TWENTY-THIRD ANNUAL REPORT

OF THE

COMMISSIONERS

FOR THE

Queen Victoria Niagara Falls Park

1908.

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1909

COMMISSIONERS OF THE QUEEN VICTORIA NIAGARA FALLS PARK.

J. W. Langmuir, (Chairman), Toronto.
George H. Wilkes, Brantford.
P. W. Ellis, Toronto.
Colonel L. Clarke Raymond, Welland.
William L. Doran, Niagara Falls.
Lionel H. Clarke, Toronto.

J. H. Jackson, C.E., Superintendent.
J. Harrison Pew, Assistant Superintendent.

Parliament Buildings,
Toronto, February 13th, 1909.

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TORONTO.

To the Honourable JOHN MORISON GIBSON, K.C., etc., etc., etc.,

Lieutenant-Governor of the Province of Ontario.

MAY IT PLEASE YOUR HONOUR:

I beg to submit herewith the Twenty-third Annual Report of the Commissioners for the Queen Victoria Niagara Falls Park, being for the year ended 31st December, 1908, together with the appendices thereunto attached.

I have the honour to be,

Your Honour's most obedient servant,

W. J. HANNA,
Provincial Secretary.

TORONTO, February 13th, 1909.

To the Honourable W. J. HANNA, K.C., M.P.P.,

Provincial Secretary, Province of Ontario, Parliament Buildings, Toronto.

SIR,—I have the honour to transmit herewith for presentation to the Legislature of Ontario the Twenty-third Annual Report of the Commissioners of the Queen Victoria Niagara Falls Park (being for the year ended 31st December, 1908), together with the appendices thereunto attached.

I have the honour to be, Sir,

Your obedient servant,

J. W. LANGMUIR,
Chairman.

TWENTY-THIRD ANNUAL REPORT OF THE COMMISSIONERS FOR THE QUEEN VICTORIA NIAGARA FALLS PARK.

To the Honourable JOHN MORISON GIBSON, K.C., LL.D.,

Lieutenant-Governor of the Province of Ontario.

May it Please Your Honour,

The Commissioners for the Queen Victoria Niagara Falls Park, as required by law, beg to submit their twenty-third annual report (being for the year 1908) together with the usual statement of receipts and expenditures. In the appendices attached will be found the Report of the Park Superintendent making reference in detail to the new works constructed and the general work of maintaining the Park proper and its outlying portions from Lake Erie to Lake Ontario during the past year; also the text of contracts entered into during 1908 for the construction of certain sections of the new Boulevard along the Niagara River from the southerly end of the Park to Fort Erie.

Senator Robert Jaffray, who was appointed a Commissioner in 1902, resigned from the Board on the 14th May, 1908, and Mr. Lionel H. Clarke, President of the Board of Trade, Toronto, was, on 24th November, 1908, by Order of the Lieutenant-Governor in Council, appointed in his place; otherwise the personnel of the Commission remains the same as at the date of the last annual report.

Mr. James Wilson, much to the regret of the Commissioners, resigned the Superintendency of the Park on the 6th April, 1908. He was appointed to the position in 1887 and had therefore served for twenty-one years, during which time he performed the very varied and important duties devolving on him to the entire satisfaction of the Commissioners.

With a view to the appointment of a properly qualified successor to Mr. Wilson, the Board considered it advisable to solicit applications for the vacant position through public advertisement. As a result of this action a large number of applications were received, but as none came up to the standard of qualification sought for, the Commissioners appointed Mr. J. H. Jackson, O.L.S., A.M. Can. Soc. C.E., of Niagara Falls, Acting Superintendent until a satisfactory permanent arrangement could be effected. Mr. Jackson having performed the duties pertaining to the position in a very efficient manner his permanent appointment was recommended by the Board and an Order-in-Council dated 27th January, 1909, was passed permanently confirming him in the position of Superintendent.

The chief incidents in the past year's administration of Park affairs may be briefly summarized as follows:—

Permanent Improvements.

The prevalence of spray in close proximity to the Falls rendered it most difficult to maintain in good condition the macadamized roadway at that important point, thus frequently causing much personal discomfort to visitors. It therefore became necessary to construct a brick driveway pavement from a point opposite the northerly end of the Administration

Building extending in front of the Falls to the extreme southerly point of view of the Horse Shoe cataract about a quarter of a mile in length. Occasion was taken during the progress of this work to reduce the grades and more suitably arrange the elevation of the street railway tracks, as well as to provide suitable slopes for the grass plots at this celebrated view point.

The condition of the road leading to the main northerly entrance to the Park has long been in a very unsatisfactory state, which was much more apparent since the construction of the new Clifton Hotel. In order to remedy this a joint arrangement was arrived at, after protracted negotiations, with the City of Niagara Falls and the International Railway for the construction of a permanent roadway of a class suited to the surroundings of this important point. This improved thoroughfare commences with the ordinary width at the Clifton Bridge and increases as it nears the Park entrance. Through the completion of this work the approaches to the Park now present a finished appearance in keeping with the fine granite columns and other surroundings at the gateway. There is yet, however, to be built by the electric railway under its agreement with the Park Commissioners a new walk from the Clifton Bridge to the Park entrance.

Boulevard from Fort Erie to the Park.

At the last session of the Legislature the Commissioners received authority to issue $100,000 debentures, the proceeds of which are "to be applied by the Commissioners primarily towards the preservation of the bank of the Niagara River between Fort Erie and the southerly boundary of the Park proper against erosion, wash or other action by nature affecting or which may affect the same, and the construction of an esplanade on and along the said bank for public purposes, and of such width as may be determined, and for the purchase of such land as may ge necessary or the acquisition thereof by expropriation."

This Act of the Legislature having been supplemented by an Order of the Lieutenant-Governor in Council, the Board was enabled to deal actively with the long delayed project of constructing a boulevard from Bridgeburg to the southerly boundary of the Park proper. The Commissioners have for many years given much thought to the various methods of giving effect in the most comprehensive way to this important work. To this end they have kept steadily before them that, in the expenditure of these public funds, the very best results, both from the standpoint of public utility and scenic effect, should be obtained.

In previous reports it has been stated that what is known as the Chain Reserve, extending from Lake Erie to Lake Ontario—a distance of about thirty miles—is vested in the Park Commission, and although, at the present time it is intended only to construct the Boulevard from Fort Erie to the Park proper—about sixteen miles, it is designed ultimately to extend it from Lake to Lake.

It may safely be asserted that in no part of the American continent is there better or more varied scope for the construction of a well designed Boulevard in combination with a series of Parks extending along the banks of one of the great rivers of the world than is presented in this project. Commencing at the foot of Lake Erie and following the sinuosities of the shore at an altitude sufficiently high to give a continued and comprehensive view of the Niagara River and the opposite American shore until the Rapids immediately above the Falls come in full view; then through the grand Park in sight of the turbulent rapids until the great cataract of Niagara Falls is

reached, and continuing along the banks of the lower river with its wonderful panorama of gorge, rapids, whirlpool and magnificent banks until the rushing and turbulent river merges with the quiet waters of Lake Ontario. Given these fine panoramic views, together with the grand historical associations connected with the whole territory from Lake to Lake, it may safely be said that the proposed boulevard with the continued series of Parks will not, when completed, be excelled on the continent of America.

In order to give effect to the views of the Commission, and after a most careful examination of the shore line of the river, the Honourable the Minister of Public Works was requested to place the services of Mr. A. W. Campbell, C.E., Deputy Minister of Public Works, (who has given special attention to the construction of "goods roads" and to works of this character) at the disposal of the Commission for the purpose of preparing the necessary plans and specifications for the construction of the roadbed. It was decided that sufficient land should be purchased from the various owners to give a general width of 100 feet to the boulevard so as to provide for a macadam driveway of 18 feet in width with grass and shrubs on the river side and trees and foot paths on the western side, with ample space for an electric railway, right of way and foot paths adjoining the properties of the bordering owners, as well as provision for a telephone pole line. In order to break the monotony that might result from too closely following a typical section, it is provided that the projecting areas will be treated in the plans and general design in a manner best suited to the respective sections having regard to the size of the areas and prominency of each on the river bank.

The land purchases are now being proceeded with, and a considerable portion has been taken possession of. It is expected that by spring at least one-half of the right of way will have been bought and ready for road building and general treatment.

It was thought advisable for construction purposes to divide the boulevard into sections and when the specifications were completed about the middle of the year, tenders were at once received for the construction of two sections of the road (full particulars of which will be found in the appendices attached). When the spring opens it is fully expected that a large portion of the road between Bridgeburg and the Chippawa River will be under contract. It is the intention of the Commission to have the roadway completed and ready for use before commencing the planting of trees and shrubs and the laying out of grass plots.

The bridge work spanning the stream along the course has been planned and one of suitable design has been completed over Frenchman's Creek at Bridgeburg.

With the responsibility placed on the commission for the care and management of the park-way along the river front it will become necessary to harmonize the adjacent surroundings with the park-way itself. To that end it will be obvious that it is vitally important that the full control of the water front should be placed under the supervision of the Commission. When it is considered that with the increased use of electrical power in the Niagara Peninsula important industries will be located in close proximity to the river and such industries will require docking privileges on the water and entrance to the land on the west of the boulevard, the placing of the water front under the care of the Park Commission becomes the more necessary. For these reasons the Government has been requested to vest in the Commission not less than 200 feet of the foreshore between Bridgeburg and the head of the Park.

Fire Protection.

For the safety of the general offices, the administration and other buildings, an independent high pressure fire service has been installed with the necessary equipment, which stands ready for instant use in the event of a fire breaking out. This precaution was justified in the summer, when a small fire occurred in the kitchen of the administration building, but which was extinguished without serious loss.

Park Lighting.

The question of lighting the Park has been under the consideration of the Commissioners for a long time, but the great cost of the requisite initial plant, as well as the annual charge for maintenance prevented the Board from entering on the work. Negotiations, however, were opened during the year with the Electric Railway Company for the use of their trolley poles and an arrangement has also been completed for furnishing electric light at a reasonable rate. These arrangements will enable the Park to be sufficiently lighted along the sidewalk on the cliff, as well as the roadway to the west between the entrance gate at the Clifton House and beyond the Falls.

Skating Rink.

Representations were made to the Commissioners during the year that, owing to the difficulty and danger of using any portion of the river for skating purposes, it would be a great benefit to the residents in the locality if an open skating rink was permitted to be placed in the bow of the river below Clark Hill. The request of the petitioners was granted, so that there are now facilities for skating in winter and bathing in summer.

Queenston Heights.

The Park surrounding Brock's Monument has been visited this year by a much larger number, both of travellers from a distance and single day picnic parties from Toronto and adjacent places, than in previous years. The presence of large crowds in this beautiful and picturesque Park has demonstrated the fact that the existing conveniences are quite inadequate for the comfort and enjoyment of visitors. The main entrance to the Park is congested by the slightest increase over normal traffic, and the water supply facilities cannot meet the demands made on them during many days of the season, while the capacity of the restaurant building is entirely insufficient to meet the requirements of visitors. To overcome these serious deficiencies, it is proposed to take down the handsome cut stone columns, comprising the old Lodge entrance to Queenston Heights and to reconstruct them at the entrance immediately opposite the electric railway landing, and, at the same time, to widen the foot path at the entrance and lessen the grade in its ascent to the Monument. It is also proposed to increase the area of the picnic grounds and open new vistas on the brow of the hill, so that the picturesque scenery in the foot lands and in the valley, as well as the placid river, may be seen. Should the popularity of this resort continue to increase it may become necessary to erect a commodious structure for a "Rest" for visitors, somewhat after the style of the Administration Build-

ing in the Park proper, where refreshments and meals can be served; meantime, until the numbers frequenting this Park justify the expenditures indicated, the present frame restaurant building will require to be enlarged and improved to meet the present demands.

Niagara Glen.

Another work of a permanent character which the Commissioners purpose taking up during the current year is the improvement of the Niagara Glen in conjunction with Whirlpool Point. Owing to the difficulty of ascent and descent at the Glen this unique property with its unrivalled and primitive wildness has not attained the popularity which it so justly deserves. Negotiations were commenced some time ago for the construction of an elevator at Whirlpool Point with a path leading to and connecting with the paths of Niagara Glen, as well as the construction of an elevator at the northerly end of that Park. It is intended to revive these negotiations during the present year and if they are successfully concluded it will become necessary to erect a suitable waiting room of the boulder style adopted by the Commissioners both at Niagara Glen and Whirlpool Point for the accommodation and comfort of visitors.

Water Mains.

The need of moisture at the northerly and southerly portions of the Park proper has been seriously felt during extremely dry weather and has frequently proved destructive of grass and plant life. To remedy this serious defect and, at the same time, to provide an ample supply of water for laying the dust of the roadways, it is proposed to instal during the year a system of water mains at different points throughout the Park limits. Experiments have been conducted in the past for dust laying, but so far, in addition to being very expensive, have not proved as successful as was hoped for.

General Maintenance.

The ordinary works of maintenance, both in Niagara Falls Park proper, as well as the outlying Parks, have been well kept up during the year. Practically the whole area of the Park proper has ben restored to its condition prior to the breaking up of the grounds for Power Company's operations and considerable work has been done in the construction of new roads and the repair and upkeep of the older ones, and many trees and shrubs have been planted in the restored portions. The largely increased area of the Park system generally, with the constantly increasing acreage brought under cultivation and horticultural treatment, must necessarily increase the expenditure for the proper care of lawns, paths and driveways.

Designs and Plans for General Park System.

Now that the Park domain has become so extensive, and seeing that additions will, undoubtedly, be made to it from time to time and in fact that it is destined to take rank among the most famed Parks of the world, it is of vital importance that the services of a skilled landscape architect of

the very highest standing in that profession should be secured for the preparation of the most comprehensive designs, specifications and working plans for the decorative treatment of the whole Park territory from Lake Ontario to Lake Erie. Each Park in the system, as well as the various sections of the boulevard, will require distinctive designs in order to produce the best scenic effects not only in each individual park but throughout the whole system. It will be obvious that such results can only be accomplished through the employment of the services of a professional landscape architect who has devised and carried to completion works of a similar character. The preparation of such designs not only require a general knowledge of every branch of landscape architecture, but a thorough practical knowledge of forestry, horticulture and every feature in plant life.

The Commissioners think that this great Park and boulevard system should not only be used for the recreation and enjoyment of the public, but should also be utilized during its formative period, and for all time to come, as a Provincial School of Practical Forestry, Horticulture, Floriculture and Botany, and last, but not least, an object lesson in good road building.

Power Measurement.

Reference ws made in the last Annual Report to the differences of opinion that existed between the Commissioners and the Power Companies as to the method of measuring the excess power "generated and used and sold or disposed of" over the stipulated quantity for which a fixed annual rental is paid by each Company respectively.

The Power Companies interested desired to be heard on the subject in order that they might place before the Commissioners their views in respect to the construction of the clause defining the rentals to be paid for such excess power. A conference was, therefore, arranged for and took place on February 13th at the Clifton House, Niagara Falls, before the Hon. J. J. Foy, K.C., Attorney General for Ontario, and the Hon. John S. Hendrie, M.P.P., when the views of the legal representatives of the respective companies were heard, as well as the reply of Counsel for the Commission. The whole proceedings, as reported verbatim, will be found in the appendix hereto attached.

Withdrawal of Water from River for Power Purposes.

A conference took place in Ottawa in the early part of the year between some members of the Ontario Government and the Dominion Government for the purpose of discussing the terms and conditions of a proposed treaty with the United States with a view to placing a limitation on the amount of water that might be withdrawn from both shores of the Niagara River for commercial purposes and incidentally to determine the amount of water that could be used by the respective Power Companies without materially deteriorating the beauty of the Falls. As the Commission had collected a great deal of information on the subject and the probable effect such withdrawal of water might have on the grandeur and scenic beauty of the Falls, the information thus obtained was placed in the possession of the Government. A monograph by Dr. Wm. Spencer on this subject had been published by the Geological Survey of Canada and the Ontario Government thought it most desirable to have the statements and deductions made by Dr. Spencer examined into by an expert engineer. Mr. Isham Randolph,

an eminent hydraulic engineer, was, therefore, engaged to examine and report upon the questions raised by Dr. Spencer as to the effect of the power developments at Niagara Falls upon the Falls themselves.

The full text of Mr. Randolph's reports will be found in the appendix.

Financial Statements.

From an examination of the financial statements appended it will be seen that the receipts of the year are about the same as for the preceding twelve months. It was expected that the various Power Companies operating under charters from the Ontario Government would have disposed of a larger amount of power in excess of the stipulated amount that each Company is authorized to take in consideration of the payment of their fixed rentals, aggregating $60,000, but this expectation was not realized. Doubtless considerably increased sums will be received during the current year from the sale of excess power from all of these companies.

The payments made by these companies on account of excess power have been accepted without prejudice to either party and subject to the decision of the Courts in the actions now pending. Should the decision be favorable to the contention of the Commissioners the receipts will be augmented by a considerable amount.

The expenditures for the year on Capital Account within the Park proper were largely increased by the construction of a permanent brick pavement at a point overlooking the Falls. This work has already been referred to under the heading of "Permanent Works."

It will be observed that the expenditures connected with the Niagara River Boulevard during the year amounted to $39,322.69 which along with $22,554.96 expended in previous years makes a total expenditure of $61,877.65 on the new boulevard. These large expenditures have caused an overdraft in the Bank Account of $73,722.50 of which $61,877.65, as above stated, was expended in connection with the boulevard. When the $100,000 new issue of debentures have been sold this overdraft will be repaid.

