tion of these is properly carried out. It is also necessary to carry this work out in the most economical way, as it is here that a lot of money spent in building roads is utterly wasted. A good organization requires the use of tools and machinery suitable for the type and amount of road which is being built. A slip scraper where necessary and a wheel scraper where it is necessary, a push grader in its proper place and an elevator grader in its place; team hauling of material where that is economical and hauling by tractors where these prove economical. Each of these have their place, and a proper organization will use each in its right place. The number of teams and men must suit the requirements of the road under construction. Too many men and teams, and they will be in each other's way. Too few, and the work will not be carried out economically. Most important of all is a good foreman, who knows what is required and how to get the desired results. Under a good foreman every team and every man is in the right place.

Under proper organization the men soon discover how each portion of the work can be most easily carried out and just what work should be done. No time is wasted getting started and no unnecessary labor performed when they are at work. A man on work with which he is familiar will certainly show better results than one unaccustomed to that work. The effect of this knowledge will be shown in a lowered cost and a better job of construction. Good organization, therefore, not only insures that the road will be properly constructed, but that it will be economically constructed.

The third principle of proper road construction is the systematic carrying out of the work. For the best results the whole road scheme should be planned in advance and every piece of work done towards the completion of that scheme. It is not meant by this that every piece of road on which work is done should be at once constructed as a finished road, as financial conditions will not always allow this, but whatever work is done should be a step towards the completion of the finished road. This systematic construction is very important where drainage is necessary. The only proper place to start a road drain is at its outlet and the work carried towards its upper end. The mile of road which is most used is the one next to the market. It is, therefore, reasonable that the roads nearest the market should be built up first and the system added to each year as far as possible. It is only by this systematic carrying out of road construction that a satisfactory scheme of roads will ever be provided.

These three principles, then, engineering, organization and a systematic scheme of road-building are the three essential elements for road construction. If these are attended to good roads will result.

An exemplification of the results of adopting correct principles for road construction is seen in England. This country, after struggling in mud for fourteen hundred years, applied these principles which we have just considered under the supervision of John MacAdam. From that time onward England's roads rapidly developed. Shortly after this, England also began to develop industrially. With the experience of our Mother Country before us as well as the experience of other countries, we must be classed as dull children in this respect if we do not adopt these fundamental principles in our road construction. All ratepayers will not be building roads, but all can use their influence to have road construction in their municipality carried out under proper engineering, good organization and in a systematic manner.

PLANNING THE DISTRIBUTION OF THE WATER SUPPLY OF A SMALL TOWN.*

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HAVING determined the necessary supply, storage and filtration of the new water system, it becomes necessary to take up the distribution of the supply. The term "distribution" covers all the operations of the plant from the filtered or clear water reservoir up to the point where the water is delivered to the consumer.

The Method of Distribution.—Distribution of supply is one of two main kinds, gravity or pumping; in rare cases both gravity and pumping are resorted to. Where the topography is suitable a purely gravity supply can often be developed that will need neither purification nor pumping. In cases of this kind, there are but few points as to capacity of supply and distribution to be considered. However, in most cases it is necessary either to purify or to pump the water, or both. In some cases there is a combination of direct pumping to reservoir and gravity distribution from the reservoir to the consumer. These conditions favor the most economical rate of pumping, provided the reservoir can be made of sufficient size to accommodate all variations in demand, and is high enough to give sufficient pressure for all fire and domestic purposes.

Where the reservoir site is of the above nature, the pumps can be designed for a nearly constant speed and for a constant head, and neither will materially change except as there are changes in the water level in the reservoir, and these changes will be seasonal rather than daily or weekly. Pumps designed for such conditions can be operated at a much more economical load than can pumps that are designed to operate part of the time at one speed and head and part of the time at another speed and head. Such conditions will be ideal from an operating point of view, and the only objection to them is that there may be a rather high capital charge for the installation. This should be carefully watched to be sure that what is saved at one place is not lost at another. Locations such as this should be most carefully planned so that there will be sufficient capacity in the mains to and from the reservoir, especially from the reservoir. Particular attention should be paid to the size of the outlet, lest it be too small for the supply, as it will have to work under a very little head of water and its capacity will be governed thereby. Then there should be a duplicate main in the principal distribution system to prevent a water famine in case there is a failure in one main. The capital charges on this duplicate main may be very large, as the site of the reservoir may be at some distance from the city.

In case the reservoir site is upon the top or the side of a hill sufficient diamond drill borings should be made to determine the condition of the underlying strata. Do not think that because it is a hill it is as strong as the hills. There may be an underlying stratum that will be of insufficient strength to carry the additional load imposed upon it by the erection of a reservoir on its top. Or leaks may develop in the reservoir that will so saturate the underlying strata that they will become too unstable to carry the load. These points may seem far-fetched or unreasonable, yet they are possibilities and grave ones, and must be investigated. In any case, the design of a gravity system should be such that it will be as easily controlled as a pumping system.

*From "The American City."