

PAGES

MISSING

The Canadian Engineer

A Weekly Paper for Civil Engineers and Contractors

Proposed Development of Hamilton Harbor

Report Presented This Week to Hamilton Harbor Commission, Recommending Creation of 1,250 Acres of Park and Residential Property, 1,198 Acres of Industrial Land, 6.26 Miles of Docks and 16.98 Miles of Boulevard

By JOHN M. WILSON

District Engineer, Public Works Department of Canada

HAMILTON harbor, situated at the westerly end of Lake Ontario, possesses natural advantages that are not surpassed by any other harbor on the Great Lakes. Its present area at normal Lake Ontario level (elevation 246 above mean sea level, New York), is 6,973 acres, varying in depth from shallow water in the marshes to 80 ft. in the harbor proper. Of this total area, 4,500 acres has an existing governing depth of 18 ft., or sufficient to take care of present Welland canal draught. The harbor is land-locked with the exception of a channel (maintained by the Dominion government) at the entrance to Lake Ontario, and has a normal shore line of 32.78 miles.

A casual reference to the plan showing the existing conditions (see page 538), and consideration of same in reference to the size of the city of Hamilton, conveys the impression that complete development of Hamilton harbor involves a cost disproportionate to the size and needs of the community affected. This was taken into consideration during the early stages of the investigation into the possibilities of Hamilton harbor, and it was thought wise to make the proposals as complete as possible, looking to the future growth of the city. The work projected on the plan on page 539 may not be completed for a number of years, but if the scheme as a whole be adopted, the foundation will have been laid for continuity in planning construction operations to be undertaken from year to year as finances will permit.

In the year 1873 the population of Hamilton was 30,000; the (municipal) census of 1919 gives a population of 110,000. Using the rate of growth shown by these figures, a curve might be projected into the future in order to determine the probable population at any given time, but I do not believe that any such estimate would be conclusive. Hamilton's location as a logical manufacturing and distributing centre should attract a large percentage of the immigration that I am reliably informed will shortly come to this country from the British Isles, and this, together with the natural development of Canada during the next few years, should greatly accelerate the city's growth.

Provides for 30-Ft. Draught

In planning for the future in works of this nature it is necessary to consider the requirements of a community many years in advance, and to take into account what the possibilities of an inland port situated as is Hamilton, will be when the St. Lawrence and Welland canals are deepened and ocean tonnage is brought to the Hamilton docks. I may say that a very strongly organized movement is now under way to bring about the deepening of the St. Lawrence canals, and Hamilton would particularly benefit on account of the very large export tonnage that would be handled over the harbor.

An essential to the successful development of a harbor, from an industrial and commercial standpoint, is public control of the waterfront properties. In this regard the Hamilton Harbor Commission is not in the position it should be.

A large portion of the waterfront property is privately owned or controlled, and in order to put the commission in possession of assets that would form a sound basis for negotiation with private interests, and furnish lands for industrial development, it was deemed expedient to recommend the establishment of a new harbor headline in accordance with the limits of the work outlined on the development plan.

The scheme in general provides for ships drawing 30 ft. of water, or ultimate Welland canal draught, to dock in slips at the city of Hamilton and alongside wharves constructed in what is at present the waters of the harbor, and serving lands created by reclamation with material dredged and pumped from the bed of the harbor; the serving of these industrial lands with steam and electric transportation, concentrated on what is termed a marginal way; and the creation of new park lands and recreation centres, coupled up with a boulevard drive 16.98 miles long, encircling the entire waterfront.

Nineteen Tentative Plans Studied

A complete survey of the harbor and vicinity has been made, soundings taken over the dredging and reclamation areas, and borings made to ascertain the nature of the material to be moved, and nineteen tentative study plans were prepared before the layout suggested herein was adopted.

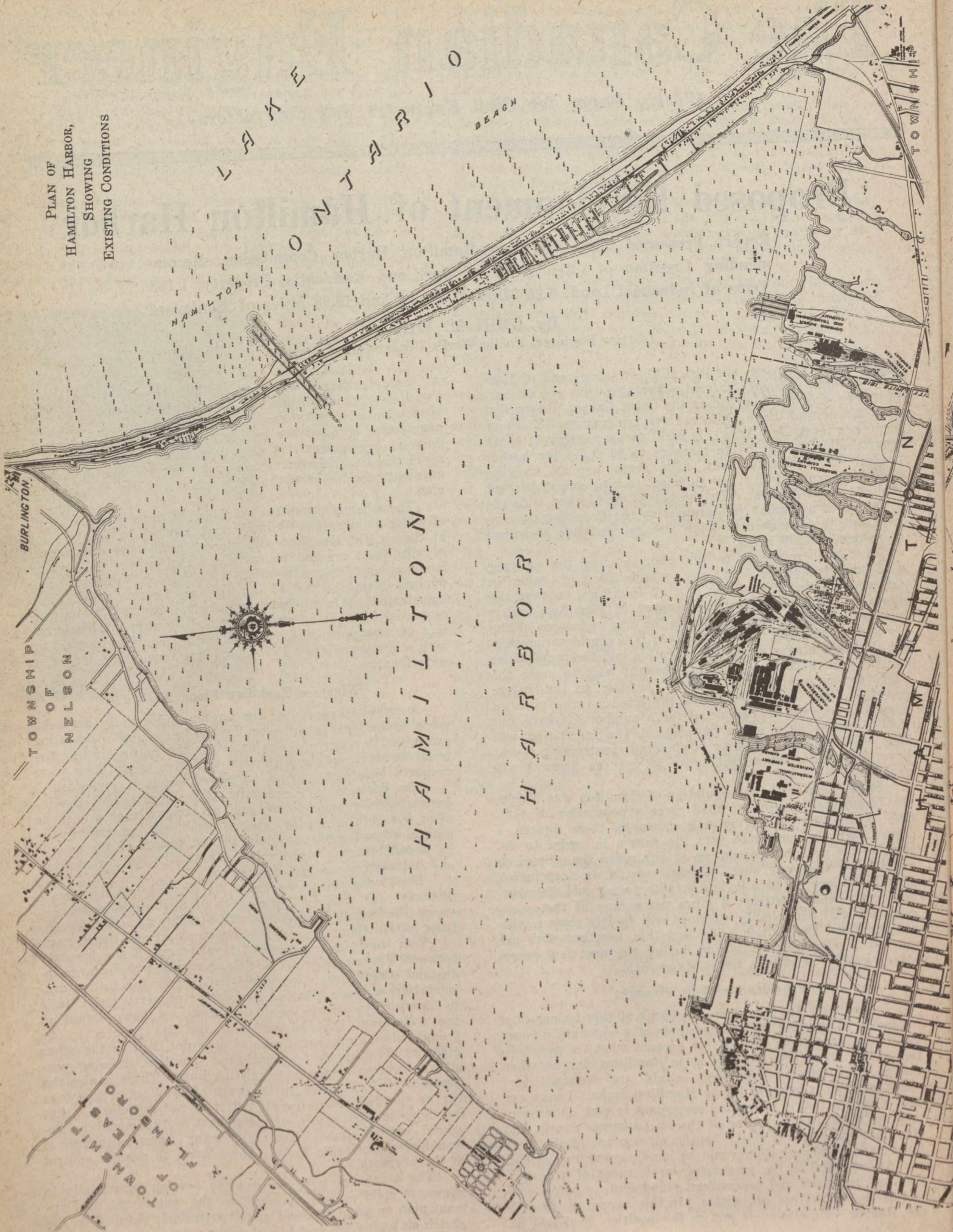
The decision to concentrate to a large extent the industrial development to the east of James street was made after a careful study of existing conditions, embodying the natural advantages of the land in that section of the harbor, its accessibility to service, its adaptability to reclamation, and its relative ease of acquirement.

This industrial development is divided into two main districts: (1) The one lying south of Burlington street, between Wellington and Wentworth streets; and (2) the one lying within Gage avenue, Burlington street and Beach road.

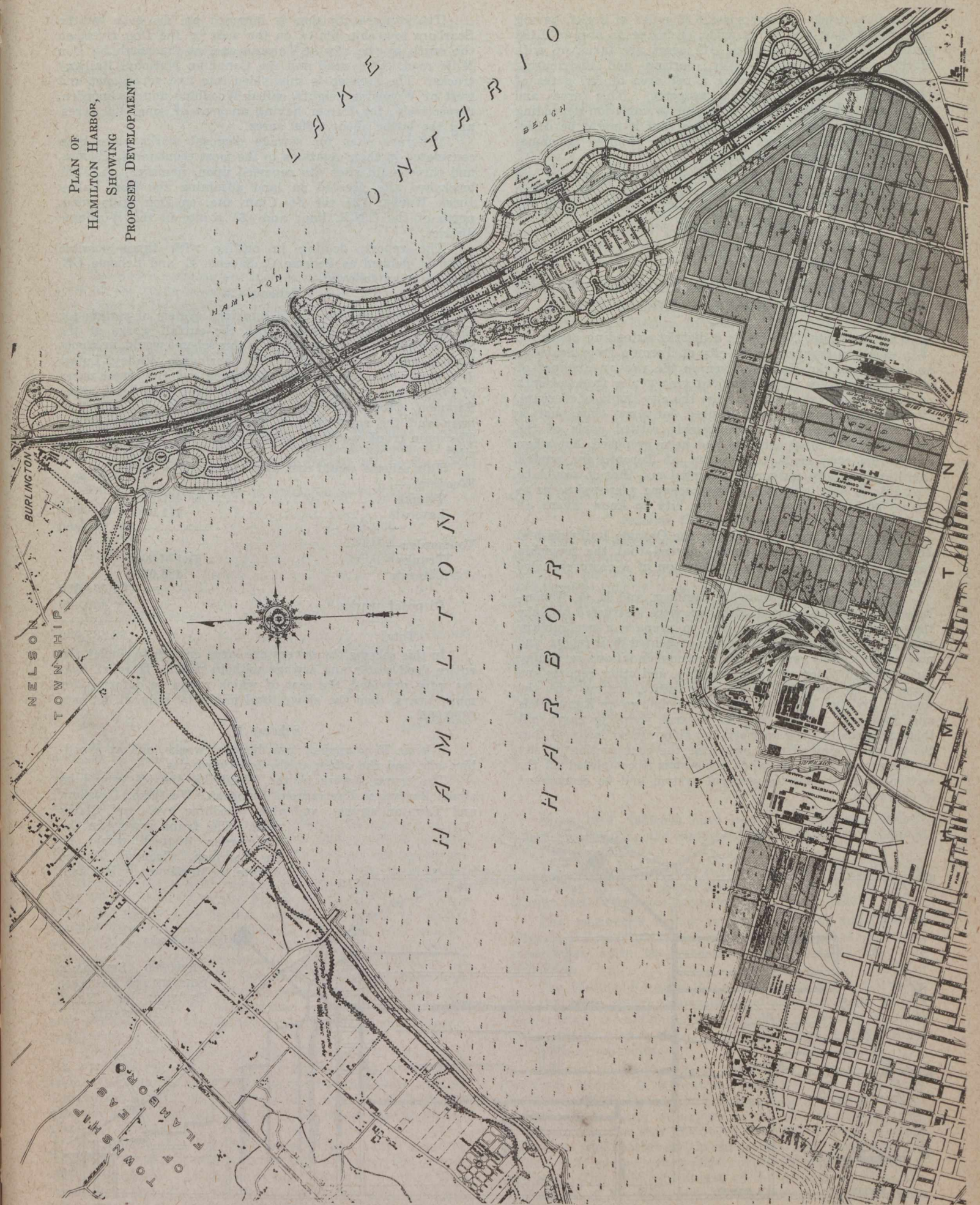
This leaves the waterfront development of the property between Wentworth street and Gage avenue (where large industrial plants are now located), a matter for future consideration and negotiation. The latter property lends itself to incorporation in the general scheme, as shown dotted on the waterfront development plan, but its failure to be brought into the general scheme does not deprive the other districts of adequate transportation facilities, it being possible to render service from existing lines. There is also the possibility of extension to the west of Wellington street as far as the Desjardins canal, but it is not anticipated that anything in the nature of permanent works would be required beyond James street for many years, although it would seem desirable for the commission to acquire control of the property.

The area that it is proposed to develop industrially is shown in solid outline, hatched, on the waterfront development plan on page 539, and more particularly detailed on the sketch on pages 546 and 547, showing cross section at foot of

PLAN OF
HAMILTON HARBOR,
SHOWING
EXISTING CONDITIONS



PLAN OF
HAMILTON HARBOR,
SHOWING
PROPOSED DEVELOPMENT



Wellington street. It comprises 6.26 miles of docks, having slips 600 ft. long and 200 ft. wide, enclosing an area of 1,198 acres. Of this total acreage, 311 acres are taken up with streets, trackage right-of-way, sorting and distributing yards for freight, etc., leaving a net area of 887 acres of leasing and revenue-producing property. This area and length of dock wall would be subject to variation depending on the number and location of slips that it might be desirable to construct in order to provide the required accommodation for prospective industries.

The areas lying to the north of the marginal way are for the accommodation of plants requiring rail and dockage facilities immediately adjacent to their buildings, while the
(Continued on page 545)

\$2,357,000 SEWERAGE SCHEME RECOMMENDED FOR EASTERN PART OF YORK TOWNSHIP, ONT.

YORK township, Ontario, is a district extending along the northern frontier of the city of Toronto from Scarboro on the east to the Humber river on the west, a distance of about fifteen miles. Its populated area varies from a depth of half a mile to three miles from the city limits of Toronto. The township council have desired for some time past to provide sewers for the more thickly settled parts of the district, and isolated schemes had been prepared, but when application was made to the city of Toronto for outfall facilities, the city authorities pointed out that it would be desirable to have a comprehensive scheme prepared so as to enable both the township and the city to know where all the main outlets would be located.

When the matter came before the Ontario Railways and Municipal Board, it was finally agreed that the township council would authorize the preparation of a comprehensive scheme of sewerage.

Frank Barber, as township engineer, and R. O. Wynne-Roberts, who is associated with him, were instructed to make the necessary investigations and to prepare a preliminary scheme. These engineers have now presented their report and preliminary plans covering their recommendations regarding the eastern division of York township, and other reports and plans will be submitted in the near future, dealing with the western division and with the district known as Runnymede and Swansea. It will require several years to carry out these schemes in their entirety, but they are so designed that the township council may authorize the construction of any section at any time, and when the system is completed all the sections will fit into the general system and be economical of operation.

The eastern division is bounded on the east by the Scarboro township limits, on the west by the Don river, on the south by the city of Toronto and on the north by Don Mills road, Glebe road and the Canadian National Railway tracks. The division is subdivided into two areas, east and west of Woodbine heights, called Woodbine and Todmorden, respectively, the former having an area of some 400 acres, and the latter about 1,000 acres.