The Comissioners made preparation for suitably entertaining Lord Roberts during his visit to Canada to attend the Quebec Tercentary Celebration but the programme was not carried out owing to Lord Robert's illness and hastened return to England. In September Lord Milner and party spent two days at the Falls as guests of the Commissioners and were taken over the power works and to the historic and scenic points of the frontier. In September also the Canadian Mining Institute with visitors from Great Britain and the Continent were shown the interesting features of industrial Niagara on both sides of the River.

All which is respectfully submitted.

J. W. Langmuir,
Chairman.
George H. Wilkes.
P. W. Ellis.
L. Clarke Raymond.
William L. Doran.
Lionel A. Clarke.

QUEEN VICTORIA NIAGARA FALLS PARK.

Financial Statement, 1908.

Receipts.

Ontario Power Company, rental	$30,000 00	
Ontario Power Company, excess rental	88 50	
Canadian Niagara Power Company, rental	15,000 00	
Canadian Niagara Power Company, excess rental	18,624 15	
Electrical Development Company, rental	15,000 00	
International Railway Company, rental	10,000 00	
Zybach & Company, rental	9,000 00	
Brock's Monument tolls	1,001 50	
Wharf privileges	501 00	
Sundries	760 40	
		$99,975 55
Overdraft in Imperial Bank, December 31st, 1908		$73,722 50
		$173,698 05

Special Account.

For maintaining water levels at intakes of Canadian Niagara Power Company and the International Railway Company.

January 31, 1903, deposited	$25,000 00	
December 30, 1905, interest to date	2,288 41	
		$27,288 41
Less cost of submerged dam		$2,189 32
		$25,099 09
December 31, 1908, interest accrued to date		$2,344 58
		$27,443 67

Financial Statement, 1908.

Expenditures.

Paid Imperial Bank overdraft, January 1st, 1908 ..... $24,212 12

Capital Account:

Wages, permanent works:

New roads	$2,516 88	
Permanent works	2,439 01	
Trees and shrubs	1,640 78	
Fire protection	613 72	
Niagara Glen	192 45	
Butler's Burying Ground	101 15	
Bridge Street shelter	50 00	
		$7,553 99

Expenditures.—Continued.

Materials, permanent works:

New roads	$2,194 59	
Fire protection	990 34	
Trees and shrubs	439 39	
Iron pipe fence	409 50	
Water lots	375 55	
Butler's Burying Ground	217 74	
Niagara Glen	59 21	
Queenston	40 49	
Bridge Street shelter	20 40	
Furnishings	19 25	
Fort Erie	7 50	
		$4,773 96

Niagara River Boulevard:

Roadway construction	$17,200 11	
Lands purchased	10,160 11	
Stone riprap	7,647 69	
Bridges	4,314 78	
		$39,322 69

Land purchases (Queenston)	$1,030 20	
Legal	1,902 06	
Brick pavement, complete	27,109 22	
		$81,692 06

Maintenance Account:

Salaries paid staff, including constables, gardeners, etc.	$14,353 88	
Wages, labourers and teamsters	17,413 25	
Materials	7,198 97	
Office expenses	653 23	
Commissioners' expenses	1,162 38	
Miscellaneous	1,002 93	
		$41,784 64
Paid interest on bonds, including bank charges		$24,168 24
Paid interest on overdraft		1,840 99
		$173,698 05

APPENDIX A.

Report of the Park Superintendent.

To the Commissioners of the Queen Victoria Niagara Falls Park.

Gentlemen,—I have the honour to submit the following report of work undertaken and performed during the year 1908 in maintaining and improving the Queen Victoria Niagara Falls Park with its outlying portions northerly to Lake Ontario and southerly to Lake Erie, under the supervision of Mr. James Wilson until May 1st and under my control since June 13th.

General.

In addition to the ordinary routine of maintaining the Park system efficiently and providing for the needs and comfort of the throngs who come from far and near to gaze upon nature in her supreme effort, a step forward has been taken this year in commencing the construction of the interconnecting links between the outlying parks and the Park proper, that will, when completed, form a continuous parkway for 20 miles above the Falls and eventually for the same distance below the Falls.

Niagara Falls Park.

The area of the Park proper to be maintained and cultivated to a high degree of perfection has been increased yearly since the completion of the first installation of the various power companies until the close of the season 1908 sees the whole of the original area of 150 acres requiring attention in the repair and upkeep of paths and roadways together with the green plots and shrubs.

During the year much attention has been given to the roadways in this portion of the park vacated by the companies and partially restored at the end of 1907. The main carriage drive from the Power House of the Canadian Niagara Power Company to the head of Dufferin Islands has ben re-surfaced equal to the other park driveways and is in constant use for vehicular traffic. The secluded drive around the "Elbow" at Dufferin Islands has been repaired and newly surfaced with stone, adding an extra half mile of pleasant water scenery accessible to carriage traffic.

Small connecting links of roadway macadam construction have been built between the Power House of the Park and River Railway Company and the Canadian Niagara Power Company leaving one main drive yet to be constructed between the former Power House and the Park green houses and near the base of the bluff.

The planting of trees and shrubs in the Park area under the process of restoration has been attended with more encouraging results from mulching the soil with manure and very little of the stock has been lost this last season.

The changes and new arrangements detailed at length in the Report of 1907, providing for more suitable quarters to carry on the police system of the Park both at the north end and the south end have resulted in a better arrangement of the force and a more complete patrol of the park limits. Very little disorderly conduct has been reported and with the exception of several detentions for minor offences only two arrests have been made during the year. One person committed suicide by shooting during the season.

A most regrettable accident occurred on the morning of July 29th when Isaac Beswick, an employee of the regular Park staff, met his death opposite Rambler's Rest Shelter, being struck by a bridge car of the International Railway. The unfortunate man appeared not to hear the approach of the car though the gong was sounded.

On the morning of July 6th a small fire was discovered in the kitchen of the Administration Building. Fortunately it was seen in time to prevent serious loss, the automatic extinguishers being used. This circumstance was made the occasion of thoroughly instructing the regular police staff in the use of the new fire fighting apparatus which was not quite complete at this time. All the valves were explained and the operation of the hydrants tested by actual practice as an object lesson.

The question of ordering material and payment of accounts has been revised to completely follow each transaction through by correspondence on file, and new books have been arranged to show the progress of expenditure during the year so that the actual state of each appropriation can be seen without referring to each detail of cost.

Unfortunately estimates of the numbers of visitors daily are not recorded so that a comparison with former years cannot be made, but it would appear that this year the total number is slightly under the average. The 15th September marked one of the maximum crowds when the Niagara district turned out to the demonstration to Sir Wilfred Laurier.

New Works.

The report for 1907 set forth three important permanent improvements that it was proposed to take up as early as was practicable. These works together with the installation of a high pressure water supply for fire protection have all been carried out, the system of Park lighting being the only measure not actually completed, and it is partially in service now.

Brick Pavement. The roadway along the edge of the cliff from the Administration Building to and above the Horseshoe, formerly of macadam construction, has been entirely removed and constructed of standard brick pavement, a total distance of 1700 feet with a circular drive at the southerly end where vehicles tend to become crowded in the busy summer season. This work consisted of an excavation 12 inches in depth below the finished grade which was at a lower elevation than the old roadway, to form the subgrade. This subgrade was compacted by rolling to form a solid and sufficiently hard surface to receive the concrete foundation for the brick work. Concrete 6½ inches thick was used for the foundation and upon this a sand cushion 1½ inches in thickness after compacting was uniformly laid to receive the paving brick 4 inches thick.

When the concrete was sufficiently hard the brick surface was rolled to an even surface of required form and the whole grouted with portland cement grout and left to set hard for traffic. At the edges and at equal spacing longitudinally were laid pitch joints of elastic nature to take care of the expansion and contraction at different seasons of the year. The sides of the roadway throughout are curbed with a limestone curb set in concrete and drainage is provided for by catch basins at intervals along the length of the roadway. The brick for this work were purchased from New Cumberland, West Virginia, and consist of a yellow fire clay block repressed vitrified forming a roadway of very clean and pleasing appearance.

The large carriage traffic has not been slow to appreciate this much needed improvement and express itself by a large increase in the vehicles passing over this road.

Owing to the very severe conditions of spray and the anxiety to provide against any possibility of defective work it was deemed advisable to perform the contract by day's labour. The result shows that the cost is practically the same as the lowest tender and the cost of inspection is much reduced, while the foundation is thicker by half an inch than the specifications originally called for.

Several changes in the adjacent paths and green plots were made necessary during the paving construction. The grade of the International Railway tracks at the Administration Building has been lowered by a foot and the gravel platform made to conform as also were the foot paths leading from it. The small green plot at the Horseshoe has been removed entirely and the roadway located along the edge of the concrete walk.

Park Lighting. The lighting of the Park was taken up actively at the first of the year and after much correspondence and comparisons of design a contract was entered into with the International Railway for the installation of a system of incandescent lights along their right of way using the iron poles to support the brackets and hoods containing the lights. The system extends from the main entrance of the Park to the upper limit of Duffering Islands with two brackets of three lights each on every iron pole. The cables (lead covered) are all placed in iron conduits with junction boxes at the foot of the poles and from these are lead up the poles by iron conduit pipe to the semi-circular bracket supporting the hood. The lighting apparatus presents a very neat and substantial appearance and situate as it is between the main drive and the foot path in many places gives light to as great an area as possible. Power for the current is supplied from the International Railway power house as part of the contract entered into.

Park Approach. Negotiations were entered into with the City of Niagara Falls and the International Railway which resulted in the construction of a new and very much wider approach to the Main Park entrance the Upper Steel Arch Bridge. The construction is of the macadam type and at a much higher elevation than formerly and sets off to better advantage the new granite gateways. The International Railway tracks were raised to conform with the new grade and by agreement the Company will next year build a new concrete walk along the edge of the cliff from the Bridge to the Clifton Incline similar to that laid by the City on the westerly side of the River Road.

Fire Mains. The laying of a high pressure main with hydrants for fire protection at the Administration Building under contract to the Ontario Power Company was completed early in the year and there are now erected ready for use three fire hydrants in close proximity to the Commissioners Offices. Hose and the necessary fire fighting apparatus has been purchased to adequately protect the structures at this point.

Maid of the Mist Company. With the expiration of the lease of privileges by the Commission to the Maid of the Mist Company in April of this year an arrangement was made with them as part of the renewal to build a concrete retaining wall for the purpose of enclosing the eddy immediately southerly of their landing stage on the Niagara River.

This space had been an eye sore for some time it being the lodging place for decaying matter which became offensive in hot weather.

City Water Works. Advantage was taken of the request from the City of Niagara Falls to increase their pumping plant inside the park limits to require a complete repairing of the Station so as to present an appearance more in keeping with the surroundings. The building has been added to

and new roofed, and it is now proposed to construct a driveway around it to connect with the new pavement. With the completion of the improvements this vicinity will present itself as less out of harmony with its nearness to the great cataract.

Skating Rink. It will be endeavored this winter to maintain an open air skating rink at the smooth water behind Dufferin Islands where the swimming pond is in the summer season. Large numbers of the City young people will spend the afternoon there, if good ice can be kept.

It was thought advisable last year to recommend the deepening of this swimming pond to secure sufficient depth for diving, but it has been found that the pond is frequented very largely by children and their mothers and it would seem the better policy to have this an absolutely safe bathing ground for the little ones.

Queenston.

This outlying park is becoming more popular as a single day picnic ground for various organizations from Toronto and other places that can reach it readily and on a number of days this summer more people have had to be looked after at Queenston than at the park proper. And it appears probable that this popularity will increase rather than decrease within the next few years. With this in view it appears to me that careful consideration should be given to improving the grounds and affording the necessary facilities for the convenience and comfort of the crowds. As it is there are no better provisions now than several years ago, although the conditions are vastly different. Considerable expense would be incurred but it is a matter that should be met even to the extent of foregoing some of the improvements at the Park at the Falls.

Niagara Glen.

The usual works of maintenance have been performed at this point this year. The older shelters have been repaired and new roofs built, while the main stairs have been reconstructed.

Fort Erie.

No work other than that of careing for the property has been carried out at Fort Erie. The grounds have been kept in good condition and visitors shown over the old ruins.

Butler's Burying Ground.

The spot known as Butler's Burying Ground at Niagara, whose care was placed under the Commission, has been partially fenced and arrangements are being made for a right of way to the grounds from the highway.

Niagara River Boulevard.

In the month of April, active work in preparing for the construction of the Boulevard along the upper Niagara River from the Falls to Fort Erie, was begun, when a complete survey of the length, sixteen miles, was made. Upon carefully considering the plan prepared it was decided to purchase extra width of property to make a full allowance of 100 feet upon which to build a macadam roadway, paths and grass plots, with space for

a double track electric railway and a small right of way for telephone lines. The good roads department of the Government was consulted as to the proposed layout and under Mr. A. W. Campbell, Deputy Minister of Public Works, a typical plan was prepared with specifications for road construction. Surveys were then commenced to show the quantity of land to be secured from each owner along the route and information prepared for proceeding with the purchase. This work is now complete and negotiations are in progress with the owners following a general policy outlined by the Board of Commissioners after careful discussion. Some of the extra width has been bought and turned over to the Commission and it is intended to have the whole complete by next spring.

The typical plan shows a green plot 15 feet in width adjoining the edge of the bank followed by a roadway 30 feet wide, of which 18 feet is stoned after the manner of macadam roadways. Bordering upon the roadway 25 feet is left for a path and two rows of trees; then 20 feet is reserved for electric railway purposes and the remaining 10 feet is for a pole line for telephone use. Where projections occur in the contour of the shore line, extra width has been taken so that these may be beautified and relieve any monotony from the sameness of employing the typical section throughout.

For construction purposes the work has been divided into sections and as the land has been arranged for, these have been thrown open for tender and contracts awarded. Section No. 1, a length of one and one-quarter miles above Chippawa, has the roadway completed under the specification prepared, and is in use, while section No. 4 two and three-quarter miles long has been commenced at the Bridgeburg end of the route. Much care has been given to the proper interpretation of the requirements for building to produce a surface that will be satisfactory under the traffic that will pass over it, and special attention has been exercised upon the drainage of the gutters.

Simultaneously with the opening of sections of roadway for travel the problem of maintenance must be thought of. This can be best accomplished with the mileage under control by a division into sections after the manner of a railway trackage and keeping at intervals materials for repair work and quarters for the road men.

Outlets from the larger ditches are provided by constructing reinforced concrete culverts, while the larger streams are bridged by steel concrete bridges of a design in keeping with the character of the work. One of these, a forty foot span, is completed at Frenchman's Creek near Bridgeburg and presents a fine appearance with its cut stone hand rails, and retaining walls of hand laid dry walls holding up the approaches.

The protection of the shore line from erosion by cutting from the river currents has been vigorously carried on and practically all of the lengths originally outlined have been lined with stone riprap laid up along the water's edge. More of this stone work will be required in the future as the currents change and commence to wear away in a new place. It would be advisable to examine the whole frontage and lay out for protection such portions as require it most.

All of which is respectfully submitted.

John H. Jackson,
Superintendent

QUEEN VICTORIA NIAGARA FALLS PARK.

Contract for the Construction of the Niagara River Boulevard,

Section No. 1.

This agreement made (in triplicate) this 11th day of August, A.D. 1908, by and between The Queen Victoria Niagara Falls Park Commission, of the first part, and The Queenston Quarry Company (E. D. Lowrey, President), of the Village of St. David's, and T. E. Ferris, of the City of Niagara Falls, both in the Province of Ontario, Contractors, of the second part.

Witnesseth:—

1. That the said party of the first part has let and awarded to the Contractors, and in consideration of the covenants and agreements herein contained on the part of the Contractors to be kept and performed by them, does hereby let and award to the said Contractors the following described work or contract, upon the following terms and conditions and specifications, hereunto annexed, and in accordance with the plans thereof on file in the office of the Commission at Niagara Falls, all of which form a part of this contract.

2. The work to be done, and the materials to be furnished under this contract, are described as being the construction of Section No. 1 of the Niagara Boulevard, a distance of 6,460 lineal feet.

3. And the said Contractors, in consideration of the letting and awarding to them of the said contract and work, and in consideration of the payments hereinafter mentioned, to be made to them by the said Commission, and under the penalty expressed in a bond bearing even date with the presents and hereunto annexed, hereby agree at their own proper cost and expense to do all the work, furnish all the material above set forth, according to the true intent and meaning of the specifications and conditions herein contained.

4. And do further agree that the said Commission shall be and are hereby authorized to appoint an engineer of the said Boulevard, and such assistants and inspectors as they may deem proper, to inspect the work to be done under this agreement and to see that the same strictly corresponds with the specifications hereunto annexed.

5. To prevent all disputes and litigation, it is further agreed by and between the parties to this contract that the Engineer of the said Boulevard shall in all cases determine the amounts of quality of work to be done and which are to be paid for under this contract or in connection with said Boulevard construction, and he shall decide all questions which may arise relative to the execution of the contract, or to said construction on the part of the Contractors, and his estimates, directions and decisions shall be final and conclusive and binding upon the said Contractors.

6. It is understood that whatever conditions and specifications are mentioned herein, the conditions and specifications hereunto annexed are referred to, and the same are to be taken as a part of this contract and construed therewith.

7. And it is further agreed that this contract shall be executed in triplicate, one of which triplicates shall be kept by the said Commission, one to be kept by the said Engineer, and one to be delivered to the Contractors.

