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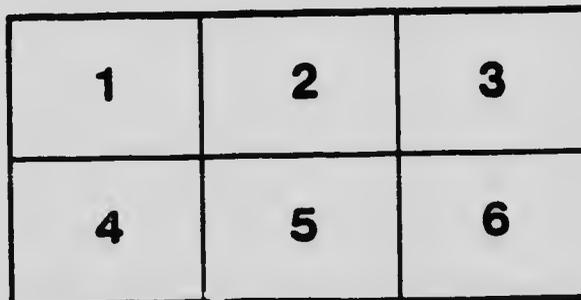
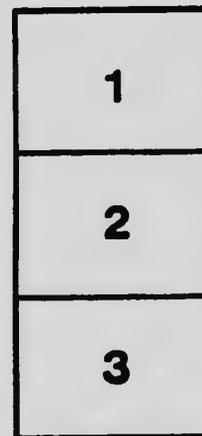
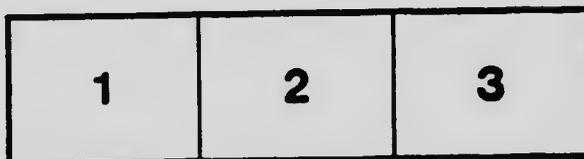
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ENGINEERS' REPORT  
ON  
PORT EDWARD TOWNSITE  
AND  
HARBOR

*R. H. THOMSON, A.M., Ph. D.*  
*Member Am. Soc. C. E.*  
*CONSULTING ENGINEER*

*RITCHIE, AGNEW & CO.*  
*CIVIL ENGINEERS AND SURVEYORS*  
*PRINCE RUPERT, B.C.*





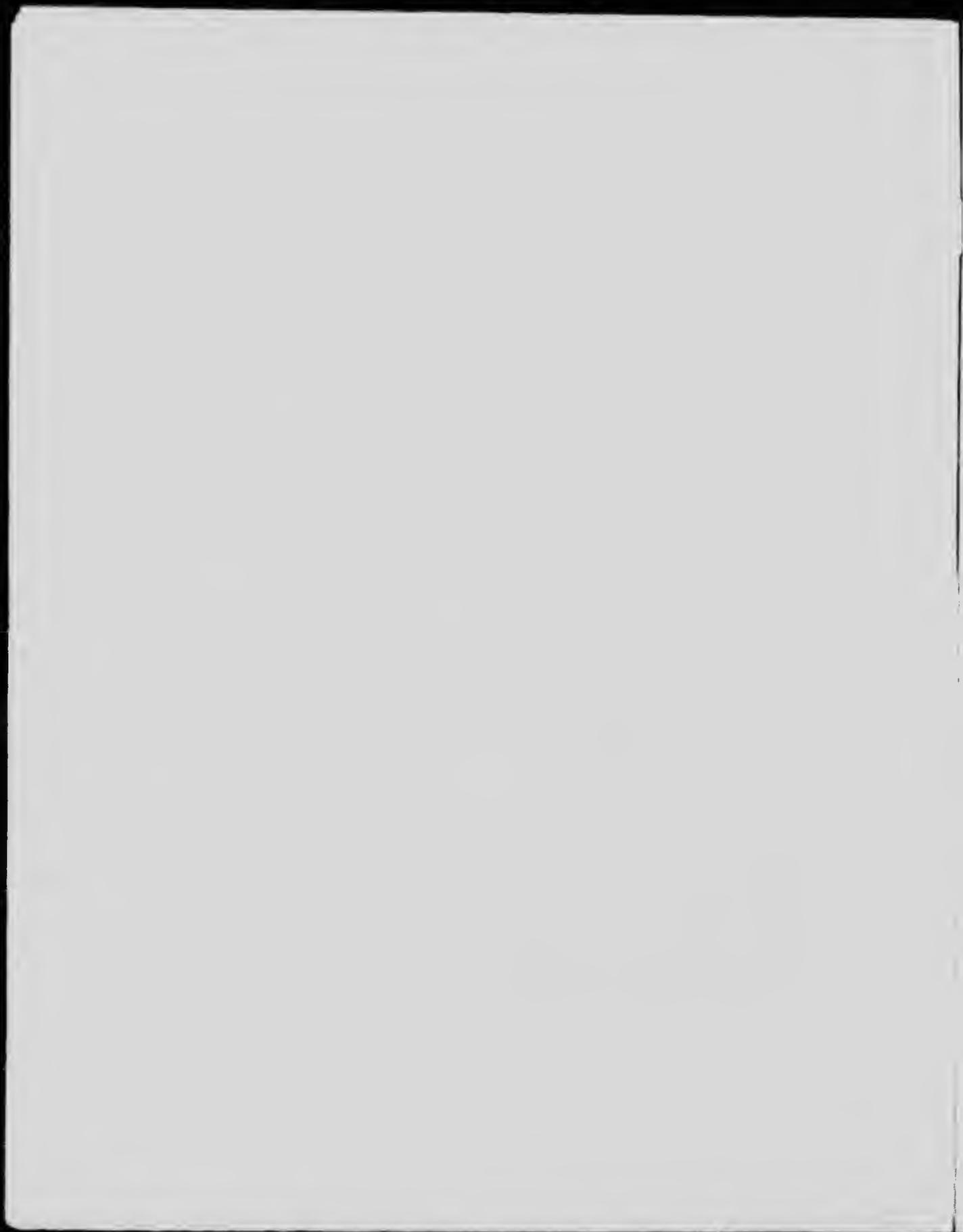
NATURE OF PORT EDWARD WATERFRONT



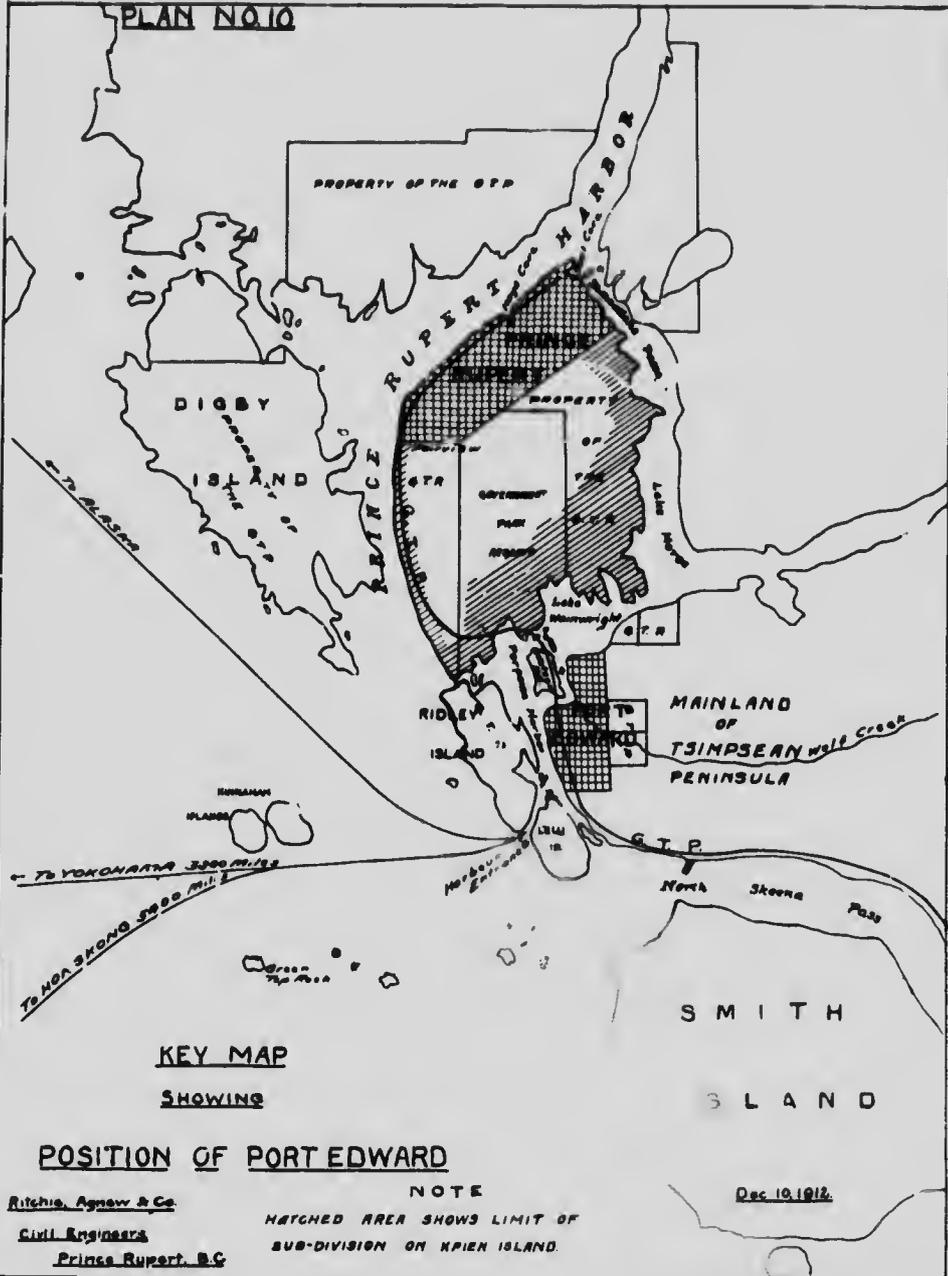
ENTRANCE TO PORPOISE HARBOR AT PORT EDWARD

111

111



PLAN NO. 10



KEY MAP  
SHOWING

POSITION OF PORT EDWARD

Ritchie, Agnew & Co.

