in 1893 in a new station and extended the potential of its arc system to 1,000 lamps. In addition to two old turbines, the company purchased a third 60" three hundred horse power water wheel, rearranged the shafts to reduce the loss in generated power and replaced belting connections with ropes, which were supposed to smooth the operation of the wheels.[4] This unit was entirely devoted to generating electricity for street lighting. Commercial customers were served by a separate system powered by a 48" turbine and three DC

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[2] Although their letters are often vague, it is evident that Ahearn did not hesitate to appeal directly to the Prime Minister, and that Laurier supported his friend's enterprises. It is also apparent that Ahearn regularly discussed with Laurier his business and political affairs in private meetings. Numerous letters between Ahearn and Laurier are kept in National Archives of Canada (NAC), MG26 G, Sir Wilfrid Laurier Papers (SWL), Political Papers. General Correspondence.

[3] "Doubling the Lights," *Ottawa Journal*, 3 April 1893.

[4] The application of ropes was less expensive, but was generally criticized by electrical engineers. *Canadian Electrical News* (March 1893): 37. Short news items in the *Canadian Electric News* are untitled.

generators.[5] Nonetheless, the company was still unable to produce enough power to compete for new contracts.

The Standard Electric Company on the other hand, had more prospects. It was incorporated in 1891 by Erskine H. Bronson, Frank P. Bronson, W.G. Bronson, D. Murphy, C. Berkley Powell, G. B. Pattee, and C. H. McIntosh.[6] Following the typical Chaudière pattern, the power house of Standard Electric was installed in an old mill on E. H. Bronson's property and most of the machinery was recycled from the yard. However, entering the business later than other electricity providers, the Bronsons benefitted from the experience of OELC and Chaudière Light and Power. The original plant was soon enlarged and equipped with state-of-the-art generating machinery. Since the street illumination market in Ottawa was already dominated by the OELC and in Hull by the Chaudière, Bronson's company enlisted mostly private consumers. It provided power to the Russell House, where it installed seven hundred lights and the first elevator in the city. The Standard also lighted the Russell Theater and set up four hundred lights in the Grand Union station. Most of its business, however, came from the sale and installation of electric motors. It supplied sixty motors to the Martin & Warnock's flour mills and fifteen machines to Dalglish and Bradley's woollen mills. The company set up electric motors in the offices of the Ottawa Journal, the Citizen, J.D.Taylor Printing Company and the Cole Manufacturing Company; its motors powered the St. Jean Baptiste Church

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[5] *Loc. cit.*

[6] *Ottawa City Directory* (Ottawa: Might Directories, 1891).

organ and the Central Chambers elevator in the Parliament.[7]

By 1894 operation of three power enterprises in Ottawa was no longer economical. The technology had changed and new generating machinery had to be complemented with additional equipment such as switchboards, exciters, transformers and meters. Furthermore, it became necessary to employ skilled operators to run this complicated machinery efficiently, and the companies faced a shortage of qualified labour. Maintenance costs were increasing and so were the transaction costs of power generation. The three companies existing in Ottawa – the Ottawa Electric Light Company, the Chaudière Electric Light and Power and the Standard Electric – which so far operated in a cartel style, but wastefully duplicated their distribution systems, inevitably moved toward a consolidation.[8]

3.1 Creation of the Ottawa Electric Company.

As the economic situation in Ottawa worsened during the 1890s depression and the cost of producing electricity rose, the three companies started to discuss a possible merger to eliminate duplication, lower power generation and distribution costs and control prices of electricity in the city. The Ottawa City Council, which was carefully following the actions of the three electricity providers, suspected that this merger would affect the city's finances. The price of electric lighting would certainly increase and the

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[7] "Rapid Increase in Electric Power," *Ottawa Daily Free Press*, 30 August 1891.

[8] For an explanation of a natural monopoly see Charles David Jacobson, *Ties that Bind: Economic and Political Dilemmas of Urban Utility Networks, 1800-1990* (Pittsburgh: University of Pittsburgh Press, 2000):7-17.

taxes paid by the new company to the city would most likely diminish.[9] In an attempt to offset the emerging monopoly, in 1893 the Council investigated the possibility of municipal ownership of hydroelectric stations. Since electric power generation had proven profitable and the physical network of artifacts was already established in Ottawa, the city decided to explore management and operations of its own electric services. The Council was primarily interested in taking over street illumination, but did not rule out power generation for other purposes.[10] The municipal politicians moved quickly and in February 1894 Ottawa applied to the Ontario Legislature for amendments to the Municipal Act to enable the city to acquire the funding to purchase a power generating plant. The application contained a clause allowing the city to expropriate private businesses and to take over the Chaudière power houses. Fortunately for the power brokers it was forwarded to Erskine Bronson, who now represented the city in the provincial legislature.[11]

Bronson was in a difficult position, for he would not support any bill that included an expropriation clause. Yet as Ottawa's representative, he had to act on the city's behalf. The power utilities controversy, moreover, was more difficult to handle than the street railway situation, which he had faced four years earlier, since Levi Crannell was no

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[9] The Ontario Legislature was working at that time on the O'Connor Bill, which would have declared the plants of the gas and electric companies non-assessable for municipal taxation. See "Taxation of Electric and Gas Street Plant," *Canadian Electrical News* (May 1894).

[10] City of Ottawa Archives (COA), Minutes of the City Council, 5 September 1893. COA.

[11] COA, Minutes of the City Council, 12 February 1894.

longer on the City Council. In addition, Bronson's own financial stake in the electric-generation industry could have easily been used to discredit his actions.[12] Bronson believed that the best defense of the industry's interests lay in a merger, for otherwise the city would be able to pick off – that is, municipalize – the weakest of them. On 7 March 1894, Bronson advised his brother-in-law and partner in Standard Electric, Levi Crannell, to negotiate a consolidation of the three power producers to pre-empt the city's bill by merging their operations before he presented it to the Legislature. He stressed that the matter had to be resolved fast as he could postpone the debate on the bill only for one week.[13] On the same day, Bronson played for time by asking the City Council's solicitor for clarification of the expropriation clause. He also contacted Mayor Cox with a reassurance that Bronson would protect Ottawa's interests. [14] Bronson's plan was to delay the introduction of the Electric Bill to the Committee on Standing Orders and consequently to have it rejected because of the lack of sufficient notice.

Meanwhile, Crannell, Pattee and Clemow were negotiating a merger with Ahearn and Soper. Chaudière Electric possessed the largest capital reaching $269,000.[15] Ahearn

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[12] For more on Bronson's position see R. P. Gillis, *E.H. Bronson and Corporate Capitalism*, MA Thesis (Kingston; Queen's University, 1975):144-145. As Bronson expected, municipal politicians used his association with the Standard Company to criticize his handling of the Electric Bill in the Legislature.

[13] NAC, MG28-III26, Bronson Papers (BP), Vol. 693, p.108, Bronson to Crannell, 7 March 1894, and Vol. 693, p.120, Bronson to Crannell, 10 March 1894.

[14] *Loc. cit.*, p.118, Bronson to MacTavish, 9 March 1894 and p.130, Bronson to Cox, 12 March 1894.

[15] BP, Vol. 668, File 289, Minutes of the Meetings between the Ottawa Electric Light Co., the Standard Electric Company and the Chaudière Electric Light and Power

and Soper were certainly interested in consolidation, but insisted on a deal that favored their business. In addition to the strongest position on the market, the Chaudière Electric Light and Power was the only company incorporated under a federal charter. This, Ahearn and Soper claimed, gave them an advantage over the other electric businesses; the company could operate in Ontario and Quebec and, with the strong support of the Liberal Cabinet was immune to any municipal attempts to control its operations. Therefore Ahearn and Soper insisted that the new company should be based on the Chaudière charter. Crannell, Pattee and Clemow of Standard and OELC were reluctant; they were afraid that the city would strongly oppose any attempts to incorporate the new company under federal legislation and so impede the merger.

Finally, on 17 March 1894, the entrepreneurs reached a deal.[16] The new Ottawa Electric Company was to be incorporated with a federal charter with capital of $1,000,000 divided into $100 shares to be distributed among the shareholders of the Ottawa Electric Light Company, the Standard Company and the Chaudière Electric Light and Power Company, the later being granted the largest portion of the capital.[17] The Board of Directors of the new company consisted of five to nine members and one salaried Managing Director. Thomas Ahearn was elected President; F. E. Bronson, Vice-President; A.A. Dion, Superintendent; and D.R. Street, Secretary-Treasurer.[18] The

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Company.

[16] *Loc. cit.*

[17] *Loc. cit.*

[18] *Loc. cit.*

company sent a petition to the Secretary of State of the Dominion requesting an act of incorporation.[19]

In Toronto, Bronson carefully lobbied the Chairman of the Private Bill Committee to reject the City of Ottawa petition, and by 20 March, he was confident that the Bill would not pass.[20] Impatient Ahearn and Soper intended to speak publically against the Electric Bill. They wanted to denounce the expropriation clause and the city's attempt to interfere with private ownership and commercial endeavours. However, Bronson was convinced that a public protest would attract unwanted attention to the Bill, and expose him to a possible insinuation of bias against the city.[21] Ahearn and Soper could not take chances with such an important issue. They discussed the matter with Charles Fleetford Sise, the Canadian president of the Bell Telephone Company, who suggested that the best action for the Private Bill Committee would be to pass the bill, but place an upper limit on the capital that the city could use to purchase an electric company.[22] Bronson accepted this idea, and on 20 April the Bill no. 47, called "An Act Respecting the City of Ottawa" was passed with an amendment permitting the city to borrow a maximum of $250,000 for its electric venture.[23] This amount was, as intended, insufficient to allow the municipality

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[19] NAC, RG 6, Department of the Secretary of State, Vol. 86, File 1525.

[20] BP, Vol. 693, p.146, Bronson to Crannell, 20 March 1894.

[21] *Loc. cit.*, p.124, Bronson to Soper, 10 March 1894.

[22] *Loc. cit.*, Vol.720, Crannell to Bronson, 27 July 1894.

[23] An Act Respecting the City of Ottawa, *Statutes of Ontario*, 57 Vict. c.96, 1894,

to buy any existing company or to construct a new municipal plant.[24]

The Ottawa councilors, realizing that their appeal to Toronto had failed, on 11 June 1894 signed a ten-year contract for the street illumination with the Ottawa Electric Company.[25] The price was set at $65.00 per lamps per year, and the contract stated that the new amalgamated company would not increase its charges to commercial and private customers and would offer a 25 percent discount on all accounts paid on time after the first year of service. The company was only allowed to raise prices if the city requested it to bury its overhead wires.[26] With this agreement the city agreed to withdraw its objection to a federal charter for the company and the Ottawa Electric Company was officially incorporated by Act of Parliament on 27 July 1894.

3.2 Technological Infrastructure.

The new company immediately started to work on consolidation of the existing electric systems to economize its operations. With the merger of the three companies, the

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[24] Gillis's thesis attributes the entire Electric Bill scheme to Bronson; however, the letters between Bronson, Soper and Crannell, and Ahearn's influence with the Bell Company shows that Ahearn and Soper played a very important role in the ensuring that the city would not be permitted to purchase electric companies. See Robert P. Gillis, *E. H. Bronson and Corporate Capitalism : A Study in Canadian Business Thought and Action, 1880-1910* (Master's thesis, Queen's University, 1975), chapter III; BP, Vol. 693, 720 Correspondence.

[25] *By-Laws of the Council of the Corporation of the City of Ottawa for the Year 1894* (Ottawa: The Council, 1895). See By-Law No. 1472.

[26] COA, Minutes of the City Council, 30 April 1894.

Ottawa Electric took over the hydraulic lots leased by its predecessors.[27] It now owned lots K, L, M, N, O, and P on the south side of Head Street on Chaudière Island. Still, the Ottawa Electric Company lots were not able to furnish adequate amounts of hydroelectricity.[28] Seeing an opportunity to capitalize on the waterpower still in his personal possession, Erskine Bronson established Ottawa Power Company to supply energy to the Ottawa Electric Company and to the Ottawa Electric Railway Company.[29]

At the time of consolidation the Ottawa Electric Light owned a new power house, a workshop for armature winding, and a Thomson-Houston arc light distribution system manufactured in Canada in 1881 by Royal Electric. The Chaudière company operated three power houses equipped with alternating-current machinery purchased from Westinghouse, and an auxiliary steam station, built in 1893, which produced power in winter to replace the hydro-power lost whenever anchor ice built on the Ottawa River. Chaudière also ran a small armature rewinding and repair shop.[30] Standard Electric occupied a large two-storey building, equipped with four powerful, 66 inch water turbines, each able to run the generating machinery in the entire station. Bronson's six

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[27] COA, MG39-4-62, Ottawa Electric Company (OEC), Land Transactions, Conveyance of Land.

[28] The problems with the water power resources at the Chaudière are discussed in a separate section of this chapter.

[29] COA, MG39-4-62, OEC, Transactions. Ottawa Power never competed with Ahearn and Soper for contracts.

