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The Montreal Exhibition Building and Museum, 1860: a Monument to Pre-Confederation Canadian Economic Nationalism

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ABSTRACT

The Montreal Exhibition Building and Museum, 1860:
a Monument to Pre-Confederation Canadian Economic Nationalism

Giles Nicholas Chessel Hawkins

This study of the Provincial Exhibition Building and Museum, the "Crystal Palace," built in Montreal in 1860 after the designs of the architect, John Williams Hopkins, aruges that the specifically Canadian political, social and economic conditions which prevailed during the period played a direct role in the decision to construct the building.

The emergence of a "national policy" in the 1850s and 1860s led directly to the creation of the Board of Arts and Manufactures for Lower Canada which undertook construction of the building as part of its legislated mandate to maintain a museum and model room in Montreal and to participate in annual Provincial exhibitions.

The local roots of the Board are traced to the activities, programs and leadership of the Montreal Mechanics' Institute. Before either the construction of Joseph Paxton's "Crystal Palace" in 1851 or the creation of the Board of Arts and Manufactures in 1857, the institute was holding annual industrial exhibitions in Montreal and in the 1850s was lobby for the construction of permanent exhibition buildings in the city.

The creation of the Board in 1857 usurped many of the functions of the Mechanics' Institute and consolidated the direction and promotion of technical education and innovation in industry in the hands of the professional and entrepreneurial class who, as historians of the Canadian economy have argued, were promoting a Canadian nationalism as a vehicle to protect and consolidate their economic power.

The Board undertook the construction of the "Crystal Palace" in Montreal in 1860. It developed a preliminary program for the building, selected the site, sought the necessary funding and engaged the architect. The planning and construction of the building are examined and a reconstruction of the building is proposed.

TABLE OF CONTENTS

CHAPTER I

An Approach to the Study of the Montreal Crystal Palace of 1860

Kenneth Frampton has argued that the Crystal Palace, constructed after the designs of Joseph Paxton, in London's Hyde Park as the venue for the Great Exhibition of the Works of Industry of All Nations in 1851, "was essentially the crystallization of the primary system of production and distribution, identical in its paleotechnicity to the cast iron lathes and rolling stock that were displayed within its machine hall. . . ."[1] Yet, while the building so completely and so successfully embraced the techniques and the materials of the new industrial age in its physical form and construction, it was also an ideological statement, an architectural testament to the power and presence of the industrial capitalist class which was consolidating its position as the new ruling class in mid-nineteenth century Victorian Britain.

The Crystal Palace represented much more than the triumphant application of the new engineering technology and of the latest

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[1] Kenneth Frampton, "Industrialization and the Crises in Architecture" Oppositions 1 (September, 1973), 65-67.

advances in metallurgy and glass manufacturing to architecture for the thousands of men, women and children who streamed through its doors and over its galleries in the summer and fall of 1851. It was a totem, a ritualistic object, which at once embodied and justified the social and economic structure of mid-century Victorian England. Matthew Digby Wyatt, an architect involved in the construction of the 1851 Crystal Palace and a member of both the Executive and Building Committees for the Great Exhibition, describes the building as a display of "the sources of COMMERCIAL POWER. . . ."[2] His essay in the Official Catalogue to the Great Exhibition is a paen to both the Crystal Palace and to this power and it reveals the extent to which it deployed through the social and economic fabric of mid-century Britain:

> That it should have been possible in any country to have so speedily collected such a vast quantity of materials, without previously sounding the note of preparation, would have furnished some faint idea of the extent of the stores of raw material kept ever ready to supply the exigencies of sudden demand. That the raw material should have been so molded into forms so various and complex, and so original, in so short a time, would argue that such a result could alone have been effected by the natives of a country in which a knowledge of the principles and practice of mechanics and machinery had been long deeply studied and widely diffused. The facility with which the machinery employed must have been brought to bear upon the masses of raw material supplied, would have evidenced a power to produce, and to elaborate matter into manufacture, of the very highest order; while the grace with which the charm of decoration has been superadded, to so utilitarian a structure, would have served to show, that mindful as the English habitually are, of the practical and the economical, they are by no means indifferent to the

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[2] M. Digby Wyatt, "The Construction of the Building," Great Exhibition of the Works of Industry of All Nations, 1851: Official Descriptive and Illustrated Catalogue, Vol I (London: Wm. Clowes and Sons, 1852), p. 81. The emphasis is Wyatt's.

beautiful in the Fine Arts.

> Whoever had been enabled to trace through every stage the progress of the Exhibition Building, from the first order given by the contractor, to the issue of the final directions for its opening, would have had an opportunity of realizing the perfection to which the practice of connecting commercial co-operation in supply, and mutual reliance in money and time bargains, with the methodical organization of labor, has been carried in England at the present time. It is by means of the experience acquired in the conduct of the vast engineering works which have of late years occupied the attention, and commanded the labors of some of her most intelligent citizens, that this country has been enabled to reduce to a perfect system this power of subordinating the supply of materials, and of eliciting, in similar works, that precise description of labor from every individual, for which his natural characteristics or education may have specially qualified him.
>
> The firm through whose exertions the building has been erected, in itself presents an excellent model of the commercial constitution necessary to produce such great works with rapidity. While of its heads, one is remarkable for high scientific attainments, another possesses singular commercial aptitude, together with a minute knowledge of the working details of his business. Others again, bring to the common stock of intelligence a precise knowledge of legal and monetary transactions, together with experience acquired in many years' connection with speculations of great magnitude. The principal superintendents and foremen set in operation by this intellectual motive power, and act precisely as the various portions of a well-devised machine, being at the same time maintained in as perfect control. Through these agents the labor of the artisan, skilled in his own department, profoundly ignorant in others, is brought into useful operation; and thus thousands are combined to realize the will of one directing mind. But for the perfect system of discipline, which frequent practice in directing the labors of masses of workmen has now made general throughout England, it would have been impossible to have fashioned, in so short a time, so novel and so vast a structure as this Temple of Peace. . . .[3]

For Wyatt, the Crystal Palace was as much a product of the new social and economic order as it was a product of the new technologies. This new order was not simply the result of scientific discovery and

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[3] Ibid., pp. 49-50.

technological advance but, as Wyatt notes, it was also the product of the energies of a specific group of individuals bound together by shared social and economic interests.

This newly emergent industrial capitalist class not only owned the factories and the railways and controlled the press, it was also promulgating new ideas and new attitudes which were consistent with and which would augment their control of the means of production. As Karl Marx states:

> In every epoch the ideas of the ruling class are the ruling ideas, that is the class that is the ruling material power is at the same time the ruling intellectual power. The class having the means of material production has also control over the means of intellectual production so that it also controls, generally speaking, the ideas of those who lack the means of intellectual production. The ruling ideas are nothing more than the ideal expression of the dominant material relationships expressed as ideas, hence of the relationships which make one class the ruling one and therefore the ideas of its domination. The individuals who comprise the ruling class possess among other things consciousness and thought. Insofar as they rule as a class and determine the extent of a historical epoch, it is self-evident that they do it in its entire range. Among other things they rule also as thinkers and producers of ideas and regulate the production and distribution of the ideas of their age.[4]

Consistent with its being a work of architecture, the Crystal Palace was, in Marx's categories, at once the product of material and of intellectual power. It functioned as an ideological or "ideal" expression of the power and presence of the newly emerging ruling

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[4] Karl Marx, "The German Ideology: A Critique of the Most Recent German Philosophy as Represented by Feuerbach, B. Bauer and Stirner," Writings of Young Marx on Philosophy and Society, eds. and trans., Loyd D. Easton and Kurt H. Guddat (Garden City, N.Y.: Doubleday & Co., Inc., 1967), p. 438.

class and the triumph of the Crystal Palace and of the Great Exhibition which it housed was the triumph of the emergent ideology of industrial capitalism.

Yet the Crystal Palace designed by Joseph Paxton figured in and was transformed by the ideological debate of the period. Despite the popular enthusiasm for the Great Exhibition and despite the accolades which greeted the Crystal Palace, both were surrounded by controversy and were met by intense opposition. Yvonne Ffrench argues that the 1851 Crystal Palace was a figure in the much larger debate taking place in mid-century Britain: a debate between the supporters of a policy of Imperial Free Trade and its Protectionist opponents. This debate was not simply an event which forms part of a broad social and economic background to the construction of the building and which is unrelated to the physical form of the building and its design.

Indeed it is ironic that although the construction of Paxton's building testifies to the victory of its Free Trade proponents, the Protectionist opposition left their mark on the building in the form of the building's distinctive fan window and transept. The manufacturing interests in the new industrial regions of Britain were ardent supporters of the proposed exhibition. These industrial capitalist were, at the same time, actively promoting an expanded policy of international Free Trade. The Crystal Palace, as Ffrench argues, was identified as a propagandistic vehicle for the cause of Free Trade. Led by Colonel Sidthorp, a notorious Protectionist and defender of the traditional landholding aristocracy whose position and power was increasingly under threatened by the rise of the newly

emergent capitalists, those opposed to Free Trade seized upon the issue of the elm trees which would have been cut in the Hyde Park site as a means of blocking construction of the Crystal Palace.

Paxton's initial proposal was for a perfectly trabeated building. However, a barrel-vaulted transept was added to Paxton's original design in order to avoid cutting the trees and construction proceeded. This feature provided the building with what critics have heralded as one of its most compositionally significant features[5] and Ffrench's argument provides an instructive lesson by revealing the influence of an ideological clash, a clash which took the form of a debate on economic policy, upon the design decisions and the physical form of what is widely recognized as one of the most important monuments in the history of architecture.

As both the venue for exhibitions of the products of industry and as a specific example of the application of the new industrially based technologies to architecture, the 1851 Crystal Palace and the exhibition buildings it spawned are a revealing index to the industrial and technological sophistication of the societies which produced them. Further, they bear witness to the spread of the new ideology of industrial capitalism. The Montreal Crystal Palace, constructed in 1860, nine years after Paxton's celebrated prototype was also a product of the ideology of a class of industrial capitalists emerging in the mid-nineteenth century Canadas and it too was implicated in the social, political and economic controversies and

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[5] Yvonne Ffrench, The Great Exhibition: 1851 (London, Havill Press: 1950), especially pp. 75-77.

debates of the period.

The construction of the Montreal Crystal Palace took place in the middle of the nineteenth century, at a time when new economic, social and political relationships were emerging in the colonies of Upper and Lower Canada. Specific local controversies and the pre-confederation economic and political debates played an important role in the decision to construct the building, as well as in its program and design.

This thesis studies the Montreal Crystal Palace of 1860 as a product of these developments and views the construction of the building as a significant event among them. The distinction between those events which somehow are of especial concern to the architectural historian and those which merely form part of an abstracted "background" with only a thematic or analagous relation to the building under examination is rejected in the belief that architecture, as a specific subject of enquiry, cannot be divorced from its broader context. An attempt is made to understand the building as a product of a broadly defined historical process. As Alexander Tzonis has argued, "the objective of architecture, besides defining the design process proper, is to reflect and reinforce the requirements of social relationships, the characteristic quality and organization of the eventual status quo. Design objectives provide a conceptual framework, a suggestive set of rules through which individual activities are channeled and moulded."[6]

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[6] Alexander Tzonis, Towards a Non-Oppressive Environment, an Essay (Boston: i Press Books, 1972), p. 105

The particular historical processes which were reshaping the colonies of British North America at the time of the construction of the Montreal Crystal Palace were complex and they have been approached by historians of Canadian social, political, economic, urban and working-class history. Their work has been considered in an attempt to locate the the building in the network of issues and events which form a part of its design and construction.

CHAPTER II

The "National Policy" and the formation of the Board of Arts and Manufactures

Like its counterparts in London, New York, Paris, Dublin and Munich, as well as in other Canadian cities,[7] the construction of the Montreal Crystal Palace was related to the emergence of a system of industrial production and of an industrial capitalist class. However, the assertion that the Montreal Crystal Palace was the manifestation of Canada's coming of age in the age of steam and iron, of railroads, steamships and smoking factories, while true, is a simplification. Except for suggesting the presence of the necessary technical potential to produce the building, these facts do little to answer the basic questions of why, by whom and how its construction was undertaken at this particular time and in this particular place. The assertion ignores, as well, the specific economic relationship between Britain and the colonies of Upper and Lower Canada and the way

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[7] See Kenneth W. Luckhurst, The Story of Exhibitions (London: Studio Press, 1951), esp. pp. 117-145, John Hix; The Glass House (Cambridge, Mass.: MIT Press, 1974), pp. 153-59. A pictorial resume of other exhibition buildings and projects can be found in George F. Chadwick, The Works of Sir Joseph Paxton, 1803-1865 (London: Architectural Press, 1961), pp. 181-83. For other Canadian Crystal Palaces see below, p. 41, n. 75.

in which this relationship was altered in the forty years preceding the 1867 confederation of the colonies of British North America and the construction of the Montreal Crystal Palace in 1860.

Lower Canada in 1838 at the time of Lord Durham's investigation was "an old and stationary society, in a new and progressive world."[8] As a subordinate in the British Colonial System, commercial activity in Canada was strictly controlled in order to foster export of unprocessed staples.[9] Manufacturing was limited and communication between the towns and villages was almost wholly undeveloped. A recurring theme in Durham's report is "the striking contrast which is presented between the American and the British sides of the frontier in respect to every sign of productive industry, increasing wealth, and progressive civilization."[10]

Control of Canadian commerce was exercised primarily through British tariff policy and the Navigation Acts. These discouraged the import of non-British goods and gave preference to colonial merchandise in the Imperial market. The economies of the colonies of British North America were based upon the export of such unprocessed staples as furs, cereals and timber. Shifts in the tariff affecting ships timber during and immediately following the Napoleonic Wars, for example, had a dramatic effect upon the economies of the British

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[8] Lord Durham, Lord Durham's Report: An Abridgement of Report on the Affairs of British North American, ed. Gerald M. Craig (Toronto: McClelland and Stewart Ltd., 1963 [1839]), p. 28.

[9] W.A. Mackintosh, "Economic Factors in Canadian History," in Approaches to Canadian Economic History, eds. W. T. Easterbrooke and M. H. Watkins (Toronto: McClelland and Stewart Ltd., 1967), p. 8.

[10] Durham, p. 114.

colonies in North America.[11]

Complementing those Imperial policies designed to assure the supply of staples and to maintain a protected market for British industrial production were other policies intended to retard colonial industrial development in order to create and maintain dependence on British industrial production. Measures introduced by the British Parliament towards this end in the eighteenth century included a prohibition on the colonial manufacture of steel and of finished iron goods, the export of machinery and the emigration of artisans with expertise in specific key trades in the new industrial based economy.[12]

The commerce and manufacturing that did exist in the Canadas in the early decades of the nineteenth century were largely centered in Montreal. As a result of its geographical position the city was a natural point of exchange and the city emerged as an entrepôt.[13] Yet Montreal, the financial and commercial center of British North America, suffered by comparison with even secondary American cities.

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[11] See A. R. M. Lower, "The Trade in Square Timber," Approaches to Canadian Economic History, eds. W. T. Easterbrooke and M. H. Watkins, (Toronto: McClelland and Stewart Ltd., 1967), esp. pp. 30-33.

[12] Peter Mathias, The First Industrial Nation: An Economic History of Britain, 1700-1914 (London: Metheun and Co., 1969), pp. 85-86, 258, 298.

[13] Bray Hammond, "Banking in Canada Before Confederation, 1792-1867," in Approaches to Canadian Economic History, ed. W.T. Easterbrook and M.H. Watkins (Toronto: McClelland and Stewart Ltd., 1967), pp. 127-168.

As Durham remarked, "The ancient city of Montreal, which is naturally the commercial capital of the Canadas, will not bear comparison, in any respect, with Buffalo, which is a creation of yesterday".[14]

However, in the two decades following the publication of Lord Durham's report, the economic structure of the Canadas underwent a rapid transformation. Both in response to similar developments in the United States and as a result of a desire to augment and facilitate the export of staples, canals and railways were constructed and, the Canadas experienced a "revolution in transport". The growth of this transportation infrastructure had an important although secondary and unanticipated result which was to prove crucial in the development of the colonial economies and, particulary, the economy of Montreal. As H. Clare Pentland argues, "the net effect of Canada's revolution in transport. . . was much less the stimulation of exports, or of imports, than the presentation to Canada's farmers and manufactures of the coherent home market which they would have had the greatest difficulty in creating for themselves."[15] As a result of this unforseen consequence Montreal increasingly emerged as an industrial center providing goods and services to the surrounding region.

The transportation revolution had other consequences, which were to prove important in the emergence of an industrial capitalist economy in the Canadas. The construction, first of the canals and later the railways, resulted in the importation into the Canadas of

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[14] Durham, p. 114.

[15] H. Clare Pentland, Labour and Capital in Canada, 1650-1860 ed. Paul Phillips (Toronto: James Lorimer & Co., 1981, ms. ed. 1960), p. 147.

capital as well as the technical, managerial and financial expertise needed in an industrial capitalist economy. By 1860, railway construction[16] had not only resulted in a massive influx of capital, but the engineering marvel of the age, the Victoria Bridge was nearing completion in Montreal, and locomotives were being locally constructed in the Grand Trunk Railway's shops in Point Saint Charles.[17]

Another factor of importance in the development of an industrial economy in the Canadas were the changes made to the Colonial System. The twenty years following the publication of Durham's report and preceding the construction in 1860 of the Montreal Crystal Palace witnessed a radical transformation of the economic relations of the Canadian colonies to Britain. The bond which linked Canada to Britain was slowly disintegrating as Britain, asserting its economic supremacy and searching for an ever expanding market for its industrial output, sacrificed the certain assurance of its protected but limited colonial markets for an unlimited international market through a policy of free trade. Unlike Britain, France and even the United States where industrialization took root and grew in a comparatively slow and progressive manner, industrialization in the Canadas, while of more limited extent, took place with great rapidity. Faced with the loss

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[16] G. P. de T. Glazebrooke, A History of Transportation in Canada, Volume I, Continental Strategy to 1867 (Toronto: McClelland and Stewart, 1964), esp. Chapter 5, "The First Railway Era," pp. 140-179. Glazebrooke notes that between 1850 and 1860, track mileage in Canada increased from sixty-six to two thousand miles, p. 164.

[17] The first locomotive constructed by the G. T. R. R. was the Trevthick in 1859, see Ralph Greenhill, Engineer's Witness (Toronto: Coach House Press, 1985), p. 64.

of a privileged market for its produce and with the prospect of American industrial production filling the vacuum created by Britain's withdrawal, deliberate measures were instituted by the local colonial government in the Canadas to create an industrial economy and to survive as a political and economic entity.

Among the steps taken by the local colonial government was the enactment of a series protective tariffs. The Galt-Cayley tariff of 1858 was of particular importance in the series of measures taken to create an independent Canadian industrial economy. Indeed it marked a turning point in the pre-Confederation history of Canada. As one writer remarks,

> The peculiarly distinctive feature of Galt's policy was . . . , that it was the first serious move toward industrial as contrasted with agricultural protection. As such it demonstrated the profound changes that were taking place in the Canadian economy. The rates of duty were relatively moderate, but it was significant that duties were being used in order to encourage manufacturing industries.[18]

The emergence of a tariff policy, which was designed to protect and foster industrial growth in the late 1850s was among the first of a series of measures identified by V.C. Fowke[19] as the "national policy". These measures, according to Fowke, include the confederation of the colonies of British North American territories

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[18] Guy MacLean, ed., Oscar David Skelton, Life and Times of Sir Alexander Tilloch Galt (Toronto: McClelland and Stewart Ltd., 1966), p. 116. See also Easterbrook and Aitken, Canadian Economic History (Toronto: The Macmillan Co. of Canada Ltd., 1958), p. 373

[19] V.C. Fowkes, "The National Policy - Old and New," in Approaches to Canadian Economic History, ed. W.T. Easterbrook and M.H. Watkins, McClelland and Steward Ltd., Toronto: 1967, pp. 237-258. Pentland, op. cit., pp. 164-67, presents a similar argument.

within a political and economic unit and they were "fully formulated prior to Confederation, which was its major constitutional instrument. Other instruments of national policy, such as western . . . settlement, the Pacific railway design, and the system of protective tariffs, took shape in the decades after 1867. No one of these policies, but all of them together, merit the title "national policy".[20]

Although not included in Fowke's thesis, it can be argued that among the numerous measures which make up the "national policy" was the construction of the Provincial Exhibition Building and Museum in Montreal by the Board of Arts and Manufacturers of Lower Canada in 1860. This is suggested not only by the role which the building and the institution which undertook its construction was intended to play in the emergence of an independent national economy founded upon industrial strength, but by the role which Galt, the "father" of the pre-Confederation "national policy" played in the events leading up to and surrounding its construction.

Long a vocal and active advocate of industrialization and of economic nationalism in the Canadas, Galt had been involved in promoting settlement and developing mining in the Eastern Townships and was active on behalf of the St. Lawrence and Atlantic and of the Grand Trunk railways as a promoter, financier and company director. Galt, as his biographer Oscar Douglas Skelton writes, "was the

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[20] Ibid, p. 242.

representative railway figure of the decade. . . ."[21] Advocating local initiative and enterprise, he defended the ability of Canadians to execute the construction of the Grand Trunk Railway in 1853 in the following words: "We feel strongly on this subject, not merely from our direct interest, but because, as colonists, we desire to see the public men of this country promoting provincial enterprise. We desire to see the standard of self reliance raised. We decry the inferiority of our resources. We assert a permanent injury is done by repressing every effort to act for ourselves and we repudiate most strongly the necessity for calling in foreign aid to do which we are amply able to do ourselves."[22]

As Minister of Finance in the Cartier-MacDonald government, he participated in the parliamentary debate on the authorization of a $20,000 grant in support of a Canadian exhibition in Montreal to celebrate the visit of the Prince of Wales in 1860. Endorsing both the proposed exhibition and Montreal as its site, Galt argued that "Montreal, being the chief seat of manufacturers, it was of course, the most fitting place to hold a General Exhibition."[23] Subsequently, Galt was actively involved in the negotiations regarding the site of

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[21] Oscar Douglas Skelton, Life and Times of Sir Alexander Tilloch Galt, ed. Guy MacLean (Toronto: McClelland and Stewart Ltd., 1966 [1920]), p. 16.

[22] Quoted in Skelton, Life of Galt, p. 34.

[23] Thompson's Mirror of Parliament, Being a Report of the Debates in both Houses of the Canadian Legislature, No. 31 (April 23, 1860), p.1.

the Crystal Palace.[24]

The desire to establish an industrially based economy, despite the often bitter in-fighting and the opposition from regional interests, appears to have been widespread in the colonies of British North America in the decade preceding the construction of the Montreal Crystal Palace. The petition presented to the Governor General requesting funding for the 1860 exhibition in Montreal notes the benefits which would accrue to the Canadas as a result: "dans l'opinion de cette chambre une exposition provinciale des produits de l'agriculture, des arts, et de l'industrie de Haut et de Bas-Canada . . . tendrait à stimuler la progrès et l'avancement du pays."[25] The ideology of progress which shapes so much mid-nineteenth century thought[26] had taken hold even among opinion makers in French-speaking sections of the population which, some thirty-years earlier, had been

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[24] After noting that Galt was leading the government negotiation regarding the proposed Government Gardent site for the Crystal Palace, the article continues as follows: "Le Herald dit que le comité du conseil [The Board of Arts and Manufacturers of Lower Canada] parassait être d'avis de donner $20,000 pour la construction de la bâtisse et $30,000 pour l'achat de terrain en question. Le Courrier de Saint-Hyacinthe, No. 15 (13 avril 1860), p. 2, col. 5. Also see, "Palais de Cristal," Le Pays, 7 avril 1860, 10 avril 1860 and 28 février 1860, for further information on Galt's role in these negotiations.

[25] Le Pays (Montréal), 17 mars 1860, p.2. Agricultural products were not exhibited as a result of a drought in the summer of 1860 see Le Courrier de Saint-Hyacinthe, 31 juillet 1860, p. 2.

