

Retainage Practice in the Construction Industry

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INTRODUCTION

The value of new construction in the United States is in excess of \$860 billion (US Census Bureau, 2003). On a significant portion of this work the practice of retainage is common. Retainage is generally characterized as a contractual arrangement where payment for a percentage of the value of completed work is withheld until completion (Jervis and Levin, 1988). In essence, retainage is money that has been earned but payment is delayed until a later stage of the project. Retainage held by an owner on a general contractor typically cascades through the entire delivery chain to include project subcontractors and vendors. The practice is commonly perceived to provide a level of financial protection to the party withholding retainage as well as an added incentive for proper and timely performance of the work. However, in an industry where profit margins are thin and cash management is essential, withholding retainage can create a financial strain on contractors and their delivery partners (Harrell, 2003).

History and Purpose

Construction projects are distinctive undertakings that typically involve a significant commitment of money and resources. Each project is often complicated, typically involves new methods and technologies, and generally has severe time and cost constraints. Because of the magnitude of cost and duration of production, partial payments for the work are typically disbursed during production. In essence, owners are providing partial payment for a 'product' prior to completion and final acceptance. Extending payment for a project during production has inherent risks including overpayment for the work installed, payment for defective work, and the continued solvency of the parties until the work is complete. To counter these risks retainage has evolved as a common practice in the construction industry whereby owners retain a percentage of each progress payment to their contractors, and contractors in turn typically withhold a similar amount from their subcontractors until satisfactory completion of the project (OPPAGA, 2000).

The practice of retainage has its origin in the UK industry at the onset of construction of the railway system in the 1840's. This massive construction undertaking created an environment encouraging new entrants into the construction industry to meet surging demand. Many of these 'new' contracting entities were unable to successfully perform, resulting in a high number of insolvencies. This situation led to the practice whereby railroad companies would withhold 20% or more of the contractors' payments to ensure performance and offset completion costs should the firm default (SECG, 2002; Mendes, 2003). Retainage provided a pool of funds to draw upon for completion of the work should the contractor be unwilling or financially incapable of completing the project (SECG, 2002).

From its origin in the UK the practice of retainage has grown to widespread use in the United States. In addition to protection against contractor insolvency, proponents have encouraged its use to provide a 'buffer' for the valuation of work installed, remedy defects found during turnover of the facility, and encourage contractor performance. However, opponents often argue that the primary purpose of retainage is to provide a source (or offset the need) for cash for the organization holding the retained funds (SECG, 2002).

Contractual arrangements vary, but retainage typically ranges from five to ten percent of the value of work installed. The contract may permit a reduction in the retainage percentage upon reaching certain construction milestones, but the total amount of retained funds is generally not released until substantial completion of the entire project. Contractors typically 'pass' the owner's retainage requirements through to their subcontractors and vendors. Even if an owner does not hold retainage on the contractor, it is not uncommon for the contractor to withhold retainage from its subcontractors (McGreevy, 2002). The trend in the construction industry has been for general contractors to self-perform less of the actual work. As a result, the financial burden imposed by retaining funds for work completed has fallen disproportionately on subcontractors, especially those that finish their work early in the delivery period (OPPAGA, 2000).

The practice of retainage is becoming an increasing hardship on contractors and subcontractors as profitability margins narrow. Robert Morris Associates (RMA) collects financial data from companies and compiles industry averages for comparison and benchmarking. In 1972 RMA noted that contractors earned approximately 6% profit on each dollar of revenue. By 1986 the profitability rate had declined to 3% and at the turn of the century it hovers around 2% of revenue. The financial situation is not much better for the subcontracting community where profitability now averages 3%-4% or less. Therefore, an owner retaining 10% on work installed is typically withholding up to five times the contractor's, or three times the subcontractors', profit on the project. This financial strain poses cash flow problems and has been linked to contractor failure (SCEG, 2002).

Evolution of Retainage Practice in the US

Due to the unique and fragmented structure of the construction industry, few individual contractors or subcontractors have the ability or influence to change retainage practices. As a result, national organizations representing industry members have taken the lead. These organizations include the Associated General Contractors of America (AGC), the Association of Builders and Contractors (ABC), the American Subcontractors Association (ASA), and the Associated Specialty Contractors (ASC). Each has a constituency that often times overlaps. AGC is an organization with over 33,000 members primarily consisting of general and specialty contractors. ABC is a national trade association representing over 23,000 members. Its primary membership also consists of contractors, subcontractors, and suppliers. ASA is a nonprofit trade association representing more than 6,000 subcontractors and specialty contractors in the construction industry, and ASC is an umbrella organization representing eight specialty contractor groups. Recognizing that Federal, State, and Local governments account for close to half of the expenditures for non-residential new work, much of the organizational focus has been on the public sector.

In the early 1980's, ASA and ASC were at the forefront of the effort to enhance the industry's payment practices (Semling, 1982). In 1983 the Office of Federal Procurement Policy urged that the general practice of holding 10% retainage on Federal work be limited to those cases where the practice was deemed necessary to ensure completion (Schweizer, 1983). This executive action applied to the contract between the government and the prime contractor. Five years later, the Prompt Payment Act Amendments of 1988 extended protection to subcontractors. This legislative action prohibited general contractors from retaining or withholding from a subcontractor more than the government retains from the contractor. In addition, it established minimum standards for the prompt release of retainage.

The Current Federal Acquisition Regulation (F.A.R.) continues to support the government's shift in policy to a more equitable approach to retainage. Paragraph 32.103 of the regulation states *"...Retainage should not be used as a substitute for good contract management, and the contracting officer should not withhold funds without cause. Determinations to retain and the specific amount to be withheld shall be made by the contracting officers on a case-by-case basis. Such decisions will be based on the contracting officer's assessment of past performance and the likelihood that such performance will continue."*

Subsequent to FAR's policy shift, the retainage policy of the individual Federal agencies was in a state of flux with retainage practice varying from project to project and agency to agency. Policy ranged from a 'zero retainage' policy adopted by the Department of Defense to other agencies' continued use of the 'old Federal Standard' of 10% on the first half of the work and zero retainage held on the last half of the project if performance on the project was satisfactory.

However, the overall trend for both the Federal and State agencies since the early 1980's has been toward a reduction in the percentage of retained funds on new construction. This shift is largely due to the continuing efforts of the American Subcontractors Association, the Associated General Contractors of America, and the Associated Specialty Contractors. Currently, Federal agencies such as the Department of Defense, the General Services Administration, and the US Department of Transportation have 'zero' retainage policies and typically only withhold retainage if there is just cause.

Federal policy has also had an impact on State retainage policy, in particular for those projects utilizing Federal funding. One of the most significant actions involves the US Department of Transportation (USDOT). Responding to a 1995 ruling by the US Supreme Court in the Adarand case, the USDOT revised its Disadvantaged Business Enterprise (DBE) program in 1999. The new regulation required that States establish contract language that required their prime contractors on DOT-funded projects to promptly pay all subcontractors (DBE and non-DBE) final retainage upon satisfactory completion of the subcontractor's work. Payment was due the subcontractor even if the prime had not received payment from the state or final approval (acceptance) from the state for the subcontractor's work. Under this requirement, commonly referred to as the 'Pay Before Paid' requirement, the prime contractor could be financing up to 10% of the construction costs (Deery, 2001). Primes argued this new requirement reduced their leverage on subcontractors to correct defects and left them with little protection should the subcontractor not pay their suppliers or second tier subcontractors.

There was an outcry from contractors and their industry representatives to address the shortcomings of the 1999 regulation. In response the USDOT proposed new regulations in 2001 that were subsequently adopted in July 2003. The new (and current) regulation removes the prime's 'Pay Before Paid' requirement and essentially allow the states to adopt one of three methods to ensure prompt payment of subcontractor retainage:

- *"... decline to hold retainage from prime contractors and prohibit prime contractors from holding retainage from subcontractors" or*
- *"... decline to hold retainage from prime contractors and require a contract clause obligating prime contractors to make prompt and full payment of any retainage kept by prime contractor to the subcontractor within 30 days after the subcontractor's work is satisfactorily completed" or*
- *"... hold retainage from prime contractors and provide for prompt and regular incremental acceptances of portions of the prime contract, pay retainage to prime contractors based on these acceptances, and require a contract clause obligating the*

prime contractor to pay all retainage owed to the subcontractor for satisfactory completion of the accepted work.” (Ichniowski, 2003:1):

In 2001 the AASHTO Subcommittee on Construction surveyed the states to assess the impact of this USDOT regulation on state retainage policies for their state Department of Transportation (DOT) work. Of the 47 states participating in the survey, only seven, or 15%, had a zero retainage policy prior to the regulation change. However, by the date of the survey two years later, twenty-one states (45%) had a zero retainage policy for primes and/or subcontractors on DOT work. As expected, Federal policy had a significant impact on state retainage practices (AASHTO, 2001).

In addition to the modification of state law to comply with Federal regulations on USDOT funded work, most states have also adjusted their retainage statutes to reflect changes in the percentage withheld, payment timing, and/or implemented alternatives to conventional retainage practices. For some states these statutes apply only to certain departments, such as the State’s DOT projects, while others are applicable for all state work. While no state has taken the position of abolishing retainage, the trend has been toward a reduction in the percentage of funds withheld and/or policies more sensitive to the contractor’s cash flow concerns (ASA, 2003a; Stockenberg, 2001b).

Just in the past several years Maryland, Mississippi, and Arizona reduced the retainage percentage on all state work (ASA, 2003a). Legislative efforts in Utah capped subcontractor retainage to the amount being held by the owner and required retention to be released on portions of the building accepted for early occupancy. In addition, legislation to reduce or limit the retainage percentage has been introduced in Ohio, Oklahoma, Colorado, Florida, and Wisconsin (Pitts, 2003; Grimm, 2003; Stockenberg & Limbaugh, 2002). In Wisconsin the proposed legislation reduces retainage on all public work to 5% till 50% complete and zero thereafter - a considerable change from the requirement 30 years ago of 15% for the duration of the project (Fabishak, 2003).