8. And the said Contractors hereby agree to receive the following prices as full compensation for the use of forms, tools, patterns, plant, implements and machinery, including all transportation, etc., for the same, and for all the labor for executing all the work contemplated in this contract; for all bailing, draining and pumping of water; for all loss or damage arising out of the work aforesaid, or from the action of the elements or from any unforeseen destruction or difficulties which may be encountered in the prosecution of the same, and for all risk of every description connected with the work, also for all expenses incurred by or in consequence of the suspension or discontinuance of the said works (in case the Engineer should so direct) and for well and faithfully completing the work and the whole thereof in the manner and according to the plans and specifications and the requirements of the Engineer under them; being distinctly understood that there shall be no claim for any extra work except as herein specially provided for; also the furnishing (including transportation) of all the materials necessary for the full completion of the work; and the keeping of the works in repair, and in good working order, until the final payments are made, the whole of the work to be completed according to the plans and specifications for the lump sum of ten thousand five hundred and twenty-two dollars ($10,522), and further agree to any combination of the following additions and deductions per item to or from the work shown on the plan and described in clause 2 of this contract, namely:

The addition or deduction of:

1. Earth excavation, including disposal, 30 cents per cubic yard.
2. Macadam roadway complete, $2.20 per square yard.
3. Furnishing and laying 4-inch tile drain, 20 cents per lineal foot.

9. The work embraced in this contract shall be begun within three days after notice so to do shall have been given to the Contractors by the Engineer, and carried on regularly and uninterruptedly thereafter with such a force as to secure its full completion on or before October 10th, 1908, and such portions thereof shall be completed in each month as the Engineer shall determine is a fair proportion thereof.

10. And the said parties of the second part hereby further agree that the said party of the first part shall be and is hereby authorized to deduct and retain out of the moneys which may be due or become due to the said party of the second part under this agreement as damages for the non-completion of the work aforesaid within the time hereinbefore stipulated for its completion, or within such further time as in accordance with the provisions of this agreement shall be fixed or allowed for such performance or completion, the sum of one hundred dollars ($100) per day for each and every day the time employed upon the said work may exceed the time stipulated for its completion or such stipulated time as the same may be increased as hereinbefore provided which said sum of one hundred dollars per day is hereby in view of the difficulty of estimating such damages agreed upon fixed and determined by the parties hereto as the liquidated damages that the party of the first part will suffer by reason of such default and not by way of penalty.

11. That party of the first part reserves the right of suspending the whole or any part of the work herein contracted to be done if it is deemed to be for the best interests of the Commission so to do, without compensation to the Contractors for such suspension other than extending the time for completing the work as long a time as it may have been delayed by such suspension.

12. No charge shall be made by the Contractors for hinderance or delay from any cause during the progress of the work embraced in this contract.

13. The said Contractors further agree that they will give personal attention constantly to the faithful prosecution of the work and will not assign or sublet the work or any part thereof or any of the moneys or orders payable under the contract without the previous written consent of the Commission, but will keep the same under their personal control; that no right under this contract nor to any orders or moneys due or to become due hereunder shall be asserted against the said Commission or any members or officers thereof, by reason of any so-called assignment in law or equity of this contract or any part thereof, or of any moneys or orders payable thereunder, unless such assignment shall have been authorized by the written consent of the Commission; that no person other than the parties signing this agreement as the Contractors hereby now have any claim hereunder; that no claim shall be made execpt under a specific clause of this agreement by any person whatever.

14. In the event of the contractors failing or neglecting for one month to pay the wages of the men and teams employed on the works the Commission, on the representation of the Engineer, reserve to themselves the right to pay all such wages ascertained to be due and to deduct the amount of the same from any monies due or coming due to the Contractors upon this or any other contract.

15. It shall be lawful for the said Commission in case the said Contractors shall fail in the due performance of any part of their undertaking or shall become bankrupt or insolvent or shall compound with their creditors or propose any composition with their creditors for the settlement of their debts, or shall carry on or propose to carry on their business under inspectors on behalf of their creditors, or shall commit any act of bankruptcy, to relet the undertaking of said contract or any part thereof, and upon such condition as it may think fit, or from time to time may engage workmen and provide all such materials, implements and apparatus and employ the same in such manner as the said Engineer may think necessary and proper for completing the said works, or any part of them, and any loss, damage, or deficiency that may arise in consequence of said bankruptcy or failure on part of the contractors shall be paid and deducted out of the money retained by said Commission out of any work previously performed by said Contractors, and should said money so retained be not sufficient to indemnify and cover such losses, the deficiency then due shall be a charge on the bond accompanying this instrument.

16. If the said Contractors are not, in the opinion of the Engineer, proceeding with the work expeditiously, continuously and in accordance with the terms of this contract, and to the satisfaction of the said Engineer, and so as to ensure in his opinion a satisfactory completion and delivery to the Commission by the date herein provided, and should the Engineer so certify to the Commission in writing the said Commission shall thereupon require the said Contractors to proceed without delay with such force as may be directed, and in case of their refusal or neglect to completely comply with such requirement within three days after being notified so to do, the said Commission may take possession of and complete said work at the expense of said Contractor as herein provided in case of failure or insolvency.

17. The Contractor shall deliver to the Engineer accounts for extra work duly ordered in the manner hereinbefore mentioned and provided in specifications signed by himself or agent, and such accounts will be paid in

full within five weeks upon the Engineer's certificate for their correctness, and no claim whatever will be considered for works not so included in such account. Such payments on extra work shall not be construed, however, as an acceptance of any such work, and shall not lessen the liability of the Contractors to replace defective work though the conditions of the same may not have been known to the Engineer at the time his certificate was given or acted upon.

18. In order to enable the Contractors to prosecute the work advantageously the Engineer shall on or about the last Saturday of each month make an estimate in writing of the amount of work done and materials delivered to be used in the work, and the value thereof according to the terms of this contract. The first such estimate shall be of the amount or quantity and value of the work done and materials delivered since the Contractors commenced the performance of this contract on their part. And every subsequent estimate, except the final one, shall be of the amount or quantity and value of the work done since the last preceding estimate was made. And such estimates of the amount and quantity shall not be required to be made by strict measurement, or with exactness, but they may, at the option of the Engineer, be approximate only. And upon such estimate being made the Commission will pay to the Contractors eighty (80) per cent. of such estimated value.

19. The Contractors hereby further agree to make all the needed repairs in the said work during a period of nine months after its final completion; and they hereby further agree that the Commission is authorized to retain out of the monies payable or to become payable to them, under this agreement, the sum of five per cent. on the amount of the contract, and to expend the same, or so much thereof as may be required, in making the aforesaid repairs to the satisfaction of the Engineer, if after the delivery or mailing of a notice in writing to the Contractors or their agent, they shall neglect to make the aforesaid needed repairs within the time specified in such notice; and they (the Contractors) hereby further agree to be responsible for any accident that may occur on account of the defective condition of the work.

20. It is further mutually agreed, that whenever this contract, in the opinion of the Engineer, shall be completely performed on the part of the Contractors, the Engineer shall proceed with all reasonable diligence to measure up the work, if need be, and shall make out the final estimate for the same, and shall certify the same; and upon the expiration of sixty (60) days after the acceptance by the Commission of the work herein agreed to be done by the Contractors, the said Commission will pay to the said Contractors the amount remaining, after deducting from the amount or value named in the last mentioned (final) certificate, all such sums as shall previously have been paid to the said Contractor under any of the provisions of the contract, and also such sums of money as by the terms they are authorized to reserve or retain, provided that nothing herein contained shall be construed to affect the right hereby reserved by the said Commission to reject the whole or any portion of the aforesaid work should the said certificate be found or known to be inconsistent with the terms of this agreement, or otherwise improperly given.

21. And it is hereby agreed that the said Contractors shall indemnify and save harmless the Commission from and against all claims against the said Commission for all labor done and materials furnished under this contract, and shall furnish said Commission with satisfactory evidence, when requested, that all persons who have done work or furnished materials under

this contract, for which the Commission might become liable, have been fully paid, or satisfactorily secured; and in case such evidence is not furnished an amount necessary and sufficient to meet the claims of persons aforesaid shall be retained from money due the said Contractors under this contract, until the liabilities aforesaid shall be fully discharged or satisfactorily secured.

22. And the Contractors agree that they will execute and deliver to the said Commission a bond by an approved surety company in the sum of five thousand dollars ($5,000) for the faithful performance of the contract, conditioned to indemnify and save harmless the said Commission from all suits or actions of every name and description brought against the said Commission, for or on account of any damages received or sustained by any party or parties, by or from the said Contractors, their servants or agents, in the construction of the said works, or by or in consequence of any negligence in guarding the same, or any improper material furnished by the Contractors used in its construction, or by or on account of any act or omission of the said Contractors, and that the Contractors will faithfully perform this contract according to the true intent and meaning thereof; and the said Contractors hereby further agree that so much of the money due to them under and by virtue of this agreement as shall be considered necessary by the said Commission, may be retained by the Commission until all such suits or claims for damages, as aforesaid, shall have been settled, and evidence to that effect furnished to the satisfaction of the said Commission.

23. This agreement shall ensure to the benefit of and be binding upon the successors and assigns of the Commission and the heirs, executors, administrators and assigns of the said Contractors as well as upon the Commission and Contractors.

In witness whereof, the parties to these presents have hereunto set their hands and seals, the day and year herein first written.

Signed, sealed, and delivered,
In the presence of
W. S. Malcolmson.

Queen Victoria Niagara Falls Park Commissioners.

P. W. Ellis,
Acting Chairman.
(Seal)

Queenston Quarry Company, Limited.

Per E. D. Lowrey,
President.
(Seal)

F. E. Ferris.

QUEEN VICTORIA NIAGARA FALLS PARK.

Contract for the Construction of the Niagara River Boulevard, Section No. 4.

This agreement made (in triplicate) this nineteenth day of September, A.D. 1908, by and between The Queen Victoria Niagara Falls Park Commission, of the first part, and William Upper, of the City of St. Catharines, and Chalres Lobb, of the City of St. Catharines, both in the Province of Ontario, Contractors, of the second part.

Witnesseth:—

1. That the said party of the first part has let and awarded to the Contractors, and in consideration of the covenants and agreements herein contained on the part of the Contractors to be kept and performed by them does hereby let and award to the said Contractors, the following described work or contract, upon the following terms and conditions and specifications, hereunto annexed, and in accordance with the plans thereof on file in the office of the Commission, at Niagara Falls, all of which form a part of this contract.

2. The work to be done, and the materials to be furnished under this contract, are described as being the construction of Section No. 4 of the Niagara River Boulevard, a distance of 14,200 lineal feet.

3. And the said Contractors, in consideration of the letting and awarding to them of the said contract and work, and in consideration of the payments hereinafter mentioned, to be made to them by the said Commission, and under the penalty expressed in a bond bearing even date with the presents and hereunto annexed, hereby agree at their own proper cost and expense to do all the work, furnish all the material above set forth, according to the true intent and meaning of the specifications and conditions herein contained.

4. And do further agree that the said Commission shall be and are hereby authorized to appoint an Engineer of the said Boulevard, and such assistants and inspectors as they may deem proper to inspect the work to be done under this agreement and to see that the same strictly corresponds with the specifications hereunto annexed.

5. To prevent all disputes and litigation, it is further agreed by and between the parties to this contract that the Engineer of the said Boulevard shall in all cases determine the amounts or quality of work to be done and which are to be paid for under this contract or in connection with said Boulevard construction, and he shall decide all questions which may arise relative to the execution of the contract, or to said construction on the part of the Contractors, and his estimates, directions and decisions shall be final and conclusive and binding upon the said Contractors.

6. It is understood that whatever conditions and specifications are mentioned herein, the conditions and specifications hereunto annexed are referred to, and the same are to be taken as a part of this contract and construed therewith.

7. And it is further agreed that this contract shall be executed in triplicate, one of which triplicates shall be kept by the said Commission, one to be kept by the said Engineer and one to be delivered to the Contractors.

8. And the said Contractors hereby agree to receive the following prices as full compensation for the use of forms, tools, patterns, plant, implements and machinery, including all transportation, etc., for the same, and for all the labor for executing all the work contemplated in this contract; for all bailing, draining and pumping of water; for all loss or damage arising out of the work aforesaid, or from the action of the elements or from any unforeseen destruction or difficulties which may be encountered in the prosecution of the same, and for all risk of every description connected with the work, also for all expenses incurred by or in consequence of the suspension or discontinuance of the said works (in case the Engineer should so direct) and for well and faithfully completing the work and the whole thereof in the manner and according to the plans and specifications and the requirements of the Engineer under them; being distinctly understood that there shall be no claim for any extra work except as herein specially provided for; also the furnishing (including transportation) of all the materials necessary for the full completion of the work; and the keeping of the works in repair, and in good working order, until the final payments are made, the whole of the work to be completed according to the plans and specifications for the lump sum of thirty-two thousand five hundred dollars ($32,500), and further agree to any combination of the following additions and deductions per item to or from the work shown on the plan and described in clause 2 of this contract, namely:

The addition or deduction of:—

(1) Earth excavation, including disposal, 60 cents per cubic yard.
(2) Macadam roadway complete, $1.40 per square yard.
(3) Furnishing and laying 4-inch tile drain, 12 cents per lineal foot.

9. The work embraced in this contract shall be begun within three days after notice so to do shall have been given to the Contractors by the Engineer, and carried on regularly and uninterruptedly thereafter with such a force as to secure its full completion on or before August 15th, 1909, and such portions thereof shall be completed in each month as the Engineer shall determine is a fair proportion thereof.

10. And the said parties of the second part hereby further agree that the said party of the first part shall be and is hereby authorized to deduct and retain out of the monies which may be due or become due to the said party of the second part under this agreement as damages for the non-completion of the work aforesaid within the time hereinbefore stipulated for its completion, or within such further time as in accordance with the provisions of this agreement shall be fixed or allowed for such performance or completion, the sum of one hundred dollars ($100) per day for each and every day the time employed upon the said work may exceed the time stipulated for its completion or such stipulated time as the same may be increased as hereinbefore provided, which said sum of one hundred dollars per day is hereby in view of the difficulty of estimating such damages agreed upon fixed and determined by the parties hereto as the liquidated damages that the party of the first part will suffer by reason of such default and not by way of penalty.

11. That party of the first part reserves the right of suspending the whole or any part of the work herein contracted to be done if it deemed to be for the best interest of the Commission so to do, without compensation to the Contractors for such suspension other than extending the time for completing the work as long a time as it may have been delayed by such suspension.

12. No charge shall be made by the Contractors for hinderance or delay from any cause during the progress of the work embraced in this contract.

13. The said Contractors further agree that they will give personal attention constantly to the faithful prosecution of the work and will not assign or sublet the work or any part thereof or any of the monies or orders payable under the contract without the previous written consent of the Commission, but will keep the same under their personal control; that no right under this contract nor to any orders or monies due or to become due hereunder shall be asserted against the said Commission or any members or officers thereof, by reason of any so called assignment in law or equity of this contract or any part thereof, or of any monies or orders payable thereunder, unless such assignment shall have been authorized by the written consent of the Commission; that no person other than the parties signing this agreement as the Contractors hereby now have any claim hereunder; that no claim shall be made except under a specific clause of this agreement by any person whatever.

14. In the event of the Contractors failing or neglecting for one month to pay the wages of the men and teams employed on the works the Commission, on the representation of the Engineer, reserve to themselves the right to pay all such wages ascertained to be due and to deduct the amount of the same from any monies due or coming due to the Contractors upon this or any other contract.

15. It shall be lawful for the said Commission in case the said Contractors shall fail in the due performance of any part of their undertaking or shall become bankrupt or insolvent or shall compound with their creditors or propose any composition with their creditors for the settlement of their debts, or shall carry on or propose to carry on their business under inspectors on behalf of their creditors, or shall commit any act of bankruptcy, to relet the undertaking of said contract or any part thereof, and upon such condition as it may think fit, or from time to time may engage workmen and provide all such materials, implements and apparatus and employ the same in such manner as the said Engineer may think necessary and proper for completing the said works, or any part of them, and any loss, damage, or deficiency that may arise in consequence of said bankruptcy or failure on part of the Contractors shall be paid and deducted out of the money retained by said Commission out of any work previously performed by said Contractors, and should said money so retained be not sufficient to indemnify and cover such losses the deficiency then due shall be a charge on the bond accompanying this instrument.

16. If the said Contractors are not, in the opinion of the Engineer, proceeding with the work expeditiously, continuously and in accordance with the terms of this contract, and to the satisfaction of the said Engineer, and so as to ensure in his opinion a satisfactory completion and delivery to the Commission by the date herein provided, and should the Engineer so certify to the Commission in writing the said Commission shall thereupon require the said Contractors to proceed without delay with such force as may be directed, and in case of their refusal or neglect to completely comply with such requirement within three days after being notified so to do, the said Commission may take possession of and complete said work at the expense of said Contractor as herein provided in case of failure or insolvency.

17. The Contractor shall deliver to the Engineer accounts for extra work duly ordered in the manner hereinbefore mentioned and provided in specifications signed by himself or agent, and such accounts will be paid in

full within five weeks upon the Engineer's certificate for their correctness, and no claim whatever will be considered for works not so included in such account. Such payments on extra work shall not be construed, however, as an acceptance of any such work, and shall not lessen the liability of the Contractors to replace defective work though the conditions of the same may not have been known to the Engineer at the time his certificate was given or acted upon.

