The Architect's Guide to Avoiding Change Orders

A practice handbook for designing, documenting, and administering work that finishes the way it was drawn.

A counterpoint and companion to the contractor-side change-order literature.

First edition

Foreword

There is an entire shelf of books written for contractors on how to identify, price, and win change orders. There is no equivalent shelf written for architects on how to prevent them. This guide is an attempt to begin filling that gap.

The change order is one of the most consequential documents on a construction project. It moves money, redistributes risk, extends time, and — quietly — rewrites the story of who is responsible for what. For owners, change orders erode budgets and trust. For contractors, they are a legitimate mechanism for being paid when scope grows and, occasionally, a recovery tool when bids were thin. For architects, change orders are something else entirely: a measure of the completeness of the work we issued, the clarity of the language we wrote, and the quality of the construction administration we provide.

This handbook is unapologetically partisan. It is written for architects, with an architect's reading of how change orders are generated, priced, and negotiated by the other side of the table. Understanding that mechanics is the prerequisite to disarming it. The premise is simple: most change orders are preventable upstream, and the ones that are not preventable can usually be made smaller, faster, and less contentious by what an architect does before the shovel touches the ground and during the months that follow.

Nothing in this book is legal advice. Sample clauses are illustrative and should be reviewed by your counsel and adapted to your jurisdiction, project type, and contract family. Section references to AIA documents track the 2017 editions of B101 and A201, which remain the most widely used in U.S. private-sector practice as of this writing.

How to use this guide

The guide is organized around the life of a project. **Part I** sets the economic stakes. **Part II** catalogs the root causes of change orders that architects can actually control. **Part III** describes the process defenses that catch problems before they get issued. **Part IV** treats construction administration as a preventive discipline rather than a reactive one. **Part V** covers the contract language and owner alignment that make all of the above possible. **Part VI** zooms out to the firm level: standing programs that compound improvement project after project.

The appendices are the working tools: phase-gate QA/QC checklists, a drawing/spec coordination checklist, an RFI decision tree, a proposed change order (PCO) evaluation worksheet, sample supplementary clause language, eight anonymized case vignettes, a glossary, and an annotated bibliography. Most practitioners will use the body of the guide once and the appendices weekly.

Terminology note

This guide uses **change order (CO)** for an executed bilateral modification, **proposed change order (PCO)** for a contractor's request to price work not yet authorized, **construction change directive (CCD)** for a unilateral owner-directed change under AIA A201 §7.3, and **field order** or **minor change in the work** for a no-cost, no-time written instruction under §7.4. Where the law of your jurisdiction or contract family uses different terms, substitute accordingly.

Contents

Part I

The economics of the change order

1. The contractor's incentive structure

To prevent change orders you must first accept why the other side wants them.

A general contractor's revenue on a hard-bid lump-sum project is fixed at award. Profit is what remains after the work is built — and on a competitive bid, that margin starts in the low single digits. Every dollar of unanticipated cost is a dollar out of profit unless it can be recovered through a change order. This is not a moral failing of the contracting industry; it is the geometry of fixed-price construction. A well-run general contractor treats change order recovery as a core business process, with trained personnel, documentation systems, and pricing libraries built for that purpose.

Subcontractors operate under tighter margins still, with even less working capital to absorb surprises. A mechanical sub bidding a $4M project on a 6% target margin and discovering a 3% scope gap in the drawings is not going to absorb half of next quarter's profit out of professional courtesy. The change order is, for that sub, a survival instrument.

Knowing this, the architect who treats the project documents as a finished product on the day they are sealed is making the most expensive mistake in practice. The documents are not finished on issue day; they are finished when the building is built. Between those two dates lives every ambiguity, omission, conflict, and oversight, and a counterparty whose job is to find each one and convert it into revenue.

The asymmetry, plainly

The contractor has economic and operational incentives to find change orders and a trained organization to pursue them. The architect, in the standard B101 arrangement, is paid a largely fixed fee and rarely staffs construction administration as densely as the contractor staffs change order management. Whatever else is true, the home team is outnumbered. Process compensates for the imbalance.

2. What a change order really costs

On a project status report, a change order shows up as a single dollar figure: the value of the executed modification. That figure is almost never the actual cost of the change to the project.

Direct cost

The face value of the CO captures the labor, material, equipment, bond, insurance, and markups on the changed work. Markups on changes are typically higher than markups on base bid work — sometimes substantially. A 15% combined overhead and profit on subcontractor work, with another 10% on top from the general contractor, plus bond and insurance, can move a $50,000 cost of work to $70,000 or more on the CO. Where multiple subcontractors are involved, markup stacking compounds the spread between cost and price.

Indirect cost

Indirect cost is everything that does not appear on the CO but is incurred because of it. The owner pays the architect, construction manager, and commissioning agent to evaluate the change. The general contractor's project management staff burns hours estimating, negotiating, and documenting. The schedule slips, sometimes by more than the change itself would justify, because the work has to be sequenced into a plan that was made without it. Other trades wait, mobilize, or remobilize. None of that appears in the CO log.

Schedule cost

A change that adds two days of duration to a non-critical activity may have no schedule cost. A change that adds two days to a critical path activity may add two days to substantial completion, and with it two days of general conditions, two days of owner financing, and two days of operational delay. Schedule cost is the most under-counted component of total change cost because it is the hardest to model.

Relational cost

Change orders consume the goodwill of every party at the table. The owner, who expected the building they paid the design team to draw, asks why the building they are getting is different. The contractor, who expected to make money building what was drawn, becomes defensive about whether what was drawn was buildable. The architect, who issued documents in good faith, gets pulled into a forensic exercise about the standard of care. Each change order shifts the relationship by a small amount. Enough of them, and the project enters claims posture before completion — even when the dollar totals would not, on their own, justify it.

A working multiplier

There is no universal formula for total cost of a change, but a working multiplier of **1.5x to 3x the face value** is a defensible starting point for most institutional and commercial projects when indirect, schedule, and relational costs are honestly accounted for. The implication for the architect is that the value of preventing a $50,000 change order is not $50,000 — it is closer to $100,000 in real avoided cost to the project. That math is the case for every line item in this guide.

3. The architect's exposure

Owners hire architects under a standard of professional care, not a warranty of perfection. AIA B101-2017 §2.2 expresses that standard as the skill and care ordinarily provided by architects practicing in the same or similar locality under the same or similar circumstances. This is a forgiving standard in the abstract and an unforgiving one in practice, because it is operationalized through expert testimony in claims, and through a more subtle but equally powerful mechanism: owner perception.

Liability exposure

Where change orders trace to design errors or omissions, owners and their counsel will look first at the betterment doctrine. Under that doctrine, the owner is generally not entitled to recover the full cost of corrective work if the corrective work also gives them something they would have had to pay for anyway. The classic example: a beam was undersized, the steel package has to be revised, and the corrective work adds capacity. The owner pays for the capacity they would have paid for had the design been correct on the first issue; the architect's exposure is the premium attributable to the late discovery — the demolition, re-erection, schedule impact, and markup differential. Betterment is a defense, not a shield. It does not eliminate exposure; it bounds it.

Insurance carriers describe a small set of claim patterns that dominate severity: site-related differing conditions handled poorly during CA, mechanical and structural coordination failures discovered late, code interpretation disputes with the AHJ, and consultant-of-the-architect failures (especially MEP and structural) where the prime architect is the contractually visible party. The single most consistent finding across published claims studies is that **late discovery is the multiplier**. A coordination conflict caught in DD costs hours of redesign; the same conflict caught after the slab is poured costs orders of magnitude more and creates a claim. Most of this guide is a series of techniques for moving discovery earlier.

Fee exposure

The B101 basic services fee assumes a baseline volume of construction-phase activity. RFIs, submittal reviews, site visits, and CO reviews are scoped against an expected project. A project drowning in change orders pulls construction administration hours far past the scoped envelope. Additional services provisions (B101 §4.2 and §11.3) allow recovery for that work, but only when it is documented contemporaneously and tied to a cause that is not the architect's own error. Firms that do not run a disciplined additional services process find their CA budget consumed by free work in defense of their own fee.