Changes in retainage policy are not just limited to reductions in the percentage of retained funds. The State of Oklahoma was one of the first to allow contractors to avoid retainage altogether if they would post security such as a certificate of deposit or a letter of credit. Continuing with the trend to adopt ‘alternatives’ to the traditional retainage practices, Arizona and Maryland passed regulations permitting securities in lieu of retainage and recently Illinois enacted legislation allowing retainage to be placed in an interest-bearing account with the interest accruing to the subcontractor (ASA, 2003a; Gordan, 2001).

In 2001 New Mexico enacted one of the most ambitious retainage programs legislated up to that point in time. The statute limited GC and subcontractor retainage to 5%, required interest-bearing escrow accounts for retainage, mandated the release of retainage held on each ‘separately ascertainable item of the schedule of values’ upon substantial completion of that portion of the work, allowed for the substitution of securities, and established prompt payment requirements and penalties (Calvert, 2001).

The reassessment of state retainage policies is continuing. Connecticut and Oklahoma have current legislative proposals requiring the creation of an interest bearing escrow account for retainage and Oklahoma’s pending legislation requires the early release of retainage for subcontractors completing their work early on in the project. Ohio’s proposed legislation eliminates retainage on all public work and withholds the Certificate of Occupancy until the contractor provides certification that subcontractor retainage has been paid (Pitts, 2003; Ohio General Assembly, HB208).

Legislation for retainage policy has not been limited to public work. For example, Missouri and Montana limit retainage on private work to 10% and New York, as well as Montana, limit subcontractor retainage to the amount being held on the contractor by the owner for the subcontractor's portion of the work. In 2002 Missouri passed comprehensive legislation for private construction projects limiting retainage to 10%, permitting the substitution of securities for both the GC and subcontractors, line item release of retainage, established provisions requiring retainage to be held in a trust fund, mandated the release of retainage upon substantial completion, and established prompt payment guidelines for subcontractor retainage. In addition, New Mexico's recently enacted legislation reducing retainage to 5%, establishing requirements for prompt payment, and providing for the substitution of securities applies to both public and private construction. This evolution of retainage policy governing private work continues with Colorado and Ohio both having current legislative initiatives affecting retainage practice on private work (Stockenberg & Limbaugh, 2002; McGreevy, 2003; Calvert, 2001; Grimm, 2003; Stockenberg, 2003).

All but three states (New Hampshire, West Virginia, and Wyoming) have statutes regarding retainage covering public and/or private work. Forty states specify a retainage percentage. Of those states that specify a retainage percentage, thirteen retain 10% on the first 50% of the work but ten of these states hold no retainage (or return half of the 1st portion) on the 2nd half of the work so that at completion the combined percentage is 5% or less. One state withholds 8% and twenty-three states retain 5% while three states withhold less than 5%. In total, the amount withheld for retainage at completion is 5% or less for all but two states specifying a retained percentage. That equates to ninety-five percent requiring 5% or less compared to 20 years ago when the typical retained percentage was closer to 10%. In addition to addressing retainage amounts, 21 states permit securities, three allow bonds and one permits a letter of credit as a substitute for retainage and 16 require interest to be paid on retained funds. Federal and State legislation has continued down the path of increased regulation, reduced retainage rates, and the increased acceptance of retainage alternatives for both public and private work. (Croysdale, 2003; Stockenberg & Limbaugh, 2002; ASA, 2003a; McGreevy, 2002; Calvert, 2001; Grimm, 2003).

Industry Standards for Retainage

The retainage practices of the various departments within the Federal government are becoming more consistent while the policies of the states are trending toward reducing the amount of retained funds and the use of alternatives. However, there remains considerable variance in retainage practices throughout the industry, particularly in the private sector (ASA, 2003a).

The American Subcontractors Association, the Associated General Contractors of America, and the Associated Specialty Contractors generally support the reduction or elimination of retainage. However, standard industry contracts and subcontracts typically have provisions for retainage, but avoid specifying retainage percentages and support limited use of alternatives. For example, AGC's standard contract between the Owner and Contractor contemplates retainage at a rate agreed to by the parties and suggests no additional retention be held once the work is fifty percent complete. This standard contract permits early release of retainage for subcontractors that have completed their work and allows securities to be substituted for retainage with interest on the securities accruing to the contractor (AGC No. 200, 2000).

AGC's standard subcontract permits subcontractor retainage at a rate agreed to by the parties and provides for retainage reduction at completion and/or if the Owner reduces the retained percentage of the contractor (AGC No. 650, 1998).

The AIA 201 General Conditions, an industry standard, provides for contractor retainage but does not specify a percentage. The document requires the release of retainage to the general contractor upon substantial completion. It provides for early release of subcontractor retainage only in the event that the subcontractor's retainage is released to the contractor by the Owner (AIA A201, 1997).

In practice, the retainage policy for a project is typically negotiated between the parties and is inconsistent throughout the industry. To aid the development of standard retainage practices, improve the fairness of retainage policy, and increase the acceptance of retainage alternatives several industry organizations reached an agreement outlining suggested industry practice for retainage. In 2002 the Associated General Contractors of America (AGC), the American Subcontractors Association (ASA), and the Associated Specialty Contractors (ASC) approved a 'joint' position concerning retainage practice as follows:

- *Whenever possible, retainage should be eliminated or reduced.*
- *If the need for retainage cannot be eliminated, an acceptable alternative form of security in lieu of retainage may be used.*
- *If retainage is required, the percentage retained should be as low as possible.*
- *Where retainage is held, the percentage level should be the same for subcontractors as for the prime contractor.*
- *Early (including line item) release of retainage should be encouraged.*
- *Reduction in retainage and release of retained funds should not be delayed because work under change orders has not been completed.*
- *When retainage is used, retained amounts should be deposited in an escrow account which bears interest inuring to the contractor and subcontractor in their respective shares. (AGC/ASA/ASC, 2003)*

Impact of Retainage

Even though there has been considerable evolution of retainage policy, there remains a spirited debate on the merits of its practice. Proponents argue that it provides financial protection for the owner and ensures performance while imposing minimal financial hardship on contractors. Opponents submit retainage reduces competition and increases project cost, provides a financial disincentive for timely completion of the work, and places a severe financial hardship upon contractors and subcontractors.

Impact on Construction Cost

Proponents of a reduction or elimination of retainage argue that retainage reduces competition and increases the cost of construction. In 1999 the American Subcontractors Association (ASA, 1999) conducted a national survey of its membership on retainage practices. In that study they found that 91% of their membership are more likely to pursue a project if no retainage is withheld. Also 69% of the responding subcontractors indicated they would lower their bid by an average of 3.1% if the project did not require retainage. ASA's conclusion was that owners and contractors utilizing retainage on their project(s) reduced competition and increased price (Mendes, 2003). Studies by Meir (2002) and SECG (2002) found a similar relationship between payment and price.

Croysdale (2003) submits that lowering the retained percentage from 10% to 5% results in construction savings of 1% to 1½ %. An earlier analysis by Farid (1986) purported a similar relationship - increasing the retained percentage raises the contract price. In Hughes, Hillebrandt, and Murdock's (1998) study the respondents noted an increase in contract price ranging from 0 to 4% with an average of .2% of the contract price for each year of the project.

The underlying basis for the conclusions of these studies is rooted in 'financing' costs and a reduction in competition. Retainage essentially requires that contractors incur the expense of financing a portion of the project. In addition, competition is reduced because capable, but smaller, less well-financed companies are not able to compete on projects with excessive retainage requirements (Harrell, 2003). The effect on project price is echoed by AGC's Chief Executive Officer Stephen E. Sandherr in his reaction to the DOT's relaxed position on retainage: "Not only will contractors and subcontractors benefit from the new retainage policy, but the government, and ultimately the taxpayer, will realize significant cost reductions" (Day, 2001:2).

Merck, one of the largest pharmaceutical companies in the world, also believes reducing retainage percentages can have a favorable impact upon project cost and performance. The firm changed its retainage policy on several projects "to attract a greater number of quality contractors" (Stockenberg, 2002:23). Their initial project retainage was lowered and at 50% completion no additional retainage was withheld if quality and performance were satisfactory. Similarly, H.G. Hill Realty, one of the largest private developers in Tennessee, does not withhold retainage because they believe that this approach enhances working relationships and contractor performance. They note that "as long as the job is progressing properly and they are getting good performance there is no need" (Bradbury, 2000:22).

Impact on Performance

Intuitively most owners can rationalize the relationship between retainage and price, but even with the increase in cost many believe that retainage affords a needed level of financial protection to ensure contractor performance. Lending support to that assessment is a 2001 study by the AASHTO Subcommittee on Construction. This study surveyed the states to determine the impact of the 1999 Federal DBE regulation that encouraged the elimination of retainage on federally funded DOT work. AASHTO found that 29% of the states with a zero retainage policy had 'problems with performance'. The concerns generally revolved around issues relating to completion of the work. State agencies reported problems such as contractors losing interest in the project, difficulty in getting contractors to complete repairs or cleanup, delays in obtaining closeout documentation, and increased difficulty in obtaining subcontractor bonding. Barnes and Ahmad's (1994) survey involving public agencies in Florida had similar findings. That study concluded that owners firmly believed retainage provided a needed incentive to ensure quality performance and timely completion of the work.