18. In order to enable the Contractor to prosecute the work advantageously the Engineer shall on or about the last Saturday of each month make an estimate in writing of the amount of work done and materials delivered to be used in the work and of the value thereof according to the terms of this contract. The first such estimate shall be of the amount or quantity and value of the work done and materials delivered since the Contractors commenced the performance of this contract on their part. And every subsequent estimate, except the final one, shall be of the amount or quantity and value of the work done since the last preceding estimate was made. And such estimates of the amount and quantity shall not be required to be made by strict measurement, or with exactness, but they may, at the option of the Engineer, be approximate only. And upon such estimate being made the Commission will pay to the Contractors eighty (80) per cent. of such estimated value.

19. The Contractors hereby further agree to make all the needed repairs in the said work during a period of nine months after its final completion; and they hereby further agree that the Commission is authorized to retain out of the monies payable or to become payable to them, under this agreement, the sum of five per cent. on the amount of the contract, and to expend the same, or so much thereof as may be required, in making the aforesaid repairs to the satisfaction of the Engineer, if after the delivery or mailing of a notice in writing to the Contractors or their agent, they shall neglect to make the aforesaid needed repairs within the time specified in such notice; and they (the Contractors) hereby further agree to be responsible for any accident that may occur on account of the defective condition of the work.

20. It is further mutually agreed, that whenever this contract, in the opinion of the Engineer, shall be completely performed on the part of the Contractors, the Engineer shall proceed, with all reasonable diligence, to measure up the work, if need be, and shall make out the final estimate for the same and shall certify the same; and upon the expiration of sixty (60) days after the acceptance by the Commission of the work herein agreed to be done by the Contractors, the said Commission will pay to the said Contractors the amount remaining, after deducting from the amount or value named in the last mentioned (final) certificate, all such sums as shall previously have been paid to the said Contractor under any of the provisions of the contract, and also such sums of money as by the terms they are authorized to reserve or retain, provided that nothing herein contained shall be construed to affect the right hereby reserved by the said Commission to reject the whole or any portion of the aforesaid work should the said certificate be found or known to be inconsistent with the terms of this agreement, or otherwise improperly given.

21. And it is hereby agreed that the said Contractors shall indemnify and save harmless the Commission from and against all claims against the said Commission for all labor done and materials furnished under this contract, and shall furnish said Commission with satisfactory evidence, when requested, that all persons who have done work or furnished materials under

this contract, for which the Commission might become liable, have been fully paid, or satisfactorily secured; and in case such evidence is not furnished an amount necessary and sufficient to meet the claims of persons aforesaid shall be retained from money due the said Contractors under this contract, until the liabilities aforesaid shall be fully discharged or satisfactorily secured.

22. And the Contractors agree that they will execute and deliver to the said Commission, a bond by an approved surety company in the sum of ten thousand dollars $10,000) for the faithful performance of the contract, conditioned to indemnify and save harmless the said Commission from all suits or actions of every name and description brought against the said Commission, for or on account of any damages received or sustained by any party or parties, by or from the said Contractors, their servants or agents, in the construction of the said works, or by or in consequence of any negligence in guarding the same, or any improper materials furnished by the Contractor, used in its construction, or by or on account of any act or omission of the said Contractors, and that the Contractors will faithfully perform this contract according to the true intent and meaning thereof; and the said Contractors hereby further agree that so much of the money due to them under and by virtue of this agreement as shall be considered necessary by the said Commission, may be retained by the said Commission until all such suits or claims for damages, as aforesaid, shall have been settled and evidence to that effect furnished to the satisfaction of the said Commission.

23. This agreement shall ensure to the benefit of and be binding upon the successors and assigns of the Commission and the heirs, executors, administrators and assigns of the said Contractors as well as upon the Commission and Contractors.

In witness whereof, the parties to these presents have hereunto set their hands and seals, the day and year herein first written.

Signed, sealed, and delivered,
In the presence of
W. Hardwick.

The Queen Victoria Niagara Falls Park Commission.

L. Clarke Raymond,
Acting Chairman.
(Seal)

William Upper.
(Seal)

Chas. Lobb.
(Seal)

Memorandum of agreement made in duplicate this 11th day of August, A.D. 1908.

Between The Queen Victoria Niagara Falls Park Commission, hereinafter called "The Commission," of the first part, and H. D. Symmes, of the City of Niagara Falls, Contractor, hereinafter called "The Contractor," of the second part.

Witnesseth:—

That the Contractor, in consideration of the covenants and agreements on the part of the said Commission herein contained, hereby covenants and agrees with the Commission as follows:—

1. That he shall and will for the consideration hereinafter mentioned well and sufficiently execute and perform in a true, perfect and thoroughly workmanlike manner all the works required in the erection and completion of a steel concrete bridge over Frenchman's Creek on the River Road, agreeably to the plans and specifications for said work hereto attached, which said plans and specifications are incorporated as part of this contract, and to the satisfaction and under the direction of the Engineer appointed by the Commission. And will find and provide good, proper and sufficient material of all kinds whatsoever as shall be required for completing and finishing the said bridge, for the lump sum of twenty-nine hundred and seventy-six dollars ($2,976).

2. That he will accept as full payment for extra work as follows:—

(1) Extra concrete, per cubic yard, $10.

(2) Extra earth excavation, per cubic yard, 50 cents.

3. In consideration whereof the Commission covenant and agree with the Contractor to pay the Contractor the sum of twenty-nine hundred and seventy-six dollars ($2,976), such payments to be made on the certificate of the Engineer; eighty (80) per cent. on the completion and acceptance of the structure and the balance within thirty (30) days after its acceptance.

In witness whereof the said parties hereto have duly executed this agreement.

THE QUEEN VICTORIA NIAGARA FALLS PARK COMMISSION.

(Seal)

Signed, sealed, and delivered,
In the presence of
JENNIE F. QUILLINAN.

L. CLARKE RAYMOND,
Acting Chairman.

H. D. SYMMES.

(Seal)

QUEEN VICTORIA NIAGARA FALLS PARK COMMISSIONERS.

Hearing at the Clifton Hotel, Niagara Falls, February 15th, 1908, before the Honourable J. J. Foy, K.C., Attorney-General for Ontario, Chairman, the Honourable John Hendrie, M.P.P., and the Commissioners of the Queen Victoria Niagara Falls Park, with reference to the system of measurement to be adopted in accounting for the excess power generated by the power companies in the Park.

PRESENT:

Park Commissioners:

J. W. Langmuir, Chairman,
George H. Wilkes,
P. W. Ellis,
Col. L. Clark Raymond, K.C.
William L. Doran,
Sir Æmilius Irving, K.C.,
R. A. Ross, Electrical Engineer,
James Wilson, Superintendent.

Canadian Niagara Power Company:

Wallace Nesbitt, K.C.,
A. Monro Grier, K.C.
P. P. Barton, General Manager.

Ontario Power Company:

Walter Cassels, K.C.,
W. N. Ryerson, Superintendent.

Electrical Development Company:

George Tate Blackstock, K.C.,
W. A. Pearson, Chief Engineer,
D. H. McDougall, Treasurer.

Hon. Mr. FOY: I understand there is some dispute between the Commissioners of the Park and the different electrical development companies as to what is the proper measurement or proper means of ascertaining the rentals to be paid for power. Accounts have been presented by the Commissioners, and I understand that the method adopted by the Commissioners in their computation is disputed, and it was thought, rather than have any litigation, or with a view to avoid litigation, and to bring the matter possibly to a head, that a conference of the different parties interested might be useful in brushing some of the difficulties or objections away, or, if not remove them altogether, at all events boil the matter down a little and bring the dispute within a small compass. I ask Mr. Langmuir to make a few remarks as to the object of this conference and what is intended to be done in it.

Mr. LANGMUIR: Mr. Attorney-General and gentlemen, you are all aware of the existing agreements with the three power companies. Briefly stated, these agreements, so far as the provisions that are to be considered are concerned, are all alike. They provide that for a payment of what I

may call a fixed rental or a certain sum charged, each power company is allowed to manufacture, use and sell or dispose of 10,000 horse power, and after that 10,000 horse power is reached that for the next 10,000 disposed of or manufactured they shall pay $1 per horse power, for a further 10,000 horse power they shall pay 75 cents per horse power, and thereafter 50 cents for each horse power. The quantity generated, sold or disposed of over the first ten thousand we call surplus power.

The Canadian Niagara Power Company and the Eleectrical Development Company have now reached the stage of developing surplus power. When that stage was reached the Commission considered the agreement in that behalf and it was decided that we should employ the services of an electrician, or an electrical expert, to define to us on what terms we would render the bill to the companies for the surplus power. We had his report on the subject, which we referred to our solicitor, Sir Æmilius Irving. Inasmuch as Professor Galbraith's report mentioned three methods under which that measurement and charging might be made, it was the more necessary to refer it to the solicitor, as we did. The solicitor reported to us and gave his opinion as to the method under the agreement that should be adopted. These bills were therefore made out on the terms set out in the opinion of Sir Æmilius Irving.

We thought it advisable, however, before going further, to submit the report of the electrician, and our solicitor's report, to the Attorney-General, which we did, asking his advice on the subject. Ultimately an Order-in-Council was passed adopting the views of our solicitor and authorizing us to render the bills in accordance with the view that he expressed.

These bills in one instance were rendered, and the company took a different view. The view adopted by the Commissioners, and approved of by the Government was that, what is known as the increasing peak power was the plan that should be adopted. I understand that the company to whom the bill was rendered took the ground that it should be the average peak. Therefore this brought us at once into antagonism. We came to an arrangement, however, that we would accept payment on the terms proposed by them, leaving the other method in abeyance, hoping to have had a conference before this time.

This conference is now called, and the Attorney-General is now prepared, I presume, to hear why the bill rendered by the Commission cannot be adopted by the respective power companies.

That is, sir, I think, briefly stated, the position we occupy at the present time.

Hon. Mr. Foy: Well, I will be glad to hear the opinions and views and arguments of those companies that are opposed to the method adopted by the Commission in the bills that have been rendered.

Mr. Blackstock: I suggest the Canadian Niagara Power Company should open the discussion.

Mr. Nesbitt: Mr. Attorney-General and gentlemen, I desire, in the first place, to thank the Commission and the Government for the courtesy they have extended to us, first, in coming to the very sensible and business-like view of taking the rent that everybody admits is due, and, as to that which is in dispute, leaving it to be the subject of a conference; and, secondly, we have to thank the Commission and the Attorney-General for showing us fully the report of Mr. Galbraith, for giving us a copy, so that we can see how far we disagree, if at all, from the conclusions he arrived at, You are all, I presume, familiar with that report.

Now, in the first place, let me mention as a matter of history, shortly, the situation. The company which I represent, the Canadian Niagara Power Company, as you all know, under the original contract made with the Government in 1892, had the exclusive use of the park for the production of power, and for that they were to pay for all time a fixed rental of $25,000 a year. Subsequently a discussion arose between the Commissioners, the Government and ourselves, as to whether the contract was being carried out, and, as the result of that discussion, a suggestion was made for a lowering of the fixed or sleeping rent, as it may be called, the minimum rent which we had to pay in any event, and after that that we should practically allow the Government to share in the profit, if I may so describe it, of the enterprise, in the earnings, we to abandon our exclusive use of the park. That culminated in what I may call the parent agreement for all the companies, the agreement of July, 1899, which was subsequently ratified by legislation; and one clause in that agreeement is the clause that is under discussion. I am reading from the Electrical Development Company's agreement:

"The said agreement of the 7th of April, 1892, in respect to the amounts of rentals and period for which the same is payable, is hereby amended by providing that from and after the 1st day of May, 1899, the rental payable under the said agreement in lieu of that specified in paragraph 4 thereof shall be up to the first day of May, 1949, the sum of $15,000 per annum—(that is in lieu of the fixed rent of $25,000)—payable half yearly on the same days and times as specified in said paragraph four of said agreement and in addition thereto payment at the rate of the sum of $1 per annum for each electrical horse power generated—(I may say that I understand there is no such thing as what may be called an 'electrical horse power'; its equivalent in the amount of energy which would be equal to one horse power .746 watts)—and sold and used or disposed of over 10,000 electrical horse power up to twenty thousand electrical horse power, and the further payment of the sum of seventy-five cents for each electrical horse power generated and used and sold or disposed of over twenty thousand electrical horse power up to thirty thousand electrical horse power, ande the further payment of the sum of fifty cents for each electrical horse power generated and used and sold or disposed of over thirty thousand electrical horse power; that is to say, by way of example, that on generation and use and sale or disposal of thirty thousand electrical horse power the gross rental should be $32,500 per annum, payable half yearly, and so on in case of further development as above provided, and that such rates shall apply to power supplied or used either in Canada or the United States. Such additional rentals as shall be payable for and from such generation and sale or other disposition as aforesaid to the Commissioners shall be payable half yearly at the rate above specified on the first days of November and May in each year for all power sold in the several half yearly periods from the day of sale; and within ten days after said first days of November and May in each year on which such additional rentals shall be payable respectively, the treasurer, or if no treasurer, the head office of the company shall deliver to the Commissioners a verified statement of the electrical horse power generated and used and sold or disposed of during the preceding half year, and the books of the company shall be open to inspection and examination by the Commissioners or their agent for the purpose of verifying or testing the correctness of such statement, and if any question or dispute arises in respect of such return, or if any statement

delivered at any time by the company to the Commissioners of the quantity or amount of the electrical horse power generated and used or sold or disposed of or of the amount payable for such additional rentals the High Court of Justice of Ontario shall have jurisdiction to hear and determine the same and to enforce the giving of the information required."

That being the situation when the period, as the Chairman of the Commission has stated, arrived when over the ten thousand horse power was produced, a statement was filed by the secretary-treasurer of the company showing the amount which had been "generated, sold, used or disposed of" during the six months following, and it was out of that the dispute arose. Then Mr. Galbraith was sent over, and he crystallized his views on the second page of the report, as follows:

"The agreement seems to leave little or no room for doubt on the following points:

"1. The same system of determining the rental should be used for each company."

In that we entirely concur, because, as you will readily see, Mr. Attorney-General, the contract is the same, that is, leaving out the difference in the amount of fixed rent, and that contract must be construed the same in each case. We concur in number one.

"2. The nature of the company's contracts with its customers, especially the question as to how the power is sold, whether as power, or energy, or current, or combinations of these, should not affect the rental."

We concur in that. I assume we will all agree that the contract between the Government and ourselves must be construed by its terms, and not in reference to anything outside the contract. We could not, by making a distributing contract, add to, or take from, the contract with the Government; it must stand or fall upon its own construction.

"3. The power should be measured at the generator terminals and therefore should include all losses between the generator and the customers. The agreement does not read 'power *transmitted* and used and sold or disposed of.'"

We do not concur, as we understand that statement, in his third conclusion. There are several words used in dealing with the basis for collection of rentals. It is not generated. Generation, of course, must be conceded by everybody to mean the absolute maximum that could be charged. But, in addition to the language used, we submit that you have to read in the other language, which also forms a part of the basis for calculation, namely, "generated, sold, used or disposed of," and that it must therefore mean the power generated, used, sold or disposed of.

Now, you can readily conceive a case where power may be generated and there may be, as there always is, a certain percentage of loss before it is used, sold or disposed of. In that case we say that you have to take that which is the net result of the generation, the use, the sale, or disposition, otherwise you leave out of the contract three very important items in addition to the mere generation. I may say that, so far as the particular company for which I speak is concerned, I believe it is not a matter of very great moment. But that should not alter the construction of the document.

"4. The word 'generated' in the agreement refers to power generated in the company's station and not to power generated elsewhere and transmitted to customers through the company's feeders."

We concur in that.

"5. The words 'used and sold or disposed of' refer to commercial use and disposal.

We concur in that.

"6. No power, whether from direct or alternating current, necessarily used in the company's station, and no power used for experimental purposes in improving and testing the company's plant, are to be included in the power upon which the rental is to be based."

We concur in that, and I think that throws a very lurid light upon the reasonableness of the construction which I have suggested in dealing with clause 3, because, of course, in measuring the power at the generator terminals you would get the losses and the loads used for testing our plant, so it would hardly be suggested it came within the language of the other.

"7. Use and sale or disposal are to be considered as contemporaneous with generation."

Now, I have been unable to follow precisely what Professor Galbraith meant by that. It seems to me in one aspect that we entirely concur. If, however, it is to be read as practically an amplification of clause 3, or an intermingling with the same idea as in clause 3, then we would dissent from that to the extent I have indicated in discussing clause 3.

Then he proceeds a little further on in dealing with what he calls the "fluctuating rental" to make this statement:

"Another method is to use the average of the instantaneous powers generated during the day. This method is naturally connected with the 'flustuating rental' method of computing rental since it is a measure of the electrical energy actually produced during the day and of the water actually used. It is the lowest horse power capable of producing the actual electrical energy of the day and must therefore work for 24 hours."

And a little further on he says:

"On the other hand, it does indicate the total amount of energy produced in the 24 hours, and roughly the quantity of water used."

That is, speaking of the average power.

