river at low water, and 1,100 acres on flats about 34 ft. above low-water level. The river varies in width from about 400 ft. at low water, to about 650 ft. at flood. The variation in level between low and high water is about 15 ft., but on the occasions of one or two extreme floods it has been 30 ft. The flow at low water is about 1,200 cu. ft. per sec., and at average high water 50,000 cu. ft. per sec.

The portion of the city then served by sewers amounted to about 2,350 acres, and three systems were in use, *viz.*:—

(1) The Saskatchewan Avenue system, discharging into the river at Saskatchewan Ave.

(2) The Eastern system, discharging into the river at the north end of Frasers Flats (now Riverdale). This served the main business area of the city.

(3) The Rat Creek system, discharging into the bed of Rat Creek at a point about two miles from its outlet. From the discharge point the sewage flowed down the bed of the creek to the river as an open sewer. This was the latest, and was designed in 1905.

In 1909, preliminary data were collected for a comprehensive scheme of sewerage, the need of which had by that time become very much in evidence. In 1910 Mr. Alexander Potter, of New York, was called in as consulting engineer.

The author describes the collection of all data that it was possible to acquire relating to rainfall intensity and storm run-off in the locality concerned, and outlined the considerations which led up to the adoption of a tunnel system of main sewers. These considerations were:

(1) The height of the plateau above the river.

(2) Favorable ground for tunneling.

(3) That steeper grades and consequently smaller sewers could be adopted, than would have been the case if the economical depth for open trenching had been adhered to.

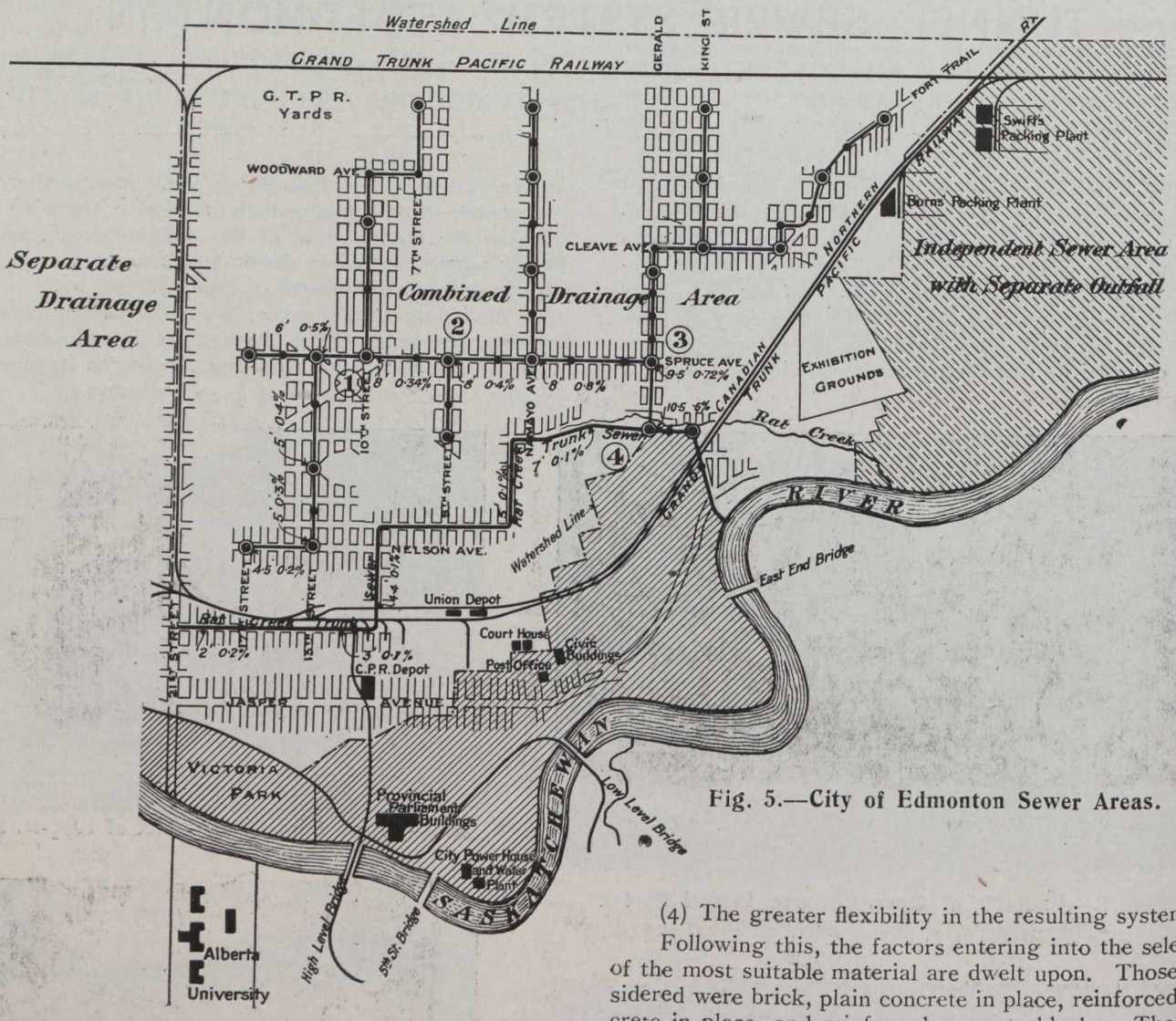

Fig. 5.—City of Edmonton Sewer Areas.

(4) The greater flexibility in the resulting system.

Following this, the factors entering into the selection of the most suitable material are dwelt upon. Those considered were brick, plain concrete in place, reinforced concrete in place, and reinforced concrete blocks. The last-mentioned were adopted as best fulfilling all the necessary requirements. The form of reinforced block type adopted is shown in Fig. 6. Surrounding the blocks, and lying between them and the earthen walls of the tunnel, is a layer of about 4 inches of mass concrete.

The reinforcement consists of circumferential square twisted bars within the concrete or mortar which forms the circumferential joints of the sewer, and of longitudinal straps tying the blocks together as a solid unit. This reinforcement is designed to resist the external pressure on the sewer.

As these sewers are at depths below the surface varying from 50 to 100 feet, they may be subjected to considerable internal pressure when the area is fully built up. Steel reinforcement, in the form of flat bands around the outside of the blocks, is added to resist this pressure. Each circumferential band is made in two pieces joined by coupling shoes of special design. Textonious lugs superseded these on the greater part of the work.