

## SPECIFICATIONS.

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X In considering a set of specifications it must be borne in mind that there are three parties involved, namely, the buyer, the contractor and the engineer. Most troubles over specifications are the result of each of these parties persisting in interpreting them according to his own particular viewpoint without regard to the rights and considerations of the others. ~~It has been said that the great confusion of tongues and resulting failure in the building of the Tower of Babel was probably caused by a disagreement over specifications.~~ Specifications should be so written that the buyer, (the taxpayer in the case of public improvements), gets what he pays for and pays for what he gets.

2 It usually falls to the lot of the engineer to write up the specifications for various types of construction work. The writer should critically analyze his specifications, first as the buyer, then as engineer and finally as contractor. Viewed carefully from these three viewpoints, the specifications can be so shaped that they will adequately safeguard the interests of all parties concerned.

Specifications are interpreted primarily by the inspector and the contractor. The average inspector, especially on public work where politics has a free rein, is absolutely incapable of properly discharging the duties with which he has been intrusted. In many cases he knows practically nothing about engineering, frequently being unable to read a blueprint. It is little wonder that construction under such poor supervision often results in failure. But, on the other hand, construction projects free from political contamination frequently move along under very incompetent inspection due to the very poor salaries paid for this work. On the average highway job, for instance, it is practically impossible to induce a man with the necessary training and experience to accept a position as inspector at the low salaries offered, from \$90 to \$150 per month.

In my opinion, the inspector is one of the most important men on any construction job, if not **the** most important. Regardless of the reputation and ability of the engineer or the excellence of the specifications, nine times out of ten the structure will be made or marred by the ability of the inspector. Millions of dollars of the taxpayers' money are wasted every year as a result of economizing on inspector's salaries. (D)

Recently I spent a day on a county macadam road job a little over a mile in length. The inspector was a young, local farmer, apparently honest and well meaning but absolutely ignorant as far as his duties were concerned. Only center-line

grade stakes had been set and as soon as the first layer was removed from cuts and first dumping made in fills, these stakes were gone and there was no way of telling whether the grading was correct or not. I asked the inspector how he knew whether or not the grading was finished to specifications. He said he had gone over the line of stakes before the work started, noting the cut or fill marked on the various stakes and had "sort of estimated" where that elevation would be on the fence along side. Imagine the results from such a method. And there was no fence along about half of the road. The road was never finished according to specifications and the case hung fire in the courts for many months. Considering the money lost by the county on this job, they could easily have paid a capable inspector ten, fifteen or even twenty-five dollars a day and still have been ahead financially as well as having the kind of road they ordered.

Specifications should be interpreted upon the broad grounds of professional intelligence as well as common sense. Unforeseen difficulties will arise on almost every job, requiring certain variation from the letter of the specifications. Inexperienced inspectors are prone to stick absolutely to the wording of the specifications in such cases thereby precipitating a battle with the contractor and in many cases obtaining results wholly contrary to the desires of the one who wrote the specifications.

The authority of the inspector should be clearly outlined, (mainly for the benefit of the contractor), and he should be relieved as much as possible from errors of judgment resulting from the too frequent use of the clause, "to the satisfaction of the engineer."

I do not favor the arbitration clause in specifications. In case of disagreement between contractor and engineer, the latter should be the final authority. Arbitration spells compromise in practically every case. The engineer writes the specifications to get for the buyer what he pays for. Usually a compromise does not attain this desired aim.

Copying specifications too freely is a dangerous habit frequently indulged in by incompetent engineers. Many counties possess highway specifications that have been copied blindly from various sources. Many of them were obsolete when copied and have never been revised. As a result they are worthless. It is always dangerous to copy highway specifications that are four or five years old because the designs, methods, etc., are changing so rapidly. The revolution of the design of concrete slabs resulting from knowledge gained in the Pittsburgh, Arlington and Bates Road tests may be sighted as an example.

The standardization of paving brick, asphaltic materials, concrete mixers, etc., brought about by the Department of Commerce under the direction of Mr. Herbert Hoover, (himself an engineer), has greatly simplified the work of the highway specification writer.