You will see, therefore, the points on which we differ. I may say that Professor Galbraith gives no indication of his own view of what is the proper construction. He merely amplifies this at considerable length on a matter about which I think there will be no difficulty between ourselves and the Commissioners, that is, as to the proper methods of arriving at the measurement of the power, and, having arrived at that, to say what basis it should be calculated upon. Now I might give you an illustration of the difficulties that exist in relation to that. Let me show you, Mr. Attorney-General, a good illustration of what Mr. Galbraith deals with. Here is a diagram we have obtained by the courtesy of this company, and it is a striking illustration of the difference between peak and average. (Handing diagram to Hon. Mr. Foy.) This marked "average," you see, is the result of taking all the instantaneous powers, the second class, so to speak, during the day and getting the average load, the actual electrical energy disposed of and paid for. This gives you a notion of how at one point in the day the peak runs up. As I understand the contention of the Commissioners, it is that that point must be taken as the basis of the rental, and then, if the next day it went up to a higher point in the next column, that it should be taken from that on, and so on from year to year, and if it went say to the top of the diagram, at any moment of time during the six months, it should never during the whole

of the 50 years go below that. If I am misinterpreting what I understand to be the contention of the Commissioners, it is an error of information. That gives an average load of 19,200 horse power and a peak load of 43,800 horse power. So you will see the extraordinary difference.

Now, let me illustrate it in another way. Take it in exceptional times, not to illustrate the company which I represent, but more particularly that which you are familiar with in Toronto. During Exhibition time, lasting say ten days, there is a call for power to the extent of 50,000 horse power, which lasts from, say half an hour to an hour and an hour and a half. As I understand the Commissioner's contention, that must be taken from that time through the whole six months, although they may not sell more than 10,000 horse power, that 50,000 horse power must be taken at the basis from which the rent must be calculated.

That method, we say, is a wholly visionary method of making the calculation. It entirely leaves out the considerations of use, sale or disposal. It, for instance, as Professor Galbraith indicates, entirely leaves out the consideration of the average load, which practically represents, taken in the rough, the power generated and the water used in the generation of the power. We say, in the first place, how would you make your affidavit that is required? It requires the treasurer to give a verified statement of the electrical horse power—that is, the electrical energy equal to the horse power, because there is not, as I say, such a thing as horse power in electricity—the electrical energy equal to horse power generated and used and sold or disposed of during the preceding half year. Now, how do you get at that? Surely, common sense would say there is only one way to get at that, and that is to take the whole half year, see precisely what quantity you have generated, taking the peak and taking the minimum—that is the antithesis of peak—and see what you have generated, used, sold or disposed of. The language seems to me to be so plain that, but for the statement of the Chairman that a different view had been taken, one could not understand how there could be really a dispute on the subject.

The treasurer of the company has to give an affidavit of the power, that is, the energy, the current generated, used and sold or disposed of during the preceding half year. That must cover the whole part. To get at that, you must take the average throughout and say there has been so much power and divide that by your equivalent of horse power, and say that is the electrical horse power. That, I should have thought, went without saying. By analogy, the whole matter is practically covered in another way. Take the Statute, which my learned friend, Mr. Cassels, will elaborate, where it speaks of the way rentals are to be calculated. How is that to be done? The Statute is perfectly explicit that it has to be done by an apportionment. I merely glance at the Statute—Mr. Cassels will deal with it more fully—but it puts into practical illustration what the meaning of that language is.

Then go back to the earlier part of it. How are you to get at the electrical horse power, that is, the electrical energy generated? What is it you are to pay rent on, the electrical energy generated? That is one thing. As I say, generated covers absolutely the maximum, that covers the utmost, but it is not that which has to be dealt with. It is not only to be generated, but to be used and sold or disposed of, and it has to be calculated from the date of sale—not generation, but from the date of sale. Does not that give an indication at once of what is the meaning of the whole contract? That indicates—of course, I thought it would not be necessary to add that, but perhaps it is better to do so—that indicates it is a fluctuating

matter. You cannot take a fixed point and then say it is to be the basis. Let me illustrate, if the other contention is correct, what would follow. We get a right under our sleeping rent, our fixed rent, to generate up to 10,000 horse power. We generate at one moment of time, say this year, 40,000 horse power; next year, through some breakdown in our works, we generate under the 10,000. Are we to pay for the next 50 years, or that year, on the 40,000 horse power, to continue that, although it has not been sold or used or disposed of in any way, although the contract says it is to be paid from the day of sale? How would you work it out practically?

Take another illustration, which is a common one in England at any rate, and in the United States. A man takes a mine, leases a mine, he leases it at what is called a sleeping rent; that is, the proprietor, the owner, is to receive not less than $5,000 a year, that is certain. After that he has to pay a royalty— a royalty on what, if it is to be calculated on the tonnage from the day of sale? Would it not be on the total tonnage during the six months? Would it be arguable in such a case? How do you differentiate? Take a patent. I lease a patent, I am to pay a fixed or sleeping rent, say of $5,000 a year, and I am to pay on what is produced from day to day from the day of sale. Must not you take the average and find out, if you have to put in, as you always have to, an affidavit at the end of the year, what the result of the year's business is? The royalty is calculated on the total amount, not taking the highest amount payable in any one day and say that has to be the fixed thing during the six months' term.

Now, I do not know there is very much more to be said. Let me give another illustration. Electrical horse power represents so much energy. So, if you wanted to get at the number of books in a room, you would not put them in irregular piles and take the highest, but you would take the various piles and average them. The same thing applies when you want to get at the instantaneous productions of power which are recorded on the instruments: You take those total instantaneous productions throughout the six months to get at the quantity of energy produced. In the same way, by the process suggested, you arrive at the amount of water actually used, distributed over the whole year or half year. Now, payment is in respect of a license to use water during the year or half year based on the amount. Whether you use any or not, you must pay $15,000; that will entitle you to use 10,000 horse power, the equivalent of 10,000 horse power of electrical energy, and above that, after that, you pay for what you use. As I say, there is nothing to be made out of the word "horse power," because it does not mean anything, it simply means the force used to raise 33,000 pounds a distance of a foot in a minute, and it is spread over the half year.

Now, supposing an accountant were put in there, supposing you put your own accountant in, and you say to him, "We want you to tell us from the books of the company, what they have generated, used or sold or disposed of during the year." What would you say to a man who came back and said, "Although I find they have actually generated, sold used or disposed of only 20,000 horse power, yet I find that in one day for a second—because is is instantaneous, not during the whole day even—they used 65,000 horse power. I multiply that by 180, or six times 30, and say, that is the horse power, although the actual fact is the exact opposite. I find from the books what the company generated, sold, used or disposed of was, in fact, not that at all, but one-half of that." What would you say to your accountant? I should suppose you would dismiss him as not giving you the fair result.

In all these matters one is struck by a recent observation of a great English judge. Dealing with matters of inference and the like, he said that when he knew the fact was the exact opposite, he, for his part, protested against being asked to come to the monstrous result that the law said the exact opposite of what he knew to be the fact. I refer to the language, not of the present, but of the last preceding Lord Chancellor in dealing with a somewhat kindred matter.

Mr. CASSELS: Mr. Chairman and Gentlemen,—I appear for the Ontario Power Company. They are not, at present, affected, in that they are not generating beyond their maximum of 20,000 horse power. Nevertheless, the question will come to be an important question perhaps in the future. I have to reiterate what my learned friend, Mr. Nesbitt, has stated of the courtesy of you gentlemen in coming over here, particularly yourself, sir, in coming to this bleak place for the purpose of giving us the benefit of this discussion. I think I may take it for granted, that, having brought us over here, both yourself, Mr. Chairman, and you, gentlemen of the Commission, are here with an open mind. In other words, I assume you have not made up your minds one way or the other, but that you are here ready to receive any suggestions and to act upon any views that commend themselves to your judgment. I think I may take that for granted, otherwise we would not be here at all.

We have not had the pleasure of seeing the opinion of the solicitor. We have had the pleasure of seeing Mr. Galbraith's report. We have come here for the sake of solving, if possible, the doubts and arriving at some conclusion on the construction of this document.

Now, I have very few words to say, but it strikes me there is one point that has to be eliminated from the construction of this agreement, that is the capacity generated, the capacity first indicated when the contracts were made. In other words, the Ontario Power Company that I represent are charged with a rental of $30,000 a year whether they generate or not. What do they charge that $30,000 a year for? It is because they are given the right to draw a certain amount of water to utilize the park in a certain way, and they go on paying that whether they use it or do not use it; so that the capacity has nothing to do with it.

Another point that seems to me is a matter of very great importance is this: The term used is "horse power." Now that means absolutely nothing, except in connection with time. It is like interest. The rate of interest at 5 per cent. practically means nothing, unless you get it in relation to the time. So, if you are making a contract that you would lend $5,000 at the rate of 5 per cent. per annum, there you would have the time limit, which is essential in order to get at the meaning of the word "rate" and at the meaning of what is to be paid. If you only borrowed for three months, you would only pay interest for those three months. And why is that? Because it is at the rate of so much per annum, necessarily meaning that, if it is for a less period than a year, then you are only to pay for the proportionate time. Now, when you come to admit, as must be admitted, that horse power has no meaning unless it has relation to time in some way or other, then you come down to this agreement, and what do you find? You find that, "in addition thereto, payment at the rate of the sum of $1 per annum for each electrical horse power." You must have the words "at the rate," which, as a matter of law, as I will point out in a moment to the Attorney-General, indicates of necessity an average. You have the horse power which becomes explainable when you find that in connection with that you have "at the rate of $1 per annum." There is your horse power per annum. You pay $1

for that horse power per annum; and you get then a definite meaning annexed to the word horse power. Then you have "at the rate of." Well, if it is only used for three months, are you to pay for the year? That is, apparently, the contention, if it were seriously contended for. Then, moreover, you pay at the rate of, and when it comes down to the rental, "Such additional rental as shall be payable for such generation and sale or other disposition as aforesaid to the Commissioners shall be payable half yearly at the rate above specified on the first days of April and October in each year for all the power sold in the said several half yearly periods from the day of sale." What is the meaning of the words, "from the day of sale?" If at any period during the six months your peak has run up to 10,000 horse power over and above the minimum, and that 10,000 horse power has only been used for one day, what a senseless thing it is to provide that the day of sale is to be a factor. But when you take that it is payable at the rate of a dollar per annum, and that it is to run from the day of sale, then you get the analogy of the interest I mentioned, then you get some logical and reasonable construction of these documents.

I would not have thought, and nobody has stated that Sir Æmilius Irving has given a different reading of that point, but, if he has, I would like him to reconsider it, because it does seem to me to be an impossibility to take that document, to put the proper meaning on the word "horse power," to point out that it is only rateable, namely, proportionate, that the year is the fixed limit and the day of sale is the time from which it is to govern, and then to argue that the peak at any given time during the six months is to control, and control for all time.

Now the statute in regard to rental, which is the revised statute. What it says in regard to rent is:—

> "Rents shall include rent service, rent charge, rent seck and all periodical payments or renderings in lieu of or in the nature of rent."

This extra dollar, on whatever basis it is charged, is expressly made rent by the terms of the agreement. It forms part of the rent and comes exactly within the definition of this statute. What does the statute say?

> "All rents, annuities, dividends and other periodical payments in the nature of income, ... shall, like interest on money lent, be considered as accruing from day to day, and shall be apportionable in respect of time accordingly."

There is the statute of our own Legislature, and there is the principle that our own Legislature has enacted. It is the same as the rate on money—I do not wish to repeat what I said before, and I would submit that it is almost too plain to be discussed.

Then a good deal of stress has been given to the word "rate." The statute is "at the rate." Now there are authorities in England for the proposition, that where the words " at the rate of" are not in the particular contract the amount is not apportionable. For instance—these are cases more particularly where it provides for the payment of fees of Directors—one case was, "The Board shall be entitled to receive by way of remuneration in each year £5,000." It was argued on one side that the remuneration was only payable for the complete year; it was argued on the other side that it meant at the rate of. Mr. Justice Cozens-Hardy, a very able Judge, puts it this way:

> "Plaintiff contended that Lord Norris was entitled to a one-sixth share at the rate of £5,000 a year. I hold that article 81 does not give remuneration at the rate of, but only provides that the board shall be paid—and so on—

drawing that distinction. In another case Mr. Justice Wright, also a very able Judge, expressed himself in this way—it was argued for the applicants that on the true construction of the article the directors were to receive the remuneration at the rate of, and that the amounts were therefore apportionable:

> "If, instead of £150 and £100 per annum, the words had been 'at the rate of £150 and £100,' I suppose there would be no question that the sums would be apportioned, I ought to say, but I think I have no doubt on the subject."

That is a very eminent Judge. Now here we have, not merely, as I pointed out, the words "at the rate of," but we have it absolutely essential, if I am rightly informed, that in order to define horse power at all you must define time, and the definition is given for the year, and the payment to be made is "at the rate of" for the year. Surely, what is contemplated and what is intended is that fair play should be done all round. We are not liable for the maximum generated, not liable unless it is used or sold, or otherwise disposed of. That is the test. Then, when you come above the 20,000 horse power you have got to get at the average of the six months, and if that is the only point there is at issue between the various companies, it seems to me on consideration that can easily be got rid of.

Mr. Blackstock: Mr. Attorney-General and Gentlemen,—I appear for the Electrical Development Company, and I should like to associate myself with the expressions of gratitude that my learned friends have mentioned at your conceding us this opportunity of putting before the Commissioners and yourself the views of the company with reference to this method of computation. I should also like to say that I hope on the terms of the contract entered into between ourselves and the Commissioners, we shall be saved the scandal of not being able to come to an agreement respecting its terms, or rather, respecting its meaning, because there is no question of fact involved, without going to some tribunal outside ourselves in assisting us to reach a conclusion on that point.

The statements which have been made and the arguments adduced by my learned friends, Mr. Nesbitt and Mr. Cassels, relieve me of the necessity of saying more than a word, because I fully concur in all that has been said by them. Now, may I emphasize a point referred to by Mr. Cassels in another connection, because it seems to me to furnish the key to the whole of the discussion in which we are concerned. Does anybody dispute that what we are to pay for is per horse power that has been used for one year, does anybody dispute that proposition? I understand not. Well then, if that is so, let me put a concrete case. I take the case, which I understand exists on the opposite side of the river where one enterprise takes 25,000 horse power continuously, night and day, during the entire year. Now, suppose that were the only customer which the power company had, and suppose that for three months, during some period of particular stress, it were necessary to supplement that by another 10,000 horse power, which that customer said it would take for three months: Does anybody pretend that under such a contract you could charge in respect to that 10,000, used for three months, the same price as you could charge if it had been used for 12 months? I think the bare statement of the proposition carries with it its own refutation.

Now, coming to the question we are considering, the clause is in this language. After stating the fixed rental of $15,000 as what we have to pay, the contract proceeds.—

"And the further payment of the sum of 75 cents for each electrical horse power generated and used and sold or disposed of over 20,000 electrical horse power up to 30,000, and in addition thereto payment at the rate of the sum of $1 per annum for each electrical horse power generated and used."

At the rate of $1 per annum. That is to say, the user of the horse power has got to be throughout a year, otherwise the method of computation does not arise, except later on there is provision for doing it after six months; that is, the payments are to be made at the expiration of six months. So until you have the user for the period provided by the contract the liability does not arise; the contract in terms says, it has to be used for that period in order that the liability may arise.

Suppose you have a steady user throughout the year, day and night, now of 10,000 horse power. Upon that, it is perfectly obvious that you have got to pay; that horse power has been generated, used and sold throughout the year. There is no dispute about it, and we are all agreed, it is the common case of us all, that in respect of that 10,000 horse power you have got to pay for it in accordance with the terms of the contract. Now, above that level line of 10,000 horse power, according to certain exigencies that would, during the use of that steady volume, arise, this fluctuation happens, 5 minutes to-day, 30 minutes next week, a month hence 45 minutes, and so on. Now, as to all the horse power used in those fluctuations, what you have to do, if you carry out that contract, is to take each one of those horse powers and say, that horse power was there for five minutes, the other horse power for half an hour, and so on, and keep an account in respect of each one of those horse powers, until you get to a point where the total use of the particular horse power extended over a year before the liability under the contract would arise. Let me illustrate that by a perfectly concrete example. You are now providing for a competition of power, a competition between the companies, a suggested competition between us and other companies, like the Electric Power Company, other companies that may be started and are projected, and, again, a suggested competition with the Government itself. Now then, supposing all our customers are taken away to-morrow, is it to be said that once having run up to a peak of 50,000 horse power, without a solitary power being generated, without a solitary power being used, without a solitary power being either sold or disposed of, still you are liable under this contract for 50,000 horse power a year? A statement of it again, I say, carries its own refutation upon it. It does not mean that, and it was not intended to mean that.

Now what did this mean, Mr. Chairman? What it meant was, that every time you take a horse power and use it for a year, then a liability comes to pay for that horse power so used for a year. The difficulty in this case arises, not from any inability to discover what it is that you have to pay for—there is no obscurity about that—that is perfectly plain—the practical difficulty arises, Mr. Attorney-General, in respect of the method by which you are to arrive at a payment which is perfectly clear. The practical difficuly is in keeping an account of these horse powers. There is where you have the practical difficulty in saying what is that method by which we may determine most accurately the period over which the horse power has been used. In respect to that, I understand that there is no difference of opinion, I understand we are all agreed that the only way in which you can do this is by the average system. Let me take this, for instance, as an illustration, Mr. Attorney-General, of the incongruities of the situation. (Exhibits diagram to Chairman.) Now, here is an actual period of six

months from November 1st, 1906, to April 30th, 1907, here is an actual diagram in practice. These are the peaks. You will observe that on a certain date the peak, under some extreme exigency, rose for less than one hour apparently to this high point. According to the suggested interpretation of this contract, and the scheme upon which we are to pay, a line is to be drawn from that point right across here over this blank area. The bill has been rendered to us with a line drawn right across here. All this area in here represents power that has never been sold, never been generated, never been used, nobody has got a dollar out of it, and yet it is said, because at one time, for a few seconds, half an hour, a day, if you like to put it so, it ran up to that peak, it has to be considered as though it steadily stayed there and all this blank area has to be paid for as though it were a full area. That is the argument that is seriously advanced in opposition to the one upon which the power companies rely.