Different sites for sewage disposal works have been considered in their relations to the most economical schemes, and three main sites are reported upon, namely: (1) The brickyard site, located on land adjoining the Don Valley Brick Works; (2) the St. Clair site, on Don Mills road, north of the C.N.R. line; and (3) a site in the Woodbine district.

The report, dealing in outline with three possible schemes, defined as Scheme C, Scheme E, and Scheme CE, is in part as follows:—

Scheme C

Scheme C provides for a combined system of sewers for the entire eastern division, with the outfall works at the St. Clair site. The trunk sewers in this scheme would, in Woodbine district, be along Rosevear, Barrington, Valley, Lumsden, Cedarvale, Bracebridge, Woodbine and the street north of Plains road to Leslie; and in the Todmorden district, along Sammon, Cronyn, Davies Estate, Mortimer, McCash, Cosburn and the corresponding streets west of Leslie street. The main trunk would be along Leslie street to the St. Clair site.

This scheme would cost approximately as follows:—

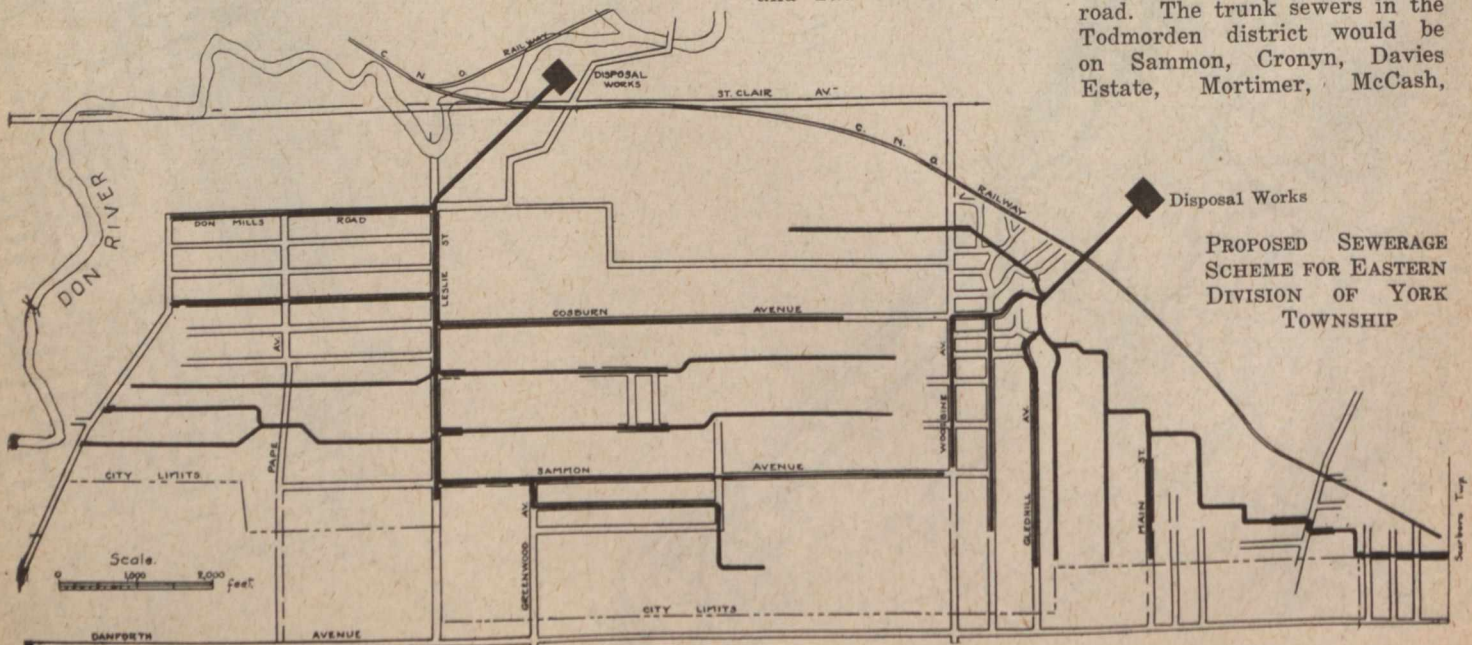
| | | | |
|----------------------|-------------|---------|--------------------|
| Woodbine— | | | |
| Trunks | \$ | 462,000 | |
| Laterals | | 311,000 | |
| | | | \$ 773,000 |
| Todmorden— | | | |
| Trunks | \$1,176,000 | | |
| Laterals | 488,000 | | |
| | | | \$1,664,000 |
| Disposal works | | | 400,000 |
| Total | | | \$2,837,000 |

In this scheme the sewers are large enough to convey the entire flood water and sewage without relief. If relief sewers were provided, the cost of which would be deferred for many years, then the above total might be reduced by, say, \$300,000.

Scheme E

Scheme E comprises two disposal works, one at Woodbine site and the other at the brickyard site.

The trunk sewers in the Woodbine district would be along Rosevear, Barrington, Lumsden, Westlake, Gresham and Taunton streets, and also Woodbine ave. and Plains road. The trunk sewers in the Todmorden district would be on Sammon, Cronyn, Davies Estate, Mortimer, McCash,



Gower, Cosburn and Gamble, Plains road and Don Mills road.

This scheme would cost approximately as follows:—

| | |
|----------------------|-------------|
| Woodbine— | |
| Trunks | \$ 289,000 |
| Laterals | 264,000 |
| Disposal works | 140,000 |
| | \$ 693,000 |
| Todmorden— | |
| Trunks | \$ 991,000 |
| Laterals | 40,000 |
| | 380,000 |
| Disposal works | 300,000 |
| | 1,711,000 |
| Total | \$2,404,000 |

The above costs do not include relief sewers, which will parallel the trunk sewers and can be built when the streets are about to be paved and when the existing trunk sewers are working to their full capacities. It is not anticipated that relief sewers will be necessary for many years after the original ones have been constructed.

Scheme CE

Scheme CE would provide a sewerage system with two outfall works, one at the Woodbine site, and the other at the St. Clair site. The trunk sewers in the Woodbine district would be the same as already described in Scheme E, and the trunk sewers in the Todmorden district will be the same as described in Scheme C.

The cost of this scheme is estimated as follows:—

| | |
|--------------------------|-------------|
| Woodbine— | |
| Trunks | \$ 289,000 |
| Laterals | 264,000 |
| Disposal works | 140,000 |
| | \$ 693,000 |
| Todmorden— | |
| Trunks | \$1,176,000 |
| Less relief sewers | 142,000 |
| | 1,034,000 |
| Laterals | 488,000 |
| Less relief sewers | 158,000 |
| | 330,000 |
| Disposal works | 300,000 |
| | 330,000 |
| Total | \$2,357,000 |

In Scheme CE, the present savings which would be effected by providing future relief sewers are deducted so as to make a fair comparison with Scheme E, and it will be observed that these two schemes will cost about the same amount.

If the area south of Sammon avenue, be drained to the city, as the engineers think it should, then it will be possible to effect a tangible reduction in the cost of the remainder of the entire schemes. In view of the fact that the proposed schemes will dispose of sewage and storm water, and will thus relieve the city of the future disposal of storm water from the major part of the eastern division, it is recommended that the city be asked to deal with both sewage and storm water from the area south of Sammon and Cronyn avenues. It is also recommended that the subdivision of Davies Estate, adjoining Don Mills road and Cambridge avenue, be drained into the city sewers, for the reason that such method would be cheaper than connecting to the township sewers. The outlets can be arranged to suit city arrangement of sewers.

The engineers point out that in Scheme E, practically the whole of the sections west of Leslie street can be sewered without building the trunk sewer, but the latter must be constructed before the sewers in this section are fully developed, or the sections east of Leslie street can be undertaken.

In Scheme CE, the Leslie street trunk sewer must be built first, because it would be the only outlet for the sewage and storm water. Attention is also drawn to the fact that the construction of any portion of the system may be undertaken provided the works commence at the outfall ends.

Approximate annual capital costs of the two schemes, E and CE, have been computed on the basis of repayment, in the case of trunk sewers and disposal works, at 6% in 30 years, and in the case of laterals under 27 ins. diameter at 6% in 10 years.

In Scheme E, the total fixed charges amount to \$215,600 per annum, or, on a frontage basis, an annual average cost of 55 cents per foot. In Scheme CE, the fixed charges total \$207,097, or an annual average cost of 52.8 cents per foot. A tangible saving is shown when the figures are based on 30-year debentures at 6% for all works. Scheme E then totals \$174,330, or 44.5 cents per foot; and Scheme CE, \$171,075, or 43.6 cents per foot.

For purposes of comparison, it is interesting to note that the annual cost of different sewers excluding trunk sewers, already constructed in the township, ranged from 23.6 cents per foot seven years ago, to 53.31 cents per foot in 1917.

In making their recommendations as to which is the best scheme to adopt, Messrs. Barber and Wynne-Roberts state:—

“The problem of selecting the scheme which will be best adapted for future extensions, depends upon what new subdivisions will be placed on the market and what transportation facilities are available in the near future. For example, if the land along Independent road be subdivided, and a street railway is extended thereto, it would be necessary to anticipate the needs of that locality, and consequently the St. Clair site would be suitable. Furthermore, when the subdivision north of the Canadian National railway and east and west of Davies road, calls for sewers, then the Woodbine site will probably be suitable for most of it.

Scheme CE is Recommended

“For immediate development, the brickyard site offers some advantages. The Scheme E is more flexible, and it is the more natural outlet, and is accessible. It is, however, unfortunate that it is so near the residential portion, but for immediate purposes, it would be the one we would recommend. On the other hand, having regard to the future extensions of the populated areas, which of necessity must tend toward the north, we are prepared to recommend Scheme CE.

“If the brickyard site of Scheme E be carried out, it would be suitable for the future subdivision of the 80 acres west of Davies Estate homestead, and also for the parts lying off Todmorden road, but in the event of St. Clair site being adopted, it would be necessary to have a small independent plant for these areas.”

Since 1912, \$635,000 have been expended on London's sewer system. The city engineer's plans call for an additional \$250,000 for 1920.

The eighteenth annual convention of the Canadian National Clay Products Association will be held at the Prince George Hotel, Toronto, January 20th to 22nd, 1920.

The engineer's report to the Vancouver and District Sewerage Board, presented recently, shows that the total expenditure since the inception of the board has been \$2,253,915.

The Modern Housing Corporation, 435 Woodward Ave., Detroit, Mich., which is a subsidiary of the General Motors Corporation, is contemplating a housing scheme in Ontario and would be glad to receive catalogues from manufacturers of building materials.

Among the papers read before the Canadian Mining Institute recently in Vancouver, B.C., was one by William E. Greenwalt, of Denver, on the application of his process of electrolytic smelting of copper ores. Mr. Greenwalt predicted that in the near future electro-metallurgical methods will be so well established in connection with the copper industry as to compete successfully with the present system of smelters. The chief advantages of the process would be the elimination of the high cost of shipping ore from the mine to the smelter.

PATROL MAINTENANCE ON HARD SURFACE ROADS

BY J. S. CRANDELL

Consulting Engineer, General Tarvia Dept., The Barrett Co.

SOONER or later all main line highways will be patrolled by repair gangs whose business it will be to maintain the roads under their care in satisfactory condition. Probably this would have been done long ago except for the fact that it seemed like a needless expense to pay wages to men to keep up roads that were thought not to need upkeep. But from the beginning the railways knew the value of section gangs, and the secret of low operating cost is largely perfect maintenance of track. Highway engineers have to learn the lesson; some of them have already learned it, and have profited thereby.

There is not much use trying to repair and keep in good shape a road built of poor materials on undrained soil. But given a good road, it is a simple matter to keep it in perfect condition all the year round if a system of intelligent maintenance is installed. Under these conditions, a well-built road will last indefinitely. A splendid example of what can be accomplished is found in Lucas County, Ohio. The county surveyor, Cecil L. Rood, has reduced the cost of maintenance from year to year, in spite of higher prices for labor and materials.



FIG. 1—PATROL HOUSE FOR STORING ROAD MATERIALS

There are several points to be borne in mind in maintenance work:—

1. Train the men for the work to be done.
2. Keep on hand an adequate supply of materials for maintenance.
3. Use labor-saving devices.
4. Provide shelter where men can work in bad weather.
5. Keep materials, tools and other equipment locked up when not in use.
6. Keep accurate records of all work done, with cost, time, materials, etc., included.
7. Get out on the job often and "stick around."

One of the best investments in starting a patrol maintenance system is the acquisition of a building in which material and equipment may be stored, and where men can work. Such a building is illustrated in Fig. 1. Here a mixing board has been placed on which Tarvia KP and stone are being mixed as a patching material. (The mix should be stored away for a few days before using.) In this patrol house are kept shovels, screens, brooms, pick axes, wheelbarrows, sledge hammers, lockers for the men, etc. The house is well ventilated, and on a rainy day two gangs of mixers may be kept busy mixing and storing away the patching material for future use.

Often an old house or shed may be acquired for a patrol house. A little repairing or painting will make it suitable and attractive. Nor is it necessary to provide new and expensive equipment throughout. Fig. 2 shows how a bar-



FIG. 2—THIS RIG COST JUST TWO DOLLARS

rel of Tarvia KP has been mounted on an old fire hose truck that had been discarded years ago. For \$2 it was made into an excellent vehicle for moving barrels from the yard to the job. Similar economies will occur to the observant foreman or engineer.

If the mileage to be covered by a patrol gang is extensive, it will be cheaper to buy a one or two-ton motor truck than to haul with horses. The wages saved by reducing time lost getting to and from the job will soon pay for the truck.

Many cities and counties are keeping their supply of bituminous patching materials in storage tanks. A convenient form for town or city plants is shown in Fig. 3. If the tank is to be used along country roads, it is better to place it with the long axis horizontal instead of vertical, and to elevate the tank sufficiently so that the cold patching material may flow by gravity into the wagons or trucks that the maintenance gang uses. Such a tank is inexpensive; about \$150 for a tank holding 1,200 gallons is a fair price. The advantage far outweighs the initial cost.

Fig. 4 shows a convenient form of wagon for bringing the mix from the patrol house to the job. The one illustrated is a cart used formerly for collecting ashes and garbage. A bottom dump wagon is not so handy a type for this kind of work.

