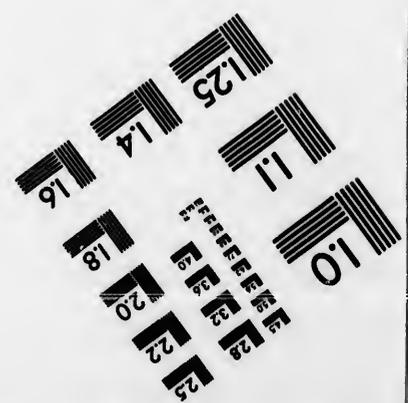
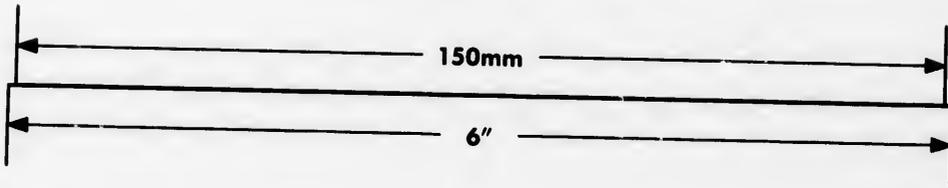
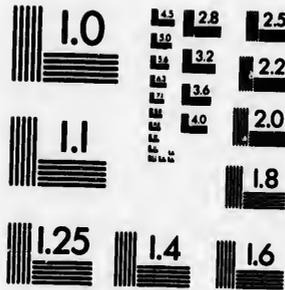
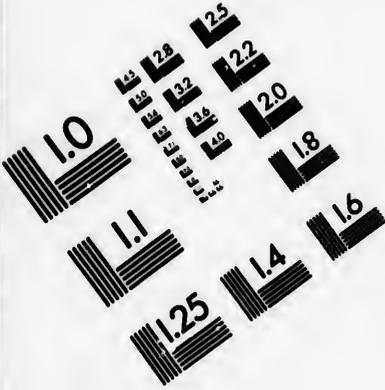


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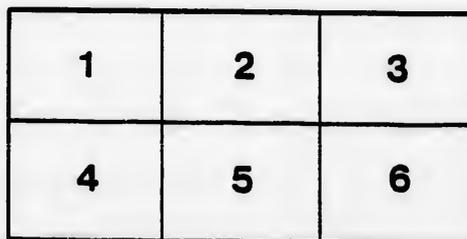
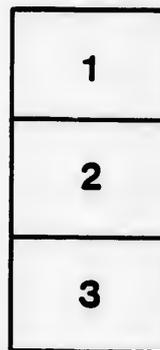
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# ONTARIO DEPARTMENT OF AGRICULTURE.

TORONTO, JUNE 1, 1895.

## BULLETIN (SPECIAL).

### ROAD-MAKING.

PREPARED BY THE ONTARIO GOOD ROADS ASSOCIATION.

**REQUISITES FOR PERMANENCY.** In order to make and maintain a permanent roadway, two rules must be followed :

1. Take the water out.
2. Keep the water out.

**UNDERDRAINING.** Where a road is to be constructed on a wet and retentive soil, a perfect system of underdraining must be provided. This is best done by cutting ditches diagonally across the roadbed with discharge into sideditches. These diagonal ditches should have a good fall and good outlet and should be from eighteen inches to two feet deep and about one foot wide at the bottom, with a slight slope outward. In these should be laid coarse, broken stone, broken bricks or other material suitable to form a drain, filling them up to the level of the sub-grade.

**SURFACE DRAINING.** Open ditches should be cut on each side of the roadbed at a distance of about twelve feet from the outsides of the metalling. They should be deep enough to drain the foundation ; at least eighteen inches below the sub-grade.

**TILE PREFERABLE.** Where tile is cheap and a good outlet obtainable, tile side drains are preferable to open ditches. Shallow gutters should be made over the tiles to catch the surface water and conduct it to catch-basins placed at convenient distances apart. The catch-basins should be made of durable materials of sufficient size to be freely cleaned and should be covered with iron gratings. The basins should extend at least two feet below the bottom of the tile to provide space for the deposit and they should be cleaned at least twice year.

**THE ROADSIDES.** The strips of ground between the metalled road and the open ditch should be properly graded to conform with the crown and grade of the metalling and should be seeded and kept in sod. This will always be pleasing to the eye, is cheap and very largely useful in preventing the carrying of mud on to the metalling. Moreover, the uniformity of the grade facilitates the passing of meeting teams.