Now, when you come to compare that system with the average system, why, the result is simply this: One is a system by which with absolute precision you state what has been generated, used, sold or disposed of under the contract, it meets the requirements of the contract with absolute precision; the other is an arbitrary, artificial, insincere and untrue representation which absolutely disregards the contract and prevents the common understanding of all the parties from being reached. It seems to me that the moment you arrive at that point, then there is an end of this controversy.

The question we have to deal with is not a question of what the obligations of the companies are. That is plain. It is to take a horse power and use it for a year, and in respect of that to pay for that horse power a dollar. If you use it for less than a year, you pay the proportion of a dollar. If you use it three months you pay 25 cents, if you use it six months you pay 50 cents, if you use it nine months you pay 75 cents, and if you use it all the year you pay a dollar. That is all there is about it.

Now the whole practical question which you have got to decide is, What is the convenient, and not only the convenient, but the absolutely correct, method of arriving at what the number of horse power used is? Upon that we fully concur with the statement of Mr. Galbraith in his report, and in respect to that he says:—

> "Another method is to use the average of the instantaneous powers generated during the day—(which is what we are recommending)—this method is naturally connected with the 'fluctuating rental' method of computing rental, since it is a measure of the electrical energy actually produced during the day and of the water actually used."

Now, I apprehend that what we are all trying to get at is, what our obligation to pay rests upon, and he says:—"This method is naturally connected with the 'fluctuating rental' method of computing rental, since it is a measure of the electrical energy actually produced during the day and of the water used," He continues:—

> "It is the lowest horse power capable of producing the actual electrical energy of the day and must therefore work 24 hours."

We agree with this statement. It is the only practical method of determining the amount, which we are all agreed upon is what we have to pay for, and by that method we are willing to be bound.

I cannot think that the subject is involved in the slightest obscurity. I never had, I think, less difficulty in delimiting the frontiers of rival obligations between parties than is furnished by this contract. It is plain and explicit. And, of course, when you pass from the letter of the contract to the spirit of it, it becomes doubly so. What was it? It was, as was

incidentlly referred to by my learned friend, Mr. Nesbitt, that is, you went forward leasing horse power for a year to people and getting a yearly rental from them; which means that nobody is going to pay a year's rental to a company for a momentary user. Let me illustrate it this way. Supposing we were seriously saying to a purchaser that for all time to come, if the peak happened to run up under some sudden strain to an enormous increase upon what he was actually taking, that for all time to come he was to be kept at that point under his obligation. It would be said at once it was a monstrous proposition. Nobody would think it was a fair way of determining the rights of the parties. Now, so it is here. The intention was that where we used a horse power for a year and made it available for the purpose of making money, that upon that yearly rental to somebody else we should pay the Commissioners a dollar ourselves in respect of it for that year. That is what that means, and this contract and the report of Professor Galbraith, taken together with our concurrence in the remarks he makes in the description he gives of the averaging system, point out, not only the practical way of measuring the obligation, but also the only equitable one.

Hon. Mr. Foy: Are there any other companies who wish to be heard? As there do not appear to be any, I will ask Sir Æmilius Irving to speak on this argument.

Sir Æmilius Irving: Mr. Chairman and Gentlemen:—In the first place the principal point, and the point that I wish to put before you emphatically is, that all my learned friends have said in no way alter, change, weaken or permit me to say that I have overlooked anything so far as my opinion is concerned. They draw attention to a paragraph here in which Professor Galbraith says that the agreement gives no indication whatever of the way in which the matter is to be paid for. Of course, Professor Galbraith is a man of position, and everything that he says is entitled to very great respect, but I disagree with Professor Galbraith, as I would not turn to him for the construction of a written agreement. When he comes to speak of the different details and means of working, of course that is far beyond my criticism, for I have to lean to his knowledge of his especial profession. In speaking of the method to be adopted in computing the rental from a given list of daily powers, he states:—

> "One view which may reasonably be taken is that the rental in its variable stage is to increase step by step with the development of the plant." (Now, we are on the proper course to discuss the construction). "In order to indicate the stage of development at any time some criterion must be specified."

This obligation is not to pay upon the power generated from day to day, but to pay upon the capacity, upon the development of the plant. The suggestion that has been made that one day it might rise up to some monstrous height and from that he argued that it is to be calculated at that point, is true in so far as the height to which it can go; but the height to which it can go cannot honestly be beyond the capacity of the plant measured by the contract rights that they have to take water. They have not got an indefinite right to take any quantity of power that they may choose. They are to take water according to the specifications of certain works, which it is to be assumed they have built up to, and which are specified in the contract in detail, and what that may be, 100,000 or perhaps more, is the maximum that they can possibly be called upon to pay, because they cannot manufacture any more; and it is to gauge what they have plant enough for, not to follow them from day to day with pen and ink and find out what they have done to-day and what they are going to do to-morrow. It is this: You are not

to develop at once 10,000 horse power, you have got a plant, or you are permitted to construct a plant, which will develop very much more. If you develop more you shall pay according to that scale that is spoken of; but so soon as you increase your plant to the ability to develop, that fixes your additional rental.

> "Thus the expenditure of a given amount of money or the fulfilling the conditions of a mechanical test might have indicated the time and amount of increased rental. It is possible to assume that the actual generation of electrical power for commercial purposes is the criterion of development adopted and is made a part of the agreement for no other purpose than to mark the stage of development. With this assumption the rental is to increase within the terms of the agreement on the day on which the power generated becomes greater than that generated on any previous day, and is to be based on this increased power until the day on which a greater power shall be generated, and so on." (There is Professor Galbraith's explanation of what he means by what is somewhere termed the peak power.) "No falling off in the power generated on any of the intermediate days will affect the rental. Thus the rental will increase from time to time, even from day to day, with increasing generation of power for commercial purposes, but cannot decrease. Decrease and stoppage of output, accidents aside, depend upon the business of the company and not on the stage of development. For convenience of reference this method will be quoted as that of 'increasing rental.'"

That is measured on the stage of development. That, I think, answers the points my learned friends so elaborately paid attention to.

The criticism upon the language of the agreement that it is to be "generation, sale, use or output"—that is not the right word—

Hon. Mr. Foy: Disposal.

Sir Æmilius Irving: Disposal; that does not signify whatever. In conveyancing any agreement in respect of what the connection of words is can be availed of to further the point that is under discussion. It is not under discussion unless there are other corroborative matters to take away the principal feature of the agreement, and to say, "Well, by another word it would be somewhat less." It does not enter into that, I respectfully submit.

There was one other point that my learned friends introduced with reference to a statute. I suppose that that means terms for construction or interpretation in the Landlord and Tenant Act or some Real Property Act. I would like to ask if that is what is meant. What statute did you mean?

Mr. Cassels: The Landlord and Tenant Act.

Sir Æmilius Irving: Oh yes. But then that does not take and alter what is the construction of this particular contract or the way the words are used in this particular contract. You say it is rental. I think it is rental: but it is rental under the definitions to which both parties have subscribed in that paper. It is not rental in respect of the Landlord and Tenant Act. It is not drawn in pursuance of that Act. It is drawn in reference to the common law style of drawing a document, and must speak for itself.

Those are the three points is seems to me that my learned friends made a good deal of, all that was capable of being elaborated they elaborated, but, as I have stated before, it made no impression upon me, in no way

cutting down the construction which has to be put upon the agreement, which is that the only system to be applied has to be the criterion that marks the stage of development. It is that that they are called upon to pay.

Supposing they are going to have 10,000 horse power by such a time. As they increase, they are to pay, and there is an expression in the agreement, which my learned friends necessarily were not bound to draw attention to—and in addition to anything which we may generate, the further sum,—therefore showing that this further sum is part and parcel of the same scheme of return to the landlord as applied to the original dead rent. We are going to develop 10,000 horse power and have it ready by such a day; as we develop more, we have to pay for more; and that rule has to be applied to ascertain what is the progressive stage of development, and not anything with reference to averages or any other manipulation—I do not use it in a bad sense—any other arrangement of figures.

Mr. Blackstock: Sir Æmilius, may I ask you, just for the sake of clearness, as to the expression in Professor Galbraith's report to which you allude, the principle assessing the extra payment against us as capacity is developed in the plant? If I correctly appreciate both the observations in that report and the remarks by which you have amplified and explained that principle, I understand that to go to the length of saying that if we once illustrate in practice that we have a certain capacity, from that time forward we are bound to pay the rental which such a capacity indicates, no matter whether we were to shut down our works and generate and use no power at all.

Sir Æmilius Irving: Reach—you say illustrate in practice—reach by development, I think, is nearer the point.

Mr. Blackstock: Yes.

Sir Æmilius Irving: Then, what I say is, that when you reach that point, from that day—not prior, of course,—from that day in that current half-year you begin at the higher rate. If it is so ruinous to you, what did your clients do when they signed the agreement? They put in a stipulation that they could retire and give up the lease altogether. That is a very important thing for a body who may in a judicial capacity discuss it. You have the same option as in the case of a mine. It is frequently the case that the working of a mine becomes so unremunerative that the lease becomes oppressive, and then the lessee is not bound by the contract. One of you gentlemen spoke in effect that you were bound hand and foot. Well, give up the place.

Mr. Blackstock: I appreciate the point, and the only observation I am going to make in connection with it is this: I understand the position that is taken now, that once having shown by practice that we have the power to develop, our plant has advanced to that point, where, as you say, a certain development is evinced, that from that time forward we are bound by that exhibition of capacity. Then, what I point out is, with all deference, I do not think it is possible to work out this contract upon that conception. For this very obvious reason, that the contract makes the basis of payment originally the verified statement of the treasurer or secretary of the organization for six months. Now, what does that mean? It means there may be a difference in one six months from what there is in another six months; and if it is fixed and absolute by reason of the exhibition of power upon a particular occasion, there is an end of any necessity for an affidavit or verified account every six months, unless, indeed, in some other six months it went up again. If, so far as the true power is concerned, it is to

be according to the peak that on some occasion was reached, if that is to determine the matter, why, of course, the contract calling for a verified account for every six months or so is wholly inoperative. That clause of the contract plainly points to fluctuation. The meaning of it is, that one six months you may use a low horse power, and the next six months an exceptionally high horse power, and the following six months an exceptionally low power again.

Sir ÆMILIUS IRVING: Never; because the argument you are answering, and I put forward, is, you can never go back. All that you have to give a statement for is that you have not exceeded what you did before; and the officer of the Commission—it is not your statement alone—the officer of the Commission has a right to go in and examine.

Mr. BLACKSTOCK: I understand the argument of Sir Æmilius to be, that once having reached that peak, it is impossible for us ever to send in an account of which we charge ourselves with a lower sum.

Sir ÆMILIUS IRVING: Certainly.

Hon. Mr. FOY: Or is it only confined to the six months? Would it go on for ever?

Sir ÆMILIUS IRVING: It would go on for ever, if they never exceeded that six months. If on the first of January, or whatever the date is, they had generated so many horse power, then if in the next following half year they have never gone above that, it remains at what that is.

Hon. Mr. FOY: Suppose they only generated in the following six months one-half of what they did in the preceding six months, would that still go on?

Sir ÆMILIUS IRVING: Certainly; because their machinery and plant could develop that if they chose.

Hon. Mr. FOY: These diagrams of the companys' and so on indicate what is used, not what is generated.

Sir ÆMILIUS: No; that is what is generated.

Mr. GRIER: Generated, used and sold. The dotted line is the daily peak and the stronger line is the daily average.

Sir ÆMILIUS IRVING: That is their construction of it.

Mr. GRIER: No; this is a diagrammatic form of the business for this six months.

Hon. Mr. FOY: The average is brought down afterwards from this.

Mr. BARTON: This is the peak load (indicating on diagram). The highest load reached at any moment on that day, that is the average for that particular day of 24 hours.

Sir ÆMILIUS IRVING: You are paid for that high peak load.

Mr. BARTON: No; we are paid for the average.

Hon. Mr. FOY: Have you an instrument that records that, or is it the result of somebody else going into it?

Mr. BARTON: It is done afterwards. What is recorded is the number of horse power hours, and by dividing the number of horse power hours by 24 you get the average horse power for the 24 hours; that is the way that you arrive at it.

Sir ÆMILIUS IRVING: What is put forward on behalf of the Commissioners gets rid of that calculation. It goes to some particular instrument which marks where it has been. It does not go into any detail in reference to that, because they deny being bound by that examination of figures; they want to go to an instrument which is marking the amount of power that has passed through their machinery.

Mr. GRIER: If the next month we are up there, the line is there; if next month down there, the line keeps there (indicating). It is forever increasing; never decreasing.

Mr. CASSELS: There is one point I would like to state in answer to Sir Æmilius Irving. I understand his view is that peak load and the capacity to develop are the same; in other words, do I understand if we have the capacity to develop it does not matter whether we ever attain the peak or not, if by the capacity we have installed we can reach that peak.

Sir ÆMILIUS IRVING: I do not exactly understand what you mean, but I am not pretending to say that you are trying to confuse me at all.

Mr. CASSELS: You put your ground on the test of the development of a particular company.

Sir ÆMILIUS IRVING: We are only speaking of the development.

Mr. CASSELS: Supposing we did not sell during the next year at all, nevertheless the point of development has been reached.

Sir ÆMILIUS: We have nothing to do with that.

Mr. CASSELS: But you say when the development has reached such a stage that marks the price we have to pay?

Sir ÆMILIUS IRVING: The price of rental you have to pay.

Hon. Mr. FOY: If shut down for three months?

Sir ÆMILIUS IRVING: They still have to pay rental at that high peak, because it is for some economical reason of their own that they have shut down.

Hon. Mr. FOY: What clause in the agreement makes them do that?

Sir ÆMILIUS IRVING: Because it says that when they have developed anything above 10,000 horse power they are to pay at the rate of—I think it is $1.

Mr. GRIER: Yes, $1.

Sir ÆMILIUS IRVING: One dollar per annum for the excess that they manufacture or generate.

Mr. NESBITT: It does not say that.

Sir ÆMILIUS IRVING: That is my construction. I am asked to point out what is the clause I rely upon, and I say that is the clause.

Hon. Mr. FOY: Suppose they shut down for three months, they are not generating or manufacturing.

Sir ÆMILIUS IRVING: But they have reached their capacity to generate. If they choose to shut down they do that for economical reasons. If there is no water, as happens in some mines, then the mine worker gives up and backs out altogether. These gentlemen have got that very clause, that at any time they may give notice and step out of any liability to pay rent.

Hon. Mr. FOY: The agreement says the rental is to be at the rate of so much upon what they generate, and so on. Suppose they shut down six months, they are not then generating or developing; and what clause in the agreement says they are to pay rent on what they have not generated?

Sir ÆMILIUS IRVING: They have to pay rent whether working or not.

Hon. Mr. FOY: But the rent is at a certain rate on a certain number of horse power which they generate.

Sir ÆMILIUS IRVING: But they begin by being liable for $15,000 by way of dead rent on 10,000 horse power, whether they shut down or not, and they went on at once and had to pay, and did pay.

Hon. Mr. FOY: That is clear; but for the excess rent there are certain words used in the agreement charging them a rental at a certain rate per annum upon certain things.

Sir ÆMILIUS IRVING: If they generate more, then they are to pay an additional rent.

Hon. Mr. FOY: On something that they generate.

Sir ÆMILIUS IRVING: That additional rent is an additional sum upon all the circumstances of the contract under which the original $15,000 is payable. The increase of the amount does not in any way vary the contract, except as to measure.

Hon. Mr. FOY: I want to know as to the words you rely on.

Sir ÆMILIUS IRVING: Here is the agreement; there are printed copies by the hundred somewhere.

Hon. Mr. FOY: (peruses agreement). They are to pay $15,000 anyway, no matter what happens?

Sir ÆMILIUS IRVING: That is clear.

Hon. Mr. FOY: Then the excess:—

> "And in addition thereto payment at the rate of the sum of one dollar per annum for each electrical horse power generated and sold and used or disposed of over 10,000 electrical horse power up to 20,000 electrical horse power."

Now, what is there in that agreement to say they shall pay rental whether the power is generated or not generated, which would be the case if they were to shut down for six months? Is there any other clause?

Sir ÆMILIUS IRVING: If they generate for one day—I am meeting you face to face upon it, I am not avoiding anything—if they generate for one day, then their power and authority to draw water is through a certain class of machinery, which has mounted up and been extended beyond the original 10,000 horse power up to whatever it is. The point my learned friends did not seem to reach or admit is, that this is a measure to pay for the quantity of water the works, as constructed, have power to take from the river.

Mr. CASSELS: I would just like to make one remark in answer to that. Take, for instance, the Ontario Power Company. We pay a dead rent for the right to take water that will develop whatever power we can make through our pipes and works. We start in. Now, is it ordinary common sense to imagine that this company is going to spend millions of dollars with that authority to take that water, if we are not going to lay our pipes and build our works and have everything ready for perhaps double the capacity that we requre this year or next year to get rid of it? Ordinary business foresight would necessitate doing that, but, according to this theory, because we have chosen to put up works which would carry water capable of developing double the power that we have a market for, still, we are to pay what our plant is capable of developing.

