

CAMPBELL PLANS FOR A BETTER VARSITY

UNIVERSITY OF OREGON, Eugene Nov. 12—A great state university for Oregon with an immense student body, a high standard, as good a faculty as can be gotten together, and a system of dispensing knowledge that will reach the state at large, not merely the limited number on the campus, is the plan of President P. L. Campbell of the University of Oregon. It is a plan made possible by the favorable vote of November 4, upon the university building appropriations. Already it has been started. In a statement just before he left for Washington, D. C., to make an address before the National Association of State Universities, President Campbell gave an inkling of his plans. Here are some excerpts from his statements: "The university can now confidently bid for the best men the country produces as members of its faculty. Oregon has recently been unusually fortunate in securing men of the very finest type, but such good luck cannot be counted upon steadily unless there are reasonable expectations of permanent university growth. "With the university now free from the harassing distractions of campaigns and all other outside matters, its energies, with hope and renewed courage, in its problems of higher efficiency and broadened service, it can very soon become a principal factor in the state's development. "The whole system of higher education in Oregon is now in position to make remarkable advances."

FULL REPORT IS MADE TO COUNCIL

(Continued from page 1)

water supply, several of which were suggested.

Sources of investigation.

Early in the present year Messrs. Toozee, Horton and Metzner were appointed a committee by the Council to investigate sources of pure water. Many interviews were held with various engineers, involving trips to Portland and much correspondence with authorities in other parts of the state to obtain information in regard to engineering services and available sources of supply. The outcome of these efforts was the decision of the committee to pursue investigations along the following lines: 1. The Clear Lake proposition; 2. Hypochlorite; 3. Canby gravels supply; 4. The development of springs; 5. The sinking of wells; 6. The securing to Oregon City of Bull Run water rights and supply.

1. The Clear Lake proposition was considered first. Engineer Louis C. Kelsey who had been selected as consulting engineer by the State Board of Health to make a report on the feasibility of supply from this source by means of a pipeline from the Willamette Valley including Eugene, Salem and others, was consulted and made a verbal report of his efforts to the council of this city. Further consideration of bringing this water to Oregon City was abandoned by the committee for the time being, as it was found that the development of this source was practically impossible through large appropriation of state funds for the vast project and it would take from three to five years to furnish the same to Oregon City if the legislature should favor it.

2. The use of hypochlorite to reduce possibilities of contamination was considered and later the council requested the Board of Water Commissioners to install the same at the plant as a precautionary measure. This was done.

3. M. J. Lee representing himself and interested capitalists has offered to furnish water supply to this city under conditions set forth in a franchise prepared and now waiting for this council's consideration. The provisions of this franchise submitted in the summer after several conferences between the committee and Mr. Lee were given full consideration by the committee, attorney B. N. Hicks, representing the city and the committee at several meetings and finally completed, June 26, 1913, for further consideration by the Council when the further investigations of other sources should be completed and presented.

The committee examined the territory upon which this supply is located, with Engineer Dieck who took readings topographical and scientific and discussed this source at length under Section D, "The Canby Gravels" in his report of Mar. 19, 1913, on sources of supply other than the Willamette River. He therein expresses the belief that in wells driven through the hard clay below the upper gravel and well into the lower gravel at a sufficient distance back from the Molalla River to preclude any contamination from this direction a supply of water may be found which would be permanently free from human contamination. The quantity and quality would, of course, have to be determined by experiment, as by critical chemical and bacteriological analysis covering sufficient period of approximately 1700 per month would be charged. This would increase cost to average consumer for residence use approximately 64 cents per month, less of course his part of the reduction in cost of filtering estimated at \$35.00 per month.

(4) The amount to be furnished is minimum of 1,000,000 gallons and maximum of 2,000,000 gallons per day. (5) The term of the franchise is twenty years, Oregon City reserving the right to purchase at the end of

any five year period including land surrounding plant, right of way, leases, etc. The valuation shall be determined by three disinterested arbiters and in case they shall not agree it shall referred to the State Railway Commission for final valuation. The water pumped at Canby would flow through 48 inch wooden pipes by force of gravity and be delivered into the wells at the present plant. The same mains and power as now would be employed for distribution. There would be a saving in not filtering as shown in section 3.