Studies involving the subcontracting community reach different conclusions regarding the relationship between performance and retainage. The Specialist Engineering Contractors Group (SECG), an umbrella organization in the UK comprised of six trade unions representing over 300,000 workers, recently completed a study on retainage. In September 2002, they submitted their report to the Trade and Industry Select Committee in the UK titled *The Use of Retentions in the Construction Industry*. The report contains a number of testimonials from its members on the subject as well as a series of findings and recommendations. Based on its investigation, SECG submits "retentions do not add value but, on the contrary, undermine efforts to obtain improvements both in performance and in relationships between all parties" (SECG, 2002:6) They submit the practice of retainage promotes adversarial relationships that reduce individual

and collective performance on the project. Its use tends to indicate a lack of trust promoting adversarial relationships while lowering or eliminating retainage improves the working relationship (Ahmad and Barnes, 1994). The elimination of retainage facilitates project partnering thereby encouraging the alignment of project goals, which is essential for performance improvement (Egan, 1998; Harrell, 2003).

SCEG (2002) contends “there is no evidence to link the existence of retentions to the elimination of defects or enhanced levels of performance” (SCEG, 2002:6). ASA’s 1999 survey reached a similar conclusion. It found that retainage was not a motivating factor in the completion of the work for 80% of its membership.

In addition, opponents lament that retainage practices treat performing and non-performing contractors in the same manner thereby reducing its effectiveness. Many argue that retainage provides an incentive to delay completion of the work to minimize the contractor’s financing cost. Opponents also submit that retainage is not an owner’s only, or most effective, option to induce performance or correction of faulty work (SECG, 2002). They argue a more successful option is to withhold a portion of the progress payment(s) until the specific performance problems are remedied (ASA, 2003a; Lathrop & Gage, 2002).

Financial Impact on Contractors and Subcontractors

ASA’s 1999 study found that 92% of the respondents noted retainage a serious problem facing their firm. Many of the respondents harbored a great deal of frustration concerning collection of retainage. Having these funds tied up for months, if not years, increased their cost of doing business, reduced their ability to take on additional work, and diverted management’s efforts toward collection efforts. It also exposed the firm to the risk of continued solvency of the owner until collection. SECG noted that “construction was financed bottom-up - therefore the weakest and smallest firms (with the poorest access to credit) bear the financing burden” (2002:6). They found that many of the subcontractors bearing the financial burden felt the reason retainage practice persisted is that it remains a source of interest-free financing for an owner. What was particularly offensive to some was that if a contractor reported income based upon the percentage of completion method, they were actually paying income tax on funds not yet received, thereby further aggravating the cash flow burden (Barr, 2002).

Ahmad and Barnes’s (1994) Florida study yields similar findings. It concludes that retainage reduces profitability, increases borrowing costs, precludes investment in additional work or equipment, and increases contractor bankruptcies. OPPAGA’s (2000) investigation into retainage practices at the request of the Florida legislature supports this earlier study, but finds that the reduction, or elimination, of retainage may have some adverse effects. Restricting subcontractor retainage would encourage sureties to become more defensive and underwrite fewer subcontractors needing payment and performance bonds. This in turn would increase contractor risk, resulting in micro management of the subcontractor (or contractor) and/or the reluctance to contract with firms unfamiliar to the parties thereby restricting competition.

Retainage Alternatives

Downs (2002), in a recent article titled “*Big owners liken retainage reform to terrorism,*” points out that resistance to changing retainage practice in the private sector is high and OPPAGA (2002) found that this reluctance to change extends to public agencies. However, in spite of industry resistance, retained percentages are trending down and retainage alternatives are often

appearing in legislation and industry practice. Over the past couple of decades legislators have enacted prompt payment statutes, the Federal government has adopted a zero retainage policy, and many states have reduced their retained percentage on public work with some even extending statutes to the private sector. In addition to these trends, alternatives to the *standard* retainage practices have started to take hold. The payment of interest on retained funds, retainage escrow accounts, substitution of securities or bonds, line item release, and limiting the amount of retainage that a contractor can withhold from a subcontractor are some of the more commonly emerging alternatives.

Payment of Interest

Proponents of change in retainage practice claim there is a national movement to require interest on retained funds (TCA, 2001). AGC/ASC/ASA's 2002 Joint Position on Retainage states "Where retainage is used, retained amounts should be deposited in an escrow account, which bears interest, accruing to the contractor and the subcontractor in their respective shares." The general consensus emerging within the industry is "once earned, amounts held in retainage should benefit the subcontractor (or contractor)" (OPPAGA, 2000:7). Currently two-thirds of the states require interest on retainage or permit securities with interest accruing to the contractor on public work and five states have extended interest requirements to private work.

Escrow Accounts

With this approach, retainage is placed in escrow accounts that prevent unwarranted expenditure or diversion of the retained funds. This practice can also place the retained funds out of the reach of creditors should the owner experience financial difficulties. An escrow account generally involves two types of expense that must be borne by one or more of the parties – the cost of administering the account and the cost of financing the escrowed funds. Currently 14 states have legislation regarding escrow accounts for retainage with three states extending this protection to private work (Stockenberg & Limbaugh, 2002).

Substitute Securities

Substitution of securities is essentially a process whereby the contractor (and/or subcontractor) substitutes securities in a form acceptable to the parties in lieu of the owner withholding retainage. Currently more than 40% of the states have regulations permitting the substitution of securities for retention on public work and three have extended this practice to the private sector (Stockenberg & Limbaugh, 2002; Mendes, 2003).

Line Item Release

Construction retainage is generally withheld starting with the contractor's first progress payment on the project and held until final completion of the project some months or even years later. This practice places a severe financial burden on those subcontractors, such as excavation or foundation contractors, whose work is completed early in the project (OPPAGA, 2000; SLRC, 2002). Line item release of retainage is a practice whereby retained funds are released when a separately identifiable portion of the work is satisfactorily completed. Seven states currently have statutes permitting this practice on public work and one state, New Mexico, passed legislation in 2001 requiring line item release of retainage on private work (Stockenberg & Limbaugh, 2002).

Bonds in Lieu of Retainage

In public sector work it is a common requirement for the general contractor to supply Payment and Performance (P&P) bonds. The bonds provide the owner additional protection against poor performance, non-payment of the contractor's bills associated with the project, and/or financial failure of the contractor. General contractors also can require P&P bonds from subcontractors for similar reasons. In addition to the financial and performance protection afforded by the actual bonds, the bonding process itself is generally viewed as a prequalification process that screens out firms unable to effectively perform the project scope (Ahmad and Barnes, 1994). Industry organizations such as the ASA argue that P&P bonds, or a separate bond covering just the retained funds, should be allowed as a substitute for retainage. Otherwise, the owner has 'double' protection – the bonds plus retainage. Permitting substitution of a bond(s) provides protection to the owner while permitting the contractor (and/or subcontractor) to collect payment in full for work satisfactorily performed. Contractors often favor a P&P bond in lieu of retainage because it can cost up to seven times less to fund the bond requirements than to fund the retainage requirements (SECG, 2002).

Another form of surety protection is the substitution of a bond for only the retained funds. Retainage bonds are popular with contractors because they free up retained funds for relatively low cost. In Louisiana, where retainage bonds are permitted on DOT work, almost 100% of the contractors substitute a bond (Stockenberg & Limbaugh, 2002). However, contractor support disappears if only subcontractors are allowed to substitute retainage bonds, because then the contractor is forced to fund the project retainage.

Retainage bond opponents argue that their use reduces an owner's protection and encourages a more conservative approach, or actual under certification, of progress payments (Hughes *et al*, 1998). Owners have yet to embrace the substitution of P&P bonds or retainage bonds for retainage as evidenced by the findings of Ahmad & Barnes's 1994 study. They found that owners had serious reservations about bond substitution. The public owners in their study felt it was too difficult and time consuming to get a surety to respond should the contractor be unwilling to finish the project. Similarly, a study by Hughes *et al* (1998) found that owners typically viewed the threat of litigation as a necessary step to encourage surety action. Owners in that study felt that 'retention bonds must be on demand otherwise they are useless' (1998:25). The findings of these studies are supported in practice. Only four states, or 8%, have provisions to substitute a bond for retainage (Stockenberg & Limbaugh, 2002).

Limiting Subcontractor Retainage.

The American Subcontractors Association has continued to support legislation requiring that contractors be permitted to withhold no more retainage on a subcontractor than the owner is retaining on the contractor (ASA, 2002). Contractors have typically been non-supportive of this approach because it restricts their ability to withhold additional funds if they deem it necessary to ensure performance. However, in practice the retained funds are typically equal. Even AGC's Standard Form of Agreement between Contractor and Subcontractor states "The rate of retainage shall be {a percentage}, which is equal to the percentage retained from the Contractor's payment by the Owner for the Subcontract work" (AGC 650, Para. 8.2.2).

Retainage Abuse

Even though retained percentage rates are trending down and retainage alternatives are gaining popularity, retaining funds for work performed is still a significant operating challenge for the construction contracting community. The practice presents a financial burden, especially to small and medium sized contracting entities, and can be a source of financial abuse (SCEG, 2002; Stockenberg, 2001a).

As referenced earlier, ASA's 1999 study found that 92% of the respondents noted that retainage was a serious problem facing their firm. In this study, the average amount of retainage receivables 'on their books' was \$620,025 with an average age of 160 days but ranging up to 481 days. Three years later the problems and concerns persist. ASA's 2002 national survey of its membership found that 93% viewed retainage practices a serious or somewhat serious issue with slow final payment of retainage as a serious or somewhat serious issue for 95% of its membership. Additionally, slow payment was the most serious issue for 17% of the respondents which was up from 5% in 2000 (ASA, 2002).

