For Pathmasters.

1. Every good road has two essential features :

(*a*) A thoroughly dry foundation.

(*b*) A smooth, hard, waterproof surface covering.

2. The foundation is the natural subsoil, "the dirt road," which must be kept dry by good drainage.

3. The surface covering is generally a coating of gravel or broken stone which should be put on the road in such a way that it will not, in wet weather, be churned up and mixed with the earth beneath. That is, it should form a distinct coating.

4. To accomplish this,

(*a*) The gravel or stone should contain very little sand or clay—it should be clean.

(*b*) The road must be crowned or rounded in the centre so as to shed the water to the open drains.

(*c*) Ruts must not be allowed to form as they prevent water passing to the open drains.

(*d*) The open drains must have a sufficient fall, and free outlet so that the water will not stand in them but will be carried away immediately.

(*e*) Tile under-drains should be laid wherever the open drains are not sufficient and the ground has a moist or wet appearance, with a tendency to absorb the gravel and rut readily. By this means the foundation is made dry.

5. Do not leave the gravel or stone just as it drops from the wagon but spread it so that travel will at once pass over and consolidate it before the fall rains.

6. Keep the road metal raked or scraped into the wheel or horse tracks until consolidated.

7. Grade and crown the road before putting on gravel or stone.

8. If a grading machine is available, grade the roads which you intend to gravel before the time of statute labor, and use the statute labor as far as possible in drawing gravel.

9. A fair crown for gravel roads on level ground is one inch of rise to each foot of width from the side to the centre.

10. The roads on hills should have a greater crown than on level ground otherwise the water will follow the wheel tracks and create deep ruts, instead of passing to the side drains. One and one half inches to the foot from the side to centre will be sufficient.

11. Repair old gravel roads which have a hard centre but too little crown and high, square shoulders, by cutting off the shoulders, turning the material outward and placing new gravel or stone in the centre. Do not cover the old gravel foundation with the mixture of earth, sod and fine gravel of which the shoulders are composed. The shoulders can be most easily cut off by means of a grading machine

12. A width of twenty-four feet between ditches will meet most conditions, with the central eight feet gravelled.

13. Wherever water stands on the roadway or by the roadside or wherever the ground remains moist or is swampy in spring and fall, better drainage is needed.

14. Look over the road under your charge after heavy rains and during spring freshets. The work of a few minutes in freeing drains from obstruction or diverting a current of water into a proper channel may become the work of days if neglected.

15. Surface water should be disposed of in small quantities, great accumulations are hard to handle and are destructive. Obtain outlets into natural watercourses as often as possible.

16. Instead of having deep, open ditches to underdrain the road and dry the foundation, use tile.

17. Give culverts a good fall and free outlet so that water will not freeze in them.

18. In taking gravel from the pit, see that precautions are taken to draw only clean material Do not let the face of the pit be scraped down, mixing clay, sand and turf with good gravel. There is a tendency to draw dirty gravel as it is easiest to handle.

19. Gravel which retains a perpendicular face in the pit in the spring, and shows no trace of slipping is generally fit for use on the road without treatment, Dirty gravel should be screened.

20. Plan and lay out the work before calling out the men.

21. When preparing plans keep the work of succeeding years in view.

22. Call out for each day only such a number of men and teams as can be properly directed.

23. In laying out the work, estimate on a full day's work from each man and see that it is performed. Specify the number of loads of gravel to constitute a day's work. Every wagon box should hold a quarter of a cord.

24. Make all returns clearly, showing who have done their work and who have not.

25. Make early arrangements for having on the ground when required, and in good repair, all implements and tools to be used in the performance of statute labor.

25. Do all work with a view to permanence and durability.

Boston was the first city in the world to adopt a system of daily medical inspection of schools three years ago. Other eastern cities now observe the plan as a regular municipal function. This work is distributed among fifty physicians in Boston, the city being divided into fifty districts. Each visiting physician has from one to five schools to visit, and his compensation is $200 per year. The total cost of the inspection in Boston is, therefore, $10,000 a year, a sum that is considered very small in proportion to the importance of the work.

The Weight of Road Rollers.

A heavy road roller is without question an indispensible implement in the construction of macadam streets. Macadam roads were, of course, built before steam rollers were invented, but crops were harvested before self binders were invented. The effect of a roller in road-making is as great an advance on the old results as is the use of the self binder on the work of the cradle.

There are different kinds and classes of rollers. The horse roller weighing six or eight tons, will do fairly well if a steam roller cannot be afforded, but the horse roller is not sufficiently heavy and has to be used much longer on a given section than a heavy steam roller to produce the best results. The feet of the horses in exerting sufficient strength to move the roller, sink into and disturb the road metal, and thereby injure the shape and quality of the roadway.

There is a danger, on the other hand, of having a steam roller which is too heavy. A very heavy roller will sometimes sink into light or loose soil, force it ahead and create a mound over which it cannot pass ; this, however, may sometimes be overcome by spreading over the surface of the soil being rolled, a thin coating of gravel. The same result will sometimes occur with an excessively heavy roller on a layer of loose stone. The heavy roller is more liable, too, to injure underground pipes, catch basins, culverts, bridges, or disturb sidewalks.

For these reasons, a roller exceeding ten or twelve tons in weight, in some localities where the soil is of a loose or sandy nature, is frequently not desirable. In districts where the natural soil is gravelly or of a stiff clay a heavy roller may generally be operated successfully, but some municipalities have made the mistake of purchasing a too heavy roller and have found it necessary to use a light horse roller in consolidating the sub-soil and first layers.

Nor, if the stone used in the construction of macadam streets is of a soft nature, is a heavy roller say of twenty tons desirable even in the finishing courses, as the crushing effect has been found in some cases to crumble and pulverize the stone, rather than merely consolidate it.

For new work, in which the dirt foundation must be rolled, a weight of twelve tons is generally the most serviceable ; but for picking up an old roadway and reconsolidating it or for finishing a new work, fifteen tons is better. Where a town owns only one roller it is generally advisable to consider very carefully the work to be done before purchasing a roller of over twelve tons weight.

Authorities in favor of good roads locate wisely, grade scientifically, crown carefully, drain thoroughly, build permanently, supervise constantly, and permit travel only on wide tires.