The grantees of this franchise offer sufficient bonds to insure prompt and sufficient construction of line and delivery of water, according to terms of the franchise attached hereto. Employment of Engineer Dieck The employment of a hydraulic engineer preceded the investigation of the Canby Gravels. Engineer Dieck's selection by the committee was very careful and he held conference with and investigated the records of several very reputable men of training and experience, among them J. H. Cunningham, J. W. Morris, ex-city engineer of Portland, Louis C. Kelsey, and others. Engineer Dieck was formerly in the government service as sanitary and hydraulic expert in the Philippines, now Commissioner of Public Works Portland, was chosen at the current price paid all reputable engineers.

Mr. Dieck began his duties systematically and true to scientific principles, first examined the city filter plant and distributing system as a base for his calculations relative to the needs of the city in the matter of quantity of supply, etc. His investigations of this plant recorded in his report with his recommendations were both timely and would be very valuable if acted upon.

For several days both Mr. Dieck and the committee traversed the territory adjacent to Oregon City, making investigations of every source that gave any reasonable promise whatsoever.

The available sources investigated are described in the Engineer's report to the council March 19th. Among these sources were: (a) The Willamette Springs; (b) Wells in the hills west of the Suspension Bridge; (c) Wells in the hills east of the same; (d) wells and springs in Mt. Pleasant district, including the Lawton well and the Hartke spring; and (e), later the Hollowell spring and the Englebrecht tract.

(Minor prospects: (a) the Apperson Springs; (b) the source at Canby and nearby Oregon City, including five springs, among them the so-called "Lee" springs, the "Hobo" and other unnamed. These are of doubtful quality and quantity and open to serious contamination.

Unvisited sources: (a) The E. E. R. bridge crossing at New Era encountered what was alleged to be artesian water, but the amount of sulphur contained renders it non-palatable; (b) the Gard springs, once before investigated, showed a smaller flow than would be practicable for further development at this time.

Said report recommended the further investigation of the Mt. Pleasant prospects by the sinking of a cased well to a depth not to exceed 250 feet, and a test pumpage, and analysis if results should justify them. He further recommended a similar test of the deep well at Canby and should there be found sufficient flow, careful chemical and bacteriological examinations covering a period of time should be made before deciding definitely in regard to source. For his service of 13 1/2 days and for drafting materials, reports, etc., he was paid \$339.57. The Council directed the committee to make investigations, Feb. 19, 1913, and made an appropriation of \$500.00 therefor.

The council committee then advertised through the Portland papers for a contractor to drill a test well the matter was also advertised in the city papers. The committee directed the contractor to work according to regular plans and specifications prepared by the city engineer. Both contract and specifications are attached hereto, and may be referred to for terms, prices, etc.

The committee went over the Mt. Pleasant district and inspected the well at Canby and other prospects, April 24th. It was finally decided to drill a well on the Wm. Ladd tract in this district and an option was secured for 90 days for \$4.00 consideration April 29th, and the committee met and accepted the same May 2d.

Having gone on with the drilling so far as the appropriation of \$500 would allow and believing a deeper drilling should be made, the council in special meeting at which a large number of prominent citizens and taxpayers expressed a desire to see the work go further, voted an appropriation of \$1000.00 more to continue this well for a greater depth. This ordinance passed its second reading April 9th. The drilling was continued to a depth of 314 feet. Having failed to find water in sufficient quantities to supply the city, Mr. Scott, at a special meeting of the council and several other members of the committee, recommended discontinuing drilling on the Ladd tract as he had reached a depth and conditions where the project was unpracticable for further development. He offered to furnish two million gallons of pure water to the city per day from wells if allowed to select the site in close proximity to Oregon City. He would take his own chances on the purity and supply depending upon critical examination of both, the former through a series of both chemical and bacteriological tests extending over a period of several weeks and the latter through pumpage tests. He would furnish all materials and do all work efficiently and expeditiously. His price for the same he set at \$8000.00, if he fulfilled the conditions of his contract. He also offered to furnish a good and sufficient bond for faithful performance of the contract.