[30] A.A. Dion, "Some Notes on the Consolidations of Two Systems of Electric Supply," *Canadian Engineer* (November 1895): 184-186.

alternators were purchased from the Royal Electric and could power 13,000 lights.[31]

In 1894 Ottawa Electric began to consolidate the electric power generation and distribution systems of its founding companies.[32] The work was completed gradually in order to provide uninterrupted service to the customers. The two winding shops were merged and moved to a large, empty building; the operation of this new workshop was extended, and the company hired a skilled foreman to do electrical repairs on-site. The old arc station, which did not produce enough power, was furnished with an additional alternator to increase its output for street lights and therefore avoid penalties for blackouts. Since the liabilities for unprovided service to the city were high, the Ottawa Electric decided to employ three patrolmen, who started up lamps, which went off during the night, replaced and repaired any burnout lamps, and cooperated with the Fire Department during lighting hours, cutting or disconnecting electric wires whenever necessary.[33] The patrolmen kept daily reports detailing the history of every lamp in the city; these reports were recorded by the Ottawa Electric Company in office books, which are no longer extant, probably having perished in a fire.

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[31] *Loc. cit.*

[32] *Loc. cit.*

[33] There is very little information available on the number of workers and labour relations in the Ottawa Electric Company before the strikes of 1919. Certainly the number of employees was increasing at the end of the 19th century. Ottawa was the first city in Canada to receive a charter from the International Brotherhood of Electrical Workers. The Local no. 93 was established by A.A. Dion on 20 December 1899 and was intended as a forum for discussions on issues associated with electrification. Unfortunately, the local functioned for only 19 months, and its records did not survive. It reopened as local no. 400 in January 1904, but closed after only one year. See International Brotherhood of Electrical Workers, *Ottawa Local 586* (Ottawa: IBEW, 2002).

In order to economize the power generation and distribution for incandescent lighting, the Standard and Chaudière equipment was consolidated into a single system. Large and well-designed, Standard's building was converted into the central station. All the feeders and wiring for generators were concentrated in this building and connected to the new T-H switchboard.[34] The power houses of the Chaudière Company were converted to substations and furnished with switchboards connected to the main power house.

Generally, the turbines installed in the power houses were controlled mechanically, but since the waterhead at Chaudière could fluctuate rapidly, Ottawa Electric installed handles to facilitate manual control of the gate. Because of high variations of voltage under load changes, the company employed a separate turbine and dynamo to excite the fields of all the generators in the substations. It also experimented with various generating schemes to find the most efficient solution for Ottawa's environment. For example, parallel running lines were tested and found to be wasteful with high idle current; the company also tested various generator connections that would allow it to bolt together pulleys and shafts, as well as interchanged armatures to alter the output of the machines. But none of these experiments could entirely solve the problems caused by waterhead fluctuation on the Ottawa River. In 1899, Ahearn and Soper,

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[34] This switchboard is still in the same building, now owned by the Ottawa Hydro. One indication of the merit of the machinery used at the OEC is the fact that the original turbines and generators are still used at the Chaudière power houses no. 2 and 4 to furnish current for approximately 6,000 houses. The switchboard and the control board were only disconnected in the year 2000. This information is provided by Michael Poulin, the Manager of the Chaudière substations.

therefore, purchased an additional, low temperature, Westinghouse AC generator rated at 1,200 volts with 420 KW capacity. This was said to be the largest generator then available in Canada.[35] Furthermore, the Ottawa Electric Company improved its coal-burning plant. The old U.S. machines were disconnected and the plant was furnished instead with four, 500 volts, DC, compound Westinghouse generator.[36]

The OEC distribution system was redesigned: duplicating wires were taken down, feeders and converters disconnected and unused posts removed, thus lowering network maintenance costs. The lights of all public buildings, churches, theaters and hotels were divided between two circuits, eliminating the possibility of a total blackout. Still, the distribution system consisted of old copper wires and appliances used for several years, and required improvements, constantly postponed by the Company.[37]

The old, open-arc street lamps, installed in 1885 by the Ottawa Electric Light Company, were replaced around 1894 with safer and more efficient closed-arc lamps or incandescent fixtures. The lamps were placed on a hanger or a fixture about 1.8 meters from the cedar posts (see Appendix I, Plate 6). On busy streets, the lights were suspended from wires in the middle of the road to provide more illumination for crossing. The street lamps were very simple and inexpensive; tangled in wires, these early fixtures were not

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[35] "Large Electric Light Dynamo," *Canadian Electrical News* (January 1899): 18.

[36] *Loc. cit.* See also "Electrical Ottawa," *Electrical World* (September 21, 1895): 310.

[37] BP Vol. 810. See a report on the assets of the Ottawa Electric Company, titled "Ottawa Situation," prepared by J.G. White and Company for E.R. Wood, The Dominion Securities Corporation, 10 October 1905.

particularly decorative. Parks were illuminated with close arc lamps hung between poles in the middle of walkways (see Appendix I, Plate 7).[38] The lamps installed in Ottawa would become an excellent example of a persistent technology inasmuch as their design was still being used well into the 1940s.[39]

Although the distribution system required improvement, the power generating stations of the Ottawa Electric Company were well equipped for electric lighting and motor operations. In addition to this common usage, electricity in Ottawa, the city with long winters, also powered numerous electric heaters in hotels, stores, barbers' shops, restaurants and government offices, as well as five privately-owned electric stoves and three hot water furnaces.[40] The Ottawa Electric Railway, although it operated its own hydraulic stations, commonly exchanged power production with the Ottawa Electric

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[38] Although the City Beautiful Movement influenced urban politics in Ottawa at the turn of the century, in this city it was mostly confined to planning parks and improving sanitation system. The lamp design began to play a more important role after 1913 when the city introduced ornamental cast iron post lamps. In 1916, the Ottawa Improvement Commission installed concrete post lamps in capital parks. Both types of lamps are still used by the National Capital Commission along Confederation Boulevard. See John Collins, "An Innovative Lamp-post Design of 1916: A Fine Example of Urban Heritage in Ottawa," *Canadian Journal of Civil Engineering* (October 1993): 736-740. When in 1920s the city decided to replace the cast iron post lamps on Spark Street, the abutting property owners agreed to pay an extra tax to maintain their ornamental lights. See Hydro-Electric Enquire Commission. *Ottawa Electric Company* (Toronto, 12 March 1923): 3751-3752.

[39] This lamps are commonly depicted on the photographs taken in 1940s, and now preserved in both the National Archives and the City Archives. On the idea of a persistent technology see Thomas P. Hughes, "Evolution of Large Systems," Wiebe E. Bijker, Thomas P. Hughes and Trevor Pinch, eds., *The Social Construction of Technological Systems* (Cambridge: MIT Press, 1989): 77.

[40] "Electrical Ottawa," *Electrical World* (September 21, 1895): 309. See also Appendix II, Table 2, "Services provided by the Ottawa Electric Company, 1894-1904."

Company to ensure efficient use of the load capacity.

At the beginning of the 1900s, anticipating growth of the electric market in Ottawa, Ahearn and Soper prepared to extend the power generating and distributing network. However, their plans were devastated on 26 April 1900 when a lumberyard fire swept through the city. Out of six stations of the Ottawa Electric Company, four were completely burnt. The company was left with the central station and an auxiliary steam plant. Practically the whole distribution system was destroyed in the west end of the city and in neighbouring Hull. Fortunately, the new power house built for the Ottawa Street Railway remained intact and some of its output could be rerouted to serve lighting customers.[41]

At an emergency meeting in Bronson's office, the directors voted to rebuild the company and the next day new machinery arrived at the Chaudière.[42] The equipment was set up in an old mill rented by the OEC from lumberman, J. R. Booth until its own power stations could be reconstructed.[43] To save the company from bankruptcy, Ahearn and Soper needed to gather sufficient financial resources to cover the cost of rebuilding and refurnishing the power stations. In a rather desperate move, the Ottawa Electric Company's Board of Directors appealed to their shareholders for additional stock subscriptions. The response was overwhelming. Years of promoting the meanings of electrification among the residents of Ottawa was now paying off. The company was able

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[41] "The Ottawa Fire," *Canadian Electrical News* (May 1900): 87.

[42] BP, Vol. 667, File 127.

[43] "The Hull-Ottawa Fire," *Canadian Electrical News* (June 1900): 96.

to reinvest immediately in the new system, and within two years its stock liability added up to $1,000,000, with bonded indebtedness of $500,000. The stockholders loyally and wisely abandoned all dividends for six years (with the exception of $20,000 paid up in 1903) to rebuild the reserve account (see Appendix II, Table 3).[44]

While rebuilding the company after the 1900 fire, the Ottawa Electric and the Ottawa Electric Railway redesigned their plants. They abandoned an obsolete 1000 volt, 133-cycle, single-phase generating scheme and installed two-phase, 60-cycle machinery capable of producing 2200 volts current. The systems of both companies were standardized and made fully interchangeable.[45]

By the end of 1901, the Ottawa Electric Company operated four power houses.[46] Power house no. 1 was constructed in 1901; it was a fireproof stone, steel and concrete building. With a total capacity of 2800 KW, the station was furnished with three, two-phases, 2200 volts, 60 cycle, 700 KW Westinghouse generators of a revolving armature type, driven by three horizontal, 39" Stilwell-Bierce & Smith-Vail Company water wheels, directly connected to the alternators and operated at 180 rotations per minute. The waterhead was controlled by Lombard governors, which could raise it to 9.7 meters or lower it to 6 meters. Since arc street lamps were still being used in Ottawa in the early

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[44] BP, Vol. 667, File 127. In 1903, after three years in the courts, the company recovered the $18,669.50 it had been forced to pay to the city as a penalty for disruption of lighting services after the fire. See "Legal Case," *Canadian Electrical News*, June 1903, p.120.

[45] BP vol. 810, " Ottawa Situation," 10 October 1905.

[46] *Loc. cit.*

1900s, power house no.1 was furnished with two Westinghouse, type C induction motors of 150 lights capacity each, attached to a Western Electric multiplied circuit arc generator. An additional 100-light Western Electric arc machine was belted to the shaft of the third generator.

Power house no. 2 had a poor intake of water and was used only from November to January when the river waterhead stabilized at six to seven meters.[47] It was located in old stone building that survived the fire of 1900 and was furnished with very basic equipment: two, 600 KW, two-phase, Westinghouse generators, rated at 2200 volts and 60 cycles. Each generator was belted to a vertical 66" American Register Gate water wheel.

As for the two remaining stations, Number 3 was an auxiliary steam plant, furnished with one 500 KW, 500 volts, DC, Westinghouse generator; two 175 KW AC Westinghouse generators; two Wheelock engines; six return tubular boilers, and one 1500 KW Westinghouse-Parsons turbo generator. The plant produced approximately 1500 to 2000 KW at peak load. After the fire, E.H. Bronson added a new generating plant to his existing Ottawa Power Company's house. The station, commonly called Power house no. 4, was costly and inefficient. The poor design of its flumes caused the water wheels to deteriorate fast, and the station produced only marginal power.[48]

The distribution system, rebuilt in 1900, consisted of standard, overhead lines (for

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[47] BP vol. 810, " Ottawa Situation."

[48] L. Carvish, "Ottawa Hydro Generation Equipment, Chaudière Station no. 4," in Canada. National Capital Commission. Interpretation and Heritage Directorate, *Chaudière Historical Documentation* (Ottawa: National Capital Commission, 1982).

area served see map Appendix I, Plate 8). By 1905 it carried current to 7,394 customers, of whom 6,259 used Shallenberg or Westinghouse meters, while the rest were charged a flat rate as determined by the utility's franchise.[49]

3.3 Ongoing Problems with the Hydraulic Resources at the Chaudière Falls.

The power houses rebuilt in 1900 and the new equipment allowed the Ottawa Electric Company to carry on its business, but did not solve the problems caused by the city's geography. When Ottawa municipal politicians had decided to boost the market for electric power generation in Ottawa in the 1880s, the councilors and local capitalists had looked upon the Chaudière Falls as an extremely powerful source of hydraulic energy. It was believed that the water power resources in the city would not only support the existing needs of Ottawa indefinitely, but were rich enough to permit the establishment of an entire electrical manufacturing industry in the city.

However, the municipal politician and capitalists had boldly overestimated the available natural hydroelectric resources.[50] The waterhead on the Chaudière was not well regulated; its levels fluctuated, affected by anchor ice in winter, by flooding in spring and by low water in the rainless summer months. In July and August the water was usually too low to produce the needed current, and the OEC had to use its auxiliary steam plant. The high price of the imported coal used to power its plant substantially eroded the

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[49] BP, Vol. 810, "Ottawa Situation."

