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Opportunity Lost: Mismanagment of the Closeout Phase of Construction Projects

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College of Technology

Opportunity Lost: Mismanagement of the Closeout Phase of Construction Projects

In partial fulfillment of the requirements for the
Degree of Master of Science in Technology

A Directed Project Report

By

Jared Rogers

Committee Member

Approval Signature

Date

Randy R. Rapp, Chair

Robert F. Cox

James L. Jenkins

Acknowledgement

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Author's Abstract

In nearly every construction project, completing the project on time is one of the most critical things for everyone involved. Late project completion causes a wide variety of complications for the entire project team. This paper seeks to identify some of the causes for delay in the last phase of construction projects: the closeout phase.

Original research was conducted to gather input from construction industry professionals about their experiences with the closeout phase of projects. Factors perceived to cause closeout delay were identified, along with perceptions about the closeout performance of survey participant's firms. The research validated the study's premise that the closeout phase is difficult to successfully execute, for a variety of reasons. The collective responses also shed light on the perceived effectiveness of several strategies to encourage timely project completion.

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Introduction

In nearly every construction project, time is of the essence. Contractors incur a certain amount of overhead costs – staff salaries and benefits, temporary facilities, and equipment, to name a few – every week while construction is in process. Similarly, project sponsors (“owners”) incur carrying costs – including construction loan interest, staff salaries and benefits, insurance, rent or mortgage of existing facilities during construction (Assaf & Al-Hejji, 2006). It is almost always true that each party’s interests are best served by achieving closeout at the earliest possible date (Abd El-Razek, Bassioni, & Mobarak, 2008).

One of the major milestones featured in the three most popular standard forms of contract in the United States (promulgated by the American Institute of Architects, Engineers Joint Contract Documents Committee, and ConsensusDOCS, respectively) is known as Substantial Completion. Although the precise definition of Substantial Completion in each of these three Owner-Contractor agreements varies, the language found in the American Institute of Architects’ AIA A201-2007 document is representative:

Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use (2007).

When the contractor achieves Substantial Completion, it is the beginning of the end of the project; all significant work activities are complete, with only superficial deficiencies remaining. These deficiencies, commonly termed the “punch list” might

include “touch-up painting, installation of minor finish items that were missing from an original order, or repair of work damaged accidentally” (Carson, Potter, Sanders, & Stauffer, 2009). At this point, the owner can begin moving its furniture and equipment into the facility, and can commence its operations, pending governmental approval for occupancy.

Although the amount of work left to perform after Substantial Completion is a small portion of the overall contract work (usually less than 1% of the contract value), completing the punch list often takes a disproportionately long period of time. Getting from Substantial Completion to Final Completion should be a readily achievable process. However, in many commercial and industrial construction projects, Final Completion is not achieved by the scheduled date (Carson et al., 2009), resulting in negative consequences for all involved parties.

Many attempts have been made over the years to address this problem. Among the most prominent strategies for on-time completion in use today are: (a) owner’s retainage, in which some percentage of payment due to the contractor for work completed is withheld by the owner to guarantee sufficient funds are available to hire a third party to complete the work, should the contractor fail to do so, as well as to provide an incentive to the contractor to quickly complete its work, (b) liquidated damages charged to the contractor for the owner’s loss of use related to the delayed, incomplete project, and (c) financial bonuses paid to the contractor for early completion (Arditi & Chotibhongs, 2005; Crowley, Zech, Bailey, & Gujar, 2008; Neil, 1991).

Despite the use of various incentive and punitive measures, why is it still true that so many projects fail to achieve on-time final completion? Do construction project

realities – such as unforeseen field conditions and owner-directed changes – mean that on-time completion is inherently difficult to achieve? Are the various contractual measures in place to assure on-time completion of insufficient magnitude to motivate contractors? Do last-minute, owner-directed design changes interfere with contractors' ability to bring the project in on schedule? Do contractors misjudge the time owner-directed change orders will require to complete? Or, are contractors so focused on starting the next project that they lose focus on completing the current one?

This paper will examine the reasons that prevent contractors from achieving on-time 100% construction completion. The unifying theme of the research is to define the delayed project closeout problem from the perspective of the principal parties involved, and to define what measures they put in place attempting to address the issue.

Statement of the Problem

Each week during the construction process, costs are incurred by all parties involved. Therefore, it is almost always true that each party's interests are best served by achieving closeout within the contractually-defined schedule. As stated in the vast majority of construction contracts, time is of the essence (Carty, 1995); indeed, the project schedule is one of the two most important considerations for project sponsors ("owners") (Crowley et al., 2008; Maloney, 2002).

Unfortunately, construction projects which have run smoothly and on schedule throughout most of the project can suddenly become bogged down at the project closeout phase (Carson et al., 2009). To the extent that the builder is unable to achieve 100% completion in a timely manner, the owner will take occupancy of its new building while there are still a certain amount of eyesores visible, contractor equipment and materials

lying around, and construction workers intruding on the facility users. In addition to these inconveniences, the previously discussed financial hardships are inflicted upon both the owner and builder (Brammah & Ndekugri, 2009). Perhaps most importantly, poor execution by the contractor during closeout could have the effect of souring its relationship with the client, destroying goodwill built up during the balance of the construction phase (Gransberg & Ellicott, 1997).

Clearly, some undefined factors are responsible for this apparent disconnect between expected performance and what the contractor is actually able to achieve.

Significance of the Problem

The two most important considerations for sponsors of construction projects are having a high degree of confidence in both the project budget and schedule (Crowley et al., 2008; Maloney, 2002). Months – or perhaps years – are invested by owners in coordinating the development of a new facility. For an owner, a capital facilities project involves much more than the physical construction of a building; an organization has invested precious resources in developing the project concept and bringing it to fruition. Time and money are also invested in hiring consultants (most notably the architect or engineer), coordination of relocating staff, moving expenses, coordination with utility providers, marketing materials, and any number of other items. Unsuccessful prosecution of project closeout therefore increases the owner's costs.