He further offered to drill the well at the nominal price of \$1 per foot to the city to furnish pipe, which, in case he was not successful in this attempt to produce a satisfactory supply of water, he would pull it possible and allow the city the cost price for the same. In case the wells were accepted, the regular price should be paid.

The councilmen at this meeting, June 4th, decided to accept the second offer and passed an ordinance appropriating so much as might be necessary to use for such further investigation of the Ladd tract as might be deemed advisable. At this meeting were, besides the councilmen present including the committee, a number of citizens and taxpayers. Expressions were unanimous urging this further effort.

June 10th, an option was secured on the G. Englebrecht tract and lying just beyond the limits of the city along by the road leading to Park Place. This option was to run for 60 days and the price of the property, if purchased at expiration of that period, was \$625 per acre. No charge was stipulated for the option itself. Later the committee became personally responsible for destruction of crop, fences, etc., incident to the work. The committee and Mr. Scott inspected the Hollowell Springs and considerable territory in the region of Gladstone, Meldrum, and the Clackamas river mouth, having determined upon this course at a special meeting of the council committee the evening previous, but found no site that promised so much as the tract above mentioned, the said springs not offering sufficient supply, and on Tuesday, June 17th, Mr. Scott began drilling an eight inch well on the Englebrecht tract.

The progress of this drilling, the cost and the results below are corroborated by the city engineer's and recorder's records. Clear and cool water in large quantity was found at a depth approximately 50 feet.

The drilling was continued to a depth of 148 feet. Having entered a brittle red shale indicating absence of good water in sufficient quantity drilling was discontinued at this depth. Having broken the pipe at depth of approximately 40 feet in pulling, a second well was drilled to a depth of 52 feet a short distance to the north side of the first.

Cost of wells: Ladd Tract Site. May, drilling 14 ft. at \$3, soil 8 ft. casing ..... \$ 42.00 May, drilling 236 ft. at \$5, rock and miscellaneous ..... 1222.00 June, drilling 64 ft. extra at \$2.50 ..... 160.00 June, drilling 134 ft., 6 inch pipe ..... 87.65 June, labor pulling pipe ..... 8.75 June, less 117 ft., 6 inches line pipe pulled, at 65c ..... 76.65 Total ..... 1444.35

Englebrecht Tract Site: Drilling 148 ft. at \$1.00 ..... \$ 148.00 Casing, 8 inches, 35 ft. 9 ..... 35.75 Pulling pipe ..... 17.50 June 18: Drilling, putting in pump, etc. 61.25 Casing 8 in. 52 ft. 7 in. ..... 52.60 Express on Jacks ..... 6.50 Express on Jams ..... 2.45 Miscellaneous during pumping 4.50 Pumping, total, one day ..... 17.30

Less available pipe, 52 ft. at \$1.00 ..... \$52.00 100 ft. at 65c ..... 65.00 Total ..... \$117.00 Above total ..... \$ 345.85 Less ..... 117.00 Cost of pulling pipe ..... \$ 17.50 Total ..... \$ 246.35

Entire cost of drilling three wells ..... \$1690.70

Condemnation From the first there has been opposition to every investigation attempted by the committee, even Bull Run supply for this city, before the facts in any case could be established. In opposition to the Englebrecht well it has been stated: (1) That the tract overflows and the well would be contaminated thereby. The latter claim has been refuted by the statement of hydraulic engineers that all surface water may be easily and effectively cased out from any opening. The pipes themselves are impervious to all outside influences including water, and the surrounding territory could be kept entirely free from contaminating influences, actual or estimated, up to eight acres of the same.

(2) A second objection urged was that the site of the well was subject to all the contamination of the Abernathy Creek, a nearby lake, and the Willamette and Clackamas rivers. According to the city engineer's measurements, actual or estimated, the distances are: from the Abernathy running stream, 600 ft.; from the lake, 1600 ft.; from the Willamette 1800 ft.; and from the Clackamas, 2500 ft. If, however, the water from these sources should find its way to wells it would signify little or nothing, as it would have to pass through the above quoted distance of the best quality of water gravel, which would eliminate the possibility of contamination, we believe. In fact this gravel is universally recognized as the best filter for water for municipal purposes. For example many of the cities of this country and Europe are supplied with water from cased wells, the water turned into and filtered through artificial beds. Gladstone obtains her supply, said to be pure, from the Clackamas river and filtered through a chute 4 to 5 feet in diameter, a few feet long and pumped direct into the mains, we are informed. Again, these streams are all flowing water and the lake is fed by springs and can easily be drained. The soil surrounding this well is clay loam, clean and under cultivation, and within a hundred feet of the main traveled highway.

