

## Quality is Job One: Teaching Construction Quality Management to the Next Generation of CMs

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Many of Hill International, Inc.'s senior leaders give back to the industry by teaching the next generation of construction managers about the services PM/CM firms provide. Hill First Vice President, Federal Programs Ed Newman, PE, CCM, for example, has been teaching CM practitioners about quality management—specifically the meaning and purpose of construction quality management, the processes involved, and how to develop a strong quality management plan.

Newman serves as an instructor for the Professional Construction Management course provided by the Construction Management Association of America (CMAA), and most recently presented the Quality Management module to a class organized by CMAA's Central Pennsylvania Chapter. "The U.S. construction industry depends on CMAA to set so many standards," says Newman. "This includes quality, so it makes sense that we introduce students early on to the CMAA's definitions and processes. Their Professional Construction Management Course has all of the go-to knowledge team members will need when they get into the field. I see my job as an instructor as adding some concrete examples to CMAA's materials—where might CMs encounter these processes in the field? What will they look like? What best practices can I incorporate?"

The class typically includes students from various backgrounds and levels of experience, some with an existing understanding of QA/QC and some entirely new to the topic. "The course is designed to both introduce and reinforce good Quality Management practices. It does this by walking through the entire process, from defining quality to resolving quality



disputes." The result is an introduction to and explanation of accepted QA/QC best practices that equips CMs to drive quality on their projects regardless of scope, type, or scale.

### QUALITY AS A PROCESS

According to CMAA, Quality Management is the process of planning, organizing, implementing, monitoring, and documenting a system of management practices that coordinate and direct relevant project resources and activities to achieve quality in an efficient, reliable, and consistent manner.

Teaching quality management starts with an explanation of what project quality means, explains Newman: "CMAA defines construction quality as the degree to which a project and its components meet the owner's expectations, standards,

and intended purpose. As CMs, we determine quality by measuring how a project conforms to the approved plans, specifications, and applicable standards.” Understanding the owner’s definition of quality is key. “What, exactly, do we mean by conform? You need a reasonable, viable definition of what that idea means to each owner, whether that’s a Federal government agency or a small private company. Is compliance with the contract documents enough? If not, that needs to be clearly explained and detailed in your Quality Management Plan, or QMP.”

Consistency is the goal, says Newman. “My students know the importance of measuring project quality before they even come into the class,” says Newman. “But the course offers them a framework to define and ensure quality no matter what factors influence and impact their specific projects.

“Really the key idea is consistency. If you plan QM, organize it from the beginning, and get it all into your QMP, quality is going to become a part of what the project team does daily,” he explains. “We need this quality process to be ingrained in everyone on the team, as it works through the whole project.” He adds, “Imagine a process where you replaced adversarial positions with a system where you work with people to gain that level of quality that everyone expects. That’s what a good QMP does: drives the process.”

## MINDING YOUR QA/QC

Quality Control (QC), whether in construction, manufacturing, software, or a myriad of other project-driven endeavors, is the continuous review, certification, inspection, and testing of project components, including persons, systems, services, materials, documents, techniques, and workmanship. This continuous review determines if the components conform to the plans, specifications, applicable standards, and project requirements.

“In design,” says Newman, “There’s a box for the engineer’s initials who designed it, and a box for the engineer who checked the calculations. There’s your QC, that’s it. In construction, however, things are more complicated. For a concrete pour, there is the foreman in charge of the pour and a testing technician who tests the concrete, for example. But remember, it’s probably not just the quality of the pour, but the quality of the project MBE/DBE program, the quality and thoroughness of the pre-bid meeting, the quality of the design-build procurement. What system do you have in place

to provide a QC check for all these elements, from planning all the way through to maintenance?”

Newman specializes in managing projects for Federal and state agencies and offers his own experience to explain the nuances of QC to his students. “Just as owners and their agencies vary, so do their approaches to QC. The U.S. Army Corps of Engineers (USACE) and the Federal Highway Administration have the contractor perform the QC materials testing and have their agency personnel or a consultant perform quality assurance (QA) of testing and the QC inspection of workmanship. But other agencies, especially at the state level, may perform all aspects of the QC process. As the CM, you need to know the specifics of your owner first-hand for each component, from shop drawings to soil bearings.”

Quality Assurance, or QA, is the second main component of the Quality Management Process. QA, as defined by CMAA, is the application of planned and systematic reviews that demonstrate that quality control practices are being effectively implemented. “Think of it this way,” says Newman. “The QA team audits the contractors’ quality control practices to make sure that they’re applied consistently and to verify the things they’re submitting and the work that they are doing is in compliance with their own QC system.”

## THE QMP

What drives QA/QC? A well-defined, well-developed QMP. According to CMAA, the QMP is a project-specific, written plan that reflects the general methodology to be implemented by the CM over the course of the project. The QMP thus enhances the owner’s control of quality through a process-oriented approach to the various management tasks for the program.