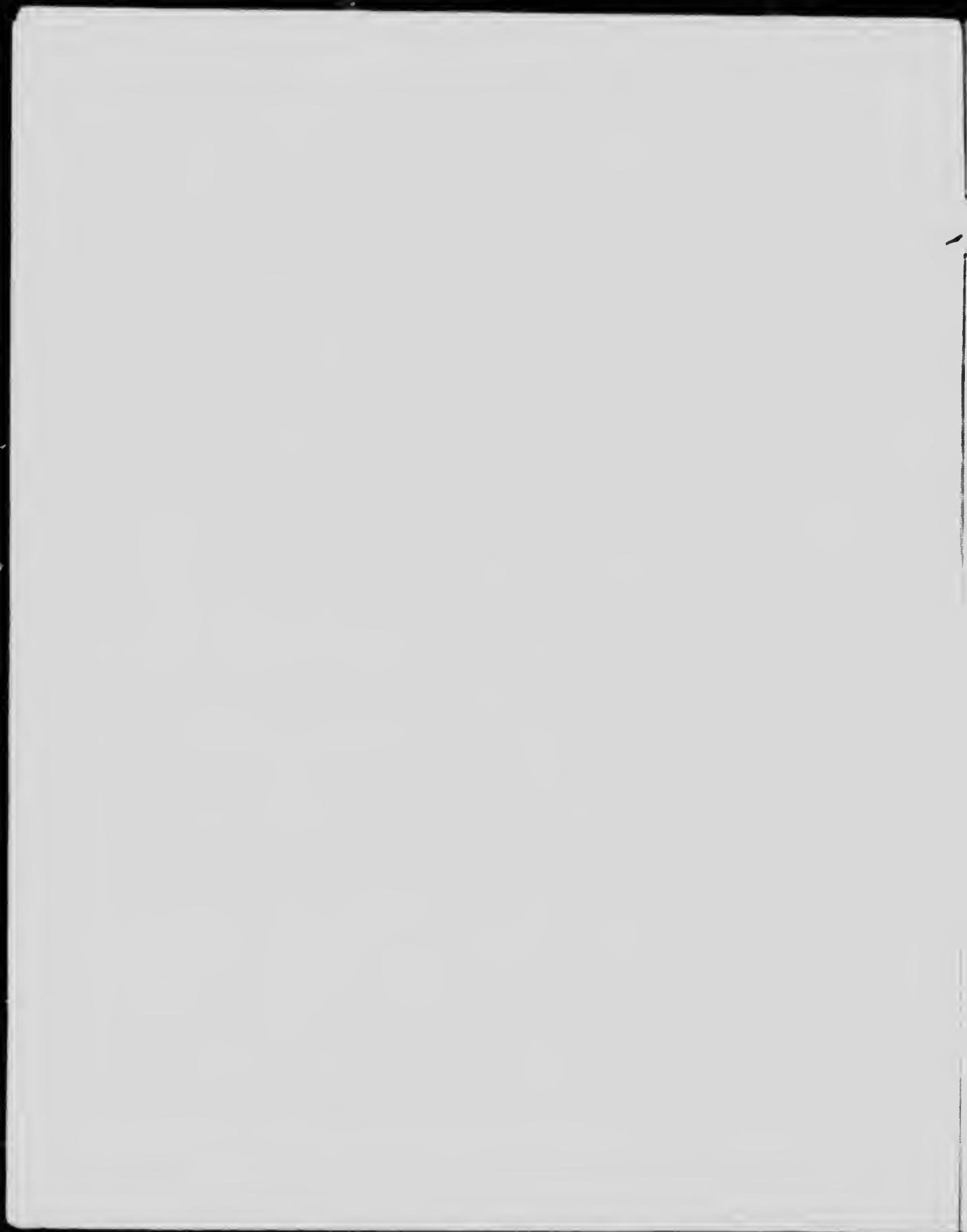
Civil Engineers

Prince Rupert, B.C.

NOTE

HATCHED AREA SHOWS LIMIT OF  
SUB-DIVISION ON KPIEN ISLAND.

Dec 1916.



# REPORT ON PORT EDWARD

The townsite of Port Edward is located on the coast of British Columbia (fronting on Porpoise Harbor), eight miles south of the port of Prince Rupert, and approximately five hundred and forty miles north of the City of Vancouver and fifty miles south of the Alaskan boundary.

Location

Port Edward is destined to become the industrial complement of Prince Rupert. Prince Rupert and Port Edward taken together contain every natural advantage found in the best equipped harbor cities of the world, and in addition, offer facilities for the development of large and prosperous industries beyond the facilities offered by any other city on the entire Pacific coast. Inasmuch as the destinies of Prince Rupert and Port Edward are so closely interwoven, and the development of the one depends to a very great extent upon the prosperity of the other, we will first touch upon the history of the City of Prince Rupert and the plans which are now under way for its final development.

Port Edward's relation to Prince Rupert

## Prince Rupert and Its Resources.

Prince Rupert, familiarly known as the "Fort of Progress" is the westerly terminus of the Grand Trunk Pacific Railway. In 1905, the British Columbia Government granted 10,000 acres of land to this railway as an aid to it in building up its terminal city. During that same year, the Railway Company purchased 14,000 acres of Indian Reserve land, and these two blocks of land constitute the original holdings of the Railroad Company at this point. The Company immediately proceeded to sub-divide a little over 2,000 acres, one-quarter of which, under the terms of the Crown Grant, reverted to the Province of British Columbia. Up to the month of May, 1909, when property in Prince Rupert was first offered to the public, no private construction work had been begun in the city. Prior to this, the Railroad Company, in conjunction with the Government, had formulated their plans and had laid out the initial municipal systems necessary to the primary development of a town. Plank sidewalks, roadways, sewers and water mains sufficient to provide for a city of 10,000 people were all laid in place before the property was offered to the public. A comprehensive plan with adequate provisions for the future growth of the city was prepared, thus ensuring a regular, orderly and economical upbuilding of this city in marked contradistinction to the usual haphazard method of planning the towns of a new country. The advantages attendant on this orderly method of procedure were quickly noticeable. In the three years' time since property was first offered to the public, a healthy, active city has found its beginning. At present the population of Prince Rupert is in excess of 6,000. The business district is remarkably well developed; the residence district is being rapidly built up, and already many handsome homes overlooking Prince Rupert harbor have been constructed.

G.T.P. land Holdings at its Western terminus

Municipal Development

The rapid growth of this city is due to more causes, however, than the mere fact that it is the westerly outlet of a great transcontinental railroad system. Prince Rupert is also the most northerly terminal port of the Dominion of Canada. It furnishes the short-

Shortest route to Orient.

est route to the Orient, an advantage which, if it stood absolutely alone, would assure its growth and development. The following facts emphasize this statement. The distance goods must travel to get from Prince Rupert to Yokohama is about 3,800 miles. These same goods must travel 4,283 miles, or 483 miles further to reach Yokohama from Vancouver. From Prince Rupert to Hong Kong is a distance of about 5,400 miles. After the completion of the Panama Canal, the New York shipper, desiring to ship to the Orient by water, will have to send his wares over 10,000 miles to reach Yokohama, over 11,600 to get to Hong Kong. Shipments from Eastern Canada ports will have to travel the same distance plus whatever distance north the Canadian port may be from the port of New York. Furthermore, ports on the eastern coast of the continent, even after the Panama Canal is completed, will require as long a time and as great ocean transportation cost to reach the markets of Asia for the **single** trip, as Prince Rupert and the other North Pacific ports for the **round** trip.

Last Contract  
for Trans-  
continental  
system now  
sub-let.

At this writing, Messrs. Foley, Welch & Stewart, the contractors in charge of the Grand Trunk Pacific construction, announce that the contract for the last section has been sublet, and that all work to be done on this great transcontinental railway system is now actually completed or under way. As soon as the railroad has been completed—and it is expected that the line from the Atlantic to the Pacific coast will be joined together within two years at the very latest—there will be flowing into Prince Rupert a steady stream from its wonderfully fertile hinterland.

Service  
Offered  
by G.T.P.

The splendid service offered by the Grand Trunk Pacific Railway is perhaps best illustrated by a table prepared by the Grand Trunk Pacific Railway Company showing a comparison of summit elevations, maximum gradients and total elevations ascended for various transcontinental railways.

