# TECHNICAL SPECIFICATIONS' EFFECT ON CONSTRUCTION[a]

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**ABSTRACT:** Technical specifications constitute that portion of the contract documents that control the performance of the construction project. The technical specifications impact all parts of the construction project. Clear specifications and a consistent understanding of the intent of the specifications by all parties leads to a project of higher quality. The specifications also protect the right of the contractor to choose methods of construction and provide assurance that the owner will receive the required performance from the finished product. Specifications that fulfill these demands often lead to better relations through consistent decision making and proper delegation of responsibility. The prompt clarification of ambiguities and the fair resolution of discrepancies concerning technical specifications leads to projects with fewer disputes, resulting in a reduced need for arbitration and litigation and thus lower overhead costs for both owners and contractors.

## INTRODUCTION

The technical specifications constitute an important controlling contract document concerning the performance of construction work. Like the plans, specifications must frequently be referenced, as the specifications impact all aspects of a construction project. Because specifications use an indirect means of communicating (verbal descriptions in lieu of pictorial representations), careful use of language is imperative to reducing problems on the project. Although contract documents cannot be expected to be completely unambiguous, their haphazard preparation will likely yield disastrous results.

The representatives of both contractors and owners are the primary parties involved in the construction process. Although their respective roles will generally be clearly defined in the contract documents, they must be ever mindful of the objective of the project design. To that extent, the intent of each specification should be clearly understood by both parties. The legal implications of the specifications and the application of them in the field should be consistently interpreted by all parties. While it may not be possible for the construction laborer or the testing representative of the owner to completely understand all the aspects that may be encompassed by the specifications, their superiors should understand and appreciate the overall purposes of the specifications.

Each specification has a precise intent. Whether it is to exemplify the design of a given element, verify the performance by the contractor, or test an element of the project, a specification controls the construction process. The contractor's personnel and the owner's inspectors should understand the design of each element being specified and its practical function. The design of a particular element can be critical to the integrity of a structural system, as in the placement of tension-reinforcing steel in a concrete beam. How-

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ever, an element may also be designed to serve a purely aesthetic purpose. If the contractor's field personnel or the owner's inspector fail to recognize what attributes of an element are important, the finished product might not satisfy minimum requirements or the product might be delivered at an excessive price.

## Example

An actual account (Stan Davis, lecture, University of Washington, 1989) of a construction incident emphasizes this point. Reinforcing steel (#3) was being placed for strip curbing in the streets of Seattle according to Seattle Engineering Department specifications. The inspector on the site was ready to stop work because the reinforcing steel in some locations was being spaced too close, and in some places too far apart [12 in. (30 cm) instead of 11 in. (28 cm) spacing]. The specification for placing reinforcing steel in the curb had been developed 20 years earlier and was used on streets where strip curbing was placed on top of the paved roadway edge. The reinforcing steel was used as an anchor for the curb in lieu of a keyway, which had proved ineffective in preventing curb/pavement separation. This innovation occurred when a construction worker took a spare piece of #3 reinforcing steel out of his pickup, bent it into a U-shape and placed it in the green concrete pavement. Behold, the problem with curbs breaking had been solved and thereafter the procedure was incorporated into the City of Seattle standard specifications. Note that the reinforcing-steel spacing was somewhat arbitrary and merely reflected a practical spacing that had proved successful in one instance. Because the inspector did not think about the purpose of the specification or the purpose served by the rebar, extra work and confrontation occurred.

## Clarity of Intent

Specifications should be written so that the intent is clear. For example, phrases such as "to the satisfaction of the engineer" or "to a reasonable . . ." are not clear enough to provide the required detail. These should never be used except on extremely rare occasions. When the contractor is preparing a bid, such phrases will leave the contractor in doubt of the actual requirements that must be met to satisfy the specification. If these phrases are to be used in evaluating a contractor's performance, the interpretation of these terms should be clarified prior to bidding, as in a prebid conference. If these clarifications are not made before construction begins, disputes are likely, because the contractor will proceed with methods he feels will produce acceptable results. The owner or inspector may have an interpretation of the specification that disagrees with that of the contractor. Obviously such a situation could be avoided through better communication of what constitutes an acceptable finished product.

In determining the requirements in a specification, the specification author should appreciate the contractor's right to choose the method of construction. Provided the specifications definitively portray the finished product, the contractor is given the opportunity to select a method that meets these requirements and is held responsible for any flaws in the product that do not satisfy the specification. Developing new requirements for each specific project is

not economically feasible, therefore standard specifications should be used or included as a separate documented reference. Special or unique provisions can then be included to specifically address any unusual circumstances.

The amount of control over the contractor, as dictated in the specifications, will vary with different types of work. In most instances, control over the contractor's methods should be limited, but care should be taken to ensure that the expected results are obtained. In some instances, though, the contractor's methods may have to be controlled to some degree because of environmental conditions, hazards, safety concerns, or concern over existing operations, as in highway work. In these instances, tight control over the methods should be specified in an attempt to ensure that the proper parties retain responsibility (e.g. the owner).