[50] H. John Taylor, *Ottawa : An Illustrated History* (Toronto : James Lorimer & Company Publishers, 1986): 81.

company's net income. No help was forthcoming from the OER, the OEC's sister company. Indeed, when the water was low, the plant of the Ottawa Electric Railway was shut entirely and the power was only produced by the OEC houses and by the Ottawa Power Company.[51]

The Ottawa River at the Chaudière Falls had a width of 60 meters with a drop of 15 meters. The maximum discharge on the Falls was 5,462 cubic meters per second. The average available flow during low water was 311 cubic meters per second. Yet around 1900 a Chaudière old dam leaked so much water that only about 60% of the flow was actually utilized, producing approximately 16,500 horse-power per 24 hours. [52] This situation could only be resolved by combining the water flow control technology with appropriate adaptations in the design of power generating stations. A storage facility above the Falls would increase the minimum water discharge to 792 cubic meters per second, with an optimal waterhead of 9 meters and the average 80,000 horse power on a water wheel shaft, making the resource steady and reliable during all the seasons.[53]

However, the ownership of the lots at the Chaudière posed problems since they were divided between companies situated in Ontario and Quebec. The Ontario southern

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[51] BP, Vol. 810, "Ottawa Situation." See also OEC, Vol.1, File114, Shortage of Water, Vol.1, File.115,Water Problem, Vol.1, File 135-138, Water.

[52] Douglas L. McLean, "The Great Chaudière Dam, Ottawa, Ontario," *Canadian Engineer* (January 21, 1910): 53.

[53] *Loc. cit.* p.60. The dam constructed in 1910 finally solved the water fluctuation on the Chaudière. The water head was increased to 11.7 meters, the minimum flow was 792.87 cubic meters per second and power was boosted to 84,000 horse-power per 24 hours.

lots belonged to the Bronsons (lots U to Z), to J. R. Booth (lots B to J), to the Ottawa Electric Company (lots K to P), to the Ottawa Electric Railway Company (lots Q, R, S), and to the Ottawa Investment Company, which controlled lot T.[54] The northern, Quebec lots were assigned to W.C. Edwards' Ottawa Hull Power and Manufacturing Company and to E.B. Eddy's pulp and paper factory. The owners on both sides of the river paid an annual rental fee of $100.00 per lot to the Crown. Each lot was entitled to one twenty-fifth part of the water and each lessee paid a fee proportional to the number of held lots for any work necessary to control or improve the water flow on the Ottawa River for the general benefit of all lessees.[55]

There were seven owners, and almost as many definitions on how the river should be developed. Eddy and Booth, for example, were not interested in selling power. They produced it solely for their own use, that is to power their lumber mills and the pulp and paper factory. Bronson, Ahearn and Soper constantly accused Booth and Eddy of wasting water resources and demanded compensation. The relationship between the businessmen was strained, and yet a cooperation of all lessees was necessary to improve the Chaudière resources.

Moreover, the lessees on the southern and northern sides were concerned with the equal division of the water resources between Ontario and Quebec. Any work to the water bed or construction of new dams would certainly affect distribution of the water

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[54] BP, Vol. 807, Minutes of the Meetings of the Chaudière Hydraulic Lots Owners. See also OEC, Vol.1, File116-118, Agreements re: Chaudière Hydraulic lots.

[55] COA, H.J. Millar, *Chaudière Water Power Owners and Lessees*, 18 August 1969.

power. Although the owners of the Chaudière hydraulic lots met regularly at the office of E. H. Bronson, they could not reach an agreement. The competition for power was just too strong. Hence all the involved parties used their political influence to stop any work being performed by their opponents. Their disputes and court litigation lasted for years. Finally, Ahearn, impatient with prolonged court cases, said he was prepared to purchase Booth's hydraulic lots, with some financial support of Erskine H. Bronson. But Bronson balked at the sums being demanded and the deal was abandoned.[56]

And yet, a deal could not be deferred indefinitely, as Nature's quintessential elements – fire and water – made clear in 1900-1901. The waterhead was especially low during these years. The Ottawa conflagration further impeded power production, which meant that Soper and Ahearn had no choice but to extract every last drop of water power to which their lot leases entitled them. Over the next three years they did their utmost to improve the Chaudière infrastructure on the southern, Ottawa side of the river. In this endeavor, they found J. R. Booth cooperative when they suggested that a short coffer dam above lot H quickly be built to increase *ad interim* the waterhead on the river.[57]

The short dam, however, was a temporary solution, and Ahearn, Soper and Bronson decided to construct an additional channel (commonly called Bronson's Channel) and flumes to increase the waterhead to 9 meters and stabilize the water flow to the Ottawa Power Company and to the Ottawa Electric Railway power house. The channel ran from the north side of the timber slide to Middle Street on Victoria Island and

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[56] OEC, Vol.1, File 109, Bronson to Ahearn, 5 October 1896.

[57] *Loc. cit.*, Vol.1, File 115, Bronson to Brophy, 25 January 1901.

to the pond supplying Bronson's hydraulic lots.[58] The businessmen quickly proceeded to secure necessary permissions and begin work. Municipal and federal cooperation was ensured after the company notified the two governments that their lighting contracts could not be fulfilled without immediate improvement to the Chaudière.[59] The level of current in Ottawa had already dropped and the lights were noticeably dim.[60]

However, an ultimate solution to waterhead fluctuation at the Chaudière would necessitate construction of a reservoir and a dam above the Falls. In October 1903 Bronson approached the owners of hydraulic lots on both sides of the river with an offer to create one company that would lease from the Crown all the water lots at the Chaudière, and which would have authority to construct and remove dams on the Ottawa River. However, once again the owners of the hydraulic lots were unable to reach an agreement.[61] The Ottawa and Hull Power Company, a strong competitor of the Ottawa Electric, and J.R. Booth not only disagreed with this solution, but also filed a protest with the Department of Public Works against the construction of the Bronson channel and new flumes. The O.H.P.C. even threatened to dismantle the flumes and only Ahearn's intervention with Prime Minister Laurier, who personally prohibited the Hull company

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[58] *Loc. cit.*, Vol.1, File 119, Bronson to the City of Ottawa, 18 April 1901.

[59] *Loc. cit.*, Vol.1, File 121, OEC to the City of Ottawa, 6 May 1901.

[60] *Loc. cit.*, Vol.1, File 115. Bronson to Brophy, 25 January 1901.

[61] BP, Vol. 807, Minutes of the Meetings of the Chaudière Hydraulic Lots Owners.

from any action, saved the progress of work.[62]

This last dispute led to an important court case, which lasted for several years while the Supreme Court attempted to determine the interprovincial boundary and the ownership of the river bed. It found a complicated situation: the Chaudière lots B to Z belonged to the Crown and were leased on long-term agreements for industrial and trade purposes; the water on the Ottawa River, required for navigation, was declared a federal property on 22 March 1870, but the ownership of the river bed was not clearly determined.[63] Since the work done to the river bed would affect the water flow and provide one province with more power than the other, the court needed unambiguously to establish the interprovincial boundary. The question of the ownership of the river bed, which was relevant to all rivers constituting inter-provincial borders, had to be passed to the Privy Council of England.[64]

As the legal costs mounted – especially after the case went to London – it became increasingly unlikely that the owners of the water lots would ever agree – they might have played their power games indefinitely if they had been able to ignore the flickering

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[62] *Loc. cit.*, Vol.1, File 130, Belcourt & Ritchie to Ottawa & Hull Power Co. 13 January1902; Vol.1, File 131, Dept. of Public Works to Ottawa & Hull Power Co. 15 January1902. See also OEC, Vol.1, File 125-133, Re: Dams; and "Threatened Interference," *The Evening Citizen*, 11 January 1902, "Dam Difficulty," *The Evening Citizen*, 13 January 1902.

[63] BP, vol. 807, File Admission of Facts. See also Christopher Armstrong, *The Politics of Federalism: Ontario's Relations with the Federal Government, 1867-1942* (Toronto: University of Toronto Press, 1981):160-177. However, Armstrong deals with water-power control in 1920s, and does not discuss the Ottawa situation.

[64] BP, vol. 807, Minutes of the Meetings of the Owners of Chaudière Hydraulic Lots, October 1905.

patience of the residents and politicians of Ottawa with the power shortages that their bickering had bred. But, as we shall see in Chapter 4, the municipal government finally broke this impasse in 1905 by threatening the interests of all the lot owners simultaneously. Forced by the municipal competition to cooperate, the Ontario and Quebec parties reached an agreement in October 1905; they redivided water resources, and decided to construct a dam, located between the Little Chaudière and Chaudière Falls, which would finally stabilize the waters of the Ottawa River (for the division of water power see Appendix II, Table 4).[65]

3.4 Conclusion.

As for this chapter, we have learned how Ahearn and Soper adroitly built their "natural monopoly" over the opposition of, it appears, a majority of City Council. They not only outmaneuvered the Council politically throughout the 1890s, but they even used the government's own trope to confound the movement for public ownership. It had been the City Council that first associated electricity with social progress, but it was Ahearn and Soper who translated this powerful association into a system composed of hard facts and real artifacts. In this endeavour, they held an ideological advantage over the promoters of public enterprise, for as Joel Tarr pointed out, the residents of a late 19th century networked city embraced a corporate, centralized and hierarchical factory order as

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[65] COA, H.J. Millar, *Chaudière Water Power Owners and Lessees*, 18 August 1969. The dam was finished in 1910 after the Federal government contributed a substantial amount of money to its construction.

a model for an industrial society.[66] Both the Ottawa Electric and the Ottawa Electric Railway were popular, and Ottawans were not ready to support their municipalization.

Even though Ahearn and Soper influenced the interaction between the human actors, they were unable to control one important element of their global actor-network, the Falls. Therefore paradoxically, the monopoly stage proved to be the most difficult period for Ahearn and Soper's business endeavours. Components of their expanding technological system were inharmonious and the company struggled with, what Thomas Hughes has called "reverse salients," a "situation in which individuals, groups, material forces, historical influences and other factors have idiosyncratic, causal roles, and in which accidents as well as trends play a part."[67] To overcome the reverse salients such as the fire and draft, which affected Ottawa in 1900-1901, the capitalists abandoned dividends, invested in the new equipment and created a durable network of technological artifacts, which persisted well into 1940s. Yet, as we shall see in the next chapter, by 1905, their system was weakened by Ottawa's geopolitics and by the race with its raising competitor, the Consumers' Electric Company, and could not any longer ward off the government's efforts to penetrate and subdue it.

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[66] Joel A. Tarr, "Sewerage and the Development of the Networked City in the United States, 1850-1930," Joel A. Tarr and Gabriel Dupuy, eds., *Technology and the Rise of the Networked City in Europe and America* (Philadelphia: Temple University Press, 1988): 159.

[67] Thomas P. Hughes, *Networks of Power : Electrification in Western Society, 1880-1930* (Baltimore: Johns Hopkins University Press, 1983): 79.

CHAPTER 4

REGULATION AND COMPETITION: THE STRUGGLE BETWEEN THE CITY AND THE OTTAWA ELECTRIC COMPANY TO CONTROL ELECTRICITY IN THE CANADIAN CAPITAL.

4.1 Electrical Competition in Ottawa.

Even before the Consumers' Electric Company was established in 1901, several firms tried to compete with the Ottawa Electric Company. The Hull Electric Company, one of the more persistent contenders, received its charter from the Province of Quebec in 1894; it was established by W.C. Edwards, H. K. Egan, Hiram Robinson and R. Blackburn, the businessmen previously associated with the Ottawa Electric Light Company, who did not join Ottawa Electric upon the consolidation.[1] Even though its Quebec charter gave the company no right to carry on business in Ontario, the Hull Electric Company strove to penetrate Ottawa's power market. To circumvent regulation, the Hull Electric set up small companies on the Ontario side to distribute illegally current it produced.[2] Ottawa City Council turned a blind eye to this practice in an attempt to attract manufacturers to Ottawa and to ensure competition for the OEC.

Without the presence of serious competitors in Ottawa, the Ottawa Electric

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[1] The charter of the company included exclusive rights to generate and distribute power in the city of Hull. The clause, however was not valid since the Ottawa Electric Company was also allowed to conduct business on the Quebec side. See "Decision Affecting Lighting Franchise," *Canadian Electrical News* (June 1899): 115.

[2] "Installation of the Ottawa and Hull Power and Manufacturing Company," *Canadian Electrical News and Engineering Journal* (March 1903): 33-34.

Company, faced with technological problems, was unable and unwilling to extend its services beyond the dense, profitable, urban core. Nor was it capable of producing ample power to support further industrial development in Ottawa. The price of electric power, although stable, was high enough to discourage many clients from installing new electric lights, and the company refused to enlist small businesses as customers, since these in its opinion, would not consume enough power.[3] Furthermore, the inspection of meters carried by the city under the federal "Electric Light Inspection Act," routinely found that the company used poor quality, faulty meters, over or undercharging its customers.[4]

In order to provide further competition for OEC, in 1898 the city of Ottawa granted a charter to the Deschenes Electric Company.[5] It acquired current in Quebec that it carried via un underwater cable to the Russell House hotel, Deschenes' first subscriber. The Ottawa Electric Company strongly objected this practice. Although by 1898 E. H. Bronson had lost some of his political influence when he retired from the provincial legislature, Thomas Ahearn was confident that his appeals to the federal politicians would

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[3] The residents and councillors were constantly complaining about the lighting services. The street railway also was not living up to the expectations. Yet, when the City Council intended to take the railway to court for a breach of contract, the Ottawa Improvement Committee controlled by Ahearn and Bronson threatened to stop all work on the streets served by the railway, and so the city abandoned its suit. See COA, Report no. 2 of the Railway and Light Committee, Minutes of the City Council, 12 April 1901, Minutes of the City Council, 23 April 1901 and *Canadian Electrical News* (April 1899): 76.