[26] J. B. Bury, The Idea of Progress: An Enquiry into its Origins and Growth (London: MacMillan and Co., 1928), especially Chapter XVIII, "Material Progress: The Exhibition of 1851," pp. 324-33.

seen as feudal and "stationary" by Lord Durham.[27]

As La Guepe, a newspaper which ardently defended the interests of French-speaking Canadians and a frequent opponent of the projects initiated by the English-speaking entrepreneurs of Montreal editorialized:

> Le progès a fait de pays un champ ouvert à toutes les industries. Il y a de la place et des ressources pour tous ceux qui veulent y travailler; mais pour y travailler avec profit et même avec honneur, il faut savoir éclairer et aider son travail des découvertes et des inventions de la science. Aujourd'hui l'homme ignorant qui travaille en aveugle comme on travaillait il y a un demi-siècle, se trouve toujours et de tout pour en retard sur son voisin plus instruit que lui: il est exposé à chaque instant à se ruiner sur ses terres, dans son industrie ou dans son commerce, et à se voir traiter en pariah sur cette terre du Go Head [sic][28]

This faith in progress combined with the wide-spread feeling that the only course open to the Canadas, in the face of apparent British indifference to the fate of its North American colonies and the growing American political and economic domination of the North American continent, lay in an economic nationalism founded upon industrial self-sufficiency. One of the instruments designed to foster industrial self-sufficiency was the Board of Arts and Manufactures.

Established by legislation enacted in 1857, the Board of Arts and Manufacturers specifically addressed the issue of transforming the Canadas into a "terre du Go Head". Article XXVIII of the By-Laws outlines the means by which this transformation would be effected:

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[27] Durham, p. 28.

[28] La Guepe (Montréal), 17 mai 1859, p. 2.

It shall be the duty of the said Board of Arts and Manufacturers to take measures, with the approbation of the Minister of Agriculture, to collect and establish at Toronto and Montreal respectively, for the instruction of practical mechanics and artisans, museums of minerals and other material substances and chemical compositions, susceptible of being used in mechanical arts and manufactures, with model rooms appropriately stocked and supplied with models of works of art, and of implements and machines (other than implements of husbandry and machines adapted to facilitate agriculture operations) and free libraries of reference containing books, plans and drawings selected with a view to the imparting of useful information in connection with mechanical arts and manufactures to take measures to obtain from other countries new or improved implements and machines, (not being implements of husbandry or machines specially adapted to facilitate agricultural operations) to test the quality, value and usefulness of such implements and machines, and generally to adopt every means in their power to promote improvement in the mechanical arts and in manufactures in the Province; and the Minister of Agriculture having deposited in the Patent Office, and upon which Patents of Invention have been issued, to be made, from time to time, and placed in the model rooms, museums or libraries of the said Board of Arts and Manufacturers respectively; and it shall be lawful for the said Boards respectively, with the consent and approbation of the Minister of Agriculture, to establish in connection with their respective museums, model rooms or libraries, schools of design for women on the most approved plan, and furnished and supplied in the most complete and appropriate manner that the funds at their disposal may admit of, regard being had to the claims thereon of the other objects for which they are hereby established; and also to found schools or colleges for mechanics, and to employ competent persons to deliver lectures on subjects connected with the mechanical arts and sciences or with manufactures; and the said Boards shall keep records of their respective transactions, and shall from time to time publish, in such manner and form as to secure the widest circulation among the mechanics' Institutes, and among mechanics, artisans and manufacturers generally, all such Reports, Essays, Lectures and other literary compositions conveying useful information, as the said Boards respectively may be able to procure, and judge to be suitable for publication.[29]

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29 "By-Laws of the Board of Arts and Manufactures for Lower Canada Proposed at the Quarterly Meeting Held on the 5th of January 1858." (Montreal, Salter & Ross Printers, 1858), pp. 15-16. This text is identical to Article XXVII of 20 Victoria 32, "An Act to repeal a certain Act therein mentioned, and make better provision for the encouragement of Agriculture, and also to provide for the

The By-Laws further state that an Agricultural Association shall be formed with representatives drawn from the Board of Agriculture, the Board of Arts and Manufactures, county Agricultural Societies and Horticultural Societies and that "the said Association shall hold an annual Fair or Exhibition, which shall be open to competition from any part of the Province. . . ."[30]

Thus, by 1857, the legislation which would ultimately lead to the construction of the Montreal Crystal Palace had been enacted. The para-governmental agency that would construct and use the building had been formed with a mandate to establish a museum in Montreal and to participate in annual exhibitions. Although popularly known as the "Crystal Palace," it is significant that the building was referred to as the "Provincial Exhibition Building and Museum" in legal documents.[31]

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promotion of Mechanical Science." This was the Act that created the Boards of Arts and Manufactures in both Upper and Lower Canada. It was given Royal assent on June 10, 1857.

[30] Ibid. p. 19.

[31] See ANQ-M, J. S. Hunter, "Contract and Agreement," April 27, 1860, no. 5462. This document, the contract and specifications for the building between the Board of Arts and Manufactures for Lower Canada and Daniel McNeven, has been transcribed and appears as "Appendix I" below, p. 69, ff.

CHAPTER III

The Recognition of the Need for an Exhibition Building and Museum in Montreal

An examination of the events surrounding the erection of the Montreal Crystal Palace in 1860 suggests that it took place within the context of a broad debate concerning the economic and political future of the colonies of British North America. These events are related to the political and economic initiatives of Alexander Tilloch Galt and others who sought to establish a modern industrial capitalist economy in a Canada whose continued existence as a discreet political and economic entity was threatened by radical changes to the Colonial System and by the emergence of the United States as an international economic and political power. These initiatives included the creation of the Board of Arts and Manufactures for Lower Canada, which undertook the construction of the Crystal Palace. The Board articulated the program for the building, sought the necessary financing, engaged the architect, and oversaw the execution of the contract.

Although it has not been determined if Galt played a direct role in the creation of the Board of Arts and Manufactures, he was active

in both the search for funding and a site for the Crystal Palace.[32]

However, if the more specifically local background to the construction of the Montreal Crystal Palace is examined, it can be seen that the initiative for the construction of the building predates the activities of the Board following its creation in 1857 and the political activities of Alexander Galt. Further, and perhaps surprisingly, these local initiatives precede the erection of Paxton's Crystal Palace in London in 1851. This is not to suggest that the Crystal Palace, as a building type, was in any way "invented" in Montreal. It does suggest, however, that the construction of a exhibition building and museum in Montreal was an element in the discourse of industrial capitalism which was emerging in the city as its local manufacturing and industry developed.

The center for much of the discourse concerning the industrial transformation of Montreal and, more specifically, the discussion, activity and debate which would ultimately identify the need for an exhibition building in the city, was the Montreal Mechanics' Institute. Founded in 1828[33], the presence of a Mechanics' Institute in Montreal testifies not only to the presence of a class of "Mechanics," or skilled industrial workers, in the city, but also to the presence of that optimistic faith in the productive union of workers and capitalists under the aegis of industrial capitalism, which Matthew Digby Wyatt eulogized in his essay on the Crystal

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[32] See above, p. 15.

[33] The date is given in Newton Bosworth, Hochelaga Depicta: The Early History and Present State of the City and Island of Montreal (Montreal: William Greig, 1839), p. 192.

Palace.[34]

The formation of the Montreal Mechanics' Institute follows by only four years the formation of the first such Institute in London in 1823. As described by E.P. Thompson[35], the Mechanics' Institutes arise out of the difficult period of social and political unrest, which accompanied the rise of industrialism in England at the end of the eighteenth century and into the early decades of the nineteenth century, as the working class resisted the transformation and discipline imposed by the new social and economic order. The Mechanics' Institutes represented an alternative to, or, more provocatively, a means of diffusing the anti-capitalist radicalism of the working class opponents to this new order.[36] That the Montreal Institute was active in imposing middle class values upon its working class membership, is suggested by the remarks of the Reverend Newton Bosworth who, wrote of the Montreal Mechanics' Institute as follows:

> Associations of persons with a view to the benefit of the working classes, have, in many parts of Britain, been undertaken with spirit, and been productive of much good. Under proper management, they are well adapted to promote not only the mental improvement, but the moral benefit of those in whose behalf they are undertaken. By inducing those who would otherwise spend their earnings at the tavern, to pay some attention to the improvement of their minds, and by placing within their reach the means of becoming acquainted with the principles of their art, and of gaining otherwise useful knowledge, a great advantage is conferred upon them. The

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[34] See below pp. 2-3.

[35] E. P. Thompson, The Making of the English Working Class (Harmondsworth, England: Penguin Books Ltd., 1968), pp. 817-18.

[36] E. P. Thompson, Working Class, pp. 817-20, 845-46.

> institute of this city [Montreal] was founded after the model of those at home; the greater part of its members being artisans.[37]

Among the many activities undertaken by the Montreal Mechanics' Institute was the organization of industrial exhibitions in the city. It has been proposed that rudimentary industrial exhibitions were being held in Britain as early as 1756[38] and it has been claimed that agricultural fairs in North America date from 1809.[39] In Montreal fairs date from at least as early as 1823 when the House of Assembly passed an act establishing regional fairs throughout Lower Canada in an effort to improve the quality of agricultural production in the province.[40]

Fairs or exhibitions with a specifically industrial component apparently began somewhat later. Not only did the Montreal Mechanics' Institute organize the industrial section of the Annual Provincial Exhibitions but the Institute was actively involved in organizing special local exhibitions held to select items for display at the 1851 London exhibition, the 1852 New York exhibition and the 1855 Paris exhibition. In 1856 the Institute even considered the possibility of

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[37] Bosworth, Hochelaga, p. 192.

[38] Kenneth W. Luckhurst, The Story of Exhibitions (London: Studio Publications, 1951), p. 63.

[39] John R. Stilgoe, Common Landscape of America, 1580 to 1845 (New Haven, Conn.: Yale University Press, 1982), p. 251.

[40] Fernand Ouellet, Economic and Social History of Quebec. 1760 1850: Structures and Conjunctures (n.p.: Gage Publishing Ltd., 1980), p. 263.

holding "an Universal Exposition in Montreal. . . ."[41] It appears that industrial exhibitions were at least being discussed as early as 1847. At the Third Annual Meeting of the Montreal Mechanics' Institute held in that year, the membership was advised that "your committee would earnestly draw the attention of the Members individually to the Establishment of an Annual Fair, or Exposition, similar to those held in the large cities of Europe, as well as on this Continent, by Institutions of this [the Mechanics' Institute] description. The benefits arising from which have been on more than one occasion, already laid before you."[42] The "Report of the Thirty-Fifth Annual Meeting of the Montreal Mechanics' Institute" held in 1874, notes that "in the early history of the Montreal Mechanics' Institute, the Committee of management held annually, what was termed the "Mechanics' Festival" which consisted of an Industrial Exhibition on a small scale with vocal and Instrumental music, addresses, etc,

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[41] Montreal Mechanics's Institute Papers, Minute Book, 1847-53, n.p. refers to the Institute's role in the "highly creditable display of Canadian Manufactures. . .shown at the late Provincial Industrial Exhibition. . ." in the minutes of the Annual General Meeting held on November 4, 1850. This was the exhibition held to select items for exhibition in the Canadian section of the colonial department of the London exhibition of 1851. See Alfred Sandham, Ville-Marie, or Sketches of Montreal, Past and Present (Montreal: George Bishop & Co., 1870), pp. 128-19 and Montreal Illustrated (Montreal: Consolidated Illustrating Co., 1894), p. 62. For further information on this exhibition. For the New York Fair, see Letter Book, "Letter to B. Chamberlin, Sec'y, Executive Committee, N.Y. Exhibition, 24 December, 1852," n.p. For the Paris Exhibition, see Annual Report, 1855, n.p. and Montreal Illustrated, op. cit. For discussion of the proposed Universal Exposition see Minute Book, 1853-61, "The Seventeenth Annual Meeting," n.p. The resolution endorsing the proposition was defeated.

[42] Montreal Mechanics' Institute Papers, Minute Book, 1847-53, "Third Annual Meeting, 8 November 1847," n.p.

etc, etc. These Festivals were largely patronized by the citizens generally, and were looked forward to with great interest by all the Mechanics of our city. They thus helped materially to keep the aims and objects of the Institute before the public."[43]

In an 1856 committee report to the Montreal Mechanics' Institute on the "Railway Celebration", it is noted that

> the Mechanical demonstration of that day established the fact that the manufacturing facilities of Canada and particularly of Montreal, were of a high order and if properly encouraged, would compete favourably with those of any other country and, ere long, there would be such an improvement in the position of our Mechanics as to defy competition from any quarter. It is a matter worthy of serious consideration of the Mechanics of Montreal -- what can be done by the united effort of Mechanics in Montreal to place them in as good a position as the Mechanics in other countries? Montreal must lead in any undertaking of this kind, which can accomplish such an object and the Members of this Institute can be Instrumental by their united efforts in speedily arranging the desirable end."[44]

The "benefits" here referred to appear to differ from the "mental improvement" and "moral benefits" described by Newton Bosworth. This seeming contradiction between economic and moral betterment is reconciled in the Victorian attitude towards progress. Economic advance, particularly through the agency of science and technology, would, it was held, promote the general progress of mankind. That this view was current in Montreal in the years leading up to the

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[43] Montreal Mechanics's Institute Papers. This "history" was also published in a circular published following the meeting, loc. cit.

[44] Montreal Mechanics' Institute Papers, Minute Book, 1853-61, n.p.

construction of the Crystal Palace in 1860, can be seen in an address given at the Montreal Mechanics' Institute in 1853 by T.C. Keefer. Keefer, a civil engineer, was active in the railway construction boom of the 1850s, and who, while involved in the construction of the St. Lawrence and Atlantic Railway, undoubtedly had met and worked with Alexander Galt.[45] Keefer concluded his lecture on the economic benefits to be reaped through the construction of a railway system and the development of industry by discussing what he felt were the broader moral implications:

> Let then the bigot, the theorist, and the agitator ply their unprofitable trade -- let them lay the flattering unction to their souls that they alone are engaged in the high and holy cause of moral elevation. Let them commiserate the apparently low aims, the ceaseless toil and drudgery of the practical mechanic; -- but know for certainty that bigotry and intolerance, agitation, and the highest order of speculative philosophy, have existed in the midst of starving and uneducated masses; -- that it is the Steamboat and the Railroad which has peopled the recent wilderness of the NorthWest -- and by granting facility of access and by securing a reward to labor, have diffused a degree of comfort and prosperity, unprecedented in history. Every new manufacture, every new machine, every mile of railway built is not only of more practical benefit, but is a more efficient civilizer, a more speedy and certain reformer, than years of declamation, agitation, or moral agitation.[46]

In the years immediately preceding the construction of the Montreal Crystal Palace, local industrial exhibitions were held in temporary buildings erected for the purpose and in buildings loaned to

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[45] See Skelton, Life of Galt, p. 28.

[46] T. C. Keefer, "A lecture on Montreal from the pamphlet, Montreal and the Ottawa," in Philosophy of Railroads and other Essays, ed. H. V. Nelles (Toronto: University of Toronto Press, 1972), p.88.

the Institute by the Grand Trunk Railway Company.[47] However, as early as 1856 the Institute had formed a permanent sub-committee to investigate and report on the feasibility of establishing a museum in connection with the Institute.[48]

At the same time, the Institute was also actively redefining its role as an institution concerned exclusively with local or municipal issues. The president, Charles Garth, reported to the executive in 1856 that he had met with Major Campbell who had "stated that the Board of Agriculture [which was ultimately responsible for the organization and funding of the annual provincial exhibitions] had recommended in their report to the Government that the money granted to aid them in the Mechanical portion of the Annual Exhibition be transferred to the Mechanics' Institute to render the Competition more general and give a higher tone and character to the Exhibition which would relieve them from the responsibility of duties for which [they] were incompetent to discharge."[49]

The Provincial Government acted on the recommendations of the report and the Montreal Mechanics' Institute was quick to seize the opportunity offered by the government. Clearly the executive of the Institute was thinking of industrial development on a national scale

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[47] Montreal Mechanics' Institute Papers, Minute Book, 1855-59, "General Committee Meeting, 14 June 1858," "General Committee Meeting, 14 June 1858," "General Committee Meeting, 28 June 1858," and "General Committee Meeting, 11 October 1858," n.p. Exhibitions were held in G. T. R. R. Co. buildings in 1857 and 1858.

[48] Montreal Mechanics' Institute Papers, Minute Book, 1855-59, "Special Meeting, May 19, 1856," n.p.

[49] Montreal Mechanics' Institute Papers, Minute Book, 1855-59, "General Committee Meeting, 17 March 1856," n.p.

despite a mandate which confined its activities to the local municipal level. The Institute proposed to enlarge its role not only from a municipal to a provincial, but to a national level suggesting that the Montreal and Toronto Institutes jointly mount a Canadian industrial exhibition.[50] While it does not appear that such an exhibition ever took place, recognition of the Montreal Institute's new responsibilities in organizing Provincial industrial exhibitions produced the call from within the Institute for the erection of permanent buildings for that purpose. At a stormy meeting held in January 1857 to consider these new responsibilities, a motion was considered that "insomuch as the Mechanics' Insititute of Montreal are [sic] called upon from time to time to contribute to Exhibitions, that they approve of the erection of a permanent Building, to be opened once a year for exhibitions, and kept as a model and sample room for the benefit of Mechanics and Manufacturers. . . ."[51]

Although the motion was not carried, it is significant that discussion within the Institute had evolved to a point where the need for an exhibition building was receiving serious consideration. Further, it should be noted that these discussions were taking place at a time when the "national policy" of political and economic

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[50] Montreal Mechanics' Institute Papers, Minute Book, 1855-59, "General Committee Meetings, 3 and 15 December 1856; 12 January and 3 and 4 March 1857," n.p.p.

[51] Montreal Mechanics' Institute Papers, Minute Book, 1853-61, "An Extraordinary Meeting of the Institute, 16 January 1857," n.p. The meeting was "stormy" as there was a dominat faction present at the meeting which proposed that the Institute await enactment of proposed legislation which was to create the Boards of Arts and Manufactures.

independence was being discussed by Parliament and elsewhere in the Canadas.[52]

However, while the Montreal Mechanics' Institute was prepared to play a role in the "national policy," the structure and mandate of the Mechanics' Institutes in Canada was being increasingly questioned and criticized. As an institution promoting the education of the industrial working class, the Montreal Mechanics' Institute was not, either in its management or its ultimate goals, representative of the interests of that class. Despite Bosworth's contention to the contrary, its affairs were not, at least following its legal incorporation in 1845,[53] managed by its majority working class membership. A review of the Institution's Minute Books[54] reveals that its direction came from the "first class" membership drawn from among the business and professional communities, while the working class or "second class" membership seems to have been little involved. This lends credence to the belief that the case of the London Institute where, in 1825 "control passed to the middle-class supporters whose

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[52] See below, pp. 13-14 and Gregory S, Kealy, "Toronto's Industrial Revolution, 1850-1892," Canada's Age of Industry, 1849-1896, Readings in Canadian Social History, Volume 3 (Toronto: McClelland and Stewart Ltd., 1982), pp. 20-61; and Pentland, op. cit., pp. 170-75.

[53] Bosworth, Hochelaga, p: 192.

[54] Montreal Mechanics's Institute, Minute Books. The Executive regularly approved membership applications at its Ordinary Meetings. The names of the new members are appended to the minutes of these meetings.

ideology dominated the political economy of the syllabus. . ."[55] was a widespread and typical phenomena.

In the Canadas, the limited role of the working class in an institution allegedly dedicated to its needs, was being openly criticized by 1860. In that year, the Ottawa Citizen made the Mechanics' Institute the subject of a long editorial rebuke:

> MECHANICS' INSTITUTES -- There are few institutions in this province bearing the hacknied name at the commencement of this paragraph, that are in reality deserving of the appellation, and we cannot help expressing our entire approval of the course pursued by the government in this year, discontinuing the accustomed grants of money for their sustenance and support. In our own city the title of Mechanics' Institute, as applied to the institution known by that designation, is a downright misnomer. . . . Well may we exclaim "what's in a name!" Most probably now that the patronage of the government has been withdrawn, these institutions, if they continue to exist at all, will go back to their original positions, and display some of the characteristics indicated by the name given them. Associations of working men pay themselves a very poor compliment in acknowledging so tacitly that they have to select men from without their own pale to direct the affairs of a Mechanics' Institute! The gentlemen who have aspired to these positions are entitled to great credit, no doubt, and we believe them actuated by the best of motives, in seeking them; but we candidly confess, that in our humble opinion, these honors, if honors they are, should be enjoyed by mechanics. These remarks, we regret to say, are not applicable to Ottawa alone; but to almost every place in Canada where the Mechanics' Institutes have an existence or a name. Let there

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[55] E. P. Thompson, p. 818. For further information on Mechanics' Institutes in British North America, see Pentland, op. cit. pp. 182-84; Bryan D. Palmer, "Give us the road and we will run it; the Social and Cultural Matrix of an Emerging Labour Movement," Essays in Canadian Working Class History, eds. Gregory S. Kealy and Peter Warrian (Toronto: McClelland and Stewart Ltd., 1976), pp. 112-13 on the Mechanics' Institute in London, Upper Canada; and T. W. Acheson, Saint John: The Making of a Colonial Urban Community (Toronto: University of Toronto Press, 1985), pp. 79 - 82, who describes the formation and direction of the Mechanics' Institute in Saint John, New Brunswick, noting that "the gentlemen who were running the institute thought the mechanics a mass of semi-barbarians incapable of making any kind of responsible decision" (p. 80).

be a change -- if not in management, let it be in name at least.[56]

Apart from the fairs and exhibitions already referred to, the Mechanics' Institute organized courses of instruction, held public lectures, maintained a lending library and periodical reading room, and established a collection of models of recent mechanical inventions. The activities of the Institute were designed to promote and advance technological innovation in industry and the mechanical arts by raising the level of education among workers. Its mandate clearly became redundant with the creation of the Board of Arts and Manufactures in 1858.[57] Further, as the above cited editorial from the Ottawa Citizen notes, the Mechanics' Institutes were the recepients of significant government funding. With the establishment of the Board, the continuation of these subsidies was called into question. Almost immediately, the Board sought control of the Institutes throughout the province. In an 1859 report, the Board was informed that there were "dans le pays, quantité d'Instituts des artisans qui donnent peu ou point signe de vie. . . ."[58] It was

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[56] Ottawa Citizen, Friday Morning, March 16, 1860, p. 3.

[57] For the mandate of the Board of Arts and Manufactures, see above, pp. 17-18.

[58] Rapport du Sous-Comité de la Chambre des Arts et Manufactures du Bas-Canada, Présenté à l'Assemblée de la Chambre, tenue 4è jour de janvier, 1859, Avec les Minutes des Procédés de la Chambre à cette Assemblée; et Le Rapport sur les Institutions de Londres, Dublin, Edimburg et Paris, pour le Développement de l'instruction Industrielle, (Montréal: De l'Imprimerie du "Canada Directory," 1859), p. 12.

further proposed that any government funding to the Institutes be directed through the Board and subject to its approval. The Board was already providing funding to selected Institutes which were affiliated with the Board in order to undertake special educational projects. Apart from instruction in basic reading, writing and arithmetic, the Board provided funding to the institutes for courses in book-keeping, drafting, mathematics, chemistry, natural science, English as a second language to French-speaking workers and French as a second language to English-speaking workers. In 1859 there were seven provincial Institutes officially affiliated with the Board in Montreal, Lachute, Chambly, Sorel, St. Hyacinthe, Iberville, and St. Cesaire. An eighth institution, the Union St. Joseph, was refused affiliate status as it was felt its program and membership were "pas généralement accessibles aux artisans."[59]

In usurping mandate of the Mechanics' Institutes the Board formalized and institutionalized the control of the institutes by the industrial capitalist class -- a control which they had previously exercised through their domination of the executive of the Montreal Institute. The first-class membership of the Montreal Mechanics' Institute was strongly represented on the Board from its inception. The Board's membership included the Minister of Agriculture and the Chief Superintendents of Education as members ex officio, the President and one other delegate from the Board of Trade, "Professors and Lecturers on the various branches of physical science in all the chartered universities" and the Presidents and delegates from all the

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[59] Rapport. . .1859, p. 9.

