and, considering the late date at which we began, it will be seen that, notwithstanding the financial crisis, the many difficulties due to rectifying estimates and applying such rectified estimates, the amount of work done is not only not less, but is greater, all proportions considered, than the amount of work previously done. The total length of roads made with gravel or stone by municipalities last season was 97.68 miles.

Macadam.—As in 1914, the province was divided into districts for the purpose of inspecting the macadam in course of construction. The supervision of such important and costly work is one of the things whose organization we have most at heart. We strive to improve it from day to day and to get the maximum of efficiency from each inspector.

As is indicated in the instructions issued to inspectors, they are expected to teach the instructors how to make macadam and how to handle the road gangs. They are instructed to see that specifications are followed precisely as intended. He is a road maker and should work with the instructor.

Inspections are made in sections of 200 feet, which are staked out beforehand. Width of road, thickness of foundation and number of layers of stone are noted. Drainage facilities are inspected with a view as to whether the slope of watercourses in culverts and under bridges is correct.

The important roads which are being macadamized are: The Montreal-Quebec Road, the Levis-Jackman Road; the Sherbrooke-Derby Line Road, the Chambly Road, King Edward VII. Road, and many smaller roads. The following figures will show the mileages of roads built in 1915 and the money expended: 295.60 miles of macadamized roads (municipal and provincial) were made in the province under the direction and with the aid of the government; 140.70 miles of gravel roads (municipal and provincial) were made under the direction and with the aid of the government.

Since 1911, 1,173.10 miles of macadamized roads and 494.57 miles of gravel roads (being 1,667.67 miles of roads permanently improved) were made in the province under government control.

Since 1911, the government of the province has paid for the maintenance and improvement of earth roads, as well as for making macadamized and gravel roads and for the expenses of administration of the Roads Department, $14,584,681.12.

The following statement of sums spent during the last 20 years by the Quebec government for road improvements shows the astonishing rate at which the good roads movement has grown in that province:

Year.		Year.	
1895-96	$ 30.20	1905-06	$ 9,661.88
1896-97	5,953.34	1906-07	15,404.56
1897-98	7,795.56	1907-08	20,117.85
1898-99	10,203.29	1908-09	60,146.92
1899-00	14,510.00	1909-10	60,000.00
1900-01	13,000.00	1910-11	95,000.00
1901-02	6,000.00	1911-12	494,277.66
1902-03	17,572.79	1912-13	1,069,810.35
1903-04	11,000.00	1913-14	4,018,916.68
1904-05	18,250.58	1914-15	6,140,273.13

There is an excellent demand for magnesite for furnace linings. In Quebec several properties are being operated, and it is to be hoped that the industry will become well established while the demand is so good.

MAKING BOTTOM FOR PILES BEFORE DRIVING.

IT is quite common practice to deposit filling of some suitable material between and around the piles of a pier both to increase the resistance of the structure as a whole to lateral displacement and to increase the columnar strength of the piles themselves by decreasing their unsupported length, and also, but to a less extent, increasing their bearing power by additional skin friction. Care must be taken while depositing the fill to bring it up uniformly, so that the lateral pressure on the piles as units may be equal on all sides. A concentration of material at one point is capable of disastrous results, *viz.*, springing the piles out from under the caps or bowing the piles, with a consequent eccentricity of load, or even shearing off the piles near the mud line. Nevertheless, the fill is usually heaped up along the axis of the pier, sloping both ways from the centre line, giving the structure a "backbone," as it were. Sand, gravel, broken stone, or rip-rap is the usual fill material.

This method of filling is described by F. L. Simon in the Journal of the Engineers' Club of Baltimore, who says that while it has been employed successfully many times, yet it has the decided disadvantage of difficulty in controlling the distribution of the fill, resulting in one notable instance in the collapse of the structure. Why not, then, make the fill before starting the construction? The difficulty of controlling the distribution still obtains, but—and herein lies the great advantage of this method—strict uniformity of distribution is not essential and the entire hazard of the first method is obviated. There are no lateral pressures on the piles, indeterminate in amount and direction, as in the previous method, and no tendency toward a settlement of the piles with that of the fill. Secondly, there is the advantage of economy, due to the fact that shorter piles may very often be used because of the increased skin friction of the fill and compressed mud beneath it, giving equal or better test penetrations than in the first method, and due also to the relative ease of depositing the fill from scows previous to the erection of the pier.

The superiority of this second method was ably demonstrated during the construction of a pier 62 ft. wide by 830 ft. long. A number of test piles driven over the area of the pier revealed unusually severe bottom conditions—18 to 20 ft. of water and 45 to 60 ft. of mud overlying sand and clay—from which it was obvious that a large percentage of the piles would have to be in lengths of 85 to 95 ft., and most of them spliced. Fears were entertained, too, for the ability of a pier in such bottom and of such scant width to resist lateral thrusts, even though properly braced with batter piles. The safety of the assumed safe load per pile used in calculating the design was questioned.

It was suggested, therefore, that a bottom be "made" before driving the piles by dumping heavy material from bottom-dump scows over the area of the pier. The plan was approved and the bottom deposited. The material used was mixed sand and gravel, dredged from the river, weighing about 2,800 to 2,900 lbs. per cubic yard. The river mud appeared to absorb the fill; it was compressed rather than displaced, although there was a slight upheaval on both sides of the deposit and some shoaling of the water over the deposit. Piles generally 10 ft. shorter than originally contemplated were driven to satisfactory final penetrations. Not one spliced pile was used. The fill served the additional purpose of staying the piles at the mud line and stiffening the structure laterally.