[4]In 1903 the city found that out of 3854 meters, only 223 functioned correctly: 428 were too fast and 3185, too slow. See *Canadian Electrical News* (November 1903): 222.

[5] City of Ottawa Archives (COA), Minutes of the City Council, 7 February 1898.

not be left unanswered.[6] The company used all its political and economic power to prevent the Hull businessmen from infiltrating the Ottawa market, and the Russell House remained Deschenes's only client.[7]

At the beginning of the 1899, the Ottawa City Council once again attempted to establish competition as it encouraged the Metropolitan Electric Company to create a plant in the Britannia area. This company was incorporated by Thomas Lindsay, an Ottawa merchant, with capital from Montreal and Toronto businessmen.[8] In April Metropolitan finalized construction plans and issued a contract to an Ottawa firm, Brewder and McNaughton, to build a power house. Yet, six months later, Brewder and McNaughton halted the construction and withdrew from the contract arguing that the payment for the work was inadequate.[9] The directors of the Metropolitan reconsidered their Ottawa venture. In this city, the Metropolitan had to compete not only with the Ottawa Electric Company, but also with the Deschenes, which having rights to several lots on Britannia, sued Metropolitan for damages. Moreover, the Metropolitan officials realized that even if they completed the plant, they could not afford to construct a

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[6] The relationship between Ahearn and Laurier was indeed close. Mackenzie King recalled in his journal, for example, that Ahearn financed the purchase of Laurier's house, which was later left to King. National Archives of Canada (NAC). See *The Diaries of William Lyon Mackenzie King*, 16 January 1923, p. 16.

[7] NAC, MG26 G, Sir Wilfrid Laurier papers (SWL), Vol. 79, p.19409-19410, Ahearn to Laurier, including a copy of Ahearn's letter to Fraser, 28 June, 1898; Vol. 105, p.31624, Ahearn to Laurier, 23 March 1899.

[8] *Canadian Electrical News* (January 1899):16, see also "Metropolitan Electric Company," *Canadian Electrical News* (June 1901): 93.

[9] *Canadian Electrical News* (April 1899): 76, (October 1899): 226.

distribution system. The company therefore began merger talks with the Ottawa Electric Company, but these negotiations collapsed because of personality conflicts. The Metropolitan, although it renewed its municipal charter, consequently abandoned its plant.[10] Once again, the Ottawa Electric Company enjoyed near total control over the Ottawa market.

4.2 Creation of the Consumers' Electric Company.

The city tried in vain to control the Ahearn and Soper monopoly by granting charters to anyone willing to enter the electrical business in Ottawa.[11] In addition to Metropolitan and Deschenes, Independent Electric also unsuccessfully attempted to establish services in Ottawa.[12] Finally in 1901, the Council granted a charter to the Consumers' Electric Company. The Consumers' was created by J. W. McRea, who for many years had served on the Board of Directors of the Ottawa Electric Railway

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[10] NAC, MG28-III26, Bronson Papers (BP), Vol.706, Street to Henderson, 29 March 1904, see also *Canadian Electrical News* (November 1899): iv.

[11] Small electric businesses could not compete with Ahearn and Soper's empire and the sector was growing very slowly. In 1895-96 Ottawa was home to one supplier of electric equipment, not connected to the Ottawa Electric Company, one electrical engineer, and five electricians. In 1905 there were only eight dealers of electric supplies, 12 electrical contractors and eight independent electricians. See *Ottawa City Directory* (Ottawa: Might Directories, 1895/6, 1905). Ahearn and Soper would not allow for any serious competition in the city. For example, Ahearn vigorously lobbied Westinghouse to establish a plant in Canada, and then he became its first director, but he did nothing to bring this business to Ottawa. SWL, Vol.247, p.68871, Ahearn to Laurier, 2 January 1903; Vol.264, p.73019, Ahearn to Laurier, 9 May 1903, and Vol.264, p.73141, Ahearn to Laurier, 11 May 1903.

[12] COA, Report no. 5 of the Railway and Light Committee, Minutes of the City Council, 23 April 1901.

Company. After a disagreement with Ahearn and Soper, McRea had left the OER to compete against it. With financial help from the Hull Electric Company, McRea incorporated the Consumers' Company and approached Ottawa City Council with a request for a municipal charter and a permit to construct an electric plant in Ottawa.[13]

The franchise granted to Consumers' included a clause prohibiting it from selling its assets to or merging with, any other power generator or distributor, while authorizing the city to purchase Consumers' at any time during the next twenty-three years.[14] The company was required to deposit $2,000 to ensure that it would comply with this clause. The rates for incandescent light were set at 10 cents per ampere hour, with a 35 percent discount on accounts paid within fifteen days. The illumination of the commercial establishments was priced at $5.50 per year for sixteen candlepower or at 11 cents per light per week. Arc lighting was to be provided at 18 cents per light per night. The company was also required to offer a discount to small stores and offices that did not use lots of energy during the day. The city wanted to ensure that small customers, hitherto neglected by the Ottawa Electric Company, could now find a provider of electricity. The Ottawa Electric Company was soon forced to lower its charges to compete.[15]

Since the OEC could not purchase or merge with Consumers', it did all it could to

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[13] *Loc. cit.* J. W. McRea died suddenly in December 1901, but the city continued to deal with his Quebec supporters. In 1901, the Hull Electric applied for a federal charter and in 1902 reincorporated as the Ottawa and Hull Power and Manufacturing Company.

[14] COA, Report no. 2 of the Railway and Light Committee, Minutes of the City Council, 1 February 1901.

[15] *Loc. cit.*

interfere with its services. In 1902, both companies engaged in the "Battle of the Electrics. " The OEC prohibited Consumers' from using its poles because, it contended, the additional wires would overload the posts, causing fires and power outages. The residents of Ottawa followed this battle with bemusement.[16] Apparently they were used to the tangles of electric wires hanging around the city and no longer fretted about the safety of the electric distribution system. A year later, after Consumers' had established a small but sound base of subscribers, the companies carried on a "rate war," lowering prices and increasing discounts to attract new customers.[17] It became common practice for the residents of Ottawa to go back and forth between the two offices at the expiry of a contract to negotiate a better deal. Even though a potential competition was established in Ottawa, in reality low prices set by the city and constant aggressive competition on the part of the Ottawa Electric Company, which enjoyed a stronger financial base, seriously retarded the growth of the Consumers'. Its power production was nominal and list of subscribers short. Even so, Ahearn and Soper grew impatient with the situation and by 1904 were ready once again to use their political allies to overcome the legal obstacles to purchasing Consumers'. In retaliation, the City Council renewed its agitation for municipal ownership, even though an 1899 amendment to the Municipal Act (Conmee

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[16] "Ottawa Electric v. Consumers Co.," Evening Citizen, 15 January 1902, and "Battle of the Electrics," Evening Citizen, 16 January 1902.

[17] "Rate War," *Canadian Electrical News* (February 1903): 31. Even though the city wanted to support the Consumers', the Ottawa Electric Company was always able to offer lower prices, forcing the city to renew its contracts. For example, Consumers' offered to illuminate the streets for $980 per year; the Ottawa Electric priced its services at $875 dollars and obtained the contract. See COA, Report No. 9 of the Property Committee, Minutes of the City Council, 1903.

Act), made the issue more difficult. It required all municipalities to acquire the existing private power companies before they could establish publicly owned service. Moreover, the provincial Liberal government of George William Ross did not support the public ownership movement, arguing that electric power was only available to a small proportion of population and therefor could not be defined as public good.[18]

4.3 Ottawa Electric Company's Struggle to Maintain its Monopoly on Power.

By the end of 1904, Thomas Ahearn was disillusioned and angry with the municipal politicians, who, in his opinion, impeded the city's progress.[19] The relationship between the Ottawa Electric Company and the City Council was as strained as ever. The councillors suspected that Ahearn and Soper were preparing to either take over Consumers' or to force it out of business. Instead, in 1904 Ottawa Electric, abruptly ending the price war, requested permission to increase its rate from 0.36 cents to 0.75 cents per ampere hour. But the company franchise allowed it to raise charges only if it were obliged to bury its overhead wires. To circumvent this proviso, the Ottawa Electric lobbied its friends on Council to introduce a motion asking it to install a small number of wires underground, not enough to require any substantial investment on the part of the OEC, but enough to permit it legally to raise its prices. But the majority on City Council

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[18] On the Liberal position on the electric power see H.V. Nelles, *The Politics of Development* (Toronto : Macmillan of Canada, 1974): 237-247.

[19] SWL, Vol. 354, p. 94563 to 94564, Ahearn to Laurier, 7 February 1905.

saw through the scheme and quashed the motion.[20]

Ahearn and Soper then appealed to the federal government, still in sympathetic Liberal hands, for three major changes to its charter. First, Ottawa Electric applied for an increase in its capital stock to $1,500,000 and a consequent extension of the company's borrowing powers on bonds from 50% to 75%, and on paid up stock from 20 percent to 50 percent. The company argued that the population of Ottawa had grown considerably since its charter had been granted in 1894; the company therefore needed more financial resources. This was a sound argument, not unusual on its own. However, the Ottawa Electric also appealed to the Dominion to waive paragraph 'd' of section 7 of the company's charter limiting its power to acquire another business. The paragraph stated that the Ottawa Electric could only purchase the stock of other companies in regard to "goods, wares or merchandise sold to such other companies in the ordinary course of business."[21] The removal of the clause would allow the OEC to purchase the entire operations of Consumers' and the newly raised capital would finance the acquisition and the reimbursement of any penalties that the City might impose on the shareholders of Consumers' for violating their undertaking not to sell out to the OEC. The OEC's petition was submitted in form of a private bill to the Secretary of State R.W. Scott, who forwarded it to Sir Albert Earl Grey recommending "and praying that His Excellency the Governor General may sanction any Act that may be passed for the purposes of the

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[20] BP. Vol. 667, File 307. Clippings from various newspapers.

[21] Canada. Parliament. House of Commons. *Official Reports of the Debates of the House of Commons of the Dominion of Canada.* (Ottawa : King's Printer [etc.], 1904): 4186. Debates on 3 June 1904. Hereafter cited as Commons, *Debates*.

company."[22]

Suddenly, the municipal politicians, and particularly Mayor J. A. Ellis, a Conservative, a supporter of Sir James P. Whitney, and a strong proponent of the municipal ownership, realized that they were faced with imminent defeat.[23] Ellis filed a protest and presented the Parliament with letters explaining Ottawa's objection to the amendments as well as *true* intentions of the Ottawa Electric Company.[24] He also enlisted the cooperation of a Conservative M.P., Thomas Birkett, who represented the city in the House of Commons. During the reading of the Ottawa Electric Bill, Birkett argued that the company was not giving its true reasons for the request to increase stock, and implied that the OEC was preparing to take over the Consumers'.[25] Several members of Parliament, who supported the city's position, pointed out that granting the rights without charter limitations would create a precedent, which might lead in future to the creation of large trusts.[26] M.P. Maclean called the Ottawa Electric's request a "very

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[22] NAC, RG6, Secretary of State Series, A-1, Volume 114, File 1404, McCracken and Henderson. Petition of the Ottawa Electric Company for an amendment to their act of incorporation.

[23] BP,Vol. 667, File 307, Clippings from various newspapers. Conservatives, led by James P. Whitney, while in opposition during the reign of Liberals in Ontario and strongly lobbied by manufacturers, supported public ownership of power generation and distribution. The election of Whitney's government in 1905 opened the door for a creation of public electric plants. See H.V. Nelles, *The Politics of Development*, 256-306.

[24] Commons, *Debates*, 3 June 1904, p. 4188.

[25] *Loc. cit.*, p. 4180.

[26] *Loc. cit.*, p. 4189. A year earlier the same power had been granted to the Canada Atlantic Railway and to the Dominion Gas Improvement Company, without any protests from Members of Parliament making this argument invalid.

obnoxious Bill, and one that ought not to be passed" proclaiming the issue of public ownership "a new evangel of this century."[27] The Company was accused of "shining lights in Ottawa society" and giving "a certain number of dinners every session, and in that way [thinking] they can get any legislation they desire in this country in the interests of monopolies."[28] The Bill was disputed so vigorously that Ahearn and Soper had it sent to the Private Bill Committee, to wait until interest in it had become less intense.