Mechanics' Institutes.[60] As the latter memberships were allocated proportionally on the basis of one delegate per twenty Insititute members, the Montreal Institute dominated the Board as a result of its large membership.[61]

The Board pressed forward the mandate which had been taken from the Mechanics' Institute but the rhetoric of moral betterment is increasingly displaced by an assertion of the economic benefits which execution of its mandate would provide to the businessmen and manufacturers. Further, the interests of the Board were clearly and consistently identified with the interests of the industrial capitalists. It is stated in the 1859 report that education of the workers was being promoted in order that "nos ouvriers et artisans deviennent des travailleurs intelligents, ce qu'ils doivent être, afin d'assurer leur succès et le nôtre dans la concurrence que nous faisons aux fabricants des autres pays."[62] With the creation of the Board, a clear division along class lines appears in the debate concerning the education to the working class. The Board asserted that "le but de

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60 By-Laws of the Board of Arts and Manufactures for Lower Canada. . .1858 (Montreal: Salter & Ross, Printers, 1858), p. 13.

61 At a meeting held to elect members form the Montreal Institute to the Board, held on July 23, 1857, twenty-two delegates were nominated. See Montreal Mechanics' Institute Papers, Minute Book, 1855-59, "Ordinary Meeting, 23 July 1857," n.p. and Letter Book, "letter to Hon. Phillip Vankoughnet, Minister of Agriculture, Toronto, 1 August 1857," n.p. Following its formal establishment, the Board maintained its offices in the Montreal Mechanics' Hall, see Letter Book, "letter to B. Chamberlin, Secretary, Board of Arts and Manufactures for Lower Canada, 22 September 1857," n.p.

62 Rapport. . .1859, p. 12.

cette Institution. . . est si intimement lié aux intérêts industriels et matériels de cette Province".[63]

Both the Mechanics' Institute and the Board of Arts and Manufactures shared a broad commitment to the Victorian concept of progress, particularly as it was reflected in attitudes toward the working-class and was promoted through industrial development but whereas the Mechanics' Institute was active in support of municipal or local interests and, at least in theory, answered to its majority working-class membership, the Board, a creation of the Canadian parliament and embracing the emergent ideology of industrial capitalism, not surprisingly, promoted action in support of its aims on a regional or national level as part of the "national policy."

The Board's support of this policy as well as its role as an agent of capitalist interests is evident in its endorsement of legislative action to support and protect Canadian patent holders. William Rodden, a Montréal iron founder, and member of the executives of both the Board of Arts and Manufacturers and the Montreal Mechanics' Institute, as well as a city councillor,[64] proposed before the membership at an 1859 meeting of the Board that any alteration to Canadian patent laws which would have allowed American patent holders

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[63] Rapport. . .1859, p. 6.

[64] See Jean Bélisle et al., Montreal Cast Iron Architecture, second ed. (Montréal: Heritage Montreal, 1984), p. 54, for further information on Rodden's activities as an iron founder. Rodden is identified as a member of both the Board and the Montreal Mechanics' Institute in Rapport. . .1859, p. 5, and as a city councillor, see Le Pays (Montréal), 7 avril 1860, p. 2.

the same protection as Canadians be opposed. Addressing his fellow members, he stated that he was "opposé à accorder aux Citoyens des Etats-Unis, aucuns des privilèges que possèdent les inventeurs canadiens; il ne serait disposé à leur céder tels privilèges que quand ils nous donneront réciprocité en manufactures aussi bien qu'en inventions."[65]

The Board rapidly undertook its mandate not only to provide industrial instruction, but to establish a museum in Montreal and to prepare for the industrial section of the Annual Exhibition. B. Chamberlin, Secretary to the Board and editor of the Montreal Gazette, had been sent to Europe by the Board to examine and to prepare a report on those European institutions which, like the Board, were mandated to provide industrial education to the working class. He spent from May to October, 1858, in Europe and tabled his report at the January 1859 meeting of the Board.

Vague statements concerning the moral benefits of education abound in both the report and the subsequent discussion. The educational mandate of the Board was specifically directed toward young workers in shops and in factories who had abandoned school at an early age in order to go to work to support their families and echoing the remarks of the Reverend Newton Bosworth made some twenty years earlier, the Board saw education as an antidote to the "gin-palace"[66] as well as an important element in promoting industrial growth.

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[65] Rapport. . .1859, p. 6.

[66] Rapport. . .1859, p. 43.

It is ironic that, while, on the one hand, the Board was actively promoting literacy among the working-class, on the other, it assumed the failure of this campaign as a foregone conclusion. The arguments forwarded in Chamberlin's report in favor of the construction of a museum and model room are founded upon the assumption of an ingrained distaste for the printed word, or even stupidity, among members of the working class. He remarks that,

> Je suis d'avis qu'il existe une grande quantité d'honneur qu'on peut instruire et peut-être améliorer, par la vue et l'ouïe, mais les hommes cependant qui jamais cueilleront l'instruction dans les livres, fatigants pour eux. Bien des artisans ingénieux iraient loin pour étudier une nouvelle machine ou un nouvel outil, mais ne feraient point un pas pour en lire la description dans un livre ou un journal, ou s'embrouilleraient le cerveau s'ils essayaient de le faire. . . . Nous avons beau prêcher la diffusion de la science au moyen de la presse, il y a une classe très nombreuse et pas très sotte, qui apprendra plus tôt et mieux une foule de choses dans un musée que dans un livre ou une revue. . . .[67]

Although Chamberlin's report was tabled in January 1859, the Executive had clearly already decided upon a course of action and initiated discussions with its parent body, the Chamber of Agriculture, and with the Montreal City Council regarding the construction of a museum. It was noted that the Board's temporary quarters in the Mechanics' Hall were inadequate for its needs and the Executive further argued that,

> Si l'extension du local actuellement occupé par la Chambre devient nécessaire, le sous-comité profitera du nouvel espace mis à sa disposition pour commencer un musée industriel. Il est assuré qu'on peut y arriver sans grandes dépenses, en partie au moins. En Angleterre, les industriels saisissent avec empressement l'occasion d'exposer dans les musées les échantillons de leurs produits manuels avec les matériaux bruts qui ont servi à la confection de ces produits; et votre

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[67] Rapport. . .1859, p. 43.

> sous-comité ne doute pas que les fabricants de cette ville et de la province ne se montrent disposés à prêter une main aussi intelligente que secourable pour fonder un musée de l'industrie canadienne. A cet égard, le sous-comité doit référer les membres à la correspondance déposée sur le bureau et qui annonce que le conseil de ville désire coopérer avec les Chambres d'Agriculture et la nôtre, en procurant un emplacement et y élevant des édifices permanents pour expositions, etc. Ces édifices contiendront sans doute de la place pour le musée et les bureaux de la Chambre. Votre sous-comité a déjà nommé un comité spécial de conférence chargé de consulter sur ce sujet avec le comité du conseil de ville.[68]

Despite W. M. Milln's assertions, to the contrary, that, "les expositions annuelles forment un des objets les plus importants pour le progrès desquels la chambre a été établie", in light of subsequent decisions, the Board appears to have endorsed Chamberlin's proposal concerning the means of executing its mandate. Although Chamberlin had noted the positive effects of the Great Exhibition of 1851, stating that, "la grande exposition a poussé les autorités et les principaux personnages à travailler à donner aux artisans de la Grande-Bretagne cette excellence de goût et d'éducation pour laquelle il n'avait été que trop évident que ces derniers étaient inférieurs à leurs voisins les Français,"[69] he maintained in his report that temporary exhibitions were little more than popular entertainments: "Ce n'est pas assez d'ouvrir des expositions annuelles, quoique ces expositions ne soient sans utilité, comme musées temporaires; dans les cités qui offrent plus de ressources, il devrait y avoir une exposition permanente d'instruments, machines et produits, ouverte gratuitement, où le fermier et l'artisan pourraient, chaque jour de

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[68] Rapport. . .1859, p. 11.

[69] Rapport. . . 1859, p. 45.

l'année, étudier, avec une bibliothèque d'oeuvres classiques, des dessins et des modèles de machines à consulter."[70] Further, this museum, or permanent exhibition, should form part of a broader program: "Il est donc nécessaire, pour réaliser l'oeuvre que s'est proposée la chambre, d'activer l'instruction par trois agents: musées permanents aussi bien qu'expositions périodiques dans une ou plus des principales cités de la province; lecture et classes avec examens sous les auspices des diverses institutions affiliées; bibliothèques et publications utiles."[71]

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[70] Rapport. . . 1859, p. 50.

[71] Rapport. . . 1859, p. 50.

CHAPTER IV

The planning and the construction of "The Provincial Exhibition and Museum of Art and Industry"

The decision to build an Exhibition Building and Museum emerged slowly as a result of a series of decisions and alliances of interest. the principal steps leading up to that decision begin with the passage of legislation to create the Boards of Arts and Manufactures with a mandate which included the establishment of museums in Montreal and Toronto and the decision by the Board of Arts and Manufactures for Lower Canada to initiate discussion regarding funding and a site for the building, a decision which was undoubtedly made in 1858 before the Annual General Meeting of the Board held in January 1859. It has been claimed, both in recent studies and by others writing shortly after construction of the building was completed in 1860, that the building was constructed because of the visit to Montreal by the Prince of Wales to inaugurate the Victoria Bridge.[72] However, as the invitation

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[72] Samuel Phillips Day, English America: Or Pictures of Canadian Places and People, Volume I (London: T. Cantley Newby, Publisher, 1864), p. 216, states the Exhibition Building in Montreal was " originally erected as a banquet hall during the visit of the Prince of Wales," and Raymond Montpetit, "Approche socio-culturelle d'un monument architectural : le Crystal Palace de Montréal (1860-1896)," Opuscula Aesthetica Nostra: A Volume of Essays on Aesthetics and the Arts in Canada (Edmonton, Alberta: Academic Publishing, 1984), p.

to the Queen was only extended in May 1859, it appears that the decision to construct the Crystal Palace was made in a less hasty and in a more considered fashion.

The completion of the Victoria Bridge in 1860, itself an important step in the creation of the transportation infrastructure which would promote a national industrial economy, provided the occasion for a celebratory royal visit to the Canadas by H.R.H. the Prince of Wales. The official address of welcome to the Prince places the completion of the bridge in the broader context of Canadian progress noting "that great work, the Victoria Bridge, known throughout the world as the most gigantic effort in modern times of engineering skill, has been made a special occasion of your Royal Highness' visit, and proud as are Canadians of it, we yet venture to hope you will find in Canada many other evidences of greatness and progress. . . ."[73]

The Board was quick to exploit the visit of the Prince in soliciting support for its activities. Although the building was not constructed specifically because of the Prince's visit, he was invited to officially open it and a special inaugural exhibition was planned. This exhibition was of an exceptional nature with national rather than province-wide participation. Although invited to officially participate, the Board of Arts and Manufactures for Upper Canada refused to accept the invitation and the Lower Canada Board was

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146, while stopping short of stating that the building was expressly built for the visit of the Prince, does strongly suggest that this was indeed the case by including the Prince's visit among "les événements déclencheurs," which preceded the construction of the building.

[73] Witness (Montreal), May 23, 1860, p. 2.

obliged to solicit Upper Canadian participation directly by placing advertisements in newspapers there and by sending circulars to the mayors of Upper Canadian towns and villages.[74]

Before entering into the preliminary planning of the Crystal Palace, the Board examined other Canadian exhibition buildings in Toronto and Kingston. The Sub-Committee's report to the Board declared that although these buildings "were well enough designed as places in which to hold Exhibitions at stated periods [they were]. . . by no means for permanent occupation" as their location on the outskirts of the respective cities rendered them "quite inaccessible to the working population."[75]

The Board initiated discussion with the Governors of the Royal Institute for the Advancement of Learning, which administered McGill College, for a site bounded by St. Catherine and Cathcart Streets on the north and south and by University Street and McGill College Avenue

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[74] Montreal Gazette, July 6, 1860, p. 1. For an example of the advertisement see Ottawa Citizen, May 26, 1860, p. 1.

[75] Montreal Gazette, July 6, 1860, p. 1. The first exhibition building constructed for a specifically industrial exhibition in British North America may have been a building erected by the Mechanics' Institute in Saint John, New Brunswick in September, 1851, see Our Dominion, Mercantile and Manufacturing Interests, Historical and Commercial Sketches of St. John and Environs (Toronto: Historical Publishing Co. of Canada, 1887), p. 36. The Kingston exhibition building, described as a "Palace" was building in 1856, by "Mr. Power, the architect," see Herald (Montreal), August 9, 1863, p. 2. A second exhibition building was constructed after the designs of Samford Fleming and Collingwood Schreiber, both engineers rather than architects, in 1858, see Daily Globe (Toronto), September 29, 1858, p. 2; and Canadian Architect and Builder, VIII, 9 (September 1895), 109. A "Crystal Palace" was being constructed in Hamilton, Upper Canada at the same time as the Montreal building. It was designed by A. H. Hill, see Witness (Montreal), XV, (April 21, 1860) p. 249 and Daily Globe (Toronto), May 26, 1860, p. 2.

on the east and west on which to construct the building. Although the site was not legally leased to the Board until August 1860,[76] when construction of the building was nearing completion, the Board was apparently satisfied with the intentions of the Royal Institute for the Advancement of Learning and sometime before April 13, 1860, several architects were approached and invited to submit designs in a closed competition.[77]

Five entries were received and while neither all of the firms approached nor those which submitted completion entries have been identified, plans were submitted by John William Hopkins and, probably, by the firm of Lawford and Nelson.[78] The similarity of the two proposals is striking and it is possible that some of the common features were contained in a preliminary building program drawn up by the Board. Both the Lawford and Nelson and the Hopkins projects proposed a cruciform basilica fronting on Ste-Catherine Street with a

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[76] ANQ-M, J. S. Hunter, "Lease and Agreement by & Between The Royal Institution & The Board of Arts and Manufactures," August 4, 1860, no. 5667.

[77] Montreal Gazette, July 6, 1860, p. 1.

[78] This is deduced from the fact that Hopkins won the competition (Montreal Gazette, July 6, 1860, p. 1), and from the existence of a project by Lawford and Nelson, "Proposed Exhibition Building, Montreal," in the Canadian Architectural Collection, McGill University. The Lawford and Nelson project is clearly intended for the site on St. Catherine Street. It is not know, however, if the Lawford and Nelson project was ever submitted as a competition entry. A very fundamental error is apparent in the sheet of drawings: The height of the transept vault in the drawings of the section and of the St. Catherine Street facade elevation are contradicted by the side elevation of the proposed building. In the first two drawings the transept vault is equal in height to the nave vault while in the drawing of the side elevation the vault is considerably lower in height.

barrel vaulted nave running to Cathcart Street. In both the Lawford and Nelson project and in the Hopkins building an internal structural cast iron skeleton was to support two floors of galleries around the interior perimeter of the building. However, despite similarities, there were significant differences. Where Hopkins proposed building which was a true Greek cross in plan with transepts and nave of equal length extending from a central crossing, Lawford and Nelson proposed a building with a central crossing but with transepts which were much shorter in length than the nave. Further, Hopkins' building had a full basement and overhead lighting was provided for by a clerestory whereas the project prepared by Lawford and Nelson rested upon a continuous perimeter foundation and point supports for the internal structure and, unlike Hopkins' building, was lit by a continuous skylight running the entire length of the nave.[79]

Hopkins had been selected as the winner of the competition sometime before the March 24, 1860 when a call for tenders for the construction of the building appeared in La Minerve stating that "les plans et les specifications peuvent être examinés au bureau du M. HOPKINS, 'Union Building [sic] le et après LUNDI le 26 courant."[80] Preliminary plans were being reviewed and discussed by the Board of Arts and Manufactures as early as April 5, 1860. Further the Board had not only called for and received tenders but had issued a letter of conditional acceptance to Daniel McNeven as general contractor for

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[79] See Appendix II, for reconstruction drawings of the Hopkins building and reprocutions of period photographs of the building.

[80] La Minerve (Montréal), 24 mars 1860, p. 3. The call for tenders is dated "23 mars 1860."

of conditional acceptance to Daniel McNeven as general contractor for the building sometime before the April 17, 1860 meeting of the Board.

Clearly then, Hopkins had not only undertaken the design work necessary to prepare a competition entry prior to March 24, but had won the competition and had almost certainly begun the preparation of the specifications and drawings needed to begin construction before this date.

Undoubtedly Hopkins' competition project, like that of Lawford and Nelson, had been prepared for the St. Catherine Street site. However, as the negotiations, first with the City of Montreal, and later with both the City and the Provincial Government developed, the issue of funding became contingent upon a change of site to the Government Garden.[81] The Board approached Hopkins with the request that he prepare preliminary estimates as to the costs involved in the proposed change of site. These Hopkins presented to members of the Board at a meeting on April 7, 1860.

At this point the Board was faced with a dilemma: the Prince's arrival was fast approaching, funding - if forthcoming at all - was contingent upon a change of site and significant additional expense. Although refusing to make a final decision, the Board attempted both to keep its options open and to prepare for the worst. The Secretary

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[81] The question of the site for the exhibition rapidly became a contentious issue. It is dealt with by Raymond Montpetit in "Approches. . . ." Also see Raymond Montpetit, "Fêtes et société au Québec: la visite du prince de Galles et la construction du Crystal Palace à Montréal en 1860," and Pierre Brouillard, "Les dernières années du Crystal Palace au parc de l'Exposition provinciale: 1878-1896, Rapport du groupe de recherche en Art populaire: travaux et conférences, Montréal: Département Histoire de l'Art, Université du Québec à Montréal, 1979, pp. 258-84 and pp. 285-99.

was instructed "to write to the contractor and inform him to proceed at once with his arrangements for the erection of the Main Building without the Transepts. That if Transepts be added, they shall be executed in accordance with the terms stated in his Tender. That in either case the Building must be completed on or before the 1st day of July next. That if a change of site is determined upon, involving material modifications of the Building; that alterations are to be made at the same rate of prices as that calculated upon for the building already tendered for. That such change of site, or alterations of Building, if determined on, shall be notified to him on or before Saturday the 14th instant."[82]

The construction of the Crystal Palace is notable for the amount of attention which it received in the local press. Both the debate over the site of the building and its construction was followed closely.

Hopkins' competition entry had proposed a cruciform basilica with a 184 foot barrel-vaulted nave on the north-south axis between St. Catherine and Cathcart Streets with sixty-foot transepts extending east and west from a central crossing to Union and McGill College Avenues. As a result of the financial problems encountered by the Board, the transepts were reduced in length by two twenty-foot bays and the ends of each transept not finished according to the contract specifications but were simply and, it was probably assumed, temporarily, boarded up. Hopkins presented plans containing these and

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82 Montreal Gazette, Friday Morning, July 6, 1860, p. 1.

other revisions to the competition project made in the interests of economy at a meeting of the Building Committee of the Board on April 7.[83] The decision to reduce the length of the transepts was felt to be only a temporary expedient, and both the architect and the Board looked confidently toward the most too distant day when they would be extended.[84]

Work began on or before April 16 when the Witness reported that "laborers are now at work digging out the foundation.[85] A formal contract with McNeven was signed on April 27, 1860.[86] By May 5, despite the poor ground which required extensive piling and rock fill, the nine to ten foot deep foundations were well underway and already three feet above ground level on the north side of the site.[87] Perhaps as a result of unforseen expenditures incurred in constructing stable foundations, the sub-contractors for the foundation, Soucis and

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[83] Montreal Gazette, July 6, 1860, p.1.

[84] Le Pays (Montréal), 5 May 1860, p. 2. Hopkins interviewed by a journalist from Le Pays here not only suggests that the transepts will be extended to their original planned length of three bays, but suggest they might be further extended to University Street and McGill College Avenue.

[85] Witness (Montreal), April 16, 1860, p. 244.

[86] ANQ-M, J. S. Hunter, "Contract. . ." no. 5462, see below, Appendix I.

[87] Le Pays (Montréal), 5 mai 1860, p. 2. The pilings were of pine and driven to a depth of twelve feet.

St. Louis, filed a "Note and Protest" against McNeven on May 7, 1860.[88]

On May 12, it was reported that the Montreal Horticultural Society had appointed a Committee "to take charge and embellish the grounds around the Crystal Palace."[89] A week later, the same newspaper noted testily that "on Thursday morning we were surprised to find that not a single man was at work on the Exhibition Building, and on enquiring the reason, learned that the day was a fête d'obligation. The loss of the labour of so many men must be seriously felt, when it is considered that the Building must be completed at an early date."[90]

Faced with serious financial problems, the Board launched a public funding campaign in order to raise additional financing for the construction of the exhibition building and also issued a call for tenders for the privilege of selling refreshments during the exhibition.[91]

On June 6, a serious accident was reported at the building site when a Major Holmes was injured by a falling beam.[92] Construction of

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[88] ANQ-M, R. Beaufield, "Note and Protest," no. 425.

[89] Witness (Montreal), May 12, 1860, p. 301.

[90] Witness (Montreal), May 19, 1860, p. 317.

[91] Le Pays (Montréal), May 19, 1860, pp. 2-3.

[92] Witness (Montreal), June 15, 1860, p. 5.

the roof was begun on June 17[93] and on July 6 the Gazette reported that the last of the arched ribs of the dome roof. . . was raised to its place yesterday morning and decorated by the workmen with the accustomed green branch. The side roofs are boarded in, the unfinished ends of the transept are being enclosed, and the flooring will be proceeded with."[94]

In July, construction was sufficiently advanced to allow the board to turn its attention to preparing the building for its inauguration and the exhibition. The Board gave public notice that is was applying to City Council for permission "to erect (temporarily) a Steam Engine in or adjoining the Exhibition Building. . . ."[95] The Horticultural Society had agreed to prepare the grounds and arrangements had been made with the newly founded Montreal Art Association "for the proper lighting of a gallery, and proper hanging of pictures."[96] The finishing of the interior was underway and it was reported that "J. & W. Hilton are fitting up one of the rooms near the entrance for the use of the Prince of Wales. . . ."[97] This was undoubtedly the room

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[93] Witness (Montreal), June 22, 1860, p. 5.

[94] Montreal Gazette, July 6. 1860, p. 2.

[95] Montreal Gazette, July 2, 1860, p. 1. A steam engine to power mechanical exhibits was "specially made by Mr. Geo. Bush, at the Eagle Foundry. . ." and was installed in the basement of the building. See Building News, VI (July 27, 1860), 588.

[96] Witness (Montreal), July 25, 1860, p. 405.

[97] Montreal Gazette, July 27, 1860, p. 2.

intended for use as the offices of the Board. However, despite the optimism of the Witness and the Gazette, execution of the contract was not going well. On August 8 a second "Protest" was lodged against McNeven's failure to complete the building according to the agreed upon in the contract.[98]

By August 11, 1860, the building was substantially completed and was being subjected to structural tests.

> A severe test of the strength of the new Exhibition Building has been applied, under the direction of Engineers appointed by the Provincial Government and the Military Authorities for that purpose. A pressure of 20 tons was placed on twenty superficial feet of the weakest part of the galleries, without producing the slightest effect. The weight yet remains there. The building was lit up with gas in the evening after the test had been applied, and Prince's Band went in to play. The result was that people in crowds were soon promenading the galleries. But their weight added to that of the mass of iron, did not make any difference. Although it looks light, there cannot be the slightest doubt of the immense strength of the building. No man who has the slightest inkling of mechanics can question this. The Engineer, Mr. S. Keefer, Public Works, and Captain Warren, of the Royal Engineer Department, expressed themselves well satisfied. Articles for the Exhibition are arriving very fast, and of such character as to leave no doubt of its out rivalling any industrial exhibition ever held in Canada.[99]

The building was subjected to further testing on August 13 when "a number of the Royal Canadian Rifles stationed in this city, under Col. Bradford, marched up to the exhibition building, and, under the supervision of the Engineers deputed by the Imperial and Canadian Governments, concluded the test of strength of the galleries,

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[98] ANQ-M, J. S. Hunter, "Payment under Protest," August 8, 1860, no. 660.