It has been claimed that the water that rose in the well was seepage from the Willamette, but this was proven idle speculation by the facts in the case. During the summer while observations were being made in regard to water conditions, the Willamette low-ered between 4 and 5 feet and the water in the well lowered, only 4 inches, and this after pumpage.

That every citizen in the community might have opportunity to inspect the grounds and see and taste this water, several different dates were set and the hours named for pumpage at noon and in the evening, when the men from business and from work could, by a little extra effort, be present. Many of our citizens availed themselves of this opportunity and this committee has yet to hear from any one of them unfavorable comment, though some of them were at first prejudiced against it.

The soil formation is entirely favorable to this location for wells, rendering surface contamination impossible. It was shown in the drilling that there are four strata of earth and gravel: (1) an earthy clay, clean and fine and difficult for water to pass through, thus providing an excellent filter in itself, 8 ft. thick; (2) sandy loam 20 ft. in depth; (3) then occurs a four foot layer of very fine sand. This sand contains also a slight admixture of clay; (4) then a clean genuine water bearing gravel is found 18 to 20 ft. in depth. There is found water estimated at nearly two million gallons per day for four wells. Sam-

ples of these formations or strata are exhibits 1, 2, 3, 4 respectively. Samples of this and other water taken from the river and hydrants were submitted for analysis and comparison. The reports obtained from the state bacteriological laboratory, have always been public property and could have been obtained from the chairman of this committee by river committee member for the asking. No official outside the committee ever requested the results from the examination of the samples in question. The committee, for obvious reasons decided not to publish these reports until such time as the Portland Commissioners would furnish in writing the terms of Bull Run water supply for Oregon City to the committee itself. It was expected every day for weeks that these terms and report of the Commissioners would be received and the whole matter of water supply reported upon to our citizens. For reasons, which will appear later, the report was not sent into weeks and months until last week when said report was received. The reports, so far as the analysis itself is concerned, are the same as on file in the state laboratory but this case is absolutely misleading.

The reports of all samples submitted by this committee during the past summer in connection with this pure supply matter are as follows: July 3, 18 organisms per cc and absence colon b. July 9, 15 organisms per cc and absence colon b. July 17, 35 organisms per cc, absence colon b. July 22, 3 organisms per cc, absence colon b. July 29, No. 1, 4 organisms per cc, absence colon b. July 29, No. 2, 3 organisms per cc, absence colon b. July 31, 35 organisms per cc, presence colon b. July 31, 2,160 organisms per cc, presence colon b. July 31 (OAC) 50 organisms per cc, absence colon b.

These reports are verified by the original from the laboratories except that July 29 date appears as Aug. 31 in the records. In the press attack of October 24th, there are but two samples reported and a great stress is laid on that of July 29, which sample showed 15 organisms and absence of colon bacilli. The fact is, this sample was taken from the river and submitted as a matter of comparison as to number of organisms, presence colon bacilli, etc. The bacteriologist does not ask or affirm, nor does he care about the source of samples. His business is to analyze and report the results. This he did.

In addition to the samples from the well, the sample of July 29th, No. 1, was taken from hydrant near Estes' store, 7th & Taylor streets; the other, No. 2, from G. B. Dimick's lawn hydrant, both showing few organisms and absence of colon bacilli. Of the sample of July 31, the one showing 55 organisms was taken from near the intake, and the other from beside the dock—the source revealed to the bacteriologist. These were selected as a matter of corroborative interest.

The city having options on a large number of organisms containing the river water at the intake, and the favorable condition of the hydrant supply. The critics of the well water have said nothing about the O. A. C. report by the samples, nor have they acknowledged the fact that every sample tested to the state laboratory was reported pure; that the number of organisms was very low, the last one containing only three, which is as low as that of the filtered product itself dosed with chemicals to destroy all life.

