



Design & Construction  
Division

# DCD QUALITY CONNECTIONS

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**Vision:** *To be the World's recognized champion and leading authority on all issues related to*

**Mission:** *The Design and Construction Division shall advance individual performance excellence worldwide by providing opportunities to members for learning, quality improvement, and knowledge exchange*

## MESSAGE FROM THE CHAIR

Greetings to all Design & Construction Division members and our guest readers. We appreciate your continued support and interest in the Division.

We would like to welcome Ms. Jessie Schultz to the DCD, as our new ASQ Community Development Representative. We are looking forward to working with Jessie for all of our liaisons with ASQ headquarters.

Once again the Design & Construction Division took part in the annual Audit Division Conference! The conference was a success as were the DCD sessions. Our thanks go to presenters Robert Orkin, Brad Ivey, Darren James, Denise Clements, Brian Palmquist, Sandor G. Juhasz, Dennis Ramm, and Ray Crawford for their well received presentations. Special thanks go to Division Vice Chair, **Anita McReynolds-Lidbury** for an outstanding job of coordinating all of the conference efforts between the DCD and the Audit Division. We are looking forward to participating in next year's Audit Conference which will be their 20<sup>th</sup> annual conference. It will be held at the Peppermill Resort and Casino in Reno, Nevada, and the Audit Division is planning another "spectacular" conference. We are looking to have more DCD members actively participate in this conference. Those members interested in participating should contact Anita at [amlidbury@att.net](mailto:amlidbury@att.net)

On a more somber note, the construction industry has had another difficult year. Construction's unemployment rate rose slightly in October, to 17.3% from September's 17.2%, but the good news was that it was better than October 2009's 18.7%. The industry is widely considered a bellwether for the economy as an indicator of spending on infrastructure, rebuilding, and business expansion, and it has a ripple effect in terms of purchases of construction materials and equipment.

The roughly \$135 billion federal government stimulus money aimed at bolstering the industry gave some one-third of contractors a lifeline, but some companies will go out of business with the stiff competition and fewer contracts causing companies to bid at below costs.

Government statistics showed the index for construction inputs, such as concrete and diesel fuel rose 0.4%, and prices continue to rise.

The Bureau of Labor Statistics' latest monthly employment report, released on November 5, also shows that construction posted an *increase* in jobs for the month, though the gain was only 5,000. These figures are not adjusted for seasonal swings. For the highly seasonal construction industry, the rates usually worsen in cold-weather months, when work slows down.

Construction still recorded the highest jobless rate among U.S. industry sectors last month. However, it is a vast improvement from January 2010 when the unemployment rate in the construction industry was 24.7%!!

Although the industry news is unsettling, we continue to look forward to improved conditions in the first quarter of 2011. Predictions are on the positive side...hang in there!

I hope you enjoy this edition of "Connections" and thank you for your continued support.

Best regards,  
John F. Mascaro, *Fellow*  
Chair ASQ Design & Construction Division

## **HARMONIZING OUR STANDARDS GLOBALLY**

### **News from the International Organization for Standardization (ISO)**

John R. Broomfield

[jbroomfield@aworldofquality.com](mailto:jbroomfield@aworldofquality.com)

#### **Background**

All products come from processes. These processes are either nurtured or harmed by the systems in which they operate. Therefore it makes sense to reach a global consensus on the standard(s) for process-based management systems. It also makes sense for us to apply this standard to the development of our quality management systems so they are used to deliver quality assurance.

Our basic Quality Management System standard is ISO 9001. Globally, over one million management systems are certified as conforming to this standard. Many more organizations and some projects just make sure their management systems conform to this standard.

Please refer to our Interpretive Guide to ISO 9001:2008 for Design and Construction Project Teams to see how this standard is applied to our industry (item e1364 from Quality Press).

The Technical Committee responsible for the ISO 9000 family of standards is TC 176. ISO/TC176 is considering the future architecture of ISO 9001. This is because users of ISO 9001 particularly are evenly split in their opinions and experience of this basic management system standard:

- Some users say it is too onerous
- Many users say it is just right
- Some users say it is insufficient.

Dr Nigel Croft is the committee's new chair and after studying the feedback from users of the standard he proposes, for discussion, a new architecture of ISO 9001.

#### **Proposed Architecture of ISO 9001**

Develop three levels of ISO 9001 for use by the organization according to the levels of risk, criticality and responsibility associated with the organization's products:

- Light duty system standard
- Normal system standard
- Heavy duty system standard

All three versions of ISO 9001 would continue to focus on providing confidence in the organization's ability to consistently provide conforming products, but could be separated into three derivatives:

##### *ISO 9001:20xx - Part 1 – Light Duty Quality Management System Standard*

A lighter version of the standard aimed primarily at low-risk / low-responsibility organizations (a typical example might be a retailer of office supplies). Many (but not all) small to medium size enterprises may fall into this category.

##### *ISO 9001:20xx - Part 2 – Normal Quality Management System Standard*

The default standard, resulting from an update of ISO 9001:2008, to incorporate the concepts such as:

- Integration of risk management
- The importance of output (and outcomes)
- Knowledge management
- Life cycle management (LCM)
- Improvement and innovation
- Time, Speed and Agility
- Advances in Information Technology

### *ISO 9001:20xx - Part 3 – Heavy Duty Quality Management System Standard*

This version of ISO 9001 would be aimed at organizations operating in more demanding areas and high-risk situations. This system standard may incorporate, for example, enhanced requirements for strategic planning, resource management, use of statistical tools, systematic problem-solving etc.

#### **Possible Benefits**

This proposed architecture could encourage a significant number of hesitant or reluctant users to apply ISO 9001 to their management systems in a transparent way with less onerous requirements than the current standard.

It would provide continuity for current users of ISO 9001:2008, and would allow more sophisticated users (and those with more “critical” products) an opportunity for differentiation.

Within the context of certification, it would provide an opportunity for improvements in the credibility of the certification process, by allowing for the imposition of tighter and more stringent controls in the higher-risk categories.

Which version of ISO 9001 would you use?

Meanwhile please send me your comments on the draft of the overarching management system standard we distributed last month. This standard will apply to all types of management systems including quality, health and safety, environmental and security.