Reputational exposure

The most underrated exposure is the next project. Owners talk. Contractors talk. A reputation for clean documents, decisive CA, and fair handling of changes is one of the most durable competitive advantages an architecture practice can have. A reputation for the opposite, fairly or unfairly earned, follows the firm into pursuits. The internal corollary is that staff learn what the firm tolerates. A practice that ships incomplete documents under deadline pressure once will ship them again.

Part II

Root causes architects control

4. Design completeness and the “90% set” trap

A set of drawings is not 90% complete because 90% of the sheets have something on them.

Completeness is the hardest property of a construction document set to assess honestly, because the question is always relative to a baseline that nobody has explicitly defined. The most common failure mode in modern practice is the 90% set that is, by any rigorous measure, closer to 70%, issued under fee and schedule pressure with the assumption that the remaining work can be done in addenda or during CA. The contractor bids what is in front of them. Anything not bid becomes a change order.

A useful operational definition of CD completeness: at the moment of issue, the set should permit a competent, mid-tier general contractor in the project's market to bid the work without making more than a small, defined number of scope assumptions, each of which is either clarified by the project manual or carried as a clearly stated bid allowance. By that definition, a great many sets called "100%" are not.

Symptoms of an incomplete set

- Tag-and-detail mismatches: tags on plan that have no corresponding detail, details with no plan reference, or details called out at wrong scale.
- Specifications that name a product but no installation requirements, or installation requirements with no product.
- Drawings that show a condition assumed to be “similar” to another condition that is not actually similar.
- Reflected ceiling plans not reconciled with structural framing, ductwork, or sprinkler layout.
- Door, window, and finish schedules with TBD entries that have outlived their schedule.
- Sections cut through conditions that the plans do not actually describe.

Why pressure produces this

Fee structures that lock in a percentage of construction cost early reward speed through the design phases and punish thoroughness. A team that takes the extra two weeks for a CD coordination pass spends fee that the project owner does not see. A team that does not take those two weeks ships, gets paid, and the cost surfaces later — as a change order — that the owner pays in full. The economic incentive for the firm is to ship, even though the economic outcome for the owner is worse. The corrective is a project management discipline that treats a phase-end QA gate as inviolable and a firm leadership posture that backs the team that says the set is not done.

A test of completeness

Pick five non-trivial details at random from your CD set on a Friday afternoon. For each, trace it back to its plan reference and forward to its specification section. If any of the five do not close that loop — plan calls for it, detail describes it, specification governs it — your set is not ready.

5. Drawing–specification coordination

Drawing and specification coordination failures are, by most published claims studies and most internal firm post-mortems, the single largest source of design-side change orders. The problem is structural to the documents themselves: drawings are typically produced by one set of people on one schedule, specifications by another set of people on a different schedule, and the points at which the two are reconciled are rarely formalized.

The four canonical conflict patterns

1. Drawings call for a product the specifications do not include. A finish, fixture, or assembly appears on the drawings — sometimes by a manufacturer name, sometimes by a graphic convention — that is not addressed in the project manual. The contractor either bids the cheapest interpretation, bids the most defensible interpretation and prices the delta as a change, or asks the question and forces the architect into a clarification.

2. Specifications include a product the drawings do not show. The reverse case. The specification section governs an assembly that has no location on the drawings. At minimum the contractor will RFI; at worst they will install it in a location of their choosing and the owner will live with it.

3. Drawings and specifications conflict in description. Drawings show a 2-coat finish; specifications require 3. Drawings indicate a 24-gauge metal panel; specifications call for 22-gauge. AIA A201 §1.2.1 establishes that the contract documents are complementary, but does not resolve direct conflicts in the contractor's favor unless the supplementary conditions say so. The contractor will price the lower cost interpretation and bring the higher one back as a change.

4. Specifications conflict internally. A section requires one performance threshold; a referenced standard requires another. A general requirement says one thing; a technical section says the opposite. These are the most expensive to fix because they require coordinating revisions across multiple sections.

Process defenses

The single highest-leverage discipline is a formal **drawing-to-spec cross-walk** performed at the end of every phase, in which every keynote, schedule entry, and material call-out on the drawings is matched to a governing specification section, and every specification section is matched to a location on the drawings. The cross-walk is tedious. It is also one of the few activities in design that pays back its cost by a wide margin every time. Some firms automate part of the cross-walk using BIM material schedules tied to spec section identifiers; this helps, but does not substitute for an experienced reviewer reading the project manual section by section against the set.

A second defense is **order of precedence language** in the supplementary conditions. The default rule that documents are complementary is the worst possible rule for a litigation, because it tells everyone after the fact to interpret the documents harmoniously without telling them how to do it. A clearly drafted precedence clause — for example, that specifications govern materials and quality, drawings govern location and quantity, and the more stringent requirement governs in case of conflict — does not eliminate conflicts but it reduces the cost of resolving them. See Chapter 25 and Appendix E for sample language.

6. Ambiguous and contradictory language

Ambiguity is the gift the architect gives the contractor at no charge. The interpretive rule in most U.S. construction contract law is that an ambiguity in documents drafted by one party is generally construed against the drafter — and in nearly every project the drafter is, in practice, the architect. The result is a one-way ratchet in favor of the contractor's reading of any unclear provision.

Words that cause trouble

Some categories of language are reliably hazardous. **"As required"** without specifying who requires it, what they require, or how much. **"Or equal"** without an evaluation procedure. **"Match existing"** when the existing is variable or unknown. **"Coordinate with"** another trade or document without saying who is responsible for the coordination or what "coordinate" produces. **"Owner's standard"** when the owner does not have a documented standard. **"Architect to approve"** as a substitute for actually deciding.

The remedy is not to ban these phrases, which would be impractical, but to use them only when their meaning is anchored. "Match existing" is acceptable when followed by the means of confirming the match — a mock-up, an approved sample, a documented existing condition. "Or equal" is acceptable when the substitution procedure is governed by a specific section of the project manual with criteria, submittal requirements, and a defined review period. "Architect to approve" is acceptable when the basis of approval is articulated in advance.

Numerical precision and tolerance

Numbers are clearer than words, but only when the tolerance is stated. A dimension given as 4'-0" without a tolerance is, in practice, governed by industry tolerances that the architect may not know and the owner certainly does not. Critical dimensions should be flagged as critical and toleranced. Tolerance language should appear in the relevant technical sections — not buried in the general requirements where it will not be read by the trade that needs it.

7. Constructability and means-and-methods drift

AIA B101 §3.6.1.2 and A201 §3.3.1 are clear that means, methods, techniques, sequences, and procedures of construction are the contractor's responsibility. The architect is not a constructor and is not contractually expected to design the means by which the contractor builds. That principle protects the architect and, taken too literally, also harms the project.

Constructability is not means and methods. Constructability is the property of a design that can be built efficiently with available labor, equipment, and sequencing logic in the project's market. A column placed where no crane can reach it is not buildable as drawn even if the design is technically correct. A wall assembly that depends on a sequence of trade access not consistent with normal trade sequencing will be built — but at a cost that the bidder may or may not have foreseen, and the difference comes back as a change.

Designing for the way it will actually be built

The discipline of constructability review is, at its core, the discipline of imagining the building being built. It is best performed by people who have built buildings: a senior construction administrator in the firm, an owner's representative with field experience, or — on larger or more complex projects — an independent constructability reviewer engaged for that purpose. The review asks structural questions (can the steel be erected in the sequence the design assumes), envelope questions (can the rain-screen be installed without scaffold conflicts), MEP questions (can the equipment fit through the door it will be brought through), and program questions (can the occupied building tolerate the work the renovation requires).

None of this turns the architect into a constructor. It does turn the architect into a designer who has anticipated, before issue, the questions a thoughtful builder would ask after issue. Those questions become RFIs and change orders if they are not anticipated.