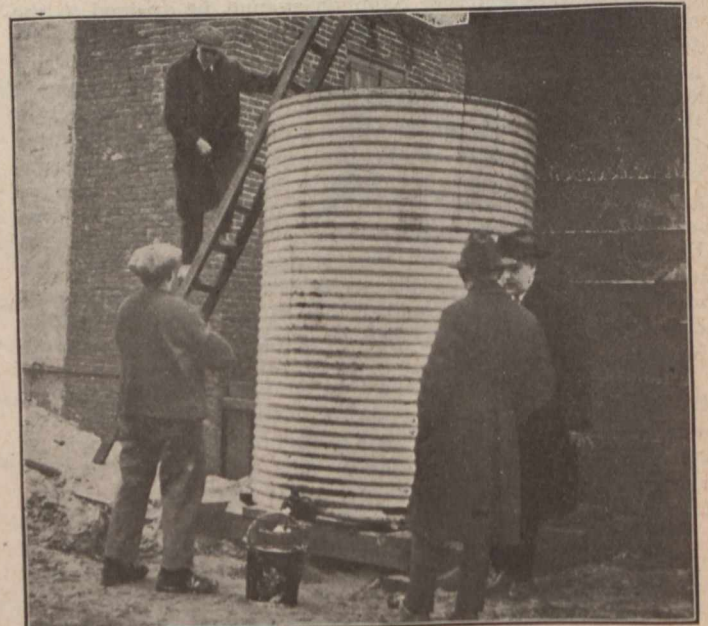


FIG. 3—INEXPENSIVE MUNICIPAL STORAGE TANK

Much of the repair work has been done in the past with hot bituminous material. The cold patching products now on the market offer a great range of usefulness, and require less care and equipment. When a hot patch is to be made, the patrol gang must be provided with a suitable portable kettle for heating the tar, and with fuel sufficient for the day's work. "Cold patch" requires neither of these.

In using a tar cold patching material, several points should be observed:—

Don't use wet stone; don't use dirty stone; don't use too much tar (about 12 to 15 gals. of tar to the cubic yard of stone is about right); don't leave a freshly made patch of stone and tar uncovered in the rain (in wet weather it should be protected for a day); don't heat a tar cold patching material (if heat is necessary, warm the stone instead).

Mix one cubic yard of a mixture of one part coarse clean sand and three parts of ¾-in. stone, with 12 to 15 gals. of tar. Mix tar and stone first, then add sand. Let this mixture cure, or season, for a few days before using.

Clean out the hole to be patched; paint the sides of the hole with tar; deposit the mixture in the hole and tamp well; leave the patch slightly higher than the surrounding road metal (it will settle after a while); sand the top.

When the patch has set up hard, sweep it and give it a light seal coat of tar, and cover with sand or screenings. Do the painting with a brush. Do not pour a bucketful of tar on a patch; only a very light coat is required.



FIG. 4—PAINTING BOTTOM AND SIDES OF HOLE

Traffic will iron out the patch into a smooth surface. Some engineers prefer to use only tar and stone, with no sand. If the stone contains much fine material, the result will be satisfactory, but with a graded stone from ½-in. to 1¼-in., and no fines, the mix will be too open to make a good patch, and sand is necessary.

The value of training the patrol gang cannot be over-estimated. Get them to do the work right from the start and much worry and trouble is eliminated.

And patch! Patch every hole, large or small. The earlier you can catch them, the less there is to do. Patch breaks in bituminous or cement-concrete surfaces as soon as they appear. Often a paint coat of tar with a coating of clean chips or gravel will prevent the formation of a hole.

Be sure to clean thoroughly the surface to be painted. Don't attempt to apply tar to a dusty, mud-caked pavement, for the tar will not stick, nor will it retain its characteristic properties. By using care and judgment, skin patches of considerable area and thickness may be built up. Use clean stone chips or ½-in. gravel for covering material instead of sand, because sand is likely to cause the material in the patch to wave or bunch; chips or gravel prevent this.

Follow up every complaint; determine the cause, and supply the remedy then and there.

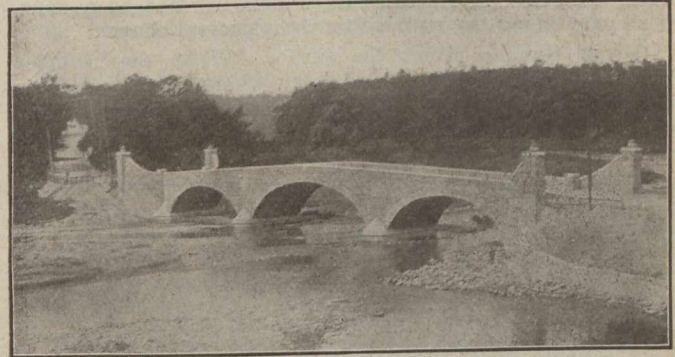
Patrol maintenance means perfect roads every day of the year. It means lowered cost of maintenance. It also means putting off reconstruction indefinitely, and that means lower taxes.

TORONTO'S MARGINAL BOULEVARD

BY REGINALD B. EVANS
Engineer of City Parks, Toronto, Ont.

FOR some years a survey has been under way for a marginal boulevard surrounding the city of Toronto. Plans and profiles have been plotted, costs of grading estimated, some work done along the south or lake-front side, and three miles of road built along the west margin of the city up the picturesque valley of the Humber river.

The latter section is much used by automobiles, as it connects the Hamilton highway with Dundas street and lies

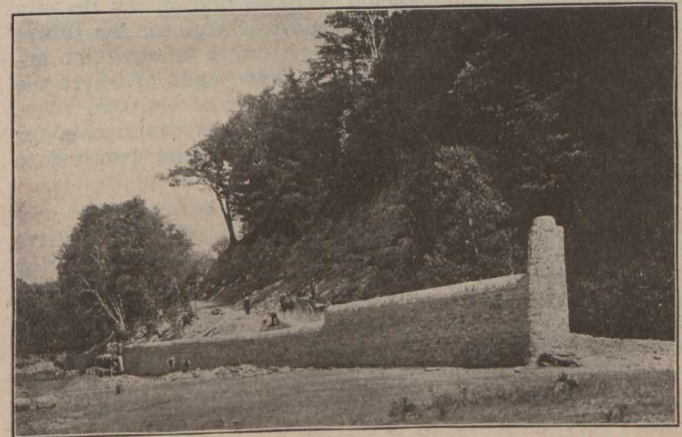


A PICTURESQUE PART OF THE BOULEVARD

through more than one hundred acres of park land owned by the city. This part of the boulevard has grown from an early trail used by our forefathers to carry grain from Lake Ontario to the old mill at Bloor street on the Humber river.

The first pavement was laid some ten years ago of concrete and is still in good repair, although it has been widened from 16 ft. to 30 ft. The road from the lake to Bloor street for the most part follows the top of the ridge of land lying between the Humber river and the ravine to the east. Little or no drainage was required on this part; some heavy clay cuts were made, however, and for several years trouble was experienced in these from heaving with frost and flooding. Finally weeping tiles were put along the side of the road and no difficulty has arisen since.

Where the road descends into the valley, a 5½% grade is used for 1,300 ft. This hill is not paved with concrete but with tar macadam, as are all the steep hills. At Bloor street the boulevard crosses the Humber river on a hand-

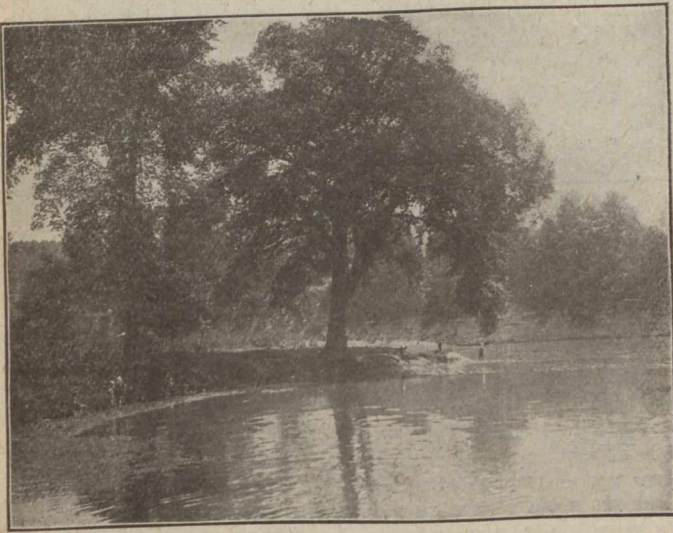


HUMBER SECTION OF BOULEVARD DURING CONSTRUCTION

some stone bridge built jointly by the county of York and the city of Toronto. This point is about one and a half miles from the lake and is the head of navigation for small boats. During the summer and well on into October, canoes ply this river in great numbers and small boys bathe along its shores.

On the west bank of the river, space is provided for parking automobiles, and a commodious tearoom is open the year round. The road from there north follows the west bank of the river, and in places is cut out of the high bank, where springs of water and seepage had to be taken care of by drains and ditches. For a distance of several hundred feet, the only location for the roadway was through a swampy piece of land at the foot of a hill. To get a foundation it was found necessary to lay weeping tile along the west side of the road, next to the hill, and to fill over the swamp high enough to get the road up out of the wet. The drain pipe is about three feet below the surface, and runs both ways from the summit. The swamp probably has fairly well dried out since construction some five years ago, and no trouble has been experienced. From this point north as far as Dundas street, the road is finished but no planting has been done, the scenery along the river being the principal charm.

From Dundas street the survey follows the Humber river and Black creek to the point where this creek goes under the Grand Trunk railway's northern division. This valley is laid out in golf grounds, market gardens and



BOULEVARDS ARE PROFITABLE WHEN THEY BRING THIS NEARER TO KIDDIES OF CROWDED CITIES

farms. The side hills are well wooded and a road is needed to develop the growing suburb.

From the Grand Trunk the proposed boulevard follows an 86-ft. diagonal road in a northeasterly direction to the corner of Dufferin street and Lawrence avenue. This is part of the system of diagonal roads as laid out by the city surveyor, comprising a comprehensive scheme for the future of the city. This diagonal road system is followed for another mile and a half across level farm lands to where the boulevard route descends into the valley of the Don river. This section has been marked out by stone monuments for some five years, and all real estate plans are required to conform to it.

Following the Don river, the next mile brings the proposed road to Yonge street at York Mills, whence the drive can go down Yonge street for a mile to Hog's Hollow or follow the ravine a short distance west of Yonge. The west branch of the Don is followed through golf grounds and farm lands for about three miles to its junction with the main Don river. The scenery through this valley is beautiful, the road passing under the high Canadian Pacific Railway viaduct, where a special opening was made, during its recent reconstruction, at a cost to the city of about \$6,000. This part of the drive could be easily constructed of gravel found along the route and later could be widened to accommodate future traffic.

From this point the route follows the valley of Silver creek to the eastern city limits, where it turns south to the Kingston road and thence via Woodbine avenue to the lake, joining the proposed Harbor Commissioners' road along the lake front to the Humber river.

The proposed marginal driveway is about forty miles in length, and approximately thirty miles are already secured to the city by present roads and promises of free rights-of-way 100 ft. wide through private property.

The alignment of the boulevard is made up of straight tangents and regular curves. The grade for the most part is light and conforms closely to the rise and fall of the ground.

The marginal boulevard is under the jurisdiction of Charles E. Chambers, commissioner of parks for the city of Toronto, while the southern, or lake-front link, referred to above as the Harbor Commissioners' road, will be constructed for the city by the Toronto Harbor Commission. A start was made this year on the first 8,000 ft. of the Harbor Commissioners' road, the construction being hot-mix asphaltic concrete on a cement-concrete base, 50 ft. wide.

THE TOWN PLAN AND THE FACTORY

BY LOUIS BLAKE DUFF
Welland, Ont.

ONE of the largest and best known industries in Ontario found it necessary a short time ago to provide for a considerable enlargement of its plant. One thinks of a plant enlargement as something added on to a building or set of buildings already existent. In this case, however, the new plant was separated from the old by over a mile. One day the whole works will be on the new site, for the old site has been filled to its edges. About it are substantial homes, some built before the factory, for the days of restrictions are comparatively young.

Conditions That Are Preventable

An analysis of this episode reveals the following set of conditions that a proper town plan would both prevent and foresee:—

1. The depreciation of the residential section due to (a) the elevation of factory buildings; (b) the frequent unsightliness of factory buildings, and in most cases the incongruity of the juxtaposition of factory and residence; (c) in certain cases smoke, fumes, noise and even dust.
2. The loss to the industrial interests of the community by the scrapping of old plant that is never quite fit for anything else, and the building of a new plant.

The factory area should have been located at the beginning of the town's growth, but the beginning has long gone past and the duty of this day remains to make the best of conditions in the laying out of areas that will serve the best interests of the community and of industry.

The areas chosen should be selected in their relation to (1) railway facilities; (2) water frontage, where necessary; (3) prevailing winds; (4) land available in large blocks, unbroken by streets; (5) accessibility; and (6) most important of all, the worker's home.

Locations, indeed, may vary. A plant making breakfast food differs in location requirements from a cement works. In general, decision as to location should be reached in the light of the greatest advantage to the city as a whole. New factories should be placed where they belong, whatever the temptation may be to place them where they do not belong; and there always are such temptations. Industries already wrongly placed should be encouraged to remove to their proper areas; there is always the incentive of added efficiency from proper location.

Industrial Land Often Subdivided

Some of our municipalities, among them Port Colborne in the Niagara section, have purchased areas for industrial development, a very necessary step to preserve the land from the subdivider. In not a few other cases, land admirably located for factories has been divided into lots. Some may be built upon and the others owned by people living in the four corners of the globe. The divided ownership, the enhancement of the values through speculation, and the broken

streets, shut the property out forever from industrial possibilities.

If the town plan, however, has some salvation to offer to industry, and nothing to offer to the worker in the industry, it has utterly failed of its mission. The factory system is here with its load of problems, one of which arises out of the fact that half the people of our nation are urban dwellers. The town plan should aid industries on the one hand, and on the other secure an economical land development, with comfortable houses and healthful living conditions for the workers.

This kind of home for every wage-earner can be made possible only by a full and frank recognition of how intimately the housing question is connected with other immense problems of town planning such as (1) factory location, to which reference has just been made; (2) street systems; (3) local transportation; (4) facilities for recreation; and (5) restrictions.

Town Plan Not Enough

But the town plan is not big enough to solve the whole problem. The regional plan, calling in the co-operation of a whole group of municipalities, is the only means by which waterfronts, the picturesque, and the historical, may be capitalized for the people. These vantage points of the section, under the regional plan, in a way become the property of all, and thought and care can make them of recreational service to all.

If the house in rental or in purchase price takes too large a percentage of the worker's wage, the deficiency must be made good by a reduced standard of living.

The builder of Port Sunlight advocated the buying of land by municipalities, to be given to those who would build homes for themselves. We have bonused every conceivable kind of industry, but no one has yet proposed the bonusing of homes. Yet the bonusing of a home is not so crack-brained as the bonusing of an industry. One bonus we can give, and that is the guarantee that the surroundings of every home will remain permanently good.

