# PARTNERING ON SMALL CONSTRUCTION PROJECTS[a]

## Discussion by C. Edwin Haltenhoff,[3] P.E., Life Fellow, ASCE

A successful project from the perspective of the owner is one that is completed on time, within the owner's budget, of specified quality, and accomplished with minimum interruption to the owner's normal business operations. To accomplish this, the owner's exact physical and administrative needs must be known, understood, and met by all stakeholders. The design professional must accurately convey these needs to contractors in the contract documents, and the contractor's proposal and construction execution must reflect those needs exactly.

The authors note that the traditional method (design-bid-build) of managing construction projects is largely adversarial in nature. They suggest that partnering will reduce the adversarial aspects of the GC contracting system (traditional method) on small projects, as it has on large projects, whether in the public or private sector. They imply that partnered projects have a better chance of providing stakeholders with a successful end result.

The discusser's first concern with this well-prepared paper is the authors' inadvertent propagation of misleading information regarding the reasons for the success of partnered projects. The authors imply that project success is dependent on the proper application of partnering procedures, the stakeholders' mutual acceptance of the project partnering agreement, and the stakeholders' conformance to the partnering charter throughout the project. In this paper as well as many other propartnering writings, there isn't the slightest reference to the fact that the faultless contractual performance of all stakeholders is the overriding and conclusive essential for a project deemed to be successful by the owner. Neglectful contract performance by any stakeholder on a partnered project will quickly mitigate if not cancel the provisions of the charter and erase the benefits of partnering.

The writer agrees that partnering will bring project stakeholders closer together and facilitate cooperation when dealing with routine contract administration. Partnering tends to raise the level of stakeholder synergism at the start of construction contract performance. And a high level of cooperation will continue as long as the competent, faithful and timely performance of all contractually bound stakeholders continues. However, the nonbinding partnering commitments will become quickly obscured when a stakeholder runs into a problem that is created by the nonperformance of another stakeholder's contractual obligations and which jeopardizes project-committed funds.

The writer's second concern is the authors' unstated assumption that, regardless of the project's size or the contracting sector in which the owner is operating, all owners have equal capabilities when it comes to performing the technical and administrative tasks required of them as the producer of a construction project. In the discusser's opinion, this assumption is very argumentative. The absence of either support or contention of this critical assumption in the paper unwittingly extends to readers the promise of partnering success on all small projects in both the public and private contracting sectors.

The authors' experience with partnering is essentially academic and based on large public sector projects where owners (COE, NAVFAC) have the necessary high-level design, construction and contracting knowledge, and experience to support the critical responsibility of producing projects. The astuteness of owners at this level of construction, especially in the public sector, precludes the incidence of many problems that arise on smaller projects where owners have little or no knowledge of design, construction, or contracting. Many are first-time builders and some consider a construction project as an ancillary adjunct to their primary business. These owners simply do not have the exposure to the project delivery process that their upper echelon counterparts have. Consequently and unfortunately, it's not unusual for a naïve, inexperienced, and sometimes presumptuous small-project producer to unwittingly be burdened with a design professional and general contractor who, for one reason or another, are not in a position to provide the level of services anticipated by the owner

The discusser especially questions the ability of small project owners to effectively use the interview process to select a suitably cooperative and competent design professional. The selection of this key stakeholder is critical to the success of the project and is one of the first actions required of the owner. In the design-bid-build format of the GC contracting system, the owner and the design professional collaborate on the design of the project. Contractually, it initiates the design professional's technical and administrative input to the project. Owners must be capable of providing detailed input that accurately reflects the needs of the facility during its use and occupancy. This includes important decisions affecting facility operation and maintenance costs that will accrue over the useful life of the facility, decisions related to equipment, and materials selections. Unfortunately, less-than-astute owners have little choice but to accept the advice and counsel of their design professional, simply because they lack the knowledge to question technical and administrative decisions or to propose more suitable alternatives.

The important periodic reviews of design-phase documents are often undertaken by owners who are unqualified to reconcile what is shown on the drawings and in the specifications with their actual project needs. These reviews are often relegated to mere formalities that can focus only on the current estimated cost of construction (which every owner can expertly respond to) at the expense of the direction and progress of the project's design. In fact many owners, though charged with the responsibility to produce a project, have never before read blueprints or construction specifications and are burdened by a limited ability to visualize space, size, and location from two-dimensional drawings. They also lack an understanding of technical and construction terminology.