8. Owner program creep and undocumented decisions

Owner-directed scope changes are, by every published study, one of the top three categories of change orders by frequency and by value. They are also the category over which the architect has the most influence and the least control. Influence, because the architect is the party at the table who sees the cost consequences of program creep before anyone else and can name them. Control, because the owner has the contractual right to add, delete, or modify scope at will under A201 §7 and B101 §4.

Program discipline begins before SD

Most program creep is the late discovery of program requirements that were never articulated. An end-user group whose needs were not surveyed at programming surfaces at DD and asks for a room that does not exist. A stakeholder whose sign-off was not formally required is reached at CDs and asks for a finish change. A capital planning department reviews the project mid-CD and decides that it should accommodate a future expansion that was not in the original brief. Each of these is, in its own narrow logic, reasonable. Their cumulative effect on the project is destructive.

The defense is a programming and stakeholder engagement process that errs on the side of over-inclusion at the front of the project, produces a written program and basis of design document that the owner formally accepts, and treats any subsequent change to that program as a documented decision with cost and schedule consequences disclosed at the time of the decision. AIA B101 §4 contemplates exactly this discipline through the additional services mechanism; firms that use it consistently train their owners to think of program changes as priced events and not free updates.

Documenting decisions

An undocumented owner decision is, in the change order forensic that follows, an unmade decision. Meeting minutes that record the decision, the decision-maker, the date, and the implication should be issued promptly, distributed to the full project team, and treated as authoritative unless corrected within a stated window. This is administrative work; it is also the documentary basis on which the architect later defends the position that a given element was designed in response to a specific owner instruction.

Single-channel rule

Every project should have one named owner representative who is authorized to direct the architect. Instructions from anyone else, however senior, are advisory until they are confirmed through that channel. Without this rule the architect ends up serving a committee whose members disagree, and every disagreement is, downstream, a change order.

9. Code, AHJ, and utility coordination

Code-driven change orders are common, expensive, and largely preventable. They arise from three predictable patterns: code analysis errors at SD that are not caught until permit, late changes in code interpretation by the authority having jurisdiction (AHJ) that should have been confirmed in writing, and utility coordination failures with the serving electrical, gas, water, sewer, and telecommunications providers.

Pre-application meetings

The single most cost-effective hour an architect spends on a complex project is the pre-application meeting with the building department and, where applicable, the fire marshal. The agenda is to confirm the code edition in force, the analysis of construction type and occupancy, the path to compliance for any non-prescriptive design (alternate means and methods, performance-based design, ICC 300 or other reference standards), and any local amendments that depart from the model code. The output is a written memorandum, ideally co-signed by the AHJ representative, that becomes part of the project record. When a subsequent plan reviewer takes a different position, that memorandum is the basis for the conversation that follows.

Utility coordination

Serving utilities have lead times, capacity studies, easement requirements, and connection fees that vary enormously by jurisdiction. A project that assumes utility capacity is available and discovers in CA that a transformer upgrade is required will absorb the upgrade cost, the schedule impact, and the design fee for the revision. A project that initiated the utility conversation at SD and confirmed capacity in writing avoids the surprise. The architect is not the utility coordinator on most projects — that role typically falls to the civil engineer or the owner — but the architect is the party whose specifications and drawings depend on the utility conditions being what was assumed.

10. Existing conditions and survey assumptions

Differing site conditions and undisclosed existing conditions in renovation work are among the most reliably contentious change order categories, because they sit at the intersection of three pieces of imperfect information: the survey, the as-built drawings, and what is actually there.

New construction

On new construction, the geotechnical and survey conditions are the foundation, literally and contractually, of the design. A geotechnical report that under-investigated subsurface conditions, a survey that did not pick up a buried utility, or a topographic survey that did not extend to the actual limits of work each create the conditions for a Type I or Type II differing site condition claim under standard federal contracting language and similar provisions adopted in private contracts. The architect's defense is to specify investigation scope adequate to the project complexity, to require the geotechnical report be incorporated into the contract documents by reference rather than "for information only," and to coordinate the structural and civil design with the actual findings.

Renovation and adaptive reuse

On renovation the situation is harder. As-built drawings, where they exist, are notoriously unreliable. Concealed conditions — what is behind the plaster, above the ceiling, inside the wall — are unknowable in advance without invasive investigation, and invasive investigation is itself a scope item that owners are reluctant to fund.

The cost-effective practice is to **scope investigation to the risk**: invest in invasive investigation where the project depends on the result (the structural condition of a roof to be reused, the location of a column to be removed, the path of a riser to be relocated), and disclose explicitly in the bid documents what was investigated and what was assumed. AIA A201 §3.7.4 and §3.2 govern concealed conditions; the supplementary conditions can refine the rule, and the bid documents can shift the risk by clearly disclosing the limits of investigation. What does not work is silence — leaving the bidder to guess at the basis of design and then arguing in CA that they should have priced more contingency.

A renovation discipline that pays back

On any renovation over a modest threshold, perform a documented existing conditions survey before SD, including selective destructive investigation in areas of structural intervention, MEP riser relocation, and envelope demolition. Bind the findings into the bid set. The cost of the investigation is small relative to the cost of the change orders it prevents and the claims it pre-empts.

Part III

Process defenses

11. Phase-gate QA/QC

Quality is not added at the end. It is decided at the gates.

Every architectural firm of any size has a QA/QC program. The difference between a program that prevents change orders and a program that does not is whether the gates at the end of each design phase are real. A real gate is one that the project cannot pass without a documented review, by someone who is not the project's day-to-day designer, against a written standard, with findings tracked to resolution. A symbolic gate is a checkbox on a project management form. The latter is more common.

SD review: does the design solve the problem

The schematic design review is least about coordination and most about whether the design responds to the program, the code, the site, and the budget. The most expensive change orders trace not to detail-level failures but to scheme-level failures that are not caught until DD or later. A schematic that places the loading dock where it cannot be accessed, the egress where the code will not accept it, or the mechanical room where it cannot be served, has problems that no amount of coordination work in CD will solve cheaply. The SD review is the cheapest place to find these.

DD review: does the design coordinate

Design development is where the disciplines must come together. The DD review checks that architectural, structural, MEP, civil, landscape, and specialty consultants are designing the same building, that the BIM models reconcile, that major systems route through space that exists, and that the basis of design for each system has been documented and accepted by the owner. The deliverable from DD review should be a written list of items closed and items carried into CD, with named owners and dates.

CD review: is the set buildable and biddable

The CD review is the most rigorous of the three. It asks whether a competent bidder can take the documents, understand the scope, and price it. It checks for coordination across the set, internal consistency in the project manual, completeness against the project program, and constructability of the result. The CD review is the last opportunity, before the documents go out the door, to catch the items that — once issued — become change orders or RFIs in CA.

A CD review that finds nothing is not a successful review. It is a sign that either the reviewer is not engaged, the reviewer lacks experience, or the documents are unusually clean — and the last is the rarest. A useful diagnostic for firm leadership is to track findings-per-set over time. If the number is trending toward zero without a corresponding drop in CA RFIs and change orders, the review is not working.

Independence

The reviewer must be functionally independent of the project. A peer reviewer on the same team, who shares the project's deadline pressure and reads the same drawings every day, will miss what the team has trained themselves not to see. Firms with multiple offices can rotate reviews; firms with one office can

use a senior practitioner not currently on the project, or engage outside peer review for high-risk work. The cost of the reviewer is a fraction of the cost of one change order they catch.

12. Specifications discipline

Specifications are the documentation that nobody wants to write and everybody wants to have. They are also, by volume of words, where most of the contractual obligation of the contractor lives. A firm that treats specifications as a back-office afterthought is exposed in ways that drawings, however carefully drawn, cannot compensate for.

Format and structure

CSI MasterFormat and the SectionFormat / PageFormat conventions are the lingua franca of U.S. project manuals. Their value is that any bidder, anywhere, knows where to find what — Division 03 for concrete, Division 09 for finishes, Part 1 of every section for general administrative requirements, Part 2 for products, Part 3 for execution. Departures from the convention create transaction cost for every bidder and, on protracted negotiations, for every reviewer who has to find a clause whose location they have to guess. Adopt the convention and stay inside it.