	Highest summits	Maximum gradient in feet per mile		Total feet ascent overcome	
		Eastbound	Westbound	Eastbound	Westbound
Grand Trunk Pacific— Western Division Winnipeg to Prince Rupert Eastern Division Winnipeg to Moncton	1 summit 3712	21	26	6990	6890
Canadian Pacific	2 summits 5299 4308	116	116	23106	23051
Great Northern	2 summits 5202 3376	116	116	12861	12163
Northern Pacific	3 summits 5569 5532 2849	116	116	17830	17137
Union Pacific System, Omaha to San Francisco	3 summits 5247 7017 5631	116	105	18575	17552
Omaha to Portland	5 summits 8247 6953 3537 3936 1204	106	116	18171	17171
Western Pacific	2 summits 5712 5018	52.8	52.8	9385	5076
Santa Fe System	6 summits 7510 6987 7132 7453 2575 3819	175	185	34003	34506

The significant facts shown in this table are that the Grand Trunk Pacific has obtained a maximum gradient of only 4-10ths of one per cent., or a rise of 21 feet in the mile against eastbound traffic, a maximum gradient of only 5-10ths of one per cent., or a rise of 26 feet in the mile against westbound traffic, and that it encounters but one summit, the maximum altitude of which is only 3,712 feet.

Resources  
of country  
traversed to  
C. T. P. west of  
Rocky Mts.

The line of the railway from the Rocky Mountains west follows the valleys of the Fraser, Nechaco, Bulkley and Skeena Rivers. These four rivers, with their tributaries, drain the most valuable area of good, agricultural lands in the Province of British Columbia. When we add to this area the great valley of the Peace River, with its rich resources, it can readily be seen that Prince Rupert will have to put forth its most active efforts to supply the accommodations necessary to the efficient and prompt handling and shipping of the resources that the great country at its back will pour into its harbor.

Coal  
Gold  
Silver  
Copper

In the valleys of the Bulkley and its tributaries, hundreds of square miles of coal lands have been taken up. The district drained by the Copper River contains immense deposits of gold, silver and copper. Great alluvial deposits of gold are found in the Omineca Mining Region. The Babine Range contains silver and lead of almost immeasurable value. At the confluence of the Skeena and Blackwater Rivers, 150 miles north of Hazelton, are found the great anthracite coal fields of the Ground Hog Basin. Coming to the coast, there have been found valuable copper and gold deposits on Queen Charlotte Islands, and copper, silver and gold is being developed in large quantities on Observatory Inlet and on the Portland Canal. At Observatory Inlet, in fact, are found the mines of the Granby Consolidated Mining, Smelting & Power Company, a \$15,000,000 corporation which has already expended close to \$1,000,000 on development work and which has just now definitely decided to erect a smelter at Granby, same to cost \$1,500,000. This Company furnishes employment at the present time to about 450 men. The great placer fields of the Canadian Yukon also stand ready to send forth their gold to Prince Rupert for shipment to all parts of the world.

Timber

Large areas of most valuable timberland, containing mile upon mile of good spruce, hemlock and cedar, are contained in the distant back of Prince Rupert. These great forests are waiting the development of the coast cities they are intended to serve, and it is safe to say that the forests within a radius of 100 miles of Prince Rupert will produce timber sufficient to supply twenty-five mills with all they can cut and market for the next twenty years to come. At Swanson Bay, about 100 miles from Prince Rupert, is located a pulp mill, representing an investment of \$1,000,000 and employing hundreds of people. At Ocean Falls, about 180 miles away, another very large pulp and sawmill has been constructed. Industries of this type, as they come to be built, will seek distributing yards on the coast and will naturally look to Prince Rupert and its environs for this purpose.

Fish

The most valuable asset Prince Rupert claims is the fish which abound in the waters within a few miles of its harbor. Great halibut banks, yielding at present millions of pounds every year, for shipment to Vancouver and Seattle, are found within a radius of twenty miles. Twelve miles south of Prince Rupert lies the Skeena River, one of the greatest salmon rivers in the entire world. Even now, this river yields hundreds of thousands of cases per annum to the value of considerably over a million dollars, and this salmon industry alone, although in its infancy, gives employment to over 5,000 people during the canning season.

During the winter months, large schools of whales abound in the waters in and about Prince Rupert harbor. Two whaling stations are found on the Queen Charlotte Islands, and their catch during the past season was in excess of 400. Experts hold that more whales abound in these waters than in any other part of the world.

On the Queen Charlotte Islands are also found fisheries, and a visit to one already in operation proves to be most interesting and instructive. We find here the up-to-date fishing plant, consisting of cold storage plant, complete with ice-making equipment, guano or fertilizer plant, and oil-producing plant, with the necessary power-house installation, fish wharves, etc. The fishing is mainly done by steam trawlers, which operate on the banks and run into the plant when they have a full catch. These trawlers are of the same type as those used on the North Sea, in fact most of the trawlers on this coast have come out from the North Sea. The trawlers' catch includes, of the edible fish, black cod, red cod, ling cod and rock cod (for right to the north of Prince Rupert are found some of the largest cod banks on either coast of this continent), sole and flounder and halibut; of the non-edible fish, ratfish, catfish, and dogfish, which are particularly valuable for the oils which may be extracted from them (the oil from the dogfish liver being superior to cod liver oil). The edible fish are cleaned and the offal run into the fertilizer plant, then the fish are either frozen hard or packed in ice for shipment. The non-edible fish are run through the oil-extracting presses, and the residue is used for fertilizer, the oil being refined and barrelled for shipment.

Modern  
Fishery  
Plant.

It will be seen from the above that the modern fish plant is economical in every sense, all of the waste being transformed into marketable by-products. The northern harbors abound in crabs, and there is a field for crab-canning plants similar to the lobster-canning plants on the Atlantic coast. Clams, too, are easily obtained on the tidal flats, and the canning of these will likewise prove a profitable industry. At certain periods of the year, the waters of the harbor are alive with herring, so many, in fact, that the Indians use a long piece of wood full of nails similar to a rake, with which they rake the herring out of the water. Several plants have already been started for the canning of these herring, and the products of these plants have found a ready market. The waters of the Naas River are noted for the oolichan. These fish resemble the smelt of the Atlantic coast, and are very palatable.

On Digby Island, on the west side of Prince Rupert harbor, the Dominion Government has erected a splendid modern marine station, quarantine station and wireless station.

Dominion  
Government  
Station.

It would be possible to continue for pages the enumeration of the natural resources that assure the growth and prosperity of the City of Prince Rupert, but we believe that enough has been said to show the possibilities of making Prince Rupert one of the greatest export cities on the continent.

The question now naturally arises, why does Prince Rupert require an industrial complement? Why, with all the advantages enumerated above, is Prince Rupert not able to develop without the assistance of another townsite, and the answer is, that with all its great advantages of location and resources, there is no available water frontage in the townsite of Prince Rupert for the upbuilding of industrial enterprises, and for the construction of those warehouses, elevators and other industrial units that are absolutely essential to the ultimate success of any great commercial port. That the need of an industrial annex is appreciated by the City of Prince Rupert itself is evident by a quotation from the 1912 report of the Prince Rupert Board of Trade, reading as follows: "A wagon road should be built to Porpoise Harbor at the earliest possible moment. The necessity for this is apparent, seeing that this point will undoubtedly be an industrial site."

Why Prince  
Rupert Needs  
Port Edward

## The Advantages of Port Edward and Its Harbor, and the Plans for Its Development.

G.T.P.  
Main line  
along  
Waterfront.

Reference to the map herewith attached will show the G. T. P. railroad main line running along the waterfront of Port Edward. A hard and fast agreement with the Railroad Company stipulates that they shall erect a station, provide adequate sidings, permit grade crossings, and furnish all accommodations required as the traffic of Port Edward grows. The entire policy of the Grand Trunk Pacific Railway would, however, assure to Port Edward all of these things as traffic demands it, without any agreement whatsoever, for no railroad system has shown a greater desire to assist in the development of communities along its right-of-way than the G.T.P. This railroad realizes to the full, the reciprocal relations that of necessity exist between a common carrier and the country through which the carrier passes. Port Edward's prosperity means added revenue to the G. T. P. and increase of revenue to the Railway Company ultimately means lower rates to shippers in Port Edward.

Dominion  
Government  
Harbor  
Surveys.

The Dominion Government, recognizing the facilities offered by Porpoise Harbor (on which Port Edward fronts), has thoroughly sounded and buoyed the harbor and its entrance and has issued plans and charts showing the general characteristics of the harbor and coast line.

Personnel of  
Townsite  
Syndicate.

Giving the greatest assurance of the early success of the townsite, is the personnel of the Syndicate which is looking after its initial development. This Syndicate is composed largely of leading business men in Prince Rupert proper, who realize the necessity and the advantages of the industrial complement to Prince Rupert that Port Edward represents. All of these men have large investments in Prince Rupert itself, and all of them very naturally expect to realize a fair profit on their investments. In order to benefit their investments in Prince Rupert proper, these men have deemed it wise to lend their energies and to invest their money in furthering the development of Prince Rupert's industrial annex. Prominent amongst the Prince Rupertites who have invested in Port Edward are Mr. J. Fred Ritchie, Mr. L. W. Patmore, Mr. Samuel Harrison, Mr. A. W. Agnew, Mr. B. N. Durant, Mr. W. Clark Durant, Dr. W. T. Kergin and Mr. V. F. G. Gamble.