Please comment in the ISO-style: only comments including the reasons for change and the preferred text or reasons for deleting text will be forwarded for careful consideration by our representative on the US Technical Advisory Group to ISO/TC176.

Many thanks.

John R. Broomfield

[jbroomfield@aworldofquality.com](mailto:jbroomfield@aworldofquality.com)

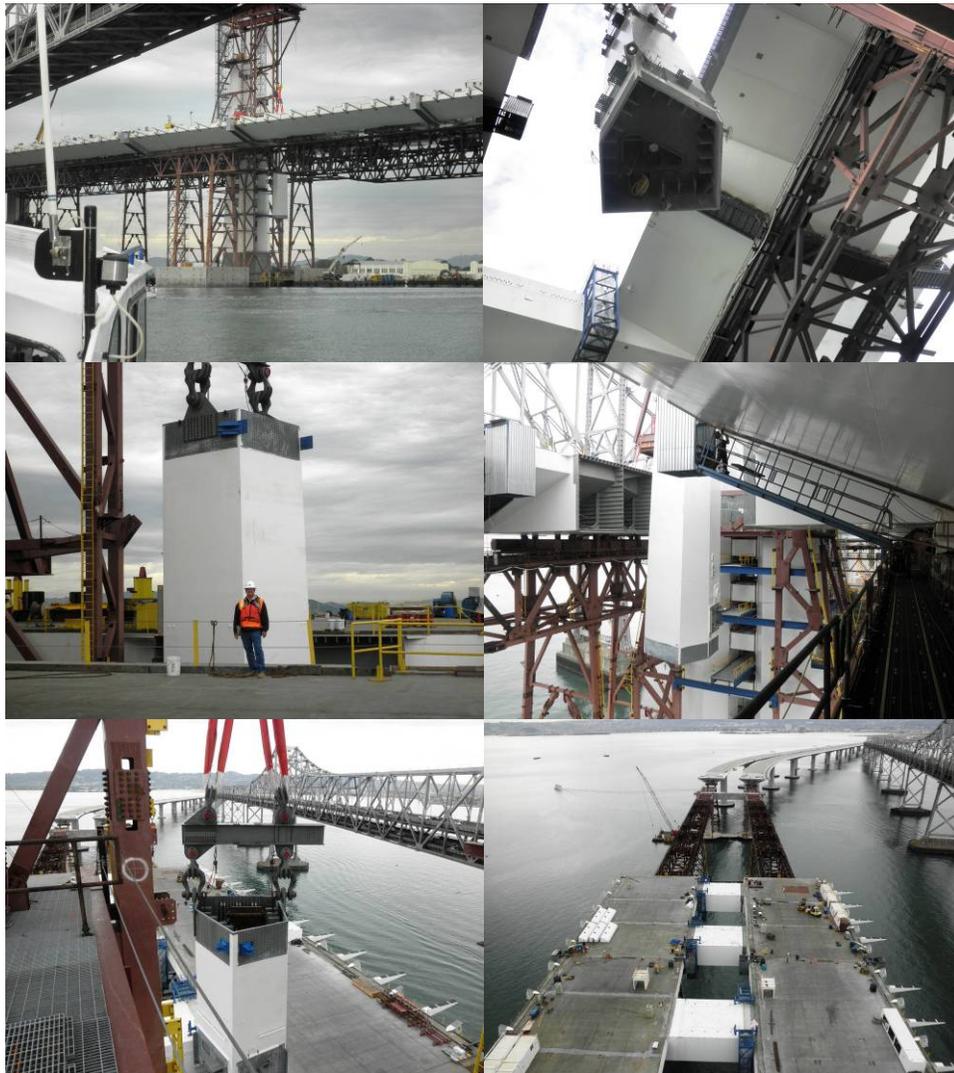
## MESSAGE FROM THE EDITOR

With this issue we continue the theme of focusing on a region of the country, this time the Southwest, by spotlighting some of our members and featuring their articles. Next time it will be the Northeast's turn, so sharpen up those pencil, smile for the camera and let's us know what you're doing.

And, because I've got some space below – more photos from the SFOBB SAS (my project) where we recently raised 4 tower shafts of 600+ metric tons each with a strand jack system.

*Chuck*

Charles J. Kanapicki, P.E., CQM, CQA  
[ckanapicki@abfjv.com](mailto:ckanapicki@abfjv.com)



## COMMENTS FROM OUR MEMBERS

### Email Alerts for DCD Newsletters – One reader writes:

Instead of sending out the entire newsletter via email, couldn't ASQ send out a "notice" of the newsletter issues? ... surely they can send out Division info about the newsletter being issued...

*Editor's Response – You got it – with this issue ASQ will send out an email alerting DCD members*

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### It's More Than QC of a Deliverable

Robert Dawson, PE, CMQ/OE - Lockwood, Andrews & Newnam

With planning, design and construction phase services for projects that range from LARGE – 108" diameter – water pipelines to light rail transit to wastewater treatment to school facilities, it is becoming more apparent to LAN – management and engineers - that the scope of quality should extend beyond just a single task, QC of the deliverable.

In a recent transit project, the audits have included discussions that resulted in opportunities for improvement, "OI's", being included in the audit report. In some cases, the auditor came to realize that the root cause was within his organization and beyond the scope of what the auditee could control. From this sort of open communication, we've seen similar benefits in other tasks including comment-response resolution tracking, reviews of sub-consultants' deliverables as well as planning, scheduling and documentation regarding design criteria and directives.

We're now more comfortable with having quality in all phases and tasks, fully integrated into each project. Training sessions now take on more of a team building event that facilitates improved communication and coordination as we agree to "Say what we do" and "Do what we say".

**Robert W. Dawson, PE, CMQ/OE**

Resident Engineer

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## Unemployed Member Dues

In these troubled and uncertain economic times, the ASQ DCD Board thought it would be a good idea to remind our members of the following (taken directly from the ASQ website):

Unemployed ASQ members receive a discount on their membership dues based on consecutive years of membership.