Thomas Adams, in a recent article on "Canada's Post-War Housing Progress," quotes the considered opinion of two well-informed observers as to the housing policy which has been adopted in this country, and which is not federal, provincial or municipal, but a combination of all three. C. Stanley Taylor, project engineer for the firm of Mann & MacNeille, New York, who were advisers to the United States government on many of their housing projects, states: "We wish to express our unqualified admiration for the completeness, practicability and simplicity of the administration methods of the Canadian plan. We believe this to be the most practical step toward the provision of good housing by federal co-operation which has yet been taken in any country."

The city engineer of Edinburgh states that the Canadian project is on sounder economic lines than the proposed housing schemes in Britain.

K. V. Haymaker, of the Department of Labor, Washington, says that the difficulty in the way of more and better homes is financial. No solution short of a nation-wide solution is satisfactory. The house starvation of the nation cannot depend upon casual financing for alleviation. The local association, helpful as it has been, always falls down when its help is most needed.

"By-Products" of Good Housing

I mention these outside judgments because I believe we have started to answer the housing question on the right lines, and if we supplement the Housing Act in our own municipalities with provisions that will ensure to the home builder a non-impairment of his investment, and healthful and beautiful surroundings, we have gone a long way toward making our towns and cities fit places in which to live.

The fruits of the effort will not be good houses, alone, but, what is more, important, good homes. Good homes make good towns and cities and good industries,—and out of it all will grow a good Canada.

For the young Canadian the gain will be more than for the old. The boys of Bournville at twelve years of age

average 8½ lbs. heavier than those at St. Bartholomew's ward in Birmingham, and the girls a bit more than that again; and both boys and girls average nearly 3 ins. taller than those of St. Bartholomew's. The infant mortality rate is little more than half that of London.

A good house is more than a good house. It means also a good standard of living; it quickens the life, and it draws men and women, and little men and women, up to the light of better things. For what else do we live?

FOUR DAMS PROPOSED FOR ST. LAWRENCE RIVER

THE plans for the prospective development of the St. Lawrence-Great Lakes route for ocean navigation provide for four dams and concentration basins,—at Morrisburg, Cornwall, Lake St. Francis and below the Lachine Rapids. Extensive borings are now being made to determine the best sites. The first two dams would be international, and the others in the province of Quebec. It is stated that at least 3,000,000 h.p. could be developed. These dams would create a deep water channel between them for ocean vessels, but at each dam locks would be required as large as those being constructed on the new Welland Ship Canal, and near Montreal there would have to be a new canal system. Engineering problems which the Dominion Power Board is endeavoring to solve are the location of these dams so as to obviate ice-jams; extensive dyking against flooding of low-lying lands in Huntingdon county, Quebec; ascertaining the effect which the new plan, when completed, would have on the flow of the Ottawa River; and the fixing of a water velocity suitable both for navigation and power production.

PROPOSED DEVELOPMENT OF HAMILTON HARBOR

(Continued from page 540)

areas on the marginal way and to the south of it are for warehousing and light manufacturing where ready access to the water and shipping is desirable and rail shipment facilities are imperative. In the district to the south of the marginal way, all properties are served at the rear by track-age, leaving streets clear of obstructions for approaches and teaming.

The extreme easterly end of the district is served with a ship channel and turning basin, marking a clear-cut line between the industrial area and the beach development, as well as affording an increased area of waterfront property. Rail shipments in and out of the district are handled through a sorting yard, 58 acres in extent, located between Martimas street and Kenilworth avenue, and connected up with existing rail lines.

To carry out this proposal, certain properties would have to be acquired outright. In other cases, the commission could probably, by negotiation, arrange for a waiving of riparian rights in return for reclamation of water lots and docking privileges, but in any case it is not apparent where any serious obstructions would arise.

Coming to the question of cost, it is necessary to consider the length of time that would elapse before the entire work would be completed, and try to relate this in some way to the present uncertainty of labor conditions and costs of materials. Obviously this is quite impossible, as manufacturers will not quote prices except for immediate delivery and the wages paid to labor are constantly changing. A perusal of the price fluctuations during the past four years would show that an estimate made in 1914 would look absurd when applied to present conditions, and is sufficient evidence of what might happen during the next fifteen years, or the period of time over which the carrying out of this improvement might reasonably be expected to extend. In view of this, I thought it wise to recommend for immediate consideration the development of the industrial section between Wellington street and Wentworth street, for which the Dominion government has already made an initial appropriation of \$100,000, and estimated the cost accordingly.

This area extends to the revetment wall at the foot of Wellington street, but the dock running north and south at that location could be left available for some time by allowing the reclamation material to take a natural slope on the westerly side, leaving the slip open. When conditions warrant (that is, when the area now set aside for a slip could be used to better advantage for manufacturing sites), the steel sheet piling forming the face of the government wall could be withdrawn and salvaged, thus minimizing the loss occasioned by abandoning the layout at present existing.

The main items entering into the cost of this section of the development are as follows:—

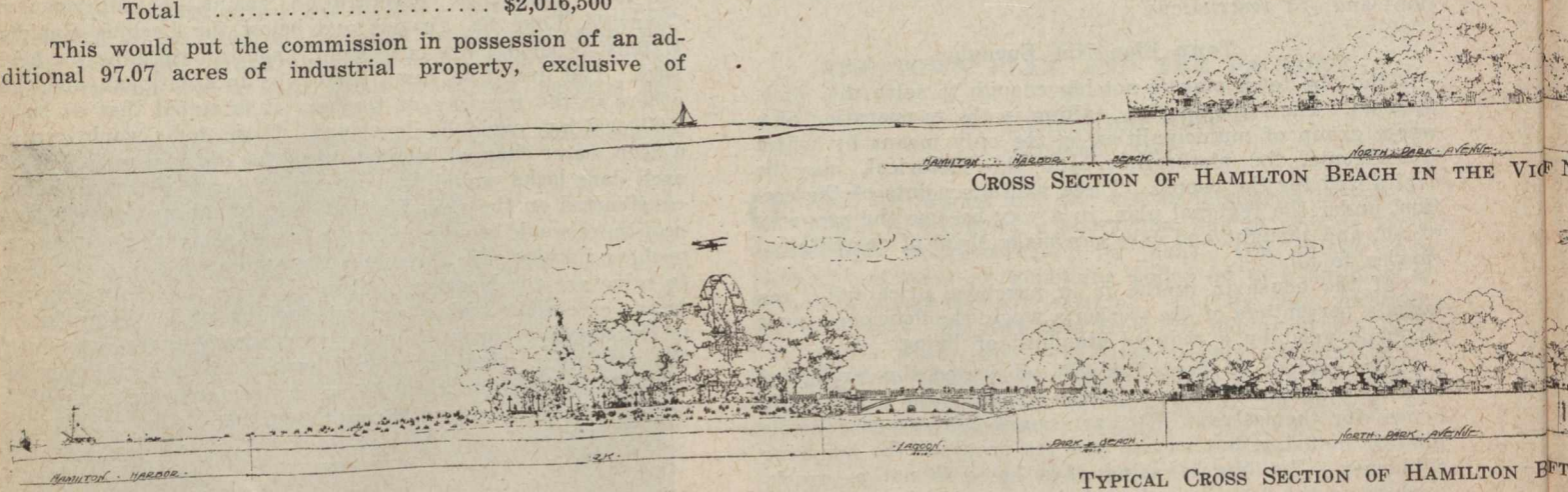
| | |
|--------------------------------------|------------|
| Construction of retaining wall | \$ 980,000 |
| Acquisition of property | 103,000 |
| Reclamation | 933,500 |

Total \$2,016,500

This would put the commission in possession of an additional 97.07 acres of industrial property, exclusive of

beach of its objectionable features from the standpoint of a parking and playground treatment, permits free access to the lake beach from the boulevard drive, and may be incorporated in the layout proposed by the Tye-Cauchon report on the railway situation at Hamilton. The entire rail service accommodation suggested herein was planned with the probability in mind of the early electrification of steam roads in Hamilton.

It was thought desirable to increase the beach area in order to provide greater accommodation, and soundings and borings revealed the presence of suitable material in sufficient quantity to more than effect the reclamation planned. A lagoon treatment is used along the frontages of the existing property, and the created lands are made accessible by artistic concrete foot bridges at strategical points and vehi-



streets and track allowance, that could in the near future be utilized for factory and warehouse sites.

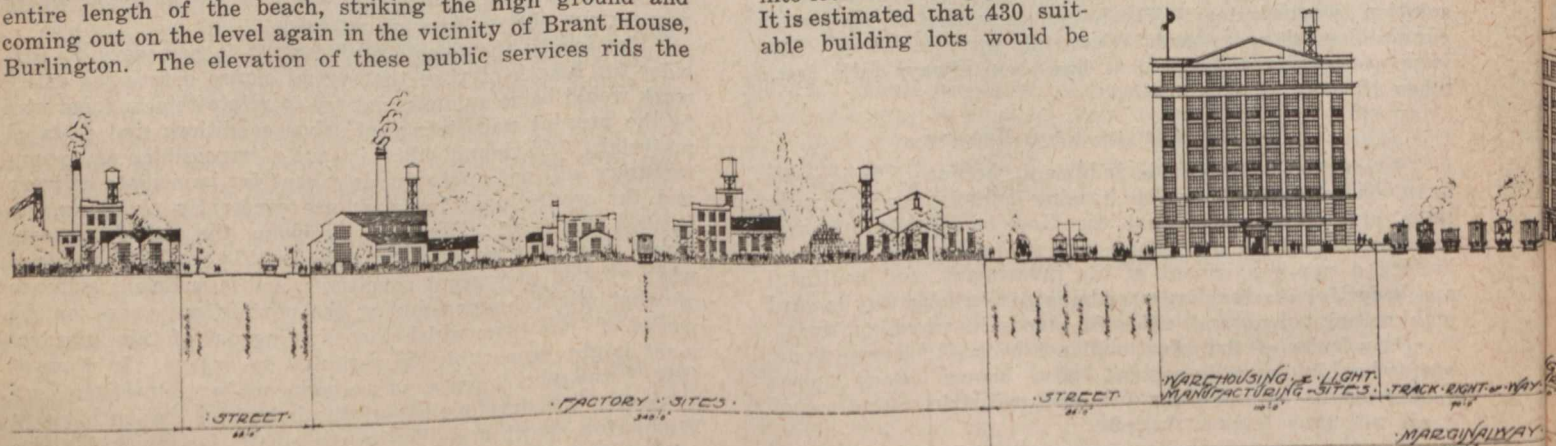
Burlington beach and the north shore of the harbor by their physiography lend themselves admirably to aesthetic treatment, and the proposed development along these frontages is largely for park, amusement and residential purposes. It might be argued that this phase of the proposal is not essential, but from a study of the prevailing conditions in other large centres, the writer is firmly convinced that no waterfront development is complete, or adequately meets the requirements of a large industrial city, if ample provision be not made for recreation purposes.

The sketch showing the typical cross section of the beach development (see illustration above), provides for the elimination of rail traffic on the beach road and concentrates power transmission lines and electric and steam roads on an elevated viaduct located approximately on the present Grand Trunk right-of-way. This viaduct could commence to rise on an easy grade in the vicinity of the Grand Trunk crossing at Burlington street, and the tracks could be elevated the entire length of the beach, striking the high ground and coming out on the level again in the vicinity of Brant House, Burlington. The elevation of these public services rids the

ular service bridges where required. Locations are suggested for bath houses, public parks, playgrounds, amusement centres, aquatic clubs and residences. There is also provision made for a promenade board-walk along the lake frontage of the beach, protected by a large sloping sand area extending to the water's edge.

It will be noted that no plans have been made for break-water protection in the lake, it being impossible at this time to estimate the extent or location of the possible requirements. This can only be determined after careful observation of the effect of the waves and currents on the beach, after same has been reclaimed, but since the formation of Burlington beach is the result of a natural accretion, it is not expected that serious erosion will take place.

For the reasons outlined in connection with the industrial district, I estimated only the cost of the reclamation on the bay side of the beach to the south of the canal, which is the section that would in all probability be first undertaken. This comprises an additional area of 172 acres, 85 of which has been subdivided into lots for leasing purposes. It is estimated that 430 suitable building lots would be



CROSS SECTION AT THE FOOT OF WELLINGTON STREET,

This area extends to the revetment wall at the foot of Wellington street, but the dock running north and south at that location could be left available for some time by allowing the reclamation material to take a natural slope on the westerly side, leaving the slip open. When conditions warrant (that is, when the area now set aside for a slip could be used to better advantage for manufacturing sites), the steel sheet piling forming the face of the government wall could be withdrawn and salvaged, thus minimizing the loss occasioned by abandoning the layout at present existing.

The main items entering into the cost of this section of the development are as follows:—

| | |
|--------------------------------------|------------|
| Construction of retaining wall | \$ 980,000 |
| Acquisition of property | 103,000 |
| Reclamation | 933,500 |

Total \$2,016,500

This would put the commission in possession of an additional 97.07 acres of industrial property, exclusive of

beach of its objectionable features from the standpoint of a parking and playground treatment, permits free access to the lake beach from the boulevard drive, and may be incorporated in the layout proposed by the Tye-Cauchon report on the railway situation at Hamilton. The entire rail service accommodation suggested herein was planned with the probability in mind of the early electrification of steam roads in Hamilton.

It was thought desirable to increase the beach area in order to provide greater accommodation, and soundings and borings revealed the presence of suitable material in sufficient quantity to more than effect the reclamation planned. A lagoon treatment is used along the frontages of the existing property, and the created lands are made accessible by artistic concrete foot bridges at strategical points and vehi-

available, allowing 50 ft. frontage to each, which, when coupled up with the returns from amusement privileges, should yield an annual income of approximately \$75,000. The control of the present beach should be transferred to the Hamilton Harbor Commission before improvements are undertaken, so that the resulting revenues could be applied against the interest and sinking fund charges on the capital expenditure.

The items entering into the cost of this section of the development are as follows:—

| | |
|---------------------------------|-------------|
| Reclamation | \$1,486,000 |
| Bridges | 300,000 |
| Channel wall at south end | 700,000 |
| Total | \$2,486,000 |

the north side of the harbor over the right-of-way already largely dedicated, while the other section follows the water's edge on the parkway and beach to be reclaimed by hydraulic dredging at the foot of the cliffs. The two branches merge again at the west end of the harbor, where it is proposed to reclaim the low-lying marsh lands as another park area. The boulevard then continues along Harvey and Dundurn parks to connect through the city with Burlington street again.

The total length of this boulevard drive is 16.98 miles, 10.59 miles of which traverse parks or are over lands commanding a harbor outlook.

The completion of the entire work will leave Hamilton harbor with an area of 4,380 acres, or 6.8 square miles, having a governing depth for navigation of 30 ft., as compared with the present 4,500 acres, having a depth of 18 ft. There will be added 1,250 acres of park and residential property, 1,198 acres of land suitable for industrial purposes and 6.26 miles of dockage accommodation.