When the design professional deems the contract documents complete and ready for use as bidding documents, inexperienced owners do not have sufficient credentials to satisfactorily access the technical quality and accuracy of the documents against construction industry standards. Even experienced owners have difficulty assuring the clarity, content, correctness, and overall quality of contract documents before they are issued to bidding contractors. They rely heavily on their thorough periodic reviews and perform a painstaking final review to catch errors, omissions, and ambiguities before conceding that the documents are ready for release to bidding contractors.

Proprietary contract documents provided by owners, and standard documents amended by an owners' attorney, often contain provisions that protect the owner's investment in the event the project turns bad (owner's attorneys assume that it will) rather than provisions that facilitate the project delivery process and foster stakeholder cooperation. Contractors consider these provisions negative, adversarial, and overbearing

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and react to them by inflating their dollar proposals and entering a contract with the owner as an established adversary.

When drawings and specifications harbor an inordinate number of errors, omissions, and ambiguities, they adversely affect the credibility of the design professional and the project during both the bidding and the construction phases. Contractors, always performing under time constraints whether bidding or constructing the project, have little choice but to resort to standard construction practices if they are to proceed. Astute owners, especially those who intend to use partnering, take the first step toward project success by diligently scanning the drawings and technical specifications with the purpose of eliminating contractual sensitivities and stipulating contract provisions that will be fair and even-handed to all project stakeholders.

The practice on public sector projects and most private sector projects is to select the low-bid contractor to perform the construction. Prequalification of bidders, a very desirable adjunct to competitive bidding, is common in the private sector but not easily achievable in the public sector. Without prequalification there are no assurances that the low-bid contractor has the capabilities to provide an acceptable level of management or to technically perform the project's requirements during construction. In fact, the only quality exhibited by the low bidder is the ability to produce the low-dollar proposal. Yet general contractors, under the design-bid-build contracting structure, have the exclusive role of coordinating the work of trade contractors and managing the construction process. Being the low bidder says absolutely nothing about a contractor's ability to manage the construction of the project.

However, the increased dollar value of large public projects automatically provides a form of prequalification that has some value to the owner. The large price tag of the project establishes a short list of general contractors who can provide the owner with the required labor and material and performance bonds. In effect, sureties actually determine the contractors who are eligible to bid various-size projects. Because of the surety's large financial exposure on large projects, a contractor's ability to obtain bonds is a fair indication of that contractor's performance track record. So, with some reservation, owners can accept bondability as a plus prequalifier.

But, surety response to bonded contractor problems is not uniform, and surety cooperation with the owner varies considerably from one surety firm to another. To avoid potential problems when surety intervention is needed, astute owners prequalify the sureties that are acceptable on their projects. As there are many more sureties available to service smaller projects than larger projects, the task of fairly prequalifying sureties is a major undertaking. For this reason as well as an owner's unawareness of the surety situation, small project owners seldom prequalify sureties and forgo the opportunity to use contractor bondability as an indicator of contractor past performance.

In essence, when using the GC contracting system on small-size projects, the chances of ending up with a team of stakeholders who have the knowledge and experience to make the project a success from the owner's perspective is considerably less certain than on large-size projects. Partnering notwithstanding, owners who have a working knowledge of design, construction, and contracting are staffed to achieve success on any size project in either the public or private sector. But it is financially impractical for owners such as school boards, county commissioners, city councils, plant managers, church councils, physician's groups, hospitals, clinics, libraries, small businesses, etc., to maintain a qualified staff unless the owner is constantly building projects. Without a working knowledge of the project delivery process available to them, owners unwittingly create many of the problems that occur during the project—problems that partnering cannot solve.

Unfortunately, owners with knowledge of partnering gained from reading articles and papers such as the authors' are impressed with the propartnering information they contain. ''After all, if it works so well for the CEO and NAVFAC on their large and complex projects, it will certainly work for me on my small simple project'' is an assumption that some small-project producers make as they try to find ways to ensure the success of their project. Many small-project owners, sensing their limitations as a project producer, include partnering as a contractual requirement, believing that it will offset their inadequacies or prove to be the panacea that will assure project success.

Owners would be much more qualified to shoulder owner responsibilities if they employed the services of someone who has the knowledge of design, construction, and contracting, not as a stakeholder but as a consultant who can provide guidance and counseling for the project's duration. These services are available from CM firms (construction management firms), who often provide consulting services as well as CM contracting services for project owners. The cost of these services would be nominal compared with the cost of the problems unwittingly created by an unqualified owner. In essence, the small-project owner would be temporarily transformed into a fully qualified large-project owner with the capability to gain the high degree of project success that large projects enjoy due to the astuteness of a knowledgeable owner. The authors' promises of partnering success would now be valid on the small project.

