APPENDIX A—*Continued.*

(this datum is referred to the low water of Lake Michigan of 1847, and is 579·61 feet above sea level at Sandy Hook). No water flows over this spillway until the volume passing the water-gage above it reaches 300,000 cubit feet per minute.

The cross section of the earth sections from A to E inclusive is 202 feet on the bottom, with side slopes of 2 to 1. This section extends for about 500 feet into the west end of F, and then reduces to 110 feet on the bottom, preserving the same side slopes. The explanation for this change of cross section is as follows:—Throughout the rock sections and those sections in whcih there is a preponderance of hard material, or where rock may appear, the section adopted is designed, according to law, for a flow of 600,000 cubic feet of water per minute, which means provision for a population of 3,000,000 people. The narrow channel provides for a flow of 300,000 cubic feet per minute, or for about the present population of Chicago. The enlargement of the narrow channel can be made by the easier methods of excavation, such as dredging, whenever the needs of the city require it. The grade throughout the lettered sections is 1 foot in 40,000 (·025 feet per 1,000 feet) and the bottom of the channel at Robey Street is 24·448 feet below datum. The numbered sections, from No. 1 to No. 6 inclusive, are underlaid with solid rock. The width of the bottom, in rock, is 160 feet, and walls of masonry laid in cement will be built upon the rock surface to a height of 5 feet above datum. Sections 7 to 14, inclusive, are in solid rock; width at bottom, 160 feet; sides vertical, prism taken out in three slopes with offsets of 6 inches on each side for each cut, making top width of 162 feet; grade in rock, 1 foot in 20,000 (·05 feet per 1,000.)

Section No. 15 is also in rock, and its cross section is enlarged at its south end so as to form a "windage basin," in which large vessels may be turned around. The controlling works are located on this section. These works will consist of gates or movable dams, by which the flow of water from the main channel into the tail race, which is to deliver the outflow into the Desplaines River can be controlled.

This river below Lockport follows the trough of the valley down a steep declivity to the canal basin in Joliet. The fluctuations in Lake Michigan by varying slope of water surface, will be felt at the controlling works, and provision must be made to meet these fluctuations within a range of 5 feet above datum, and 8 feet below, or an extreme oscillation of 13 feet. The fall from datum at the controlling works to the level of the upper basin will be about 42 feet in a distance of about 4½ miles. As the plans for controlling works have not been finally adopted by the Board of Trustees, they cannot now be discussed.

The total amount of excavation involved in the construction of the main channel is 26,077,765 cubic yards of glacial drift, and 12,071,668 cubic yards of solid rock, or an aggregate of 38,149,433 cubic yards, to which must be added the material excavated from the river diversion: glacial drift, 1,564,403 cubic yards; solid rock, 258,926 cubic yards; total river diversion, 1,823,329 cubic yards; grand total, main channel and river diversions, 39,972,762 cubic yards. All of this work is now under contract, and in addition thereto 384,958 cubic yards of retaining wall.

In response to the request of the senior member of the Board, the Board of Trustees of the Sanitary District of Chicago has furnished a report on lake level effects on account of the main channel of the Sanitary District of Chicago, containing briefs by Trustee L. E. Cooley, C.E., and by Thos. T. Johnston, Assistant Chief Engineer, accompanied by numerous blue prints. These papers present a full discussion of the subject as viewed by the canal officials.

What is the outflow af the Lower Lakes?

In November, 1891, the Chief of Engineers, U.S.A., at the request of the secretary of the American Society of Civil Engineers (who had been asked by the chief engineer of the Montreal Harbour Commission of Canada to suggest the subject), ordered a set of observations made to determine the amount of water flowing down the Niagara river. The time was especially propitious, as the water was then very low.

The results of these measurements were somewhat unexpected, and they were repeated in May, 1892. The second set corroborated the first, and the whole formed the