Master specs and project specs

Most firms work from a master specification — either a commercial product (MasterSpec, SpecsIntact, BSD) or a firm-developed master maintained internally. The discipline that distinguishes well-administered specs from poorly-administered ones is rigorous editing for project applicability. A master section run unedited will contain provisions that are not relevant, products that are not specified, and references to other sections that are not in the project manual. Each of those is a question waiting to be asked in bid Q&A or RFI.

The non-negotiable editing discipline: every section issued for bid has been read by a person, not just generated by a script. Track changes from the master are reviewed. Every "see Section XXXX" reference resolves to a section that is actually present. Every product listed is one the design intends. Every option in an or-equal clause is named or governed by a substitution procedure.

Performance versus prescriptive

The classic spec writer's question is whether to write the section prescriptively (name the products, name the methods) or as a performance specification (state the required performance and let the contractor propose how to meet it). The choice is project-dependent. Prescriptive specs give the architect more control and shift more risk onto the architect for the adequacy of the named product. Performance specs give the contractor more flexibility and shift more risk onto the contractor for meeting the stated performance — but only if the performance criteria are measurable, defensible, and unambiguous. A performance spec written without measurable criteria is the worst of both worlds: the architect has no control, and the contractor has no clear obligation.

Division 01: the section nobody reads

Division 01 — General Requirements — is the most consequential and least-read division in the project manual. It governs submittals, substitutions, allowances, alternates, schedule, payment procedures, change order procedures, and closeout. A firm-master Division 01, kept current by a

designated specifications lead and adapted carefully to each project, is one of the highest-leverage investments in CO prevention an architectural practice can make.

13. BIM coordination and clash detection

BIM is not a CO prevention tool by itself. A BIM model coordinated by a team that does not believe in coordination is no better than a 2D set produced by the same team. BIM is, however, the most powerful coordination tool available to design teams, and the published research on its effect on RFI counts and change orders is consistent: where BIM is used with discipline, both are reduced significantly.

Clash detection that matters

Automated clash detection in coordination software will find tens of thousands of clashes in a typical model — most of them duplicates, false positives, or trivia. The discipline that converts the raw clash report into useful information is the **clash matrix**: a defined list of which model elements should be tested against which other elements at what tolerance, by whom, on what cadence. A clash matrix that includes structural framing against mechanical ductwork, mechanical ductwork against plumbing risers, sprinkler mains against ceiling height, and equipment access against finished surfaces, with a defined acceptance threshold, produces a manageable findings list that the team can resolve.

LOD and the federation problem

Model elements are useful for coordination at a level of development that supports the question being asked. Coordinating a column against a duct at LOD 200 produces noise; coordinating them at LOD 350 produces actionable findings. The federation problem — combining models from architectural, structural, MEP, and specialty consultants into a single coordinated whole — requires a model coordination plan that states what each party will deliver, at what LOD, on what schedule, in what format. Without this, BIM coordination is a series of late-night exports that nobody trusts.

14. Constructability and independent peer review

Constructability review, distinguished from QA/QC, asks not whether the documents are coordinated but whether the building they describe can be built efficiently in its market. The reviewer is typically a CM, an experienced superintendent, or a senior CA architect — someone who has watched many buildings go up and knows what causes trouble in the field.

The most productive constructability reviews happen at the end of DD, when the design is sufficiently developed to be evaluated but still flexible enough to change. A review performed at the end of CDs may catch problems, but the cost of fixing them is much higher. A review performed during bidding is largely academic.

Independent peer review

For high-risk projects — first-of-kind designs, complex programs, novel structural systems, fast-track delivery — independent peer review by an outside firm or qualified individual is a defensible investment. The peer reviewer reads the documents as a contractor's chief estimator would, looks for the buried risk and the unstated assumption, and reports findings to the architect and, where appropriate, the owner. Peer review fees are small compared to the change order exposure they reduce, and several professional liability carriers offer premium credit for documented peer review programs.

15. Bid-phase defenses

The bid phase is the architect's last opportunity to fix the documents before they are priced. It is also, paradoxically, the phase in which the architect has the least time and the highest pressure. A disciplined bid-phase program treats the bidder Q&A as a diagnostic tool, the addenda process as the formal mechanism for correcting the set, and the apparent low bid as a moment for verification rather than celebration.

Bidder Q&A as diagnostic

The bidder's questions during the bid period are a free, unsolicited QA review of the documents by people who have an economic incentive to find every ambiguity. A spike in questions on a particular system or detail is a signal. A question that proposes an interpretation contrary to the design intent is a signal. The architect who treats Q&A as a nuisance and answers narrowly misses the diagnostic value; the architect who treats Q&A as feedback uses it to issue clarifying addenda that close the door on disputes that would otherwise surface in CA.

Addenda discipline

Addenda are contract documents. They have the same force as the original drawings and specifications, and they are read with the same attention. Three rules: number them sequentially, distribute them through a single controlled channel to every bidder of record with confirmation of receipt, and incorporate them into the final contract documents by reference. Addenda issued late in the bid period without adequate review create as many problems as they solve.

Bid review

An apparent low bid that is significantly below the next bidder, or significantly below the architect's estimate, is a warning sign. It may mean the low bidder has a competitive advantage that the others lack — but it more often means the low bidder has missed scope, misunderstood scope, or is bidding to acquire the project with the expectation of recovering through change orders. A bid review meeting with the apparent low bidder, working through the scope, the schedule, the allowances, and the bidder's exception list, often reveals the issue before the contract is awarded. Once the contract is signed, the cost of the bidder's gap becomes the project's problem.

16. The pre-construction meeting as a CO firewall

The pre-construction conference is treated, on too many projects, as a procedural meeting where introductions are made and forms are exchanged. It is, properly used, the single most important administrative meeting in the project's life. It is the moment to set the operating rules for the next twelve or eighteen months of work, including the rules that govern change orders.

Topics that the architect should insist on covering and on memorializing in the meeting minutes: the RFI procedure, including format, distribution, target response times, and escalation; the submittal procedure, including the submittal schedule, the action stamps, and the consequences of late or incomplete submittals; the change order procedure, including the format for proposed change orders, the documentation required to substantiate cost and time, the schedule for review, and the treatment of work performed without authorization; the field observation cadence and the procedure for field directives; and the dispute resolution procedure, including the initial decision maker designation under A201 Article 15 and any conditions precedent to filing a claim.

A pre-construction conference that ends with the parties in agreement on these procedures is a project that has materially reduced its change order exposure before the first dollar of construction is spent. A pre-construction conference that papers over disagreement on these procedures is a project that will negotiate each one of them under pressure in the months ahead.

Part IV

Contract administration as prevention

17. RFI triage

Read the request behind the request.

The request for information is the most-handled document in construction administration and one of the most underestimated. Industry studies have placed average RFI counts on commercial projects in the range of several hundred to a few thousand per project, with response times averaging one to two weeks. Each RFI represents either a real gap in the documents, a contractor's attempt to clarify before proceeding, or — sometimes — a setup for a future change order claim. The architect's job is to distinguish among these and respond appropriately to each.

Categorizing RFIs at intake

A useful triage taxonomy:

- **Clarification** — the documents are clear if read carefully but the question reveals confusion. Respond by quoting the relevant sheet, detail, or specification section.
- **Coordination gap** — the documents have a real omission or conflict. Respond with the corrected information and document whether it requires a change order or is a no-cost clarification.
- **Substitution request** — the contractor is proposing an alternative product or method. Route through the substitution procedure in the project manual; do not approve informally in an RFI response.
- **Constructive change probe** — the question seeks an interpretation that, if given, would support a future change claim. Identify the trap and respond narrowly.
- **Design question disguised as RFI** — the contractor is asking the architect to design something that should have been priced. Distinguish carefully; do not perform additional design work without authorization.

