

Managing Construction Quality

The Good Old Days

Successful construction projects used to go something like this: Owners would hire experienced, hard working Architects and Engineers who developed plans and specifications that were not perfect, but good enough that experienced, hard working General Contractors could hire experienced, hard working Trade Contractors to do the work of making a project happen. We worked through the inherent difficulties of construction by working long hours, keeping our word and understanding that “stuff happens”. We accepted that no project was perfect, that people screw up, and knew that there was little use in crying over spilled milk. The satisfaction of a job well done carried us through the toughest days.

We didn't spend much time telling specialists, like trade contractors, how to do their job. They had skilled tradesmen, the construction was relatively simple, and most contractors did things pretty much the same. If we had a contract, it was something the “suits” put together, and copies might not be sent to the job site since they had little or no connection to “getting the job done”.

The New World

Construction professionals are living in a new world:

- Consumers expect increasing quality and decreasing prices in all products.
- The building industry is not keeping pace with the quality and price advances many industries are making.

- Consumers are more litigious than ever and there is a proliferation of attorneys.
- The building industry is not attracting the best and brightest young people.
- The built-environment has been altered in the last 20 years, including increased complexity, less fault-tolerant materials, and tighter, slower drying buildings.
- Consumers are more conscious of building-related health issues than ever.
- In some areas, a lack of skilled construction labor makes the construction professional's job even more critical.

Construction Management

Our company delivers training in construction management and we have categorized the phases of project planning and management in a framework we call “The DBSKCV™ (pronounced “dib-skiV” - DiB-SKCiV) Method.”

Summary of the DBSKCV™ Method

- Define the Scope of Work (this includes the design phase).
- Budget: Identify how much the project will cost the contractors and owner.
- Schedule when the construction will happen and share this information.
- Contract (K): Who is doing what? Everyone should know what to expect.
- Coordinate the construction.
- Verify, document and communicate that everyone is doing what they should.

For details, please read *The DBSKCV™ Construction Management Method*.

Construction Risk Management

Growing legal risks, administrative issues, sky-rocketing workers' compensation costs, increasing fees and taxation, and complicated insurance issues are only a few of the reasons why the price of construction is higher today than ever before. Managing construction risk is a full time vocation for many professionals and beyond the scope of this article (we do training on this too).

THE ABC'S OF RISK MANAGEMENT

- A = Avoid Potentially Dangerous Situations (impossible in construction)
- B = Be Really Good At What You Do
- C = Cover Your Assets

The ABC's apply to Managing Construction Quality because (A.) we must face the fact that "risk avoidance" as a construction professional is impossible, (B.) being good at what you do means doing all you can to make sure a project succeeds, and doing a little bit of someone else's job will sometimes become necessary, and (C.) the best "coverage" is avoiding problems by delivering work that meets expectations. Just accept that buyers expect quality *and* performance, even when they pay rock-bottom prices, and lawyers expect perfection; the former is hard, but easier than the latter.

Project Definition

The "Define" phase of construction management consists of documenting the work to be performed. This is usually graphic and written with plans, specs, references to codes and standards, and detailed "Scope of Work" documents.

Getting a clear, specific and detailed project scope is the first step in the construction project management process and it is where a project's "quality" is established.

SOME QUICK DEFINITIONS

- Plans and Details: Graphic representation of construction.
- Specifications: Specs are the written representation of construction, which usually includes a greater level of detail regarding construction performance, process, products, and quality.
- Construction Contract: Agreement between two or more parties for the delivery of construction; plans and specifications are used as the definition of what is being bought and sold.
- Standards: Documents, with graphic and written information, referenced by plans, specifications and construction contracts, which specify performance criteria and/or methods in greater detail than typical plans or specifications. Standards are created by standards setting bodies like ASTM, product manufactures, and industry trade groups.
- Scope of Work: Written documents, usually based on the plans and specs, which identify or clarify the project definition. These documents are attached to prime and trade contracts to establish who is doing what. In theory, the "Scope" for the prime contractor should include everything being sold to the owner, and all the trade contractor "scopes" in aggregate should include everything in the prime scope, less the GC's self-performed work.
- Hold-Point: Critical time in the construction process where construction should stop for verification of conformance with plans, specifications, standards (including performance) and contracts. Verification can include inspection, testing, recording, and reporting.

In "the good old days" we left the details of "how to" to the trade contractors. After all, they are the specialists. But for the reasons stated above, leaving the details to trade

contractors to work out among themselves has left a lot of projects in a less than enviable position: lack of integration, quality problems, re-work, leaks, lack of durability, and on and on.

Owners or their representatives should no longer sign a one or two page “Proposal” from a contractor which serves as the “Scope of Work.” Such documents are not likely to contain information specific enough to ensure the scope is complete, they don’t ensure that the parties are on the same page for quality or performance, and they lack adequate contractual protections.

Specification writers making obscure references to documents that are difficult to obtain is not new. But acquiring these documents is now much easier due to the internet. It is now possible to “define” (design) our projects using readily accessible documents that we can use during the building process to make sure the on-site work is being installed and integrated correctly. This information needs to be integrated throughout the plans, specifications, standards and contracts. In practice, these documents should be created or referenced in the *Define* phase, referenced in the *Contract* phase, and used to compare the actual work in the field to the plan during *Coordination* and *Verification*.

Managing Construction Quality

There is no way to 100% guarantee project success and performance; the closest I have found is the use of a proven system.