Consecutive Years of Membership	Dues Discount
1-4	50%
5 or more	100%

### Eligibility Criteria

- You must be a Full, Senior, or Fellow member.
- Any years as a Forum, Associate, or enrolled student do not qualify.
- You may submit this application only after being unemployed for at least 90 days.
- You must be actively seeking employment.
- Retired or self-employed members are not eligible. ASQ offers a similar benefit for retired members.

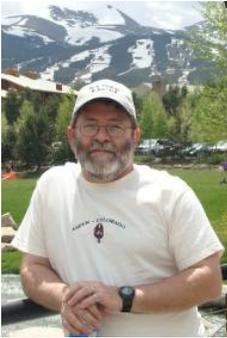
### Benefits

- Your basic membership dues for the current membership year will be paid or partially paid by ASQ. Basic membership dues exclude additional Forums and Divisions, journals, and additional Sections (Seniors and Fellows—you keep your extra benefit of choice).
- You may participate in the program for no more than two years in your membership lifetime. You must complete an application for the second year of participation.
- After renewing your membership, please visit [Careers in Quality](#) to search for jobs, apply for positions online, and post your resume for employers to view.

[Download the 2010/2011 Unemployment Program Application \(July 2010–June 2011 Membership Groups\)](#) (PDF, 78 KB)

# THE SOUTHWEST REGIONAL VIEW

## Who's Who



**Name:** David Brown

**Residence:** Denver Colorado

**Education:** BSc Eng. CE

**Introduction to Quality:** Reading "Zen and the Art of Motorcycle Maintenance" and starting the struggle to define and verify Quality.

**Current Job:** Senior Principal with Delcan, developing and deploying Quality Management programs on transportation infrastructure projects across the country.

**Previous Experience:** Grew up next to a highway construction company, establishing from an early age the desire to be a Civil Engineer and be involved in building infrastructure.

**ASQ Activities:** Senior member since 1995

**Recent Honor:** Member of Transportation Research Board Construction Management Committee

**Family:** 20 years married with two daughters

**Favorite Ways to Relax:** completing home improvement projects and maintaining our family autos.

**Quality Quote:** Three most important words in real estate are "location, location, location". With quality management, the three most important words are "requirements, requirements, and requirements".



**Name:** Katherine Holtz, PE (**BE SURE TO READ HER ARTICLE ON PAGE 10**)

**Residence:** Austin, Texas

**Education:** University of Texas at Austin, BSCE 1981

**Introduction to Quality:** As Materials Engineer for Austin District at TxDOT. Quality in test methods and procedures, precision of equipment and process.

**Current Job:** Texas Region Construction Services Program Leader, RS&H CS

**Previous Experience:** Construction Quality Manager, Delcan Corporation  
Director of Materials and Tests Division, TxDOT

**ASQ Activities:** Certified Quality Auditor, Certified Quality Manager/Organizational Excellence

**Family:** Partner Mary Goehring, Son Michael Hargett, Millie the cutest dog ever

**Favorite Ways to Relax:** walking Millie, fishing, reading historical novels

**Quality Quote:** Quality has to be caused, not controlled. Philip Crosby



**Name:** Miles Littlefield

**Residence:** Los Alamos, NM

**Education:** BSEET – DeVry Institute of Technology

**Current Job:** Los Alamos Site Quality Assurance Manager, Portage Inc.

Organization does environmental remediation and engineering services including erosion & sediment control, hazardous waste retrieval, packaging & disposal, and other related environmental projects for the Department of Energy, Department of Defense, and Environmental Protection Agency. My role is to manage, maintain & implement site quality systems and project specific QA/QC plans.

**Previous Experience:** Electronics design and manufacturing in a variety of industries including consumer electronics, industrial controls, automotive, telecommunications, and utility power.

**ASQ Activities:** International Team Excellence Awards judge, CSSBB, CSSGB, CQA, CQE, CMQ/OE, and exam committee work on nearly all of the above certifications.

**Family:** Married my High School sweetheart over 25 years ago and raised five children with her. The oldest is a Corporal in the USMC, the second is serving a mission for our church in California (the oldest did as well a few years ago), the third is going to college to become a Mechanical Engineer, and the fourth is in High School and the youngest in grade school.

**Favorite Ways to Relax:** Family adventures including camping, shooting (firearms & cameras), and traveling around in our RV.

**Quality Quote:** Quality is meeting the customer's needs in a way that exceeds the customer's expectations.



**Name:** Terry Brickman

**Residence:** Evergreen, CO

**Education:** Bachelor of Technology, Ryerson Polytechnic University, Toronto, Canada

**Introduction to Quality:** When I first started with PCL, I was the QC inspector for the exterior wall of a 52 floor class A office tower in downtown Toronto, Canada. The Construction Manager that assigned me to the project said; "If it leaks you're fired!" Over 22 years later I'm still with the company so now you know the results of my efforts.

**Current Job:** National Director, Quality Management, PCL Construction Enterprises, Inc., Denver, CO.

**Previous Experience:** Building Science Engineer with a Consulting Engineering Company

**ASQ Activities:** Recently joined the organization

**Recent Honor:** Watching my son graduate from Army basic training at Fort Knox, Kentucky.

**Family:** 3 children, an 18 year old who recently joined the Army National Guard and 15 year old twins

**Favorite Ways to Relax:** Drinking a glass of red wine and watching the elk eat all the vegetation in my yard in Evergreen, CO.

**Quality Quote:** Build it right, Build it once!



Terry's son with family at graduation from Army basic training at Fort Knox, Kentucky

## SOUTHWEST ARTICLES

### Developing a Materials Acceptance Program for Design Build Projects Meeting 23 CFR 637B Requirements

Katherine Holtz, PE  
RS & H Construction Services, Inc.

Title 23, Code of Federal Regulations, Part 637 (23 CFR 637), requires State agencies to have an approved Quality Assurance (QA) Program for materials. The regulations provide flexibility by allowing the use of contractor test results in the overall Agency acceptance decision.

This presentation will depict the need for improved, formal, customized Materials Acceptance Programs for Design Build (DB) projects where the Design Build team is responsible for a Quality Assurance Program (typically Quality Control and Quality Acceptance), FHWA required elements of a Materials Acceptance Program for Design Build and my recommendations for improving Quality Programs on DB projects.