The water, which was not had fair consideration in comparison with other sources and yet has analyzed pure. No less authority than the Secretary State Board of Health declared when the first sample was delivered, that, should it not be found pure, he would not condemn it as the drilling had been completed only a few hours before. Again, the casing of the well was open at the top during the periods between pumpings, several days apart usually, and during public inspection. Close to the public highway over which there were hundreds of teams and vehicles passing every day, and clouds of dust filling the air, what it could be pure could hardly be expected, and yet that it was shown by analysis—even the first sample, while the last showed only three organisms and no colon bacilli.

The Live Wire Committee, with other citizens, met with the council committee, July 10th, and suggested to the latter that the State Board of Health be requested to pass judgment on the said tract for water purposes. The chairman so advised the Secretary, who replied that no well in the Willamette Valley would be recommended, unless very deep. No effort was made to go further with the matter, as this practically condemned all available well supplies. The contractor closed the pipe when he moved his machinery away, and the city engineer ordered a pump in, but owing to the rust accumulating in the same, further test could not be practicable. Then, too, the matter of further development has been delayed for the Bull Run proposition under consideration since July, when the new city government of Portland became established.

The total cost of the investigations, we believe, is justifiable on the basis of municipal business and humanitarian enterprise. It has done for its object the solution of a problem involving the health and progress of the community. That such thorough investigation should be made before spending larger sums of money to obtain a supply of pure water from a distance, we believe, is sound. It cannot be truthfully asserted that this money has been wasted, as the work done and the facts established will obviate the necessity for future effort and expense along this same line. Nor is this all. The committee maintains that it has discovered a supply of water of sufficient quantity through the operations of four to six wells to supply this city with a population several times its present size; that this water is palatable, cold, registering 52 degrees, and believes that a series of fair tests—chemical and bacteriological—would corroborate those now on record.

That this investigation has been a business proposition is further corroborated by the expenditure of much more money by our own business corporations for the same purpose and in the same way. During the present year the company authorized by the city, \$2000.00, at another \$1000.00, and still further up to \$5000.00, exclusive of the engineer's compensation, amounting to several hundred dollars more for the drilling of wells on their property in the West Side. They have little or nothing to show for their efforts, but they declare it is a business proposition and are planning to go into the matter again.

The Moody Land Company employed Mr. Scott at a much higher price to drill for water on their property immediately after drilling here. They were not successful in finding water, though, within two hundred feet of the Willamette bank and at considerable depth. They are satisfied with their investment in finding out what conditions are, however.

The following estimates of costs of conveying water to consumers are based upon the maintenance of the present system of a reservoir at Mt. View and another reservoir proposed by the Board of Water Commissioners and to be located on the tract now owned by the city and including the site of the Jones crusher. The pipe line would be direct from wells to reservoirs and the present pumps removed and utilized in the new plant. From wells to reservoir at Mt. View: (1) 10000 ft. 12-in. pipe at \$10.000.00 Hauling, labor, etc., at 25c ..... 2,500.00 \$12,500.00

From wells to proposed reservoir at Crusher: (2) 5800 ft. 12-in. pipe at \$1 ..... \$ 5,800.00 Hauling, labor, etc., at 25c ..... 1,450.00 \$7,250.00

Estimated cost of 4-8 in. wells each producing 600,000 gals. or a total of 2,400,000 gals. per day ..... \$ 1,500.00 Estimated cost of pit for pumps ..... 1,000.00 (4) Total cost wells and pipe line to Mt. View reservoir ..... \$14,500.00 (5) Total cost wells and pipe line to Crusher reservoir ..... 9,250.00 (6) Adding cost of new pumps to (4) would cost ..... 17,500.00 (7) Adding cost of new pumps to (5) would cost ..... 11,250.00

The following estimate is based on conveying water from wells to present pumping station—a plan not recommended by the committee: (8) From wells to station 5800 ft. 72-in. pipe at \$1.00 ..... \$ 5,800.00 Hauling, labor, etc., at 25c ..... 1,450.00 Pump and Pit ..... 1,000.00 Total ..... \$8,250.00