Response discipline

Three rules that, applied consistently, eliminate most RFI-driven disputes. **One**, respond to the question asked, not the question implied. A request to clarify a detail is not a request to redesign it. **Two**, identify whether the response constitutes a change in the work. Add language such as "This response constitutes a clarification of the contract documents and does not authorize any change in cost or schedule" or, where applicable, "This response describes a change in the work; please submit a proposed change order for review." Silence on this point is read against the architect later. **Three**, track response times. Late responses to RFIs are one of the most common bases for contractor delay claims, and on most projects the delay defense is best built day by day rather than reconstructed after the fact.

Industry benchmark

Published RFI analyses suggest that a meaningful fraction of RFIs — by some studies, between a quarter and a half — could be answered by careful reading of the existing documents. The fraction that traces to genuine document deficiencies is smaller but more expensive. Tracking both rates on

every project produces a feedback loop into the firm's CD review program.

18. Submittal review without scope expansion

Submittal review under A201 §3.12 and B101 §3.6.4 is one of the most exposure-prone activities in CA, because the architect is reviewing the contractor's interpretation of the documents and any approval given is read by the contractor as confirmation that the submitted item meets the contract. AIA forms attempt to limit this reading through review stamps that state the review is for general conformance with the design concept and does not relieve the contractor of responsibility for dimensions, quantities, fabrication processes, or coordination — but in practice, an architect who stamps a submittal that does not meet the contract has a hard road defending the position later.

Reviewing what is in front of you, only

The discipline that protects the architect is to review what the submittal says, not what the contractor is presumed to have intended. A shop drawing that shows a deviation from the contract documents should be marked accordingly — "deviation noted; revise to comply" or "approved as noted; deviation accepted as a change in the work pending change order" — and never accepted with silence. A product data sheet that includes a product not specified should be returned as a substitution request, not approved as conforming.

The trap is the silent approval. An approved submittal that contains a deviation the architect did not catch becomes, in the contractor's later position, an architect-authorized change. The defense begins with disciplined review and explicit notation.

Scope of review

The architect's submittal review is not a substitute for the contractor's coordination review under A201 §3.12.6, which requires the contractor to coordinate submittals with the work and certify that coordination by signature. On projects where the contractor's coordination review is performative or absent, the architect is reading uncoordinated submittals and absorbing the consequences. The supplementary conditions can reinforce the contractor's coordination obligation and the consequences of submittals that fail it; see Chapter 25.

19. Field observation and documentation

Field observation under B101 §3.6.2 is not inspection. The architect is not required to be continuously present, not required to verify quantities, and not required to guarantee the work. The architect is required to visit the site at intervals appropriate to the stage of construction, to become generally familiar with the progress and quality of the work, and to determine in general whether the work is being performed in accordance with the contract documents. The distinction between observation and inspection is important contractually and matters in claims; in practice, it is the cadence and documentation of the visits that defends the architect.

Cadence appropriate to the stage

The schedule for site visits should match the construction schedule, not the calendar. The work to be observed is concentrated in time: the layout, the underground utilities, the first lift of structure, the first mock-up, the first lift of envelope, the first finish room, the rough-in for each major system, the cover-up of any concealed work, and the punch list. A weekly visit cadence that does not align with these events misses the observations that matter; an event-driven cadence aligned with the trade schedule does not.

Field reports that hold up

The field observation report is the primary contemporaneous record of the architect's CA work. Three properties make a report defensible: it describes what was observed, not what was inferred; it identifies non-conforming work where observed and the corrective action requested; and it is distributed promptly to the owner and the contractor on a consistent schedule. Reports that batch a week of observations into a single Friday afternoon write-up lose the date specificity that later becomes relevant. Reports that do not call out non-conforming work create an implication that the work was acceptable as observed.

Photographs are records

Date-stamped, geo-tagged photographs from every site visit are the most under-utilized documentation in construction administration. They cost nothing to take and an enormous amount to wish for in a dispute. Adopt a discipline of photographing every visit, regardless of what was observed, and storing the photographs in the project record.

20. Change order, construction change directive, and minor change

The AIA contract documents provide three mechanisms for modifying the work after contract award, each with its own procedure, signatory requirements, and risk profile.

Change order (A201 §7.2)

A bilateral modification signed by owner, contractor, and architect that states the change in the work, the adjustment in the contract sum, and the adjustment in the contract time. Used when all three parties agree on the change and its price. The slowest mechanism, because it requires negotiation; the cleanest, because the agreement is complete on execution.

Construction change directive (A201 §7.3)

A unilateral instruction signed by the owner and the architect (not the contractor) directing the contractor to proceed with a change in the work in advance of agreement on price or time. The contractor is obligated to proceed. The price is determined later by one of the methods stated in §7.3.4 — mutual acceptance of a lump sum, unit prices, cost plus a fee, or another method permitted by the contract. The CCD is the right tool when the work cannot wait for negotiation; it is the wrong tool when used to avoid the discipline of pricing the change before it is built, because the eventual price is then negotiated from a position of weakness.

Minor change in the work (A201 §7.4)

A written order from the architect, consistent with the intent of the contract documents, that does not involve adjustment in cost or time. The mechanism for documenting clarifications and small instructions that genuinely do not change the work. Used liberally, the field order keeps minor matters out of the RFI and CO logs; used carelessly, it becomes the basis for a contractor's claim that the cumulative effect of "minor" changes was material.

The architect's discipline is to pick the right tool. A directive that should have been a CO becomes a fee dispute; an RFI response that should have been a CO becomes a constructive change claim; a field order that should have been a CCD becomes a directed change without a paper trail. Each tool is appropriate to a defined circumstance; using the wrong tool is a primary source of CA-phase disputes.

21. Negotiating proposed change orders

Once a proposed change order is on the table, the architect's job is to evaluate it on three independent axes: scope, cost, and time. Mixing the three together — accepting an inflated cost because the schedule pressure is high, or accepting an extended time because the cost looks reasonable — leads to settlements that compound across the log.

Scope

Is the work in the PCO a change to the contract, or was it always required? A PCO that describes work shown on the drawings, called for in the specifications, or required by code is not a change. The architect's first move on receipt of any PCO is to read the contract documents against the claim and document the finding. PCOs that fail the scope test are returned, not negotiated.

Cost reasonableness

Where the work is a legitimate change, the architect evaluates the contractor's cost build-up against industry norms. Labor hours benchmarked against published productivity data (RSMeans, the relevant trade association manuals). Material costs benchmarked against current published prices and supplier quotes. Equipment rental rates against the Blue Book or local equivalents. Markups against the contract's specified overhead and profit percentages on changes. The most common cost issues:

- **Markup stacking** — overhead and profit applied at each tier (sub-sub, sub, GC) without the contract's specified caps.
- **Inefficient labor hours** — productivity loss claimed without a measured-mile analysis or documented impact.
- **Equipment double-counted** — equipment included in the labor crew that is also charged as a separate line item.
- **Bond and insurance applied to inappropriate base** — the contract usually specifies the base on which bond is calculated; PCOs sometimes apply it to total including markups.
- **General conditions claimed without justification** — extended general conditions are recoverable only on changes that extend the contract time and only for the costs actually incurred.

Time

A request for time extension must be supported by a schedule analysis that shows the change affecting the critical path. Common methods include the time-impact analysis (TIA), in which a fragnet of the change is inserted into a current updated CPM schedule and the impact on substantial completion is measured. A request for time that is not supported by a critical-path analysis is, in most jurisdictions, a request that can be denied. The architect's defense is to require the analysis before evaluating the time request, not to evaluate the time request on the contractor's representation alone.

Eichleay and extended general conditions

The Eichleay formula is a federal-government-derived method for calculating extended home-office

overhead on delays. It is widely cited and frequently misapplied in private contracts. Where the contract does not adopt Eichleay by reference, the contractor must prove extended home-office overhead by another method. Where the contract does adopt it, the formula's narrow conditions of applicability (true delay caused by the owner, suspension or near-suspension of the work, inability to take on replacement work) must be satisfied. Treat any Eichleay claim with the scrutiny its history of misuse warrants.

22. Schedule impact and time extensions

Schedule disputes are, in dollar terms, the largest category of construction claims. They are also the most analytically demanding, because the question — what would have happened if X had not occurred — is counterfactual and depends on the schedule that was in place when X did occur.