#### *The Need –*

The application of quality processes and procedures that were developed for traditional Design Bid Build projects, are not always applicable to Design Build projects. Our current quality culture still believes you can “inspect” in quality. Perhaps too much attention is put on a test result, rather than the processes and procedures that ensure a passing test result in the end. The successful Contractor focuses on processes and procedures such as certified quality staff, written procedures for performing an item of work with hold points for supervisory or quality staff review, and rewarding quality by measuring rework.

Based on my experience with DB projects I noticed recurring break downs in Material Acceptance Programs written by the Owners on various projects. In general, requirements are usually copied from Design Bid Build projects, but should be rewritten to match the DB process for all materials. Owners misuse quality terminology. There is a misunderstanding of the new roles and the actual cultural difference in the Design Build delivery method.

In the field, I typically saw improper and/or inadequate planning of sampling approaches. Programs and processes to identify appropriate verifications data for analysis purpose were not set up. For example, there was no way to trace whether a verification test was taken from the same lot as an acceptance test.

Because of the way Owners have set up the system, the Design Build team sees quality as a function that can be reduced so they can lower their bid. Because of loose requirements, the Owner allows the DB to perform quality without trained and educated people. Quality is usually their second job.

As a member of the TRB Committee AFH20, Management of Quality Assurance, I initiated a discussion on this matter and performed research to see what others have discovered about the quality function on Design Build projects.

The FHWA Office of Infrastructure performed a review of materials acceptance programs where the Contractor’s tests were used in the acceptance process and reported it in the **Quality Assurance Stewardship Review- Summary Report for Fiscal Years 2003-2006**. The following opportunities for improvement were noted:

1. Not using independent samples for State verification samples,
2. No statistical comparison of contractor and State data,
3. Low State to contractor test comparison ratio of 1 vs. 10 results, and one vs. one comparisons of test results for validation,

4. Lack of control of contractor supplied data,
5. Lack of a defined time for comparing test results,
6. Not increasing testing frequencies when test results don't compare,
7. States are not controlling the sampling location and timing,
8. States are allowing biased retesting provisions, and
9. Lack of security for samples.

Professor Douglas Gransberg of Oklahoma State, reviewed 60 Design Build Request for Proposal documents (**Gransberg, Douglas D.: Moenaar PhD, Keith R. Transportation Research Board Annual Meeting 2007 Paper #08-0251: Does Design-Build Project Delivery Affect the Future of the Public Engineer?**) and found that 23 (38%) did not include language to clearly assign Quality Assurance responsibilities. He also noted only 4 (7%) of the documents had specific language that described the responsibilities for each of the elements of a QA program.

**And finally, according to the Technical Advisory *Use of Contractor Test Results in the Acceptance Decision, Recommended Quality Measures, and the Identification of Contractor/Department Risks T 6120.3 of August 9, 2004:***

- QC and acceptance functions often have been combined or intermingled. This has been a major source of confusion.
- Statistical QA specifications and acceptance procedures have been implemented without fully understanding the risks involved to both the State Transportation Department and the contractor.
- It is estimated that few departments have developed and evaluated the risk levels associated with their acceptance plans.

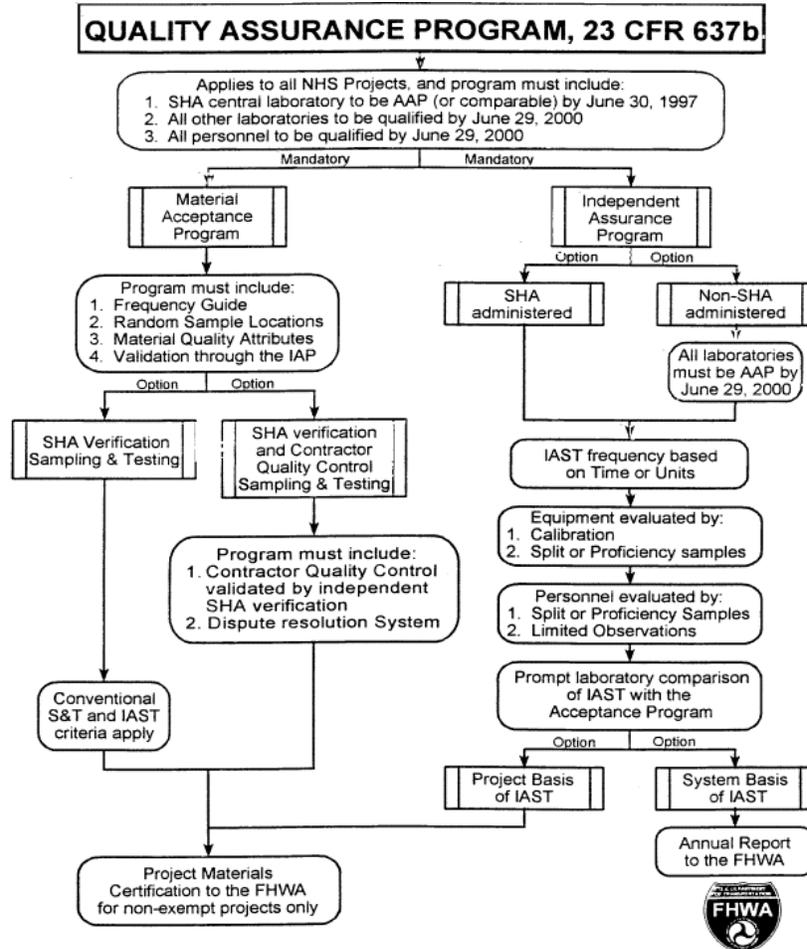
*The Requirements-*

FHWA 23 CFR 637 is the backbone requirement for defining materials acceptance programs when Contractor tests are used as part of the acceptance process. This CFR was originally developed for Design Bid Build projects that wanted to implement pay incentives to improve the final pavement quality. It requires a Material Acceptance Program and an Independent Assurance Program. State Highway Department Laboratories had to be under the **AASHTO Accreditation Program** and all other labs and personal were to be qualified in some manner. It also defined quality terminology.

Numerous research, training manuals and workshops have been developed to implement the CFR. One of my favorites is FHWA-RD-02-095, Optimal Procedures for Quality Assurance Specifications by J. L. Burati, R. M. Weed, C. S. Hughes, H. S. Hill. Their work includes an excellent flow chart of a Quality Assurance Program.