Similar surveys were performed in several states in 2003 with comparable results. Ninety- three percent (93%) of ASA's membership in Ohio viewed retainage a serious or somewhat serious issue and 91% responded similarly for slow final payment. In Mississippi it was 92% and 83% while Ohio respondents indicated 94% and 94% respectfully. Colorado and Phoenix had similar results (ASA, 2003b).

An early UK study found that twenty-five percent (25%) of retained funds were never paid and a majority of the remaining retention was often paid late (Reading Construction Forum, 1998). Similarly, a study by Hughes *et al* (1998) found that payment of contractor and subcontractor retainage was often delayed and posed a serious problem for the industry.

Delays in the recovery of retention are often not justified as evidenced from a study commissioned by The Building Services, Research and Information Association (BSRIA) in 2002. The BSRIA study by Samuelson and Gooding (2002) investigated 27 cases and found only one with justifiable cause to hold the retained sums.

SCEG's (2002) investigation identified a number of instances of retention abuse including long delays in recovery of retained funds, the use of retained funds to unjustly offset alleged poor quality work, delaying retention payment to encourage a reduction in the amount of final payment, and the use of retention to offset charges or delays unrelated to the subcontractors work on the project. BSRIA's study identified common categories of retention abuse, including:

- Long delays in the recovery of retainage. In its study final payment of retained funds was often in excess of two years after completion of the project.
- Continuing to hold retained funds due to poor performance of others.
- Using retained funds to induce subcontractors into final settlement with unfavorable terms for the subcontractor (Samuelson and Gooding, 2002).

Opinions Vary

However, opinions on retainage and its impact and/or abuse often depend on one's vantage point. Most all agree that retainage practice has an impact upon the parties and the construction process, but whether its influence is favorable or unfavorable in large part depends upon perspective and contractual position. The polarization of opinion is evidenced in a 1994 study involving public

agencies and contractors in the State of Florida (Ahmad and Barnes, 1994). In this study 55 general contractors and 38 public agencies responded to a questionnaire on the practice of retainage.

These two groups essentially agreed that 10% retainage was common, that it encourages front-end loading, and both groups had similar opinions regarding the periodic release of retainage on long duration projects. However, beyond these three issues the public owners and contractors had very differing opinions. A significant majority (88%) of the contractors felt that retainage adversely impacted profitability while only 19% of the owners shared that opinion. Conversely, 87% of the owners felt that retainage protects the owner while only 27% of the contractors agreed. In fact, contractors felt that retainage increased the likelihood of financial failure. Similar disparity existed regarding the effect upon the Owner-Contractor relationship. A majority (59%) of the contractors believed that retainage practices harmed the relationship while only 8% of the owners thought that a revised policy would enhance the relationship.

A strong majority (72%) of the public agencies believed that no change in retainage policy was necessary while only 20% of the contractors thought the practice should remain unchanged. There was similar disagreement concerning relaxing retainage requirements, with most owners resisting the reduction of retainage to 5%. A majority (53%) of the owners did not support interest bearing escrow accounts versus 85% of the contractors and while 61% of the contractors supported bonds in lieu of retainage, only 1% of the owners felt that bonds were an acceptable alternative.

This study exposes the disparity of opinion between public owners and contractors on retainage practice and provides insight into the difficulty for policy change. Essentially, contractors viewed retainage as an unnecessary burden creating financial hardship with minimal benefits for the owner and felt retainage practices needed to change. Conversely, public owners believed that retainage afforded them a necessary degree of protection that imposed minimal burden upon the contracting community. They felt policy change was unnecessary and alternatives were typically undesirable.

However, Ahmad & Barnes's study was completed almost a decade ago on a very limited geographical scale. In addition, other participants in the construction process, including subcontractors, private owners and architects who are affected by retainage policy were not included in the study. Similarly, ASA's (2002) and SCEG's (2002) studies only obtained data from subcontractors and AASHTO's (2001) study was restricted to state DOT agencies. The limitations of these previous efforts, along with the recognition that retainage practices tend to evolve over time, give rise to the need for a comprehensive study on current retainage practices and the impact that retainage policy has on each member of the construction team.

RESEARCH OBJECTIVES

This research effort will build upon the work of previous studies investigating retainage practices in the construction industry. It will incorporate a national sampling representing the primary participants in the design and construction process, including owners, architects, contractors and subcontractors. The primary objectives of this research effort are to:

- Identify the detriments of retainage for members of the construction team.
- Identify the benefits of retainage for members of the construction team.
- Identify alternatives that will minimize the detrimental impact of retainage.

- Where such alternatives are already in use, evaluate their effectiveness.

RESEARCH METHODOLOGY

Methodology Overview

There are two ‘general’ approaches that could be taken to address this research effort: 1) data could be obtained from a broad and representative sample of each population using a self-administered survey instrument, or 2) the practices and insight from a small sampling could be examined in greater detail. To obtain the benefits inherent with each approach, the research design incorporates elements of both methodologies.

Survey Instrument

A self-administered survey was developed to obtain input from a large sampling of members of the construction team using both closed-end and open-ended response options. Use of closed-end responses permitted an evaluation by each of the respondents on the selected topics of retainage practice. Incorporation of open-ended response options allowed respondents to provide additional insight or related information.

The survey instrument was designed using a seven-point likert scale for most of the closed-end responses and short answer or essay format for response to the open-ended questions. The instrument was structured to obtain input on the following primary topics:

- **Company Data:** General company information, including type of organization, annual construction volume, and area of operations.
- **Current Retainage Practices:** Retainage practices used on their projects, including the use of alternative practices.
- **Retainage Abuse:** Their assessment of the prevalence of abusive practices, and supporting documentation concerning the collection of project retainage.
- **Retainage and Price:** The impact, if any, that project retainage has on a) their willingness to pursue a project and b) their pricing of a project.
- **Retainage Alternatives:** Their support or opposition for alternatives to traditional retainage practices.

The survey instrument was pilot tested and needed refinements were incorporated. When completed, the survey instrument contained a total of eighty-seven (87) questions with either closed and/or open-ended response options.

Sample Selection

Data for this study was solicited from architects, general contractors, subcontractors, construction managers, public owners, and private owners. A probabilistic sampling for each category was selected as follows:

Architects: All of the Architects classified as Architect/Engineer (AE), Architect (A), and Engineer/Architect (EA) on Engineering News Record’s (ENR) 2003 listing of the Top 500 Design Firms were included in the sample. In addition, six Architects from each state and two from the District of Columbia were randomly selected from the American Institute of Architects

(AIA) 2004 national membership listing. A combined total of 525 architects were included in the sample.

General Contractors: All contractors listed in ENR's 2004 listing of the Top 400 Contractors with the majority of their work in 'General Building' were included in the sample. Supplementing this list, were 645 randomly selected Contractors from the Associated General Contractors (AGC) 2004 national membership listing who belonged to the category of Building (B), Highway (H), or Industrial (I). A total of 970 contractors were included in the sample.

Subcontractors: The sample included all the 5,500+/- members of the American Subcontractors Association (ASA) listed in its 2003 Membership Roster.

Construction Managers: The sample included all the 2,500+/- members of the Construction Management Association of America (CMAA) members as recorded in its 2003 Membership Listing.

Public Owners: The sample of public owners included the highest-ranking construction official within each State Department of Transportation (DOT), including the District of Columbia. In addition, the highest-ranking construction and design facility administrators from each state were included in the sample. The sampling frame used to select these individuals was the National Association of State Facilities Administrators (NASFA). Combined, a total of 176 public owners were asked to participate.

Private Owners: Two hundred eighty-nine (289) private owners randomly selected from *Engineering News Record's* 2003 Listing of the Top Owners were included in the sample.

In total, the combined sampling of architects, general contractors, subcontractors, public owners, construction managers, and private owners for this study contained 9,960 candidates.

Survey Distribution

In late May 2004, a hard copy of the survey instrument was mailed to the sampling of architects, general contractors, and owners. They were asked to respond using an enclosed self-addressed, postage paid envelope, but were also given the option of completing the survey online. The membership of CMAA (construction managers) and ASA (subcontractors) were solicited electronically and requested to participate by completing the online survey.

Survey Response

By the July 2004 cutoff date for participation one thousand thirty-six (1035) usable responses were received. The response rate was 20.2% for those solicited by postal mail and 8.0% for those asked electronically to participate. The combined response rate was 10.4%. As shown in Table 1 – Usable Responses, the response rate for the various categories of participants ranged from 4.5% for construction managers to 56.8% for public owners.

Table 1 – Usable Responses

Category	# Solicited		Usable Responses			Response Rate		
	Postal	E-mail	Online	Postal	Total	Postal Solicitation	E-mail Solicitation	Combined
Public Owners	176		55	45	100	56.8%	Na	56.8%
Private Owners	289		10	8	18	6.2%	Na	6.2%
Architects	525		11	49	60	11.4%	Na	11.4%
Constr. Mgrs.		2500	108	5	113	Na	4.5%	4.5%
Gen'l Contr.	970		72	145	217	22.4%	Na	22.4%
Subcontractors		5500	516	11	527	Na	9.6%	9.6%
Totals	1960	8000	772	263	1035	20.2%	8.0%	10.4%

Respondents included public agency representatives from 41 states whose agency's annual construction volume ranged from \$459 million to \$9 billion. Representatives from 16 different federal agencies, 59 state agencies, and 25 local agencies provided input. Public agencies responding included the Department of Transportation, transit authorities, the Department of Corrections, General Services Administration, local counties, municipalities, school districts, water districts and community colleges. Private owners from 14 different states with an annual construction volume ranging from \$3 million to \$500 million also completed the questionnaire.

One hundred seventy-three designers and construction managers participated in the survey. Respondents included architects from 34 states with design responsibility for an annual construction volume ranging from \$1 million to over \$1 billion dollars with an average of \$204 million. Construction managers from 32 states responded. Their annual construction volume ranged from \$1 million to over \$5 billion with an average of \$450 million.