For the industrial and beach sections recommended for

CROSS SECTION OF HAMILTON BEACH IN THE VICINITY OF NORTH PARK AVENUE, SHOWING EXISTING CONDITIONS

TYPICAL CROSS SECTION OF HAMILTON BEACH AFTER COMPLETION OF PROPOSED DEVELOPMENT

streets and track allowance, that could in the near future be utilized for factory and warehouse sites.

Burlington beach and the north shore of the harbor by their physiography lend themselves admirably to æsthetic treatment, and the proposed development along these frontages is largely for park, amusement and residential purposes. It might be argued that this phase of the proposal is not essential, but from a study of the prevailing conditions in other large centres, the writer is firmly convinced that no waterfront development is complete, or adequately meets the requirements of a large industrial city, if ample provision be not made for recreation purposes.

The sketch showing the typical cross section of the beach development (see illustration above), provides for the elimination of rail traffic on the beach road and concentrates power transmission lines and electric and steam roads on an elevated viaduct located approximately on the present Grand Trunk right-of-way. This viaduct could commence to rise on an easy grade in the vicinity of the Grand Trunk crossing at Burlington street, and the tracks could be elevated the entire length of the beach, striking the high ground and coming out on the level again in the vicinity of Brant House, Burlington. The elevation of these public services rides the

ular service bridges where required. Locations are suggested for bath houses, public parks, playgrounds, amusement centres, aquatic clubs and residences. There is also provision made for a promenade board-walk along the lake frontage of the beach, protected by a large sloping sand area extending to the water's edge.

It will be noted that no plans have been made for break-water protection in the lake, it being impossible at this time to estimate the extent or location of the possible requirements. This can only be determined after careful observation of the effect of the waves and currents on the beach, after same has been reclaimed, but since the formation of Burlington beach is the result of a natural accretion, it is not expected that serious erosion will take place.

For the reasons outlined in connection with the industrial district, I estimated only the cost of the reclamation on the bay side of the beach to the south of the canal, which is the section that would in all probability be first undertaken. This comprises an additional area of 172 acres, 85 of which has been subdivided into lots for leasing purposes. It is estimated that 430 suitable building lots would be

The construction of roadways, sewers, water services, etc., would be taken care of in the cost as a local improvement, while the grade separation would be a matter of adjustment by the Board of Railway Commissioners between the city, the railway companies and any other interested parties.

Burlington street, as before pointed out, forms the backbone of the industrial district, and through its connection with the east and west ends of Hamilton, is the logical connecting link for a boulevard drive around the harbor. This thoroughfare should be widened to 86 ft. and connected up at the east end with the beach road. The beach road, having been freed of rail traffic, carries the boulevard to the channel crossing, where the Dominion government has in contemplation the construction of a bascule bridge to span a 300-ft. opening instead of the present 150-ft. channel.

Continuing in a northerly direction along the beach road, the boulevard swings to the west near Brant House, where it divides. One section is carried along the high ground on

immediate consideration, the total estimated cost is \$4,502,500 which should be apportioned among the parties interested—viz., the Dominion government, the city of Hamilton and the Hamilton Harbor Commission.

It has been intimated that the people of Hamilton would expect the Dominion government to bear the expense of the construction of the dock walls, at an estimated cost of \$980,000, and to deed to the Hamilton Harbor Commission all water lots now vested in the Crown; also to pay the cost of the wall on the beach side of the channel and turning basin, which forms a part of the industrial district, at an approximate cost of \$700,000.

The city of Hamilton should be asked to pay the cost of acquisition of all properties required, and to deed the same to the Hamilton Harbor Commission, at a cost of \$103,000, and to pay for the reclamation of the park areas on the beach, at an estimated cost of \$500,000. The city should also be asked to transfer to the commission all waterfront properties which the city now owns or controls.

CROSS SECTION AT THE FOOT OF WELLINGTON STREET, SHOWING TYPICAL PROPOSED INDUSTRIAL DEVELOPMENT

The Hamilton Harbor Commission would then have to finance the reclamation of the industrial areas and the revenue-producing section of the beach, including necessary bridges, at a cost of approximately \$2,219,500.

This scheme would put the commission in possession of assets that would enable it to carry on the industrial development planned.

The length of time that it would take to see the entire undertaking completed depends entirely upon the financial support accorded it and the aggressiveness of the administration, but I have no doubt that if the work recommended for immediate consideration be gone on with now, the advantages that will result to the city of Hamilton and to the country as a whole, will commend themselves in such a way as to bring the entire scheme of waterfront and harbor development to an early realization.

Valuable services were rendered by J. E. Hollaman in conducting surveys and in the preparation of the plans, and consulting advice on parking and boulevard treatment by Jas. J. McKay. By the courtesy of the Toronto Harbor Commission, in order to obtain the benefit of their experience on their \$25,000,000 waterfront improvement now under construction, it was possible to have E. L. Cousins, their chief engineer and manager, exercise a consulting supervision over the entire investigation.

PARRY SOUND WATER WORKS

Report by Consulting Engineers Favors Mill Lake as the Source of the Town's Future Water Supply—History of the Water Works

IN a report recently made by Chipman & Power, consulting engineers, Toronto, upon the proposed water works extensions and improvements at Parry Sound, Ont., a brief history of the original water works system and subsequent developments is related, present conditions are discussed, and recommendations are made regarding the best source of supply. The following information is abstracted from the report:—

The original system, designed in 1892 by John Galt for a population of 1,700 people, consisted of an intake pipe, pump house and residence for the operator, one steam pump, one boiler, an elevated storage tank and about five miles of distributing mains, with five hydrants and gate valves. The distribution system was extended year by year as demands arose. In 1904, a vertical triplex pump, driven by an electric motor, was installed, and in 1915 a larger elevated storage tank was erected beside the old one. The steel tank erected in 1892 is 16 ft. in diameter, 20 ft. in height, and contains 25,000 gals.; and that built in 1915 is 36 ft. in diameter, 18 ft. high, and has a capacity of 116,400 gals.

The present water supply is drawn from the harbor, and is polluted, as the Seguin river, which flows through the town, carries the sewage and street drainage into the harbor. The factories along the shore contribute to the pollution, particularly as the drainage from an iron smelting plant and a chemical works discharge within 300 yds. of the intake. The only purification of this water is effected by chlorination.

The present conditions are summarized as follows:—

1. The present water supply is polluted, and such pollution will probably increase.
2. The steam pumping plant is old and inefficient, and the pumping capacity must be increased.
3. A new pump house is required.
4. Distribution mains from the pumping station to the business section of the town are too small to give proper fire service.

The population of Parry Sound is now approximately 4,000, and the average daily water consumption for the entire year is estimated as about 300,000 gals., increasing in summer to a peak of 700,000 gals. per day, or the full capacity of the triplex pump. For a town of 4,000 population the fire underwriters require four fire streams, or about 800 gals. per min., which, added to the peak domestic supply,

gives a total of 1,300 gals. per min. as the present requirements. In the opinion of the engineers, those portions of the works that cannot be extended or enlarged without the sacrifice of constructed works, should be of ample capacity for double the population, or for about 9,000 people. Upon this assumption, the normal domestic consumption would be about 700,000 gals. per day, the peak in the summer should not exceed 1,000 gals. per min., and the fire service required would be 1,400 gals. per min., making a total of 2,400 gals. per min. during fires.

Three Sources Considered

The engineers gave consideration to three sources of supply: (1) Parry sound; (2) Mill lake; and (3) Trout lake.

The area of the waters of Parry sound from Kill Bear Point to Rose Point, is approximately 24 sq. miles. The entrance to it from the west is navigable for vessels drawing 25 ft., and the sound itself could float the navies of the world. The maximum depth is 360 ft., this point being distant only two miles due west from the water works pump house, and one-third of a mile north of Three Mile Point on Parry island. The shores of the sound are of solid rock, with an occasional sand beach at the head of a bay. The Seguin river discharges into the south end of the sound, and along the north shore there emerge a few small brooks.

With the exception of the town of Parry Sound on the east, the Nobel explosive factory on the north, and the G.T.R. terminus of Depot Harbor on the south, the shores of Parry sound are uninhabited, and there is practically no agricultural land immediately back from the shore.

The entire population of the country along the shores of the sound, including the places above mentioned, at the present time does not exceed 5,000 people, and the town of Parry Sound, and the Nobel plant, are the only serious factors in the possible pollution of the water. The former is the only one that seriously affects the existing source of water supply.

At a distance of about half-a-mile due west from the water works pumping station, the depth of water is given on government chart as 210 ft. Intake pipes of greater length than this have been laid in Canada, but the engineers state that they do not know of any place in Canada or in the United States where a water works intake has been laid in a depth of water much exceeding 100 ft.

The bed of the sound is overlaid with a soft mud, that would bury any pipe laid along the bottom. It would be practicable to lay an intake with screen in 200 ft. depth of water, but it would be very expensive to repair such pipe if it should be accidentally broken or if it should draw apart at a joint. It could be tested at any time to determine if it had drawn apart, and it could be flushed out. Leaks, however, would be difficult to locate, and impossible to repair excepting by lifting the pipe above the surface of the ice in the winter months.

Pollution by Town's Sewage

At a depth of 200 ft. the temperature of the water would be lower than at the existing water works intake, and would therefore be less affected by warmer surface water during the summer months. When covered with ice, the water at the surface would be cooler, and it is probable that the general pollution would extend to the deepest points.

The location of the present pumping station was selected when the bay water was less polluted, and was undoubtedly the cheapest and best location when the cost of force main to the town is taken into consideration. To move the pumping station up the shore towards Bower's bay would involve a heavy expenditure for force main, as the excavation would be through solid rock for practically the entire distance.

The sewage from the town, now discharged into the Seguin river, is carried into the southerly part of the harbor and then, by the agency of currents and winds, the pollution is diffused. The engineers state that the greater the distance the intake be located from the mouth of the river, the less the degree of pollution. They are of opinion that the water from the present intake, or from an intake in that vicinity,

December 18, 1919

can be so purified by filtration, followed by chlorination, as to be safe for all domestic purposes.

If the harbor be retained as the source of supply, it will be necessary to treat the domestic sewage before discharging it into the river, and also to collect the sewage from a small, but important area near the pump house, and pump it over the hill to an outlet into sewers now flowing into the river. The first cost of the sewage disposal plant will depend upon the degree of purification necessary. Probably sedimentation tanks, and chlorine disinfection, will be considered satisfactory by the health authorities. The solids deposited in the tanks may amount to four tons per million gallons of sewage treated, all of which must be periodically removed and disposed of in some way. To collect the solids, and then discharge them into the river when it is in flood, would not give satisfactory results, but this might be done by an employee without the knowledge of the health officials, and the source of water supply seriously polluted. By chlorination, the bacteria in the sewage can be destroyed, but the dose must be a heavy one, say 50 to 100 lbs. of liquid chlorine for each million of gallons treated, or an average of about 35 lbs. per day.

Liquid Chlorine More Efficient

About 18 lbs. of hypo-chlorite of lime solution per million gals. are now used for sterilizing the water supply. Less than 3 lbs. of liquid chlorine would effect the same results as this quantity of lime. If hypo-chlorite of lime solution were used for disinfecting the sewage, it would require an average of 210 lbs. per day. The annual cost for chemicals for disinfecting the sewage, would therefore be about \$6 a day, to which must be added the labor of attendants, say \$1 a day, and the cost of the removal of the sludge. The total annual expense in connection with treating the sewage at the present time would amount to at least \$3,000 per annum. Pumping the sewage from the area contiguous to the water works pumping station would cost about \$600 per annum.

Mill lake is an expansion of the Seguin river, the outlet being distant 300 yds. from the north-east limit of the town. The lake is roughly circular, with an area of 1,100 acres. The Seguin river enters the lake from the north and discharges at the south-west angle. Another large stream enters the lake at the south-east angle.

The drainage area of the Seguin river above Mountain dam is given in a report of the Ontario Hydro-Electric Power Commission as 380 sq. miles. The annual run-off on this drainage area is given as 622 cu. ft. per sec., with a recorded minimum of 33 cu. ft. per sec., in September, 1917, and a maximum in April of 3,620 cu. ft. per sec. There is an additional area, tributary to Mill lake, which would increase the total to over 400 sq. miles. Practically all the land within the watershed consists of low ranges of solid rock, with swampy valleys between, which are scantily timbered. There are many lakes and ponds in the watershed, and at several points dams have been erected for controlling the water.

At the foot of Mill lake a timber dam was constructed many years ago, the height of the crest being 10 ft. above the slack water below. This dam raised the water in Mill lake about 8 ft., and flooded considerable low land from which the standing timber has been removed. The town has acquired this dam and other dams at various points on the river.

Fewer Dangerous Bacteria

On the main stream, about three miles north from Mill lake, another timber dam exists, called the Mountain dam, with a height of 25 ft., and on the south branch, one mile south of Mill lake, a dam 5 ft. in height controls the water. Another important dam is at the foot of Lake Wau-beck. In all, there are about five substantial dams and several minor dams for controlling the water within the watershed, but none are being used directly for power purposes.

Early in the summer the lakes and ponds are full, and the dams overflowing. In the autumn and winter the stop-logs are removed and the water drawn down. In the early spring the lakes and ponds are refilled. Swampy areas have been flooded by these dams, and the water of the

Seguin has consequently acquired a swampy taste that is disagreeable. In color the water is brown, similar to that in the Ottawa river. It will probably be found to be much softer than Parry sound water, say the consulting engineers, and therefore more satisfactory for laundries, bathing, boilers, etc.

Bacteriologically, the Mill lake water will probably show a greater number of bacteria, they say, but fewer dangerous bacteria of the typhoid group than does the present source of supply. Mill lake has an elevation of 52 ft. above Georgian Bay. A contract has been awarded for a new concrete dam to replace the old timber dam.

Filtration, Chlorination and Aeration

Filtration and chlorination will render this water safe for domestic purposes, and some of the color will be removed by the filters, but there may be some difficulty in removing the disagreeable taste. In some places this has been accomplished by aeration.

As compared with the water in Parry Sound, the water from Mill lake will be darker in color, warmer in summer, softer, but occasionally swampy in taste. It will also be a safer water from the public health standpoint. The engineers state that they cannot assume the responsibility of recommending the taking of the supply from the Seguin river below Mill lake, owing to the number of nuisances that now exist along the river bank, and the possibility of factories or buildings being erected that will drain into the river. This river bank could, however, be cleaned up, and as it is now owned by the government, it is probable that it could be protected from future pollution. The danger of sewage pollution from the Mill lake area may be considered as negligible, but in order to prevent contamination, a strict surveillance of the lake shore will be necessary, if it should be selected as the source of supply.