Optimal Acceptance Standards for Statistical Construction Specifications:

Appendix E Figure 47: Flowchart of 23 CFR 637B



[www.tfhr.gov/pavenebt/pccp/pubs/02095/appe.htm](http://www.tfhr.gov/pavenebt/pccp/pubs/02095/appe.htm)

The other significant piece for developing a Material Acceptance Program is the FHWA Technical Advisory T 6120.3. It further explains and details implementation procedures for a Material Acceptance Program. The Contractor is responsible for the QC and the State Transportation Department is responsible for obtaining and conducting verification tests and making the acceptance decision. In the Design Build delivery method, sometimes it is unclear of where the acceptance decision lies, and what components make up the acceptance decision.

State planning and research pooled fund study SPR-2(199), "Optimal Acceptance Procedures for Statistical Construction Specifications", was conducted to provide recommendations for statistically sound QA procedures and balancing of risks. The F-test and T-test are the recommended methods for determining if Contractor and Owner tests come from the same population, because they have more power to detect actual differences than the method that relies on a single department test for the comparison of Owner and Contractor tests. It clearly states **the method of comparing a single department test to a number of Contractor tests should not be used**. For Independent Assurance Program tests it is recommended that the paired *T*-test (compares Contractor and department results from an equal number of split samples) be used on the total accumulated split sample results. The recommended Quality Measures are the percent within limits (PWL) or percent defective (PD). In comparing tests it is recommended that you measure both the center and spread, use the mean and standard deviation and estimate the percentage of the lot that is within PWL, or outside of PD, specification limits.

## *Recommendations-*

The most important thing that needs to be done is to formally address the framework of the Materials Acceptance Program by providing clear requirements in the contract documents. Special Specifications should define and assign risk, and define Owner and Design Builder roles based on risk. Contract documents should include the FHWA definitions for Quality Control, Quality Assurance, Quality Acceptance, Owner Verification and Independent Assurance; and these terms must be consistent in all documents. Contract documents should define what quality is and how it will be measured. Then, the Owner should determine and document who is in what role. - Who performs the Quality Control? - Who performs Quality Assurance, and is it assurance or acceptance? - Is the Owner's verification testing a part of acceptance or is it just verification?

The Owner should define components of the acceptance program including establishing a random sampling plan, establishing a process and lot size, establishing a tracking and monitoring process, and an analysis process. The Owner should also include defining what the process is, when it will occur, and who will perform it.

The Owner must define components of the Independent Assurance program, determining if the program will be based on split samples from the project or proficiency sampling. Again the Owner should define the tracking, monitoring and analysis processes and procedures.

Also, the Owner should define the "So What". Determine and document the specific actions to take by the Owner or Design Builder when specific items occur. For example, when a material specification is not met (and to what degree), the consequences may be withholding payment, increasing frequency of testing, or replacing personnel.

The most common issue left out of the Design Build delivery method is addressing risk; the Design Builder's risk that conforming material will not be accepted, and the Owner's risk that non conforming material will be accepted. We must write the risk requirements into contract documents. For example:

"The Design Builder's quality program shall ensure that the Owner has less than a 5% risk of accepting materials that should be rejected. The Design Builder's quality program shall meet the requirements of AASHTO Materials Specification R 9-97(2000) Acceptance Sampling Plans for Highway Construction."

Acceptable risk may be determined using Table 1 of AASHTO Materials Specification R-9-97(2000). Some ideas from the specification include using larger sample quantities equates to less risk and using operating curves to establish risk.

In defining the analysis process for each material, determine the frequency of testing and allowed variability for QC, QA and IA by reviewing data from past projects, determining acceptable risk, based on Contractor's capabilities, benchmarking, literature review and research. Require producers to show their production process is in control using OC curves, Cpk (process capability index) and PWL. Be sure to include sample size, sampling locations, define the lot and sampling procedure.

For example:

"All QC samples will be saved by the Design Builder in a location to be designated by the state."

"If a test fails there will be no retesting of materials to replace that test. Tests may be run to identify the limits of the material to be rejected."

"All QC test results will be submitted to the Owner for statistical comparison to verification testing. The materials, their attributes, sampling locations, frequency of comparison, comparison

deadline, specific analysis processes and allowable tolerances for each attribute are listed in Table X. The Design Builder shall produce control charts on the material and make the charts available to the Owner daily.”

Perhaps we should also consider new approaches to the quality function in the Design Build delivery projects. One approach would be to consider an allowance for Quality - do not make it part of the low bid. Or specify the size of DB's Quality Control staff and the exact program they will have for quality and let the DB team bid on that. Another approach could be paying the DB more directly for quality, and specify how to earn the pay. Another idea is for the DB to address in the proposal their Quality program in terms of the Owner's risk. Another good approach would be to include more effective measures to clearly outline what happens if the DB does not perform, (increase sampling, etc.). Another idea is to make prior performance an award consideration - the DB should submit OC curves from previous projects for various materials. The owner should also consider differences in QA programs based on types of specifications. For example, you can reduce the QC effort if a warranty is given.

According to John Wise of Kiewit Construction, the key to good Contractor Quality Control is Management Commitment, Dedicated Resources, Training, Measurement of Rework, Documentation, and Continuous Improvement. These are items we can measure and consider in the Materials Acceptance Program.

Quality systems designed in the traditional Design Bid Build delivery methods are not a one size fits all for the Design Build project. There is evidence that the systems cannot be implemented in the same way and that there is opportunity for improvement. Customizing contract documents and allowing new approaches can help to improve material quality in Design Build projects.

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- CHARLES S. HUGHES, NCHRP Synthesis 346 State Construction Quality Assurance Programs, 2005.
- J. L. Burati, R. M. Weed, C. S. Hughes, H. S. Hill FHWA-RD-02-095 Optimal Procedures for Quality Assurance Specifications

## A 'High Quality' project – How is this achieved?

“High Quality” – we all want it, but what does it mean?