Another Plan. Using the present system, entering the mains at the nearest practical point, would estimate a large part of the cost of the proposed pipe line to the reservoirs. The total cost per year then for operation of these wells would be to the consumer, under this most feasible plan: Cost of water per mo. for yr. \$0,000.00 Int. on well construction \$1500 at 5 per cent ..... 75.00 Int. on well pit for pumps \$1000 at 5 per cent ..... 50.00 Depreciation 10 per cent on pumps and pit ..... 250.00 Cost of pipe line from wells to 5th street main, to supply upper reservoir district, estimated at ..... 8,000.00 Int. on \$8000 at 5 per cent ..... 400.00 Depreciation iron pipe, 4 per cent ..... 320.00 Superintendent ..... 1,500.00 Three operators, (\$100, \$75, \$75), \$250 per mo. ..... 3,000.00 Incidentals ..... 1,000.00 Total ..... \$6,950.00 Cost per month ..... \$ 549.58

VI. Bull Run Supply for Oregon City. Last winter definite effort was put forth by the council committee to obtain Bull Run water from the City of Portland, but at that time her city civic would allow only a two-year contract, thus making it necessary to renew the contract with each administration, or to obtain the consent of her electorate through an election to a change in the charter.

Under these conditions it was deemed inadvisable to proceed with the matter at that time. Immediately after the Commissioners took office under the new Portland charter July 1st, the committee renewed its efforts and from time to time urged the grant of water rights to this city. Many conferences were held, and many problems legal and civic came up for solution in connection therewith. Finally the commissioners granted verbally and then in writing this concession, Oct. 22d. The city attorney's opinion covering the legal phases of the question most likely to appear followed, corroborating the right of the city to sell water to outside municipalities.

The terms that are in general: (1) Oregon City shall construct a pipe line from reservoir No. 1—the point of contact urged by the committee—at Mount Tabor to such point as Oregon City may select. (2) Water shall be furnished through meter. (3) The amount of water is 1,500,000 per day. (4) Rates: (a) First 4500 gals. at 22 1/2c per 1000 gals. (b) Next 150,000 gals. at 16 2/3c per 1000 gals. (c) Over 154,500 gals. at 13 1/3c per 1000 gals.

Payment therefore to be made monthly in advance, based upon the estimated amount to be consumed and adjusted to correspond with the meter reading. Oregon City shall also pay under the Water Board Sinking Fund the sum of \$2000.00 per annum. (5) Period granted is ten years when the meter rates now established. (6) The sale of water by Oregon City to be prohibited outside its corporate limits.

Analysis of These Terms (1) That Oregon City should construct her own pipe line is a pure business proposition, leaving to her the choice of materials, including kind of pipe, wood, iron or steel-cased, the engineering service, right of way, maintenance, etc. The committee urged that the water should be drawn from the Mt. Tabor reservoir, instead of from the Portland pipe line at Gray's crossing, the point heretofore urged. This pipe line is now inadequate to supply its district and at times there is a reduction in the usual supply. To furnish Oregon City then there would have to be constructed a new line, which would have to be charged in proportion to service to Oregon City, or the people taxed for same would have just cause for complaint which might, at some future time, deprive us of the stipulated amount. At the said reservoir there is always an abundant supply. (2) Meters.

The use of a meter at the Portland end of the line would no doubt require same here. It is maintained that this is the only just and equitable plan, and is employed in nearly all cities. It is contended that when the flat rate exists there is no incentive to the part of many consumers and in such case the more careful must help pay for

this waste. This is true even where there is a municipal plant, the small economy in paying the same as the large and wasteful consumer who may use and waste many times more than he. In the matter of sprinkling, for instance, one man may sprinkle over 8000 square feet on even an inside lot, while another may have a small fraction of this area, and yet must pay the same amount.