The size of the conduit necessary to convey the water from Mill lake to the pumping station at the power house will depend on the height at which the water in the lake is to be maintained. With a 24-in. conduit, the discharge at the pump house would be 1,630 gals. per min. with the water in the lake drawn down 7 ft. below the crest of Mill lake dam, 2,240 gals. if drawn down 5 ft., and 2,650 gals. if lowered 3 ft. The engineers are of opinion that the lake will seldom be lowered more than 5 ft. With this head, a 20-in. conduit would deliver 1,450 gals. per min., and an 18-in. pipe 1,100 gals. per min.

In the Mill lake scheme, by reducing the diameter of the conduit from 24 ins. to 18 ins., the capacity would be decreased by about one-half, and if Mill lake were drawn down a few feet, the discharge would not be sufficient for fire service, and it would then be necessary to supplement it by pumping from the power house fore-bay.

The engineers state, therefore, that they would not advise that the conduit be made less than 20 ins. in diameter. This will discharge 1,100 gals. per min., with Mill lake lowered 7 ft.

The Trout Lake Scheme

Trout lake is distant about two and one-half miles in a straight line north from Mill lake. The area of the lake is about 660 acres, and the area of its tributary watershed 1,340 acres, in addition to the lake surface. The greater part of the shore line is rock, and one sounding gave a depth of 45 ft. The water in this lake is clear, quite a contrast to the amber-colored waters of the Seguin river and Mill lake, and was found free from pollution.

The lake discharges normally to the southward, but in high water it overflows eastward through a ditch; both outlets eventually discharge into the Seguin river.

At the main outlet, the stream falls about 30 ft. in a distance of about a half-mile, entering a small pond. Leaving this, the water flows through a rocky canyon, with a fall of 140 ft. in less than a mile. The elevation of Trout lake is 250 ft. above Georgian Bay, and 40 ft. above the top of the existing steel water tank.

The length of gravity conduit necessary to convey Trout lake water to the power house would be about 32,000 ft., and about 5,000 ft. length additional main required from the

power house to the tank. If a 12-in. conduit were laid throughout, it would deliver about 1,000 gals. per min. at the power house, and 450 gals. per min. into the water tank. The discharge would be doubled by using a 16-in. conduit. A satisfactory domestic supply could be given for some years by gravity through a 12-in. conduit, but for fire service, pumping would be necessary. Should the domestic demand increase the peak above 500 gals. per min., it would be necessary to boost the pressure by pumping.

Gravity Type Filter Plant

If a 16-in. pipe were used, it would give domestic service without pumping for many years, but pumping would be necessary for fires and for domestic service whenever the peak demand exceeds 1,000 gals. per min., or at the rate of 1,440,000 gals. per day. The peak hourly domestic demand in the summer months is now about 600 gals. per min. and will increase with the population.

The quality of the water in Trout lake is satisfactory, and its elevation sufficient to give a domestic service by gravity. The clearness of the water is due to the small watershed as compared with the lake surface, and the rocky character of the country.

At Toronto the average annual rainfall is 34 ins., the minimum 24 ins., while at Parry Sound the average rainfall is 40 ins., and the minimum recorded in 27 years is 31 ins. The engineers state, therefore, that they can only safely assume that one-third of the rainfall on the land surface can be impounded in the lake. The evaporation from the lake surface will probably slightly exceed the rainfall on it. Assuming that in a dry season, 10 ins. of water can be impounded from the 1,340 acres, this will give an average daily yield of about 840,000 gals., or 583 gals. per min. The storage in the lake would be sufficient to guarantee a supply for about 8,000 people, with services unmetered, but by general metering of services, Trout lake might be depended upon to supply 12,000 people.

The engineers' estimates are for a rapid sand filter of the gravity type, with a capacity of 800,000 gals. per 24 hrs. The filter comprises four units each of 200,000 gals. capacity, one of which may be cut out for renewals or repairs, as the remaining three will be sufficient to deal with the maximum daily consumption. As the turbidity of Mill lake or Parry sound is never high, a much greater volume of water can be filtered, per square foot of filter area, than of more turbid river waters, or even Lake Ontario water at Toronto after gales.

Advantages Over Pressure Type

The filters will be superimposed over the clear water basin, and space provided in the filter house for storage of chemicals. Pressure filters are satisfactory, say the engineers, when not overtaxed or mismanaged, but the gravity type has these advantages:—

1. Their operation can be observed.
2. Removals and repairs can be more readily made.
3. The head can be varied with the condition of the sand or of the water.
4. More uniform and more satisfactory results can be attained.

If pressure filters be substituted for gravity filters, the cost of the Parry sound scheme or the Mill lake scheme might be reduced by \$5,000 but the engineers do not advise this.

The report states that the expenses of operating the present water supply are approximately as follows: Salaries and wages, \$2,500; electric power and fuel, \$2,000; maintenance and repairs, \$500; house services, \$500; making a total of \$5,500. The fixed charges amount to \$5,000, giving a total expenditure of \$10,500. The revenue from fire protection is \$3,200; from schools and municipal use, \$250; and from general consumers, \$9,550; totalling \$13,000. The engineers are of the opinion that the charges for maintenance and repairs are too low, and that no allowance has been made for depreciation.

The estimated cost of the new scheme is \$107,000, and includes the following items: Land and right-of-way, \$1,000; intake, 20 ins., 1,000 ft. long, \$10,000; pump well and pump

house, \$6,000; power transmission lines, \$4,000; two pumps, 750 gals., with motor, etc., \$10,000; pumps and pipes to filters, \$9,000; coagulating basin, 120,000 gals., \$7,000; filters, capacity 800,000 gals. a day, \$15,000; filter house, \$5,000; 400,000 gals. reservoir, \$15,000; venturi meter and chlorinator, \$2,500; and new mains, \$22,500.

As the existing intake from the pump house to Parry sound is of sufficient capacity for present requirements, the proposed new intake may be deferred for a few years, and, if this be omitted the estimate will be decreased by \$10,000.

An annual expenditure of \$19,970 will be made up as follows: Operating charges, \$7,700; fixed charges, \$12,270. The latter include \$5,000 on existing works and \$7,270 on new works and assume that debentures for these improvements will run for 30 years at 6% interest.

Estimates of Expense

To meet this expenditure it would be necessary to increase the annual revenue by about \$7,470, besides taking care of the fixed and operating charges in connection with the sewage disposal works.

It is estimated that the Mill lake scheme will cost \$128,000, as follows: Land and right-of-way, \$2,000; 24-in. conduit from Mill lake to power house, \$45,000; coagulating basin, filter equipment, reservoir, venturi and chlorinator, \$44,500; pump house, \$4,000; three pumps, each 750 gals., \$13,000; and 12-in. force main, \$19,500.

The cost of operation will be approximately \$7,600; the fixed charges on old works, \$5,000; and on new works, \$9,300; making a total annual expenditure of \$21,900. This scheme will necessitate an increase in the revenue of \$9,400. By adopting a 20-in. pipe instead of a 24-in. one, the first cost will be reduced by \$6,000 and the fixed charges lessened by \$435 per annum.

The third scheme, that of obtaining water from Trout lake, is more expensive, and will probably cost \$272,000, including the following items: Dams and head works at Trout lake, \$12,000; 16-in. cast-iron main, \$129,000; excavating and laying pipe, \$48,000; additional cost for rock excavation, \$30,000; reservoir, pumps and pump house, \$32,000; and force main, \$19,000. If wood-stave pipe be substituted for the cast-iron pipe estimated upon, the cost will be reduced by \$30,000, or possibly \$35,000.

The annual cost of operating the Trout lake scheme amounts to \$4,200, and is less than either of the others, as pumping would only be necessary during fires. The fixed charges on old works are \$5,000; on new works, \$19,740; making a total of \$28,940, which exceeds the revenue by \$16,440. By using wood-stave pipe, the annual reduction in the fixed charges would be \$2,180.

The conclusions arrived at by the consulting engineers are as follows:—

Conclusions

In the Parry sound scheme, the annual operating costs and fixed charges will be slightly higher than in the Mill lake scheme, but the difference is so trifling that it is not a factor in deciding between the two schemes. The Trout lake project would prove too expensive, and the yield from the watershed might not prove sufficient for the future requirements of the town. For the present, Parry sound water, filtered and chlorinated, would be a safe, wholesome water, cold, clear and palatable, and more acceptable to the citizens than Mill lake water. The Parry sound water, however, is now polluted with sewage, and this pollution will increase. Even if the sewage be treated, there will always be a danger of untreated sewage, or of sludge, being discharged into the river below the power house, and carried into the sound.

The water in Mill lake is contaminated by vegetable growths, which render it objectionable in its raw state. The flooded lands within the watershed of the Seguin river no doubt increase the natural contamination, but it is improbable that this will be further intensified, and it is not so dangerous as the Parry sound water, which is polluted by sewage.

Filtration will improve the quality of the Mill lake water, remove the organic vegetable matter, and render it safe to drink at all times. The analyses and examinations

which are being made by the health authorities should demonstrate whether it is possible to remove entirely the disagreeable tastes and odors.

After treatment, Mill lake water will be preferable to Parry sound water for practically all industrial uses, steam boilers, heating plants, laundry purposes, etc., but will not be so palatable as Parry sound water.

Taking the future development of the town into consideration, the engineers favor Mill lake as the source of future water supply.

STEEL CO. IMPROVES PUMPING FACILITIES

BY constructing an earthen dyke, 4,000 ft. long, around the eastern end of Grand lake, thus creating a new basin 5 ft. higher than was previously possible, the Dominion Iron & Steel Co., of Sydney, N.S., has increased the water area of the lake from 180 to 390 acres. This was necessary in order to secure an adequate supply of fresh water for the steadily growing steel company, who, during the last year, have installed a large coal washing plant and two modern batteries of Kopper's coke-ovens. The old spillway at the outlet has been replaced by a new 94-ft. spillway of substantial design.

The enlarged area which will hereafter be under water made necessary the relocating and rebuilding of two and a-half miles of the Sydney & Louisburg Railway Co.'s tracks between Victoria Junction and the steel company's assembly yard, the installation of new reinforced concrete culverts, new telegraph and telephone lines and a new water tank. The work also involved the raising—for a distance of 2,000 ft.—of the Sydney and Glace Bay Railway Co.'s tracks, as well as the power lines of that company.

An interesting feature in connection with this part of the work is that the alterations to the Sydney & Louisburg and the tram company's railway systems were effected without any delay or interference to the operations of their regular train or tram service. These changes in the track and pole lines required excavation of 80,000 cu. yds. of earth and rock.

The steam pumping equipment formerly in use, installed in 1910, has now been replaced by three new DeLaval electrically driven centrifugal pumps, each with a capacity of 4,000,000 gallons daily. Two of these units are expected to be in constant service. The third is a spare. These pumps are housed in a new fireproof building.

The connecting of the old water main to the new pump house required the raising and relocating of 3,200 ft. of the old 20-in. pipe line, but the change was made with only a slight interruption to the water supply of the Sydney coke plant.

The new elevation of Grand lake is about 100 ft. above the sea level. The increase of 5 ft. over the former level results in the total storage capacity being enlarged by 625,000,000 gals.

Steps have been taken to organize the municipalities in the Niagara district for the purpose of holding a "Niagara District Industrial Conference" next summer.

Since the federal government's purchase of the C.N.R., several provincial governments owning railway lines have endeavored to sell them to the Dominion cabinet. The New Brunswick government would like to dispose of the Valley Railway, while Alberta is ready to sell the Great Waterways, and British Columbia is anxious to part with the Pacific Great Eastern.

Estimated originally at about \$5,000,000, the new Parliament buildings at Ottawa are expected to cost at least \$8,000,000. This increase is mostly due to the rising cost of labor and materials, one and a half millions being charged up to the former and one million to the latter. Delays on the work are responsible for another half million. Definite instructions have been given that the buildings must be ready for temporary occupation at the February session of parliament.

Letter to the Editor

TRADE UNIONISM AND ENGINEERS

Sir,—After careful perusal of the article entitled, "No Room for Trade Unionism in Engineering Profession," Say Directors of American Association of Engineers," published in your issue of November 27th, 1919, the writer wishes to make these comments:—

The substance and reasoning tend towards an idealism of which the engineering profession already has too much, and appear to be the conclusions of the ultra clever and brilliant of the profession, who, either by hard labor or circumstances, have reached the pinnacle where remuneration or the struggle for existence ceases to bother them. They represent, so to speak, the capitalistic class of the profession.

To the vast multitude, the unnumbered hosts of the profession, the writer believes the conclusions expressed do not apply. In discussing methods, the term, "dignity of the profession," is used. Where, let me ask, is this "professional dignity," on construction works on which the professional engineers and inspectors (for engineers sometimes have to be inspectors) receive less remuneration than foremen and other labor-trade men?

These are conditions which should not exist unless engineers of this class are merely to render service to society.

Is the professional engineer not a laborer? He usually toils, not eight but fifteen or sixteen hours a day. He is no more nor less than an educated and specialized laborer. Why, then, should other laborers have unions and associations in which they are allowed to have at least some voice as to what the products of their efforts are worth, while the engineer stands alone, like a mendicant, and is compelled to take whatever his employer feels like giving him.

In the struggle for existence all laborers must necessarily co-operate and work together towards one end—viz., to make this world of ours a better place to live in. The artisans and laborers, less educated than professional engineers, have taken the lead by organizing and banding themselves together with advantage. Unionism, although it has faults, has advanced the status of these organizations and has placed some of their members in parliaments.

If our great professional body cannot evolve some policy for the betterment of its members as a whole, why not adopt labor unionism as it is, and then apply ourselves to elevate it, not only for our own benefaction, but for the welfare of all laborers, and strive to blend all classes together, until we reach the time when strife and strikes shall be no more?

FRED CHRISTIE.

Peterborough, Ont., December 11th, 1919.

The Midland district of the Department of Public Works of Canada has been added to the Central Ontario district, of which John M. Wilson is engineer in charge. This action was taken this week, after the death of Mr. Armstrong, who was district engineer at Midland.

N. Quesnal and James T. Lewis, both of the John Inglis Co., Toronto, will address the Ontario section of the American Society of Mechanical Engineers this evening (December 18th) at the Engineers' Club, Toronto. Their subject will be "Thirty Years' Progress in Boiler Construction in Canada."

The proposed joint water scheme for the border cities of Ontario (Windsor, Walkerville, Sandwich, Ojibway and Amherstburg) which will likely be voted on by the people of those municipalities at an early date, will cost about \$2,100,000, according to the engineers' estimates. Of this amount \$980,000 is required as compensation for the existing plants.

TWO NEW HYDRO-ELECTRIC POWER PLANTS FOR NOVA SCOTIA

THE Nova Scotia Power Commission has been authorized to proceed with the development of what are known locally as the Margaret's Bay water powers, about 20 miles from Halifax. The commission is undertaking immediately, and will carry forward as rapidly as possible, an initial development of about 8,000 h.p. It is probable that at a comparatively early date work will be undertaken at another site with an ultimate capacity of approximately 16,000 h.p.