A set of expectations is carried by the owner as it brings the contractor onto the project team; the owner has a vision of itself utilizing the facility for many years to come, and carefully selects the contractor based on its perceived ability to make that vision manifest. A contractor that achieves a high level of performance during the bulk of the

construction process can have its efforts negated by allowing a seemingly small part of the work to linger, unfinished as the owner begins to occupy the facility (Carson et al., 2009). A disconnect between the importance a contractor places upon project closeout versus the importance an owner places on it can result in a significant opportunity lost to the contractor (Bryde & Robinson, 2005).

Failure on the part of the contractor to aggressively execute the work of the contract during the project closeout phase can have more than immediate, project-specific cost implications. Repeat business is essential to the financial health of general contractors; the amount of resources expended by a contractor to win work from a new client is substantially higher when compared to the cost of having an existing client continue to bring repeat business through the door. Arditi, Polat, & Makinde (2008) found that contractors have a 28% “hit-rate” on competitively bid work, while negotiated work yielded a much healthier 65% “hit-rate”. According to the study’s authors, not only is negotiated work a more reliable procurement method, but it is also more profitable for the contractor (Arditi et al., 2008). Therefore, poorly executed project closeout on one project can lead to less negotiated contracts, which can mean less future work – and less profit – for a contractor.

Statement of the Purpose

This directed project will attempt to achieve the following:

- Review the work of previous researchers for findings relevant to this investigation
- Identify factors that prevent contractors from achieving on-time 100% completion, even when they reached substantial completion on schedule

- Define characteristics of construction contractors with satisfactory records of timely completion

Review of Literature

Search Methodology

The literature review was conducted using a substantial list of online databases available through the Purdue University Library system. Construction and engineering specific databases served as the primary source of references, while databases covering business and more general material also yielded valuable resources.

In order to locate relevant resources, search terms, date limits, and other criteria were input into electronic search forms. Search terms, used in various combinations, included: *punch-list, close-out, construction industry, substantial completion, final completion, total quality management (TQM), schedule delay, liquidated damages, beneficial occupancy, project success, client satisfaction, and client expectations*. The goal in using the preceding terms was to uncover as many works as possible dealing with the problems related to construction project closeout and the resulting impacts.

While project management is a discipline that spans many industries, there are many industry specific terms and unique situational realities in construction that made it difficult to draw upon any potential corollary knowledge in those other industries. Thus, a large potential pool of resources from which to glean additional material was made unavailable. The narrower range of articles – specifically focused on the construction industry – is therefore the basis for this study.

Significance of the Problem

Available literature reveals that numerous problems are caused when a contractor is unable – for whatever reason – to closeout a construction project on schedule. An entire corner of the legal system has sprung up around the prevalence of difficulties encountered at construction project closeout. Contractor/client relationships can be easily spoiled based on poor execution of the closeout phase. Great quantities of time and money are squandered – on the part of owners, architects, and contractors – due to the lack of organization around completing the final details of a project (Boyle, 1993).

Contractors may not be the only party guilty for this lack of attention paid to the closeout process, however. Molenaar and Saller (2003) argue, based on their survey findings in relation to the design/build project delivery method, it “can be seen intuitively,” that “the completion of a successful design/build project has little to do with the final stages” (111). Their survey, which measured opinions of contractors, owners, and architects, found that all three groups categorized training and education pertaining to the project closeout phase as the least urgent need for their projects (2003).

That there has been a systemic problem in the construction industry in achieving final completion in a timely manner is assured. What is less apparent is this: What patterns of behavior are responsible for the poor performance? And further, what steps can be taken, which systems implemented in order to reduce the prevalence of delays during the project closeout phase?

Review of Literature

A comprehensive search of available literature yielded mixed results in terms of a body of research from which to draw definition and direction. The concept of timely

construction completion has inspired many works from different approaches. Aspects of project closeout have been the subject of past studies in a general sense, in that various authors have tested a variety of factors that correlate to extension of construction beyond the scheduled date.

Beginning in the early 1990s, academics and practitioners realized that concepts previously begun in the manufacturing industry, such as continuous improvement and total quality management (TQM), could be adapted to the construction industry. The gradual acceptance of TQM systems by contractors, which began in the 1990s (Love, Li, Irani, & Faniran, 2000), led to more rigorous construction management practices, having the effects of utilizing resources more efficiently and creating more formal quality control apparatuses.

The works of Maloney (2002) and others (Al-Momani, 2000) point out that there is a dichotomy between construction project product and service; a construction project can be built to a very high level of quality, but the owner may still feel dissatisfied with the contractor's performance, due to a poor level of client management on the contractor's part. Owner dissatisfaction can also result from their having unreasonable or unclear expectations of the construction project (Garnant, 2005).

Still others have studied the legal significance of "substantial completion" and how that affects the owner's ability to compel the contractor to achieve final completion (Carson et al., 2009; Crowley et al., 2008). Agreed-upon liquidated damage clauses have faced many legal challenges in which the contractually defined dollar amount was found to be arbitrary and unenforceable (Crowley et al., 2008).

Only the work of Carson, Potter, Sanders, & Stauffer (2009) focused on the execution of “the last one percent” of a construction project – from substantial to final completion. This article emphasized the importance of all parties collaborating to plan for the project closeout, and how a failure to prepare early for this phase could easily doom a project to a protracted situation, unsatisfactory to all.

Summary

While many worthy studies touching upon construction project closeout issues have been published in recent years, work more keenly focused on unsatisfactory closeout management has not been produced. The preponderance of the literature suggests that there are indeed widespread instances of inadequate execution at the late stages of construction, and a host of issues have sprung up around those failures.

Legal issues and actions between contractors, architects, engineers, and owners have become increasing commonplace in mediation, arbitration, and litigation settings. Modern management practices, such as total quality management, teaming concepts, and customer service orientation have more recently emerged in the construction industry precisely because of persistent discord among project team members.