[99] Witness (Montreal), August 11, 1860, p. 3.

staircases and flooring of the building. It is a well known fact that the tramp of a military corps is the severest test a building or other erection can withstand and we are happy to state the building endured the strain in and measures shock in a perfectly satisfactory manner, and fully carried out the anticipations of the Board of Arts and Manufactures."[100]

The testing apparently marked the completion of McNeven's contract for the Witness, on August 18, declared that "Mr. McNiven, the builder of this beautiful edifice, has now delivered it; his contract thus being completed in the time fixed for it."[101] Final preparations for the exhibition and the inauguration of the building by the Prince of Wales were underway shortly thereafter and the Board published a notice stating that "it will be impossible to admit any parties to the Exhibition building until the day of inauguration, except for those employed in fitting up the interior and placing of goods. The workmen have been already been too much interrupted by visitors, out of mere curiosity."[102]

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100 Montreal Gazette, August 14, 1860, p. 2. The testing of the structure is very similar to that carried out in the 1851 London building, see M. D. Wyatt, op. cit., p. 56.

101 Witness (Montreal), August 18, 1860, p. 522. This is contradicted by the "Protest" cited above. The contract specified July 15 as the delivery date.

102 Montreal Gazette, August 23, 1860, p. 2.

CHAPTER V

A Description and Analysis of the Montreal Crystal Palace

The selection by the Board of Arts and Manufactures for Lower Canada of John William Hopkins as architect of the Provincial Exhibition Building and Museum was, perhaps, not surprising. Born in Liverpool in 1825, Hopkins had resided and practiced in Canada since his arrival in 1852. His first professional commission in Canada was undoubtedly the Mechanics' Hall for the Montreal Mechanics' Institute, a commission undertaken in informal partnership with James Nelson and for which they received life membership in the institution as their only payment.[103] On October 8, 1853, while working on the Mechanics'

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[103] The precise date when Hopkins and Nelson undertook the commission has not been determined, however it was sometime before Robert Stephenson, the son of the great English engineer and the engineer responsible for the Victoria Bridge, visited the Mechanics' Institute and "examined the plans for the new Institute" on August 17, 1853. Montreal Mechanics' Institute Papers, Minute Book, 1847-53, "Mr. Stephenson at the Mechanics' Institute," n.p.; Construction of the building was begun in the Fall of 1853, see Montreal Mechanics' Institute Papers, Report, 1855, n.p. For Hopkins' and Nelson's payment, see Montreal Mechanics' Institute Papers, Minute Book, 1853-61, "Report of the Fourteenth Annual Meeting of the. . .Institute," n.p., "Messrs. Hopkins & Nelson, architects, have proposed to receive Life Membership in consideration of professional services. . . ." While executing the commission, Hopkins and Nelson formed a legal partnership, see ANQ-M, J. S. Hunter, "Articles of Co-partnership between John. W. Hopkins & Jas. Nelson," October 8, 1853, no. 219.

Hall project, Hopkins and Nelson entered into a legal partnership.[104] Hopkins was an active member of the Institute and he participated in the organization of a "Polytechnic Exhibition and Fancy Fair" organized by the Institute in 1855[105] and was a member or its building and finance committees.[106] Through his activities as a member of the Institute Hopkins undoubtedly came into contact with many of those members of the Institute's executive subsequently appointed to the Board of Arts and Manufactures.

While information concerning Hopkins' training and practice before coming to Canada has not come to light, the fact that in 1855 he entered into a partnership with Frederick Lawford (who had worked in the office of Charles Barry),[107] as an equal partner suggests the quality of his credentials as an architect.[108] Nelson, who also joined the partnership, did so on the basis of a reduced participation.[109]

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104 ANQ-M, J. S. Hunter, "Articles of Co-partnership between John W. Hopkins & Jas. Nelson," October 8, 1853, no. 219.

105 Montreal Mechanics' Institute Papers, Minute Book, 1855-59, "General Committee Meetings, 12, 19 March and 2 April 1985," and Minute Book, 1853-61, "Extraordinary Meeting, 27 March 1855," n.p.

106 Montreal Mechanics' Institute Papers, Minute Book, 1855-59, "General Committee Meetings, 2 April 1855 and 2 November 1855," n.p.

107 Jean-Claude Marsan, Montréal en évolution (Montréal: Fides, 1974), pp. 217-18.

108 ANQ-M, J.S. Hunter Contract No. 538, 15 March 1853.

109 ANQ-M, J. S. Hunter, "Agreement," March 15, 1855, no. 533. Under the terms of the agreement Hopkins and Lawford each received three of eight shares in the practice while Nelson received two shares.

As the eldest son in a family long engaged in the service of the Royal Coast Guard and in view of his Liverpuddlian origins[110], it is perhaps not surprising to find customs houses and particularly warehouses listed among Hopkins earliest commissions in Canada. Other early commissions undertaken by the firm include public buildings, major churches, shops, tenements and city and country residences for members of the English-speaking business community. The firm of Hopkins, Lawford and Nelson quickly became one of the city's most successful practices and both Frederick Lawford and Hopkins were active in promoting a new standard of professionalism for the practice of architecture in Canada.[111]

For Hopkins the period leading up to his winning of the competion for the Crystal Palace must have been difficult. The Hopkins, Lawford and Nelson partnership was formally dissolved in October 1859 and, under the terms of the dissolution, Hopkins was to take up practice in

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[110] Montreal Gazette, December 12, 1905, p. 9; Canadian Architect and Builder, December, 1905, p. 178. I would like to thank Robert Hill, Editor, The Biographical Dictionary of Canadian Architects, 1800-1950 (forthcoming) for bringing the obituary notices from which biographical information on Hopkins is drawn.

[111] Hopkins was the Founding President of the Province of Quebec Architects Association. See Canadian Architect and Builder, III (October, 1890), 110-16, and IV (March, 1890), 35. Lawford was active in a short-lived professional organization for architects, engineers and surveyors in Canada, the Association of Surveyors, Civil Engineers, and Architects founded in 1859, see Builder, XX (August 9, 1862), p. 573 and Journal of the Board of Arts and Manufactures for Upper Canada, I (January 1861), p. 14. I am grateful to Stephen A. Otto, Historian, for his kindness in bringing these last two references to my attention.

Ottawa where the firm had maintained a branch office.[112] In January and February 1860 the following advertisement was appearing regularly in the Ottawa Citizen:

> To Persons about to Build
> Hopkins and Fripp,
> ARCHITECTS
> OFFICE. Aumond's Buildings, Ottawa
> PLANS and SPECIFICATIONS prepared
> ESTIMATES furnished and Buildings superintended.
>
> Ottawa, Jany. 1, 1860[113]

However, if Hopkins indeed left his Montreal practice to in fact establish a practice in Ottawa with Fripp, it must have been for a very short period indeed.

Undoubtedly the contract for the Crystal Palace was an important commission for the thirty-four year old Hopkins. It was not only a major public building, among the largest in the city, but the use of cast iron both structurally and in the facades probably represented the most extensive local use of this material ever undertaken in Montreal up to this time.[114]

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[112] ANQ-M, J.S. Hunter, "Dissolution of the partnership between John W. Hopkins, Frederick Lawford & James Nelson & agreement between Lawford & Nelson," October 22, 1859, no. 5123.

[113] Ottawa Citizen, February 14, 1860, p. 4.

[114] For a studies the use of cast iron in architecture in Montreal in the nineteenth century see Jean Bélisle, et al., Montreal Cast Iron Architecture en Fonte, second ed., (Montreal: Heritage Montréal, 1984) and Renée Loisier, "Façades en fonte à Montréal : Aspects Technologiques et Stylistiques" (M.A.thesis, Concordia University, 1984). Of course the Victoria Bridge, which was under construction from 1855 (?) to 1860 was the largest structure constructed of cast iron any where in the world. It was not however a local enterprise, the iron work and technology being directly imported from England. See L.T.C. Rolt, George and Robert Stephenson, The Railway Revolution

The project proposed by Hopkins in his competition entry was for a cruciform basilica based upon a twenty foot square module. A Greek-cross in plan with the nave and transepts extending in three twenty foot bays in each direction from a forty by twenty foot central crossing, the plan and elevation, in its fundamentals conformed to mid-Victorian prescriptions for museum design. Gwilt's popular mid-century encyclopaedia of architecture includes museums among its description of significant public building types and recommends, somewhat unenthusiastically perhaps, that "the Greek cross connected by a dome in the centre for the hall of communication is perhaps as good a form for a museum on a small scale as could be adopted. . . ."[115]

The sobriquet, "Crystal Palace," which was quickly applied to the to the project by the Montreal press is in fact a misnomer as far as it recalled or referred to the 1851 prototype. It was probably not only the extensive use of glass in the Paxton Building but the particular faceted character of the "ridge and furrow" glass roofing system which suggested the name "Crystal Palace" to Paxton's contemporaries. Hopkins building contained neither. However, by 1860 when construction of the Montreal exhibition building was undertaken, the name had apparently lost its initial connotation and had become

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(Harmondsworth, England: Penguin Books, 1978), pp. 315-17.

115 Joseph Gwilt, Encyclopaedia odf Architecture; Historical, Theoretical, and Practical, rev. ed. (London: Longmans, Green, 1867; reprint ed. New York: Bonanza Books, 1982), p. 1038. Gwilt also proposes the Greek cross plan as the most appropriate for libraries as well, see p. 1036.

simply a catch-all term for an industrial exhibition building which in its use of such materials as glass or iron or which, through certain design features, recalled the prototype. The Gazette was quick to note and to offer an explanation for the decidedly non-crystaline character of the Montreal building remarking that it is only in a "climate like that of Britain that a glass and iron structre can be made permanently available."[116]

However while Hopkins' building contained a sufficient number of references to Paxton's building to inscribe the building in the nacent tradition of "crystal palace" architecture in the minds of journalists writing in the popular press, Hopkins did not merely rework Paxton's prototype on a reduced scale. Events had succeed one another with great rapidity in the nine years which had elapsed since the Great Exhibition of 1851 and two main trends are evident. On the one hand Paxton's building had initiated a series of large scale temporary buildings employing the most advanced engineering technology which were designed to serve as venues for international exhibitions.[117] On the other hand ferro-vitreous elements were increasingly employed in permanent buildings erected as museums and libraries.

Such buildings as University Museum, Oxford, by Dean and Woodward, constructed from 1855 to 1860, bear witness to the movement of ferro-vitreous architecture into the mainstream of Victorian architectural practice and its accepted by even the most savage critics of Paxtton's exhibition building when cloaked in an appropriate and historically

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116 Montral Gazette, May 19, 1860, p. 2.

117 For a discussion see Luckhurst, op. cit. and Hix, op. cit.

correct stylistic garb.[118]

Hopkins building was of mixed construction.[119] The principal facades on St. Catherine and Cathcart Streets were constructed of cast iron while the side walls of the nave and the transepts were of conventional American bond brick construction with brick piers in the form of pilasters separating each bay. A cast iron internal structure supporting two levels of twenty-foot wide galleries formed a continuous circuit around the interior perimeter of the building.

The building design was based upon a twenty-foot square module with trussed girders of 19' 4" attached to eight inch diameter vertical connectors. The connectors had sockets at each extremity and were fitted into eight inch diameter columns. The cast iron facades and other structural and ornamental wrought and cast iron work were executed by three local foundries, Johnson and Company, Ives and Allen, and Rogers and King.[120]

Although the module of the Montreal Building was twenty feet as

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[118] Ruskin, who strongly criticised the Crystal Palace and the new architecture of iron and glass, was insturmental in securing the University Museum commission for Dean and Woodward and it is an exemple example of the Venetian Gothic style which hewas promulgating at this time. See Roger Dixon and Stefan Muthesius, Victorian Architecture (New York: Oxford University Press, 1978), p. 107 and pp. 159-161.

[119] Unless otherwise noted, all information regarding the method and materials used in the construction of the Crystal Palace are found in ANQ-M, J. S. Hunter, "Contract and Agreement," April 27, 1860, no. 5462. This document, the contract and specifications for the building between the Board of Arts and Manufactures for Lower Canada and Daniel McNeven, has been transcribed and appears as "Appendix I."

[120] Building News, VI (July 27, 1860), 588.

opposed to the twenty-four feet of Paxton's Building, the structural system for supporting the galleries of the two buildings is similar.[121] However, unlike Paxton's prototype in which the internal structure of the building formed a continuous part of the exterior walls and which carried a fragile ridge and furrow glass roof, Hopkins cast iron structural system for supporting the galleries and roofs was enclosed by self-supporting brick walls. Each cast iron column immediately adjacent to the brick wall was anchored into brick pilasters by two wrought iron ties. Thus both the exterior brick shell and the internal cast iron structure provided each other with lateral support.

The barrel-vaulted nave was constructed of a series of timber ribs in the form of segmental arches resting at six-foot eight inch centers on wooden runners supported by cast iron corbels bolted to the second floor columns. Although the specifications are highly detailed regarding the fabrication of most elements of the building there are few specifications regarding the construction of these arches. In view of both other structural "borrowings" by Hopkins and the fact

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[121] One of the most useful sources for information on the construction of the 1851 London Crystal Palace remains the essay by Matthew Digby Wyatt, "The Construction of the Building," Great Exhibition of the Works of Industry of All Nations, 1851: Official Descriptive and Illustrated Catalogue, Vol. I (London: Wm. Clowes and Sons, 1852), pp. 49-81?. Other useful sources of information are George F. Chadwick, The Works of Sir Joseph Paxton, 1803-1865 (London: Architectural Press, 1961), Yvonne ffrench, The Great Exhibition: 1851 (London: Harvill Press, 1950). Folke T. Kihlstedt, "The Crystal Palace," The Scientific American, CCLI (October 1984), 132 - 143 presents a useful analysis of the building's structural engineering features. See, too, Appendix II, below, for reconstruction drawings of the Hopkins Exhibition Building and Museum..

that the ribs were pre-assembled and raised into position,[122] it is probable that they were similar in construction to those of the 1851 Crystal Palace.[123]

Undoubtedly the fabrication of the arches was included in the sub-contract for the woodwork which was awarded to the firm of Ostell and Shearer.[124] One of the principals of this firm, John Ostell, was not only an entrepreneur engaged in the building materials trade but was, or had been until shortly before the construction of the Montreal Crystal Palace, a surveyor, an architect and an engineer and he may have played a role in determining the design of these arches. However, it should be noted that Hopkins' abilities as a structural engineer were at least the equal of those of Ostell.[125]

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[122] Montreal Gazette, July 6, 1860, p. 2.

[123] See Wyatt, pp. 63-64. This method of constructing laminated timber arches was not new. A somewhat similar system appears to have been employed by Lewis Cubitt in the Kings Cross Railway Station in London of 1851-52, see Henry-Russell Hitchcock, Early Victorian Architecture in Britain, abridged ed. (New York: Da Capo Press, 1976), illus. XVI 33. Joseph Gwilt in his Encyclopedia of Architecture; Historical, Theoretical, and Practical, revised ed. (London: Longmans, Green, 1867; reprint ed., New York: Bonanza Books, 1982), p. 613, traces the history of the laminated wooden arch back to experiments carried out in 1825 and 1826 by a certain Colonel Emy.

[124] The Building News, VI (July 27, 1860), 588. I would like to thank Robert Hill, Editor, Biographical Dictionary of Canadian Architects, 1800 - 1950, for bringing this article to my attention.

[125] Ellen James, John Ostell, Arpenteur/Architect/Surveyor, (Montreal: McCord Museum, 1985), esp. pp. 87-88. The evidence cited by James in support of Ostell's claim as an engineer is a design for a

As previously noted, a brick exterior shell enclosed the building on all sides except for the facades at either end of the nave, which were principally constructed of cast iron, and the facades at the ends of the transept which, as constructed, were boarded up.[126] This ostentatious use of brick was novel in a major public building in the Montreal of 1860. In the mid-Victorian hierarchy of building materials brick ranked far below cut stone. It was an industrial building material, the material of factories, warehouses and worker housing. It could be argued that the use of brick as one of the major components of a building intended to play a major role in the industrial development was appropriate or even symbolic of the specifically "industrial" mandate of the Board of Arts and Manufactures. Yet Hopkins' use of brick was a novelty in Montreal not only because it was so ostentatiously employed, but more specifically, because the type of brick used was in itself novel. The contract specified that Toronto White Pressed Brick was to be employed in the principal facades and in the window embrasures, pilasters and cornices in the nave and transept walls. The manufacture of pressed brick had

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timber roof truss signed, "John Ostell, Engineer in charge." Hopkins designed an elaborate wooden roof truss for a drill shed of great complexity with a clear span of more than one hundred feet, see ANQ-M, CAR 39/54 (#77).

126 A photograph in the Archives Municipal de Montréal clearly shows this. However as the transepts were intended to be extended to their full, three bay length of sixty feet, this was a temporary expedient. The contract (Appendix I), suggests that these facades were to be completed in a manner similar to the principal facades on St Catherine and Cathcart Streets.

only recently begun in Canada and its appearance in the Montreal Crystal Palace may well have marked its first use in the city.[127] Manufactured by mechanically applied pressure, pressed brick had a much more regular surface and form than the handmade bricks which were in widespread use in the Montreal of 1860. Additionally, the Toronto White brick was a pale, dun-yellow, in color and it contrasted vividly with the local rose-colored brick of Montreal which was used elsewhere in the nave and transepts walls of the building. The Crystal Palace may well have not only marked the first appearance of Toronto White Pressed brick in the city but the first use of brick polychromy as well and it can be further suggested that this polychromy marriage of Montreal rose and Toronto white brick symbolized the specific role that the building and the institution that commissioned it hoped to play in the emergence of a national industrial economy in a united Canada. If, indeed, it is the case that Hopkins was using building materials didactically in the Montreal exhibition building and museum then a further similarity to Deane and Woodward's University Museum in Oxford is suggested. In the University Museum the column shafts supporting the glazed roof of the central courtyard were of different

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[127] The Toronto Pressed Brick Company was incorporated in 1857 (20 Victoria, c. 177), and its advertisement was appearing regularly in the Globe (Toronto) in 1860 offering "Pressed White Stocks & Common Red Bricks. . . ." for Sale, Globe (Toronto), May 7, 1860, p. 1. Ronald Brunskill and Alec Clifton-Taylor, Brickwork (New York: Van Nostrand Reinhold Co., 1982) pp. 45-46, date the widespread manufacture of pressed brick to the 50s of the last century. The novelty of Hopkins' use of pressed brick can be judged by the statement made some sixty-three years later that "not more than five or six years have elapsed since the manufacture of pressed bricks was commenced in Canada." (Canadian Architect and Builder, March 1893, 45).

British stones or marbles. Each was carefully labelled and formed a part of the geological exhibit in the museum.

Certainly Hopkins did not have to go far nor did he have to deal with strangers in his search for a local source for Toronto White Pressed brick. The Montreal agent, James Garven, was a former apprentice to the firm of Hopkins and Nelson[128] and the office address of the agency, 23 Great Saint James Street, was the same as that for Hopkins' professional office.[129] The suspicion that Hopkins himself was directly involved with the agency is further suggested by the fact of his previous involvement, while in partnership with Lawford and Nelson, in the manufacture of bricks.[130] Although Hopkins had surrendered all of his rights and interests in the firm's brickmaking activities with the dissolution of the partnership in 1859,[131] this stipulation like that which surrendered the firm's Ottawa office to him, may well have been quickly forgotten.

By Victorian standards Hopkins' building was austere but in comparison with Paxton's Crystal Palace it was rich in ornament and

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128 ANQ-M, J. S. Hunter, "Indention of Apprenticeship," October 2, 1854, no. 373.

129 ANQ-M, J. S. Hunter, "Indention of Apprenticeship," October 2, 1854, no. 373.

130 ANQ-M, J. S. Hunter, "Contract & Agreement," February 6, 1858, no. 3233; "Transfer and Lease," February 6, 1858, no. 3232; "Contract," December 20, 1858, no. 4180; and "Agreement & Transfer," April 13, 1859, no. 4500.

131 ANQ-M, J. S. Hunter, "Agreement and Transfer," 13 April 1859, no. 4500.

non-functional detail. This reflects developments in ferro-vitreous architecture in Britain in the years immediately following the erection of Paxton's Crystal Palace. As Dixon and Muthesius remark, "where metal and glass buildings were constructed in the Mid-Victorian period they tended to become less stark, and to be overlaid with architectural decoration."[132]

In elevation Hopkins' building rose from a full basement, nine to ten feet deep to three feet above grade on St. Catherine Street and, as a result of a gentle slope falling from the north to the south, to six feet above grade on Cathcart Street. Above the foundation the building consisted of three full floors and a clerestory in both the nave and the transepts. Twenty-foot wide single side aisles ran continuously along the sides of both the nave and the transepts and defined the space occupied by the first and second floor galleries.

The building was well lit with natural light pouring down from nave and transept clerestories and through windows in the flanks and facades. While the transept clerestories were covered with a pitched roof of timber construction, the nave was roofed with a semi-circular barrel vault. At either end of the nave facades, principally of cast iron, extended upward and enclosed the ends of the vault with a semi-circular cast iron fan window approximately forty feet in diameter. These large fan windows provided the building with one of its most direct references to Paxtons's prototype where similar cast iron fan windows enclosed either end of the transept barrel vault.

Although this fan window was pierced with three rows of radial

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132 Dixon and Muthesius, op. cit., p. 101.

windows, it functioned as more than a simple window. Built up of a series of semi-circular castings of increasing diameter, it not only only acted as a structural support for the window glass but near its outter-most extremity, where it met either corner of the facade, it was joined to brick chimmnies. By means of a cast iron tube built into the fan window and connected to these chimmnies, smoke from the heating apparatus, and perhaps from the steam engine installed in the basement of the building as well, was conducted to a decorative cast iron chimney pot which rose above the mid-point of the fan windows.

Hopkins' ingenuity in designing what was at once window and chimney recalls both the technical innovation and the "multivalent"[133] approach to design characteristic of Paxton's exhibition building. One frequently cited example of the technical ingenuity and "multivalence" found in Paxton's Crystal Palace is the use of the hollow columns which formed the basis of structural support for the building as down spouts connected to gutters on the roof.[134]

In plan, elevation, the massing of its component forms and, particularly, in the articulation of geometrical structure through the use of polychromy the building recalls the early renaissance basilica, Santa Maria Nouvella, by Alberti. Certainly Hopkins shared the

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[133] The term "multivalent" was coined by Charles Jencks in Modern Movements in Architecture (Harmondsworth, England: Penguin Books Ltd., 1973), pp. 13 ff. According to Jencks, it consists of "four distinct qualities: imaginative creation, or the putting together of parts in a new way, the amount of parts so transformed, the linkage between the parts which is the cause of this creation and which allows the parts to modify each other (p. 14).

[134] These "multivalent" columns are discussed in much of the literature on Paxton's Crystal Palace, see Chadwick, op. cit. p. 56.

Victorian predilliction for Tuscan renaissance models. The Church of the Messiah designed for the Unitarian concrgation of Montreal by Hopkins, Lawford and Nelson in the late 1850s was among the most significant examples of this popular style in the city. A copy of Sei Fabbriche di Firenze, at McGill University which contains an series of lithographed line drawings of Tuscan renaissance facades and architectural details was apparently used as a pattern book by the firm. The book is a tatalizing suggestion of the extent of their interest in and knowlege of Tuscan architectural models.[135]

Like Alberti's basilica, Hopkins' design for the Crystal Palace is strictly controlled by Euclidian geometric forms, the square and the circle, derived in systematic proportions from the governing twenty foot square module. The geometric basis of the design is consistently articulated through mouldings and cornices, and through such features as the cast iron segmental arches below the lean-to roof of the side aisles on the St. Catherine and Cathcart Street facades. However the most emphatic means of articulating these abstract geometric forms is through the use of brick polychromy.