NEW PREST-O-LITE PLANT AT TORONTO

THE Canadian National Carbon Co., Ltd., and the Prest-O-Lite Co., of Canada, Ltd., have jointly purchased ten acres at the corner of Bathurst street and Davenport road, Toronto, as a site for a new manufacturing plant. The new plant will consist of two buildings, one of which will be 80 by 400 ft., two stories high, with one section 80 by 80 ft., three stories high, to be occupied by the Canadian National Carbon Co., while the building for the Prest-O-Lite Co. will be 80 by 400 ft., two stories high. The heating plant will be housed in a separate structure, 50 by 60 ft., and will have room for installation of additional units.

All the buildings will be of reinforced concrete, with flat-slab floors and mushroom-type columns at 20-ft. centres, steel sash and brick curtain walls. The plant will be served by two switch tracks operated under a joint agreement between the Canadian Pacific and the Canadian National railways. It is expected that the plant will be ready for occupancy in May, 1920.

At present the two companies are operating five plants at different locations in Toronto. R. H. Combs, who has been general manager of the Prest-O-Lite Co. for the past three years, was also recently appointed general manager of the Canadian National Carbon Co. In addition to the plant described above, Mr. Combs states that the company will erect in the spring a new acetylene-gas plant in Toronto or vicinity, and a new storage-battery warehouse and assembly plant at Winnipeg. The contract for the Toronto plant has been awarded to Wells & Gray, of Toronto.

PROPOSED PETERBORO FILTER PLANT

PRELIMINARY plans and estimates of cost for a filter plant have been submitted by William Kennedy, Jr., consulting engineer, Montreal, to the Utilities Commission of Peterboro, Ont. The report states:—

"After a study of the quantity of water supplied to the town for the past few years, the quantity required at certain hours of the day, and especially during dry and hot spells of weather, together with possible heavy drafts of water for fire purposes during such dry and hot weather periods, also making allowance for an increase of population and water consumption, I have decided to recommend for first construction a mechanical gravity, sand filter plant of five million gallons' capacity per day, and in connection with this filter plant a covered reservoir of two million gallons' capacity.

"The filter plant will be designed for six million gallons' capacity per day in units of one million gallons to each filter unit, but five units only to be first installed, with the necessary connections made for the sixth unit when required.

"I may also mention that the plant is so designed as to permit of duplication of these six units, thus providing for an ultimate filter capacity of twelve million gallons daily.

"It is estimated that a five million gallons' plant will be sufficient for all purposes until the year 1925.

"The reservoir, containing filtered water, will have a present capacity of two million gallons, and is so designed and placed that its capacity may be increased to say four or five million gallons when so required.

"The additions to the filter plant or reservoir, or both, may be made without interfering with the water supply to the town.

"Full plans and specifications for the entire plant, including coagulating and clear water basins, low-lift pumps, etc., as above outlined, will be prepared, and from which tenders will be invited from contractors for the different classes of works, materials and equipment included. The whole of the necessary works and supply of materials, etc., will be divided into, say five contracts, but one contractor may undertake two or more contracts, or even the entire works required; or a part may be done by day work under the direction of your waterworks superintendent.

"The contracts may be divided about as follows:—

"1. Intake crib in river; intake pipe; suction well; construction work generally; and superstructure for filtration plant.

"2. Filter equipment.

"3. Low-lift pumping machinery; suction and discharge pipes within the building; electrical equipment.

"4. Outside pipe lines, including 24-in. discharge from the low-lift pumps; 30-in. conduit from clear water basin to pumping station, with valves, etc.; necessary sewers and drain connections.

"5. Two million gallon clear water reservoir.

"The specifications will also provide for receiving and the consideration of tenders for the entire filter plant from reputable contractors who may wish to make such modifications from the prepared plans and specifications as will suit their own designs and construction.

"It is intended to place the entire works on the Carnegie property recently acquired by your commission, except the pipe lines from the reservoir to the pumping station, which will run along the roadway.

"The estimated cost of the works above outlined is \$300,000. More detailed plans may lower this estimate somewhat. My opinion is that the works, as per this report, can be built for the amount named.

"The main items in the cost of operation will be wages, fuel for heating purposes, power and chemicals.

"Assuming 3,600,000 gallons per day filtration, the estimated cost for operation—assuming chemicals at their present prices—is \$10,700 per annum, or say, \$8.15 per million gallons of filtered water, or assuming a population of 23,000, this is equal to say 47 cents per capita, interest and sinking fund not included."

The membership of the American Association of Engineers has passed the 10,000 mark, according to a bulletin sent out by the secretary of the association.

F. W. Thorold, consulting engineer, Toronto, is reporting on the water works system of Strathroy, Ont. The wells are not furnishing the amount of water expected, and it is anticipated that a new source of supply may have to be found.

A. D. Swan, Montreal, consulting engineer to the Vancouver Harbor Commission, has been instructed to proceed immediately with plans for the first unit of the proposed improvements, which will cost \$5,000,000. Tenders for the initial work will be called for during the next six or eight weeks, it is said.

Members of the Manitoba branch of the Engineering Institute of Canada met December 9th in the Fort Garry Hotel, Winnipeg, and tendered a complimentary banquet to those of their number who have returned from overseas. The principal item on the program was the presentation by Brig.-Gen. H. N. Ruttan of an illuminated address to Capt. C. N. Mitchell, V.C., M.C. Following the silent toasting of the "glorious dead," T. R. Deacon proposed the toast to the guests, which was responded to by Maj. E. P. Featherstonhaugh, Lieut.-Col. R. H. Mulock, Maj. A. J. G. Taunton and Maj. C. W. Chivers. Short addresses were also given by Mayor C. F. Gray, Hon. G. Grierson and Isaac Campbell, a well-known lawyer.

The Canadian Engineer

Established 1893

A Weekly Paper for Civil Engineers and Contractors

| Terms of Subscription, postpaid to any address: | | | |
|---|------------|--------------|---------------|
| One Year | Six Months | Three Months | Single Copies |
| \$3.00 | \$1.75 | \$1.00 | 10c. |

Published every Thursday by

The Monetary Times Printing Co. of Canada, Limited

President and General Manager
JAMES J. SALMOND

Assistant General Manager
ALBERT E. JENNINGS

HEAD OFFICE: 62 CHURCH STREET, TORONTO, ONT.
Telephone, Main 7404. Cable Address, "Engineer, Toronto."

Western Canada Office: 1206 McArthur Bldg., Winnipeg. G. W. Goodall, Mgr.

PRINCIPAL CONTENTS

| | PAGE |
|--|------|
| Proposed Development of Hamilton Harbor, by J. M. Wilson | 537 |
| \$2,357,000 Sewerage Scheme Recommended for Eastern Part of York Township, Ont. | 540 |
| Patrol Maintenance of Hard Surface Roads, by J. S. Crandell | 542 |
| Toronto's Marginal Boulevard, by R. B. Evans. | 543 |
| The Town Plan and the Factory, by L. B. Duff | 544 |
| Four Dams Proposed for St. Lawrence River.. | 545 |
| Parry Sound Water Works | 548 |
| Letter to the Editor | 551 |
| Steel Company Improves Pumping Facilities.. | 551 |
| Two New Hydro-Electric Plants for Nova Scotia | 552 |
| Proposed Peterboro Filter Plant | 552 |
| Personals and Obituaries | 554 |

PAVEMENT GUARANTEES

HEATED discussion followed the proposal made last February to the American Road Builders' Association by its committee on economic status of guarantees for pavements on roads and streets, that 10% of the contract price of new paving, and 20% of the contract price of resurfacing work, be retained by municipalities as a guarantee of satisfactory construction.

It was claimed by the paving contractors that serious injury would be done to their business as a result of the retention of such a large percentage of their contract price. The committee took these objections into consideration and decided that they could be practically eliminated by reducing the amount of the retained percentage to a point where the money retained would merely equal the reserve which the contractor might reasonably be expected to set aside to cover repairs.

From the committee's final report, published in *The Canadian Engineer* for November 27th, 1919, it will be noted that the amount of the guarantee was reduced from 10% to 5% for new construction, and from 20% to 8% for resurfacing, with the idea that the contractor should be paid immediately upon completion of his work all the money which he has expended in construction, together with a 10% profit.

Francis P. Smith, consulting paving engineer, New York City, advises us that the committee were of the opinion that if paving work be constructed with reasonable care, the percentage guarantee finally recommended by the committee would be sufficient to cover all ordinary repairs, and that it is inadvisable and nearly impossible to set aside a reserve sufficiently large to cover anything like a complete failure of pavements, and that protection against such contingency should come from the guarantee bond.

ENGINEERING WORK AT THE FRONT

CANADIAN engineers who saw active service with units in France are probably without knowledge of the doings of other "sappers," who served in Siberia; and officers and men who were sent to Italy have no idea what kind of work had to be done in India; those who were in Serbia have heard little of conditions in Gallipoli; sappers who encountered great heat in Mesopotamia would be interested to know the conditions that were met on the Archangel front. Each and every front of our expeditionary force had its own trials and met conditions peculiar to the part of the world in which it was engaged. Sappers were called upon, probably everywhere, to fulfil their functions as complete units or field companies, but there is no doubt but that individual sappers, or small parties of sappers, were often sent to perform some important work, away from the force and lines of communication, where unique difficulties were encountered.

It is suggested that it would be very interesting to all engineers, whether they have served overseas or not, to read short accounts of the experiences of sappers who have served on the different fronts. *The Canadian Engineer* would like to receive and will gladly pay for articles dealing with the different phases of sapper activity on the various fronts.

Those Canadian engineers who served with bridging trains in Palestine and Egypt could write valuable accounts of engineering operations prior to the capture of Jerusalem, and those who were building railways could put together interesting material on this subject. Many Canadians also served with the Royal Engineers in India, Mesopotamia, Persia and other countries, and every man must have had some engineering experiences differing from those of his fellows.

COURT ACTION FOLLOWS ELECTROLYSIS

ACCORDING to T. H. Hooper, waterworks superintendent, approximately twenty-five miles of Winnipeg's water mains are at present affected by stray electrical currents from the tracks of the Winnipeg Electric Railway Co. Mr. Hooper has been instructed to report upon the cost of examining the whole of the twenty-five miles affected. The city is now suing the company for \$18,000 alleged damages through electrolysis.

SUIT AGAINST ONTARIO "HYDRO"

THE council of Stamford township, Ontario, is about to bring a test suit against the Hydro-Electric Power Commission of Ontario in connection with the power canal which is being built between Chippawa and Queenston. In the past five months sixty wells have dried up in Stamford within half a mile of the canal. The Hydro Commission decline to admit liability and refuse to supply the farmers affected with water unless they pay for it.

MOTOR FLUSHERS EFFECT BIG SAVINGS

INTERESTING facts relative to the saving effected by the replacement of horse-drawn equipment by motor street-flushers are given in the report of the Works Commissioner of Ottawa. He says: "Each of our flushers mounted on motor trucks has replaced ten horse-drawn outfits. Two 1,000-gallon power flushers mounted on 3½-ton trucks operated all year, flushing an average of 18 miles of pavement, of all widths per day at a cost of \$1.72 per mile. The total cost was \$4,650 for 150 days of actual operation. The teams formerly used accomplished this work for \$16,800."

THE editorial, business and mechanical staffs of *The Canadian Engineer* wish every reader a right merry Christmas and a happy New Year.

PERSONALS

JOHN M. WILSON, who has just presented to the Hamilton Harbor Commission his report on the proposed waterfront development at that city, was born September 7th, 1883 in Toronto, and was educated in the Toronto public schools, at Harbord Collegiate and at S.P.S., University of Toronto, where he graduated in 1908 in civil engineering.



After a year with the Wood Products Co., which concern has since been absorbed by the Standard Chemical Co., Mr. Wilson joined the engineering staff of the water works department, city of Toronto, in 1909, but a few months later he resigned in order to become city engineer of Moose Jaw, Sask. In 1911 he left the employ of the city of Moose Jaw and formed the contracting firm of Wilson, Townsend & Saunders, whose head office was at Moose Jaw at first but who

moved to Toronto in 1913. In 1914 Mr. Wilson withdrew from that firm in order to accept an appointment as senior assistant district engineer of the Toronto office of the Public Works Department of Canada, and a month later he was appointed district engineer of the central Ontario district, with headquarters at Toronto, which position he still retains. The central Ontario district includes the large territory which may be roughly described as being bound on the south by Lake Ontario, on the west by Georgian Bay, on the north by a line drawn from Manitoulin Island to North Bay, and on the east by a line drawn from North Bay to Kingston.

ALFRED NOSWORTHY, architect and industrial engineer, formerly of Lacroix & Nosworthy, Quebec, has opened an office in Montreal.

LIEUT. H. E. BATES, who returned recently from service overseas, has accepted a position with the Laurentide Co., Ltd., Grand'Mere, P.Q.

THOMAS R. PATTERSON, of Auburn, Ont., has been appointed engineer for Huron county succeeding his father, Donald Patterson, who resigned owing to ill-health.

MAJOR P. J. JENNINGS has returned from service in German East Africa, and is now in Calgary with the Department of the Interior, Reclamation Service, Irrigation Branch.

H. A. GOLDMAN, of Toronto, has been appointed acting secretary of the Toronto branch of the Engineering Institute of Canada, in place of W. S. Harvey, who resigned on account of moving to the United States.

PAUL F. SISE has been elected president of the Northern Electric Co., Ltd., succeeding Edward F. Sise, who has resigned in order to devote his time to other activities. Paul F. Sise returned last spring from overseas.

SPENCER BALL, who graduated in civil engineering at the University of Saskatchewan, with the class of 1916, has been appointed to a position on the hydraulic engineering staff of the Hydro-Electric Power Commission of Ontario. Mr. Ball enlisted immediately upon graduation and within a couple of months was sent to France, where he won a commission as lieutenant and served with the Canadian forces until he was wounded not long before the armistice.

He was confined to a military hospital in England for nearly a year, and reached Canada only a few weeks ago.

