



JUSTUM, ET TENACEM PROPOSITI VIRUM, NON CIVIUM ARDOR PRAYA JUBENTIUM, NON VULTUS INSTANTIS TYRANNI MENTE QUATIT SOLIDA."

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THE BEE

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 August 10.

ON THE SCIENCE AND PRACTICE OF ROAD MAKING.

[Extracts from an Essay read by Mr. P. CERRAR, before the Literary Society, Pictou, 30th Dec. 1835.]

LAYING OUT OR TRACING A ROAD.

This business of tracing the line of a Road should never be undertaken without the assistance of instruments; and all local suggestions should be received with extreme caution.

To guard against errors in this important point, it is essentially necessary not to trust to the eye alone, but in every case to have a survey made of the country lying between the extreme points of the intended new road. For this purpose an experienced surveyor should be employed to survey and take the levels of all the various lines that, on a previous perambulation of the country appear favourable. It is only by such means that the best line can be determined.

These surveys should be neatly and accurately protracted and laid down on good paper, on a scale of sixty yards to one inch, for the ground plan, and of thirty feet to an inch for the vertical section.

The map should be correctly shaded, so as to exhibit a true representation of the country, with all its undulations of high grounds and valleys, streams and brooks, houses, orchards, churches, ponds of water adjacent to the line of road; and all other conspicuous objects should also be laid down on the map. A vertical section should be made and the nature of the soil or different strata should be shown, over which each apparently favourable line passes, to be ascertained by boring; for it is by this means alone that the slopes at which the cuttings and embankments will stand, can be determined and calculated. If it be necessary to cross rivers, the height of the greatest floods should be marked on the section; and the velocity of the water, and the sectional area of the river. If bogs or morasses are to be passed over, the depth of the peat should be ascertained by boring; and the general inclination of the country for drainage should be marked.

All the gravel pits or stone quarries contiguous to the line should be described on the map, with the various roads communicating with them; and the existing bridges over the streams or rivers which are immediately below the proposed point of crossing them should be carefully measured, and the span, or waterway, stated on the section.

These preliminary precautions are absolutely necessary, to enable an engineer to fix upon the best line of road, with respect to general direction, and longitudinal inclination. Without the unerring guide of actual measurement and calculation, all will be guess and uncertainty.

It may be laid down as a general rule, that the best line of road between any two points will be that which is the shortest, the most level, and the cheapest of execution; but this general rule admits of much qualification; it must, in many cases, be governed by the comparative cost of annual repairs, and the present and future traffic that may be expected to pass over the road. Natural obstructions also, such as hills, valleys, and rivers, will intervene, and frequently render it necessary to deviate from the direct course.

In every instance of laying out a road in a hilly country, the spirit level is essentially necessary to

show the proper line of road to be selected. The general rule to be followed in surveys is to preserve the straight line, except when it becomes necessary to leave it to gain the rate of inclination that may be considered proper to be obtained, without expensive excavations and embankments.

When a deviation is made for this purpose, it becomes necessary to proceed in a direct line from a new point.

When hills are high and numerous, it sometimes appears, from a perambulation and inspection of the country, to be advisable to leave the straight line altogether from the beginning, in order to cross the ridges, at lower levels, by a circuitous course.

It constantly happens that although inclinations which do not exceed the prescribed rate can be had without quitting the straight line, the ridges may be crossed, at many feet of less perpendicular height, by winding the road over lower points of them; but the propriety of doing so will depend upon the length that the road will be increased, by going round to avoid passing the ridges in the direct line. The saving of perpendicular height to be passed over by a road, though a matter of so much importance and practical utility, has not hitherto received that attention from engineers which it deserves.

When expeditious travelling is the object, the maximum rate of inclination that never should be exceeded in passing over hills, if it be practicable to avoid exceeding it, is, that which will afford every advantage in descending hills, as well as in ascending them. For, as carriages are necessarily retarded in ascending hills, however moderate their inclinations may be, if horses cannot be driven at a fast pace in going down them, a great loss of time is the result. This circumstance is particularly deserving of attention, because the present average fast rate of driving over any length of road can be accomplished in no other way than by going very fast down the hills. But when the hills are very steep, and a driver cannot keep his time except by driving very fast down them, he exposes the lives of his passengers to the greatest danger.

How much time is lost in descending steep hills will appear from the following statement:—Suppose a hill to be so steep as not to admit of a stage coach going faster down it than at the rate of six miles an hour, five minutes will be required for every half mile; but, if the hill were of an inclination of 1 in 35, it might be driven down with perfect safety at the rate of 12 miles an hour; at which rate the time for going half a mile would be two minutes and a half, so that there is a loss of half a mile in distance for every half mile down the steep hill.

Besides the loss arising from the additional horse power required to draw over very steep hills, there are other circumstances which make it desirable to avoid them.

In descending them, the drag becomes indispensably necessary. In coach travelling, the stopping to put it on and take it off will be the loss of at least one-fifth of a coach travelling at the rate of ten miles an hour; for in slackening the pace of the horses, and before they stop, nearly one minute will be occupied.

An inclination of 1 in 35 is found by experience to be just such an inclination as admits of horses being