It is therefore reasonable to assume that work to further the understanding of the reasons for many individual projects’ shortcomings and what steps can be taken to lower the possibility of the shortcomings ever appearing would be of interest and use to a broad community. Contractors, designers, and owners could all reap significant, tangible benefits from an investigation into management of the construction project closeout process.

Assumptions

Contractors are typically motivated to finish projects in the shortest reasonable time in order to save overhead costs and earn their final contract payments.

This study will utilize the same definition of “substantial completion” used in the most popular forms of contract in use today – American Institute of Architects’ *AIA Contract Documents*, and the Engineers Joint Contract Documents Committee’s *Contract Documents*.

Delimitations

Neither liquidated damages (LDs), which are contract provisions that assess charges against the contractor for late completion, nor other contractual provisions, such as mediation and arbitration, will be studied. Many detailed studies of LDs and other contractual matters are available, and as discussed above, LDs are not applicable once substantial completion has been achieved.

Limitations

Construction industry professionals surveyed for this study were geographically concentrated in the Midwestern portion of the United States.

Analysis**Methodology**

Original research conducted for the directed project included an online survey for both construction management and owner/developer personnel. This survey was submitted to Purdue University’s Institutional Review Board for approval prior to distribution. Respondents were required to acknowledge their informed consent to the

research before they could participate. The survey asked participants to provide both quantitative (through the use of Likert scale and numerical input questions) and qualitative (short written answer) responses to questions about their experience with construction projects, with particular attention paid to the closeout phase (see Appendix A – Survey).

Characteristics of Respondents

Invitations were sent electronically to 61 construction industry professionals via Qualtrics survey software. A total of 35 invitees (57%) responded at least partially to the survey. Complete responses were received in June and July of 2012 from 32 construction industry professionals (52%) with direct involvement in project management. This study is based on those 32 complete responses.

Respondents were solicited from researcher’s direct professional contacts, as well as those of close colleagues. A large majority (84%) of respondents worked in the Chicago metropolitan area. As shown in Table 1, there was an even stronger prevalence of general contractors and specialty contractors (29 out of 32, or 91%).

Table 1: Respondents’ Roles in the Construction Industry

Role	Frequency	%
Owner/Owner’s Representative	2	6%
Architect/Designer	1	3%
General Contractor/CM	10	31%
Consultant	0	0%
Specialty Contractor	19	59%
Other	0	0%
Total	32	100%

As a whole, the respondents were an experienced group; eighteen of the respondents (58%) reported more than 15 years of experience in the construction

industry, and fully 94% (29 out of 31) had at least 6 years in the industry (See Table 2).

This would indicate that respondents possessed sufficient familiarity with the closeout phase of construction projects to provide valid feedback.

Table 2: Respondents' Years of Experience in the Construction Industry

#	Answer	Response	%
1	Less than 2	0	0%
2	2-5	2	6%
3	6-10	8	26%
4	11-15	3	10%
5	More than 15	18	58%
	Total	31	100%

Sectors in which respondents' firms had experience represented a broad spectrum of the construction industry. Similarly, the dollar value of typical projects handled by respondents' firms was spread across a wide range. As with the respondents' tenure in the construction industry, the array of sectors indicated in Table 3 and Table 4 suggest that the findings are representative of construction projects in general, rather than being specific to a limited number of sectors.

Table 3: Respondents' Firms' Experience in Various Sectors of the Construction Industry

#	Answer	Response	%
1	Commercial	29	91%
2	Residential	6	19%
3	Healthcare	29	91%
4	Education	27	84%
5	Heavy/Civil	2	6%
6	Transportation	4	13%
7	Government	25	78%
8	Other	0	0%

Table 4: Typical Construction Contract Size for Firms Represented by Respondents

#	Answer		Response	%
1	Less than \$500,000		4	13%
2	\$500,000-1,000,000		8	25%
3	\$1 million-5 million		7	22%
4	\$5 million-10 million		2	6%
5	\$10 million-20 million		2	6%
6	More than \$20 million		9	28%
	Total		32	100%

Findings

The premise of this research was based on the assumption that the closeout phase of construction projects is inherently difficult to execute successfully. The results in Table 5 would seem to validate the hypothesis, with 19 of the 32 respondents agreeing (or strongly agreeing) with the statement, “Compared to other phases of construction, the closeout phase is more difficult to successfully execute.” Only 8 respondents disagreed with that statement.

Table 5: Respondents' Attitudes about Closeout and Their Firms' Views

#	Question	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	Responses	Mean
1	Compared to other phases of construction, the closeout phase is more difficult to successfully execute.	0	8	5	15	4	32	3.47
2	On typical projects where the work progresses according to schedule, the closeout phase usually is executed according to schedule, as well.	1	13	2	16	0	32	3.03
3	Compared to others, my firm does a good job of managing the closeout phase of construction projects.	0	3	5	23	1	32	3.69
4	My firm places a great deal of emphasis on the closeout phase of construction projects.	0	6	4	18	4	32	3.63
5	My firm's record of closing out construction projects is a valuable sales/marketing tool.	1	9	9	9	3	31	3.13
6	My firm spends an appropriate amount of time and effort planning for project closeout in the early stages of each project.	2	12	9	8	1	32	2.81
7	To the extent that there are delays in project closeout, they are usually due to another party's actions/inactions, rather than my firm.	0	3	8	18	3	32	3.66

Table 5 also shows that 24 of 32 respondents (75%) agreed that their firm is more successful at managing the construction closeout phase than others. Twenty-one respondents (66%) felt that closeout delays were usually caused by firms other than their own. And while 69% of respondents (22 out of 32) agreed that, "My firm places a great deal of emphasis on the closeout phase of construction projects," paradoxically, only 9 respondents (28%) felt their firm spent "an appropriate amount of time and effort planning for project close-out" up-front. The research of Molenaar and Saller (2003) might help explain the latter observation; they found that owners, designers and contractors place a low emphasis on education relating to closeout.