Think of it this way: *Construction plans and specifications are a hypothesis, and a hypothesis should always be verified.* The hypothesis is that the designers and specialty consultants have composed a set of documents that are appropriate to build a project that will meet the *performance*

expectations of the owners and applicable codes. The contractors on the project then work under the hypothesis that the design is functional, and that the work they do will also meet *performance expectations*.

Question: How do we verify our construction projects are going to perform?

Answer: (1.) During the define phase, we make sure our design hypothesis is reasonable by having someone with experience in building performance issues review, comment and recommend improvements; (2.) We make sure the plans, specifications, standards, and contracts are consistent in describing “what good performance looks like”; (3.) We establish a procedure to “verify” at specified *Hold-Points* during construction; (4.) During construction we inspect to verify conformance with the design (plans, specs, standards, and contracts). (5.) After the initial assemblies are installed, we test them to verify performance, or build a mock-up and test it before construction (whichever is more cost effective).

Remember: We must be willing to administer consequences to project team members who don’t do what they promise. You will get resistance. If a contractor has signed a contract to perform consistent with a specified standard, it will sometimes take a strong will to make some of them perform.

ATTACHMENT: The attached *Independent Quality Review* spreadsheet is a matrix of optional services one might purchase from a consultant. The minimum activities required for a third party to be of assistance in ensuring project quality are identified; higher levels of service are like buying more insurance. Remember, this does not include *doing* the actual design. At a minimum, this is making sure the project definition is close to complete, and helping assure that proper installation and integration of the assemblies

will lead to appropriate performance. Further work can ensure a connection between the plans, specifications, standards and contract scope of work documents.

Quality Management Plan

Here is the system, organized in the context of The DBSKCV Method. Remember, the DBSKCV Method is iterative, meaning we walk through all steps many times throughout the life of a project. We should go through the “D-B Loop” (e.g Define-Budget-Repeat) many times before getting to the Coordinate phase.

DEFINE

- Architectural, Structural, and Specialty Design
- Specification Writing
- Referenced Standards

QUALITY PLANNING (Often by Independent Quality Review Consultant)

- Evaluation of plans and specs
- Evaluation of referenced standards, and contract / scope of work language review (Optional)
- Hold Point Development and performance verification planning (Optional)
- Mock-Up of assemblies and testing (Optional)
- Recommendations (final) from Quality Review Consultant
- Meetings or teleconferences between Quality Review Consultant and Owner, Designers and/or Contractors (Optional).
- Review of updated design, specification, referenced standards and contracts made in response to Recommendations from Independent Quality Review Consultant (Optional).

BUDGET: Update as necessary throughout the process. Make active decisions about “how much insurance to buy”.

SCHEDULE:

- Establish Hold Points
- Be prepared to stop the project if acceptable performance cannot be achieved

CONTRACT

- Connect the Plans, Specifications, and Standards, Quality Management Plan, including Hold Points, to the prime and trade Contracts and Scope of Work documents so that Quality does not “cost extra” (in change orders) during construction.

COORDINATE

- Make sure prime and trade contractors know the standards they will be held to during the Verify phase.
- Coordinate actions at Hold Points in the construction schedule to verify quality of installations.

VERIFY

- Visual Inspection at Hold Points to verify conformance with project definition (plans, specs, standards and contract scope of work documents) and to evaluate any on-site changes (Optional)
- Testing to verify performance (Optional)
- Final Report that might include: Quality control process, design summary, evaluation process, inspection summary, testing summary and on-going maintenance recommendations (Optional)

Independent Quality Review

Line	Description of Potential Services	Service Level																		Typical Durations	
		1A	1B	1C	2A	2B	2C	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	6C	Low	High
1	Evaluation of plans and specifications	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	8	40
2	Evaluation of referenced standards		x	x		x	x		x	x		x	x		x	x		x	x	4	40
3	Evaluation of contracts (scope of work)			x			x			x			x			x			x	4	40
4	Hold Point Development							x	x	x	x	x	x	x	x	x	x	x	x	4	40
5	Mock-Up of Assemblies and Testing										?	?	?	?	?	?	x	x	x	16	80
6	Recommendations (final)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	8	80
7	Meetings or Teleconferences	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	2	40
8	Review of Updated Design	?	?	?	?	?	?	?	?	?	?	?	?	x	x	x	x	x	x	4	40
9	Visual Inspection				x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	4	160
10	Testing							x	x	x	x	x	x	x	x	x	x	x	x	8	80
11	Final Report										x	x	x	x	x	x	x	x	x	8	40
12																					
13	Potential Deliverables																				
14	Opinion Letter re: Evaluation	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		
15	Issues List with Recommendations	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		
16	Inspection Summary				x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		
17	Inspection Report										x	x	x	x	x	x	x	x	x		
18	Location Matrix				?	?	?	?	?	?	?	?	?	x	x	x	x	x	x	1	16
19	Hold Points				?	?	?	x	x	x	x	x	x	x	x	x	x	x	x		
20	Testing Protocol							x	x	x	x	x	x	x	x	x	x	x	x		
21	Testing Summary Report							x	x	x	x	x	x	x	x	x	x	x	x		
22	Project Close Report							?	?	?	?	?	?	x	x	x	x	x	x		

Explanation of Service Levels

L1: No Inspection

L2: Limited Visual Inspection

L3: Limited Visual, Limited Testing

L4: Periodic Inspection, Limited Testing

L5: Extensive Inspection, Limited Testing

L6: Extensive Inspection, Extensive Testing

Document Review Levels

A: Plans and Specs only

B: Plans, Specs, and Standards

C: Plans, Specs, and Standards and Contracts