4.4 Purchase of the Consumers' and Creation of a Municipal Plant.

In January 1905, the Ottawa Electric Bill was reintroduced to the House of Commons.[29] This time Thomas Ahearn personally worked on the details involved in its introduction to Parliament. He decided that the Ottawa Electric Company's Bill No. 12 should be referred to a Special Committee that would be sympathetic to the company's interests. He asked Prime Minister Laurier to introduce a necessary motion and suggested in a private letter to Laurier's office that:

> When our bill no. 12 is called in the House of Commons Sir Wilfrid might state that as some of the provisions of this bill had been the subject of much criticism he had thought it desirable that the bill should receive further consideration at the hands of a special committee, and would name the following to compose this committee and thus avoid taking up the time of the House with a prolonged discussion that this bill would seem to invite.[30]

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[27] Idib., W.F. Maclean, 6 June 1904, p.4218, 4220

[28] *Loc. cit.*, p. 4222.

[29] Commons, *Debates*, 31 January 1905, p. 316-317.

[30] SWL, Vol. 357, p. 95218, Ahearn to Laurier, 28 February 1905.

To this letter Ahearn attached a list of committee members whom he wished to see appointed. The next day, Laurier addressed the House of Commons stating:

> I do not know much about the Bill, except from what I have read about it casually and from a cursory reading of the Bill itself. I understand that the Bill has merit, but also that the provisions go much further than the city of Ottawa would like.... In view of the strong opposition made by the city of Ottawa, which is very much interested in the Bill, it has been suggested to me, and I make that suggestion to the House, that, instead of proceeding with the bill, the order be discharged and the Bill be referred to a special committee to be composed of Messrs. Fitzpatrick, Haggart, McIsaac, Monk, Galliher, Bergeron and Dugas.[31]

As Ahearn wished, the Bill was referred to a Special Committee composed of his supporters. Mayor Ellis meanwhile personally canvassed every member of Parliament to dismiss the Bill. He even enlisted the help of the city of Toronto, which appealed to the House of Commons to reject the OEC's petition.[32] However, many M.Ps perceived Ellis's attempts as a reflection of Mayor's personal views and not necessarily the opinion of the Ottawa City Council. In fact, the City Council as a political entity never addressed the Dominion Government on the issue.[33] In the end, the Bill no. 12 was passed with an amendment to its section five to assert that "nothing in this Act contained shall be construed as prejudicially affecting any of the rights of the municipal corporation of the city of Ottawa under its existing franchise agreements with the company and the

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[31] Commons, *Debates*, 1 March 1905, p. 1888.

[32] NAC, RG6 , Secretary of State, Series A-1, Volume 117, File 525, Thomas Caswell. Petition of the Corporation of the City of Toronto praying that Bill No. 12 relating to the Ottawa Electric Company may not be assented to.

[33] Commons, *Debates*, 6 June 1904, p. 4226.

Metropolitan Electric Company, Limited, and the Consumers Electric Company, Limited, or either or any of them."[34] The Act also raised the Ottawa Electric capital stock and borrowing powers as requested and eliminated paragraph "d", section 7, in order to authorize the OEC to purchase other companies – such as Consumers'.

Mayor Ellis had lost his battle in the Parliament. Initially, he attempted to negotiate a deal with Ottawa Electric to keep the price of electricity steady. Yet he soon realized that the only way to control the monopoly was to acquire Consumers' before the Ottawa Electric Bill was signed by the Governor General and the OEC absorbed its competitor. The purchase plan was not simple; to accomplish it, the Mayor needed not only the cooperation of the aldermen, but most of all, the support of taxpayers. In 1894, the Ontario Legislature allowed the city to collect $250,000 for the acquisition of an electric plant, but the ratepayers had to authorize the council to issue debentures to the amount of the purchasing price, which was set by Consumers' at $200,000.[35] The public referendum on the matter was set by the city for 18 May 1905.

Mayor Ellis and Alderman Black, his main supporter, proposed a bylaw to enable the city to rase taxes to purchase the Consumers' plant. But the aldermen were divided on the issue; the proceedings turned into arguments and even mutual insults. Alderman

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[34] *Loc. cit.*, 27 March 1905, p. 3201, see also BP, Vol. 667, File 307, Clipping from various newspapers.

[35] OCA, Minutes of the City Council, 17 April 1905. Because of the strong competition with the Ottawa Electric Company, the Consumers' remained a small business. It employed one electrical engineer and four labourers in the transformer station. Other four workers were employed in the collection office and 12 men worked on lines. The operation was small enough for the city to manage without large additional resources and costs.

Grant was outright opposed; Aldermen Askwith and Davidson proposed that the city establish a special committee to investigate all the water power sites of Ottawa before recommending a purchase. This motion was dismissed by Ellis and Black as an attempt to delay the vote on the municipal ownership to the OEC's advantage. "Alderman Askwith is a good alderman" – commented Black, during the City Council meeting – "Of course Ald. Askwith does not take his inspiration from the Electric Co. But if Ald. Askwith were a bad man and took his inspiration from Messrs. Ahearn and Soper he could not better serve their interests than he does with these motions."[36]

With such strong disagreements among the City Council, the Mayor decided to win the issue of the municipal ownership on the public forum, and with the cooperation of P.D. Ross, the editor of the Ottawa Journal, he conducted a vigorous campaign against the Ottawa Electric Company.[37]

Ellis and Ross used the semantics of power as a public good, threatened by greedy capitalists who intended to usurp what justly belonged to the people, while the Journal

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[36] *Loc. cit.*

[37] The plan to buy out the Consumers' was prepared by Alderman Black and Mayor Ellis. See "Property Owners Sanctions the Purchase," *Ottawa Evening Journal* 19 May 1905. In his paper on the history of the electric power in Ottawa, Askwith contributed the idea to P.D. Ross, who convinced Ellis not to deal with the Ottawa Electric. Ross certainly played an important role during the referendum and for many years served as a director of the Ottawa Hydro Electric Commission. However, there is no indication in his personal papers or diaries that he came up with the acquisition plan. See COA, F. Askwith, *A Historical Sketch of the Electrical Utility Industry in the Ottawa Area*, and NAC, MG 30 D98, P.D. Ross Papers (PDR), Journal, Vol. 1905.

did its utmost to discredit the aldermen who opposed the referendum.[38] The Evening Journal suggested that Askwith "manages frequently to get into very dubious company in the city council."[39] Grant was presented as "one of the worst aldermen this city has ever had – worse than the average alderman who may lack principle."[40] The seven politicians who opposed the city's bill were accused of working for the electric interests against the public good.

While Ahearn and Soper did not respond to any of the insinuations, Bronson took a public stand. In a memorandum addressed to the citizens of Ottawa, sent to the Evening Journal and the Ottawa Free Press, he responded to the accusations against the Ottawa Electric Company.[41] First, Bronson ridiculed the city's notion of "an alleged monopoly that ensures to the citizens of Ottawa probably in perpetuity the cheapest electric service upon the continent, and a service equal to the best in point of efficiency?"[42] He denied that the OEC enjoyed a monopoly, as it had to compete with the Ottawa Gas Company.

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[38] P.D. Ross was appointed as one of the first directors of the Ottawa Hydro-Electric Commission and enjoyed his position for almost two decades, yet as soon as the Ontario Liberals returned to power in 1934, he was dismissed in rather strange circumstances. Apparently, someone claiming to represent Ross, approached Stewart Lyon, the chairman of OHEC, offering Ross's resignation. The resignation was accepted and made official despite Ross's protests that he did not authorize anyone to make such statements on his behalf. Dr. R. H. Parent, a Liberal and a medical officer of the Ottawa Electric Company, was appointed in his place to the Ottawa Hydro-Electric Commission. See PDR, Vol. 2, File 13,

[39] "Some Aldermen," *Ottawa Evening Journal*, 19 April 1905.

[40] *Loc. cit.*

[41] BP, Vol. 667, File 307

[42] *Loc. cit.*

Bronson pointed out that the price of 0.39 cents per ampere hour was lower than the franchise rate set by the city. Next, he denied that the company was planning to increase its charges by $150,000 per year for street lights as alleged by the mayor, although he did admit that the contract price might go up by as much as fifty thousand dollars. Bronson strongly objected to "watered stock" allegations, stating that the company's finances were in excellent shape and that its properties, virtually free of a mortgage, carried high equities. Finally, Bronson advised Ottawa's business elite that the Council was responsible for market instability and the slow economic development of the city. He insinuated that the municipalization of electric industry was a first step to socializing other businesses such as retail.

Bronson's statement was reinforced by a letter from Daniel O'Connor, a well-known and respected businessman, who did not hold any interests in the electric industry, but as an owner of large properties he had a big stake in the vote. In his address O'Connor asked three questions: Do we need civil lighting? Can we afford it? And should it be paid for by property owners? In each case, his answer was no. The city already enjoyed a well established and inexpensive street lighting system, and comparatively few people used electricity in their private homes or small businesses. Moreover, light was a commodity, not public good, therefore, in O'Connor's opinion the taxpayers should not be forced to pay for street illumination.[43] O'Connor implied that the city was hiding the actual cost of purchasing and operating an electric plant. The bylaw, he argued, on which the property owners were asked to vote, referred to $200,000 dollars,

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[43] *Loc. cit.*

when in fact the city had already applied to the Ontario government for a loan of an additional $300,000, which would bring the total price tag for a municipal lighting system to $500,000.

The statements by Bronson and O'Connor caused a stir among the residents: letters poured into the local press.[44] The Board of Trade voiced its objection to the City Council's involving itself in a business matter. The federal Minister of Justice called on the city to withdraw the deal, while a local cleric, Reverend R. J. Hutcheson, loudly condemned both the greed of corporations and the dishonesty of the public servants. Throughout the campaign, it seemed that the editors of the Ottawa Journal and the Ottawa Free Press had lost balance in their coverage of the controversy. While Ross depicted Ahearn and Soper as the enemies of the city, Alfred Woods, the owner of the Free Press rejected any excuse for the city's venture into the business world.[45] The Ottawa Free Press suggested that the Mayor "led the city to further disasters," and that "capital need not seek investment in Ottawa with any hope of security from attack." The paper even suggested that "the root of the evil is centered in the City Hall."[46]

The Ottawa Citizen took a more even approach to the problem. The Citizen focused on capitalist culture, which required a certain business behaviour and made

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[44] *Loc. cit.*.

[45] SWL, Vol. 375, p. 99873 to 99876, Ahearn to Laurier, 2 July 1905. Accused of manipulating the editorial in the Free Press, Ahearn denied having any influence over the paper; still, he admitted lending between $16,000 to 20,000 dollars to Alfred Woods, the owner of the newspaper. Even this generosity could not save the Ottawa Free Press and by the end of 1905 it had been taken over by P.D. Ross.

[46] BP,Vol. 667, file 307.

profits the ultimate goal of a company. While the journal praised Ahearn and Soper's excellent managerial skills and contribution to the industrialization of the city, W. M. Southam suggested that electric power generation and distribution had ceased to be simply a business endeavor and had become a matter of public good. Electricity was no longer a commodity that could be sold and purchased, but a service and necessity that should be collectively and publicly controlled. Since the Ottawa Electric Company had only 275 shareholders and there were thousands of possible users of electricity in the city, the "greatest good [was] to the greatest number."[47]

On 18 May 1905, 3313 property owners in Ottawa cast their vote. 1883 ratepayers supported the municipal purchase of the Consumers' plant, 1430 decided against it, and almost three thousand eligible voters did not come to the polls. Still, the number of participants was the largest in any referendum held by the City Council up to that date, and reflected the energy and enthusiasm put into the campaign by the municipal politicians, the press, and the Ottawa Electric Company.[48]

Defeated, Bronson and Ahearn looked for various options to protect their interests.[49] The Ottawa Electric Company now offered to administer the Consumers' for the city at cost plus 7 percent dividends on its capital stock. The OEC asked that during the term of the agreement no other company receive a concession for electric lighting,

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[47] BP, Vol. 667, file 307. A few years later W. M. Southam married Lilias Ahearn, Thomas's daughter.

[48] Editorial, Ottawa Citizen, 19 May 1905.

[49] BP, Vol. 697, Bronson to Ahearn, 9 June 1905

power distribution, waterworks, or installation of meters in Ottawa. This option would allow Ottawa Electric to accumulate sufficient financial reserves to buy the plant from the city in a few years. In case this offer was rejected, the second deal was designed by Ahearn himself.[50] He suggested that the Ottawa Electric Company manage the plant and the distribution system of Consumers' and so provide full electric services to the city for $12.50 per horse power for the next ten years. Once this agreement was signed, the OEC would again benefit from a total control over the electricity market in Ottawa. Both options were unacceptable to a majority of the City Council. Although Bronson was keen to negotiate, neither Mayor Ellis nor Ahearn and Soper were willing to compromise. The city intended to manage its own plant in competition with the Ottawa Electric.