The largest survey samplings included contractors and subcontractors who were located in 42 and 39 different states respectively. The annual volume of the respondents from both categories ranged from \$1 million to greater than \$1 billion. However, the size of the firms averaged \$91 million for contractors and \$24 million for subcontractors.

Considering the length of the questionnaire (four pages with 87 questions), the geographical representation, range of organizational size, and amount of participation should be considered exceptional. This level of participation enhances the validity of the findings.

FINDINGS AND ANALYSIS

Organization and Statistical Analysis

Survey respondents were asked to provide input in five categories including 1) retainage practices on their current projects, 2) respondent evaluation of various retainage practices, 3) assessment of retainage abuse, 4) the impact of retainage on project pricing, and 5) alternative retainage practices. To facilitate an organized and comprehensive presentation of the findings of this study, each of these five categories will be analyzed systematically and then collectively summarized at the conclusion of this study.

With over 1,000 respondents and a survey instrument containing 87 questions, approximately 90,000 data points were collected. The statistical analysis of the data included the calculation of descriptive statistics, means testing, and the testing of paired samples. All statistical testing of the data was performed to a level of significance of .05.

Current Retainage Practices

Subsequent to the section of the questionnaire soliciting general information on the organization, respondents were asked to indicate the retained percentages applicable on their projects and the frequency that they encountered alternative approaches. Table 2: Retainage Percentages by Category of Owner, tabulates the project frequency that owners utilized each of the itemized retained percentages.

As shown in Table 2, federal and state agencies imposed 10% retainage terms on only about one-fifth of their projects (20% & 16% respectively) whereas private owners withheld 10% retainage on more than half (56%) of their projects. Conversely, 63% of the federal respondents held no retainage while only 19% of the state and 15% of the private owners did not withhold retainage.

Table 2: Retained Percentages by Category of Owner

Retained Percentage	% @ Comp.	Fed (16)	State (78)	Private (18)
10% for the contract duration	10.0%	20%	16%	56%
10% till 50%, then 5% on the remainder	7.5%	7%	2%	3%
10% till 50%, then 0% on the remainder	5.0%	3%	22%	11%
5% for the contract duration	5.0%	6%	30%	15%
3.5% for the contract duration	3.5%		1%	
6% till 50% then 0% on the remainder.	3.0%		1%	
4% till 50% then 2% on the remainder	3.0%		1%	
5% till 50%, then 0% on the remainder	2.5%	1%	3%	
2.5% for the contract duration	2.5%		2%	
2.0% for the contract duration	2.0%		1%	
1.0% for the contract duration	1.0%		2%	
None	0%	63%	19%	15%
Average retained % during the project		3.26%	5.56%	7.59%

Table 2 also identifies the average percent retained over the life of their projects for each category of owner (assuming an equal distribution of contract billings). The average is 3.26% on Federal work, 5.56% on state projects, and 7.59% on private projects. Note that the average retained percentage increases as you move from federal work to projects at the state level. Also, private owners impose a significantly higher percentage of retainage than evidenced in public work.

These general trends, of increased retainage as you move to 'local' and private projects are quite evident in Figure 1. More than half of the projects for private owners had retainage of 10%. In addition, retainage of 5% or more at completion of the work was present on 85% of the private projects, 70% of the state projects, and only 36% of the Federal projects.

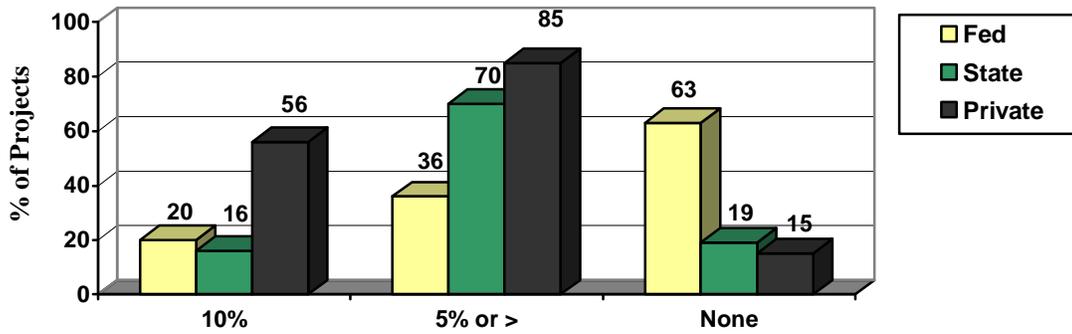


Figure 1: Retained Percentages

Architects, construction managers (CM), contractors, and subcontractors were also asked to provide input concerning the retained percentage on their projects. Table 3: Retained Percentages – Owner’s Agents & At-Risk Builders tabulates their response. As evidenced in Table 3, architects, CM’s, contractors and subcontractors were involved in a limited number of projects where no retainage was held (only 16%, 9%, 12%, and 12% respectively). Conversely, three-quarters or more of the projects for these participants had retainage of 5% or greater.

Table 3: Retained Percentages – Owner’s Agents & At-Risk Builders

Retained Percentage	% @ Comp.	Arch	CM	GC	Sub
10% for the contract duration	10.0%	30%	38%	37%	67%
10% till 50%, then 5% on the remainder	7.5%	17%	17%	8%	6%
10% till 50%, then 0% on the remainder	5.0%	20%	22%	20%	7%
5% for the contract duration	5.0%	9%	11%	19%	7%
5% till 50%, then 0% on the remainder	2.5%	3%	3%	3%	1%
2.5% for the contract duration	2.5%	1%			
1.0% for the contract duration	1.0%	4%		1%	
None	0%	16%	9%	12%	12%
Average retained % during the project		6.99%	8.00%	7.29%	8.27%

The average retained percentage during the life of the project ranged from 6.99% to 8.27% - a retainage rate similar to the average noted by private owners. This correlation is somewhat predictable because approximately 75% of all new work in the US is for the private sector. The most significant variation in the data collected from this group is the concentration of projects with 10% retainage. Two-thirds (67%) of the subcontractors’ projects have 10% retainage versus only approximately one third of the projects for the other categories in this grouping. A statistical comparison between general contractors and subcontractors supports the assertion that the retained percentage is greater for subcontractors.

Use of Alternative Retainage Practices

In the next section of the questionnaire, respondents were asked to indicate how often they encountered alternative retainage practices on their projects. These alternative practices are grouped into four general areas: 1) the substitution of financial instruments of guarantees, 2)

compensation or protection of retained funds, 3) early release of retainage, and 4) retainage limits. Response options for the frequency they encountered each alternative practice included Never (1), Almost Never (2), Seldom (3), Sometimes (4), Often (5), Almost Always (6), and Always (7). Table 4 tabulates the mean response on each alternative practice.

Table 4: Use of Alternative Practices

	Mean
Substitution of Financial Instruments or Guarantees	
Substitution of securities in lieu of retainage.	1.49
Substitution of a Letter of Credit in lieu of retainage.	1.33
Substitution of a bond in lieu of retainage.	1.48
Elimination of retainage with a Payment & Performance Bond	1.50
Compensation or Protection of Retained Funds	
Payment of interest on the retained funds.	1.44
Retainage deposited in an escrow account.	1.73
Early Release of Retainage	
Line item release of retainage.	2.27
Retainage released on work completed early in the project.	2.43
Release of final retainage prior to occupancy.	2.17
Retainage Limits	
Limits on the amount of subcontractor retainage.	2.41

The mean response for the alternatives allowing the substitution of a financial instrument or guarantee ranged from 1.33 to 1.50 (Never to Almost Never). Respondents indicated substitution of a letter of credit, securities, or a retainage bond was almost never practiced on their projects. Additionally, the elimination of retainage with a Payment and Performance bond was again almost never allowed. Evidence of its low acceptance is that only 3.2% of the respondents noted that it was *often* allowed on their projects.

Retainage alternatives that offered compensation or protection of the earned funds again were rarely encountered. The mean response for the payment of interest and the use of escrow accounts indicates that these alternatives are ‘Almost Never’ used. Eighty-one percent of the respondents indicated that interest was never paid on retained funds and only 5.3% of the respondents’ projects often employed the use of escrow accounts.

Alternatives offering the early release of retainage had slightly more application as evidenced by the higher mean scores. They were still seldom utilized, but approximately 10% of the respondents’ projects had line item release of retainage and/or release of retainage for work completed early in the project. Similarly, 15% of the projects often had limits on the amount of subcontractor retainage.

Assessment of Retainage Practices

The survey questionnaire had two sections, containing a combined 34 questions, soliciting respondent assessment of retainage practices. These questions were structured to provide respondent input on 1) the perceived owner benefits and detriments of retainage, 2) the influence retainage has on contractor and subcontractor performance, 3) the influence retainage has on project relationships, 4) the financial impact that retainage has on contractors and subcontractors,

and 5) the perceived fairness of retainage practice. The mean response for each question was calculated and statistical comparisons were evaluated. A summary of the findings is presented in the following sections.

Owner Benefits / Detriments

In the first category, Owner Benefits/Detriments, owners, architects and construction managers (hereafter referred to as Owners/Agents) had general agreement on the benefits and detriments of retainage. The trio felt retainage provided financial protection for the owner and was not employed primarily to provide a source of interest free financing for the owner (a position most strongly voiced by the owners). However, Owner/Agents were neutral on whether retainage provided a buffer for overvaluation of the work installed, maybe in part because they believe that retainage encourages front-end loading.