Mr. E. J. Mathews, of Seattle, Washington, the original owner of the land on which Port Edward is situated, realizing full well the great intrinsic value of this property, insisted upon retaining a very substantial interest in the property when he transferred it to the Syndicate which is now developing the townsite. Mr. Mathews is first vice-president of the Denny-Renton Clay and Coal Company of Seattle, the largest manufacturing concern in the State of Washington. He is also heavily interested in land and timber throughout British Columbia, and holds extensive mining properties in Alaska and the United States.

A group of Montreal men are interested in Port Edward, to wit: Mr. William Agnew, retired wholesale merchant; Mr. T. J. Drummond, President of the Canada Iron Corporation, Limited, and several other companies, and a Director of the Royal Bank of Canada, the Montreal Trust Company and numerous other corporations; Mr. A. W. Stevenson, financial agent; Mr. Fred Cooper, merchant; Mr. W. T. Rodden, manufacturer, and Mr. W. J. Dunn. Every man in this group is of the highest business standing in Montreal, and every one of these men has made a marked success in his particular line of business. The very fact that men of such judgment have invested their money in this townsite, augurs well for its prompt and profitable development.

Mr. Henry Walker, of Winnipeg, late general auditor of the Grand Trunk railroad, is also one of the Syndicate which is now developing the property. Mr. Walker is thoroughly familiar with the country served by the Grand Trunk Pacific railroad, and an investment by him would indicate a well-founded belief in the future of Port Edward townsite.

Capt. Thomas Harker and Mr. P. Byng Hall, of Victoria, together with Mr. Zera Strong, of Vancouver, are a group of men thoroughly familiar with real estate conditions in British Columbia, and all of them have been glad to make an initial investment in the Townsite Company. Mr. Spencer Waters, of the New York Cotton Exchange, and Mr. H. G. Woolley, capitalist, of Calgary, complete the group in the original Syndicate.

### The Conditions in Prince Rupert that Demand an Industrial Annex Like Port Edward.

Cities originate for some specific purpose. The ancient cities of Europe, and even of this continent, originally grew around a fort or castle, where the people banded together for mutual protection. Modern cities originate at their most convenient point of contact with the outer world, and grow in the lines of least resistance or greatest attraction. The forces of attraction and resistance include topography, location of railroad lines, harbor facilities and other factors. Growth in cities consists of movement away from the point of origin in all directions except as topographically hindered. The cities of the North Pacific coast almost without exception are materially affected in the direction of their growth by topographical conditions. Seattle is a noteworthy example of this. Thousands of dollars have been spent in Seattle on re-grading streets to make commercial growth possible, and in one instance, streets were lowered 143 feet. The rugged nature of the North Pacific coast makes town construction both difficult and expensive. This is particularly the case in Prince Rupert, which has been referred to as the City of Hills. The growth of Prince Rupert commercially is affected by its waterfront facilities, railroad line and topographical conditions. When we reflect that the cost of transporting five tons by wagon will cover transportation of fifty tons by rail and five hundred tons by water, we appreciate the fact that for economical handling of material for industrial concerns and manufactures, we must have well arranged water and rail transportation, with sufficient land available at reasonable rates for the construction of manufacturing plants of all kinds, and also facilities for transferring and storing heavy cargoes which require commodious warehouses equipped with modern means of handling freight. The success of the manufactures will also depend on having cheap and attractive homesites for their employees within reasonable distance of the factories.

General  
Development  
of cities.

Analysing the present waterfront conditions in Prince Rupert, we find we have the G. T. P. as far as the Provincial Government water front block and Shawatlans Passage (see Plan 10). This water front block will not be available for large shipping until the channel has been improved, on account of the tides and the narrowness and shallowness of channels. There is a good industrial site for one or two fair sized industries at Sea' Cove. The Canadian Fish and Cold Storage Company have the next available property, on which they have constructed the largest single unit fish plant on the American continent. Adjoining this plant, is another site taken up by a smaller cold storage plant. The remaining water front property to the bay north of Hays Cove is not suitable for industries on account of the steep rock bluffs back of the railroad and the extreme depth of water close to the shore. All of the available land at Hays Cove will be required for the dry dock of 20,000 tons lift-

Waterfront  
Conditions at  
Prince Rupert  
showing lack  
of available  
industrial sites.

ing capacity, and its workshops and power plant now being constructed by the Grand Trunk Pacific Railway. This dry dock will be the largest of its kind on the American continent, and will cost approximately three million dollars.

The remainder of the waterfront other than the wharf leases already taken up, consists of Provincial Government waterfront, required for Government purposes, or waterfront needed by the Grand Trunk Pacific for terminal purposes down to Fairview. (See Plan 10). From this point to Ridley Island, the land inside the railway is so steep and rugged as not to be suitable for buildings of any kind, the mountain coming practically down to the shore. The railway then runs through Provincial Government Reserve to the crossing of the Zanardi Rapids, where it leaves Kaien Island, crossing to Watson Island and then to the mainland fronting Porpoise Harbor. With the exception of the present waterfront in Prince Rupert harbor now served by the railway, and as shown above either not available or not suitable for any number of industries, there is no suitable industrial property other than Watson Island, and that part of the mainland fronting on Porpoise Harbor, known as Port Edward.

G. T. P. property adjacent to Prince Rupert.

While Ridley Island will eventually be used for industries, it is not available until the G. T. P. constructs a spur line to serve it. The property on the inside of Kaien Island fronting on Shawatlans Passage, Morse Lake and Lake Wainwright, will not be available for shipping until extensive locks have been put in at the Butze and Zanardi Rapids, as these tidal rapids make it impossible for large vessels to enter the salt lakes at the rear of Kaien Island. Lake Wainwright is also cut off by the G. T. P. bridge at Zanardi Rapids, and to utilize this lake from Porpoise Harbor will necessitate a swing or bascule bridge to replace the present structure. The land across the harbor from Prince Rupert, including Digby Island, cannot be utilized for industries requiring water and rail transportation until the Grand Trunk Pacific Railway construct a further twenty miles of railway, including three expensive swing or bascule bridges. All of the above land lies north of Port Edward.

The land south of Port Edward, over which the main line of the G. T. P. runs, lies along what is known as the Inverness Slough at the head of DeHorsey Island, and is not suitable for large steamship service on account of the shallowness of water over certain bars which must be crossed to reach this property. At low tide, a canoe only can cross these bars. The mouth of the Skeena, which is found at the south end of Inverness Slough, is affected by ice during the winter months to such an extent as to render navigation impossible for periods of three weeks or more at a time.

From the above it will be seen that the only sites available for industries at present with harbor and railroad facilities, are on the shore line of the Prince Rupert townsite, and here only a very few sites suitable, of which only one or two are available, and at Port Edward situated on the mainland and fronting on Porpoise Harbor.

## PORPOISE HARBOR

### General Characteristics.

General development of harbors.

A close study of the development of harbors on the Atlantic and Pacific coasts develops the fact that almost every harbor city of importance has been compelled to spend millions of dollars in improvements of one kind or another, before its harbor was capable of accommodating ships of large tonnage and deep draught. The ideal harbor is one that in its natural state permits ships of the greatest tonnage and deepest draught to sail up

its channel at any state of tide, and dock at its wharves without any delay or inconvenience. This means that the channel of approach must be sufficiently deep and wide to accommodate the largest vessels afloat, and this same condition must obtain at the slips. The ideal port must further offer facilities for easy and prompt transshipment from vessel to railway and from vessel to warehouse, and vice versa.

Time is the most valuable asset in modern shipping. In the olden days, before vessels were propelled by steam, the loss of a day or two was not very material. Sailing vessels would contract to deliver goods within a certain period—tide and weather permitting. With the advent of the steamship, and the consequent great increase in cost of construction, it becomes of paramount importance that vessels should make as many trips as possible within a certain period. If a steam vessel covers its course twelve times a year, it returns a profit to its owners; if it covers its course but ten times, it operates at a loss. Consequently it naturally seeks those harbors which offer it all modern facilities for entry, discharging and loading within the shortest possible time.

Requirements  
of a first-  
class Port.

The next most important factor is the relative position of the port to the country at its back, which furnishes the material for export, and which consumes the imports, and to serve this country the harbor must be able to offer prompt and efficient railroad facilities from the port inland.

A number of the European ports, amongst them London and Bremen, maintain suburbs, at which vessels of large tonnage and deep draught must discharge a certain amount of their cargo before the channel to the port proper will accommodate them. This means a heavy additional expense and naturally deters vessels from seeking the ports in question, if other ports with greater facilities can be found in the vicinity. Practically no port in Northern Europe has a channel of sufficient depth to accommodate all ships. This statement includes the ports of Hamburg, Bremen, Amsterdam, Rotterdam, Antwerp, Havre, London and Liverpool.