Ottawa officially took over the Consumers' Electric Company's plant and contracts with 1,359 customers on 18 July 1905.[51] The company was placed under the supervision of J. A. Ellis and the Municipal Electric Department. To decrease contract obligations, all the accounts in arrears or not profitable were cancelled. The city also dismissed an electrical engineer who had been employed by the Consumers' and engaged the Underwriters Association to inspect and supervise the entire operations. This novel move was fiercely criticized by the electric industry, which did not believe that underwriters had enough practical knowledge, as short sighted and even disastrous.[52]

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[50] *Loc. cit.*

[51] OEC, Vol.5, File 1, J. A. Ellis, Report on Municipal Electric Plant, 2 December 1905.

[52] "A Short Sighted Policy," *Canadian Electrical News* (May 1906): 107.

In December the Mayor notified the Ottawa Electric Company that its contract with the city, worth approximately $26,000 per year, would be terminated upon a two-year notice.[53] The notice allowed the Council to resolve a power supply problem; since the city dare not risk a lawsuit from the OEC by entering into a direct agreement with the Ottawa and Hull Power and Manufacturing Company, on 31 July 1907, the Council arranged a purchase contract with the Hull company through the Hydro-Electric Power Commission of Ontario, becoming one of the first municipalities to joint the Commission.

The relationship between the Municipal Electric Department and the Ottawa Electric Company was, contrary to initial concerns, quite civil. Shortly after J.A. Ellis took over Consumers' he met with the officials of the Ottawa Electric to advise them that the city intended to run a profitable business but would set its prices at a competitive level. Ottawa Electric and the city thereafter shared poles for a nominal fee of $1.00 per year, and exchanged lists of delinquent clients. Although, its rates did not increase, the returns of OEC actually went up after 1905, partly because the company was finally able to afford dividends, withheld after 1900, but also due to stabilization of the market in the city.[54] In 1906, the Ottawa Electric Company further strengthened its economic position by consolidating with the Ottawa Gas Company as Ottawa Light, Heat and Power Company, which serviced the city for more than forty years.[55]

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[53] COA, Minutes of the City Council, 6 November 1905 and 18 December 1905.

[54] OEC, Vol.5, File 21, Hydro-Electric Enquire Commission, 12 March 1923.

[55] *Ottawa City Directory* (Ottawa: Might Directories, 1907)

4.5 Conclusion.

Because of the strong political position of its directors, the Ottawa Electric Company enjoyed a monopoly in the city between 1894 and 1905. Through their network of interrelated companies, Ahearn and Soper dominated the entire electric industry in Ottawa. However, unable to produce surplus power, and unwilling to allow any competition, the two entrepreneurs retarded the industrial growth of the city. For ten years, municipal politicians tried to control the monopoly through regulatory contracts, but these were not sufficient once the OEC no longer had to fear private competition. The situation in Ottawa thus conformed to the national pattern described by John R. Baldwin, who demonstrated that the cities, faced with capitalists' opportunistic behaviour, recognized in the early 20th century the need for new regulatory instruments – that is, for municipal ownership.[56] Carman D. Baggaley showed further, that in Ontario, the return of the Conservatives to power in 1905, and the rising public power movement forced the province to move toward the public-ownership as a new way to regulate the market.[57] The changing social attitudes toward monopolies and presence of the Conservative government in Toronto made it possible for Ottawa to purchase the Consumers' Electric Company plant and control the power monopoly through establishment of a municipal electric system.

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[56] John R. Baldwin. *Regulatory Failure and Renewal: The Evolution of the Natural Monopoly Contract* (Ottawa: Canadian Government Publishing Centre, 1989):83-93.

[57] Carman D. Baggaley, *The Emergence of the Regulatory State in Canada, 1867-1939* (Ottawa: Economic Council of Canada, 1981): 212-243.

CHAPTER 5

CONCLUSION

The acquisition of a municipal plant in 1905 delimited the first era in the history of electrification of Ottawa. During its first quarter century the electrical system was an example of – to use John Law's phrase – "heterogeneous engineering."[1] That is to say, not only were the builders and shapers of the electrical system a diverse lot – as likely to be judges and politicians as technologists and capitalists – but also the most important entrepreneurs, namely Thomas Ahearn and Warren Y. Soper, had to perform many different roles themselves; they were politicians, sociologists, managers, entrepreneurs, inventors, and word spinners, as well as electrical engineers. They recognized that a public utility needed, above all, political cover, and so they built a powerful political alliance with Erskine Bronson and the Bronson-Crannell family. Erskine Bronson became the key translator, or intermediary, for the electric company in the political forum. With his cooperation and protection, Ahearn and Soper were able to build a strong monopoly, but after his departure from the politics they could no longer sustain their monopoly over Ottawa's power market. Even so, their company dominated that market until modernization of public transit necessitated its sale to Ottawa Hydro in 1948.

The municipal government was the second most important force in shaping Ottawa's early electrical system. It introduced the idea of electrification as a way to

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[1] John Law, "Technology and Heterogeneous Engineering: The Case of Portuguese Expansion," John Law, M. Callon and A. Rip, eds., *Mapping the Dynamics of Science and Technology: Sociology of Science in the Real World* (Basingstoke: Macmillan, 1986):111-134.

redefine the city and regulated the power monopoly through contracts, awards of franchises, and after 1905 the public ownership of an electric plant.

Both the Ottawa politicians and the capitalists strove to impose on residents a meaning of hydroelectricity that benefited their own agenda. The City Council regarded the power as a tool to reshape and boost city's economy and presented it to Ottawans as public good that should be controlled by the municipality. Ahearn and Soper promoted Ottawa as an 'Electric Paradise" in order to reinforce the momentum for the services of their companies. Consequently, the social meaning of electrification in Ottawa displayed interpretive flexibility, but gradually shifted from an expensive and inaccessible novelty to an attribute of urban comfort. By 1905 it had attained what SCOT theorists call "closure" – that is, it was now clearly perceived by Ottawans as a public utility and therefore liable to be municipalized.

Even as the *human* actors shaped the electrification of the city, the process was also being affected by *nonhuman* actors.[2] The electric sinews of Ottawa were beset by its geopolitics: the city's natural resources and the location of the Chaudière Falls on a provincial boundary created reverse salients that impeded electrification and creation of the "natural" monopoly.[3] The Falls were fickle -- problems caused by ice-buildup, flooding, and the fluctuating water head on the Ottawa River, deterred the ability of the Ottawa Electric Company to produce current necessary to protect its service from

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[2] The idea of symbiotic influence of human and non-human actor on technology is discussed by John Law, M. Callon and A. Rip, eds. *Mapping the Dynamics of Science and Technology: Sociology of Science in the Real World* (Basingstoke: Macmillan, 1986):3-15.

[3] It was Thomas Hughes who first applied the military concept of reverse salients (at a front) to the history of technology, replacing the older, less helpful trope of technological "bottlenecks". See his *Networks of Power*, 79-105.

competition and regulation.[4]

Ahearn and Soper used their technical skills to identify critical problems and to harmonize the operation of the technological network. They were extraordinarily innovative when it came to technology. The electric companies in Ottawa interconnected their equipment, experimented with the location of water wheels, and employed auxiliary power to produce more current. Ahearn and Soper not only adjusted American technologies to Ottawa conditions, but they also founded a network of electrical manufacturing companies to produce equipment of their own design.[5] In other words, they provided Ottawa with a basic, exporting industry.

However, Ahearn and Soper learned the truth of the adage that, "within a system, constraints narrow the scope of possible technical solutions, dictating future developments."[6] In Ottawa, the key constraint proved to be the Chaudière Falls. The Falls, a barrier to Ottawa's transportation ambitions, seemed in the nineteenth century to promise an electrifying future in the age of manufacturing.[7] At first its interprovincial

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[4] Chris de Bresson pointed out that electric power generation has been one of the most innovative industries in Canada and the core of country's most important technological complex. See Chris De Bresson and Jim Petersen, *Understanding Technological Change* (Montreal: Black Rose Books, 1987): 91

[5] The electric artifacts produced by the Ahearn & Soper, Inc., the Ottawa Car Company, the Ottawa Porcelain & Carbon, and the Ahearn Electric Heating and Manufacturing Company included street cars, electric locomotives, snow removing equipment, heaters, stoves, lamps, insulators, and motor brushes. The Ahearn & Soper, Inc. still exists, producing computer technologies in Toronto. The Ottawa Car Company (later the Ottawa Car Manufacturing Company, and then the Ottawa Car and Aircraft Company) operated until 1947 as one of the most important Ottawa manufacturers.

[6] De Bresson and Petersen, *Understanding Technological Change*, 83

[7] The growth of electric distribution in Ottawa was very slow. In 1901, 8% of the Ottawa population used electric power; by 1905, the number had increased by only 4%. City of Ottawa Archives, Municipal Electric Company Reports, 1905 - 1915.

location seemed to be an advantage to would-be monopolists, for Ahearn and Soper used it to justify a Dominion charter that put their company largely beyond the city's regulatory reach. But in the early twentieth century, it became obvious that the boundary also meant that the Ottawa Electric Company would never be able to build a unitary system, since competitors, operating on the north bank of the Ottawa River under Quebec law, would always be able to challenge it with immunity. Moreover, the seemingly rich waterpower resources on the Chaudière could not, in fact, provide enough power to sustain the service requirements of the OEC and its clients. In fact, the river's inadequacies kept the public power movement alive in Ottawa, until the creation of a municipal plant became politically feasible possible. Paradoxically, the Falls, while not strong enough to nourish a monopoly, at the end created and nurtured an electric duopoly in Ottawa.[8] The river giveth and taketh.

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[8] The relation between natural resources and monopolistic or competitive organization of industry is explored in Christopher Armstrong and Henry V. Nelles, "Contrasting Development of the Hydro-Electric Industry in the Montreal and Toronto Regions, 1900-1930" *Journal of Canadian Studies* (Spring 1983): 5-27.

APPENDIX 1

PLATES

Plate 1. Map of Chaudiere Islands, c.1880.
Illustrated Historical Atlas of the County of Carleton and Russell.

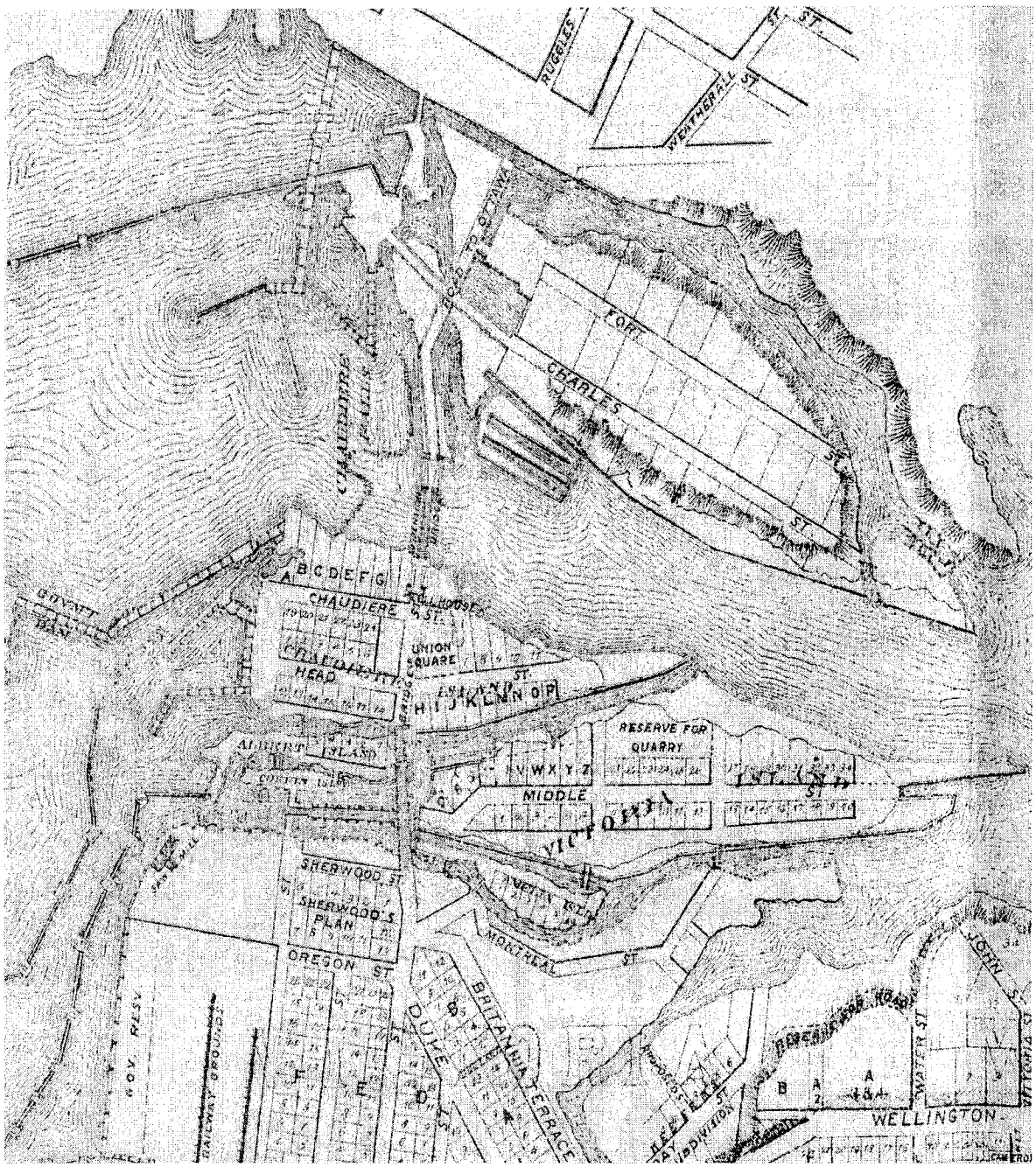


Plate 2. Thomson-Houston arc lamp.
Electrical World (May 2, 1889): v.