Hon. Mr. FOY: Mr. Ross, our expert, will perhaps give us his views.

Mr. ROSS: Of course, I cannot speak from the legal standpoint, but only from the narrow technical standpoint. In doing that I must take the clause which would enable an engineer to measure the power sold. The clause I have here speaks of one thing, and one thing only, and that is horse power. Now, contrary to an impression that may have been given in some way or may have been derived, a horse power has a very definite meaning. It is a rate of doing work. Now, it does not say in this contract that you shall supply energy or anything else but horse power, and horse power is measured, it is so definite that it is measured on an instrument which indicates instantaneously. You read it on your switchboard through the working of a needle on a meter. So here is an instantaneous instrument to be used in measuring horse power.

Mr. NESBITT: That is a certain quantity of energy to raise 33,000 pounds in a minute.

Mr. ROSS: It is the rate at which you can do work. Your company, all the companies here, every company in Canada, sells power, not only on the

kilowatt hour basis, but on the horse power basis. What the companies appear to be pleading for is the selling to them of power on the kilowatt hour basis, that is on the average that would have to be measured by instruments which would total up the amount of power used during each hour, and from that summation take the average. Here is a contract which calls for horse power, which is a perfectly definite thing, and these companies will sell their horse power in precisely that way to their customers. A customer may impose a minimum, but at the same time the company sell in identically the same way as is contemplated in this contract, reading it as a technical man would. There is another question here. This clause speaks of the electrical horse power "generated and sold, and used or disposed of." That is reiterated and repeated throughout the contract. It is rather a cumbersome clause, but if it has any meaning, it appears to me that "generated, and sold, and used or disposed of" may be divided and be capable of two separate meanings. One is, "generated and used" by the company, and the other is, "sold or disposed of" outside the company. Now, there has nothing been said of this concrete case given here. The first part of the clause may be taken as an abstract way of dealing with the matter. Here is a concrete case: 30,000 horse power, which is derived at a certain definite figure. Now, you cannot, by any process of averaging or taking the average of maximums or average of anything else, attain that result.

Mr. Nesbitt: You cannot?

Mr. Ross: Except in one instance, and that one case is an impossible one; that is where the horse power is developed during 24 hours continuously, that is, charging the horse power for the whole day.

Mr. Nesbitt: Take your affidavit, turn a little further down. How do you get to that 30,000? You take the total throughout the time and divide it. That is the only way it can be done.

Hon. Mr. Foy: This concrete case rélies upon a generation, use, sale or disposal of 30,000 electrical horse power. It does not say for the whole year kept up at that figure the gross rental shall be $32,500 per annum.

Mr. Ross: Exactly, per annum, for the whole year. So there is a definite figure that can only be attained by the use of the maximum. As I understand it, that means the basis of the rental.

Hon. Mr. Foy: It does not say on its generation, use, sale or disposal kept up for the whole year, but on generation and use of that, not per annum or throughout the year, but on that being generated the gross rental shall be $32,500 per annum. That is the point Mr. Ross is making.

Mr. Blackstock: It is on a per annum generation and use.

Hon. Mr. Foy: Not in the example the clause gives, but immediately on the generation, use, and sale or disposal. That is the point Mr. Ross is making I am only drawing Mr. Nesbitt's attention to it.

Mr. Nesbitt: Yes, Mr. Irving, and I drew the clause.

Mr. Ross: The basic rental is $15,000, the primary excess rental over 10,000 horse power at $1 would be $10,000, the second excess rental is 75 cents over 20,000 horse power, which would be $7,500; making the total of $32,500. There is another point—

Mr. Nesbitt: What is the use of stating that to the Attorney-General? Pardon me for being a little impatient, but what is the use of saying to any person of common sense that the way of doing that is not by the average horse power.

Hon. Mr. Foy: Mr. Ross has not finished his explanation.

Mr. Nesbitt: Is not that the common sense way of doing it? And it is done. That is the way our companies are putting it in, and that is the only way.

Mr. Mr. Foy: Mr. Ross had better make his explanation, and you can follow him afterwards.

Mr. Ross: There is another thing which might possibly have some bearing on the question. It says here: "for each electrical horse power generated and sold, and used or disposed of over 10,000 electrical horse power." There is a definite line drawn. When you get your peak beyond that you have to pay so much more. As a technical man I could not interpret that in any other way than what I have given, and I do not know how anyone else could. I assume the companies and Commissioners knew what they were doing when drawing up this agreement and I assume the companies were possibly better posted than the Commissioners in drawing it. That word "horse power" is used in their own contracts in selling power, and why should it not be accepted in this case at its technical meaning?

Mr. Barton: Take the element of time into consideration. As Mr. Ross just stated, horse power is the rate of doing work. The thing sold to the companies is horse power hours, and in order to determine horse power hours you have to determine the time. If you have one horse power working a year, you have the same amount of energy or work as you have if you developed two horse power during six months; you have one horse power a year in each case. If you take the instantaneous horse power readings, as Mr. Ross has suggested, you can get the average by taking the average of those instantaneous readings, or you can get it by taking the measurements of the horse power hours and dividing by the number of hours in the year, six months, or day, as the case may be. But the actual commercial output of your plant is horse power hours, and it is not horse power, which is simply a rate of doing something, a rate of doing work, and you cannot very well base a charge on a mere rate any more than you can on a velocity.

Mr. Langmuir: I would say, although Sir Æmilius Irving is responsible for this agreement, I have good reason to believe it was drawn by Mr. Stetson, it is his phraseology. I know when it was taken up to Mr. Ward—

Mr. Nesbitt: That phraseology is Mr. Rankin's, not Mr. Stetson's.

Mr. Langmuir: I know Mr. Stetson had to do with it.

Mr. Nesbitt: I think he looked over it for probably half an hour. But it does not matter.

Sir Æmilius Irving: You say who drew it. The agreement is there to speak for itself; but it is very well known that it was drawn by these gentlemen on the opposite side, who went up to Mr. Hardy to get an abrogation of the monopoly clause.

Mr. Nesbitt: We did not go to get abrogation.

Sir Æmilius Irving: Yes, it was passed at the same negotiation.

Mr. Nesbitt: I understood the Government wanted the abrogation.

Sir Æmilius Irving: I do not know how that is, I never knew anything about it, except the new specifications and that particular paragraph were handed to me to incorporate in those terms.

Mr. Nesbitt: I saw Mr. Hardy probably 15 or 20 times in connection with it.

Sir Æmilius Irving: I did not see him at all.

Mr. Langmuir: We need not discuss that. I was under the impression, Mr. Nesbitt, it was Mr. Stetson, but if it was Mr. Rankin, that makes it still stronger, because he was experienced.

Mr. Nesbitt: The notion was that Mr. Hardy in introducing the bill into the House rather made, as a matter of politics, a good point, as he thought, that they had abrogated the monopoly clause. Mr. Langmuir may, or may not have been there, but the idea was to abrogate the exclusive mono-

poly under the $25,000 rent, and the $15,000 was then fixed, and as to the balance, the Commission were to become partners with the company.

Mr. Ellis: In regard to what has been said about this clause, I may say that in a conference between the Commission and the President of the International Railway Company we have come to an agreement precisely on the terms the Commission are now contending for.

Mr. Cassels: It seems to me, as far as I am concerned, that we have fulfilled all the duties cast upon us, we have given you our views very fully. I had come thinking there was an open mind on the subject.

Mr. Ellis: So there is.

Mr. Cassels: I suppose it is a matter now with which the Chairman and the open-minded Commissioners will deal.

Hon. Mr. Foy: Well, I shall require to go through the shorthand writer's report before dealing with the matter.

REVIEW OF THE REPORT OF WILLIAM SPENCER, M.A., Ph.D., F.G.S., ON THE PHYSICS OF THE NIAGARA RIVER.

By Isham Randolph, C.E.
1908.

April 13, 1908.

Mr. James Wilson,
Superintendent, Queen Victoria Niagara Falls Park,
Toronto, Canada.

Dear Sir,—You have referred to me for discussion certain questions raised by Mr. William Spencer, M.A., Ph.D., F.G.S., in relation to the effect upon Niagara Falls of the withdrawal of water for power purposes and of the tendency of this withdrawal to lower Lake Erie.

These are questions of grave moment and anyone having the temerity to differ with Dr. Spencer—when he asserts as indisputable facts and then gives his own conclusions thereon—must be able to support his counter views with incontrovertible proofs.

Before plunging into the issues so strongly drawn a brief review is proper of the conditions in that stretch of the Niagara River between the point where it receives the effluent waters of Lake Erie and the first of the cascades over which it tumbles in its headlong course to the Falls. Mr. Spencer has described that stretch of the River, and I might quote wholly from him had he not omitted so many details necessary to a complete understanding of the hydraulic conditions.

The U. S. Geological map prepared in 1901 indicates that the river begins at Horse Shoe Reef, which is three and one-third miles above the International Bridge. The profile of the river prepared by the Deep Waterways Commission of 1900 has its zero opposite the angle of the Buffalo breakwater, which is nearly opposite the ruins of old Fort Erie and is two and one-third miles above the International Bridge. This profile gives the elevation at Station O as 571 above sea level, and states that the lake level at that time was 571.5. Taking this as a starting point, I will follow the river down.

In the next 4,400 feet it drops 3.6 feet (elevation at guage 3, station 44, opposite the waterworks intake, is 568.4) and the resulting hydraulic gradient is .000818 (4.32 feet per mile). The width of river here as scaled from the

map (Plate No. 84, U.S. Deep Waterway Board of Engineers) is 1,870 feet. The elevation given at station 70, guage No. 4 opposite Ferry Street is 567.3. As the distance is 2,600 feet and the drop 1.1 the hydraulic gradient is .000423 (2.23 per mile). The width of the river here, as scaled from the map, is 1,650 feet and is the narrowest section. The extreme depth indicated here is 27.2 feet. The next guage taken is No. 6 at the International Bridge station 122; its elevation is given as 566.8: the drop is therefore 0.5 in 5,200 feet and the gradient 0.0000961 (0.507 per mile). The profile indicates this as the deepest part of the River. The lowest bottom elevation given on the cross section is 519, hence the resulting depth was 47.8 feet. This bridge is 1,806 feet long; of this distance 129.5 feet is shut off by piers. There are nine spans of the following width, starting from the American side: Span No. 1, 151.5; No. 2, 154.1; No. 3, 156.2; No. 4, 234; No. 5, 235.8; No. 6, 235.3; No. 7, 186.9; No. 8, 184.3; No. 9, 138.3. For a description of this bridge and the current measurements taken for determining volume of flow see page 298 *et sequitur*, Vol. 1 of the "Report of the Board of Engineers on Deep Waterways between the Great Lakes and the Atlantic Tide Waters," 1900.

At station 358 (Rattlesnake Island) the elevation given is 565.6, showing a drop of 1.2 feet in 4.47 miles, a gradient of .000051 (0.269 per mile). At station 992+50 (Schlosser's Dock) the elevation given is 563.05, a drop of 2.55 in 12.02 miles, or a gradient of .0000402 (0.212 per mile). The profile from which this data is taken follows the thalweg of the channel which separates Grand Island from the State of New York, to which it belongs. The shorter route is along the International boundary line, so the gradients in that channel will be slightly steeper than those given on the route taken by the profile. Schlosser's dock is 16.49 miles down stream from the International Bridge, and, as ascertained by scaling from U.S. Geological map, the distance therefrom to the rim of the First (or Green) Cascade is two and one-third miles, making the total distance from the bridge to the cascade 18.8 miles. It was important that this profile should be extended to Port Day, the entrance to the Niagara Falls Hydraulic and Manufacturing Company's intake, and I am enabled to do this basing the extension upon information given me by the Niagara Falls Power Co. and the Hydraulic Company. On June 2nd, 1906, the Niagara Falls Company took levels at Schlosser dock and at their intake guage showing the elevation at this dock to be 562.85 and at the intake to be 560. 85 (N.F.P. Co. datum), hence the drop was 1.47 feet on that day. The profile of the Deep Waterways Commission was constructed from information secured October 28th, 1897. I got from the Hydraulic Power Company their guage reading at Port Day, on October 28th, 1897, and found it to be 560.6; adding the correction to make the datum agree with U.S. datum prior to 1903, 0.698, I make the elevation 561.3; subtracting 1.47 from 563.05, I find the elevation at the Niagara Falls Intake to be 561.58 or .28 higher than the elevation found for Port Day. The mean difference between these two guages for October, 1897, was .15 of a foot, which subtracted from .28 leaves a difference of .13 to be accounted for, which is inconsequential.

The mean corrected elevation of Port Day for October, 1897, was 561.70. The mean elevation at Buffalo for October, 1897, was 571.75, showing a drop of 10.05 feet. The drop on October 28th, 1907, as determined by subtracting from the lake level at Buffalo (571.5) the elevation at Port Day, 561.43 (563.05—1.47+.15) was 10.07: this close check justifies me in extending the hydraulic profile from Schlosser's dock to Port Day as I have done. The distance being 9,000 feet and the drop 1.62, the hydraulic gradient becomes

.00018 (0.95 per mile). From Port Day to Goat Island the distance is about .8 of a mile and the drop 1.38. Having now constructed a characteristic profile from Lake Erie to Goat Island we have a working basis within a narrow range of possible conditions.

It must be borne in mind that the profile does not correctly represent the hydraulic gradients for all seasons of the year, as these are subject not only to changes in the level of Lake Erie but also to modifications due to varying values of the co-efficient of roughness brought about by acquatic vegetation in the stream which serves during the period of vigorous growth to increase that co-efficient.

There are certain natural laws which must be always had in mind while considering these questions.

In any channel through which an approximately constant volume of water flows, the velocities will be determined by that volume, the area of the stream, the slope and the degree of frictional resistance offered by the bottom and sides of the channel. The volume being constant the hydraulic gradient will vary with the natural declivity of the bed of the channel, the cross section and the frictional resistance. If the bottom of the channel is level, or if it sinks below the discharge end of the stretch considered, then the water must make its own gradient, and this it does by piling up at the intake end until it has built up a head sufficient to drive its volume through the channel. These are the basic principles involved in stream flow.

Few inland rivers have uniform hydraulic gradients throughout their entire length. I do not know of one that has. There are stretches of channel with steep gradients and low velocities ending in stretches of gentle gradients and low velocities; these again being succeeded by steep gradients and high velocities; but for a given volume of discharge there is a fixed regimen for each stretch, with its characteristic gradient. If in any stretch the fixed regimen is disturbed by a natural or artificial cause there results a readjustment of slope. If at the discharge end of any characteristic section the capacity of the channel to discharge water be increased by deepening, or the creation of collateral channels, and the volume of supply remain as before, the result will be a dropping of the water surface to an extent which reduces the cross section to an area which just cares for the supply. This means steepening the slope in the stretch of channel in which the changed conditions takes place, but it does not mean that this dropping extends back up stream on a new gradient parallel to the former gradient. It means the introduction of a new water plane the angle of whose surface to the horizon is greater than the angle of the original water plane, and this angle will intersect the original water plane at some point up stream at which the cross section is sufficient to accommodate the constant flow, and above that point the fixed regimen of the stream will not be disturbed.

In the case now under consideration we have as a fountain head Lake Erie, fed by the outflow from the upper Great Lakes and the precipitation within its own drainage basin. Its outlet is through the Niagara River. The shores of the lake converge at its north end and guide the waters into the river channel, the identity of which seems to begin at the "Horse Shoe Reef," three and one-third miles above the International Bridge. Our map (Exhibit I.) copied from the map of the U.S. Geological Survey and annotated to illustrate this report, shows the course of the river, its varying widths and the obstructions in its course. The profile (Exhibit II.) shows the slope or hydraulic gradients and the bottom of the channel on the line of greatest depth (the Thalweg). These do not show the cross-sectional areas, however. The relations between the levels of Lake Erie and the Port Day intake are

matters of record: the U.S. Government has kept records of the lake levels and the Niagara Falls Hydraulic and Manufacturing Company has maintained an automatic recording guage at Port Day for a long term of years. To these I have had access and I have tabulated the monthly and annual means of these readings from 1890 to 1907 both inclusive, and to make them comparable, I have made the necessary corrections in the Hydraulic Company's elevations, so that both, as shown in the tables (Exhibit III.) are in terms of sea level.

With the data thus assembled and the hydraulic principles involved thus fully presented, I am now prepared to take up Dr. Spencer's report and consider it upon its merits. My discussion will be limited to Lake Erie and the Niagara River in their relations to each other. At the outset of my investigations I felt that for a complete discussion of the questions submitted to me, I should have to know as definitely as possible the amount of precipitation annually in each of the Lake Basins, but I became satisfied that I only have to do with Lake Erie as a basin discharging certain volumes of water and that the sources which supplied that water were not subjects the investigation of which need be gone into. If Lake Erie is above a mean stage we know that an excess supply has entered it: if it is below the mean level it is certain that there is a shortage of supply. This reasoning eliminates the Chicago Sanitary and Ship Canal from the discussion. The first question to be answered is, does the taking of water from the Niagara River above the Falls tend to lower Lake Erie?

No. 1. On Page 261, Chap. XXI.:

"Since writing the above the International Waterways Commission has appeared. They recommend the limitation of the power on the Canadian side to 36,000 cubic feet per second and on the New York side to 18,500 cubic feet per second: in addition to which is the discharge of 10,000 cubic feet for the Chicago Canal— in all 64,500 cubic feet, including the Welland and Erie Canals, or nearly 37 per cent. of the low water discharge. This amount will lower the river producing effects upon the Falls only a little less than the diversion of the full franchise volume mentioned. So also it will most seriously impair navigation on the Upper Lakes, as will be explained in the next chapter."