The contractual baseline

The first defense against unsupported delay claims is a contract that requires a baseline CPM schedule, updated monthly, with each update accepted by the owner and architect. Updates that fail to incorporate prior changes, or that re-baseline without justification, should be returned. By the time a delay claim is filed, the schedule that matters is the one in effect at the time of the alleged delay event; if that schedule does not exist, the claim is being analyzed against a reconstruction.

Concurrent delay

Concurrent delay — two or more independent causes of delay overlapping in time — is the most contested doctrine in construction scheduling. The general rule, with significant jurisdictional variation, is that where an excusable delay (one for which the contractor is entitled to additional time) is concurrent with a non-excusable delay (one caused by the contractor), the contractor is entitled to time but not to additional compensation. Evaluating concurrency requires schedule data and discipline that few projects develop after the fact. Develop it during the project.

23. Claims, dispute resolution, and escalation

AIA A201 Article 15 governs claims. The procedure: initial decision by the initial decision maker (by default, the architect; by amendment, sometimes a third party), mediation as a condition precedent to binding dispute resolution, and finally either arbitration or litigation depending on the parties' selection in §15.4.

Two practical observations about claims. First, the time limits in §15.1.3 are short — twenty-one days from the recognition of the condition giving rise to the claim, in most cases — and are routinely missed by contractors and architects alike. Missing the deadline can be fatal to the claim. Track claim deadlines with the same discipline as RFI and submittal deadlines. Second, the architect's role as initial decision maker under §15.2 is a quasi-judicial one. The decision must be in writing, must state the grounds, and must be made within thirty days. An IDM decision that is well-supported and timely is rarely overturned in mediation; one that is hasty, conclusory, or late carries no weight.

When to escalate

Most disputes can be resolved within the project team if surfaced early. The disputes that cannot — typically involving substantial money, schedule, or interpretive disagreement — escalate through the contract's dispute resolution procedure. The architect's role is to facilitate resolution where possible, render a defensible IDM decision when called upon, and step back from advocacy when the dispute moves to mediation or formal proceeding. An architect who serves as both IDM and advocate compromises the legitimacy of the IDM function. Some projects address this by amending §15.2 to designate a neutral third party as IDM.

Part V

Contract language and owner alignment

24. B101 modifications worth negotiating

AIA B101-2017 is a balanced agreement, but balance is not the same as protection. Several provisions are worth examining at every project intake and, where appropriate, modifying to match the project's risk profile.

Standard of care (§2.2)

The default standard of care language is well-established in case law and well-defended by E&O insurance. Owners sometimes propose elevating it — to highest standard, to the standard of a leading architect, to the standard appropriate to the project's complexity. Each such elevation typically renders professional liability insurance unavailable for the elevated portion, because policies cover liability arising from the failure to meet the ordinary standard of care, not a contractually elevated one. Hold the line on §2.2 as written, or accept an elevation only with the explicit understanding that the resulting exposure is uninsured.

Additional services (§4)

Article 4 distinguishes additional services from basic services and provides the contractual mechanism for the architect to be paid for work beyond the original scope. The provisions that matter most for CO exposure are §4.2.1 (additional services requiring owner authorization) and §4.2.3 (services that the architect may notify the owner of and proceed unless directed otherwise). On change-order-heavy projects, the categories of services to track include reviewing extensive change order proposals (§4.2.1.5), substantial revisions in scope (§4.2.1.1), and protracted CA beyond the originally scheduled period (§4.2.2.1). Track these contemporaneously; do not reconstruct them at the end of the project.

Limit of liability

B101 does not include a limit of liability by default. Many firms add one through §10 or a custom amendment, typically capping liability at the architect's fee, the available insurance proceeds, or a stated dollar figure. Limits of liability are heavily negotiated by sophisticated owners and routinely rejected by public owners. Where accepted, they are one of the most consequential risk management tools available to the firm. Where rejected, the firm's posture on fee, scope, and insurance should reflect the uncapped exposure.

Initial decision maker (§4.2.4 and supplementary)

By default, the architect is the IDM under A201 §15.2. For projects with significant claims exposure, consider negotiating a neutral third-party IDM. The architect's IDM role is administrative; the neutral role often produces faster, less contentious initial decisions and frees the architect from the structural conflict between advocacy and adjudication.

25. A201 supplementary conditions

A201 is the operating manual for the construction phase. Its default provisions are workable but generic. Project-specific supplementary conditions are the architect's and owner's primary lever for tuning the change order process to the project's risk profile.

Order of precedence

As discussed in Chapter 5, the default rule that documents are complementary leaves interpretive disputes to be resolved after the fact. A supplementary condition that establishes order of precedence — for example, specifications govern materials and quality, drawings govern location and quantity, addenda govern over earlier-dated documents, and the more stringent requirement governs in any direct conflict — does not eliminate disputes but materially reduces them. Sample language in Appendix E.

Change order procedure

Supplementary conditions should specify the documentation required to substantiate a PCO: itemized labor hours by trade with hourly rates, material quantities with supplier quotations, equipment hours with rental rates, subcontractor breakdowns at the same level of detail, allowable overhead and profit percentages, and a defined treatment of bond, insurance, and general conditions. Without this discipline, every PCO is a negotiation about what should have been documented; with it, the negotiation is about substance.

Schedule of values and progress payments

The schedule of values is the basis for progress payment evaluation and, indirectly, for evaluating the price of changes. A schedule of values with too few line items obscures the cost of components that are later changed; one with too many becomes administratively unmanageable. The supplementary conditions can require a schedule of values at a defined level of detail, broken down by CSI division and by major component within each division. The reward is more defensible payment evaluations and more defensible change order pricing.

Notice and waiver

The notice and waiver provisions in §15 are the most consequential procedural rules in the contract. Supplementary conditions can clarify how notice is given (which medium, to which addressees, with what content), can confirm that failure to give timely notice waives the claim, and can require contemporaneous documentation of any condition the contractor intends to claim later. Notice waiver provisions are sometimes resisted by contractors; their adoption is a meaningful CO control.

26. Owner alignment on contingency, allowances, and authority

The owner is the party with the most to gain from change order prevention and, perversely, the party most often set up to be on the losing side of the change order conversation. Owner education and alignment, performed deliberately at the front of the project, is one of the architect's highest-leverage CO prevention activities.

Construction contingency

Every project should carry a construction contingency, held by the owner, sized to the project's risk profile. Typical ranges: 5–10% for new construction with thorough documentation, 10–20% for renovation, higher for fast-track or first-of-kind work. The contingency is not a slush fund; it is an explicit acknowledgment that the project will encounter conditions the documents did not address, and that absorbing them through a contingency is faster and cleaner than relitigating each one as a claim. The architect's role is to help size the contingency at the front of the project and to help administer it during construction with discipline.

Allowances and alternates

Cash allowances under A201 §3.8 are an explicit reservation of cost for items that cannot be fully specified at bid. Used appropriately — for owner-furnished items, for finishes selected late, for site conditions where the cost is uncertain — they prevent the no-bid situation and the no-design situation that produces a change order. Used inappropriately — for items that should have been specified — they shift cost certainty from the owner to no one, because the bid is now a placeholder. Alternates similarly should be used to give the owner real choices among priced options, not to defer decisions that should have been made.

Decision authority

The single-channel rule discussed in Chapter 8 is, contractually, an owner-side commitment. The owner identifies one representative authorized to direct the architect and the contractor, identifies the dollar threshold above which the representative must obtain further approval, and identifies the substitute when the representative is unavailable. Without this, the project runs on whoever was in the room when the question was asked, and the change order log becomes the record of that disorganization.

27. Communications protocol

Most large projects produce thousands of communications across owner, architect, consultants, contractor, and subcontractors. A communications protocol that is not enforced devolves into email chains in which the actual decisions are buried among side conversations, on which no party has clean records, and from which no one can later reconstruct what was decided when.