Similar to the position held by Owners/Agents, contractors and subcontractors believe that retainage encourages front-end loading. In addition, they believe that retainage does not provide a ‘buffer’ against overvaluation. However, subcontractors feel strongly that retainage does not provide financial protection for the owner and that the primary reason owners withhold retainage is to provide interest free financing whereas, general contractors as a group are neutral on this issue. However, when the contractors that self-perform a majority of their work are analyzed separately, the data reveals sentiments for this group approaching those of the subcontracting community.

The effect of retainage on competition and pricing is also split. Owners/Agents do not believe that contractors and subcontractors are less likely to pursue a project if retainage is being withheld. However, that is not an opinion shared by Construction Managers at-Risk (CM at-Risk), General Contractors (GC), or Subcontractors as noted in Table 5.

Table 5: The Effect of Retainage on Competition and Pricing

Question	CM at-Risk	GC	Sub
Are you more likely to pursue contracts where no retainage is held? (% selecting Yes)	65%	58%	85%
Would your price be lower if no retainage was held? (% selecting Yes)	60%	50%	71%
How much lower would your price be?	2.4%	2.2%	3.6%

Over 65% of CM at-Risk, 58% of the GC’s, and 85% of the subcontractors indicated that they would be more likely to pursue projects where no retainage was withheld. In addition, 60% of the CM’s at-Risk, 50% of the GC’s, and 71% of the subcontractors noted that their price would be lower if no retainage were held. When asked to quantify how much lower, CM’s at-Risk advised 2.4%, GC’s 2.2%, and subcontractors indicated 3.6%. “Owners would be amazed how much smoother and cost effective a project gets built when you eliminate retainage,” stated one respondent. In deference to the opinion of owners and their agents, the financial protection that owners believe retainage provides has a price – reduced competition and increased project cost.

Influence on Contractor and Subcontractor Performance

Owners, architects, and construction managers (CM) marginally believe that retainage motivates performance and are neutral as to whether or not retainage is needed as an incentive to obtain quality work. However, the trio strongly believes that retainage encourages the correction of defects, expedites submission of closeout documents, and is necessary to get punchlist items completed. In essence, they view retainage as providing effective leverage to correct deficiencies and closeout a project as opposed to having a substantial impact on performance during the construction period. We have “no other alternative. As an owner, project completion can only be achieved by withholding retainage” was the sentiment shared by several of the respondents.

At-risk contractors (CM’s at-Risk and GC’s) and subcontractors do not believe that retainage is an effective incentive to obtain quality work. However, they are split on the effect that retainage has on the correction of deficiencies and project closeout. Similar to Owners/Agents, at-risk contractors believe that retainage encourages timely correction of defects and expedites closeout documentation while subcontractors do not. Additionally, at-risk contractors are neutral concerning whether retainage is necessary to get punchlist items finalized while subcontractors do not think it is effective to ensure completion.

Influence on Project Relationships

Owners and their agents (architects, and CM’s) do not believe that the use of retainage indicates a lack of trust or promotes adversarial relationships. Similarly, they do not think that reducing, or eliminating retainage, facilitates project relationships or encourages the alignment of project goals. The only subset of this group not in conformance with these findings is ‘Federal’ owners. The majority of these Federal respondents do not withhold retainage and they feel that the elimination of retainage has had a favorable impact on project relationships – an opinion shared by at-risk contractors and subcontractors. In contrast to Owners/Agents, at-risk contractors and subcontractors believe that the reduction, or elimination of retainage, encourages the alignment of project goals and subcontractors feel that its use indicates a lack of trust and promotes adversarial relationships.

Financial Impact on Contractor/Subcontractor

Owners and their agents do not believe that retainage reduces contractor profit, increases contractor financial failures, nor places a severe financial burden on contractors or subcontractors. Conversely, at-risk contractors and subcontractors judge that retainage reduces profitability, and poses a severe financial burden, especially upon subcontractors who strongly believe that its use increases financial failures.

Owners and their agents do not feel that the collection of retainage diverts contractors’ attention nor impacts their ability to take on new work, which is in stark contrast to the opinion voiced by subcontractors. Interestingly, at-risk contractors strongly believe that reducing subcontractor retainage increases contractor risk - a position shared by owners, architects, and CM’s but strongly opposed by subcontractors. In addition, at-risk contractors believe that statutes limiting subcontractor retainage would discourage them from working with unfamiliar subcontracting firms. In essence, they appear to support ownership’s position that retainage affords a level of financial protection. This finding is not surprising since at-risk contractors would have little downside for withholding retainage. Typically, any subcontractor price escalation for retainage would just be passed through to the owner.

Fairness of Retainage

Owners and CM's at-risk, along with subcontractors think that subcontractors typically bear the burden of retainage. Architects, along with at-risk contractors, and subcontractors believe that withholding retainage unfairly treats good performers the same as poor performers. Owners and CM's are neutral on this issue.

Summary of Opinions on Retainage Practice

There are basically two camps with frequently contrasting opinions on the impact, or influence, of retainage practices. One vantage point is that of the party withholding the retainage - ownership and their agents (architect and construction managers). In the other camp are the parties on whom retainage is being withheld – construction managers at-risk, general contractors, and subcontractors (at-risk builders).

Owners and their agents (Owners/Agents) believe that retainage affords needed financial protection without reducing competition or increasing project cost. However, this position may be difficult to defend considering a vast majority of those pricing the work (at-risk contractors and subcontractors) judge that the use of retainage reduces their willingness to pursue a project and increases their pricing from 2.2% to 3.6%.

Again in stark contrast to at-risk builders, Owners/Agents do not think that withholding retainage impacts contractor profitability, imposes a financial burden, or adversely impacts a contractor's ability to take on new work. In essence Owners/Agents are suggesting that withholding earned funds (retainage) does not have financial consequences on the parties whose funds are being held – a position that again may be difficult to support.

Owners/Agents believe retainage practice is fair and they don't think its use adversely impacts relationships or the alignment of project goals. A rare divergence of position within this group is that architects share the contractors' and subcontractors' belief that withholding retainage unfairly treats good performers the same as poor performers. Conversely, at-risk builders and subcontractors feel the practice of retainage is unfair and they (as well as federal owners) submit that a reduction, or elimination, of retainage has a favorable impact on project relationships – a correlation that appears more logical than the Owners/Agents' position.

Lastly, Owners/Agents and at-risk contractors believe that retainage provides little or no incentive to obtain quality work. However, they believe retainage affords some level of financial protection and its use encourages timely correction of defects and expedites closeout documentation.

Retainage Abuse

The questionnaire also had a section addressing retainage abuse. The questions within this section were grouped into three sub-categories: 1) Timely & Full Payment of Retainage, 2) Owner Abuse, and 3) Contractor Abuse. The findings are presented in that order.

Timely & Full Payment of Retainage

Owners and their agents strongly believe that retainage is paid in full on each project. However, construction managers at-risk, general contractors, and subcontractors (at-risk builders) state that they receive 100% of their retainage on only 89.6%, 93.8%, and 89.6% of their projects respectively. There apparently is a disagreement on the definition of *paid in full*. In addition, there is a wide divide on the timeliness of payment. Owners, architects, and construction managers submit that retainage is paid promptly upon completion, whereas at-risk contractors and subcontractors claim it is not. Here it appears there is a disagreement on the definition of *prompt payment*.

To aid in the assessment of the timeliness of payment, at-risk contractors and subcontractors were asked to provide specific information on the collection of retainage. Their responses are tabulated in Table 6: Retainage Collection Period. Construction managers at-risk claimed the collection of final retainage ranged from 15-180 days with an average collection period of 98 days after completion of the work. General contractors indicated their collection period ranged from 30-400 days with an average of 99 days, and for subcontractors it ranged from 30-400 days with an average of 167 days to collect final retainage after completion of the work. The longer period for subcontractors may be attributed, at least in part, to 1) general contractors typically releasing subcontractor retainage only after receipt from the owner and 2) as noted earlier by the respondents, the release of retainage on work completed early in the project is seldom incorporated into contracts.

The at-risk builders were also asked the longest period they have waited for final retainage on a project. Construction manager's at-risk ranged from 45-1000 days with an average of 620 days, contractors ranged from 45-1825 days with an average of 365 days, and subcontractors ranged from 60-2500 days with an average of 529 days to collect final retainage.

Table 6: Retainage Collection Period

Retainage Collection Item	CM @ Risk		GC's		Subcontractors	
	Range	Ave	Range	Ave	Range	Ave
Days after completion to collect final retainage	15-180	98	30-400	99	30-900	167
Longest wait for final retainage (in days)	45-1500	620	45-1825	365	60-2500	529

When the parties were asked if slow payment of retainage was a serious problem, at-risk contractors, subcontractors, and even construction managers indicated it was a concern. The degree of concern for slow payment progressively ranged from construction managers' at risk 'slightly' agreeing that slow payment is a serious problem, to general contractors' with moderate agreement, to subcontractors' voicing strong support of the statement with an average response of 6.80 on a 7-point scale. Surprisingly, owners and architects were neutral on this issue. Even they did not believe that slow final payment of retainage *was not* a serious problem.

Contractor Abuse

Subcontractors view contractor abuse of their retainage as a widespread problem – a view not shared by the other parties. Subcontractors are also alone in their belief that contractors often withhold a greater amount of retainage on subcontractors than is withheld by the owner on the contractor. However, private owners, architects, construction managers, CM’s at-risk, and even general contractors concur that “contractors often use retainage as leverage to resolve subcontractor claims or changes for extra work” – a view strongly supported by subcontractors.