Characteristics  
of some of  
the most  
prominent  
European and  
American  
Ports.

Our North Atlantic ports are specially favored, for we find that New York has a channel of 40 feet at low water, Boston 30 feet, Philadelphia 30 feet, Baltimore 30 feet. Most of the European ports above mentioned can accommodate large ships, but only at high water, and this means loss of time, which as shown above, is very likely to mean a heavy loss of profit to shipowners. And yet, even despite the handicaps of their ports, the majority of these harbor cities are doing a large and profitable business.

Coming now to the consideration of the harbor on which Port Edward is situated, we find that Porpoise Harbor is formed by Kaien Island on the north, the mainland of the Tsimpsean peninsula on the east and south, and Ridley Island on the west. It is practically landlocked and is sheltered from high winds and seas. The entrance is between Ridley Island and L. Island.

Characteristics  
of Porpoise  
Harbor.

An examination of the charts prepared by the Dominion Government from soundings made by the Dominion Hydrographic Department and the G. T. P., shows that the whole harbor has been thoroughly sounded, including the entrance. From the outside there are two entrances, one on a straight line from Green Top Island to the mouth of the harbor, thence directly into the inside harbor, this range having a minimum depth of  $3\frac{1}{4}$  fathoms (22 feet) at low water, or five feet deeper than Victoria inner harbor today. The second range, as shown on the chart, has two turns. This entrance has a minimum depth of 7 fathoms (42 feet) or a depth amply sufficient to accommodate the draught of any type of vessel afloat. The minimum width of the harbor entrance between the 6 fathom

Depth of  
channel.

Tidal  
current

line at low water is 550 feet. At the north end or head of the harbor is found a turning basin 1,800 to 2,000 feet wide, amply sufficient to permit the turning of the largest type of vessel. The maximum tidal currents obtained from current meter measurements in various points of the harbor in no place exceed two knots per hour. This seems a particularly good feature when we compare Porpoise Harbor with Vancouver Harbor, which has a tidal current of 7 knots per hour at the Narrows, San Francisco Harbor, which has a tidal current of 7 miles per hour at the Golden Gate, San Diego Harbor with a tidal current of 4 miles per hour at the entrance and 2 miles per hour at the wharves, and the harbor at Portland, Oregon, which has currents varying from 3½ to 7 miles per hour. When the proposed lock is put in at Zanardi Rapids, there will be practically no currents in Porpoise Harbor.

### Piers and Wharves.

Docking  
length.

The depth of water close to the high water mark in the Prince Rupert Harbor along the shore of the present townsite makes it impossible, except in a few instances, to build pier wharves, unless the piers are constructed by a combination of cut and fill, entailing a very heavy expense. Fortunately, this is not the case in Port Edward. The shore line of the east side of Porpoise Harbor is such that piers at an angle of 45 degrees to the general direction of the shore line, may be constructed out to a length of 600 feet, and these piers will have an average depth at the outer end of 36 feet at low water, and will require but little dredging at the inner end to give an average depth of 26 feet at low water, and may be easily deepened to a further depth of 30 feet at low water. Eleven of these piers are available with a combined docking length of 14,320 feet.

Projected  
lumber  
pier.

There is also available on the water front of Port Edward a site for a quay wharf 2,640 feet in length, giving a total docking length of 16,960 feet. The wharves have been projected according to modern harbor practice, to serve the needs of an industrial townsite. The standard piers are 105 feet in width, with waterways or slips between piers 195 feet in width, giving ample space for the handling of large vessels. Pier A has been especially designed for rehandling lumber, as it is believed that Port Edward is particularly suited to rehandling lumber and pulp, which have been manufactured at such places as Swanson Bay and Ocean Falls, where already large sums have been spent in constructing up-to-date saw-mills and plants, and at other mills in the vicinity of Prince Rupert which have not railway transportation. This wharf as projected is laid out with the most modern means of economically handling lumber as shown on Plan No. 1. The system proposed has been successfully installed at the large mills at various points on Puget Sound. The industrial site immediately adjoining this wharf, which has provision for trackage on two sides, has been reserved as a site for dry lumber storage sheds, and general lumber yard. Provision has also been made between Piers A and B for a car ferry slip, so that cars may be loaded at the mills, shipped on a car ferry scow and transferred to the Grand Trunk Pacific for shipment East without rehandling, thus minimizing the cost of shipping lumber.

Prince Rupert  
Hydro-Electric  
Company's  
Investment at  
Port Edward.

Pier E has already been secured by the Prince Rupert Hydro-Electric Company. The Prince Rupert Hydro-Electric Company is a \$5,000,000 corporation financed by the same group of Montreal capitalists who are so successfully operating the Western Canada Power Company in Vancouver at present. The P. R. H. E. Co. own the most valuable power rights in the vicinity of Prince Rupert, and have secured water powers aggregating a pos-

sible development of 80,000-horse power. This Company has already commenced development of their Falls River power (located about 37 miles from Port Edward), and confidently expect to have the first unit in operation by the fall of 1913. They have purchased industrial blocks No. 12 and No. 29 in Port Edward and are at present installing a Diesel Oil Engine plant of 1,500 H. P. capacity, from which they will sell power until their water power is in operation, then this Diesel plant will be utilized as a stand-by plant. The Company's expropriation for their Port Edward plant amounts to \$183,000, while the estimates for the Falls River plant, including transmission line to Port Edward, amount to \$377,000, making a total outlay of \$560,000. When the Falls River plant is in operation, cheap power will be obtainable in Port Edward, the Company having already offered to sell power to Prince Rupert at \$28.50 per horse power per year, and having entered into an agreement with the Townsite Company stipulating that power shall be furnished Port Edward at no greater rate than charged Prince Rupert.

Pier F as proposed has been laid out to provide for a bunker wharf for handling coal and ore shipped from the Interior for transshipment to vessels. An overhead track has been provided so that cars may be taken by steam locomotives on a maximum grade of 2.2 per cent. out on an overhead track to the wharf, discharging into bunkers and from these bunkers into ships, by switching from the G. T. P. at the north end of the water front, and following the railway line projected on McIntosh Street to Mathews Street, then down Mathews Street to the wharf. The space under the bunkers will be utilized for warehouses, as shown on plan No. 2.

Projected  
bunker  
wharf

Piers K and L are particularly suited to the general coasting trade and will be provided with overhead crossing of the railway at Railroad Avenue to facilitate handling passenger traffic without crossing the tracks on Water Street or the G. T. P. line. The typical designs of wharf warehouses are shown on plans Nos. 3, 4 and 5, and all piers are provided with trackage on one side. If required, trackage can be provided on both sides. A bulkhead line following low-water mark approximately and parallel with the G. T. P. right-of-way, has been projected to make a road outside of the G. T. P. right-of-way 100 feet in width. This bulkhead will be constructed as a dry rock retaining wall. Two tracks are projected on Water Street—a running track and a standing track, with turn-outs to serve each wharf. The lessees of the wharves will be able to hold cars on their respective standing tracks while the running track will be kept open for handling cars from the track on Railroad Avenue or the G. T. P. Two tracks are projected on Railroad Avenue, a running track and a standing track, to serve each industrial site with turn-outs from the running track. Tracks have also been projected on Eighth Avenue, Niven, Macfarlane, Union, McIntosh and Mathews Streets.

Piers specially  
adapted for  
general  
coasting  
traffic.

#### Industrial Sites.

The industrial sites will all have trackage to serve their needs, as will the warehouse blocks Nos. 1, 3, 7, 8, 9 and 10. The warehouse blocks are laid out, as shown on Cross-section plan No. 8, to have trackage on the front and road facilities on the rear. Goods coming in by rail can be handled from cars to the first floor, then by elevator to second or third floor, whence they can be transferred by trucks to wagons for delivery throughout the townsite. Industrial sites have also been laid out along the tide flats between Watson Island and the mainland. These will require but little fill to raise them

Service  
Trackage

PLAN NO. 11



Ritshie, Arshaw & Co.  
Civil Engineers  
Prince Rupert,  
B.C.



PLAN

OF

PORT EDWARD

Dec 10, 1912

above high-tide level, or if desired, the buildings may be erected upon piles or piers. Further industrial sites have been laid out on the Lake Wamwright water front. These will become very valuable when the locks on the Zanardi Rapids are constructed, and the Zanardi Rapids Bridge opened up. There are in all fifty-five industrial sites, aggregating a total acreage of 151 acres.

These industrial sites are suitable for all types of factories or manufacturing plants, and those adjacent to the water front are particularly adapted to fish-packing and cold storage plants and grain elevators.

Power and Rates

Cheap power, which will be obtainable right on the townsite from the Prince Rupert Hydro-Electric Company, low taxation, cheap water rates, railway and steamship transportation, should tend to make these manufacturing sites most attractive to all firms who propose to erect branch manufacturing plants or initiate new industries to serve the Northern markets.

## THE TOWNSITE

### Town Planning in General.

Three standard methods of planning townsites.