“I want students to understand the QMP is really a team effort,” says Newman. “The plan defines the QA/QC roles for the owner, designer, CM, contractor, and other project participants, so they all have to be onboard when the plan is developed—which is very early in the project lifecycle and preferably before design.”

Newman adds that some owners may want their CM to prepare a separate QMP that reflects the CM’s own approach to quality management for their project. “At Hill, our QMPs are developed as a key piece of our Project Management Plan and contain the quality-oriented issues and discussion of processes, check lists, audits, etc.; the day-to-day performance of the various QA/QC functions; and the methods our personnel will use to perform their services. Although we have plenty of templates

and guidelines to start a QMP with, I also want new CMs to understand there is no such thing as a generic QMP, every plan should be tailored to the owner's expectations and the project's requirements."

A good QMP, says Newman, starts with the project organization. "Is this a one-person project or one that requires 12 full-time staff and a list of owner and agency stakeholders a mile long? Use a WBS [work breakdown structure], and put a name in each box," says Newman. "Then, take your WBS, and define who is responsible for QA at each step."

Next, says Newman, get your management decision flowchart together. "When you get to a point where you're doing an inspection, and there is a disagreement on quality, what happens?" asks Newman. "Thankfully, your QMP will have that documented so people know where the decision points are, who makes those decisions, and what the flow is going to be once each decision is made. Discuss partnering, formal and informal. Discuss the issue resolution ladder. When the last concrete truck arrives and the concrete is too high a slump, what happens? The QMP will give you your answer."

Design specifications and drawings may not always be fully constructible, so a constructability review is a best practice all CMs should incorporate into their QMPs. "A good example of how constructability reviews can help your quality management is the case of working in a very tight ceiling space where the construction worker, who may be a bigger guy, is trying to reach up into an opening with a wrench in his hand to do a particular operation," says Newman. "That may look great on paper, but when you get there in the field and the opening isn't big enough, or the distance between the ceiling and the duct work isn't far enough, it can really cause some difficulty. That's where the CM needs to be in there working with the architect/designer looking at those details." Newman suggests using 3D drawings and BIM to identify construction sequence problems as part of the constructability review.

### MANAGING CHANGE MEANS MANAGING QUALITY

The role of the CM, Newman stresses, is in facilitating quality. "The CM interfaces with the designer and the contractor to enforce quality standards and capture quality metrics. Often, that role means we identify any differences between the approved plans and the work delivered," he explains. "But CMs should also be prepared to explain to their owners that the contractor met the agreed upon quality standards, and it's


the owner who is not following the plan. In both cases, this is where a good CM can really make a difference—catching that potential hitch before it came impact progress and keeping everyone informed."

Newman says managing change effectively is a key point he always stresses to his students. "Scope change can happen even on the most well-planned projects," says Newman. "But you have to be careful about how and when you change scope. Sometimes, contractors suggest changes that can save the owner time and money. We want these changes on our projects, but only if we can still control and assure project quality to the owner's satisfaction."

Newman tells his students to assume the role of owner's "trusted advisor" in these situations. "Contractors don't like redoing their work, obviously. So as CM, you are the one saying to the contractor, 'Are you going to be happy when the owner comes in and looks at this?' Working with the contractor to get that level of quality, and not against them, is key. You also have to be able to process these changes effectively – a lot of times that means paperwork. So that's a part of what the CM does: managing the quality, managing the paperwork."

### QUALITY CMS, QUALITY PROJECTS

The course goes into greater depth on all of these topics, as well as further details on implementation tools, quality management team composition and roles, and specific Quality Management tasks across the project lifecycle. "Like any CM discipline, you can make an entire career out of Quality Management," says Newman. "The course gives an overview of what Quality Management is, what it does, and how it's done. To truly master quality management you need years of experience and all the resources and additional instruction you can get. Certainly, I'm still learning about Quality Management myself as technologies change and methodologies improve."

The classic project management triangle is composed of three legs: shorten one leg, and the other two will stretch to compensate. "It's a simple concept, but it's true whether you're working on a small renovation for a homeowner or a major new construction project for a Federal agency," says Newman. "As CMs, Quality Management is one the cornerstones of our service. Passing on the framework and definitions CMAA provides, coupled with some real-world examples, will help tomorrow's CMs deliver the projects their owners envision." 



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### About the Author

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Edward C. Newman III, PE, CCM, has more than 33 years of construction and project management experience, including work on office buildings, educational facilities, highways, rail transit, treatment plants, detention centers, and heavy civil and public works. He currently serves as First Vice President, Federal Programs at Hill International, Inc. out of the firm's Washington, DC, office.

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### About the Article

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