## BIBLIOGRAPHY

Haltenhoff, C. E. (1998). *The CM contracting system—fundamentals and practices*, Prentice-Hall, Upper Saddle River, N.J.

# Closure by Rita A. Gregory[4]

The discusser provides excellent comments. I agree that partnering is not a panacea and does not overcome design or construction team members who are guilty of neglect, incompetence, intentional nonperformance, or fraud. I also agree with his comments on unsophisticated owners and CM firms.

But, I still contend that partnering is a framework of communication and cooperation that alleviates (not necessarily eliminates) an adversarial project situation. Regardless of the acquisition method (D/B, D/B/C, etc.), if partnering is initiated and perpetuated by the owner, the designer, the constructor, or the construction management member of the team, it improves the project process over the traditional adversarial roles. Thank you for the constructive feedback.

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# IDENTIFYING ROOT CAUSES OF CONSTRUCTION ACCIDENTS[a]



## Discussion by Alistair Gibb,[3] Sophie Hide,[4] Roger Haslam,[5] and Sarah Hastings[6]

The consideration of root causes of construction accidents is a key issue for the worldwide construction industry of the early 21st century. In Europe the EC (Temporary & Mobile Construction Sites) Directive 92/57/EEC has driven the consideration of root causes back up the supply chain to the designers and the owners of buildings and facilities. Thus, the discussion and debate in Europe tends to be about root causes that occur well before the construction site activities that are discussed in this paper. This approach drives a risk assessment process that must be initiated at first by the owners and then by the designer, even before contracts are placed for construction. The design-related issues were considered in a recent conference in London organized by the European Construction Institute and the Conseil Internationale de Batiment (Gibb 2000).

Therefore, a European perspective on this paper is that it has not sufficiently addressed the real ''root causes'' of accidents. There are a number of references to ''management issues,'' but this is a term that incorporates so much (a huge number of disciplines and greatly differing levels of management) in the life cycle that its intended meaning seems to have been lost. Business management in construction is not the same as the issues implied in the paper concerning management of site-based aspects, and this warrants further development and distinction. A U.K. team from Loughborough University and UMIST (Manchester) is currently working for the U.K. Health and Safety Executive to consider the true causes of construction accidents using studies of contemporary incidents (Hide et al. 2000).

The authors of this paper use the Accident Root Causes Tracing Model (ARCTM) to focus on three possible issues to consider as corrective actions—namely, worker training, worker attitude, and management procedures. The importance of the project concept and design is not implied in their argument. Furthermore, despite the various references to human factors, the inference is that many responses rely heavily on adapting individual behavior. While the importance of these issues is acknowledged, work in Europe has suggested the danger of treating training as a panacea for all ills. There is much excellent work already completed in the human factors, or ergonomics, field that should not be ignored. For instance, human reliability assessment (Kirwan 1994) is a tremendous resource of material on human error identification at all levels in a process. It is not clear that these complexities have been adequately addressed in the authors' cause: condition approach. Sadly, many construction experts have traditionally ignored the wealth of knowledge and experience that already exists in the human factors sector.

In fairness to the authors, it is noted that the paper was originally submitted in 1998 and more recent work may have been done to take this subject further. However, on the basis of this paper it is suggested that the issue of root causes has not really been explored in enough depth.

### REFERENCES


Gibb, A. G. F., ed. (2000). ''Designing for safety and health.'' *Proc., ECI/CIB/HSE Int. Conf.*, London, European Construction Institute, Loughborough, U.K.

Hide, S. et al. (2000). ''By accident or design? Causal factors in construction industry accidents.'' *Designing for safety and health*, A. G. F. Gibb, ed., *Proc., ECI/CIB/HSE Int. Conf.*, European Construction Institute, Loughborough, U.K.

Kirwan, B. (1994). *A guide to practical human reliability assessment*. Taylor & Francis, London.

Suraji, A., and Duff, R. (2000). ''Constraint-response theory of construction accident causation.'' *Designing for safety and health*, A. G. F. Gibb, ed., *Proc., ECI/CIB/HSE Int. Conf.*, European Construction Institute, Loughborough, U.K.


## Discussion by Akhmad Suraji[7] and A. Roy Duff[8]

The paper introduces an alternative method of accident investigation, called accident root causes tracing model (ARCTM). This model purports to identify root causes of accidents in the construction industry. The conceptual development of this model was based upon existing theories of accident causation and human error, and it provides a useful insight into the types of additional information that might be collected in site investigations of construction accidents. The concept of accident causation used to develop this model focuses entirely on site personnel and principally on worker behavior and its immediate motivational causes.