In laying out a tract of land for townsite purposes, the modern landscape architect or civil engineer has recourse to several more or less stereotyped plans, namely, the Gridiron, Star, and the Ring or Concentric type of plan. To choose the plan best suited to conditions necessitates, in the first instance, a detailed topographical survey of the whole plot. Next, the plan of this survey must show all existing lines of communication, whether they be by rail or water, as these have a governing effect on the final lay-out.

Ring plan.

There are several instances of the Ring or Concentric plan of laying out a city in Europe, notably in Vienna, where the Ring Strasse and Gurtel Strasse are famous, and in Paris where the Inner and Outer Ring Boulevards are instances in point. In America, this method of laying out a town is principally restricted to park, suburban and purely residential districts.

Gridiron plan.

The Gridiron plan offers the maximum area for building, and consequently is eagerly sought after by subdividers whose sole desire is to obtain the greatest amount of saleable property out of a subdivision, without regard to street grades, appearance or utility.

Star plan.

The Star system, with all diagonal streets running to a civic centre, is really a modification of the Gridiron plan, by introducing diagonal streets.

The laying out of streets and avenues.

There are three distinct types of roads. In preparing a rational town-building plan, our task is to avoid the faults of making equally wide streets whether they are in a district designed to serve heavy traffic, or whether they are in the less busy parts of the town, in which residences are likely to be found, and we take as our aim, the laying out of streets according to the traffic they shall serve. The accomplishing of this end requires considerable forethought and almost prophetic ability.

To give a few strategically-planned principal streets ample width so that through traffic will find in them ample accommodation, is in actual fact, not as extravagant as to give all streets, whether local or arterial, a uniform width which is more than they need for one use or another. Mr. Olmstead, the eminent landscape architect, has pointed out that the standard ideal plan of encouraging the distribution of a certain amount of through traffic upon nearly every street in each district, is a distinct injury, both to the residential

streets, where the property holders wish to escape from the disturbance of traffic, and to the commercial streets where the abutters wish to have a maximum amount of traffic pass their business houses. In other words, the abutters are taxed for a system which is to their disadvantage. In the business district, an alley system is of peculiar value as it gives additional opportunity for fire-fighting, and also for the transportation of heavy materials, and the removal of the large amount of waste which daily accumulates in warehouses and department stores. In the residential sections, alleys are not so essential, particularly where the houses will be detached or semi-detached, as all provisions may be delivered to, and garbage removed from the side entrance without detracting from the value of even the highest-class residential property.

#### Plan Followed at Port Edward.

The first step taken at Port Edward was to make a detailed topographical and hydrographic survey of the townsite and harbor. The topography of the townsite, which includes 1,000 acres, was taken to 10-foot contours over the whole area. Transit and picket lines were run 150 feet apart in a Gridiron system, and these lines were leveled and the topography accurately obtained. This topography was then plotted on a scale 80 feet to the inch and also on a plan, scale 300 feet to the inch. On the 300 feet to the inch plan, a comprehensive lay-out scheme was worked out by cutting and trying different lines for the general direction of the avenues and streets, working back from the water front, then the details were worked out on the 80-foot plan. In this scheme, the weight was thrown into the avenues, the aim being to project them to follow as closely as possible to the natural ground surface, and at the same time, and especially in the business section, to obtain a maximum grade of 6 per cent, with the minimum amount of cut and fill. The cross streets were projected to give, where possible, a standard block size of 480 feet by 220 feet, though no hard and fast rules were adhered to where the topography interfered. Where the grades on the cross streets exceeded 6 per cent, these streets were put in with standard curved sections and a tangent parallel to the avenue, this tangent being of sufficient length to reduce the grade. By this means, a great deal of expensive grading will be eliminated.

Lots on curved streets in the business section will be particularly attractive to stores on account of the large window display frontage. Wherever it was found possible to improve a street grade or diminish cuts or fills by increasing or decreasing the size of the block, this was done. In the business section, the standard size of the lots is 30x100 feet. In the residential section the standard size is 30x110 feet. In the residential sections, where the blocks were long, lanes were run through to allow pedestrian traffic easy access from avenue to avenue. Twenty-foot lanes at the rear of the lots were provided throughout the business section, and as far back as Eighth Avenue. East of Eighth Avenue no lanes were provided as it was deemed, after careful study, that it was more advantageous to throw an extra 10 feet into the lot, than to put in lanes, the grading of which would constitute a tax on the lots, and further because it will be possible for a purchaser wishing to obtain an especially attractive homesite, to purchase his property two lots deep, giving him a depth of 220 feet. The elimination of the lane will also allow of 10 feet more garden space. Knolls were given special treatment by means of circular streets. From these knolls magnificent views of the outer harbor and sea can be obtained.

Heavy traffic destined to travel over avenues

Maximum grade of 6 per cent in business section

Curved streets.

Lanes

There are an especially large number of fine view lots so laid out that they have an unobstructed view of the sea.

### Avenues and Streets.

Alexandra  
Park

The general idea of the scheme consists of a central street running back at right angles to the water front until checked by Wolf Creek, whence it turns to the right to obtain an easy crossing of Wolf Creek. A bridge will be thrown across the creek at a point where a splendid view of Wolf Creek Falls can be obtained, and the vista of the falls, which are 80 feet in height, in the deep woods of spruce and cedar, should be particularly attractive. The land on either side of Wolf Creek from its mouth to the east boundary of the townsite, has been reserved as a park known as Alexandra Park, and the timber on this area will be left in its natural state, and paths and roads will be projected, following the creek. The avenues diverge from the central street and run parallel to the water front. On this central street a civic centre has been laid out, and provision made for sites for the municipal buildings. First, Second and Third Avenues and the central street will all converge to this civic centre. The station grounds are located to the south of the central street. The Grand Trunk Pacific Railway has already constructed and is operating its main line through the property, and has accepted from the owners, a right-of-way 100 feet wide, which is sufficient for six tracks, and also a station site 100 feet by 750 feet. As before mentioned, the townsite Company holds an agreement with the G. T. P. by which the G. T. P. agrees to allow the Townsite Company four grade crossings in its track, and also agrees to erect a station and construct the necessary sidings as soon as required. A road parallel to the station grounds is projected. This road, when graded, will be on the same level as the station and will serve for standing room for busses, cabs, express wagons, etc. Easy grades up to the business sections are provided in either direction from the station, no grade exceeding 6 per cent.

Civic  
Centre.

G.T.P. plans at  
Port Edward.

Width of  
avenues and  
streets.

It is expected that Second Avenue will be the main business avenue, and for this reason this avenue is given a width of 94 feet. The other avenues will be 72 feet in width. The cross streets are 66 feet wide, with the exception of Mathews street, on which are projected tracks, and which is 94 feet wide, and Harrison Street, the central street, which is 72 feet wide. The lots on Harrison Street are laid out to face Harrison Street, as it is thought that this will be a business street in the lower section and retail stores will occupy the upper section.

While it would seem that in making the avenues 72 feet wide throughout, too much of a standard width has been adhered to, this is not the case, for although the street has a standard width, it is the intention to vary the actual road width according to the section. In the business section, on a 72 foot avenue, the sidewalks will be 11 feet wide on either side, leaving a 50 foot roadway. This will be sufficient for three lines of traffic and also double car service, see plan No. 9. In the residential sections, by maintaining the same width of 72 feet, instead of reducing the width to suit the expected traffic, great latitude is obtained in the treatment of the avenue to serve the conditions which may be required, and also to take advantage of the topographical conditions. Here we may vary the street by putting in the sidewalks five feet wide and placing them either on the property line, or on the curb lines, with appropriate parking between, or we may park the centre of the avenue and either retain the same road level on either side of the avenue, or if on sidehill ground,

have different road levels; or again, the road may be retained in the centre and the sidewalks run through on different levels, making an attractive avenue with the minimum amount of grading.

### Grades.

The factors that determine the rent of a building are as follows:

1. Interest on capital outlay—
  - (a) For site;
  - (b) For roads and sewers;
  - (c) For buildings.
2. Maintenance expenses—
  - (a) For repairs (a fairly constant factor averaging about one-tenth of the gross rent);
  - (b) For management and sundries (a fairly constant factor averaging about one-twenty-fifth of the gross rent);
  - (c) For taxes and insurance.

From the above, it will be seen that the cost of roads, sewers and taxes on general improvements plays an important part in the fixing of rents. Port Edward is particularly fortunate by reason of the easy natural grades obtained throughout. There will, of necessity, however, be a considerable amount of grading to do in the course of the townsite's development. The materials which have to be dealt with in grading streets in Prince Rupert and Port Edward, namely, rock and muskeg, make it imperative to minimize the amount of street grading, if rentals are to be kept at the rate where they will make the erection and rental of buildings an attractive commercial proposition. With this end in view, the curved streets in the business section have been laid out so that the necessity for making heavy cuts and fills on the avenues, and thus increasing the taxation of property adjoining them, and at the same time decreasing the value of the property by leaving it up on a hill or down in a hollow, is reduced to the very minimum. The avenues have been held to the natural surface and the cross streets lengthened by curves, thus obtaining easy grades. On the residential sections, it is proposed to grade a roadway only 24 x 16 feet wide, such as the traffic may require, and to utilize the remainder of the street for parking, with the exception of the 10 feet required for sidewalk. In this way, the lots in the residential section will be taxed for the minimum amount of grading, and the avenues will have a most attractive appearance.