The rationalism of early Italian renaissance design resided, ultimately, in an irrational faith in the significance of geometric for and proportion as a reflection of metaphysical structure. By the

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135 The book, by Donato Celles, Sei Fabbriche di Firenze (Firenze: Litografia di Achille Paris, 1851), is in the Blackader-Lauterman Library at McGill University in the rare-book cage. It is inscribed on the fly-leaf, "Fredk. Lawford, Montreal, 1855." Some of the plates have pencil notational sketches beside them and a scale, drawn on paper, is interleaved. I would like to thank Robert Lemire, Historian, Centre Canadien d'Architecture/Canadian Centre for Architecture, for drawing may attention to this document.

Victorian period the theoretical and metaphysical discourse which had controlled and defined both the a use of ornament and a design method based upon divine proportion and geometric form was under attack from many directions.[136] Although these remained powerful elements in the Victorian architectural vocabulary they were increasingly viewed as purely architectural or decorative elements with, at most, a passing reference to non-architectural discourse.

The London Crystal Palace designed in 1851 by Joseph Paxton was remarkable for its revolutionary refusal of ornament and its brazen articulation of physical structure. In effect, Paxton's Crystal Palace proposed an alternate form of architectural discourse and it is this which underlies the criticism and rejection of his accomplishment by such influential figures of the period as Pugin and Ruskin. Indeed the building was, from the point of view of those imbued in Victorian architectural theory, simply "building" and not architecture. Its design methodology was derived from construction and engineering and drew upon the practices of railway construction rather than of architecture.[137]

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[136] The loss of religious faith and the questioning of what had been unshakable beliefs is a widely recognized characteristic of Victorian thought and ranged from the impact of Darwin's theories on literal interpretations of the Bible to a redifinition of the social order. See Bury, op. cit.

[137] It is significant that Fox and Stephenson, railway engineers, were responsible for preparing the working drawings and specifications for Paxton's building. Through their experience as leading figures in the railway revolution they were familiar with the design of structures assembled from a limited number of industrially prefabricated forms. See Chadwick, op. cit. The same is true of the 1858 Toronto Crystal Palace which was designed by Stanford Fleming, a railway engineer.

The design methodology of Victorian engineering was based upon considerations of cost-efficiency and a scientific and functional approach to structural design which rejected ornament as an unncessary and wasteful encumbrance. The refusal of ornament and the unembarrassed revelation of physical structure which characterizes Paxton's building heralded a rediscovered though transformed approach to the definition of structure in architecture.

Hopkins' clearly sought to design a building which would be part of the nacent tradition of proto-rational architecture. His design, however, vacilates between two traditions, between the pre-rational metaphysical discourse of the early Italian renaissance and the proto-rational capitalist discourse which underlies the design methodology of Paxton's building. Hopkins' exhibition building reflects the continuities and the discontinuites which emerge from this ambivalent design methodology as they at times meet on common ground and at others diverge and clash. The extensive use of sham windows, for example, creates not only what observers in the period described as "a light and pleasant aspect,"[138] but are a necessary rhetorical repitition, a visual statment of the additive and rigid symmetry of the design but one which is entirely non-functional and which bears no relation to the interior arrangement of the building; the extensive use of an off-white paint to merge the different materials used in the facade and the stipulation in the specifications that wooden columns were to be identical in form to the cast iron columns all point toward an attempt, on the part of Hopkins, to create a building with a

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[138] Building News, VI (July 27, 1860), p. 588.

rational integrity was purely visual.

Hopkins specifies that a single nineteen foot and four inch trusses or "girders" be used throughout the building. The use of a single truss of standard size supported by columns of a standard external diameter of eight inches not only achieves economies of scale in the production of this specific element, it imposes a regular twenty foot modular grid over the plan of the building. Thus Hopkins arrives at the module from two different directions, as a result of the pre-rational approach to design practice and through the proto-rational exemplified by Paxton's revolutionary Crystal Palace.

Yet for Hopkins the metaphysically based rationalism of Alberti and the economically pragmatic rationalism of Paxton combine to serve a single end. Both are employed in the service of a rationalism that is symbolic and visual. Hopkins' approach to design is through style operating in the service of an intentionality that is symbolic. It allows him freedom from the the theoretical contradictions which are inherent in his stylistic eclecticism.

CHAPTER VI

An Assessment and Conclusion

The Montreal Crystal Palace was officially inaugurated on August 27th by the Prince of Wales amid exceptional pomp, splendor and public excitement. Yet, despite the auspicious inauguration, the political controversy and funding problems which had beset the project from its inception did not subside or disappear. The Board of Arts and Manufactures for Lower Canada was obliged to rent the building to the military and throughout the 1860s, the local militia trained there.[139] An 1866 view of the building[140] shows a forlorn and seemingly abandoned building. The flags and banners which had welcomed the public and Montreal's royal guest some five years earlier are gone and the building has begun to show signs of lack of maintenance.

The transepts were never extended and remained boarded up. The nearest the building ever came to being enlarged was in 1863 when the military authorities proposed that a drill shed be built onto the

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[139] Herald (Montreal), November 12, 1863, p. 2.

[140] Notman Photographic Archive, McCord Museum. This view is reproduced in Montreal Old and New, op. cit., p. 385, but whereas the Notman negative (see Appendix II, fig. IV) has been cut to a "carte de visite" format the published view includes the west transept facade.

building.[141] The Crystal Palace was the venue for a series of local spectacles ranging from prize fights to celebrations of the tri-centenary of Shakespeare's birth.[142]

Not only did the building rapidly decline but the Board of Arts and Manufactures did as well. In an 1864 parliamentary debate on funding to the Board of Arts and Manufactures in Upper and Lower Canada, Alexander Galt was attacked over the failure of the Lower Canada Board to fulfill its mandate. It was charged that the Board "was managed by a little political clique who did just as they liked, working to make capital for themselves. Some hard things were said with respect to the erection of the Crystal Palace."[143] By 1867, the situation was critical and at the Annual Meeting of the Board that year, the Executive stated that "they felt, as their predecessors had, the pressing necessity of adopting immediate action to secure the reduction and discharge of the liabilities incurred in the erection of the Exhibition Building, which has been an incubus for several years past, paralyzing the efforts of the Board and circumscribing its operations. . . ."[144]

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141 Herald (Montreal), November 12, 1863, p. 2. The project was apparently never carried out.

142 See Herald (Montreal), April 22, 1864, p. 2.

143 Herald (Montreal), June 14, 1864, p. 2.

144 Proceedings of the Annual Meeting of the Board of Arts and Manufactures of Lower Canada, Held at Montreal, on the 2nd of January, 1867 (Montreal: A. A. Stevenson, 1867), p. 2.

The Board had already sold vacant building lots on the St. Catherine Street site and had returned the library of the Mechanics' Institute, which it had been renting, in a vain attempt to improve its difficult financial situation.[145]

By the early 1870s, the Board's financial difficulties had become extreme and the new Federal Canadian government attempted to assist the Board in its struggle with its debt by dissolving the Board and reconstituting it as the Council of Arts and Manufactures. However, this expediency only raised the ire of one of the Board's principal creditors, the Royal Institution for the Advancement of Learning which was the leaseholder for the Crystal Palace site.

In selecting the Saint Catherine Street site in 1860, the Board had maintained that although the area was then undeveloped and at somewhat of a distance from the city core, it "destines before many years to be the finest and most populous street in the city. . . ."[146] In this, as in little else, the Board was correct. By the 1870s the area was undergoing rapid development. In 1860, the Crystal Palace had joined the nearby Christ Church Cathedral, McGill College, and the National History Society Museum in forming a nascent enclave of cultural institutions serving the English-speaking population of the city and discussions were underway in the 1860s and early 1870s regarding the construction of three additional institutions, a

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145 Proceedings. . . 1867, pp. 3-4.

146 Montreal Gazette, July 6, 1860, p. 1.

botanical garden, a Music Academy, and the Art Association of Montreal Gallery.[147]

Provoked by the action of the government in dissolving and reconstituting the Board and by the prospect of the Board thereby evading its financial obligations to the Institution on the one hand, and enticed by a purchase offer for the site by Thomas Cramp, a developer on the other, the Royal Institute initiated action against the Board for recovery of the site.[148]

In view of the close relations between the Board and the Royal Institution, the precipitous action of the Royal Institution is perhaps surprising. However, in 1871, there was an important shift in the make up of the Board which had alienated its English-speaking supporters. Despite a minority presence of some French-Canadian

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147 The Botanical Garden project was widely discussed in 1863 and 1864. It was to be located on the grounds in front of the Old Arts Building at McGill College. Plans were prepared by "Messrs. McNab, Nairn, Spriggins and Davids - the latter having been employed under Sir J. Paxton," Herald (Montreal), April 29, 1863, p. 2. A site plan for the project is in the McGill University Archives. The Music Academy, was constructed under the patronage of Hugh Allen after the designs of Taft and Hutchison in 1875, see Raymond Montpetit and Sylvie Dufresne, "Bref historique du théâtre, Académie de Musique 1875-1910," Rapport du Groupe de Recherche en Art Populaire: Travaux et Conférences (Montréal: Departement Histoire de l'Art, Université du Québec à Montréal, 1979), pp. 171-186. The Gallery of the Art Association of Montreal, designed by Hopkins, was constructed between 1877 and 1879. See Rosalind M. Pepall, Construction d'un Musée des Beaux-Arts/Montréal, 1912/Building a Beaux-Arts Museum, Montreal: Montreal Museum of Fine Arts, 1986, pp. 19-20.

148 I am grateful to Robert Lemire, Historian, Centre Canadian d'Architecture/Canadian Centre for Architecture for bringing documents regarding action taken by McGill College against the Board over the lease on the land occupied by the Crystal Palace. See also Arnold D. Shykofsky, "Architectural Report 175, Montreal's Crystal Palace," typescript, Nobbs' Room, McGill University.

members, the Board was always consistently identified with and controlled by the interest of the English-speaking population of the City from its inception. Funding for the Crystal Palace project had been opposed almost unanimously by French-speaking members of City Council during the debate over the site. The Board and the closely related Montreal Mechanics' Institute were so strongly identified with the interests of the English-speaking community to the exclusion of the French-speaking population that parallel institutions and exhibitions were established. As La Guepe bitterly complained in an editorial, "les expositions sont conduites et faites par le "Mechanics' Institute" de cette ville qui n'est composé que d'Anglais et encore si c'était des Anglais qui connaîtraient la justice et l'impartialité autrement que de nom! Ces beaux Messieurs choisissent le lieu de l'Exposition, puis ils donnent les prix et font tous les règlements."[149] Raymond Montpetit has argued that the events which saw the Royal Institution pursue its claims against the Board and which led to the demolition of the Crystal Palace and its reconstruction on the Provincial Agricultural Fair Grounds in St. Louis de Mile End just north of the eastern extremity of Mount Royal Park, reflect the new cultural context which arose in Montreal and Quebec when French-Canadians formed a majority of the population in the 1870s.[150]

However, while the Crystal Palace was undoubtedly the victim of

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[149] La Guepe (Montréal), 17 avril 1860, p. 2.

[150] Raymond Montpetit, "Approches. . . ." op. cit., pp. 151-52.

the ethno-political division, the sequence of events is more than a simple reflection of the "revanche du berceau," the demographic shift in which French Canadians in Montreal and Quebec became an absolute majority of the population. As early as 1871, the English-speaking membership of the Board was preparing a strategic retreat in the face of increasing French-speaking control of the Board. In the appointments to the Board in that year, the new and significant presence of a French-speaking membership provoked Henry Bulmer to write J. W. Dawson, Principal of McGill College and Board President at the time of the founding and construction of the Crystal Palace as follows:

Private — Montreal 5th Janry/71

Dr. Dawson

Dear Sir:

You were duly elected Vice-President of the Board of Arts by the French delegates. They turned out at the meeting unusually strong, having delegates from many colleges, they outnumbered the English-speaking delegates considerably and had there [sic] own way so far. Mr. Weaver was elected Vice-President at first ballot but he positively declined to serve in that position. On the second ballot, you were elected.

The first meeting of the new sub committee will be on Saturday, when we shall know better how to act in the unexpected shape things have taken. If it is found that, not withstanding that they have a majority, we can work with them for this year, we shall do so.

. . . .

Next year, I hope the English-speaking delegates will be as steady at their posts as the French where this.

I mention the circumstances connected with the position for your own information, but they are such that we cannot well make them public, with any propriety or benefit.

. . . .

Yours very truly.

Henry Bulmer[151]

Dawson responded to Bulmer's request by writing to the new Board and alluding to unspecified changes in the Board and the need for "a practical man, directly connected with Arts and Manufactures."[152]

The shift in emphasis from "French" to "practical" in significant as it explains the rational of exclusion evident in many of the Board's actions and policies and it further significance and function of the Montreal Crystal Palace.

Paxton's Crystal Palace occupies an important place in contemporary chronologies of architectural history. Yet, its significance in architectural history and theory has changed in the one hundred and thirty-five years which have elapsed since its construction. Immediately following its construction, it was met with both praise and decision. While Fergusson hailed it as a new style for a new age, Pugin and Ruskin scorned and rejected it. But the underlying attitudes of Ruskin and Fergusson were not so diametrically opposed.[153] Both saw it as a "style" and as a "style", it could be understood and even employed in the appropriate stylistic context.

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151 McGill University Archives, Dawson Papers, "letter from Henry Bulmer to J. W. Dawson, 5 January 1871."

152 McGill University Archives, Dawson Papers, "Draft letter to E. Le F. de Bellefeuille, 11 January 1871."

153 "New Materials and Recent Inventions Connected with Building," Papers Read at the Royal Institute of British Architects, Session, 1874-75 (London: 1875), pp. 221-230.

Certainly by the 1880s, the assimilation of the Crystal Palace or "ferroriteous style" was complete, for even the staid and conservative Royal Institute of British Architects acknowledged its existence.[154]

However, the historiography of this style alters radically in the early decades of the twentieth century with the emergence of a new architectural discourse. John Summerson has sardonically remarked on the rediscovery of the Crystal Palace by the Modern Movement and its insertion into a new architectural discourse: "It used, you remember, to be the fashion to consider the Crystal Palace ugly and ridiculous. Then about 1935, a German architect came over here and praised it, afterwhich, obedient sheep that we are, we enabled it as a grand prototype of prefabricated modular design. Since the demise of the Palace in 1937 [when it was destroyed by fire] its canonization has, of course, been made absolute."[155]

Alexander Tzonis has argued that while the Modern Movement promoted a discourse founded upon a "rational" or "functional" approach to design, this rationalism was only "visual" or apparent and like earlier design approaches, is wholly a product of ideology.

In discovering the Crystal Palace the polemicists of Modernism were doing little more than constructing a historical "pedigree" for

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154 Ibid., pp. 229-30.

155 John Summerson, "1851 - a New Age, a New Style," Ideas and Beliefs of the Victorians: A Historical Revaluation of the Victorian Age (London: Sylvan Press, 1949), p. 63. Summerson may be referring to Nikolaus Pevsner whose Pioneers of Modern Design from William Morris to Walter Gropius was first published in 1936 under the title Pioneers of the Modern Movement (London: Faber & Faber, 1936).

"rational" architecture. They were proposing the building as a "proto-modern" or "proto-rational" antetype to their pseudo-rational architecture. Modern or Rational architecture is an architecture, according to Alexander Tzonis which, while exploiting and embracing new techniques and materials, maintains a "greater concern that the building should look rational rather than that rational methods should be employed in its design".[156] From this point of view, the Montreal Crystal Palace drew on the proto-rational architectural forms of Paxton's model as a means of signifying the utilitarian capitalist outlook of that class which was forwarding a "national policy" and the interests of their class.

The false rationalism of the Montreal Crystal Palace is readily apparent. If, as has been argued, the Montreal Crystal Palace was an element in pre-confederation "national policy", which sought to create a self-sufficient national economy in the Canadas through the development of industrial capitalism, several contradictions in the design of the building become readily emerge. Although both glass and iron were being produced in Canada, Hopkins specified that "German "Star Brand" glass. . ." and "Scotch or Welsh iron. . ." were to be employed in the building.[157] Not only is the use of imported iron in contradiction with the nationalist program of the building, but any use of iron, of whatever "nationality" could be questioned. The period during which the Crystal Palace was constructed saw a growing

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[156] Alexander Tzonis, Towards a Non-Oppressive Environment, an Essay (Boston: i Press Books, 1972), p. 87.

[157] See Appendix I.

debate between the "English" and the "American" approaches to engineering which was based on economic and practical considerations.[158] Even the Victoria Bridge, an example of Victorian engineering and "rational" design, was being openly criticized in Canada as a flagrant waste of resources that could be better employed in the service of Canadian development. As a Toronto critic wrote in 1856: "Scarcely anything strike the observant traveller fresh from Europe, on his first arrival in Canada, more than the extent to which wood is used; especially in great public works, such as Railway viaducts, and bridges of all kinds, in piers and esplanades and in many parts of the most substantial buildings, for which stone or iron would alone be considered appropriate in Europe."[159]

Another critic writing in the same journal put the matter more bluntly: "Mr. Stephenson [in the Victoria Bridge] has probably omitted to draw the needful distinction between England, where iron and capital are abundant, and Canada, where precisely the reverse of the conditions exist; in fact he appears to have adopted the same reasoning in relation to the Victoria Bridge as he did with reference to the Britannia, forgetful of the innumerable opportunities afforded in this country for the employment of capital in a much more productive manner, and more beneficial not only for the railway but

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158 Glazebrooke, op. cit., p. 166.

159 F.[rederik] W.[illiam] C.[umberland?], "Engineering and Architecture: Preservation of Timber," The Canadian Journal of Industry, Science and Art, VI (November, 1856), 561.

for the country at large."[160]

The Crystal Palace was finally dismantled and the land upon which it had stood was sold to Mr. Cramp. After much haggling with a reluctant Provincial Government, it was reconstructed in 1878 on the Provincial Agricultural Exhibition Grounds in St. Louis de Mile End. Hopkins was called upon to provide designs for alterations to the first floor facade windows and new chimmneys.[161] Although in reconstructing the Crystal Palace the transepts were extended to their originally plannned length of three bays however they were reduced in height from three to one storey.[162]

It continued to serve as a venue for industrial exhibitions and to be managed by the Council of Arts and Manufactures until destroyed by fire in 1906.[163]

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160 A. B., [Review of] Robert Stephenson, "Report on the Victoria Bridge," The Canadian Journal of Industry, Science and Art, III (February, 1856), 469.

161 This information is contained in "Hopkins - Wily Account Book," Salle Gagnon, Bibiothèque Municipale de Montréal. I would like to thank Robert Hill, Editor, The Biographical Dictionary of Canadian Architects for bringing this document to my attention.

162 It is not known if Hopkins redesigned the transepts. The above cited Account book (n.138) gives no indication that he did so, however a photographic reproduction of the building in Le Monde Illustré, reproducted in Approches. . ., op. cit., n.p. and reproduced in Appendix II fig.V below, clearly reveals the new design of the transepts.

163 A useful account of the Montreal Crystal Palace is Pierre Brouillard, "Les dernières années du Crystal Palace à Montréal au parc de l'exposition provinciale: 1878-1896," Rapport du groupe de recherche en Art populaire: travaux et conférences, (Montréal: Département Histoire de l'Art, Université du Québec à Montréal, 1979, pp. 285-99.

APPENDIX I

CONTRACT AND SPECIFICATIONS FOR THE PROVINCIAL EXHIBITION AND MUSEUM

The following is a transcript of the twenty-six pages of the contract and specifications for the construction of the Provincial Exhibition Building and Museum held at the Archives National de Québec à Montréal (ANQ-M, J. S. Hunter, "Contract and Agreement for erecting a Building for the Provincial Exhibition & Museum," 27 April 1860, no. 5462).

The parties to the contract are the Board of Arts and Manufactures for Lower Canada and Daniel McNeven. Pagination numbers have been assigned to each sheet and are given in square brackets in the text. All notes and legible deletions and strike-overs, including those subsequently added, have been transcribed. The transcription does not, however, include the first four sheets of the document. These consist of a three page printed form identifying the parties to the contract, the cost, and the architect, and a single page, handwritten text extracted from the Minutes of the Board of Arts and Manufactures for Lower Canada, Meeting of April 20, 1860, authorizing the Treasurer and the President of the Board to enter into the contract on behalf of the Board.

[cover sheet]

No. 5462.
27th April 1860

Contract & Agreement
for erecting a Building for the
Provincial Exhibition & Museum
between
Mr. Daniel McNeven
and
The Board of Arts and
Manufactures for Lower Canada

Copied Ice B. Chamberlain
23-5-60

Conditions of Contract } J.W. Hopkins
only copied and deld } 15-12-60

[1] "Provincial Exhibition Building"

Montreal - 1860

Conditions of Contract - The Contract includes the execution of the works shown on the Drawings, as well as those described or implied in the specifications, together with all minor operations and details, which may not be shown or described in the Drawings specifications, but which are necessary to the proper execution and perfect completion of the works according to the true intent and meaning of the Contract.

the correct and proper setting out of the work previous to the commencement of the same and will have to make good any errors at his own cost and charges.

Objectionable Materials and Workmanship. If at any time during the progress of the work the Architect or Clerk of the Works shall disapprove of any of the materials employed, the Contractor is forthwith to remove the same from the ground and provide others of approved qualities, and in case any portions of the works executed shall be considered defective or imperfect, or not in accordance with the terms of the Contract, such portions shall beforthwith removed & the work re-executed in an approved manner.

Additional Works and Alterations. In case the Architect should consider it desirable to alter the dimensions[3] a character of any of the works, thereby increasing or diminishing the quantities contained in the Contract such alterations shall not in anyway vitiate the Contract, but shalis to take upon himself the entire risk of and be answerable for all accidents and damages of any kind which may occur during the performance of the Contract - whether arising from fire, storms or otherwise - In case of damage to the works, he is to repair and make good the same as soon as possible at his own cost and charge; and in respect of any other kind of accident or damage, he is forthwith to reimburse and compensate the injured Parties, as the case may require, for all expenses, losses and injuries, they may ccording to the stipulation and true intent and measuring of the Contract in a workmanlike manner and to the satisfaction of the Architect, then it shall be lawful for the Board of Arts & Manufactures notwithstanding anything contained in the Contract or any certificate which may have been given by the

Architect, for the due completion of the Building or any part thereof, to institute any action or suit or take any proceedings which the said Board may be advised against the Contractor, or his executors or administrators for the damage which mae remaining Twenty five percentum - which shall in the meantime be retained in the hands of the said Board as security for the due and faithful performance of the present contract - shall be paid to the said Contractor within after the Works are finally completed delivered and accepted by the said proprietor Board.

Time for Works to be executed - The whole of the Masonry ready for receiving the Brick and iron work shall be completed on, by or before the 8th day of May
The first Gallery joists laid on by or before the fifteenth day of May _____
The Aisles roofed in, on, by or before the thirtieth day of May _____
The whole of the Building roofed and closed in & floors laid on by or before the first day of July and the Entire Building now contracted for to be completely finished as above mentioned on the first fifteenth day of July next ensuing.

Power to order Prosecution of certain portions of Work more expeditiously. The Architect or Clerk of the Works shall have full power and they are hereby authorized to order the prosecution of any portion of the work which they may consider it requisite to be done more expeditiously; (or otherwise delayed, if in their judgement it be advisable to do so) - and should the contractor neglect or refuse or delay to carry out such orders at once - it shall be lawful for the Architect or Clerk of the Works to employ such workmen as they may require to execute such work & the amount paid to them shall be charged to the Contractor & shall be deducted from the amount then due or becoming due to him -[7]

Foreman. A competent Foreman to be kept on the Ground during all working hours to receive the orders from the Architect and Clerk of the Works - but should the person as appointed be deemed by the Architect incompetent, or conduct himself improperly, he shall be discharged and another appointed in his stead; such foreman in the absence of the Contractor, shall be considered as his legal representative and shall have full power to make alterations or deviations in any works that the Architect may consider not in accordance with the Contract.[8]

Excavator's Mason's and Bricklayer's

Specification

Excavator - The ground is to be excavated the several depths that may be considered necessary for laying the foundations, drains, trenches etc. The excavated soil & material are to be distributed around the Building as will be directed.