This flat rate plan in Oregon City and its accompanying waste, it is claimed is accountable for our excessively high consumption rate per capita. The cost of meter to consumer is approximately \$8.40. These meters might, it is suggested, be furnished in place by the city from the general bond issue for the pipe line at a rental to cover interest and depreciation, or sold on some plan of rebate. (3) The number of gallons granted is far in excess of the amount used now or that will likely be used for many years to come, according to reliable estimates, based on the increase of population during a number of years past, and the present consumption per capita under conditions elsewhere similar to those existing in Oregon City. In engineer Dieck's report of March 19th, it is stated that since 1900 the growth of population seems to be normal or approaching that. While the relative growth has been about 32.5 per cent per ten year period since 1870 and about 18.5 per cent per ten year period since 1890, neither of these rates seem to fit the case with sufficient approximation to warrant its use in estimating future growth. According to United States census reports, a mean rate of 25 per cent per ten year period has been chosen as closer approximation. Upon this basis the estimated population will be 1920—5350 1930—6700 1940—8400

At this rate of increase, there will be in 1934 seven thousand four hundred population. A greater growth would be abnormal. There is further stated in this report estimates, in the absence of accurate records, that the present population per capita during the present. Upon this basis of 4600 population, the net is 172 gallons per capita. Such consumption is, evidently, in excess of all reasonable requirements and indicates gross wastage. The losses generally occurring are either reasonable plumbing, leakage in the mains, abnormal drafts at the mills, etc. In my visits to the city, leaking fixtures were everywhere encountered. Toilets and urinals were generally in a bad state of repairs and discharged under no regulation. The absence of metered services, the general practice of omitting pressure regulators and a certain indifference as to the draft upon the mains for public uses, are undoubtedly the most important reasons for the high rate per capita. This rate is considered beyond all reason. I am convinced of either reasonable plumbing regulations and with metered service the estimate following will be ample and will in no sense restrict the proper use of water. Keeping in mind the local conditions in Oregon City (with its large factory interests and the irrigation necessities in the dry months of summer) the following estimate of per capita consumption is safe: Domestic uses: maximum gals. per capita per day, 50; minimum gals., 40. Commercial uses, maximum gals., 25; minimum, 20 gals. Public uses (sewer flushing, schools, fire service, drinking fountains, blowing off mains, public building, etc.), maximum gals. per capita per day, 15; minimum gals., 10. Losses on all accs., 40 per cent. (large), maximum gals., 36; minimum gals., 28.

Total maximum gals. per capita per day, 124; minimum gals. per capita per day, 98. The maximum rate represents summer use, the minimum the winter. With the population of 1934 estimated to be 7400 any new source of supply should be capable of development to the extent of 935,000 gals. per day (in round number 900,000). On the same basis of population the amount in 1950 would be 1,400,000 gals. Again, estimating the population at even 10,500 persons at the end of twenty years the consumption would be—allowing 100,000 extra—1,500,000 gals.

Conservation of consumption under meter services are taken from reading of (1) Portland—West Side; (2), East Side; (3), Albina; (4), Lentz; (5), Portland entire; (6), Gresham. Water Meter Readings: West Side: No. meters, 5757; gals. per capita per day, 68.06; gals. per 30 days, 2038.00. East Side: No. meters, 3546; gals. per capita per day, 40.39; gals. per 30 days, 6058.5. Albina: No. Meters, 2884; gals. per capita per day, 34.16; gals. per 30 days, 5124. Lentz: No. Meters, 59; gals. per capita per day, 41.14; gals. per 30 days, 6171. Av. gals. per capita per day, 37.62. Av. gals. per meter per 30 day month, 56.43. Gresham, entire city: No. meters, 192; gals. per capita per day, 20; gals. per 30 days, 300. Estimate of supply required for Oregon City. Based upon meter readings of residence districts of Portland: Estimated population, 4500; gals. per day per capita, 37.624; gals. per 30 day service, 181.10; gals. per day entire city, 169,290; gals. per 30 day month, 507,870. Estimate of supply required for Oregon City. Based upon meter readings of Gresham for Sept. 1913: Estimated population, 4500; gals. per capita per day, 20; gals. per day entire city, 90,000; gals. per 30 day service, 10,127.00; payment to Sinking Fund, \$2,000.00; total cost per year, \$7569.90; adding one-ninth for excess population, \$818.87; cost per year, \$8388.77.