Respondents were asked to rate a series of 17 factors that could contribute to project closeout delays, as shown in Table 6.

Table 6: Ratings of Various Factors Causing Closeout Delays

#	Question	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly Agree (5)	Mean
1	Owner-directed change orders	0	2	2	14	14	4.25
2	Contractor/subcontractor personnel transferring to new projects	0	5	3	19	5	3.75
3	Inability to provide appropriate manpower to finish punch lists	0	14	3	14	1	3.06
4	Contractor's submittal of closeout documentation (as-built drawings, warranties, O&M manuals)	0	4	8	15	5	3.66
5	Excessive/multiple punch lists	0	3	2	11	16	4.25
6	Slow payment by owner	0	5	4	13	10	3.88
7	Completing punch lists in occupied space	0	3	7	16	6	3.78
8	Late-arriving materials/equipment	1	7	10	13	1	3.19
9	LEED/Other commissioning requirements	2	3	12	12	3	3.34
10	Owner's lack of urgency	1	7	10	10	4	3.28
11	Architect/designer's lack of urgency	1	4	6	18	3	3.56
12	Contractor's lack of urgency	1	9	5	12	4	3.29
13	Owner's lack of preparedness or desire to assume operations of the facility	3	9	10	9	1	2.88
14	Contractor's lack of preparedness and planning for closeout	1	6	8	14	2	3.32
15	Unclear contractual requirements relating to closeout	1	8	11	9	3	3.16
16	No financial incentive for timely completion	1	9	7	11	4	3.25
17	No financial penalty for delayed completion	1	9	8	11	3	3.19

As the table shows, the three highest-rated factors in causing delayed closeout were “Owner-directed change orders,” “Excessive/multiple punch lists,” and “Slow

payment by owner.” While the prevalence of these three factors – which could be classified as owner-driven – is unsurprising, given the large survey participation by general and specialty contractors, it can also be observed that other “owner-driven” factors – such as “Owner’s lack of preparedness or desire to assume operations of the facility” scored much lower.

Respondents did implicate contractors on a number of the factors, however; 22 of them (69%) agreed or strongly agreed with the statement that “Completing punch lists in occupied space” was a factor in delay project closeout. It could be reasoned that if the punch lists were not completed in a timely manner, there would be a need for the contractor to complete the listed items after the owner has moved its personnel and equipment into the facility. Additionally, 24 respondents (75%) agreed that “Contractor/subcontractor personnel transferring to new projects” prior to final completion was a cause of closeout delay.

Incentives and Motivators

Measures designed to encourage on-time completion (or to discourage late completion) are sometimes included in the contract between the owner and contractor. Additionally, the contractor may implement other strategies to achieve timely final completion. Table 7 shows the respondents’ experience with just a few of these strategies.

Table 7: Respondents' Experiences with Various Strategies to Encourage Timely Closeout

#	Strategy	Responses	%
1	Retainage	28	93%
2	Early completion incentive	3	10%
3	Late completion penalty (excludes liquidated damages)	12	40%
4	A specialized project "closer"	10	33%

The practice of holding retainage – monies otherwise due to the contractor, withheld by the owner until the latter stages of a project, partially as incentive, partially as insurance for the owner to hire another contractor to finish the construction, should the current one fail to fulfill its responsibilities – enjoyed nearly universal experience at 93% (28 of 32) of respondents. Other strategies were less commonly experienced among respondents.

Table 8: Perceived Effectiveness of Various Strategies

#	Strategy	Very Ineffective(1)	Ineffective (2)	Neither Effective nor Ineffective (3)	Effective (4)	Very Effective (5)	Responses	Mean
1	Retainage	0	1	6	18	7	32	3.97
2	Incentive for early completion	0	1	8	8	10	27	4.00
3	Penalty for late completion	0	2	5	7	15	29	4.21
4	Replacement of the PM with a manager specialized in closing out projects	2	6	15	7	1	31	2.97

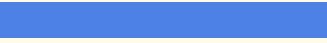

Table 8 explores respondents' perceptions of the same four strategies listed in Table 7. The first three strategies listed are all financial based and owner-driven, and were widely seen as being effective or very effective – 78%, 67%, and 86%, respectively.

The fourth strategy is one that can be implemented by any of the parties – namely, to bring in a person specializing in the closeout process as the project nears completion. Presumably, this person would have detailed familiarity with the various difficulties that often accompany the closeout phase. The large number of responses choosing, “Neither Effective nor Ineffective” (48%) suggests that this may have been a concept unfamiliar to many respondents.

Construction Scheduling

As shown in Table 9, 69% (n=22) of respondents said their firms used detailed construction activity schedules to manage project progress. This type of schedule lists each activity, duration of each activity, and the relationship between the various activities – which activity must be completed in order for the next to take place, etc.