Foundations - The Contractor is to make a sufficient number of holes of sufficient dimension & depth to determine whether it will be necessary or not to use piles upon any portion thereof - should it be formed necessary a sum per superficial yard for a depth of twelve feet is to be mentioned in the tender.

Piling - The Piles where required are to be of Pine 8in. thick/ square/ & sawn all around driven down in a compact manner and to a solid bed - they are to be three rows in width at 3 feet centers. The Piles are to be covered with 3 in. plank cut in lengths of 4 feet 6 inches & spiked down to the pine floats which will be fixed to the heads of the Piles -

The Beds of the Trenches where piling may not be required, are to be rammed down or otherwise consolidated [sic] & levelled, after being baled out or otherwise disposing of the water that may be formed or may come upon the same - whether arising from rain, drains or any other cause and the Contractor is to execute all other required works for the prevention of the same in future so as to procure a firm solid foundation -

French Drains - Construct where will be hereafter directed a French Drain from one end of the Building to the other; having small branch drains leading into[9] the main one - and discharging as will be directed.

The Ground on the Two Streets (St. Catherine & Cathcart Streets) is to be carefully levelled up to the Building so as to have a gradual rise towards it at each Entrance -

Mason & Bricklayer's Specification

Materials - All the parts colored Brown on the Plans Sections are to be built of the heights, thicknesses & in the manner shown with large flat bedded stones & mortar composed of 1/3 well burnt stone lime & 2/3 clean sharp sand well mixed and trodden together. A through stone to be built in every superficial yard of masonry: all the stonework is to be well flushed up with Mortar.

Footings - The footings are to be built of Large Stones projecting 6 in. on each side of the Basement Walls on the first course next the walls & those below this course to have equal projections the one beyond the other.

The inside faces of Basement Walls are to be neatly pointed.

Piers - of Solid masonry on footings as shown to be built under the Columns & being constructed of large stones with squared beds & vertical joints. A large rough bouchard stone to be under the main girder to receive the ends of the same & the Blocks upon which the Base Plates of the Columns & Standards rest are to be dressed Stone the full width of pier & depth shown, having two holes in each, or grooves, to receive the dowels of Baseplates.[10]

Basecourse - A rough bouchard Base course or Plinth to be provided & set round the Building. the two Entrance fronts Returns are

to have it fine bouchard - three feet high & having a deep 3 in. chiselled splay - This Base to be in two courses in height with bond stones tailing well back into the Walls every 6 feet. The average bed of the stones to be not less than 8 inches. Joists set in Blue mortar.

Bedding - All the Timbers, joists etc. are to be well bedded & filled up to their upper surface with best masonry. The window frames are to be well secured to the Masonry in Basement & to be well pointed with lime & hair mortar.

Drains in Transept - The drains from the Water Closets, which will be in the West Transept are to be of the best description of flagged stoneware piping 9 ins. diameter and either from the Kinson Potteries (Ryan Brothers, Agents) or of at least equal quality - they are to be laid with a uniform full fall into the Drain in Cathcart Street & the junctions with the same are to be made in the best possible manner with all necessary traps etc. The joints to be set in the best Cement or hydraulic lime -

String course - A string course weathered & having a good drip & plain molding under as shown to be provided & set as a sill to the ground floor windows - this string to be neatly chiselled -

Steps - The top steps at the Entrances on a line with the Basecourse to be in Stone with molded nosing & in long lengths. 13 in side on the bed - A foundation 5 feet deep will be required for the remainder.

Chimney Caps - Four chimney caps - well weathered & throated having one flue in each & to be in single stones to the[11] transepts where shown.

Bricklayers' Specification

The whole of the parts colored Red upon the Plans & Sections are to be built of the heights, thicknesses & in the manner shown.

Materials - The Bricks throughout are to be sound & well burnt, & well flushed up at every joint with mortar composed as in Mason's work -

Facings - The whole of the face-work is to be executed in the best possible manner. The arches &c to the windows on the sides as shown - sixteen inch piers - the string under stone sills or string on Ground floor - & the panels & when shown together with the brickwork on the St. Catherine Cathcart Street fronts, are to be built in the best picked White Toronto pressed bricks - The remainder of the face-work to be

of the best picked Montreal bricks of rose color - This work is to be laid in American Bond, tied in at least every fifth course with hoop iron ties into the backing which will be of red brick of the quality above specified, well bonded every fifth course with headers -

Discharging - Arches to be turned over all windows on the inside to a regular form of centering & to be executed in the best manner in 8 in brickwork - The Arches to be turned clear of the lintels -

On the outside the Arches over windows & around ventilation are to be turned truly & in the best style they will be 8 in deep & flush with the face of the brickwork above them -

The Caps to the Brickpiers & string between them[12] to be of the Toronto Brick having courses to project slightly one beyond the other from the same.

The face-work is to be laid in the best white putty mortar with very thin joints & rim with a steel jointer to form a bead -

The inside of the Brick walls throughout are to be neatly trowel Jointed & to receive 3 coats of the best lime wash carefully laid on so as not be injure the rest of the work.

Grout - The whole of the Brickwork is to be grouted with liquid mortar every fifth course, care being taken not to injure the face of the work thereby -

Flues - Flues where shewn to be built in the best manner with the hardest bricks pointed on the inside with the trowel - Those on Cathcart & St. Catherine Street fronts to be taken up in Brickwork to the level of the springing of the circular portion of the Roof - 9 in stone ware pipes from this height inside the Iron one round the circular roof and out through the Iron chimney tops.

The whole to be well cleaned out at the completion of the Building -

Pipe rings & cast iron sweep hole doors in frames to be provided & fixed in Basement.

Bedding - To bed in Mortar all walllates, templates etc. & to bed & point with lime & hair mortar all window & door frames & all sash sills to be pointed with white or red lead -

All Iron bolts or other work required by the founder to be built into the walls are to be executed as will be directed -

Note - The Brickwork behind the Blinds shewn on the Elevation of the Main body & transept sides is to be of ordinary brickwork, trowel pointed -[13]

Carpenter and Joiners' Specification.

The whole of the Material to be the best of their respective kinds, free from sap, large or loose knots & other imperfections - The jointer's work is to be of materials especially well seasoned.

Note - The scantling of the Timbers is in almost all Cases marked in Red Ink upon the drawings.

Girders - in Basement to be of the best Rock Elm or Tamarac 13 x 12 strutted from the piers as shewn on Section with Elm or ash struts 5 x 3. The girders to have 8 in wall hold mortared on the stone templets on Piers & on tamarac and in walls 6 x 6 & 3 feet long.

Joists - to the ground floor to be 13 x 3 at 20 inch centers in lengths of two bays, alternately breaking joints on the girders to which they are to be spiked as also to wall plates 6 x 4 -

The Gallery joists to be 6 x 3 at 2 feet centers on braces 12 x 6 of Pine resting at the ends in cast iron shoes or wrot. iron stirrups secured to the Iron Girders and on the side walls -

Flooring - The whole of the flooring to be tongued & grooved second quality planks 2 inch thick & not wider than 7 inches well nailed down to the joists.

The Roofs - to be constructed as shewn on the sections & Elevations and of the scantling of timbers marked in Red Ink. The domed portion to have the covering boards in two thicknesses of 5/8 in planks breaking Joints in every direction - They are to be bent to the curve & well nailed to the rafters - These latter will be halved down upon the ribs - The roofs over flat portion of Transepts to be formed of Joists 12 x 3 at 2 feet centers, bearing of the head piece of the frame forming tops of the side[14] openings for Light. This roof is to be furred so as to have a fall towards the gutters and to be covered with 1 1/4" bands tongued & grooved & well nailed down in three feet bays to joists, the latter are to be well spiked to head pieces -

The Roofs to aisles are shewn on the Transverse Section - with principal rafters 13 x 7 - curved bracket pieces 9 x 7 made in three thicknesses of plank - head pieces as shewn - let down into the cast iron brackets to secure them. purlins 11 x 7 common rafters 4 x 3. wallplates 8 x 4 under the ends of principal Rafters. Similar boarding to that specified above.

Eaves - The underside of the Eaves to Roof over the Aisles is to be lined with 1" tongued & grooved boarding having small molding of wood in the angle next the Brickwork & returning round the cantilevers as shewn.

Cornices - The Cornice to these roofs as well as to the Main portion of Building - Nave & Transepts to be worked to detailed drawings - having proper bearers to carry the same the proper projection acquired every three feet or closer if required.

Gutters &c - The Gutters will be of Tin I-X- of large size, well secured to the eaves with wrot. iron holdfasts. The blocking is to be covered with Terne Tin going up 3 inches at least under the Roof covering. Conductors from Domed roof to Aisles & from Transepts do. to aisles, continuous from the junction of the aisle roofs & body of Building along the roof to the Eaves of the Aisle roofs & to the gutters round the same and from thence to the ground to be of tin 4 in diameter - well secured with holdfasts. & having "1 facia boards behind them next brick work - lead bonds from the Gutters to the conductors and the[15] bottom lengths near the ground to be of cast iron 4 feet long. There will be eight conductors in all - That portion of the Gutter which runs over the Aisle roofs will be open & semicircular.

Rolls over the Domed portion of the Roof to be formed of two thicknesses of 1"½ plank nailed together & bent to the form of the Roof - this refers to the Ribs over the main principals & they will be 7 inches wide - those over Intermediate ones and to the Aisles to be 2"½ diameter.

Note - For Mastic Roofing see end of this specification -

Such portions of the ends of Nave & Transepts (with the Aisles in both cases) as are not shewn to be in brick, but of wood, are to be properly framed & put together in the best manner. with head-pieces, sills bracing &c complete - The studs on the average to be 4 x 4 securely grooved & nailed into heads & sills average not less than 5 x 5. The boarding on both sides to be as shewn & of 1"½ grooved & tongued stuff beaded on the inside. The space between inner & outer boarding is to be filled in with stove dried sawdust & spent ashes.

Where wooden columns, sills &c are shewn they must match the Iron ones (see detail Drawings.)

Fanlights &c - to the ends of Nave, Aisles &c transepts are to be worked to Detail Drawings. Such portions of the Main or centre ones to Nave or Body as are specific in Iron founders' specification will be Iron - the remainder of them and others above named will be of Pine - well trussed & framed together, stiffened when necessary & made so as to be put up in one piece each fanlight -

They had better receive one or two coats of paint before being hoisted up & well knotted with spirit[16] knotting.

The sashes (except those in the Offices &c on the Cathcart & St. Catherine Street fronts & the first one on the sides next them) are not to be made to open - the latter will be single hung, the upper half only - with best plaited lines, brass axle pullies, brass quadrant fasteners &c complete. The whole of the sashes are to be made with a double rebate to receive two thicknesses of glass - The sashes to be 4 x 3"½ and as in sketch - The columns to be of pine nailed to the sashes. The 3/4" lining to have a flush bead where it comes against the sash, to hide the Joint.

An 1"½ bead to the sashes in Brickwork mired at the angles 1½ in window boards to all the windows. The Basement windows to have solid rebutted frames 4 x 4 - 2 in sashes hung with butt hinges to open fastened with a small bolt.

Blinds - The blinds where shewn to be sham, being made of 1½" clapboarding nailed to upright studs one in each angle & one in the centre of each space. an inch bead scribed to the blinds on the outside -

Doors - The Main Entrances to be fitted up with 3 in doors as shown hung in two folds each with three 5 in. butt hinges in solid rebated & beaded frames 6 x 6 going up to the underside of the finders & morticed into a head piece at that height 8 x 6 - The fanlights will be as shewn fastened in with brass buttons or otherwise - The columns shewn are to be planted on the frames on both sides & half ones in the angles - The whole to be worked to drawings & locks & knobs value for $6 each door, cost price - The doors to Committee rooms, ticket offices &c are to be four panelled on both sides with raised moldings hung with 4 in. buttes in 2 in. jambs -[17] Locks &c complete value for $2½ - 6 in. molded architraves.

Borrowed light - A borrowedlight in Washing Closet where shewn.

Framing - The framing forming offices &c is to be 2 in. thick &

molded - stiffened with uprights & cross nails where necessary which will be dressed & chamfered on angles or otherwise finished - The framing will be molded on one side only - The whole of the framing & walls in the offices &c are to have skirtings with single moldings & to be 10 ins. high.

Water Closets &c In the Western Transept on each side of the aisles the Contractor is to fit up three self-acting Water Closets complete - They are to be of the very best construction as far as material & workmanship go, - so as not to get out of order - White basins will answer - The soil pipes to be 5 in. diameter & of lead of best quality with D traps, safes &c complete - The soil pipes are to be connected with the stone ware drain pipe in Basement & well secured thereto.

The seats & Riser are to be fitted up with hardwood for the former & pine for the latter - flush bead panels.

The closets to be divided from one another by 1¼" tongued, grooved & beaded boarding 7 feet high & closed in front & on the two sides with similar boarding having uprights & crosspieces - the framing to be dressed

This framing is to have crossbarred doors hung complete & with thumblatches & inside bolts. The framing just specified to be carried up to the underside of the Gallery floors - A plain 6 in skirting round the inside of closets & a similar one to that specified for Offices on the outside towards the Aisles -

A urinal to be fitted up on one side of the bay in which three of the Closets will be; having a centre[18] post with radiating divisions to form six & with a white urinal pan with brass grate & trap complete & communications with the closet soil pipes joining the stone ware one in Basement

The water is to be laid on from the Water works supply pipe in Building to the closets & urinals (to the latter of which the supply of water must be constant) with the largest sized pipe & of equal diameter to the supply pipe.

Ventilation from the Closets to be obtained by tubes communicating with the flues -

Staircases - to be as shewn on the Plans - two at each end of the Body of Building going from the Ground floor to the Upper Gallery - they will be 8 feet wide each - having Quick steps and risers - molded nosings returned - mitred outerstrings - Turned birch newels 6 in. square to landings & framed ones 8 in. to 10 in. square at the bottom on Ground floor - The ballusters to be of birch 3 in. square & turned - handrails

of the same 7 x 5 & molded - The whole to be on strong carriages & to be put together in the very best and strongest manner. The spandrils on Ground story to be neatly boarded up with 1¼" stuff tongued, grooved & beaded in panels - with doors hung complete to match the framing This framing to be in a line with the outer side of the staircases.

The soffits of the Staircases throughout are to be lined with ¼" stuff tongued, grooved & beaded in panels. with bead on the edges of strings -

A strong step ladder under <u>two</u> of the staircases to give access to Basement having 2 in. steps & sides well bound together and having a plain handrail, square newel & crossbar to each.

Steps - The Steps in front on Cathcart & St. Catherine Streets (except the top one on a line with the top of[19] Basecourse (See Masons Specification) are to be of sound "dry" Pine - Steps " 3 in. thick, molded & nosings 2 in. risers all on strong bearers -

Cathcart Street is 3 feet lower that [sic] St. Catherine Street & the steps will consequently be more in number <u>outside</u> -

Gallery & other Balustrades - The Gallery Fronts are to have a balustrade as shewn made out of 2 in. stuff (pine) with circular heads & chamfered edges - a molded plinth or skirting ranging with the base of the Columns -
The handrailing to be of birch 4 x 3

A hardwood handrailing to be provided & fixed to the balustrade to Balcony on St. Catherine Street front. and on Transepts.

The floor of the Balcony to be covered with 1¼" boards ¼" apart. second quality battens -

Linings - The windows under Main cornice all round the Building are to be lined all round & up to the spring of the domed roof level with 1" tongued & grooved lining as well as the ventilators. - The sides of the windows in the offices to be similarly lined -

Ventilators - Where shewn on the Upper Gallery and under the main cornice of Building in solid frames formed of louvre boarding made to open & close when required - Other ventilators to carry off the heated air from the circular roof to be made in the fanlights either in the circular iron ring ornament with hit or miss slides inside or elsewhere as will be directed. They are to be worked with lines & brass axle pullies from

the Upper Galleries -

Scuttle hole &c A scuttle hole with proper lid hinged complete & covered with the best sheet iron well painted to be provided & trimmed for to each roof of Transepts with a portable ladder for each side of Building -[20]

Mastic Roofing - The whole of the Roofs to be covered with the best quality of Walker's roofing cloth, coated with Mastic composition. after which the Rolls are to be laid, their edges cemented with putty cement - Another coat of composition is then to be given & the whole sanded with coarse sharp sand -

The Roofing is to be warranted & maintained for Five Years against any failure in workmanship or Materials free of all charge -

This Mr. D. M. Walker by his Agent Mr. D. Hunter agrees to do by letter in possession of the Architect -[21]

Ironfounders Specification

Materials Workmanship.

All the Castings are to be made at some Foundry approved by the Architect and are to be placed in the Stoveroom and heated to a high temperature, in which state they are to be covered with Linseed oil which is to be well rubbed in - All the Castings are to be perfectly sound & smooth, correctly placed, bedded & run with lead if required at their proper levels.

All the wrought iron work to be of the best English Iron or of approved & equal quality -

Tests - The quality and strength of every article particularly the Castings must be submitted in the presence of the Architect, or some person appointed by him, to a full proof, equal to 1/3 of the breaking weight at the expense of the Contractor, before it is removed from the foundry.

All defective castings, or other work found upon trial to be insufficient from bad materials or workmanship are to be immediately replaced.

Patterns - Provide all proper requisite castings Patterns for all castings, wrought iron or other work in this branch and described in this Specification and submit the same for approval before casting from them.

Straps &c - All straps & bolts shewn upon the drawings to be furnished or otherwise described are to be provided also all such cast iron corbels as may be requisite, which must also be fixed in their respective places as will be directed with all necessary nuts, bolts, wrenches &c.

Metal - The whole of the Girders, columns &c to be[22] cast from English or Welsh Iron or from Scotch iron mixed with other of approved quality contain such proportions as shall secure the best of castings.

The Castings to be of the several forms and dimensions shewn on the Drawings or described -

Delivery - The whole of the Iron work to be delivered by the Contractor on the site of the Building, at such times and in such quantities as shall be directed by the Architect.

The Tender must state a total sum for the several works described in this specification and shewn or set forth in the drawings, but it must be accompanied with the distinct statement of the cost of each column or girder - Those prices will apply to such additions or omissions as may be made

during the progress of the works.

Columns - The Columns are to be 8 in. outside diameter and of the section shewn on Drawings - the ring of metal to be 5/8 in. on the frame & ½ for the Galleries

Baseplates - to be flanged out at the bottom 16" x 16" having two square feathers under each 1½" deep ½ in. wide & as in sketch set on strong canvas, or fine putty mortar, as directed, on each pier and to be perfectly level & truly adjusted before the Columns are set upon them -

The Columns for Upper floors or Galleries are to be fitted into the lower ones on Ground floor & into one another with sockets or as will be otherwise directed. Then Pine to be placed between the metal to allow of expansion & contraction; or if required by the Architect, coarse canvas covered with white lead to be used instead.

The Baseplates will come up above the top of the flooring as shewn in large sized drawings -[23]

Standards - The wall standards are to be of the Section shewn resting upon a Stone Base (See Mason's Specification) to have socket joints or otherwise as directed and to be tied into the brick pier with wrought iron 3/4" ties two in the height of each column or Standard. The ties are to have cross or Anchor heads on them 6 in. long each way from the end of tie & secured to the standards arcs with rings & hooks, bolts or as will be directed.

The upper ones where shewn to have Corbels or Cantilevers to support the heel post of curved brackets over a second Gallery. The metal ring of Standard to be 5/8" thick on Ground & 2/8 on the Upper Stories.

Note - The Columns on the front of Galleries to Top floor will be different in pattern from those below, commencing at the level of the corbels or cantilevers carrying heel posts of brackets over Aisles as on Section. The will be flatted on one side like the wall standards and as will be shewn on larger Drawings.

The corbels or brackets to be of cast Iron securely bolted to the columns & standards with 3/4" bolts. The Columns in front of the Galleries on upper floor are to be carried up as shewn having a head or socket on the top of them to receive the runner to carry feet of the main Ribs of Domed Roof; each head is to be prepared, milled or otherwise with a hole for bolts & the bolts themselves to secure the runner to the same.

Girders - of Cast Iron where shewn & of the size and dimensions shewn

on Detail drawings - They will be about 19 ft. 4 ins. long each & 2 ft 9 ins. deep - being secured to the caps of the Columns & Standards. By the checks or cogging pieces cast on them and fitting into checks on the caps and as shewn[24] on the Drawings to large Scale & to be hereafter described. There will not be any girders required over the Columns or Standards against brick walls -

Shoes - Cast Iron shoes to be cast on or bolted to the Girders as shown to carry the Girders for the Joists of Galleries; the girders will be 12 x 6 & have 4 in bearing in the shoes -

Diagonal - tie rods of the diameters figured in Sections & where shewn formed of the very best wrot. iron, being securely fixed with eyes or otherwise to the columns where shewn at one end & meeting in a ring 12 in. diameter in the centre & of the same strength of metal as the rods; with ears - nuts &c complete so as to adjust the ties when requisite in the centre of the rings - The junction of these rods in the rings to be covered with an ornamental cast iron facing screwing on to each side and as will be shewn in future Drawings.

The last bay on each side of the Nave joining the Transepts and the first bay of the latter are to be properly tied with these diagonals on the Ground floor & both Galleries as shewn in Sections. Similar ties of the strength shewn & as above described between the Columns of Upper Gallery crossing the Nave - from feet of the framing of Domed roof at springing - across the Nave from this point above & parallel to the floors &c &a tie rod suspending the others as shewn with rings, face plates &c complete. These latter ties are to have their ends run through the timber where shewn & to have washers & nuts on the outside.

Fanlights &c - The upper part of the fanlights over the St. Catherine & Cathcart Street fronts above the circular ornament is to be of cast iron 3/8 thick, forming flues on each side 12 x 8 inside (at least) & connect-[25] with the brick flues at the springing of the Arch. The joints are to be riveted & bolted together in the very best manner - & the flues are to be brought out on the Roof in the centre in two flues as shewn and the whole to be cast in best manner & put together with great care.

The circular ornament above mentioned is to be of 3/8 Cast iron as also will that be running round the Arch & up the sides of the Aisle Roofs to Nave & transepts -

Balcony - A Balcony of cast Iron 4 feet projection and of a neat pattern worked to drawing to be provided & fixed on cast iron brackets on the St. Catherine St. end of Building - the brackets to be bolted to the Iron columns &c.

Awning - The Awning over the centre opening is to be made of Galvanized Iron - with wrot. iron rods where necessary to bind the whole together and to make it the requisite shape.

Railing - The Railing over transepts to be of cast iron between the Pedestals with hardwood top rail formed by the Contractor (carpenters' work) who will fix the Railing complete.

The Columns are to be cast so as to Insure the metal rings being true & equal in thickness throughout. The bottoms & tops are to be also perfectly true so as to fit to each other, to the Girders & elsewhere as will be required.

The Columns to the Entrances on both Streets are to have the arched corbels or brackets under the Girders made in Cast Iron to match the window openings or according to detailed drawings - they are to be securely bolted to the sides of the Columns & underside of [back of sheet] - the girders.[26]

Painter & Glaziers Specification

Painting - This whole of the wood & iron work is to be painted three coats of the best oil color -

All woodwork is to be properly knotted with the best spirit knotting. and stopped before painting -

The External Wood & iron work except the blinds & where otherwise directed is to be of a light drab to match the Toronto brick -

The Blinds to be of a warmer color & the ventilators to match them -

The Columns & girders inside to be painted of a pale blue or other approved color.