Port Edward's  
easy grades.

Low  
taxation.

The section from the waterfront back to Fourth Avenue has been entirely cleared. Only sound logs, suitable for building construction, telephone poles and firewood, have been left on the ground. In the section east of Fourth Avenue only the streets and avenues have been cleared, as it was thought that the residential lots would be more attractive to purchasers if the trees were left on them.

Clearing.

### Sewerage and Water Systems.

The sewerage scheme of the townsite will not be a difficult one, as the sewerage may be discharged into Porpoise Harbor without any treatment. Owing to the nature of the ground, there will be several outlets, and in consequence the mains will not be required

to serve a large area and will therefore be of moderate size. The water supply is very easily obtained from three lakes at a distance of slightly over one mile from the east boundary of the townsite. From these lakes, by gravity, an ample supply of pure water, for municipal and industrial purposes, may be obtained at a minimum expense. It will not be necessary to have storage reservoirs on the townsite as these lakes are sufficiently close to serve as reservoirs. The water rights on the streams flowing from these lakes have been secured and the water already analyzed and passed by the Provincial Analyst.

Port Edward  
Supplies a  
Want.

Throughout the planning of this harbor and townsite the aim has been to supply a want which has been keenly felt at Prince Rupert and, in fact, all along the entire north coast of British Columbia, namely, industrial sites with the most economical means of serving them with water and rail transportation, and a townsite to serve the needs of those employed in the industries. To this end, the industrial sites have been laid out to utilize all the available waterfront, and the streets and lots have been laid out to provide for inexpensive and attractive home sites by taking advantage of the exceptionally easy lay of the ground, and by minimizing the cost of such grading as may become necessary.

It is only a question of a few months until the G. T. P. will have a daily train service on their main line, and it is believed that the fifteen-minute run between Prince Rupert and Port Edward will not prevent those working in Prince Rupert from making their home at Port Edward if they find that they can obtain a homesite there with every advantage, more cheaply than they can in Prince Rupert. It is the pay roll that makes the town, and it is the pay roll that will make Port Edward.

#### Engineering and Supervision.

R. H. Thomson, A. M. Ph. D., Member of the American Society of Civil Engineers, for twenty years City Engineer of Seattle, and now Chief Engineer of Strathcona Park for the British Columbia Government, was engaged as Consulting Engineer and all preliminary plans of the harbor and townsite were submitted to him for alteration and approval. Mr. Thomson's work in the regrading of Seattle and in the construction of its water supply and water power, and many other large schemes, is too well-known to need comment. The detail work and field surveys were made under the supervision of Ritchie, Agnew & Co., Civil Engineers and Surveyors of Prince Rupert, B.C., J. Fred Ritchie, P. L. S. and D. L. S., of this firm, represented the Provincial Government during the whole of the survey of the Prince Rupert townsite, and A. W. Agnew, Associate Member of Can. Soc. C. E., had charge of field parties for the G. T. P. for the topographical and hydrographic and townsite surveys of Prince Rupert.

Conclusion.

Port Edward, located as it is in the midst of a hilly country, is favored by especially easy grades, which make its avenues, even in their unimproved state, exceptionally level. It is situated on a harbor second to none on the Pacific coast, and one which offers every convenience required by modern shipping. Across the water front of Port Edward runs the main line of a great transcontinental railway; but a very few miles to the north is situated, at the terminus of this railway, a city which bids fair to grow to large proportions within the next decade. Port Edward, by reason of its geographic location, permits the shipment of cargoes west to the Orient at a saving of many miles over ship-

ments sent forth from the lower Pacific coast ports. It offers facilities for shipment east to the Atlantic coast over a railway built on easier grades and with fewer summits than any other transcontinental railway system on this continent. In short, it is an ideal location for industries that expect to send forth their wares either east or west, and it offers such exceptional facilities for the handling and transshipping of materials, and for the housing of the men engaged in the development of industries located on its shores, that its rapid and prosperous growth and development may be confidently looked forward to

**RITCHIE & AGNEW**

*Civil Engineers and Surveyors*

by

*Augustus W. Agnew*  
*Pres. Am. Can. Soc. C. E.*

Approved

*R. H. Thomson*

Consulting Engineer.

PLAN NO. 1



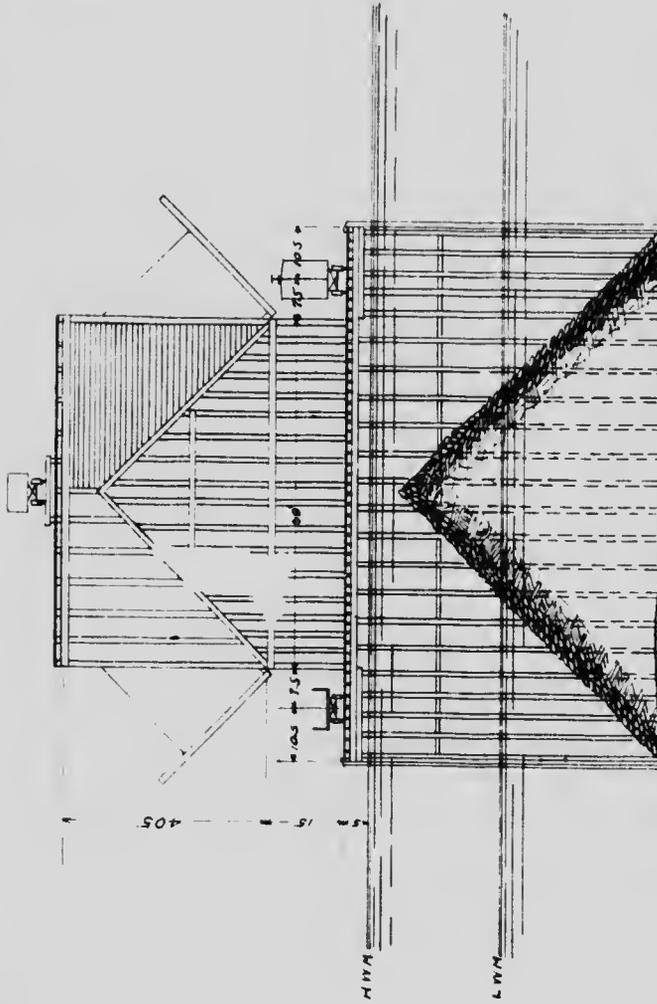
CROSS-SECTION OF WHARF 'A' LUMBER WHARF

Scale 1"=50'

Rixha, Agnew & Co.  
Civil Engineers  
Prince Rupert, B.C.

Dec. 10, 1912.

PLAN NO 2



CROSS-SECTION OF BUNKER WHARF

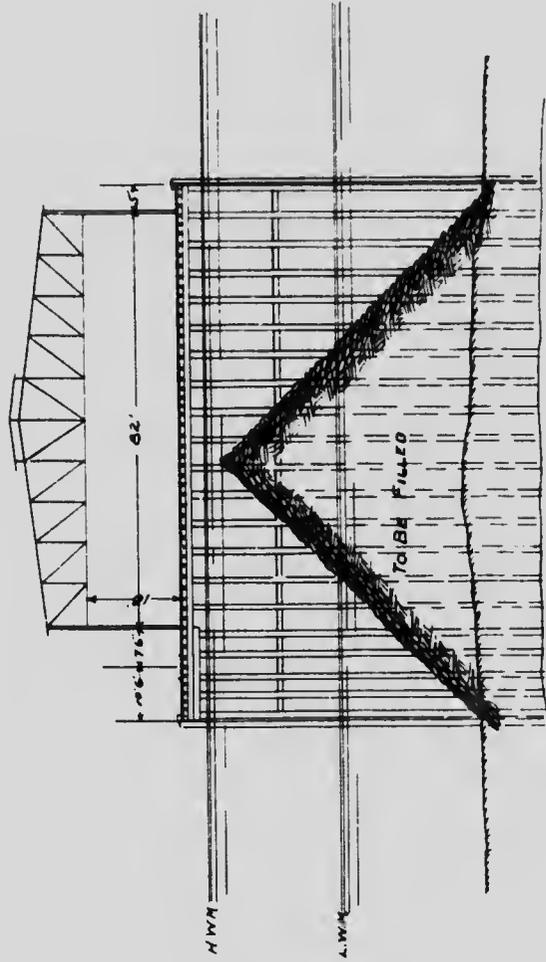
CAPACITY 22,000 CU YDS

Scale 1" = 10'

Arch. & Eng. Co.  
San Francisco  
Bunker Wharf, B.S.