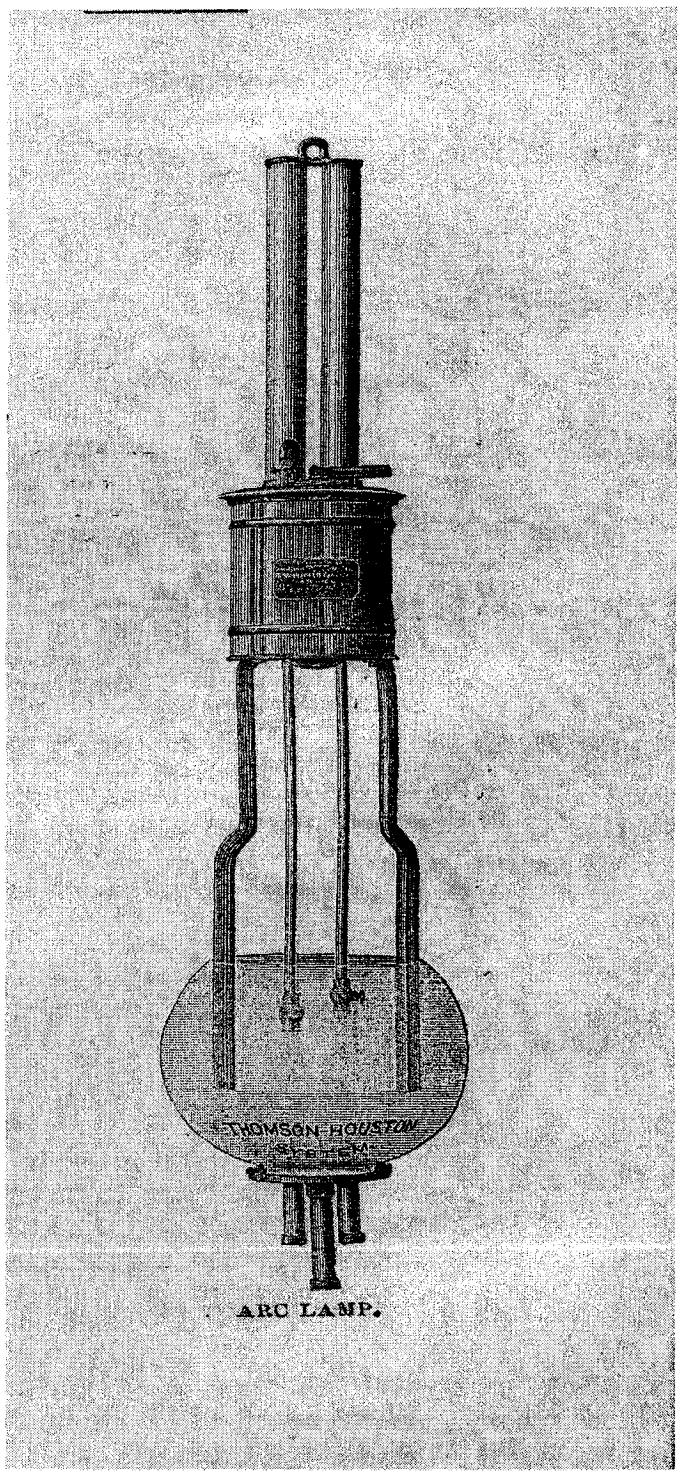


Plate 3. Streets served by the Ottawa Electric Railway and traffic volume by route, c. 1900.

Federal Plan Commission. *Report*, 1915.

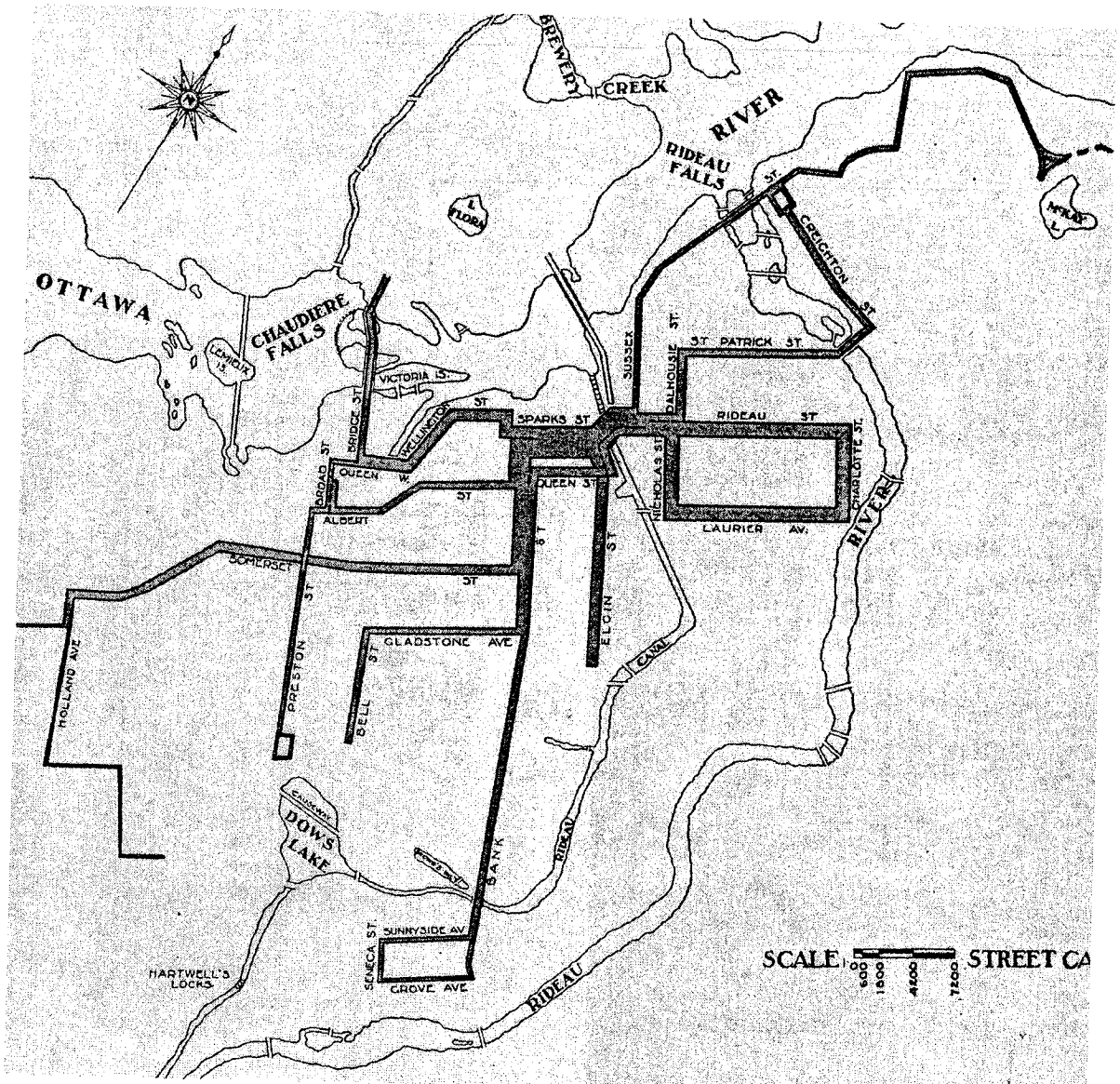


Plate 4. Sweeper no.1 leaving the shop on Albert St.
City of Ottawa Archives, CA-1554