Water Color - The Roof over domed Portion of the Nave is to be colored 3 coats of a Blue color darker at the top & shading away to nearly white at the Springing -

Glazing - The whole of the Glass is to be Star brand German sheet of the sizes shewn - that in the windows to ground & Gallery floors will average 28 x 18 inches -

It must all be point & back puttied & left clean at the Completion of the Building.

Specifications referred to in Contract and Agreement between Mr. Daniel McNeven and the Board of Arts & Manufactures for Lower Canada bearing date executed before[27]

J. S. Hunter and his Colleague Notaries Public the Twenty-Seventh of April Eighteen Hundred & Sixty. - Intest Veritatis

[signatures] D. McNeven

J. W. Dawson
President Board of
Arts & Manufactures L. C.

Norton B. Corse
Treasurer Board of Arts
& Manufactures L. C.

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APPENDIX II

Reconstruction of the Provincial Exhibition Building and Museum by J. W. Hopkins, 1860 and Related Reproductions

Figure I.....Plan

Figure II.....Elevation / Section, principal facade

Figure III.....Side elevation

Figure IV.....Reproduction of Photograph of the Crystal Palace in 1866 (Notman Photographic Archive, McCord Museum, Montreal).

Figure V.....The Crystal Palace (reconstructed) in the 1890s (from Rapport du groupe de recherche et art populaire: Travaux et conférences. Montréal: Département Histoire de l'Art, Université du Québec à Montréal, 1979, n.p.

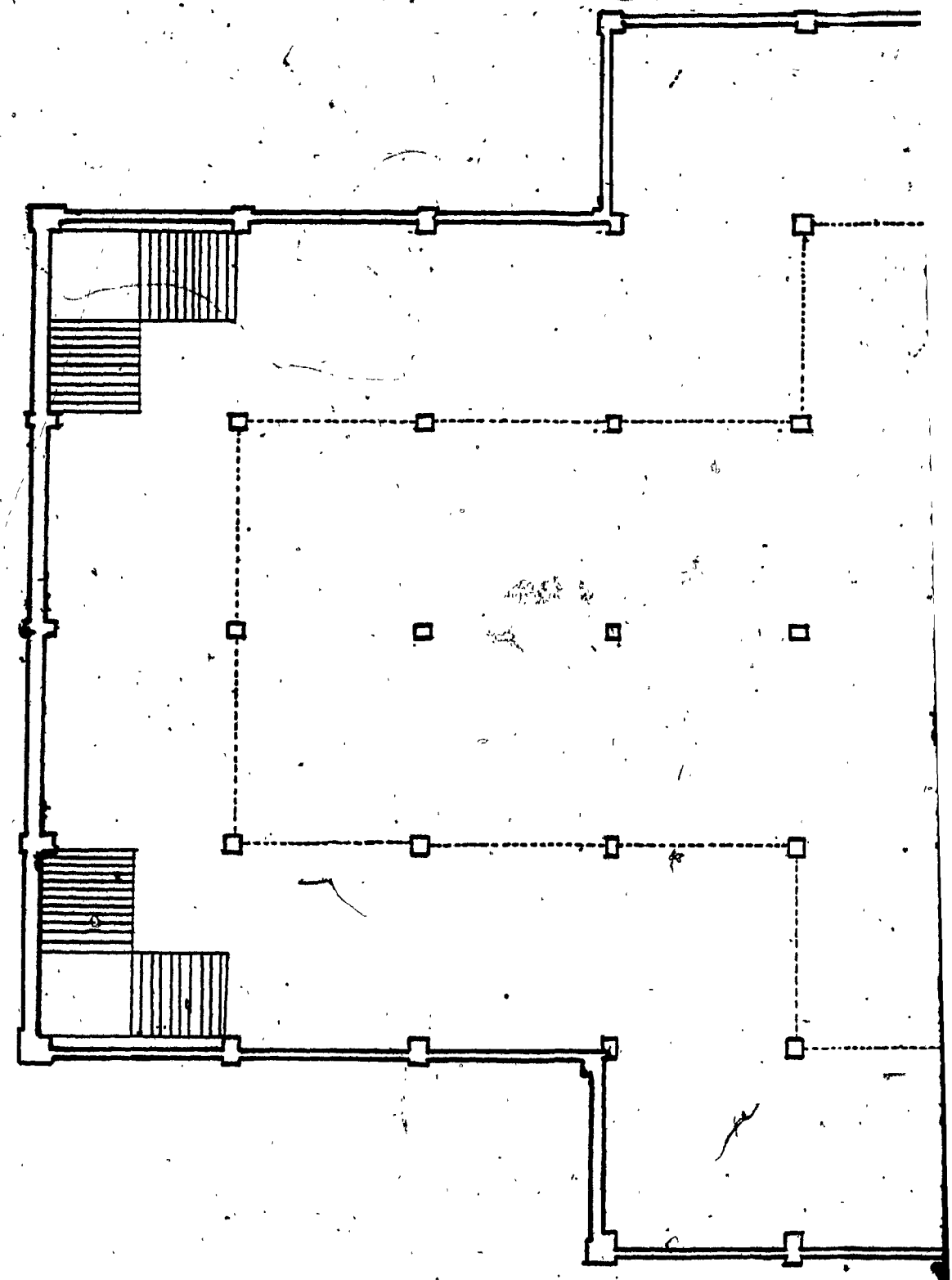
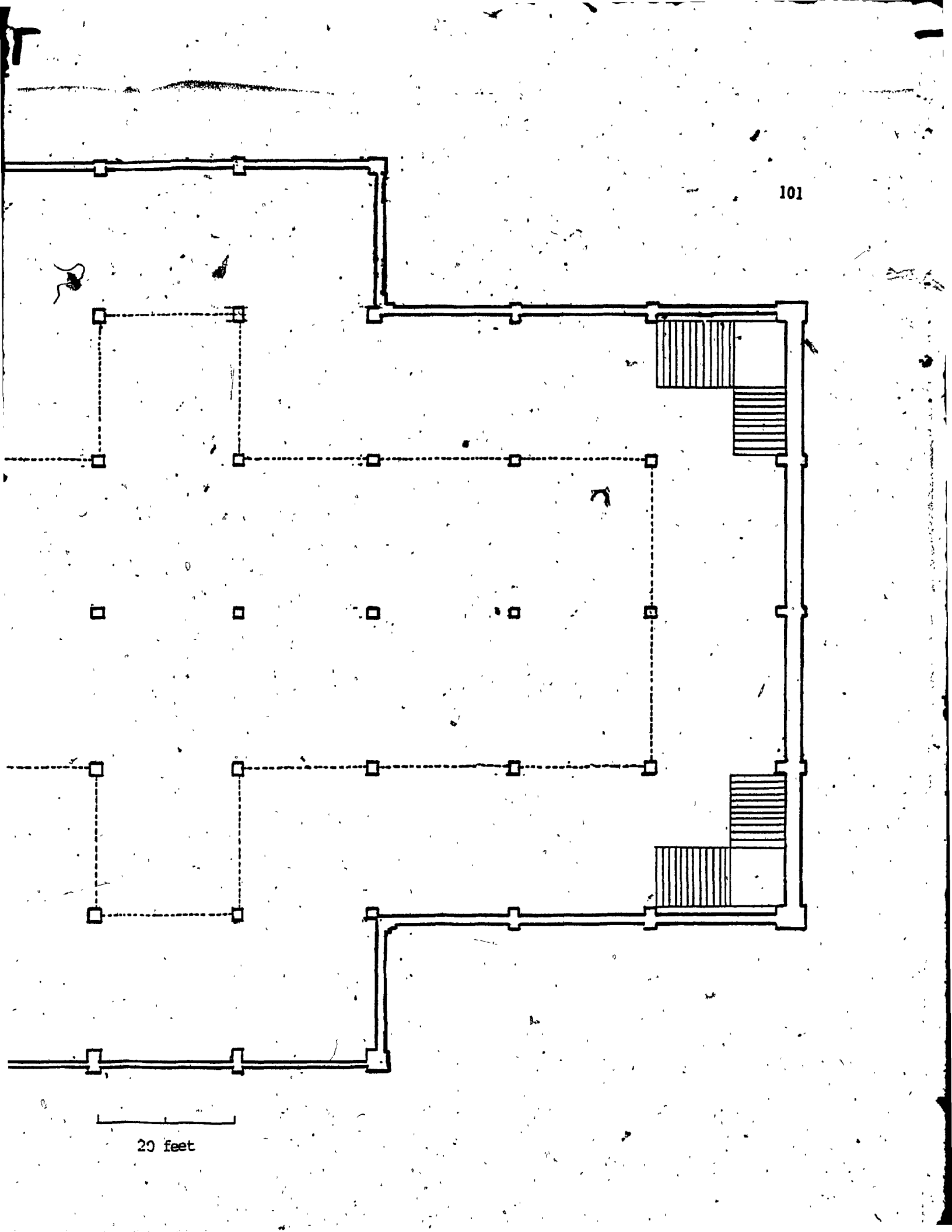


Figure I: Plan, ground floor with stairs and galleries indicated

20 feet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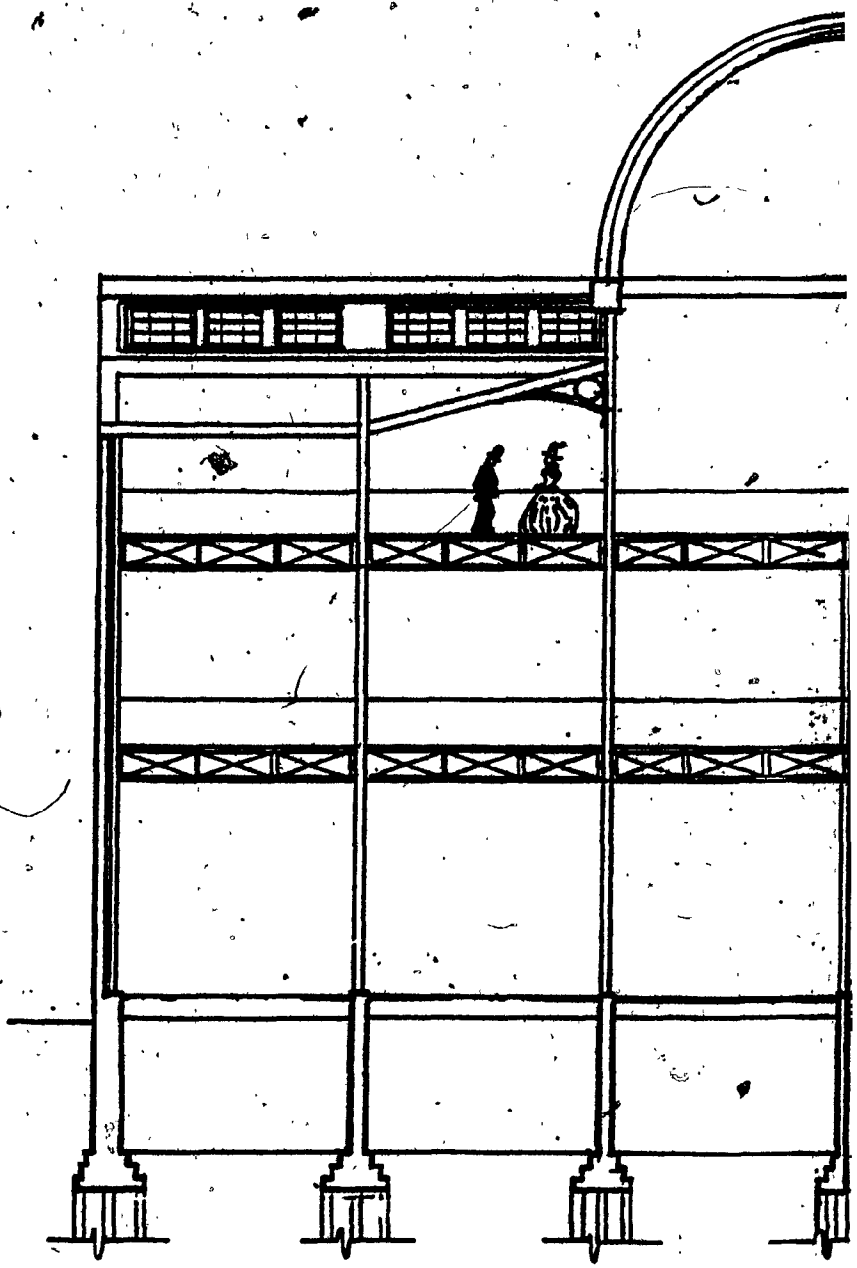

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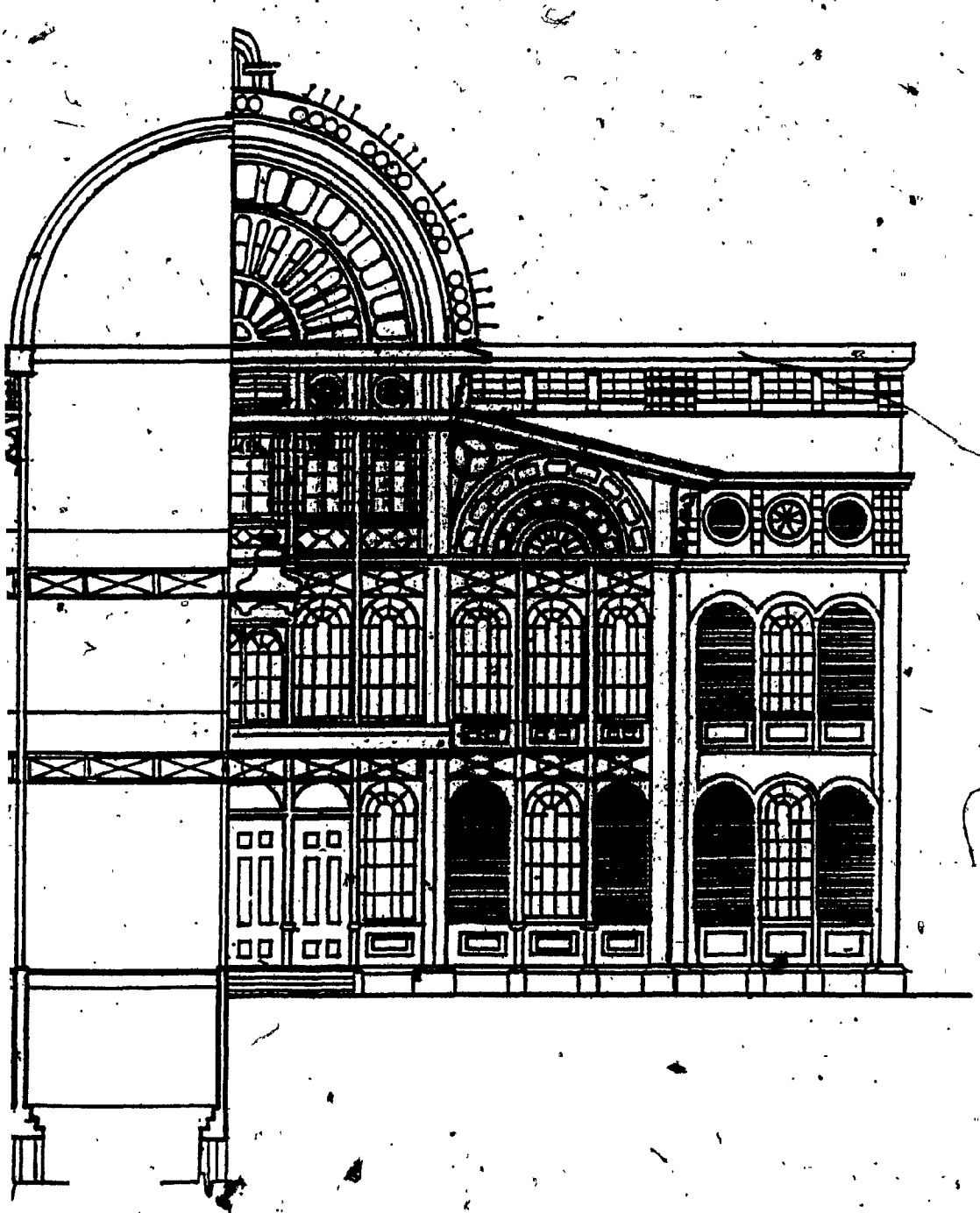
Figure II: Facade elevation and section



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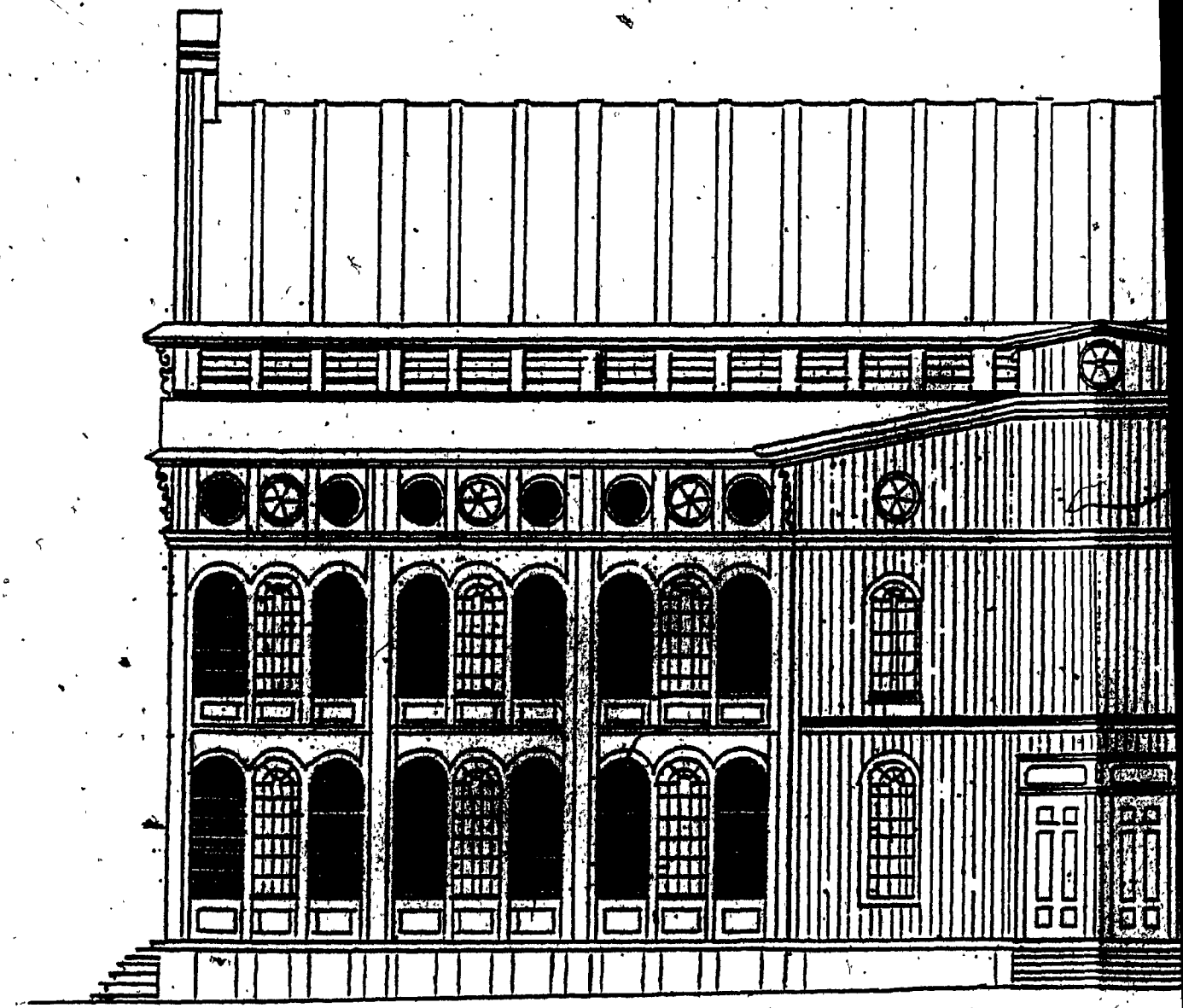