With the closing sentence of this quotation I shall take issue.

No. 2. On Pages 265-6, Chap. XXI., Part two:

"Below Grand Island the two branches of the river unite and form a basin, which, just below the creek entrance at Chippawa, is 5,050 feet across, with soundings, so that the area of the cross section can be determined. This is 83,000 square feet, the mean depth is sixteen feet. The discharge is that of Lake Erie, with only a small increase from the creeks at Chippawa and Tonawanda. It took fifteen to twenty minutes for floats to cover the distance from the line of soundings, where the area is measured to the first cascade, at the end of which is situated the forebay of the Ontario Power Company, showing the small descent of the river. From this basin or above it the power franchises allow the withdrawal of 41,200 cubic feet per second, which represents 20 per cent. of the low water flow. Accordingly the proportional diversion represents the unmodified lowering of this basin to the extent of four feet for low water and 3.2 for average water. To this must be added 10,000 feet for the Chicago Canal, thus making a total of 51,200 cubic or 25 per cent. for mean water, and 30 per cent. for low water. This total diversion at or above the first cascade should be modified to an undetermined amount from confining the river to a narrower channel after the shallower rim shall have been mostly drained.

If the proposed limitation be carried out then from 64,500 feet must be deducted the Canadian franchises of 19,750 feet taken from below the first cascade, leaving 44,750 cubic feet to be withdrawn from above it. This would make the theoretical lowering of the basin, without corrections, amount to more than 3.5 feet for even mean water or over four feet for low water.

The withdrawal of the water behind the rim of the first cascade has the same effect as the deepening of the outlet. It increases the velocity of the river above, which for a time lessens the amount of the subsidence in the basin until the Erie level is adjusted to the new conditions. Even now the rim of the first cascade from Goat Island is covered by only from one-half to one and one-half feet of water.

These observations were made after there had been a considerable diversion of the river and on a day when the lake was at its mean quinquennial level. The deeper the water upon the rim at present, provided it be eventually drawn off, the more would be the lowering of the surface behind it, due to its diversion through artificial orifices; while there would be less water on the rim the discharge would be diverted into the narrower and deeper channel, causing some retardation of the current in the basin. There is nothing to lead me to expect that the lowering will be less than three feet for mean water and more for low." (See Page 272).

No. 3. On Page 268, Chap. XXI.:

"If the subject be considered at all, there seems to be an impression that the diversion of the water at Niagara will not affect the higher lakes. If the water were all taken from below the Greens or First Cascade at nearly fifty feet down the rapids the effect upon the upper river would be unappreciable. But most of the water under the franchise will be taken from or above the rim which forms the barrier to the basin of the upper rapids."

The truth of the "impression" stated in the first sentence of this quotation is demonstrable and will be demonstrated.

No. 4. Chap. XXI., Part 2, Pages 272-3:

"With the gradual lowering of the basin, a difference of one foot in the slope of the river should increase the velocity at the outlet of Lake Erie by three per cent., which in the course of a year and a half would lower Lake Erie nearly a foot, with the complete effect shown sometime afterwards. while some as yet unmeasured factors may somewhat retard the velocity and increase the time, the ultimate effect must be the same after the equilibrium should be restored at a lower level of the lake. Subsequently comes the lowering of another and still another foot, or more, so that in a few years at most from the time of the complete use of the franchise power, Lake Erie will be lowered by three feet, or more for prevailing low water—not taking into account the effect of further deepening of the lake outlet, which may recur at any time . . . So much for the physics of the river as the question appears to me."

No. 5. Chap. XXI., Pages 274-5.

"A marked increase in the rainfall has occurred since 1900, as compared with the mean rainfall during the decade ending with that year. On examining the tables of the fluctuations of level and rainfall, and taking into account the effects of the Chicago Canal upon the different basins, I find from the results that Lake Erie should have risen 0.46 of a foot more than it actually has done when compared with both Lake Ontario and Lake Huron. What is the cause of this failure to raise the level of the Erie basin where the rainfall has increased not only over the amount of the previous period but also in excess of that of the other basins? Certainly there is but one explanation, namely, the excess has been diverted by the power uses from above the rim

of upper rapids during the five years ending with 1905 over the mean of the ten preceding years of low water. Adding to this the effect of the Chicago Drainage Canal, the fall which the lake has experienced from the artificial diversion amounts to 0.68 of a foot in height, or about eight inches. At the close of 1905 the total diversion of water was equivalent to the lowering of Lake Erie by about nine inches. Here then is direct evidence that the diversion of water has lowered Lake Erie to more than eight inches, while as yet not over one-quarter of the franchise power has been brought into use.

But the superficial observer would not see the change on account of the increased rainfall, by which the actual present level of Lake Erie is not lowered below that of previous years. Had not the diversion occurred while a corresponding rise actually took place in Lake Ontario and Lake Huron, Lake Erie would have been raised 0.68 of a foot (0.46 at Niagara and 0.22 at Chicago.)"

Not all of Dr. Spencer's faulty reasoning is embodied in the quotations made, but enough is quoted to bring out the fallacy of his conclusions and to enable me to demonstrate the facts to be counter to his statement of them.

Let us first deal with the effect upon Lake Erie of withdrawing water from Niagara River above the rim of the first cascade. This withdrawal in franchise volume, the Doctor tells us will lower Lake Erie "three feet, or more, for prevailing low water."

I have set forth the habits of obedience to the laws of hydraulics universally found among rivers. Dr. Spencer substitutes the speculations of a geologist for the deductions of the hydraulician, and reaches conclusions which do violence to all hydraulic law. Niagara River illustrates most beautifully the laws of hydraulics. Take this very stretch of the river that the Doctor calls the basin above the first cascade. He describes a cross section bounding this basin on the east, "just below the creek entrance at Chippawa" (see Quotation No. 2), where the width is 5,050 feet, the mean depth 16 feet and the cross section area 83,000 feet. The surface elevation here must be approximately that of Chippawa creek, or on a given date 562.80 Now the fall from Chippawa to the west end of the intake works of the Ontario Company is approximately 4 feet, and the distance about .8 of a mile; the gradient per mile would therefore be 5 feet. The cross section described below the entrance to Chippawa Creek is at the down stream end of a 12 mile stretch of channel in which distance the drop is 2.55 feet (see profile Exhibit II.) or a gradient of 0.212 per mile. It is plain to see that the drop of 4 feet from Chippawa to the Ontario intake is absorbed in a distance of .8 of a mile and that the regimen in the 12 mile stretch above is not disturbed by the drop to the intake of the Ontario Power Company. This is a sufficient demonstration to dispose of the theory that a drop of one, two or more feet at the first cascade would accelerate the velocity in the narrow and precipitous channel above the International Bridge. The United States Government has in its employ men trained in the science of hydraulics and they have the experience gained by long years of application of their professional knowledge to the problems we are considering. Some of these men have been charged with the duty of studying the Niagara River in its relations to Lake Erie and their determinations of the volume of discharge discard all consideration of the effect of the rapids above the falls upon that discharge because they know that Lake Erie influences the condition at the rapids above the falls by the volume of water which it sends down to them, but that these rapids in no way affect the volume of outflow from the lake. These engineers have set forth formulas for determining the discharge of Lake Erie and these take no account of the conditions nineteen miles down stream. The discharge formula adopted by the Board as set forth in their report of 1900 is:

$Q = 168812 + 17762\ (Y) + 1409\ (Y)^2$.

In this formula 168812 is the volume of discharge for a lake elevation of 570.00; Y is the difference between 570 and the elevation of the lake at the time the discharge must be determined; 17762 is the rate of increase for one foot of rise above 570 increased by 1409 multiplied by the square of the rise above 570, and Q is the resulting volume of flow.

The formula used by the engineers of the United States Lake Survey is found on page 2,857 of the Report of the Chief of Engineers, U.S.A., for 1903, and is:

$Q = 158500 + 22462\ (C\text{-}57)$.

In this formula C is the elevation of Lake Erie above sea level at the time the discharge is figured. 158,500 c.f.s. is the discharge for a lake stage of 570 and 22462 is the discharge for each foot of rise above 570. The results of computations for any given stage of lake by these two methods vary by a small percentage and the latest formula gives the smallest discharge for any given elevation of the lake. An examination of the table, Exhibit III., shows the highest mean elevation of Lake Erie in the six years prior to 1894 to have been reached in 1890 and the highest mean stage in any month that year to have been in June. The mean elevation for the year was 573.23 and for the month was 574.02. Using the Lake Survey formula for discharge we find the flow for the month of June to have been 248,797 c.f.s. The Port Day guage reading for that month was 563.15, showing a drop of 10.87 feet. The Niagara Falls Company began drawing water for power purposes in 1906. The highest stage of water since that year was reached in 1907. In July of that year the mean level of Erie was 573.33, which by discharge formula gives an outflow of 233,289 c.f.s. The annual mean elevation for 1907 was 572.80. The mean elevation for Port Day in the month of July was 562.09, showing a drop of 11.24 feet. Comparing the differences between Lake Erie and Port Day with flows of 248,797 c.f.s. and 233,298, c.f.s., 10.87 in 1890 and 11.24 in 1906, we find only 0.37 of a foot. In 1890, the Niagara Falls Hydraulic Co. was drawing so little that conditions above the first reef were practically those of unmolested nature. In 1907, the Niagara Falls Hydraulic Co. was drawing about 4,000 c.f.s., and the Niagara Falls Power Co. about 8,500 c.f.s. It is proper here to bring out a fact which has a bearing upon this discussion. The Port Day gage does not correctly indicate the general level of the water in the basin above the first cascade. This gage is at the intake to the Hydraulic Canal. Water entering that canal must be at a lower level at the entry than it is some distance away in, or else there would be no flow from the main body of water into the canal. This is exiomatic and needs no demonstration. In quotation No. 5, after discussing the low stage of Lake Erie, notwithstanding an excess of rainfall, he gropes for an explanation; the Doctor says, "Certainly there is but one explanation, namely, the excess has been diverted by the power uses from above the rim of upper rapids during the five years ending with 1905 over the mean of the ten preceding years of low water."

This recalls a housekeeping experience which came within my knowledge. A lady wishing to take a vacation with her husband arranged with his younger sister to keep house for the family while she was gone. After the vacation upon the mother's resuming the household duties the sister presented her housekeeping account and insisted that they be audited. Beefsteak was an item much in evidence: the question arose, why did she buy so much beefsteak? The answer was "Oh, whenever I could not remember what I paid money for, I put down beefsteak."

The Doctor feels bound to account for the disappearance of the water, so he puts down "power uses from above the rim of the first cascade."

Having discussed the effect upon Lake Erie of the withdrawal of water from the Niagara River above the falls and shown conclusively that navigation is not in the least menaced by that withdrawal, I will take up other phases of the question presented by Doctor Spencer. He says on Page 260, Chapter XXI.:

"Of the franchised diversion two companies on the New York side and the Ontario Company on the Canadian, take their water from above the first cascade, and consequently affect the river common to both countries . . ."

"It is the diversion of water from the rim of the first cascade which will further shrink Niagara Falls."

When the Doctor says that two companies on the New York side take their water from above the first cascade, he asserts a fact. When he includes in that statement, the Ontario Power Company on the Canadian side he falls into error, for at Port Day, the intake to the Niagara Falls Hydraulic Company, the elevation of water surface is nearly four feet higher than it is at the east end of the Ontario Power Company's intake, which indicates that the onflowing stream must have crossed the crest of the first cascade before it can enter the intake. There is room for argument, however, as to the exact location of the reef which forms the lip of the first cascade, but there is no possible doubt of the fact that the Doctor is in error in his assertion that more water is drawn from above the lip of the first cascade through the intake which admits water to the gathering basin of the Ontario Power Company than was drawn before the construction of those works.

In reaching an intelligent understanding of this situation a study of the conditions within the area enclosed between the location of the now existing intake through which water is admitted to the gathering basin of the Ontario Power Company is very instructive and serves to invalidate Mr. Spencer's contention that a greater volume of water is being drawn over the lip since the completion of the Ontario intake than was the flow over this portion of the channel in its natural condition. In a state of nature the sweep of the river was along the convex shore, and the impetuosity of the current was such that it had indented the uniform curvature of the west shore and secured a small channel around the resisting uplift known as Dufferin Islands. Where this sweep to the west occurs we have contours showing the surface of the rock floor. These range from 548 to 549, or an average of 548.5. Surface water elevations were taken before the building of any obstruction to free flow, and these range from 554.9 to 555.5, or an average of 555.2. The length of the present obstruction to free flow is about 600 feet. With this data to work from we find an approximate cross section of 4,020 feet. The velocity may be assumed with some degree of certainty at 6 feet per second, hence we would have a flow of 24,120 second feet. Since the construction of the head works of the Ontario Power Company we have an altered condition. These head works have a total length of 596 feet and are designed to control the flow into the gathering basin. There are 50 openings each 9 feet—5 inches x 6 feet = 56½ square feet, or a total opening of 2,825 square feet. Under no possible conditions could a volume of water enter the gathering basin through these openings as great as that which formerly swept over this course. I submit a plat (Exhibit IV.) showing the location of the intake with contour lines indicating the original surface and the boundaries within which the excavation has been made down to elevation 545. This exhibit discloses the fact that the rock reef at the west end of the intake was not broken through and to-day it rises to elevation 549.

Exhibit V. is a plat showing a stretch of the river beginning at the head of Goat Island and extending down below the Falls. On this plat the International boundary line is shown and lines are drawn parallel to the east boundary line (produced) of the Queen Victoria Niagara Falls Park at intervals of 200 feet. On these lines on the down stream side, the distances are marked from the boundary line to their intersections with the original shore line; and where they cross the line of the intake the distance to it from the boundary line are marked on the upstream side. This exhibit brings out very clearly the extent to which the channel has been contracted by the intake.

Exhibit VI. is an elevation of the intake showing the openings through it and on its face a hydraulic profile shows the recent flow line and in dotted lines are approximate water surface of 1902 before the works had changed natural conditions. The openings in the intake are designed to admit ample water to supply the three conduits which are to carry water from the gathering basin to the Power House below the Horse Shoe Falls. Only one of these steel conduits is now in place; it is 18 feet in diameter, hence its cross sectional area is 254.57 square feet; the velocity figured on in this conduit was 15 feet per second, hence the volume of flow should be 3,818 feet per second. Three times this volume of flow would be 11,454 cubic feet per second; this volume must be taken into the gathering basin with enough more to insure a good entry head into the conduits, a requirement far below the volume which formerly swept over the area now enclosed by the structures of the gathering basin.

The facts set forth herein and illustrated by the exhibits prove beyond contradiction that the works of the Ontario Power Company do not tend to lower the water above the first cascade. This being true, the only water extracted for power purposes which tends to lower the water above the first cascade is taken by the Niagara Falls Power Company and the Niagara Falls Hydraulic and Manufacturing Company on the New York side. The volume taken by the first of these companies is 8,500 cubic feet, and by the second is 4,000 cubic feet, or a combined volume of 12,500 cubic feet; somewhat less than the 44,750 cubic feet per second upon which Dr. Spencer predicted his argument. (See Chap. XXI., Part 2, Page 266).

That the water taken from the river for power purposes above the falls must to the degree of taking diminish the volume tumbling over the precipice is indisputable. This diminution has not as yet marred the scenic beauty of this wonderful work of nature, but the volume of diversion can not be much increased without marring that beauty. It is within the range of accomplishment to greatly increase the volume of water to be converted into power and still preserve the sublimity, grandeur and beauty of the falls, and the expenditure necessary would be amply justified by the results. This is an idea which need not be amplified here but it leads up to the great question of the conservation of the waters in the drainage areas of the Great Lakes. This conservation calls for international co-operation. In these lakes we have our seasons of surplus water and our seasons of deficient flow. The surplus is allowed to run to waste and when the low period comes there is no relief. These lakes are capable of storing all of the surplus waters and it is for man to build the works which will bring that capability into play. The mean between the high and low waters is what our commerce needs. In the days of Pharoah there was a Joseph to interpret the monarch's dream on the fat and lean kine. And the monarch appointed the interpreter to store the overabundance of seven years of plenty therewith to avert seven years of famine when the crops failed. We are not confronted with dreams needing an interpreter. The seasons have told their story year by year and we know it as far back as the records of the

Great Lakes have been preserved. We know that each year there is an outflow from the lakes far in excess of any human need and afterwards comes a period when the deep laden ships drag their keels upon the bottoms of the inter-lake channels. This need not be, it ought not to be, and it can be averted by the construction of controlling works at the head of the St. Mary's River and at the head of the Niagara River which would make possible absolute control of the waters so that there need never be a low stage of water, and a constant mean flow could be maintained. The cost of these works is insignificant, compared with any other method of providing deep navigation. The time to be consumed in building the works would be shorter by years than that needed for any other mode of relief, and the benefits in all of the upper lakes would be immediate.

In closing this report, I wish to express my appreciation of the courteous way in which the officials of the Niagara Falls Hydraulic and Manufacturing Company, and Niagara Falls Power Company, the Ontario Power Company, the Electrical Development Company, the Engineer officers of the U.S. Engineer Corps and the officers of the U.S. Department of Agriculture, have given me access to all of the sources of information bearing upon the subject which were within their custody. Not less am I indebted to you for substantial aid in the preparation of this report, which I now respectfully submit.

Isham Randolph,
Consulting Engineer.