J. E. HOLLAMAN, who made the surveys and plans for the proposed development of Hamilton harbor, was born May 1st, 1887, in Glasgow, Scotland, and was educated in the public schools of that city, at Allen Glen high school and at the Glasgow and West of Scotland technical college, where he studied architecture. Simultaneously with his college course, Mr. Hollaman served a five-year apprenticeship in an architect's office in Glasgow. After graduation he went to the United States and worked in New York City for two years, obtaining general office experience and also six months' supervision of structural steel work. In 1909 he came to Canada and entered the employ of the works department of the city of Toronto. He assisted E. L. Cousins in the preparation of



reports on pay-as-you-enter cars and other phases of street railway operation and in the making of surveys and plans for proposed subways, and in other miscellaneous engineering work. In 1912 he left the employ of the city to follow Mr. Cousins to the Toronto Harbor Commission, where he was employed at first as chief draftsman, and later as assistant on special works. He resigned from the staff of the Toronto Harbor Commission in 1918 to join the aviation department of the Imperial Munitions Board, where he carried out surveys and miscellaneous engineering work under the direction of J. B. Carswell. In December, 1918, he entered the employ of the Hamilton Harbor Commission to assist John M. Wilson in making a report on the proposed waterfront development, and since that date he has been in charge at Hamilton of the harbor commission's engineering office.

OBITUARIES

ALEXANDER ORR, of Orr Bros., contractors, Toronto, recently died, aged 57. Mr. Orr was born in Barrie, Ont., and had resided in Toronto for 35 years, during which time he had been engaged in contracting.

SIR JOHN JACKSON died last Monday in England, at the age of 68. He was famous as a contractor for public works in various parts of the world, and was a civil engineer of note. Among the great projects with which he was connected were the Manchester Ship canal, the railway across the Andes, the barrage across the Euphrates river near Babylon, the Mesopotamia irrigation works, and harbor works in Canada, South Africa, Singapore and other countries.

JOHN H. ARMSTRONG, one of the oldest employees in the service of the Public Works Department of the Dominion government, died December 13th, in Midland, Ont., from neuritis after a week's illness. Mr. Armstrong was district engineer of the Midland district, which district extends as far north as Byng Inlet and includes Parry Sound, Muskoka and portions of the Georgian Bay and Lake Huron. Mr. Armstrong was in the Toronto office of the department for many years, but upon the formation of the Midland district, he was appointed as engineer in charge of it. Mr. Armstrong is survived by a widow, two daughters and three sons.

CONSTRUCTION NEWS SECTION

Readers will confer a great favor by sending in news items from time to time. We are particularly eager to get notes regarding engineering work in hand or proposed, contracts awarded, changes in staffs, etc.

ADDITIONAL TENDERS PENDING

Not Including Those Reported in This Issue

Further information may be had from the issues of *The Canadian Engineer*, to which reference is made.

| PLACE OF WORK | TENDERS | | PAGE |
|---|----------|----------|------|
| | CLOSE | ISSUE OF | |
| Bamfield and Uchuelet, B.C., wharf repairs | Dec. 22. | Nov. 27. | 52 |
| Banff, Alta., construction of bridge | Jan. 7. | Dec. 4. | 45 |
| Canwood, Sask., erection of school | Jan. 1. | Dec. 11. | 48 |
| Finch, Ont., road construction | Jan. 19. | Dec. 4. | 45 |
| Halifax, N.S., bridge construction | Jan. 5. | Dec. 11. | 45 |
| Montrose, Ont., steel superstructure of railroad bridge | Dec. 22. | Dec. 11. | 45 |
| North Battleford, Sask., power plant equipment | Dec. 20. | Dec. 4. | 54 |
| Vancouver, B.C., dredging and filling work | Dec. 29. | Dec. 11. | 54 |
| York Tp., Ont., cast-iron pipe, cast-iron specials, gate valves, hydrants and cast-iron valve covers and frames | Jan. 17. | Dec. 11. | 54 |

BRIDGES, ROADS AND STREETS

Agassiz, B.C.—Movement is on foot for erection of bridge here.

Assiniboia, Man.—The erection of a temporary foot-bridge is contemplated. Clerk, Frank Ness, Kirkfield Park, Man.

Banff, Alta.—The bridge to be erected here over the Bow River, for which the Dominion government has called for tenders, will be built of reinforced concrete at an estimated cost of between \$160,000 and \$200,000. It is to be 416 feet long by 56 feet wide.

Beaverton, Ont.—Town council plans sidewalk and road repairs at cost of \$5,000. By-law will be voted on. Clerk, G. A. Patterson.

Charleswood, Man.—Tenders addressed to A. B. Blakely, secretary-treasurer, Municipality of Charleswood, Man., will be received at the office of the Highway Commissioner, Winnipeg, Man., up to 12 o'clock noon on Tuesday, December 23rd, 1919, for the construction of concrete foundations, wooden Howe Truss spans and timber approaches thereto for a bridge over the Assiniboine River, near the village of Headingly, between the municipalities of Charleswood and Assiniboia. Plans and specifications may be obtained at the office of the Highway Commissioner, New Parliament Buildings, Winnipeg.

Charlottetown, P.E.I.—According to an announcement made by Hon. George E. Hughes, the government is planning to take advantage of the federal road grant and expect to spend \$400,000 on roads next year.

Chatham, Ont.—By-law to raise \$17,300 for the erection of a new steel bridge over McGregor's Creek at Princess St. will be submitted to ratepayers. City engineer, Mr. Adams.

Chatham, Ont.—Kent county council has recommended to the 1920 council the erection of a bridge across the River

Thames at Prairie Siding. County road superintendent, L. A. Pardo, County Building, Chatham.

Chatham, Ont.—The farmers of Raleigh and Dover townships are urging the Kent county council to construct a bridge across the river a few miles below this city. County Road Supt., A. Pardo, County Bldg., Chatham.

Chatham, Ont.—City council passed a resolution, calling upon the Ontario government to proceed with the provincial highway scheme, and to designate the Longwoods Rd. as the route of the highway between Chatham and London.

Chilliwack, B.C.—Tenders will be called at once for construction of asphalt pavement at cost of \$18,000. City clerk, Peter J. Brown.

Coquitlam, B.C.—Municipal council has put forward a proposition to the government that they rock the Clarke Rd. for a mile at an estimated cost of \$6,200. Clerk, A. Hali-burton.

Danville, Que.—Municipal corporations of St. Camille, Wottonville, Wotton and Shipton, Que., have decided to build a road between Marbleton and Danville under government specifications. Address, L. P. Bishop, Danville.

Headingly, Man.—If the project is approved by the municipalities interested, a \$36,000 bridge will be built over the Assiniboine River at Headingly next summer. The structure will be of concrete and wood. By-laws will be submitted in Charleswood and Assiniboia to authorize the expenditure.

Kenora, Ont.—A by-law to borrow \$25,000 for road improvements will be submitted to electors at municipal elections. Clerk, J. E. Currie.

Kent County, Ont.—County council recommended that the plans and specifications of the County Engineer for pavement at Wallaceburg, Ont., be accepted and be forwarded to the Department of Highways for approval. Plans and specifications of the Duffis Creek bridge will also be submitted to the department.

Levis, Que.—City council gave second reading to by-law to borrow \$28,280 for paving of roads. Mayor, Mr. Belleau.

Mindemoya, Ont.—A definite good roads program on Manitoulin Island will be promoted as a result of a recent meeting held here, which was addressed by Hon. Beniah Bowman and an engineer from the Provincial Good Roads Department.

Morris, Man.—Engineers are here making plans and specifications for a bridge across the Red River. Approximate cost, \$100,000. Provincial Highway Commissioner, A. McGillivray, Parliament Buildings, Winnipeg.

Ottawa, Ont.—The good roads policy initiated by the government this year in the form of an appropriation of \$20,000,000, extending over a term of five years, is taking definite form and the spring and summer will see construction work actively in progress. The provinces will initiate and carry on the works, the Federal government approving the plans and contributing 40 per cent. of the cost. Ontario so far has filed plans for a provincial highway from Windsor to the Quebec boundary by way of Hamilton, Toronto, Kingston, Brockville and Prescott, with a branch road from Prescott to Ottawa. The plan of the Quebec government is to construct a first-class roadway from Hull to Montreal.

Port Hardy, B.C.—It is reported that the provincial government will construct a highway between Port Hardy and Coal Harbor next year. Minister of Public Works, Hon. J. H. King, Victoria.

Quebec, Que.—The Quebec Board of Trade and that of Drummondville are communicating with the officials of a number of cities and towns along the south shore of the St.

Lawrence River to advocate a highway that would lead from Montreal to Quebec on the south shore. The promoters of the idea have organized a monster delegation from every city, town, village and parish along the proposed highway, and this will meet the Provincial Cabinet, requesting the construction of the new road without delay. The idea is to start work early next spring.

Sarnia, Ont.—Lambton county council will purchase stone-crushers and other road machinery.

Sarnia, Ont.—A by-law to raise \$35,000 for the purchase of an asphalt plant and equipment will be submitted to the ratepayers at the municipal elections. City clerk, J. D. Stewart.

Simcoe, Ont.—Norfolk county council contemplates purchasing more road machinery. County road superintendent, G. R. Marston, Simcoe.

St. Clements, Man.—Tenders will be received by Thos. Bunn, secretary-treasurer, up to noon on Tuesday, December 23rd, 1919, for the supply and delivery of approximately 6,200 cubic yards of gravel. For specifications, apply to W. G. Mawhinney, Municipal Engineer, Municipal Hall, East Selkirk, Man., or to A. McGillivray, Highway Commissioner, Winnipeg.

St. John, N.B.—City council will have plans and specifications prepared for paving the North and South sides of Haymarket Square with granite blocks on a cement concrete foundation. City engineer, G. N. Hatfield.

St. Polycarpe, Que.—Municipality plans construction of 11,043 ft. of gravel roads; also macadam road, estimated to cost \$25,000. Secretary-treasurer, J. R. Ouimet.

Three Rivers, Que.—Council plans construction of pavement at cost of \$100,000. Engineer, Z. St. Lambert.

Toronto, Ont.—Board of Works decided to have Davenport Rd. paved and otherwise improved at a cost of about \$289,550.

Toronto, Ont.—Works Committee requested Commissioner of Works Harris to bring in a report recommending the grading of Woodbine Ave., between Kingston Rd. and Gerrard St.

Toronto, Ont.—The Board of Works, subject to a report by Commissioners Harris and Forman, decided to extend Norway Ave. through to Lee Ave. The cost, exclusive of grading, will be about \$40,000.

Vancouver, B.C.—The Woodward Departmental Stores plan erection of an overhead bridge over the alley between Hastings and Cordova Sts.

Victoria, B.C.—The Provincial Department of Public Works has under consideration the construction of a road from Campbell River to Salmon River, in Sayward district. Minister of Public Works, Hon. J. H. King.

Winnipeg, Man.—Permission has been granted by the city council for the erection of a footbridge from Donald St. to Portage Ave. City clerk, C. J. Brown.

Winnipeg, Man.—City Engineer W. P. Brereton will report on the cost of lengthening the approach to the Arlington St. bridge and on draining the McPhillips St. subway.

Winnipeg, Man.—Manitoba province, in conjunction with the municipalities, is planning the construction next year of several large bridges at an approximate cost of several hundred thousand dollars.

Winnipeg, Man.—A. McGillivray, Provincial Highway Commissioner, has announced that plans have been completed by municipalities of the province of Manitoba for the issue of debentures for an expenditure of over \$5,700,000 on road-building.

Winnipeg, Man.—Tenders addressed to R. C. Desrochers, secretary, Department of Public Works, Ottawa, will be received until 12 o'clock noon, Friday, December 19th, 1919, for the construction of roads and sidewalks at Tuxedo Military Hospital, Winnipeg. Plans and specifications may be seen at the offices of the Chief Architect, Department of Public Works, Ottawa; the Superintendent of Military Hospitals, Notre Dame Investment Building, Winnipeg, and the Resident Architect, Lindsay Building, Winnipeg, Man.

Wroxeter, Ont.—Town council plans construction of cement walks at cost of \$5,000. By-law will be voted on. Clerk, D. M. MacTavish.

York Tp., Ont.—The township solicitor was instructed by the council to proceed with the expropriation of land for the extension of Woodville Ave.

WATER, SEWAGE AND REFUSE

Dresden, Ont.—A by-law will be voted on at the municipal elections to provide \$10,000 for a water tank and equipment for a waterworks system. Clerk, J. T. Bridge-water.

Guelph, Ont.—Plans for the construction of a sewage disposal plant to serve Guelph township have been approved by the Provincial Board of Health. City engineer, F. McArthur.

Hamilton, Ont.—Board of Control recommended construction of 2-inch water main to the Isolation Hospital at a cost of \$3,500. City engineer, E. R. Gray.

Hamilton, Ont.—City council intends to construct a 4-inch force sewer, well and pumping plant on Simcoe St., at an estimated cost of \$3,865.34. City clerk, S. H. Kent.

Hamilton, Ont.—Board of Control accepted the tenders of City Engineer E. R. Gray for installation of sewers on Bay and Stinson Sts. and Roxbury Ave. amounting to about \$2,000.

Kincardine, Ont.—By-law will be submitted to ratepayers at next municipal election to borrow \$9,000 for extensions to waterworks system. Clerk, John H. Scougall.

Nanaimo, B.C.—Two schemes for the extension of the waterworks system are under consideration by the city council. The first one is estimated to cost \$166,051, and the second, \$199,107. Mayor, H. McKenzie.

Newmarket, Ont.—Town council intends to construct sewers on several streets at an estimated cost of \$18,000. Clerk, P. J. Anderson.

Orillia, Ont.—Town council has issued debentures to the amount of \$24,000 for waterworks. Clerk, C. E. Grant.

Petrolia, Ont.—Town council plans construction of glazed tile sewer. Clerk, John McHattie.

Port Dalhousie, Ont.—Town council plans waterworks system. Clerk, J. M. A. Waugh.

Sandwich and Ojibway, Ont.—No award was made by Essex Border Utilities Commission for completion of south sewage interceptor, for which tenders closed November 27th. Commissioner may consider cost-plus basis.

St. Louis de Gonzague, Que.—Dominion Department of Public Works let contract to O. Poliquin, Portneuf, Que., for two concrete abutments.

St. Thomas, Ont.—Tenders will be received by W. C. Miller, city engineer, until noon, Tuesday, December 30th, 1919, for the installation of electric and gasoline auxiliary pumping equipment for the waterworks. Plans and specifications may be obtained at the city engineer's office.

Three Rivers, Que.—Council plans aqueduct improvements at cost of \$20,000. Clerk, A. Nobert.

Three Rivers, Que.—Council plans construction of sewers at cost of \$75,000. Engineer, Z. St. Lambert.

Toronto, Ont.—Tenders addressed to T. L. Church (mayor), chairman, Board of Control, City Hall, will be received up to 12 o'clock noon on Tuesday, February 10th, 1920, for the supply and installation of: Tender No. 36—One or more 16 to 20 million Imperial gallon centrifugal pumps at the waterworks main pumping station. Specifications may be obtained at the Works Department, Room 12, City Hall.

Toronto, Ont.—The Oakoal Co. has offered to buy the city garbage for \$15,000 per year. At the present time it costs the city \$172,000 to dispose of it. The company proposes to erect a plant for the manufacture of briquettes