Owner Abuse

The divide between Owners/Agents and at-risk builders surfaces again when addressing owner abuse of retainage. Owners, architects and construction managers do not think 1) owner abuse of retainage is widespread, 2) that owners use retainage to induce settlement on unfavorable terms, or 3) that retainage is held for poor performance outside the contractors’ responsibility or control. Conversely, construction managers at risk, general contractors, and especially subcontractors view owner abuse as widespread and that owners often use these particular abusive tactics. Interestingly, even architects and construction managers concur with at-risk builders that “retainage is often used as leverage by the Owner to resolve claims or changes for extra work”. A number of the at-risk builders shared sentiments similar to one respondent who noted that “our company contracts with municipalities and they have no incentive to pay retainage. In fact, it is to their advantage to withhold it as long as possible.”

Retainage Alternatives

The last section of the questionnaire solicited input from the respondents on alternatives to traditional retainage practices. They were questioned on their support or opposition to certain practices including the reduction or elimination of retainage, substitution of financial instruments or guarantees, compensation or protection of retained funds, early release of retainage, and prompt payment and retainage legislation. A summary of their input is as follows.

Reducing or Eliminating Retainage

Owners and their agents do not support the elimination of retainage or its reduction to 2 percent or less. However, owners and construction managers are neutral on a reduction of retainage to 5 percent or less. Of the trio, only architects expressed a lack of support for the reduction to 5 percent. Conversely, at-risk builders have a different viewpoint. They support the reduction of retainage and its elimination on contractors. However, none of the parties, including CM’s at-risk and GC’s, support the elimination of retainage on subcontractors. Only subcontractors strongly support this concept.

Substitution of Financial Instruments or Guarantees

Owners and architects are opposed to all of the noted options permitting the substitution of financial instruments or guarantees for retainage. They do not support the substitution of securities, retainage bonds, or a letter of credit. They, along with construction managers, also do not support the elimination of retainage where a payment and performance bond is provided.

While CM’s at-risk are neutral on all the options, general contractors and subcontractors support the substitution of a retainage bond, and the elimination of retainage if a P&P bond is provided. Both are neutral on the substitution of securities and only subcontractors expressed weak support

for the substitution of a letter of credit. In general, at-risk builders are not enthusiastic about swapping credit instruments, but favor the substitution of bonds.

Compensation or Protection of Retained Funds

At risk builders strongly support payment of interest on retained funds and the use of escrow accounts. Contractors and subcontractors would also like to see the Certificate of Occupancy withheld until retainage is paid.

Owners and their agents do not support the payment of retainage prior to receipt of the Certificate of Occupancy. Owners also do not support the payment of interest on retained funds while their agents are neutral on this issue. However, owners do not oppose the use of escrow accounts and both of their agents support its use.

Early Release of Retainage

Only subcontractors support the release of their retainage even if the owner has not released the retainage to the contractor. CM's and at-risk builders support line item release of retainage while owners and architects are neutral on this approach. However, all parties support the release of retainage for subcontractors completing work early in the project. A procedure suggested by one respondent was to "release the subcontractor's retainage when the following trade is able to initiate work for that portion of the project."

Prompt Payment and Retainage Legislation

At-risk builders support statutes limiting the maximum percentage of retainage that can be withheld while owners and their agents are neutral on this matter. However, Owners, architects, CM's, CM's at-risk, general contractors, and subcontractors support statutes requiring the prompt payment of retainage.

Additional Alternatives offered by the Respondents

Additional alternatives to traditional retainage practices offered by the respondents fall into six general categories. These include the selection of quality team members, variations on its application to work packages, providing the opportunity to price retainage policy, application of retainage for non-performance, the use of retainage as an incentive, and the withholding or allocation of funds for project closeout activities.

Involve Quality Team Members: A number of the respondents, including some owners, shared the opinion of one subcontractor that "*the best alternative to retainage is for owners and contractors to do their due diligence and only select quality contractors.*" An often-repeated suggestion was that owners should "prequalify contractors based on their size and experience and then award projects based on a combination of price and contractor rating". Many felt that if quality contractors and subcontractors were involved in the construction process, retainage would be unnecessary. "There is really no need for retainage if contractors are pre-qualified before being invited to bid" noted one respondent.

Retainage Incentives: Closely aligned with the involvement of quality builders was the suggestion to establish a retainage policy that provided performance incentives, rather than universal punishment. "First of all hire contractors that you can trust from previous experience. Pay them fair and insist on quality and schedule and only give them future work if they perform" was a

common theme. Respondent suggestions include tying contractor performance to future work and providing incentives for customer satisfaction and when the contracting team meets customer goals or objectives. “Establish a retainage policy that reinforces positive behavior rather than use it as negative reinforcement”.

Retainage for Non-Performance: Many of the at-risk builders suggested that retainage be held only for non-performance. They suggested that retainage be based on the value of work installed, but not accepted. Another often repeated suggestion was to impose retainage (5-10%) only if the contractor falls behind schedule or is in non-conformance with the contract terms and make release of retainage contingent on the elimination of the non-performing conditions. As noted by one respondent, “most contracts state payment can be withheld for incomplete or deficient work. Start enforcing this provision. That would give you a better handle on your project.” Another sentiment shared by several was “retainage policy should not be used as a substitute for good management practices.”

Price Retainage Policy: Several respondents suggested that owners give contractors and subcontractors the opportunity to price a project with and without retainage. “They (Owners) should request an add or deductive alternate during bidding for optional retainage terms” offered one respondent.

Selective Application of Retainage: Other alternatives were suggested regarding the application of retainage. Several contractors suggested no retainage on general contractor self-performed work or project materials. In essence they were recommending withholding retainage only on the contractor’s fee and their subcontractors. Another often repeated suggestion was to withhold retainage on only labor and stored materials and one respondent suggested reduced retainage for recycled products to encourage their use.

Retainage for Project “Closeout”: Some of the respondents suggested in lieu of retainage that the schedule of values include an additional line item for final completion. Others suggested that owners require a bid item of 'demobilization' of at least 1.5% to be paid at the end of the project and/or line items for closeout materials, CO, substantial completion, and final completion.

Lastly, one respondent suggested that owners consider a “down payment up front of the same percentage as retainage held on the back end.” For example, if a retainage is ten percent, then the owner should provide a “10% upfront payment of the contract amount at commencement to facilitate cash flow. Then hold 10% until the completion of the project.”

Summary

There are a number of areas where Owners and their agents are at odds with at-risk contractors and subcontractors regarding alternative retainage practices. However, there are several issues where support of alternative practice is widespread, or at least there is no significant resistance by the parties to change.

While there is not a consensus regarding the elimination of retainage, there is also no resistance for a reduction of retainage to 5%. Owners/Agents do not support the substitution of financial instruments or guarantees while at-risk builders are also not enthusiastic about swapping credit instruments, but favor the substitution of bonds. The payment of interest on retained funds and the use of escrow accounts are favored by at-risk builders. Owners oppose payment of interest while their agents are neutral, but neither owners, nor their agents, are opposed to the use of escrow accounts. All parties support the release of retainage for subcontractors completing work

early in the project. None of the parties oppose statutes limiting the maximum retainage percentage. Additionally, owners and their agents along with contractors and subcontractors, support statutes requiring the prompt payment of retainage.

CONCLUSIONS AND RECOMMENDATIONS

There are essentially two camps, with often contrasting positions on the impact, or influence, of retainage practice. Owners and their agents essentially believe that retainage provides needed financial protection with no adverse consequences for the owner while at-risk builders submit that retainage is an unnecessary practice that affords the owner little, or no, protection while placing a severe financial burden on contractors and subcontractors. However, based on the findings of this study, both of these positions may be difficult to defend.

Financial protection for the owner is certainly a legitimate concern when you consider the high risk nature of construction and the fact that owners are extending payment during construction for a partially completed 'product'. However, owners primarily view the protection that retainage affords as materializing only when the project nears completion. Owners and their agents do not believe that retainage provides a financial buffer for overvaluation of the work during construction, in part because they believe that retainage encourages front-end loading. In addition, they view retainage as having marginal impact on contractor performance and believe it provides minimal incentive to ensure quality work. This limited impact on performance may be in part because at-risk builders, as well as architects, believe that retainage treats good and poor performers the same, thereby providing minimal incentive to perform. However, as the project nears completion, owners and their agents firmly believe that retainage encourages the correction of defects, expedites closeout documentation, and ensures completion of the punchlist. In essence, they view retainage as providing effective leverage for the correction of deficiencies and closeout of the project as opposed to providing financial protection or having a substantial impact on performance during the construction period.

However, the perceived protection that retainage provides has a price. Retainage by its definition is the withholding of the funds for portions of the work already completed. Retained funds represent revenue that has been earned by contractors and subcontractors in performance of the work. In essence, retainage requires builders to provide partial funding for the project during construction. For owners and their agents to maintain that the owner has use of this financing at zero cost is neither logical, nor supported by this and earlier studies. The findings of this study support the assertion that retainage policy influences a contractor's and subcontractor's willingness to bid, as well as the price for their portion of the work. Retainage reduces competition and increases the cost of a project – a position in harmony with economic theory. General contractors submit the increase in contract price is 2.2% while subcontractors claim it is 3.6%. However, the actual impact would be relatively easy to assess if owners did as suggested by respondents in this study who recommended that owners adopt a policy requiring contractors and subcontractors to price the project's retainage policy upon submission of their bid. If Owners implemented this approach, the actual impact of retainage policy – the price owners are paying for any perceived or actual financial protection – could be ascertained for each project.

An additional impact of retainage is its negative influence on project relationships. At-risk builders feel that eliminating, or reducing, retainage facilitates project relationships and encourages the alignment of project goals. In contrast, owners and their agents do not believe the implementation of retainage has an adverse influence on the contracting team. However, the only subset of the owners group that has extensive experience with 'zero' retainage projects are

representatives of federal agencies and they support the at-risk builders' position. The majority of these federal agents believe the elimination of retainage has a favorable impact on project relationships. As the construction industry continues to evolve toward an operating environment where effective Owner-Architect-Contractor relationships are essential to reach project objectives, retainage policy may take on added significance.