Projects are a complex set of interacting variables. They have a beginning and an end. They have a financial budget and time frame schedule. They need to be managed to take a series of resource inputs and produce tangible products. Many project management teams will establish project goals; one such goal typically refers to 'quality'. Sometimes the goal is “to have **a quality project**”. Sometimes they go further and strive for “**a high quality project**”. What is the difference between a 'quality project' and a 'high quality' project?

Retail chains will often offer customers a 'good', 'better', or 'best' level of a product, with an accompanying increase in price tag. When an owner of a facility is defining the scope of a project, should he be openly considering a good, better, best scope?

The major elements that define the quality of a project include:

- Design – the design can accommodate a short life span or a long life span
- Construction Materials – the strength and durability of the materials can radically change the end result of a project
- Experience and Expertise of the Builder – the capability of the builder chosen to complete the project will have a big impact on how well the project is completed

There are many other factors that can influence the level of success of a particular project.

Looking at these three key elements, how is a 'high quality' project achieved? Using a new highway project as an example, the basic intent is to provide a transportation corridor between two communities, the following could apply:

**Design** – A two lane highway may provide a '**good**' design and satisfy the basic requirement to have a transportation corridor between the two points without any consideration of future traffic growth. Upgrading the design to a four lane highway would significantly increase the highway capacity and would be a '**better**' capacity design. Making the project a five lane, fully controlled-access corridor would be classified as a '**best**' design, providing sufficient capacity for the corridor years into the future.

**Construction Materials** – Building the highway with a travel surface of compacted, processed granular material could provide a '**good**' surface. Placing asphalt as the driving surface would raise the classification to '**better**' with increased durability and smoothness. Providing a concrete surface would further improve the durability and capacity and would be designated as a '**best**' material choice.

**Experience and Expertise of the Builder** – The majority of contractors are selected by owners based upon the lowest price tendered for a scope of work. This approach will generally provide the owner with a '**good**' build team – any team that can meet the minimum expectations for bonding capacity. Moving the team selection criteria to a, 'pre-qualified' along with a low bid approach, would provide a '**better**' builder. Using a two envelope, appropriately weighted criteria best value selection approach, would provide the '**best**' builder to the project.

Each of the good, better, best approaches will have a significant impact on the ultimate cost of the project. These classifications are somewhat subjective and rather hard to consistently apply.

Now how do we classify these factors into the zones of a 'quality' project versus a 'high quality' project? A simple approach is to assign a 'good' approach with a value of 1, 'better' a value of 2, and 'best' a

value of 3. Multiplying the values together gives discrete scores in a range from 1 to 27. The combinations of scoring would be:

Factor	Factor	Factor	Score
1	1	1	1
1	1	2	2
1	1	3	3
1	2	2	4
1	2	3	6
1	3	3	9
2	2	2	8
2	2	3	12
2	3	3	18
3	3	3	27

'Factor' = design, material or builder

Factor Values

1 = good  
2 = better  
3 = best

Using this approach, projects with scores of 18 or 27 would be classified with a 'high quality' label. Projects with scores of 9 or 12 would have a 'quality' label. Below 9 would be not classified.

Now facility owners wanting a 'high quality' project would have a reproducible matrix to measure their project against instead of just relying on vague, undefined platitudes.

David Brown, PE

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## A WHACK ON THE SIDE OF THE HEAD

**Editor's note:** Well, I was hoping to have another article from someone with a non-design and construction quality perspective that might give us an "ah-ha" moment. Alas, I was unable to round up such a contributor so I thought I'd share this lively email debate about the USACOE quality program that I was fortunate to observe from the cc: line.

### POINT

#### Construction Quality Management for Contractors

#### A reflection on the USACE's program to address quality on their construction projects.

I recently attended an eight hour training on the Corps of Engineer's CQM program and came away with a certificate and more questions than before I took the course.

I am a Civil Engineer and have worked extensively in quality management programs on large projects for a number of years now. I have a number of ASQ certifications and have presented at several conferences on topics related to Quality Management – so how could it be that this training could raise more questions on the topic?

The Corps of Engineers have a long history of designing and building large civil infrastructure projects across the country and around the world. These structures have generally stood the test of time and are a lasting testament to the engineers and builders involved. The Corps have relatively recently changed their approach to Quality Management, adopting one where the contractors are fully responsible for the quality of the completed work and producing the documentation necessary to verify quality standards are met. The Corps now take a broader Quality Assurance role, verifying that the contractor's quality control system is working.

This course, "Construction Quality Management for Contractors", is mandatory training for all contractor's Quality Control staff working on their projects. The course material included in the \$125 fee was provided in hard copy and covered by a video presentation. The hard copy will be a useful resource when setting up a Quality Program on a Corps project. The USACE staff person presenting the material was knowledgeable on the program and covered the content in good detail.

In basic summary, the Corps CQM program is built upon the foundation of a clear distinction between inspection and testing completed by the contractor (QC) and oversight efforts by the Corps (QA). They have a three phase approach, **preparatory, initial, and follow-up** that drives the actions of the contractor to understand the quality requirements and verify that these expectations are met.

In progressing through the material, several questions swirled in my mind that if addressed, could maybe make the program so much better.

**Daily Reports** – The contractor is required to compile all documentation supporting the goings on at the project and submit to the Corps on a daily basis. The common reference to all these documents appears to be the 'date' with no consistent linking to a definable feature of work or a governing requirement. Many documents are hand written and scanned to make it an electronic version. **My question** – "Why not link the documents by other attributes like WBS or Definable Item of Work so that they can be easily found in future searches." Improve the efficiency of future searches of the documents by simple and better classification.

**Separate Progress from Performance** – The daily reports attempt to tell the story of what happened on a particular day – this typically covers a lot on what happened (progress) and a little on how well it was

done (performance). While describing what the weather was like and how many workers were on site may be of value in the case of a claim, this progress reporting is not that telling of how well the work was completed. **My Question** – “If Inspectors and testers are on the job because they are trained and certified to know requirements and evaluate performance, why are they spending so much time counting the number of workers and watching the sky to tell if it is raining?” Progress can be better recorded by a mast mounted video camera. Make the inspectors more effective in their description of how well the work is done.