Plate 5. Cover page of the Trolley Car Waltz.
National Library of Canada

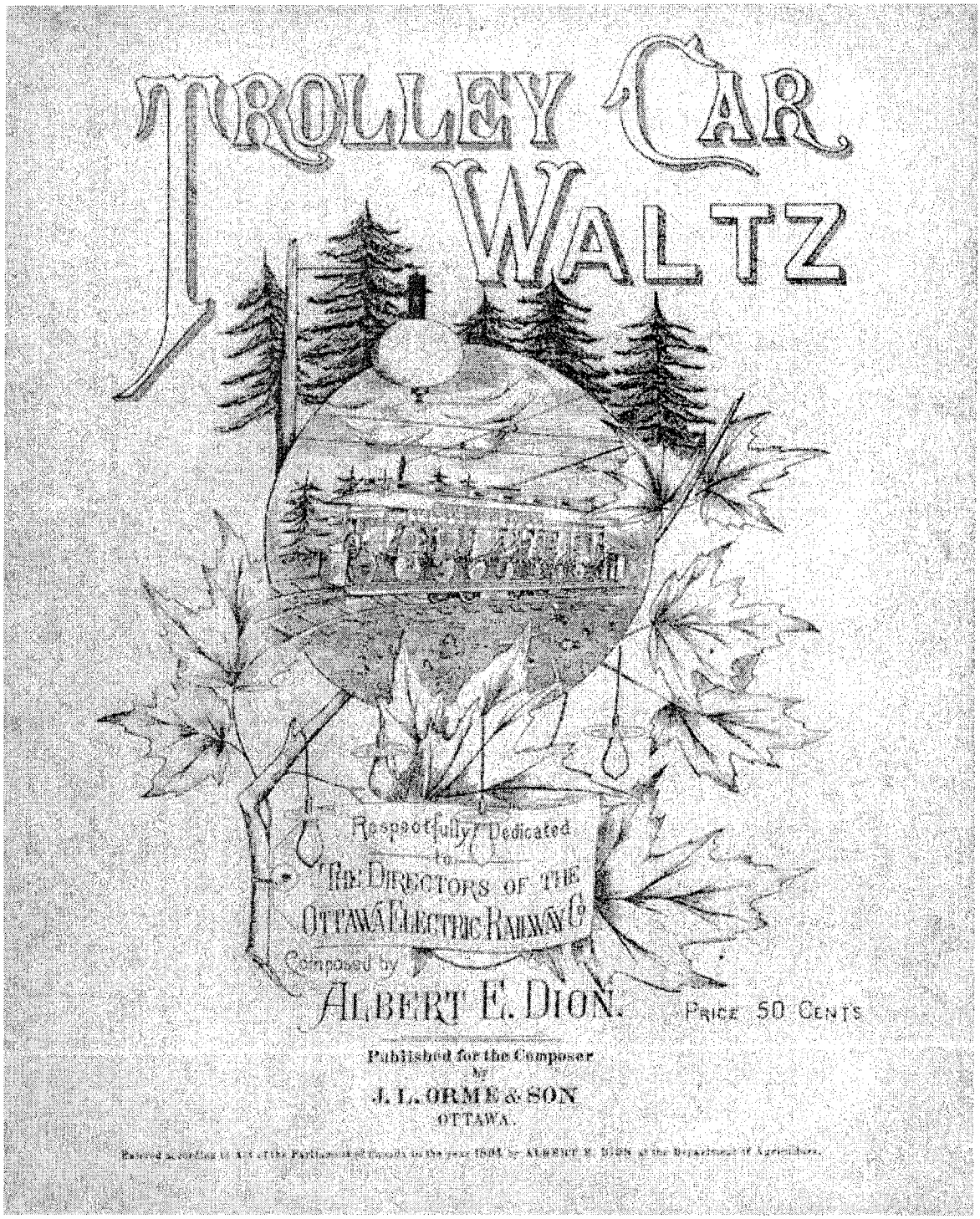


Plate 6. Street lamp on Sparks St., c. 1901.
City of Ottawa Archives, CA-0164

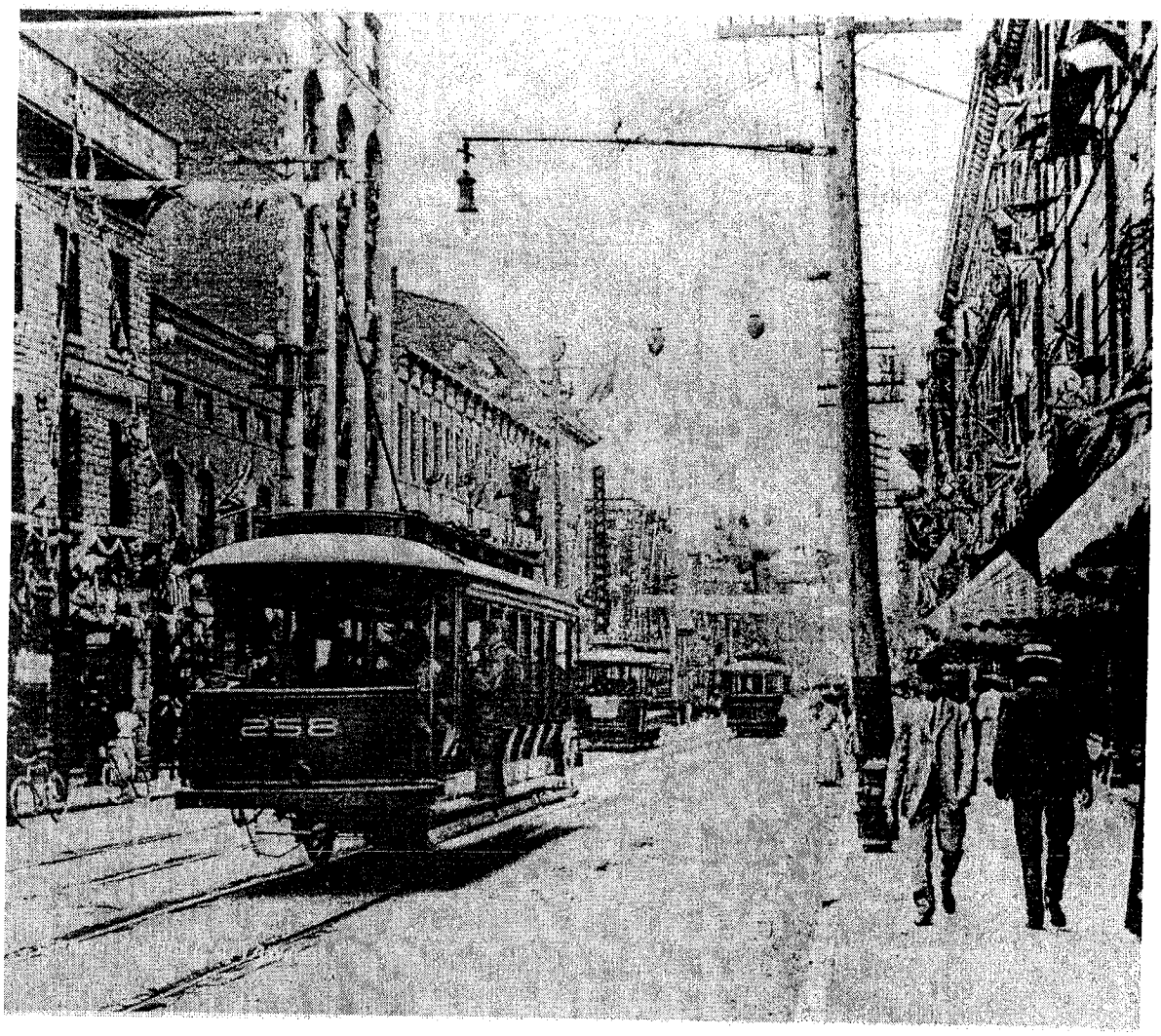


Plate 7. Street lamps on Mooney's Bay, c. 1900.
National Archives of Canada, PA-34464

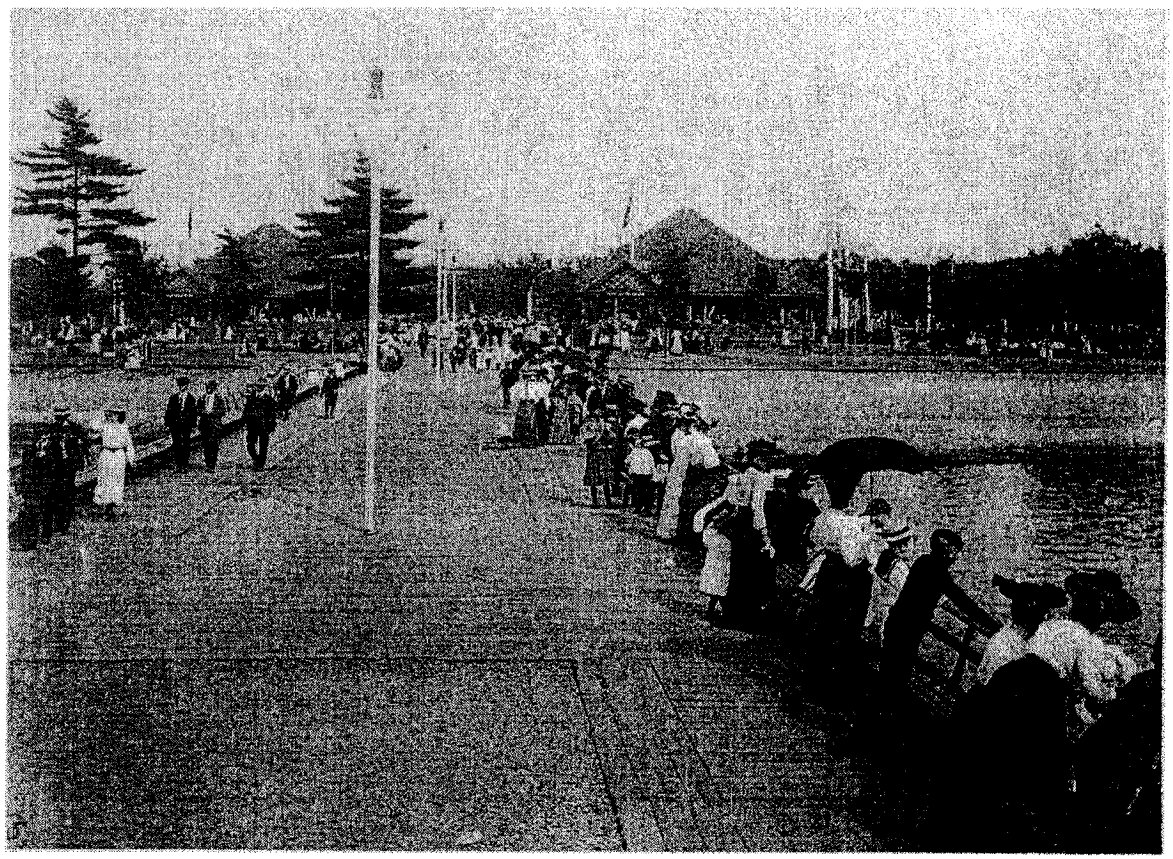
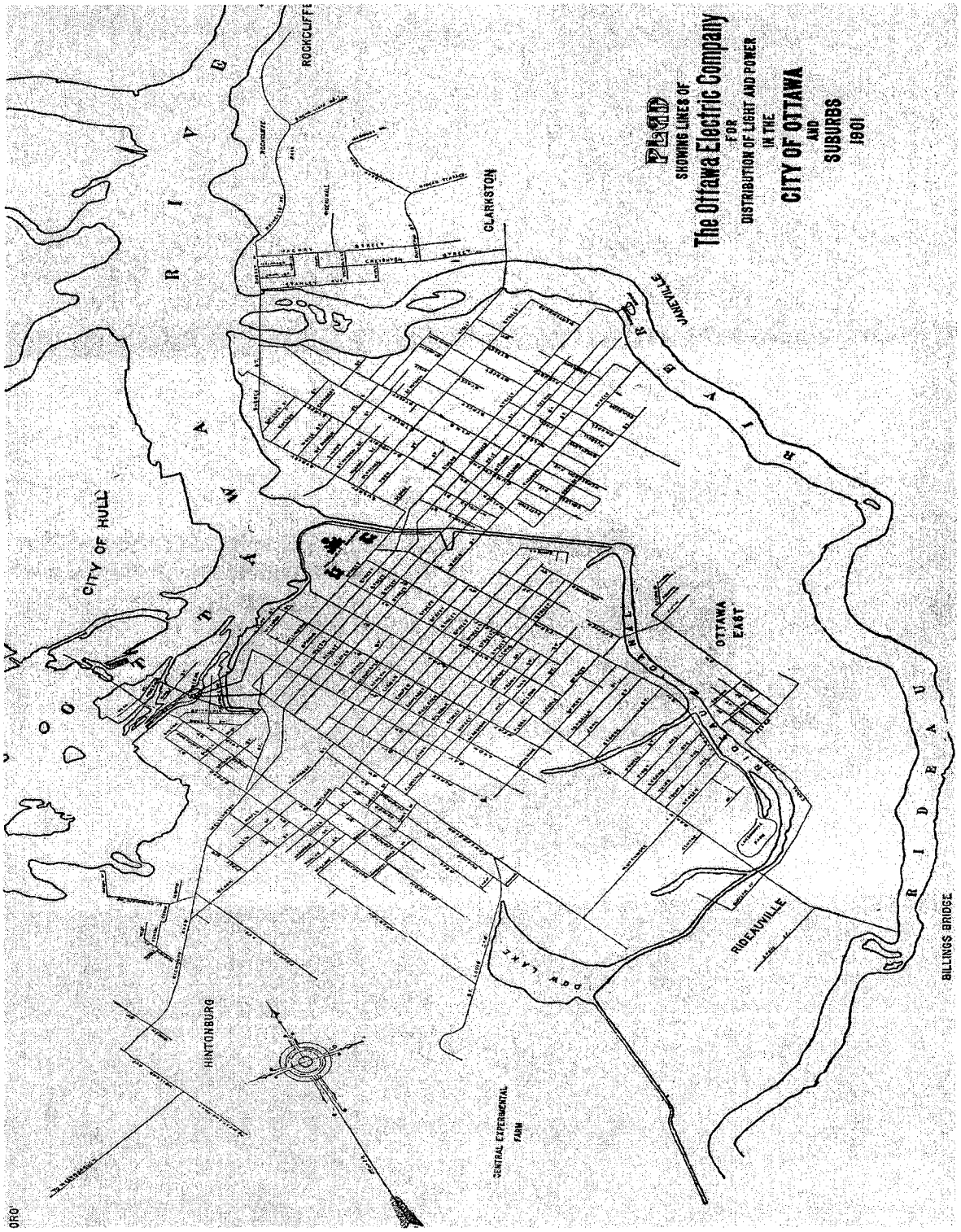


Plate 8. Streets served by the Ottawa Electric Company, 1901
National Archives of Canada, MG 28 III 26, Vol. 867.



APPENDIX 2

TABLES

Table 1. Population of Ottawa, 1880 - 1905.
The Ottawa Public Library. *Ottawa History*, vol. 5

Date	Population
1880	24,025
1885	32,857
1890	43,122
1895	49,674
1900	58,193
1905	65,120

Table 2. Services provided by the Ottawa Electric Company, 1894-1904.
O.E.C. 10th Annual Report.

Date	Number of Customers	Lights Incandescent	Lights Arc	Heaters	Motors
1894	2,720	42,152	440	11	81
1895	3,007	48,797	468	15	81
1896	3,213	53,331	497	19	81
1897	3,354	57,240	550	30	87
1898	3,569	63,113	599	32	96
1899	4,056	77,255	621	23	103
1900	4,357	87,114	644	23	103
1901	5,208	93,207	650	17	133
1902	5,820	104,407	752	24	157
1903	6,141	114,133	887	30	163
1904	6,757	126,657	986	30	186

Table 3. Ottawa Electric Company financial data, 1895-1905.
NAC, BP, Vol. 667, File no. 127, "Ottawa Electric Company Memo for Mr. Ahearn."

Date	Capital	Reserve	Bonds	Dividends
1895	645,000	48,820	320,000	8% 51,600
1896	645,000	48,820	320,000	8% 51,600
1897	645,000	48,820	320,000	8% 51,600
1898	697,800	61,340	320,000	4% 26,097
1899	765,800	75,000	320,000	6% 44,653
1900	781,800	100,000	320,000	4 ½ % 34,799
1901	926,934	100,000	460,000	
1902	1,000,000	175,000	500,000	
1903	1,000,000	225,000	500,000	2% 20,000
1904	1,000,000	275,000	500,000	
1905	1,000,000	325,000	500,000	

Table 4. The division of the water resources on the Chaudiere Falls.
City of Ottawa Archives. Ottawa Electric Company files.

Owner	Portion of the Chaudiere water resources
Ottawa and Hull Manufacturing Company	20/60ths
E. B. Eddy	10/60ths
J. R. Booth	10/60ths
Bronson family	5/60ths
Ottawa Power Company	5/60ths
Ottawa Electric Company	3/60ths
Ottawa Electric Railway Company	3/60ths
Ottawa Investment Company	1/60th
Crown / Unassigned	3/60ths

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Henry Morris Byllesby R7328-0-2-E
National Capital Commission 1883-1939. R1181-0-2-E
Ottawa Electric Company MG28 II26
Ottawa Improvement Commission R1181-10-5-E
Ross, Phillip Dansken R2236-0-7-E
Sir Wilfrid Laurier Papers MG26 G
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