Contributing to the adverse impact that retainage may have on project relationships is perceived retainage abuse. At-risk contractors and subcontractors assert slow payment of retainage is a serious problem. They submit that they do not receive full payment of retainage on approximately 10% of their projects and sometimes have to wait one to two years after completion of the work for receipt. Even construction managers, as owners' agents, view slow payment of retainage as a concern and surprisingly, owners themselves didn't claim it was *not* a serious problem. Compounding this problem is that contractors and owners use retainage to induce settlement. Contractors use it as leverage against subcontractors to induce settlement on unfavorable terms. And even the owners' agents (architects and CM's) concur with at-risk builders that retainage is often used as leverage by the Owner to resolve contractor claims or changes for extra work.

To facilitate financial protection, enhance performance, and improve project relationships Owners may want to reevaluate retainage policy and align it with the suggestions of some of the respondents. To provide financial protection to ensure project completion owners could prequalify project participants and require contractors to establish line items on the schedule of values for closeout and demobilization activities. In addition, funds could be withheld for defective work – a contractual right that most owners already possess. To encourage performance owners could adopt a policy that gives at-risk builders an incentive to perform, rather than negative reinforcement. Retainage could be withheld only if the contractor falls behind schedule or is not meeting its contractual obligations. It may be in an owner's best interest to adopt the federal government's philosophy that "*retainage should not be used as a substitute for good contract management, and the contracting officer should not withhold funds without cause*".

Despite the polarization on retainage policy the continuing efforts of the American Subcontractors Association (ASA), the American General Contractors of America (AGC), and the Associated Specialty Contractors (ASC) at the Federal and State level have yielded results. Federal agencies are more likely to embrace a zero retainage policy and the average retained percentage on public work, at both the Federal and State level, is significantly lower than the average of 7.6% on private work. However, this disparity may lessen in the future because, as evidenced by this study, even private owners do not oppose reducing retainage to 5%.

This study found additional evidence that the industry is moving toward a more balanced approach to retainage policy that addresses the legitimate needs and concerns of the parties. While alternatives to *traditional* retainage practice still have limited application, support is present on several fronts. This study confirmed that all of the parties support the release of retainage for work completed early in the life of the project and legislation to ensure prompt payment. Additionally, none of the parties oppose statutes limiting the maximum percentage of retainage. This study also found that the Owners' agents (along with at-risk builders) support the use of escrow accounts and do not oppose the payment of interest on retained funds. Changing attitudes coupled with legislative initiatives affecting both the public and private sector are reinforcing, and in some cases mandating, the acceptance of alternatives to *traditional* retainage practice.

Bibliography

- AASHTO Subcommittee on Construction (2001), *Survey on the Effect of 1999 DBE Regulations on Retainage*, Federal highway Administration
- Ahmad, Irtishad and Barnes, Wilson (1994), *Retainage Policies of Public Agencies: Findings of a Questionnaire Survey*, asceditor.unl.edu/archives/
- American Subcontractors Association - ASA (1999), *ASA Task Force on Retainage Study*
- American Subcontractors Association - ASA (2002), *Member Needs Assessment*, conducted by The American Subcontractors Association , April 2002
- American Subcontractors Association - ASA (2003), *White Paper: Retainage*, ASA February 2003
- American Subcontractors Association - ASA (2003b), *Member needs assessment* (for the States of Ohio, Mississippi, and Colorado), conducted by The American Subcontractors Association
- AGC Document No. 200 – *Standard Form of Agreement and General Conditions Between Owner and Contractor*, The Associated General Contractors of America, 2000
- AGC Document No.650 – *Standard Form of Agreement Between Contractor and Subcontractor*, The Associated General Contractors of America, 1998
- AIA Document A201-1997 – *General Conditions of the Contract for Construction*, The American Institute of Architects, 1997
- Associated General Contractors/American Subcontractors Association/Associated Specialty Contractors (AGC/ASA/ASC, 2003), *Guidelines for a Successful Construction Project*
- Barr, James H. (2002), Retainage Payable Deduction Issues in Construction and Real Estate Industries, www.mengelmetzgerbarr.com/Daily, August 2, 2002
- Bradbury, David (2000), “Subcontractors Call Retainage an Outdated, Ineffective Habit”, *Engineering News Record*, v244, No 24, June, 19, 2000,p22
- Calvert, Sean R. (2001), “New Mexico Retainage Act”, *Business Credit*, September 2001, pp62-64
- Croysdale, Donald (2003), “Commentary: Bill on Retainage Reduction Moving Forward”, *The Daily Reporter* (Milwaukee), 5/14/03
- Day, Dennis S. (2001), *DOT’s Revised Retainage Policy is on the Right Road*, News Release from The Associated General Contractors, 5/8/01
- Deery, Brian, (2001), “DOT proposes to revise retainage policy”, *AGC News & Views*, v5, 9, 5/15/01

- Downs, Peter (2002), *Big Owners Liken Retainage Reform to Terrorism*, www.stlconstruction.com/story
- Egan, Sir John (1998), *Rethinking Construction*, Report of the UK Construction Task Force
- Fabishak, Mike (2003) “Interview with Representative Dan Vrakas”, *The Daily Reporter* (Milwaukee), 7/8/03
- Farid, Foad (1986), *Sensitivity of Construction Contract Prices to Required Rate of Return and Retainage*, North Carolina State University, 1986
- Federal Register, vol. 68, No.115, Monday June 16, 2003, Final Rule Department of Transportation, pp 35542 *et seq.*
- Gordan, Elias M. (2001), *New IDOT subcontractor retainage law*, <http://www.legis.state.il.us/publicacts/pubact92/acts/92-O270.html>
- Grimm, Eric (2003), “Bill Would Limit Subcontractor Retainage to Maximum 5%”, *Colorado Springs Business Journal*, 2/14/03
- Harrell, Jeremy (2003), ‘Contractor Associations Ask State to Lower Retainage’, *The Daily Reporter* (Milwaukee), 10/9/03
- Hughes, Will and Hillebrandt, Patricia and Murdoch, John (1998), *Financial Protection in the UK Building Industry: Bonds, retentions and guarantees*, E & FN Spon, London
- Ichniowski, Tom (2003), “DOT Revises Contract Retainage Rule”, *Business & Labor*, 6/18/03
- Jervis, Bruce M. and Levin, Paul (1988), *Construction Law*, McGraw-Hill, NY
- Lathrop & Gage Law Offices (2002), “New Missouri Retainage Law Impacts Project Owners, Contractors, Subcontractors”, *Legal Brief*, September 2002
- Mendes, David (2003), “Retainage: An Idea Whose Time Has Come and Gone”, *The NAWIC Image*, Sept/Oct 2003, p10
- McGreevy, Susan L (2002) “The Tide is Turning on Retainage”, *Contractor*, July 2002 v49 i7 p24
- Meir, Jonathan (2002), “Procurement: Risk-Shifting Contracts Hurt”, *Engineering News Record - Viewpoint*, www.enr.construction.com/opinions/viewpoint/archives
- Ohio General Assembly, HB 208 As Reported by the House Commerce and Labor Committees, 2003 Legislative Information Systems, www.legislature.state.oh.us/bills
- Office of Program Policy Analysis and Government Accountability – OPPAGA (2000), *Inflexibility in Contracting and Retainage Practices Could Hurt Construction Industry*, Report No. 00-26, December 2000

- Office of Program Policy Analysis and Government Accountability – OPPAGA (2002), *Better Contracting Practices Would Aid the Construction Industry in Florida*, Report No. 02-50, October 2002
- Pitts, William (2003), “OK Senate ‘Fair Pay for Construction Act’ Draws Fire”, *The Journal Record* (Oklahoma City), 8/4/03
- Robert Morris and Associates, *Annual Statement Studies; Financial Ratio Benchmarks*, various
- Samuelson-Brown, Gerry and Gooding, Paul, *Retentions: Why They Must Go*, BSRIA Special Report, 2002
- Schweizer, John A (1983), “Retainage by feds to be curbed”, *Contractor*, v30, June 15, 1983, p1-
- Semling, Harold V. (1982), “Cont’rs Push for Payment: No-retainage Now Sought”, *Contractor*, v29 June 1, 1982
- Specialist Engineering Contractor Group – SECG (2002), *The Use of Retentions in the Construction Industry: A Submission to the Trade and Industry Select Committee*, September 2002
- Stockenberg, Richard A (2001a), “Retainage Uses and Abuses”, *Building Design and Construction*, July 2001 v42 i7 p37
- Stockenberg, Richard A (2001b), “Retainage Reform Makes Headway”, *Building Design and Construction*, August 2001 v42 i8 p21
- Stockenberg, Richard A. (2002), “Age-old question: who owns retainage?” *Building Design & Construction*, April 2002 v43 i4 p23
- Stockenberg, Richard A. and Limbaugh, John M., “Fifty-State Review of Retainage Laws”, *The Construction Lawyer*, v22, No. 2, Spring 2002
- Stockenberg, Richard A (2003), *Missouri Assembly Adopts Landmark Retainage Reform*, Gallop, Johnson & Neuman Articles, www.gjn.com/CM/PressRoom/pressroom398.asp
- Subcontractors’ Legislative Resource Center, SLRC (2002), *A Guide to Passing Retainage Reform in Your State*, American Subcontractors Association
- Texas Construction Association, Inc – TCA (2001), *TCA NewsLine Winter 2001: Interest on Retainage*, www.texcon.org/olwinter.htm
- Reading Construction Forum, *Financial Protection in the UK Building Industry*, November 1998
- US Census Bureau (2003), *Statistical Abstract of the United States: The National Data Book*, <http://www.census.gov/statab/www/>