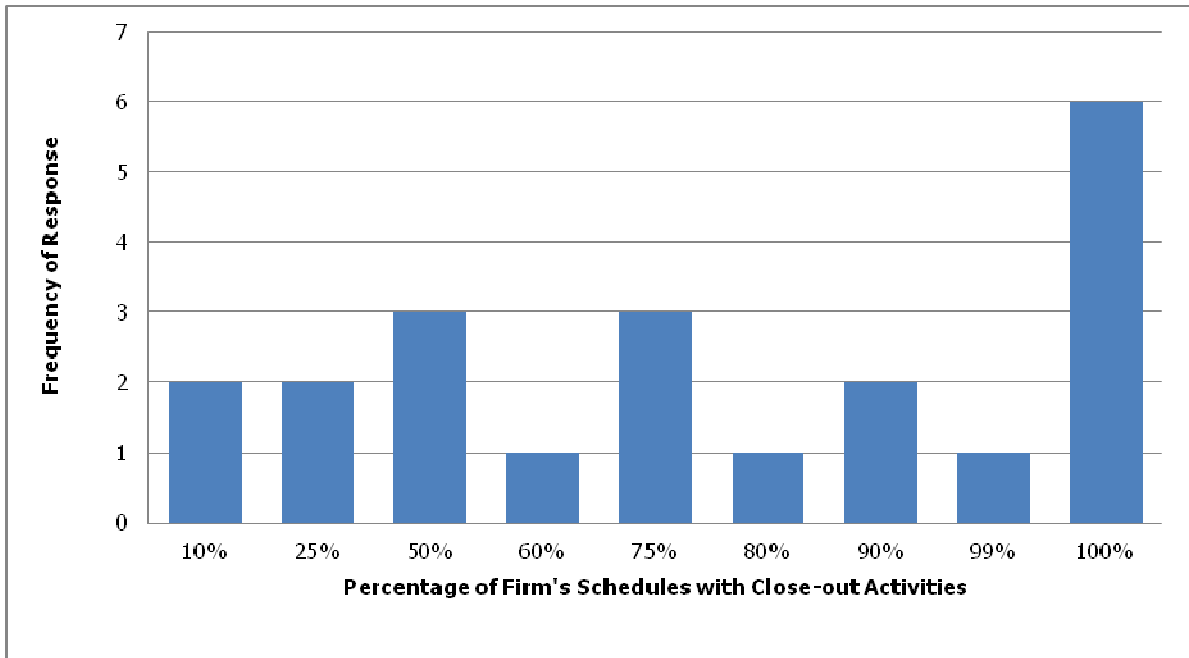
Table 9: Respondents' Firms Using Detailed Construction Activity Schedules

#	Answer		Response	%
1	Yes		22	69%
2	No		10	31%
	Total		32	100%

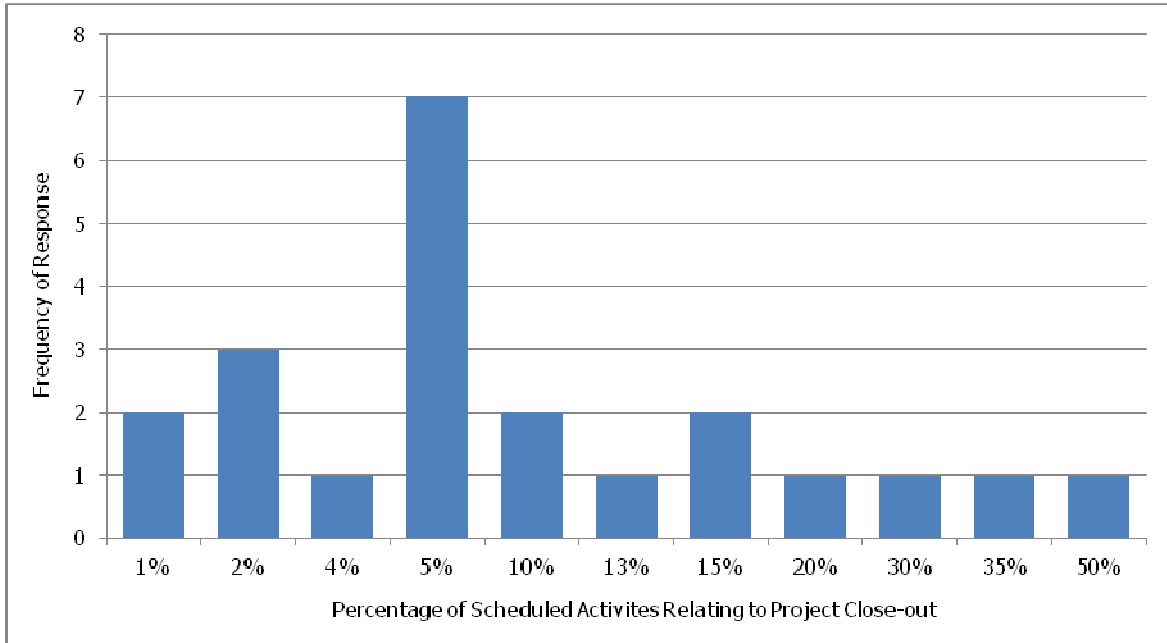
Respondents indicating that their firm used detailed project schedules were then asked what percentage of those schedules included closeout related activities. The results, shown in **Error! Reference source not found.**, show that closeout activities appear in the large majority of respondents' firms' schedules. Overall, 16 of 32 respondents said their firm used detailed project schedules, and that those schedules contained project closeout activities at least 50% of the time.

Further analysis reveals that all 10 respondents employed by general contracting or construction management firms reported that they use detailed schedules with items related to the closeout phase.

Figure 1: Of Respondents Answering ‘Yes’ in Table 9, Percentage of Their Firms’ Schedules Containing Items Relating to Closeout



Additionally, the respondents whose firms used detailed project schedules were asked to indicate the percentage of scheduled activities related specifically to project closeout. The results are shown in Error! Reference source not found.. Responses in the range of 1%-10% of scheduled activities accounted for 15 of the 21 responses (71%).

Figure 2: Percentage of Scheduled Activities Relating to Project Closeout

Note: Responses given as a range are represented by the range's mean, rounded to the nearest integer

Formal Closeout Procedures

Given that closeout can be a difficult phase of the project, respondents were asked if their firm had formal closeout procedures. Over three fifths of all respondents (61%) indicated their firm has some sort of closeout policies and/or procedures that must be followed on every job. Among those respondents identifying themselves as employees of general contracting or construction management firms, nine of them (90%) said their firm had formal closeout procedures, while only 9 of 18 (50%) of subcontractor respondents indicated the same was true of their firms.

Everyone who answered that 'Yes,' their firm had a formal closeout procedure, was asked to provide a short description of the components of the closeout program. Their responses, found in Table 10, have been assigned into one or more groups, based on the characteristics contained in each response.