**Analysis of material test results** – Testing of construction materials is typically by random sampling and at a pre-determined frequency. The intent of random sampling is not to find all the things that are wrong, but to estimate how well the whole body of work meets the acceptable limits. The frequency of sampling is intended to address an acceptable level of risk with the material and design. With random sampling, simple statistical tools should be used to determine the true risk of a failure occurring. The results of this statistical analysis should be the basis of the frequency of sampling. **My question** – “Why not use simple statistical analysis tools to better determine the risk of material failure thereby developing a better match between the levels of risk with the sampling frequency.” Every test costs money to complete so why do more testing if there is a low risk of failure and there is no additional information gained from another test result.

**Measure performance and seek out continuous improvement** – Most projects are measured against meeting budget and schedule, what about how well they are fulfilling contract requirements for quality. Contracts and specifications are filled with quality requirements. Is it reasonable to say that all these requirements are being met in the completed work or is it more realistic to say that an acceptable product will meet, for example, at least 95% of applicable requirements? Maybe the facility is a high risk and must meet 99% of all requirements – or be practically perfect. These extra four percentage points towards perfection will likely have a high cost attached – think a mission in space. **My question** – “With all the data we collect from random sampling and inspection, why don’t we better describe an acceptable quality level?” Expecting 100% conformance can come with a very high cost when a lower quality level can be more appropriate for the intended use of the facility and risk of failure.

The Corps of Engineers have come a long way from being the inspectors of the work to expecting the contractors to do the inspection and testing and provide documented evidence of performance. Their CQM program has been developed with a lot of rigor and helps the contractors to understand and meet the quality expectations. This reflection on their program is intended to encourage the agency to continuously improve and not fall into the rut of “we’ve always done it this way”.

## COUNTERPOINT

### Insights on COE quality course

I have taken the COE CQC course and seen it implemented. I understand the above comments and believe they have merit in a theoretical world of quality.

The COE CQC is a MINIMUM Quality Control standard to be used in a real world construction industry. This is a real world where “did it rain”, “Was the inspector on site” and “when did the truck arrive” are valid questions that need to be documented for later use and reference. The payment for a job and the validity of a contractor claim are often based on the “evidence” in these daily reports. You often count yourself lucky when you have one daily report per day per inspector within two days of the work. To ask the inspector to provide more reports, subdivided by work items, etc is beyond the available staffing levels in many cases.

The CQC program is useful for the QC Manager and Construction Supervisor who are managing the basic construction projects. Without this program the client lacks the tools and specifications to define

the Contractor Quality Control requirements. Yes it lacks sophistication and it lacks ART but it defines the standard base line (minimum). It does not forbid more sophisticated methods.

The 3 phases of control are basic to us but some might be surprised how often they are ignored even when the CQC is called for. Requiring the contractor to have the three phases assures (at least you have a chance) that the work is planned, the acceptance level is established, the work is verified as it happens and all the key players have a chance to participate. Field construction by the low bidder is not a manufacturing process and the personnel assigned to the daily work do not have the time or inclination to do statistical analysis. The expectations must be matched with the skill set of the inspectors.



**HAPPY HOLIDAYS  
FROM THE  
ASQ DESIGN AND CONSTRUCTION DIVISION**

## THE DCD AT THE AUDIT CONFERENCE IN ORLANDO

Audit along with Design and Construction Divisions had their annual fall conference October 7-8 in beautiful Walt Disney World, Orlando FL. The conference was very well attended by a cross-section of quality professionals, the Keynote speakers were tremendous this year; Bret Pfost, Disney; Gary Cort, Chairman of ISO Technical Committee; Denise Robitaille; and Corey Richardson, Paladin Labs. Session topics were as impressive as well, while we "Expected the Unexpected" and looked for things with "Rose Colored Glasses" but always with "The Glass Half Full".

The opening and evening events were quite the show, providing special guest appearances from Mickey and crew; along with those photo opportunities for all attendees to enjoy. Special recognition should be given to the committee members that run their cabooses off during this production, let me tell you it is quite something from the setting up to the clean-up and shipping out of all the equipment, booths and banners. Next year's conference is in Reno, Nevada at the Peppermill Resort and Casino in October so mark your calendars; the committee members are already planning an exciting event that is sure to top the last one!



Brian Palmquist & Anita Lidbury

John Mascaro



Bob Orkin

Darren James

## DIVISION COUNCIL ACTIVITIES



Ricky L. Morgan, ASNT Level III UT, PT, MT  
President-Elect American Society for  
Nondestructive Testing  
And  
Chuck Kanapicki, ASQ DCD Chair Elect  
At the Bay Area Chapter Dinner Meeting



Blaine D. Leonard, P.E., D.GE, F.ASCE  
President American Society of Civil Engineers  
And  
Danny Kahler, P.E. ASQ DCD Membership Chair  
Chuck Kanapicki, ASQ DCD Chair Elect  
At the ASCE Annual Conference in Las Vegas,  
NV



Dr. E. David Spong, F.ASQ  
President American Society for Quality  
And  
Ray Crawford, ASQ DCD Past Chair  
Chuck Kanapicki, ASQ DCD Chair Elect  
At the ASQ Annual DAC Meeting in Milwaukee,  
WI

## UPCOMING EVENTS

DATE	EVENT	LOCATION
Jan 31 – Feb 3, 2011	SSPC Annual Meeting, Technical Conference and Exhibit	Las Vegas, NV
Jan 18 – 21 2011	WORLD OF CONCRETE	Las Vegas, NV
March 13-17, 2011	NACE CORROSION 2011	Houston, Texas
21-25 March 2011	ASNT 20th Annual Research Symposium & Spring Conference	San Francisco, California
April 3, 2011 to April 7, 2011	ACI Spring 2011 Convention	Tampa, FL
April 14, 2011 to April 16, 2011	2011 STRUCTURES CONGRESS	Las Vegas, NV
May 11-14, 2010	NASCC: The Steel Conference 2011	Pittsburgh, PA
16-May-11 to 18-May-11	ASQ World Conference on Quality & Improvement	Pittsburgh, PA
June 10 2011 - June 15 2011	ASME 2011 Annual Meeting	Dallas Texas
June 16-17, 2011	ASQ's first annual Pathways to Social Responsibility Conference	San Francisco, CA
June 15th - 17th, 2011	RCSC ANNUAL MEETING	San Francisco-Oakland, CA
Nov 13 to 16, 2011	AWS 2011 Fabtech Expo	Chicago, IL

## DCD DIVISION COUNCIL FOR 2010 - 2011

A listing of the DCD's Division Council for 2010 – 2011 is provided below. The 2010 – 2011 term runs from July 1, 2010 until June 30, 2011. Individuals interested in getting involved with Division Leadership activities may contact anyone on the Division Council.