In estimating quantities, comparison is not made with the Portland West Side records, for the reason that these include a very large number of rooming houses, apartment houses, etc., which makes a comparison with residence unreasonable. The district East of the river also contains a very considerable number of apartments, which increases the reading per meter per month over and above what

it would be in an ordinary residence community. The quantity consumed by Gresham being lower than the probable consumption of Oregon City, and the average for the Portland East Side being higher on account of numbers of large meters in use, a fair estimate of the quantity required for Oregon City would appear to be, from these two estimates: Gals. per day, 130,000; cost per day, \$20.50; cost per 30 day month, \$615.00; cost per year, \$7425.00; Payments to Sinking Fund, \$2000.00; adding one-ninth for excess population, \$831.37; total cost per year, \$10,256.37. The payment to the Sinking Fund is based upon a population of 4500. Any increase in consumption would mean a proportionate decrease in the total cost per 100 gallons, the \$2000.00 being a fixed price per year for the term of the contract.

Estimated cost of the pipe line from Oregon City to Portland: Cost, F. O. B., Portland, 12-in. cast iron 10 miles, \$28,000.00, at \$1.24, \$68,640; fixtures and lead for joints at \$ .50, hauling and labor, etc., \$26,400; total, \$95,040. Cost F. O. B., Portland, 14-in. cast iron 10 miles, \$28,000 ft., at \$1.50, \$87,120.00; hauling, labor, fixtures, etc., \$ .60, \$31,680.00; total, \$118,800.00. Cost F. O. B., Oregon City, 12-in. handed wood pipe, 10 miles, \$2,800 ft. at 50c, \$2,800.00; labor, hauling, laying, fixtures, etc., at 25c, \$132,000.00; total \$336,000.00. Cost F. O. B. Oregon City, 14-in. handed wood pipe, 10 miles, \$2,800 ft., at \$ .70, \$3,960.00; labor, laying, fixtures, etc., at \$ .28, \$1,784.00; total, \$5744.00.

Based upon use and cost of 14-in. wood pipe and gravity delivery at a point on the second ledge in Oregon City, the approximate cost would be: Cost of water per mo. for yr. \$2313.53 Superintendent ..... 1500.00 3 operators, at \$250 per mo. ..... 3000.00 Payment Sinking Fund ..... 2000.00 Int. at 5 per cent on 14-in. pipe line bonds ..... 2587.20 Depreciation of line, 1-15 of cost per yr. ..... 3449.50 Incidentals ..... 1000.00 (1) Total cost per year ..... \$21,850.63 (2) Total cost per month ..... 1,820.88 (3) Average number consumers per mo. 1095 ..... 1.66 (1899 for Oct. 1913).

(5) The ten year period has been criticized as being too long for protection of the entire plant. But a more thoughtful analysis than usually accorded this term reveals conditions more favorable to this source of supply than at first appear. Portland now has approximately 20,000,000 gallons in her reservoirs and available for immediate use in excess of her heaviest day's record of consumption. She has another undeveloped source accessible from which she can obtain 40,000,000 gallons additional per day, and can add also several millions more to the daily delivery at the reservoirs by adding to her pipe line service to the reserve. In addition to all this she has plans definitely worked out and passed upon by expert authority for the construction of huge retaining dams in the gulches of the reserve for the conservation of immense supplies during the dry seasons. Though her population should increase phenomenally, it is, we believe, inconceivable that she should need this insignificant quantity within many future decades. Should the time arrive when she will need more than she shall have developed, it is hardly conceivable that this small amount of 5,000,000 gallons would be sufficient object for her to withdraw it.

It is, we believe, a moral obligation that our sister city offers to take upon herself and which she will never be permitted, by public sentiment even to take away. Once granted it is conceded by those who have taken upon themselves the largest responsibility in this matter, that the term will, at the expired time, be extended. The sale of water by Oregon City outside her limits is prohibited. The reason for this prohibition is obvious. The committee, however, urged upon the commissioners the desire to furnish west Oregon City from the supply obtained. The proposed plan does not, however, prohibit furnishing to all who may come into the corporate limits and share this city's burdens of taxation as well as her joys of living.

The estimates of cost to the city of water obtained from either of the sources mentioned do not include extensions of city limits or first cost installing of plant. We, your committee, have endeavored to do the work required in a thorough, economical and impartial manner. The large demands upon our time and energy must be apparent to all. We believe it is not for us to recommend any one plan described to the citizens of Oregon City who must eventually decide for themselves this problem of water supply. We do recommend that the electorate be given early opportunity to record their choice.

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