Table 10: Features of Respondents' Firms' Formal Closeout Programs

Text Response	Categories*
Internal checklists are a good starting point, but we insist that all PM's familiarize themselves with their unique project and the requirements of that particular customer.	A,E
Close out check list transmitted and tracked thru multiple departments.	A,C,D
formal checklist in the PM department	A
Per our documentation, close out example is detailed.	B
There is a close out checklist and on line system for tracking.	A,C
We have a written procedure for obtaining and writing warranty letters, as well as a process for closing out jobs on our books.	B
Tracking as-builts, warranty letters, final payouts / change orders, punchlist, etc. - electronically by office staff - Project Administrators or Assistant Project Managers	D
There are standards that are outlined to be met by our Firm for all projects.	E
Closeout matrix	A
There is a close out check list followed.	A
All documentation from the duration of the job is uploaded to a central file.	C
Items are talked about in a meeting every Friday with the entire staff on what is needed to closeout the job.	C
We have a structured checklist process	A
Excel sheets every project needs to fill out and report back on	A,C

*Legend for "Categories" in Table 10

	Category	Frequency
A	Checklists	8
B	Detailed Process	2
C	Central Filing/Accountability	5
D	Tracking System	3
E	Standards	2

Checklists were the most common feature of the closeout programs, appearing in eight of the 14 responses (57%), followed by components relating to centralized recordkeeping, as a way to assure team members' accountability, at 36% of responses. The variety and frequency of the various policies and procedures suggests that the industry has some recognition of the difficulties surrounding construction project closeout.

Conclusion

As the literature review, the research data, and personal experience bear out, the closeout phase of construction projects is a complicated endeavor. This research has shown that there is consensus on the importance of some factors, while sentiment is mixed on others. Similarly, there is agreement about the scale of some closeout problems, but divergence on the magnitude of other issues.

For example, of the 32 responses used in this study, there was no clear consensus on the following statement: “On typical projects where the work progresses according to schedule, the closeout phase usually is executed according to schedule, as well.” Fourteen respondents chose “Strongly Disagree” or “Disagree,” and 16 others chose “Agree.” Of the 10 respondents who said their employer was a general contractor or construction management firm, seven of them (70%) disagreed with the statement. Among the 19 specialty contractor respondents, only five (26%) disagreed. It can be concluded that the importance and magnitude of certain issues may be influenced by the role one has within the industry. In this case, perhaps general contractors bear more of the burden when it comes to navigating closeout issues, and therefore have a more negative experience of closeout.

In other cases, when there is a clear sentiment bias on multiple issues, those biases can be contradictory. For example, a majority of respondents agreed with the following statements:

- Compared to others, my firm does a good job of managing the closeout phase of construction projects

- My firm places a great deal of emphasis on the closeout phase of construction projects.
- To the extent that there are delays in project closeout, they are usually due to another party's actions/inactions, rather than my firm.

At the same time, among respondents expressing a preference, the majority disagreed with this statement:

- My firm spends an appropriate amount of time and effort planning for project closeout in the early stages of each project.

This apparent incongruity could indicate a number of different issues in the closeout process. It could be that planning for closeout was not taking place *in the early stages*, as the statement provides, but was instead happening as closeout approached. Perhaps the respondents felt that although there was a lack of planning on their firms' part, this behavior was so common in the industry that performing above average during closeout could be accomplished without advanced planning.

Factors in Delay

Among the factors considered that might contribute to closeout delay (found in Table 6), there were a number of issues cited by the majority of respondents:

- Owner-directed change orders
- Excessive/multiple punch lists
- Slow payment by Owner
- Completing punch lists in occupied space
- Contractor/subcontractor personnel transferring to new projects

- Contractor's submittal of closeout documentation (as-built drawings, warranties, O&M manuals)
- Architect/designer's lack of urgency

Possible factors that were not supported by a majority of respondents include:

- LEED/other commissioning requirements
- Contractor's lack of preparedness and planning for closeout
- Contractor's lack of urgency
- Owner's lack of urgency
- No financial incentive for timely completion
- Late-arriving materials/equipment
- No financial penalty for delayed completion
- Unclear contractual requirements relating to closeout
- Inability to provide appropriate manpower to finish punch lists
- Owner's lack of preparedness or desire to assume operations of the facility

Strategies to Ensure Timely Completion

Of the four strategic measures to compel timely project closeout researched in this study, there was a clear trend witnessed; financial incentives for achieving completion and penalties for delays were viewed as being effective by the majority of respondents. The only strategy studied involving affirmative firms could take, rather than being imposed upon them, was to bring in a manager who specializes in achieving project closeout. The result for the "closer" strategy was inconclusive, with 15 of the 31

respondents expressing no opinion on its effectiveness, and the remaining responses split between positive and negative impressions of its usefulness.

Formal Closeout Policies and Procedures

With 61% of respondents indicating that their employer used them, formalized closeout processes and/or procedures, there was a clear preference for using a standardized way to achieve successful closeout. Based on the particular aspects of the reported measures, which can be seen in Table 10, it appears that the common theme was to provide structure for respondents to follow. The fact that most respondents' firms had strategies suggests the organizational realization that closeout is difficult to achieve, and that details can be missed if not closely tracked.

Suggestions for Further Research

As discussed above, the research undertaken for this study has shed light on some issues, but has also raised more questions for others to investigate.

Some topics that could be explored in an effort to further understand and counteract difficulties encountered during closeout are:

- What are the experiences with project closeout among larger samples of Owners and Architects?
- Are there regional differences in closeout issues around the country?
- What are respondents' attitudes toward their firms' formal closeout processes and procedures? Which are the most meaningful for the involved parties?
- If firms are not spending sufficient time planning for closeout during the early stages of projects, are they focusing more on that phase as it comes closer?