The protocol need not be elaborate. A single project management platform of record (whichever the project selects), a defined list of formal document types (RFI, submittal, ASI, CO, PCO, field report, meeting minutes), a defined recipient list for each type, and a discipline of not transacting business through email outside the platform. Decisions made in side conversations are confirmed in writing through the platform within a stated window or they are not binding. This is administrative discipline; it is also the most reliable foundation for the contemporaneous record that any future claim will be evaluated against.

Part VI

Firm-level programs

28. Standing QA/QC and lessons learned

Project-level QA/QC is necessary but insufficient. A firm that catches the same coordination error project after project is, at the firm level, not learning. The discipline that converts project-level QA into firm-level capability is the standing QA/QC program — a written policy, a designated quality lead, a defined review at each phase gate of every project, a centralized findings log, and a feedback loop into the firm's master specifications, standard details, and training program.

Lessons learned that change behavior

Every project produces lessons. Most firms hold a lessons-learned meeting at project close, capture the findings in a document, and file it where it is not consulted again. The lessons-learned process that changes behavior closes a different loop: each finding is evaluated for applicability to the firm's standards (master specs, standard details, project management procedures), and the standards are updated. The next project does not have to relearn the lesson because the standard has already incorporated it. This is the only mechanism by which a firm's quality improves over time rather than depending entirely on the experience of individual practitioners.

29. Knowledge management

A firm's intellectual capital is its master specifications, standard details, project management templates, design standards, and the body of practitioner experience that informs them. Each of these requires active stewardship; left unmaintained, they decay and become a liability rather than an asset.

Master specifications

A firm-controlled master specification, kept current by a designated specifications lead, is one of the highest-return investments in the firm's QA/QC program. The master should reflect the firm's standard products, standard methods, and lessons learned from past projects. It should be updated on a regular schedule with input from project teams and reviewed annually. Master specifications that are not maintained will be used by project teams who do not realize they are using outdated content, with consequences that surface in CA.

Standard details

A firm-controlled standard details library serves the same function as the master spec. The details should be drawn at a level of completeness adequate for use in a CD set with minimal modification, organized in a way that practitioners can find what they need, and updated when the field reveals a flaw. The most common failure mode is the standard details library that has not been updated since a prior decade and now contains assemblies that no longer comply with current code, current energy standards, or current envelope best practices.

30. Staffing for CO prevention

Most firms staff design phases more densely than CA. The economic logic is that design hours produce visible deliverables that owners pay for, while CA hours produce records and oversight whose value is invisible until something goes wrong. The economic consequence is that CA is consistently under-staffed relative to the work required, and the cost of that under-staffing surfaces as RFI backlogs, submittal delays, slow change order reviews, and field problems that escalate.

The firms with the lowest claims rates, by carrier-reported data, are typically those that staff CA with senior practitioners at appropriate ratios to the volume of construction. CA is not the place for the most junior team members; it is the phase in which the architect's exposure is highest and the work most needs experienced judgment. Firm leadership that resources CA appropriately, charges adequately for it, and protects CA leads from being pulled onto the next project's design phase is investing directly in CO prevention.

31. E&O posture and defensible files

Every firm of any size carries professional liability insurance. The relationship between the firm and the carrier — through application, premium, deductible, defense counsel selection, and claims handling — is a strategic relationship that benefits from active management. Firms with documented QA/QC programs, peer review on appropriate projects, and clean claims histories typically pay less and have more cooperative claims experiences. Firms without these are paying more for less.

Defensible files

Every project should be administered in such a way that, if a claim were filed at any point in the next decade, the project file would tell a coherent story of what was designed, what was issued, what was administered, and why. The components of a defensible file: the contract documents at each issue with revision history; the project manual with addenda; the consultant agreements; the meeting minutes; the RFI log with responses; the submittal log with action history; the field reports; the change order log with backup; the IDM decisions with backup; the email and platform record; and the design team's internal coordination records. None of these are remarkable individually. The discipline of maintaining all of them, contemporaneously, on every project, is what separates a firm that defends claims well from one that does not.

A note on the work this requires

Nothing in this guide is exotic. The disciplines described — phase-gate QA/QC, drawing-spec cross-walk, BIM coordination on a defined matrix, supplementary conditions tuned to the project, RFI triage, submittal review with explicit notation, field observation aligned to the trade schedule, change order evaluation against the contract, defensible files — are all within the reach of any firm willing to commit to them. They are not, however, free. Each is a cost. The case made throughout this guide is that the cost of doing them is small relative to the cost of not doing them. That case is supported, in the literature and in the experience of every firm that has tried both, by a wide margin.

The architect who reads this guide, accepts the case, and applies its disciplines will not eliminate change orders. The owner program will still change. The site will still differ from the survey. The contractor will still find the gap. The change orders that remain, however, will be smaller, faster, and less contentious. The relationship with the owner will be better. The exposure of the firm will be lower. And the next project will start from a more disciplined baseline than the one before.

Appendices

Working tools for everyday practice

Appendix A. Phase-gate QA/QC checklists

These checklists are starting points, not finished products. Adapt to the firm's standards, the project's complexity, and the contract's deliverable schedule. Every item left on a checklist that was not addressed should be documented as a deliberate decision, not an oversight.

A.1 Schematic design review

- ☐ Program — every space in the approved program is represented at the correct quantity and approximate area.
- ☐ Code analysis — construction type, occupancy classification, allowable area and height, egress count and width, fire separations, and accessibility are documented and consistent with the design.
- ☐ Site — building footprint fits within setbacks, height limits, and easements; vehicular access, loading, and emergency access are accommodated.
- ☐ Massing and envelope — major envelope assemblies are identified at the basis-of-design level.
- ☐ Structural concept — bay sizes, column locations, and lateral system are coordinated with the architectural plan.
- ☐ MEP concept — mechanical rooms sized to the system type, riser locations identified, electrical service approach documented.
- ☐ Budget — current estimate aligned with the approved project budget; significant variances explained.
- ☐ Stakeholder sign-off — program, basis of design, and budget formally accepted by the owner before advancing to DD.

A.2 Design development review

- ☐ All disciplines coordinated — architectural, structural, MEP, civil, landscape, specialty consultants designing the same building.
- ☐ BIM models federated and clash-tested at the matrix appropriate to DD LOD.
- ☐ Major envelope assemblies developed to the level of section through each typical condition.
- ☐ Wall types, floor types, roof types, and partition types defined and consistent across the set.
- ☐ Door, window, and finish schedules drafted with the majority of entries resolved.
- ☐ Code analysis updated for any changes since SD; egress and accessibility paths reconfirmed.
- ☐ MEP load calculations available and consistent with the system design.
- ☐ Structural design at the level of preliminary member sizing for all primary framing.
- ☐ Specifications outline developed — section list with table of contents, basis-of-design products identified.

- ☐ Constructability review performed by an experienced practitioner or independent reviewer.
- ☐ Cost estimate updated; variance from SD estimate explained and reconciled with the owner.

A.3 Construction documents review

- ☐ Drawing index complete; all sheets referenced exist in the set.
- ☐ Sheet numbering consistent with firm standards; revision blocks current.
- ☐ Title blocks complete with project number, sheet title, scale, north arrow, and consultant seals where applicable.
- ☐ All notes and call-outs trace to a detail; all details trace to a plan reference; all schedules close.
- ☐ Drawing–specification cross-walk completed; every material, product, and assembly referenced on the drawings is governed by a specification section and vice versa.
- ☐ Specifications edited from the master for project applicability; all "see Section XXXX" references resolve; all options selected; all bracketed editorial notes removed.
- ☐ Division 01 reviewed by the project manager; submittal schedule, allowance schedule, alternates, and unit prices reconciled with the drawings.
- ☐ BIM clash matrix run against final coordination model; outstanding clashes documented and dispositioned.
- ☐ Constructability review at CD; findings tracked to resolution.
- ☐ Owner final review; comments incorporated or formally responded to.
- ☐ Code compliance memorandum updated and confirmed with the AHJ where pre-application discussions occurred.
- ☐ Permit-set deliverable list assembled per the AHJ's checklist.