Even though specifications may be well written, the terms must still be implemented in the field. Failure of the contractor to comply with the specification can result in poor work, but failure by the owner to judiciously and consistently enforce the specifications on the jobsite can result in ill feelings.

## Contractor-Owner Relations

Specifications that are clear and fair to all parties are often a main contributor to a friendly relationship between the owner, contractor, and other contracting parties. Poor specifications will often lead to inconsistent decisions by the inspectors on a jobsite. Additionally, the responsibilities held by each party may be questioned. All parties will feel uncomfortable because they cannot predict what will happen in the future. Will the contractor change performance to match the inspector's expectations or will the inspector modify expectations? The "who is right" confrontation can be minimized by well-written specifications. All reductions in confrontations lead to more productivity because less time is spent "ironing out" differences. Additionally, a friendly accord will result in higher quality work.

The current trend of dividing large public projects into smaller individual contracts has placed special emphasis on the need for consistent enforcement of the technical specifications. Equal performance by all contractors on the project is essential because of the ability of each contractor to observe the work performed by others. When separate inspection offices for a single owner are used, the problem becomes more complex. The interstate 90 (I-90) project located in Seattle is an example of a large public project with separate inspection offices for a single owner, the Washington State Department of Transportation (WSDOT). Some conflicts between contractors and the WSDOT over equal performance requirements on like items of separate contracts have been observed. All contractors bid to the same standard specifications on such jobs, necessitating the equal enforcement of the technical specifications on all contracts.

Field personnel should feel supported or "backed up" by their superiors. If decisions by field personnel are acceptable to those with final authority, the smooth flow of work will occur naturally. Any decisions that may be contrary to what those in the field believe or compromises made between the resident engineer and contractor, should be accurately relayed to those in the field. Oftentimes, verbal communications that pass through several parties become twisted. Decisions that impact a project should be communicated to the affected parties in the field either in writing or through verbal

communication directly to the affected party.

Whenever owners and contractors have major disputes over the specification requirements, ultimately both sides lose. Along with disputes are the associated increases in construction duration, the need for dispute resolution requiring the services of lawyers, and, in general, increased tension between the contracting parties, which adversely impacts all parts of the project. Although projects cannot be expected to be completed free of problems, minimizing disagreements or disputes will benefit all parties.

An amiable relationship between the owner and the contractor will contribute substantially to early project completion and an earlier final payment. The contractor is thereby relieved of the burden of excess financing, and the owner can begin to realize revenues from the completed project. Having fewer issues to resolve imposes a less hurried atmosphere on the job. As disputes accumulate, those that are not resolved merely become a source of irritation. The resolution of problems as they occur reduces the chance that arbitration or a court settlement will be required. Because problems are usually handled by those in the field office, reducing the number of problems to be worked out in the final stages of the project lowers the job overhead for both the contractor and owner.

Delaying decisions to resolve discrepancies not only delays the resolution of the problem but may create additional problems or compound existing ones. Clarifying discrepancies as they occur, even before bid day, will reduce the number of tense negotiations or litigation cases at the end of the job, qualities endearing to both contractors and owners. When a contractor finds an error or ambiguity in the contract documents, it is in the best interests of all parties, both legally and financially, to immediately clarify the issue. By keeping issues unresolved, the contractor only increases the chance of a subsequent problem. By waiting, the contractor may lose legal rights to compensation for associated costs. Thus, the owner must write a specification that is sufficiently open as to not hinder the contractor in choosing the construction method but that clearly controls the end product.

When an ambiguous specification is encountered in the bidding process, the contractor should seek clarification prior to submitting a bid or clearly state any assumptions that are made in the bid. Unfortunately, a conditional bid may result in the rejection of the bid as being nonconforming or nonresponsive. When and if changes in the specifications are made to clear up ambiguities, it is easy to make equitable changes in contract price if the assumptions the contractor makes are stated. When intent on the contractor's side is clearly conveyed, the contractor has a stronger position for collecting just payments for any additional work that is required.

## Conclusion

As can be seen, the specifications play an instrumental role in providing control over the outcome of the project. They provide the minimum standards of performance to be met by the contractor, they can control construction methods in special circumstances, and they establish the responsibilities of the contracting parties. Poor specifications lead to disagreements on the jobsite and often reduce the quality of the work. While no specification can be completely unambiguous, well-written specifications facilitate speedy construction and friendly relationships on the jobsite. Application of the written

words is the final step in the use of specifications on the jobsite. Just like any tool, proper use of clear and fair specifications results in superior construction.


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## Appendix. Bibliography


Brown, E. C. (1988). "Putting a lid on liability." *Civ. Engrg.*, 58(7), 66–67.

Iffland, J. B. (1988). "Quality: Out of the manual and into the field." *Civ. Engrg.*, 58(5), 54–56.

Lakamp D. W. (1986). "The training of the owner." *Civ. Engrg.*, 56(12), 44–46.

Long, R. J. (1988). "Contract documents: Lessons from litigation." *Civ. Engrg.*, 58(5), 78–80.

Simon, M. S. (1989). "Legal matters." *Constructor*, (Jan.), 122.