- The various groups involved in construction are not monolithic; what are the meaningful differences between these groups in terms of closeout responsibilities, challenges, etc.?
- This study did not seek to quantify the length of delays in achieving closeout; future research could explore the variance between the planned/scheduled length of closeout and actual durations.
- Is there a clear link between closing manager compensation and benefits or their loss and closeout outcomes? Does the project manager of a timely project get more benefit (or less penalty) than a project manager responsible for a tardy closeout?
- What is the actual time-value cost of retainage monies and other costs experienced by companies due to delayed project closeout? An investigation to quantify the cost-benefit of new activities or new approaches for contractors could prove valuable.

Attached, as Appendix B, is a modified version of the online survey used in this research project. Based on the feedback received from respondents, some additional questions could be added, which might aid future researchers' efforts to investigate closeout issues.

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Appendix A - Survey

Informed Consent Form

Introduction

This study attempts to collect information about the experiences of professionals involved in construction projects.

Procedures

You will be asked a series of questions about your opinions and experiences relating to the construction process. The questionnaire consists of **as many as 23** questions and will take approximately **15** minutes or less. This questionnaire will be conducted with an online Qualtrics-created survey.

Risks/Discomforts

Risks are minimal for involvement in this study. However, you may feel uncomfortable providing your opinions about various aspects of the construction process. Although we do not expect any harm to come upon any participants due to electronic malfunction of the computer, it is possible though extremely rare and uncommon.

Benefits

There are no direct benefits for participants. However, it is hoped that through your participation, researchers will learn more about causes of construction closeout delays and strategies to avoid those delays.

Confidentiality

All data obtained from participants will be kept confidential and will only be reported in an aggregate format (by reporting only combined results and never reporting individual ones). All questionnaires will be concealed, and no one other than the primary investigator and supervising professor listed below will have access to them. The data collected will be stored in the HIPPA-compliant, Qualtrics-secure database until it has been deleted by the primary investigator.

Compensation

There is no compensation for survey participants.

Participation

Participation in this research study is completely voluntary. You have the right to withdraw at anytime or refuse to participate entirely.

Questions about the Research

If you have questions regarding this study, you may contact Jared Rogers, at ___-___-____, rogers28@purdue.edu.

Questions about your Rights as Research Participants

If you have questions you do not feel comfortable asking the researcher, you may contact the supervising professor, Dr. Randy Rapp, ___-___-____, rrapp@purdue.edu. [You may also contact the Institutional Review Board \(IRB\) at Purdue University, 610 Purdue Mall, Hovde Hall Room 300, West Lafayette, IN 47907-2040. The IRB's phone number is \(765\) 494-5942. The email address is irb@purdue.edu.](#)

I have read, understood, and printed a copy of, the above consent form and desire of my own free will to participate in this study.

Yes

No

Which of the following most closely describes your current firm's role in the construction industry?

- Owner/Owner's Representative
- Architect/Designer
- General Contractor/CM
- Consultant
- Specialty Contractor
- Other

Which one of the following ranges best describes the average dollar value of construction projects your firm typically handles?

- Less than \$500,000
- \$500,000-1,000,000
- \$1 million-5 million
- \$5 million-10 million
- \$10 million-20 million
- More than \$20 million

How many years of experience do you have in the construction field?

- Less than 2
- 2-5
- 6-10
- 11-15
- More than 15

With what type of projects is your firm involved? (check all that apply)

- Commercial
- Residential
- Healthcare
- Education
- Heavy/Civil
- Transportation
- Government
- Other

For the following series of questions, the following will be the definition of “**closeout phase**”: the portion of a construction project between substantial completion (the point when the project is ready for the owner’s use) and final completion (the point when the contractual relationship between the general contractor/construction manager, the architect/designer, and the owner terminates (except for warranties, latent defects, etc.)).

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Compared to other phases of construction, the closeout phase is more difficult to successfully execute.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
On typical projects where the work progresses according to schedule, the closeout phase usually is executed according to schedule, as well.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Compared to others, my firm does a good job of managing the closeout phase of construction projects.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My firm places a great deal of emphasis on the closeout phase of construction projects.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My firm’s record of closing out construction projects is a valuable sales/marketing tool.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My firm spends an appropriate amount of time and effort planning for project closeout in the early stages of each project.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
To the extent that there are delays in project closeout, they are usually due to another party’s actions/inactions, rather than my firm.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Does your firm have a formal system for managing/implementing project closeout?

- Yes
- No

What are the general features of your firm’s formal closeout system?

Example: A closeout checklist that every Project Manager is required to complete and submit.

Does your firm manage its projects with detailed construction activity schedules?

- Yes
- No

What percentage of your company’s projects are managed with detailed schedules that include items relating to project closeout?

Please write the percentage:

On a typical project schedule, approximately what percentage of scheduled activities relate specifically to the closeout phase?

Please write the percentage:

Rate the following events or conditions that, in your experience, might contribute to delays of project closeout:

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Owner-directed change orders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Contractor/subcontractor personnel transferring to new projects	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Inability to provide appropriate manpower to finish punch lists	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Contractor's submittal of closeout documentation (as-built drawings, warranties, O&M manuals)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Excessive/multiple punch lists	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Slow payment by owner	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Completing punch lists in occupied space	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Late-arriving materials/equipment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LEED/Other commissioning requirements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Owner's lack of urgency	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Architect/designer's lack of urgency	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Contractor's lack of urgency	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Owner's lack of preparedness or desire to assume operations of the facility	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Contractor's lack of preparedness and planning for closeout	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Unclear contractual requirements relating to closeout	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
No financial incentive for timely completion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
No financial penalty for delayed completion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Which, if any, of the following measures have been used to assure timely contractor closeout on projects on which you have been involved?

- Retainage
- Early completion incentive
- Late completion penalty (excludes liquidated damages)
- A specialized project "closer"

For the following items that might be utilized to assure timely project closeout, rate your perception of the effectiveness of each:

	Very Ineffective	Ineffective	Neither Effective nor Ineffective	Effective	Very Effective
Retainage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Incentive for early completion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Penalty for late completion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Replacement of the PM with a manager specializing in closing out projects	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Appendix B – Modified Survey for Future Research

Informed Consent Form

Introduction

This study attempts to collect information about the experiences of professionals involved in construction projects.