Figure III : Side elevation

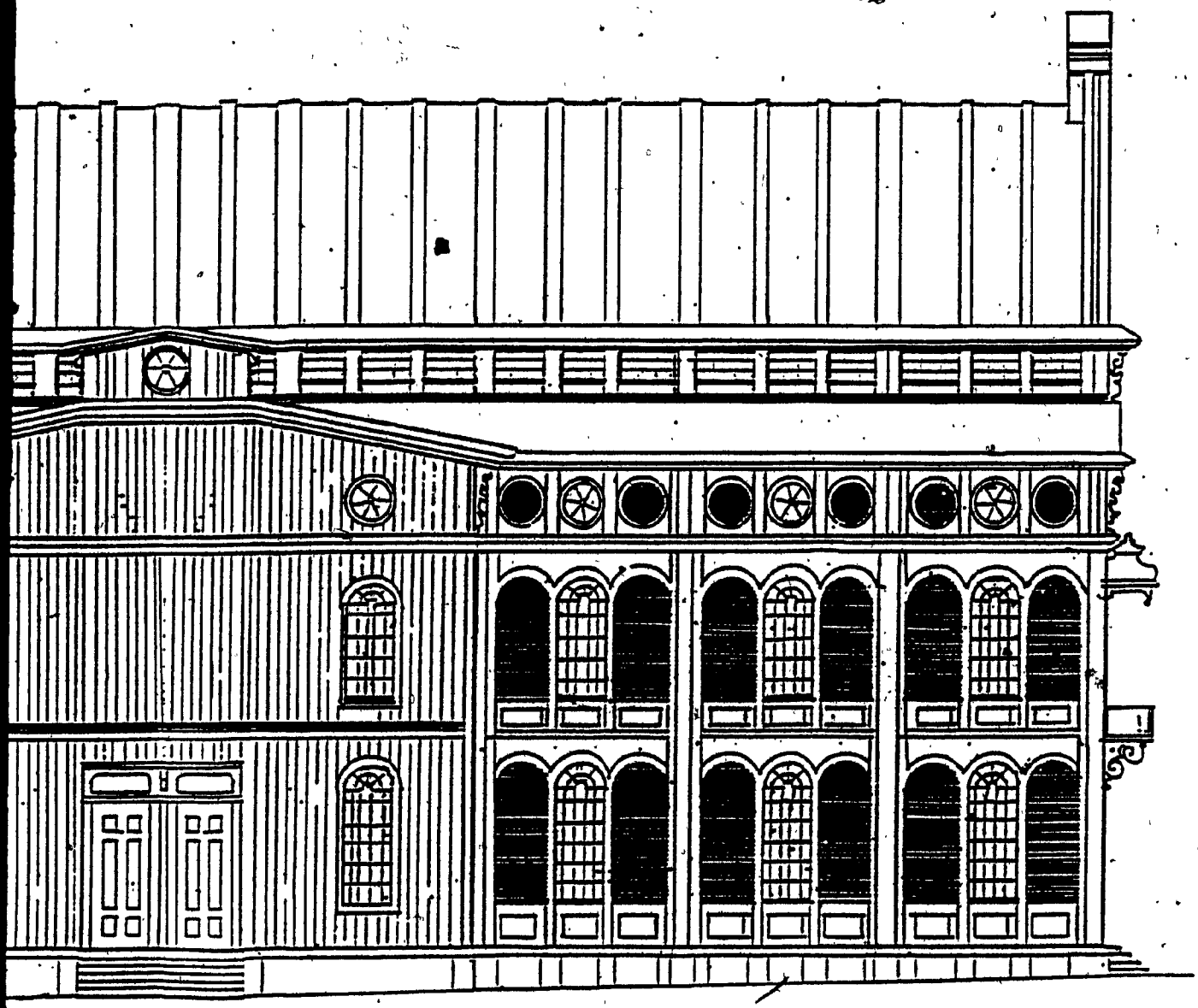

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Figure IV

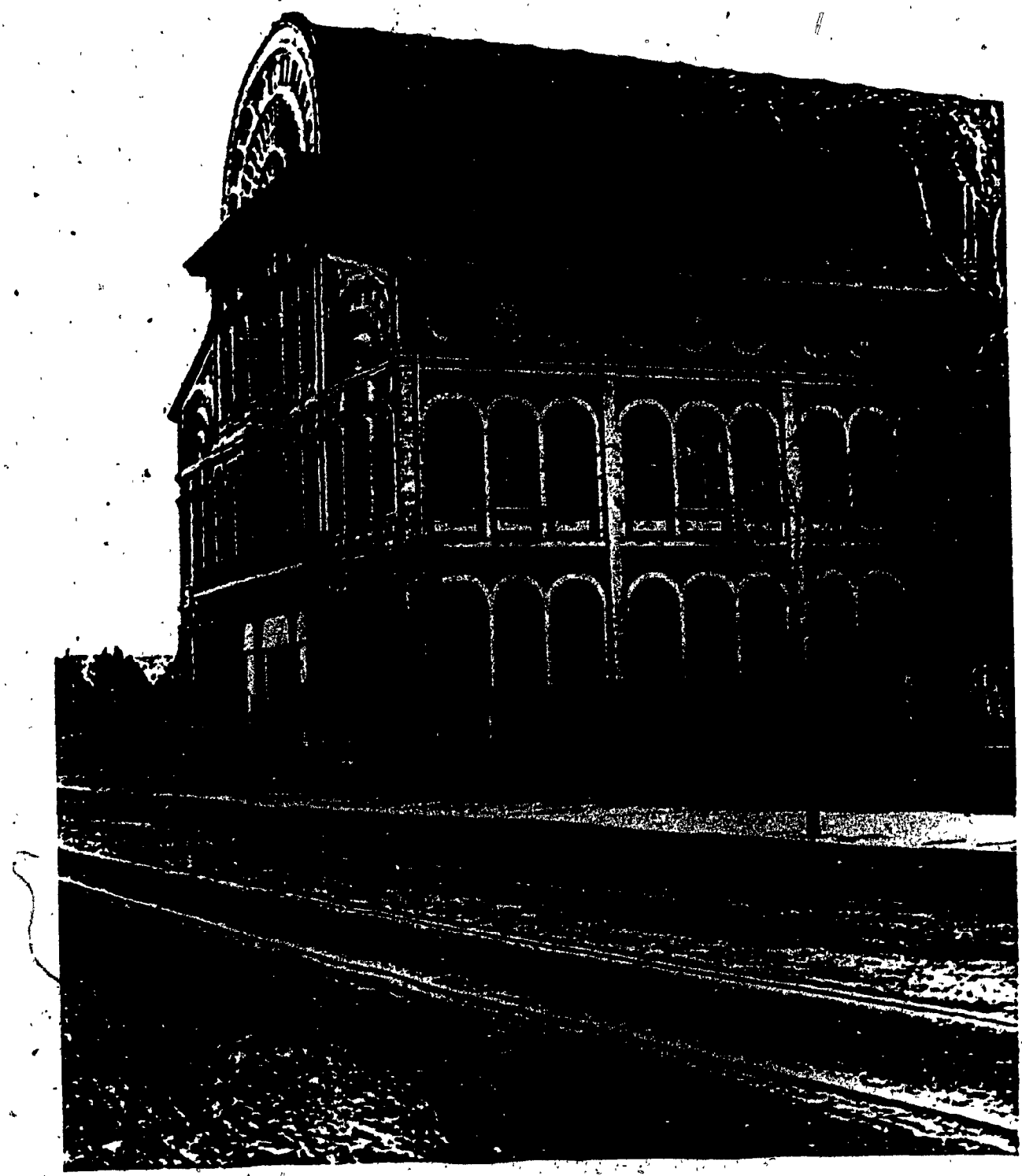
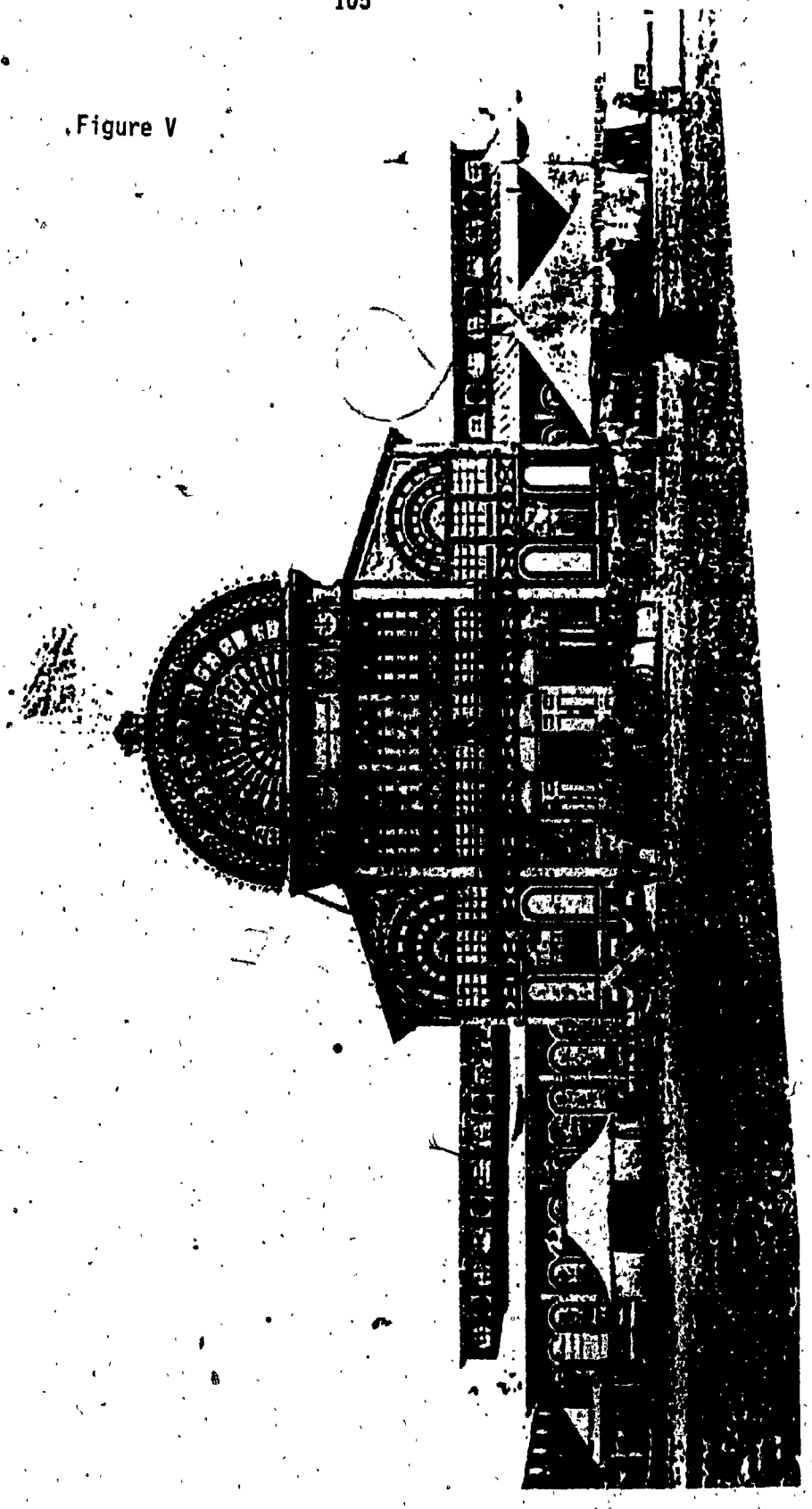


Figure V



REFERENCES AND BIBLIOGRAPHY

Special Collections and Archives Consulted

Archives de la Ville de Montreal

Archives National du Québec à Montréal

Archives National du Québec à Québec

Canadian Architecture Collection, McGill University

Department of Rare Books and Special Collections, McGill University

Lande Collection of Rare and Unusual Canadiana, McGill University

McGill University Archives

Montreal Mechanics' Institute

Public Archives of Canada

Salle Gagnon, Bibliothèque de la Ville de Montréal

Period Newspapers and Periodicals Researched

The Canadian Architect and Builder, 1888-1906

The Canadian Journal of Industry, Science and Art, 1856-62

Le Courrier de St. Hyacinthe, 1859-61

Montreal Gazette, 1857-61

Montreal Daily Transcript, 1858-60

La Guepe (Montréal), 1859-60

Montreal Herald, 1863-66

Ottawa Citizen, 1859-60

Le Pays (Montréal), 1859-61

The Pilot (Montreal), 1859-60

Quebec Chronical, 1859-60

Toronto Daily Globe, 1859-60

True Witness and Catholic Chronical, (Montreal) 1858-61

Bibliography

Acheson, T. W. Saint John: The Making of a Colonial Urban Community Toronto: University of Toronto Press, 1985.

A Manual for Mechanics' Institutions. London, Longman, Orme, Gree, & Longmans, 1839.

Anderson, James. The Improvement of Agriculture and the Elevation on the Social Scale of both Husbandman and Operative. Montreal: DeMontigny & Co., 1864.

Berman, Morris. Social Change and Scientific Organization: The Royal Institution, 1799 - 1844. Ithica, New York: Cornell University Press, 1978.

Bernal, J. D. Science in History, Volume II, The Scientific and Industrial Revolutions. Cambridge, Mass.: MIT Press, 1971.

Bélisle, Jean et al. Montreal Cast Iron Architecture, second ed. Montréal: Heritage Montreal, 1984.

Biddle, Gordon. Victorian Stations: Railway Stations in England and Wales, 1830 - 1923. Devon, England: David and Charles (Holdings) Ltd., 1973.

Bird, Anthony. Paxton's Palace. London: Cassell & Co., 1976.

Bliss, J. M. Canadian History in Documents, 1763 - 1966. Toronto: Ryerson Press, 1966.

Bosworth, Newton. Hochelaga Depicta: The Early History and Present State of the City and Island of Montreal. Montreal: William Greig, 1839.

Braudel, Fernand, "On a Concept of Social History," On History, trans. Sarah Matthews. Chicago: University of Chicago Press, 1980.

Briggs, Asa. Ironbridge to Crystal Palace: Impact and Images of the Industrial Revolution. London: Thames and Hudson Ltd., 1979.

_____. Victorian People. Harmondsworth, England: Penguin Books, 1965.

_____. Victorian Cities. Harmondsworth, England: Penguin Books, 1968.

Brockman, Harold Alfred Nelson. The British Architect in Industry, 1841-1940. London: Allen & Unwin, 1974.

Brunskill, Ronald, and Clifton-Taylor, Alec. Brickwork. New York: Van Nostrand Reinhold Co., 1982.

Building News, VI (July 27, 1860), 588.

Bury, J. B. The Idea of Progress: An Enquiry into its Origins and Growth. London: MacMillan and Co., 1928.

"By-Laws of the Board of Arts and Manufactures for Lower Canada Proposed at the Quarterly Meeting Held on the 5th of January 1858." Montreal: Salter & Ross Printers, 1858. The date is given in Newton Bosworth, Hochelaga Depicta: The Early History and Present State of the City and Island of Montreal (Montreal: William Greig, 1839), p. 192.

Chadwick, George F. The Works of Sir Joseph Paxton, 1803-1865. London: Architectural Press, 1961.

Chemetov, Paul. "Structure des bâtiments et technique industrielle," Monuments Historique, III, 3, 6-11.

Cole, G. D. H. and Postgate, Raymond. The Common People, 1746 - 1946. London: Metheum & Co., 1956.

Davies, E. Salter. "The Development of Education," Ideas and Beliefs of the Victorians: An Historical Revaluation of the Victorian Age. London: Sylvan Press, 1949. 306-312.

Day, Samuel Phillips. English America: Or Pictures of Canadian Places and People, Volume I. London: T. Cantley Newby, Publisher, 1864.

Dixon, Roger, and Muthesius, Stefan. Victorian Architecture. New York: Oxford University Press, 1978.

Durant, Stuart. "Ornament in an Industrial Civiliazation," Architectural Review, CLX (September, 1976), 139-43.

Durham, Lord, Lord Durham's Report: An Abridgement of Report on the Affairs of British North American, ed. Gerald M. Craig. Toronto: McClelland and Stewart Ltd., 1963 [1839].

Ferriday, Peter, ed. Victorian Architecture. London: Johnathan

Cape, 1963.

Ffrench, Yvonne, The Great Exhibition: 1851. London: Havill Press, 1950.

Fowkes, V.C., "The National Policy - Old and New," in Approaches to Canadian Economic History, ed. W.T. Easterbrook and M.H. Watkins, Toronto: McClelland and Steward Ltd., 1967.

Frampton, Kenneth, "Industrialization and the Crises in Architecture" Oppositions 1 (September, 1973), 65-67.

Fry, Edwin Maxwell. Art in a Machine Age; a Critique of Contemporary Life Through the Medium of Architecture. London: Metheun Co., 1969.

Garrigan, K. O. Ruskin on Architecture: His Thought and Influence. Madison, Wisconsin: University of Wisconsin Press, 1974.

Gloag, John. The Architectural Interpretation of History. New York: St. Martin's Press, 1975.

Greenhill, Ralph. Engineer's Witness (Toronto: Coach House Press, 1985.

Grenier, V. Les debuts du metal dans l'architecture," Les Monuments Historique de la France, I (1974), 45-59.

Gwilt, Joseph. Encyclopedia of Architecture; Historical, Theoretical, and Practical, revised ed. London: Longmans, Green, 1867; reprint ed., New York: Bonanza Books, 1982.

Hammond, Bray. "Banking in Canada Before Confederation, 1792-1867," in Approaches to Canadian Economic History,ed. W.T. Easterbrook and M.H. Watkins. Toronto: McClelland and Stewart Ltd., 1967.

Hitchcock, Henry-Russell. Architecture: Nineteenth and Twentieth Centuries. Harmondsworth, England: Penguin Books, 1977.

_____. Early Victorian Architecture in Britain, abridged ed. New York: Da Capo Press, 1976.

Hix, John. The Glass House. Cambridge, Mass.: MIT Press, 1974

Hobsbawm, E. J. Industry and Empire. Harmondsworth, England: Penguin Books, 1969.

Hobhouse, Christopher. 1851 and the Crystal Palace. London: John Murray, 1950.

Hollister, Paul. "The Glazing of the Crystal Palace," Journal of Glass Studies, XIV (1974), 95-110.

Hume, John R. "Cast-Iron and Bridge Building in Scotland," Industrial Archaeology Review, XI, 3 (Summer 1978), 290-299.

Ideas and Beliefs of the Victorians: A Historical Revaluation of the Victorian Age. London: Sylvan Press, 1949.

Jacobs, Jane. The Economy of Cities. New York: Vintage Books, 1970.

James, Ellen, John Ostell, Architect: A Preliminary Assessment Montreal: McCord Museum, 1985.

Jones, Owen. The Grammar of Ornament. London: Bernard Quartich, 1868.

Kalman. H. D. and Richarson, Douglas. "Building for Transportation in the Nineteenth Century," Jopurnal of Canadian Art History, III (Fall, 1976), 21-43.

Kaufmann, Edgar, jr. ed. The Rise of an American Architecture. New York, Praeger Publishers, 1970.

Kealy, Gregory S. "Toronto's Industrial Revolution, 1850-1892," Canada's Age of Industry, 1849-1896, Readings in Canadian Social History, Volume 3. Toronto: McClelland and Stewart Ltd., 1982.

Keefer, T. C. Philosophy of Railroads and other Essays. ed. H. V. Nelles. Toronto: University of Toronto Press, 1972.

Kihlstedt, Folke T. "The Crystal Palace," The Scientific American, CCLI (October 1984), 132 - 143.

King, Anthony D., ed. Buildings and Society: Essays on the Social Development of the Built Enviroment. London: Routledge & Kegan Paul, 1980.

Klingender, Francis D. Art and the Industrail Revolution. St. Albans, England: Paladin, 1975.

Koppelkamm, Stefan. trans. Kathrine Talbot. Glasshouses and Wintergardens of the Nineteenth Century. New York: Rizzoli, 1981.

Laisney, François. "L'architecture industrielle dans les expositions universelles," Monuments Historiques, III (1970), 41-45.

Lemoine, Bertrand. Les Halles de Paris. Paris: L'Equerre éditeur, 1980.

Linteau, Paul-André. The Promoters City: Building the Industrial Town of Maisonneuve, 1883-1918, trans. Robert Chodos. Toronto: James Lorimer & Co., 1985.

Lower, A. R. M., "The Trade in Square Timber," Approaches to Canadian Economic History, eds. W. T. Easterbrooke and M. H. Watkins, Toronto: McClelland and Stewart Ltd., 1967.

Luckhurst, Kenneth W. The Story of Exhibitions. London: Studio Publications, 1951.

Mackintosh, W. A., "Economic Factors in Canadian History," in Approaches to Canadian Economic History, eds. W. T. Easterbrooke and M. H. Watkins. Toronto: McClelland and Stewart Ltd., 1967.

Mainstone, Rowland. Developments in Structural From. Cambridge, Mass.: MIT Press, 1974.

Marx, Karl, "The German Ideology: A critique of the Most Recent German Philosophy as Represented by Feuerbach, B. Bauer, and Stirner," Writings of the Young Marx on Philosophy and Society, trans. and ed. Loyd D. Easton and Kurt H. Guddat. Garden City, N.Y.: Doubleday & Co., Inc., 1967.

Mathias, Peter. The First Industrial Nation: An Economic History of Britain, 1700-1914. London: Metheun and Co., 1969.

Montpetit, Raymond. "Approche socio-culturelle d'un monument architectural : le Crystal Palace de Montréal (1860-1896)," Opuscula Aesthetica Nostra: A Volume of Essays on Aesthetics and the Arts in Canada. Edmonton, Alberta: Academic Publishing, 1984.

Montreal Illustrated. Montreal: Consolidated Illustrating Co., 1894.

Morisset, Gérard. L'Architecture en Nouvelle France. Montréal: Editions du Pélican, 1980.

Mumford, Lewis, ed. Roots of Contemporary American Architecture: A Series of Thirty-Seven Essays dating from the Mid-Nineteenth Century to the Present. New York: Dover Publications, Inc., 1972.

"New Materials and Recent Inventions Connected with Building," Papers Read at the Royal Institute of British Architects, Session, 1874-75. London: n.p., 1875.

Ouellet, Fernand, Economic and Social History of Quebec. 1760 - 1850: Structures and Conjuncture. n.p.: Gage Publishing Ltd., 1980.

Our Dominion, Mercantile and Manufacturing Interests, Historical and Commercial Sketches of St. John and Environs. Toronto: Historical Publishing Co. of Canada, 1886.

Palmer, Bryan D. "Give us the road and we will run it; the Social and Cultural Matrix of an Emerging Labour Movement," Essays in Canadian Working Class History, eds. Gregory S. Kealy and Peter Warrian Toronto: McClelland and Stewart Ltd., 1976.

Pentland, H. Clare, Labour and Capital in Canada, 1650-1860 (Toronto: James Lorimer and Co., 1981 [ms. 1960]).

Pepall, Rosalind M. Construction d'un Musée des Beaux-Arts/Montréal, 1912/Building of a Beaux-Arts Museum. Montreal: Montreal Museum of Fine Arts, 1986.

Pérez-Gomez, Alberto. Architecture and the Crisis of Modern Science. Cambridge, Mass.: MIT Press, 1983.

Pevsner, Nikolaus. Pioneers of Modern Design from William Morris to Walter Gropius, rev. ed. Harmondsworth, England: Penguin Books, 1975.

_____. The Sources of Modern Architecture and Design. London: Thames and Hudson Ltd., 1968.

Pierson, William H. American Buildings and their Architects: Technology and the Picturesque, the Corporate and Early Gothic Styles. Garden City, New York: Anchor Books, 1980.

Plowden, David. Bridges: The Spans of North America. New York: Viking Press, 1974.

Porphyrios, Demitri, ed. On the Methodology of Architectural History, London: Architectural Design,. 1981.

Preziosi, Donald. The Semiotics of the Build Enviroment: An Introduction to Architectonic Analysis. Bloomington, Indiana: Indiana University Press, 1979.

Proceedings of the Annual Meeting [illegible]rd of Arts and Manufactures of Lower Canada, Held at Montreal on the 2nd of January, 1867. Montreal: A. A. Stevenson, 1867.

Rapport du groupe de recherche en art populaire: Travaux et conférences. Montréal: Département Histoire de l'Art, Université du Québec à Montréal, 1979.

Rapport du Sous-Comité de la Chambre des Arts et Manufactures du Bas-Canada, Présenté à l'Assemblée de la Chambre, tenue 4è jour de janvier, 1859, Avec les Minutes des Procédés de la Chambre à cette Assemblée; et Le Rapport sur les Institutions de Londres, Dublin, Edimburg et Paris, pour le Développement de l'instruction Industrielle. Montréal: De l'Imprimerie du "Canada Directory," 1859.

Ritchie, T. Canada Builds, 1867-1967. Toronto: University of Toronto Press, 1967.

Rolt, L. T. C. Isambard Kingdon Brunel. Harmondsworth, England: Penguin Books, 1970.

_____. Victorian Engineering. Harmondsworth, England: Penguin Books, 1970.

_____. George and Robert Stephenson, The Railway Revolution. Harmondsworth, England: Penguin Books, 1978.

Sandham, Alfred. Ville-Marie, or Sketches of Montreal, Past and Present. Montreal: George Bishop & Co., 1870.

Sheerbart, P. Glass Architecture by Paul Sheerbart and Alpine Architecture by Bruno Taut, ed. D. Sharp, trans. J. Palmes and S. Palmer. New York: Viking Press, 1974.

Shykofsky, Arnold D. "Architectural Report 175, Montreal"s Crystal Palace." typescript, Nobbs' Room, McGill University, 1959.

Skelton, Oscar Douglas, Life and Times of Sir Alexander Tilloch Galt, ed. Guy MacLean (Toronto: McClelland and Stewart Ltd., 1966 [1920]).

Snyder, Ellen Marie. "Victory over Nature: Victorian Cast-Iron Seating Furniture," Winterhur Portfolio, XX, 4 (Winter 1985), 221-42.

Stelter, Gilbert A. and Artibise, Alan F. J., eds. The Canadian City: Essays in Urban and Social History. Ottawa: Carlton University Press, 1984.

_____. eds. Power and Place: Canadian Urban Development in the North American Context. Vancouver: University of British Columbia Press, 1986.

Stephens, David E. Iron Roads: Railways of Nova Scotia. Windsor, Nova Scotia: Lancelot Press, 1972.

Stilgoe, John R. Common Landscape of America, 1580 to 1845. New Haven, Yale University Press, 1981.

Summerson, John. Architecture in Britain, 1530-1830. Harmondsworth England: Penguin Books, 1977.

_____. The Architecture of Victorian London. Charlottesville: University Press of Virginia, 1976.

Le Temps des Gares, Paris: Centre Création Industrielle, 1979.

Thompson, E. P., The Making of the English Working Class. Harmondsworth, England: Penguin Books Ltd., 1968).

Thomson, David. England in the Nineteenth Century. Harmondsworth, England: Penguin Books, 1978.

The Visit of His Royal Highness The Prince of Wales to America. Montreal: Eusebe Senecal, 1860.

Tzonis, Alexander. Towards a Non-Oppressive Environment, An Essay. Boston: i Press Books, 1972.

Wagg, Susan. Percy Erskin Nobbs: Architecte, Artiste, Artisan/Architect, Artist, Craftsman. Kingston: McGill-Queen's University Press.

Waite, P. B. The Confederation Debates in the Province of Canada, 1865. Toronto: McClelland annd Stewart Ltd., 1963.

Watkin, David. The Rise of Architectural History. Chaicago: University of Chicago Press, 1980.

Woods, N. A. The Prince of Wales in Canada and the United States. London: Bradbury & Evans, 1861.

Wyatt, Matthew Digby. "The Construction of the Building," Great Exhibition of the Works of Industry of All Nations, 1851: Official Descriptive and Illustrated Catalogue, Vol. I. London: Wm. Clowes and Sons, 1852.