It is this narrow focus that causes the discussers most concern, particularly as the accident causes identified are labeled ''root'' causes. Most current concepts of accident causation now recognize the importance of management actions, and not just construction site management (e.g., Reason 1990; Embrey 1992; Whittington et al. 1992; Groeneweg 1994; Suraji and Duff 2000). In the U.K. and most of mainland Europe, even designers, clients, and their other professional advisors are being brought into the net of those construction project participants who have a responsibility for ensuring safe construction sites [e.g., U.K. Construction (Design and Management) Regulations 1994]. In this paper, the authors classify root causes of an occupational accident on construction site as (1) failing to identify an unsafe condition that existed before an activity was started, or that developed after; (2) deciding to proceed with a work activity after the worker identifies an existing unsafe condition; (3) deciding to act unsafe regardless of initial conditions. These so-called root causes are all ascribed to worker errors. In their definitions, the authors still refer to an unsafe condition and an unsafe action, which are widely known as symptoms or immediate causes of an accident (Heinrich 1969). They do, however, continue to develop this model by treating these so-called root causes as symptoms—although they do not seem to recognize them as such—and by adding further, mostly psychological, factors in their diagnostic model to guide accident investigation. The authors consider that the unsafe condition would happen because of one of the follow-

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ing causes: (1) management actions or inactions; (2) worker or coworker unsafe acts; (3) nonhuman-related event(s); and (4) unsafe natural conditions.

The discussers' concerns are well exemplified by a specific example from the ARCTM worker subjected to management pressure. What sort of pressure—time, working method, financial, etc.? Why was pressure being exerted—project behind schedule, worker not performing, client instigated changes, etc.? What pressure was the manager under, and where did it emanate from? There is much more to learn to fully understand the ''root'' causes.

The discussers feel that this diagnostic approach is superficial and, while likely to yield more comprehensive information than is currently collected, will fail to unearth failures upstream of the site itself. This exclusive concentration on site-generated failures will ignore the many other managerial and professional failures that can precipitate dangerous site conditions and behavior. These can so often be the real root causes of construction accidents.

The authors' approach seems to be aimed at improving the management of the immediate event area of the potential accident. This in many cases is just providing a defense against unsafe situations, whereas by designing out the risk by improvements to the facility being built, the safety culture of the whole project team, including client, or the whole work environment would often create more fundamental reductions in accident risk. We need to know much more about the influences of these ''root'' causes.

## Closure by Tariq S. Abdelhamid,[9] Associate Member, ASCE, and John G. Everett,[10] Member, ASCE

The writers wish to thank all the discussers for taking interest in the paper. The views expressed in the discussions should be seen as complementary, rather than competing, to the ARCTM model presented in the paper. The writers agree with the idea that root causes of some construction accidents can be traced upstream to management, designers, owners, regulatory agencies, and others. The influence, or lack of influence, of these off-site parties may appear as the ''unsafe conditions'' branch of the ARCTM model.

The discussers suggest that the emphasis of the off-site parties should be increased relative to that of the on-site project management and construction craft workers. Perhaps the difference of opinion is based on industry practice in different parts of the world. In the United States, designers have traditionally been shielded from the day-to-day activities at the construction site. Most standard contracts clearly specify that the means and methods of construction are the responsibility of the contractor. Architects and engineers generally do not have, and do not want, responsibility or liability for the construction process, including site safety.

We can all agree that designers should adopt design practices and guidelines aimed at improving safety during the execution phase of a project. In 1997, the Construction Industry Institute (CII), located in Austin, Texas, compiled and disseminated detailed guidelines for designers to help reduce accidents. Examples of such guidelines include avoiding roof edges and skylights as locations for rooftop mechanical equipment, scheduling night work sparingly, and designing slabs on grade and mat foundations with closely spaced reinforcement, which allows a continuous walking surface (Gambatese 2000). However, the ability of the designer to influence what happens at the construction site typically ends when the construction contract is awarded. Even if such influence does exist, a designer cannot be held accountable for an accident caused by a worker's deliberate unsafe action. In such cases, the onus is on on-site management, aided by ARCTM, to find ways to correct and discourage these actions and prevent their reoccurrence.

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## REFERENCE

Gambatese, J. A. (2000). ''Safety in a designer's hands.'' *Civ. Engrg.*, June, 56–59.