Procedures

You will be asked a series of questions about your opinions and experiences relating to the construction process. The questionnaire consists of as many as ## questions and will take approximately 15 minutes or less. This questionnaire will be conducted with an online Qualtrics-created survey.

Risks/Discomforts

Risks are minimal for involvement in this study. However, you may feel uncomfortable providing your opinions about various aspects of the construction process. Although we do not expect any harm to come upon any participants due to electronic malfunction of the computer, it is possible though extremely rare and uncommon.

Benefits

There are no direct benefits for participants. However, it is hoped that through your participation, researchers will learn more about causes of construction closeout delays and strategies to avoid those delays.

Confidentiality

All data obtained from participants will be kept confidential and will only be reported in an aggregate format (by reporting only combined results and never reporting individual ones). All questionnaires will be concealed, and no one other than the primary investigator and supervising professor listed below will have access to them. The data collected will be stored in the HIPPA-compliant, Qualtrics-secure database until it has been deleted by the primary investigator.

Compensation

There is no compensation for survey participants.

Participation

Participation in this research study is completely voluntary. You have the right to withdraw at anytime or refuse to participate entirely.

Questions about the Research

If you have questions regarding this study, you may contact RESEARCHER, at ___-___-____, NAME@INSTITUTION.edu.

Questions about your Rights as Research Participants

If you have questions you do not feel comfortable asking the researcher, you may contact the supervising professor, Dr. NAME, ___-___-____, NAME@INSTITUTION.edu. You may also contact the Institutional Review Board (IRB) at INSTITUTION, ADDRESS, CITY, ST ZIP. The IRB's phone number is (###) ###-####. The email address is irb@INSTITUTION.edu.

I have read, understood, and printed a copy of, the above consent form and desire of my own free will to participate in this study.

Yes

No

Which of the following most closely describes your current firm's role in the construction industry?

- Owner/Owner's Representative
- Architect/Designer
- General Contractor/CM
- Consultant
- Specialty Contractor
- Other

Which one of the following ranges best describes the average dollar value of construction projects your firm typically handles?

- Less than \$500,000
- \$500,000-1,000,000
- \$1 million-5 million
- \$5 million-10 million
- \$10 million-20 million
- More than \$20 million

How many years of experience do you have in the construction field?

- Less than 2
- 2-5
- 6-10
- 11-15
- More than 15

With what type of projects is your firm involved? (check all that apply)

- Commercial
- Residential
- Healthcare
- Education
- Heavy/Civil
- Transportation
- Government
- Other

Which of the following most closely describes your geographic region?

- Northeast U.S.
- Southeast U.S.
- Midwest U.S.
- Southwest U.S.
- Northwest U.S.
- Other

For the following series of questions, the following will be the definition of “**closeout phase**”: the portion of a construction project between substantial completion (the point when the project is ready for the owner’s use) and final completion (the point when the contractual relationship between the general contractor/construction manager, the architect/designer, and the owner terminates (except for warranties, latent defects, etc.)).

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Compared to other phases of construction, the closeout phase is more difficult to successfully execute.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
On typical projects where the work progresses according to schedule, the closeout phase usually is executed according to schedule, as well.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Compared to others, my firm does a good job of managing the closeout phase of construction projects.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My firm places a great deal of emphasis on the closeout phase of construction projects.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My firm’s record of closing out construction projects is a valuable sales/marketing tool.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My firm spends an appropriate amount of time and effort planning for project closeout in the early stages of each project.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To the extent that there are delays in project closeout, they are usually due to another party’s actions/inactions, rather than my firm.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Does your firm have a formal system for managing/implementing project closeout?

Yes

No

What are the general features of your firm’s formal closeout system?

Example: A closeout checklist that every Project Manager is required to complete and submit.

What do believe are the most effective features of your firm’s closeout system?

Please write your answer:

Does your firm manage its projects with detailed construction activity schedules?

Yes

No

What percentage of your company’s projects are managed with detailed schedules that include items relating to project closeout?

Please write the percentage:

On a typical project schedule, approximately what percentage of the total scheduled activities relate specifically to the closeout phase?

Please write the percentage:

Have you worked on construction projects that failed to reach final closeout according to schedule?

Yes

No

What percentage of your projects fail to reach final closeout on schedule?

Please write the percentage:

Of your projects that have failed to reach final closeout on schedule, rate the following events or conditions that, in your experience, might contribute to delays of project closeout:

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Owner-directed change orders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Contractor/subcontractor personnel transferring to new projects	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Inability to provide appropriate manpower to finish punch lists	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Contractor's submittal of closeout documentation (as-built drawings, warranties, O&M manuals)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Excessive/multiple punch lists	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Slow payment by owner	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Completing punch lists in occupied space	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Late-arriving materials/equipment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LEED/Other commissioning requirements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Owner's lack of urgency	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Architect/designer's lack of urgency	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Contractor's lack of urgency	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Owner's lack of preparedness or desire to assume operations of the facility	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Contractor's lack of preparedness and planning for closeout	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Unclear contractual requirements relating to closeout	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
No financial incentive for timely completion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
No financial penalty for delayed completion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Which, if any, of the following measures have been used to assure timely contractor closeout on projects on which you have been involved?

- Retainage
- Early completion incentive
- Late completion penalty (excludes liquidated damages)
- A specialized project "starter"
- A specialized project "closer"

For the following items that might be utilized to assure timely project closeout, rate your perception of the effectiveness of each:

	Very Ineffective	Ineffective	Neither Effective nor Ineffective	Effective	Very Effective
Retainage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Incentive for early completion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Penalty for late completion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Use of a PM or Superintendent specializing in the initial stages of projects	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Replacement of the PM or Superintendent with a manager specializing in closing out projects	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>