

the city, he reports, an average of \$6,000 a month, which would otherwise be expended for hand labor. Some of the details of their operation given by him are as follows:—

From August 1st, 1917, to August 1st, 1918, the first machine working all of the 12 months, the other six operating but three months, the period of one year broken by a vacation totaling 32 days, the number of catch-basins cleaned was 10,847 and the number of cubic yards of dirt removed 13,064. With full gangs of men during the same period 21,601 catch-basins were cleaned and 25,473 cubic yards of refuse removed by hand. To clean a catch-basin by eductor cost \$1.51; by hand \$2.98. To remove each cubic yard of dirt costs by eductor \$1.26; by hand \$2.53. In the eductor costs are included all overhead charges—gasoline, oil, grease, repairs, one-fifth of the maintenance charge in the sewer district to which each eductor is detailed and 10 cents per mile for depreciation.

Catch Basins Cleaned by Eductors, June, 1918, Seven Districts

Dist.	No. C. B.'s Cleaned.	No. Yds. Dirt.	Salaries and Wages.	Supplies Gas, Oil, etc.	Miles Run.
*1	308	384	\$ 430.90	\$ 54.74	308
2	390	427	464.90	57.80	420
†3	309	304	372.90	49.58	346
4	482	485	464.19	66.44	397
5	470	504	471.80	63.92	453
6	471	533	471.80	66.64	556
†7	554	536	458.10	70.26	515
	2,984	3,173	\$3,134.59	\$429.38	2,993

*Off 6 days for repair.

†Off 8 days for repair.

‡Dumping facilities enabled this machine to keep at cleaning work more constantly than the others.

Number of catch basins cleaned	2,984
Number of cubic yards dirt removed..	3,173
Cost of labor, salaries and wages ...	\$3,134.59
Cost of gas, grease, oil, etc.	429.38
Miles run	2,993
Depreciation, 10c. per mile	299.30
Cost of repairs of 7 eductors for month of June	269.79
Total cost of operation	\$4,133.06
Cost of cleaning per basin	\$1.39
Cost per cubic yard dirt removed	1.30

Catch Basins Cleaned by Hand in June, 1918

Number of catch-basins cleaned	479
Number of cubic yards dirt removed..	544
Average cost per catch-basin	\$3.48
Average cost per cubic yard	3.06

Each machine cleans an average of 365 basins in a month. In this record is included time lost in vacations for the crews and for repairs. The department of sewers shows that by hand labor (gangs of three men each working eight hours a day) seven catch-basins are cleaned daily or at the rate of 168 a month. It will thus be seen that an eductor can do more than twice the work of a hand crew at about half the cost.

It is necessary that at least 45,000 catch-basins be cleaned every year. The Bureau of Sewers expects to clean 31,000 of these at the rate of about 4,500 to each machine, and about 15,000 basins by hand.

The average mileage of each eductor is 450 a month, traveling on streets which as a rule are straight, level and paved. The unusually great distance from catch-basins to dumps operates against a more favorable showing by the eductors and constitutes what is termed an insoluble problem. The average haul is two to three miles for each load. The average number of loads is three to four a day, five to six cubic yards of dirt composing a load. Carts drawn by horses or mules haul, on an average, two to three loads of two cubic yards each a day.

A test was held recently to learn the least time required to empty a standard basin, 10 feet deep and four feet in diameter, and it was found to be exactly six minutes. Motion picture cameras photographed the operation. Similar work by hand would have taken 2½ hours. From careful study of the operation of these machines Mr. McGrath concluded that one eductor crew can do the work of almost 2½ hand crews.

Four Men to a Crew

Superintendent McGrath has recently increased the size of eductor crew from two laborers and a chauffeur to three laborers and a chauffeur, believing that this will increase the efficiency of the machine, since two laborers are required to work so hard that their effectiveness is lessened by fatigue, and additional work done by the machine will more than offset the wages of the additional laborer. Also instead of each chauffeur drawing gasoline for the eductor whenever he desires without check on the amount, he now issues books of coupons, each book carrying enough for \$10 worth of gasoline, from which coupons are taken covering the value of the gasoline put into the tank, and thus a record is kept of each machine and it is calculated that waste is eliminated that would amount to at least \$6,000 a year.

The average pay of each chauffeur is \$125 a month, that of the man in charge of the eductor is \$4.60 a day, and the two laborers receive \$3.80 a day.

The area of Chicago is about 200 square miles divided into seven districts, in each of which an eductor was placed, each district in charge of a foreman. Three police stations, recently abandoned, serve as barns for the apparatus. Each foreman has an assistant who patrols his territory and with a rod determines the depth of dirt in each catch-basin. These data, reported by him to his foreman, indicate where cleaning is needed. It is the duty of the assistant foreman to see that every detail in his reports is observed. His reports show, also, how much time is required to clean the basins in his district.

Some Basins Cleaned Monthly

In each district there are, on an average, 17,000 catch-basins. The frequency of cleaning these depends on their location, being greatest where traffic is heaviest or where street improvements are lacking. In the downtown districts, where traffic is congested, the basins are cleaned at least every 30 days. This is done at night. Outlying basins require cleaning every six months or twelve months. Many are never cleaned, apparently, since the number of cleanings per year is only 36 per cent. of the total number of basins.

When hand cleaning is employed, telescopic shovels are used for bringing the dirt to the street surface, from which it is shoveled into wagons of two cubic yards capacity, each drawn by two horses, in which it is taken to the dumps. Where the catch-basins are unusually deep, buckets are used for removing the dirt.