**LOCATION OF SUB-DRAINS.** In a soil that is gravelly and pervious to water, the open ditches on each side of the road, even of a 66-feet wide road, are sufficient for draining the road-bed. If there be any springs under the road, a sub-drain leading directly to the side ditch will be required. Should the road be on a side hill a deep open ditch on its upper side, to arrest the flow from the adjacent land, may be sufficient, the water being at intervals conducted across and under the road by an ordinary stone culvert.

**OUTLETS.** Mistakes are often made by giving insufficient outfalls to the drains. Under the Ditches and Watercourses Act a municipality has the same power as an individual to enforce the natural outlet for the drainage water of the land. But municipal officers are apt to shrink from forcing an outlet through private lands, and to leave their road drains with insufficient outlets rather than incur the ill will of possibly influential constituents. This should not be so. Municipalities should insist upon their rights, and the owners of lands interfered with should pay the same proportion of the cost of the work as if only private individuals were concerned.

**BAD DRAINAGE AND FROST.** Imperfect drainage is the cause of the badness of our roads in nearly all cases. The inexperienced are not apt to appreciate the paramount necessity for the maintenance of a perfectly dry foundation of earth for their surface of broken stone, gravel, etc., to lie upon. A protracted rain will soften an undrained road and on the passing of a heavy load injurious ruts are the consequence. In these latitudes the soil water freezes and the consequent expansions and contractions quickly ruin a roadbed.

**DESTRUCTIVENESS OF RUTS.** It matters not whether a road be earth or macadam if attention is not given to the preservation of the finished crown. If ruts are allowed to form water is admitted. Every depression is a centre of destruction. The power of resistance to the water becomes less and less until the roadway becomes actually impassable.

**ROAD MACHINES.** In constructing earth roads a plow should not be used except where actually necessary, because a plowed surface is only with great difficulty made hard and smooth, and the plow is likely to cut too deeply into the earth. A good road machine should be procured if possible, for by the use of a machine the natural

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foundation of the ground is not disturbed in rounding up the road as is done with common plows and scrapers. Every municipality should own a road machine and should have a man especially instructed and constantly in charge of it. With a road machine in skilled hands, there will be no question raised as to the economy of construction and repairs and the efficiency of the work done.

**WIDTH OF ROADWAY.** The roadway should be twenty-six feet between the ditches and the metalling for ordinary roads eight feet wide; where more than a single line of travel is required the metalling should be sixteen feet wide.

**HEIGHT OF CROWN.** A roadway of this width should have a crown of at least ten inches and should always be maintained in this shape.

**ROLLING.** After the road machine has completed its work, the whole grade should be rolled with a roller weighing about five tons. Rolling is essential in making the foundation and surfacing to form permanent or gravel roads. The roller should follow closely upon the grader or scraper so that the loose earth may be consolidated while it is still moist. The roller should pass many times over the softer portions of the road, and where the road is very dry and not inclined to pack, it may be slightly moistened to facilitate the consolidation of the earth. The rolling should begin at the sides of the road and proceed gradually towards the centre; that is, the roller should be passed from end to end along the side of the road and then in the second passage the roller should slightly lap the first passage until the centre of the road is reached.

**METALLING.** After the formation of the road and the draining are completed, the mass of broken stone or gravel which is to form its wearing surface should be laid, packed and so consolidated that it will be practically water-tight. Such a road will be durable and easily maintained. It will shed water readily. Its hardness will prevent the formation of ruts, which is the first stage of destruction.

**WIDTH OF TIRES.** If all wagons used in country roads could be provided with tires four inches wide, they would roll the surface more smoothly and more quickly, and the road would be in fairly good condition all the year round.

**NOXIOUS WEEDS.** Chapter 202, R.S.O., 1887.

(Sec. 9.) "It shall be the duty of the overseers of highways in any municipality to see that the provisions of this Act relating to Noxious Weeds are carried out within their respective highway divisions by cutting down or destroying or causing to be cut down or destroyed at the proper times, to prevent the ripening of their seed, all the

noxious weeds growing on the highways or road allowances within their respective divisions, such works to be performed as part of the ordinary statute labor, or to be paid for at a reasonable rate by the treasurer of the municipality, as the council of the municipality may direct."

(Sec. 10, sub-sec. 4.) "Every overseer of highways who refuses or neglects to discharge the duties imposed upon him by this Act shall, upon conviction, be liable to a fine of not less than \$10 or more than \$20."

Noxious weeds include Canada Thistles, Ox-eye Daisy, Wild Oats, Ragweed and Burdock.

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