### Division Officer Nominee List (Require a vote)

Position	Member Name	Member Email	Start Date	Member #
Chair	John Mascaro	jfmascaro@hotmail.com	07/01/10	977776
Chair Elect	Charles Kanapicki	ckanapicki@abfjv.com	07/01/10	273726
Secretary	William Hall	whall518@gmail.com	07/01/10	372804
Treasurer	Celia Gray	cgray@ci.charlotte.nc.us	07/01/10	1315008

### Division Board Nominee List

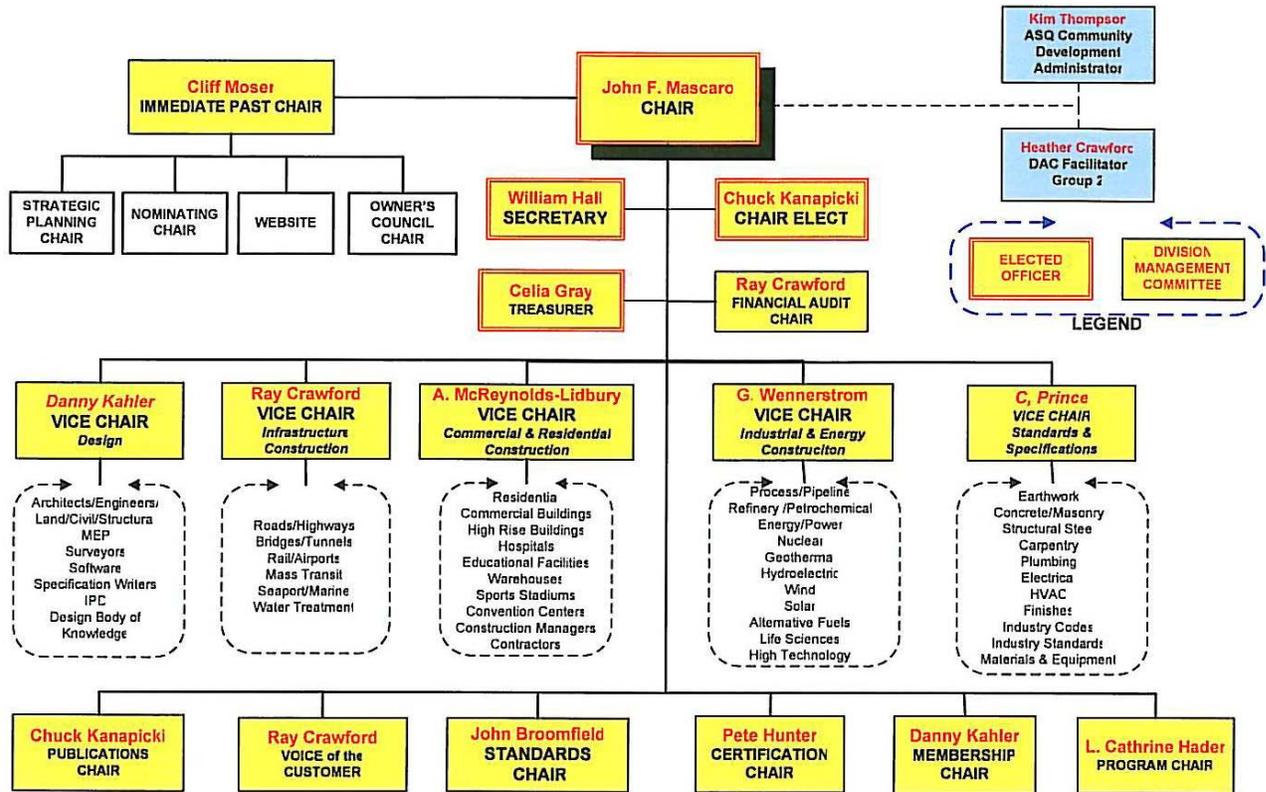
Vice Chair	Greg Wennerstrom	greg_wennerstrom@yahoo.com	07/01/10	63328716
Vice Chair	Danny Kahler	dannykahler@hotmail.com	07/01/10	63140534
Vice Chair	Anita McReynolds Lidbury	amlidbury@att.net	07/01/10	63404399
Vice Chair	Ray Crawford	crawford@pbworld.com	07/01/10	490982
Vice Chair	Cheryl Prince	cprince@itsi.com	07/01/10	110885

### Division Standing Committees Nominee List

Position	Member Name	Member Email	Start Date	Member #
Immediate Past Chair	Cliff Moser	cliff.moser@gmail.com	07/01/10	1311746
Auditing Chair	Ray Crawford	crawford@pbworld.com	07/01/10	490982
Membership Chair	Danny Kahler	dannykahler@hotmail.com	07/01/10	63140534
Nominating Chair	Cliff Moser	cliff.moser@gmail.com	07/01/10	1311746
Program Chair	L. Catherine Hader	catherine.hader@aecom.com	07/01/10	63492270
Publications Chair (Newsletters)	Charles Kanapicki	ckanapicki@sbcglobal.net	07/01/10	273726
Strategic Planning Chair	Cliff Moser	cliff.moser@gmail.com	07/01/10	1311746
Standards Chair	John Broomfield	<a href="mailto:jbroomfield@worldofquality.com">jbroomfield@worldofquality.com</a>	07/01/10	408497
Web Site Chair	Cliff Moser	cliff.moser@gmail.com	07/01/10	1311746
VoC Chair	Ray Crawford	crawford@pbworld.com	07/01/10	490982
Certification Chair	Pete Hunter	charles.hunter@shawgrp.com	07/01/10	404028

# ASQ DESIGN & CONSTRUCTION DIVISION

## 2010- 2011 ORGANIZATION CHART



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