Dec 10, 1912

PLAN NO. 3



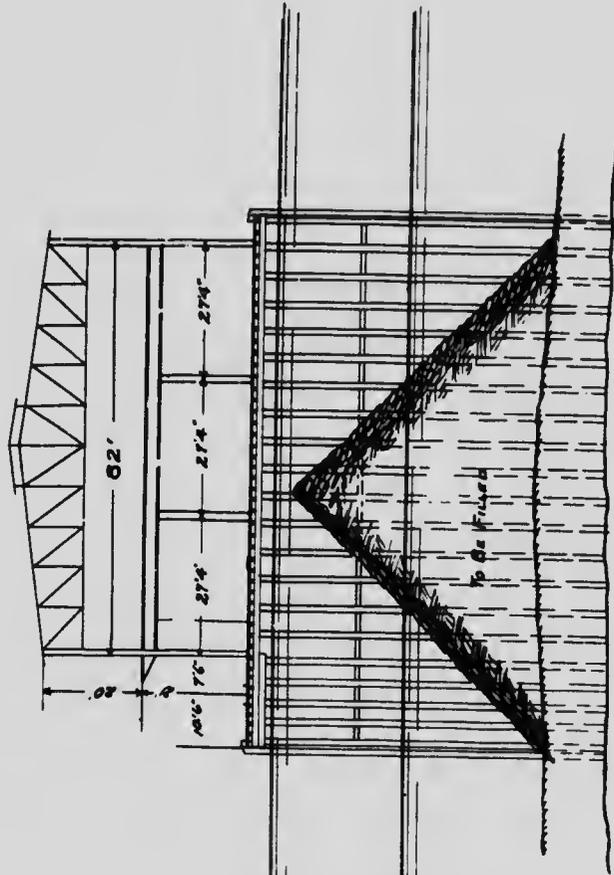
TYPICAL CROSS-SECTION OF PIER WHARF TYPE I

Scale 1:24

Dec. 10, 1912

Reuben. Aronow & Co.  
Civil Engineers  
Prince Rupert, B.C.

PLAN NO. 4



TYPICAL CROSS-SECTION OF PIER WHARF TYPE 2

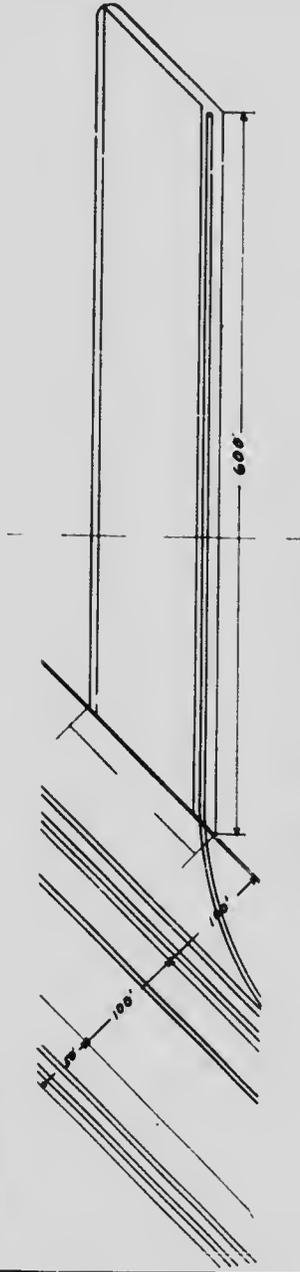
Ritchie, Agnew, & Co  
Civil Engineers,  
Prince Rupert, B.C.

Scale 1" = 24'

Dec. 10, 1912



PLAN NO. 6



TYPICAL PLAN OF PIER WHARF



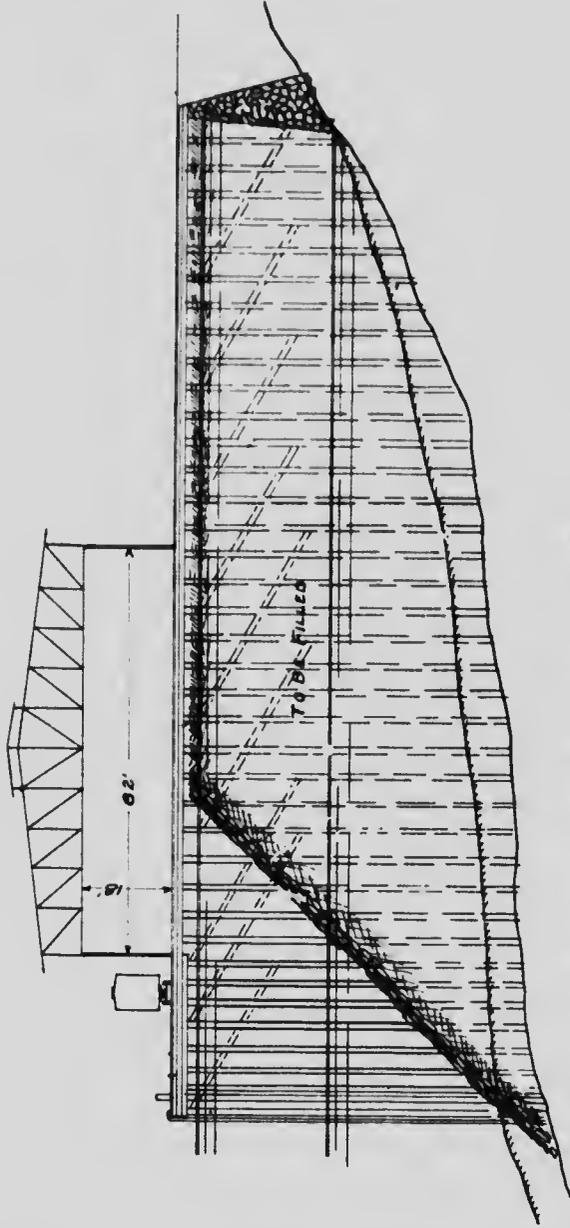
LONGITUDINAL-SECTION PIER WHARF

Scale 1"=100'

Riehle, Agnew & Co  
Civil Engineers  
Prince Rupert, B.C.

Dec. 10, 1912

PLAN No. 7



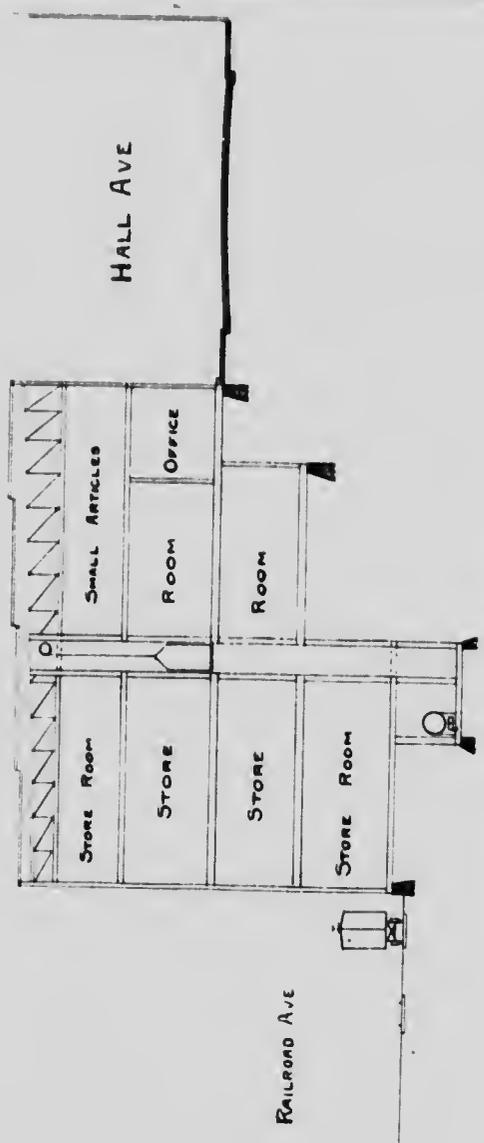
SECTION THROUGH QUAY WHARF

Scale 1"=24'

Ritchie, Agnew & Co.  
Civil Engineers  
Prince Rupert, B.C.

Dec. 10, 1912

PLAN NO. 2



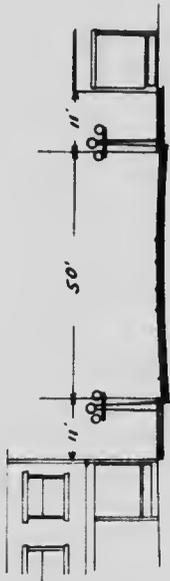
CROSS-SECTION OF WAREHOUSE

Scale 1" = 25'

Dec 10, 1912

Wm. H. Rigney & Co.  
Civil Engineers  
Princeton, N. J.

PLAN NO. 9.



SECTION 72 BUSINESS AVE



SECTION 84 BUSINESS AVE



TYPICAL SECTIONS OF 72 RESIDENTIAL AVE



Dec. 10, 1912

Richard H. Brown & Co.  
Civil Engineers, Planners, Architects, etc.

**SALES - AGENTS**

FOR THE

**Port Edward Townsite Co.  
LIMITED**

HARRISON, GAMBLE & CO. - PRINCE RUPERT, B.C.  
HALL & FLOYER . VICTORIA, B.C.