A.4 Bid-phase review

- ☐ Bid period adequate for the project complexity (commonly 4–6 weeks for institutional work).
- ☐ Pre-bid meeting scheduled and attended by the design team.
- ☐ Bidder questions tracked in a single log; responses issued via formal addenda to all bidders of record.
- ☐ Addenda numbered sequentially; receipt confirmed by each bidder.
- ☐ Bid form clear on the basis of bid, alternates, allowances, unit prices, time, and bid security.
- ☐ Bid analysis: low bid reviewed for completeness and scope alignment before award.

A.5 Construction administration review (recurring)

- ☐ Weekly RFI status reviewed; aging beyond target response time investigated.
- ☐ Submittal log reviewed against the submittal schedule; items late from the contractor flagged.

- ☐ Field reports issued for every site visit; non-conforming work documented with corrective action.
- ☐ Change order log current; PCOs in negotiation tracked with the responsible reviewer and target close date.
- ☐ Owner pay applications evaluated against schedule of values; stored materials and retainage handled per contract.
- ☐ Schedule update reviewed monthly; critical path changes flagged; delay events documented contemporaneously.
- ☐ Photographic record maintained; project file backed up on the firm's record system.

Appendix B. Drawing–specification coordination checklist

To be performed at the end of every phase and re-checked at any major revision. The most effective method is to walk every sheet of the drawings in sequence and, for each material, product, or assembly indicated, confirm that the project manual addresses it; then walk every specification section in sequence and confirm that the location on the drawings is identifiable.

B.1 From drawings to specifications

- ☐ Every keynote on the drawings references a specification section that exists in the project manual.
- ☐ Every material designation on the drawings is addressed in a specification section.
- ☐ Every product call-out on the drawings (by manufacturer or by generic description) is governed by a specification section that names it or addresses its category.
- ☐ Every schedule entry references a specification section for the product or assembly scheduled.
- ☐ Every assembly shown in a detail is governed by a specification section that addresses the components and the installation.
- ☐ Every finish indicated on plan or in a finish schedule has a corresponding specification section.
- ☐ Every equipment item shown on plan is addressed in a specification section or, if owner-furnished, in the appropriate Division 01 section.

B.2 From specifications to drawings

- ☐ Every product specified appears somewhere on the drawings.
- ☐ Every assembly specified has a location on the drawings.
- ☐ Every reference to "as indicated" or "as shown" in the specifications has an actual indication on the drawings.
- ☐ Every option in the specifications has been selected or is properly identified as an alternate, allowance, or unit price.
- ☐ Every "see Section XXXX" reference points to a section that exists.

B.3 Internal consistency

- ☐ Performance criteria stated in a section are consistent with the performance criteria stated in any referenced standard.
- ☐ Submittal requirements in Section 01 33 00 are consistent with submittal requirements in each technical section.
- ☐ Quality assurance and quality control provisions are not duplicated inconsistently between Division 01 and technical sections.
- ☐ Numbering across sections is consistent (no two sections numbered the same; no section referenced that does not exist).

Appendix C. RFI response decision tree

For each RFI received, work through the following questions in order. The discipline is to make each step explicit, even when the answer is obvious, because the documentation of the reasoning is what defends the response later.

1. **Is the answer in the documents?** If yes, respond by citing the sheet, detail, and specification section. Do not redraw or restate; cite.
2. **Is the documents' answer ambiguous?** If yes, respond with the controlling interpretation and confirm whether the response constitutes a clarification (no change in cost or time) or a change in the work (CO required).
3. **Does the question reveal a coordination conflict?** If yes, identify which document governs (per the order of precedence in the contract), respond with the correct condition, and assess whether the corrective work constitutes a change.
4. **Is the question proposing a substitution?** If yes, return the RFI and direct the contractor to submit through the substitution procedure in Division 01.
5. **Is the question seeking the architect to perform design work?** If yes, evaluate whether the work was within the original scope. If no, respond that the requested work is outside the basic services scope and authorization is required.
6. **Does the question imply a constructive change claim?** If yes, identify the trap explicitly in the response: state the contract requirement, the work as designed, and the absence of a directive that would change either.
7. **Is the response within the target response time?** If no, document the cause of the delay (insufficient information from the contractor, awaiting consultant input, awaiting owner decision) and the date the architect was in a position to respond.
8. **Does the response require coordination with the consultants?** If yes, route promptly with a deadline and confirm receipt; the architect remains responsible for the consolidated response.
9. **Has the response been logged?** RFI number, date received, date responded, response category (clarification, coordination, substitution, change), and any associated cost or time impact.

Appendix D. Proposed change order evaluation worksheet

Used for every PCO received. The worksheet structures the analysis on the three axes — scope, cost, time — and produces a defensible written recommendation to the owner.

D.1 Identification

Project name; PCO number from the contractor; date received; description of the change; originating cause (owner-directed, design clarification, differing site condition, code interpretation, contractor-proposed substitution, other); reference documents (RFI numbers, ASIs, CCDs, field directives, prior COs).

D.2 Scope analysis

Is the work described in the PCO a change to the contract? Cite the specific contract provisions (drawing references, specification sections, A201 articles) that the analysis turns on. State the conclusion: change, partial change with stated boundary, or not a change. If not a change, document the basis and return the PCO.

D.3 Cost analysis

Component	Contractor amount	Reviewed amount	Basis / notes
Labor (by trade, hours × rate)			Compare hours to industry productivity references; verify rate against contract
Materials (qty × unit price)			Compare unit prices to current published references or supplier quotes
Equipment			Verify rental rates against Blue Book or local references; confirm not double-counted in labor crew
Subcontractor costs			Require sub breakdown at same detail as GC build-up; verify markup tiers
Sub overhead and profit			Confirm percentage matches contract-specified cap on changes
GC overhead and profit			Confirm percentage matches contract-specified cap; verify applied to correct base
Bond			Verify percentage and base per contract
Insurance			Verify percentage and base per contract
General conditions (if claimed)			Only allowable on changes that extend the contract time; verify actual costs incurred
Total			

D.4 Time analysis

Does the contractor request a time extension? If yes, the request must be supported by a time-impact analysis or equivalent showing the change's effect on the critical path of the current updated schedule. If the analysis is not provided, return the PCO and request it. If provided, evaluate: was the affected activity on the critical path; does the fragnet for the change accurately represent the work; does any portion of the delay concur with non-excusable delay caused by the contractor.

D.5 Recommendation

Written recommendation to the owner: approve at the reviewed amount, approve in part, reject, or hold pending additional information. Include the basis of the recommendation in language the owner can understand. Include the architect's evaluation of the change's effect on the project budget contingency and any subsequent work.

Appendix E. Sample supplementary clause language

These samples are illustrative. They are written to convey the substance of clauses commonly used to discipline the change order process; they are not vetted for any specific jurisdiction or project. Have counsel adapt them to your contract family, governing law, and project context before use.

E.1 Order of precedence

Sample: "In the event of any conflict among the Contract Documents, the documents shall govern in the following order of precedence: (1) Modifications executed after the date of the Agreement; (2) the Agreement; (3) Addenda issued during bidding, with later addenda governing over earlier ones; (4) Supplementary Conditions; (5) General Conditions; (6) Specifications; and (7) Drawings. As between the Specifications and the Drawings, the Specifications shall govern as to materials and quality, and the Drawings shall govern as to location and quantity. In any conflict, the more stringent requirement shall govern, except that this clause shall not be construed to require any work clearly outside the scope of the Contract."

E.2 Change order documentation

Sample: "All proposed change orders submitted by the Contractor shall be supported by itemized cost detail, including: labor hours by trade and classification with applied rates; material quantities and unit prices supported by current supplier quotations; equipment hours and applied rates; subcontractor cost breakdowns prepared at the same level of detail as the Contractor's own; documentation of overhead, profit, bond, and insurance percentages as specified in the Contract; and, where a time extension is requested, a time-impact analysis demonstrating the effect of the change on the critical path of the current updated Project schedule. Proposed change orders submitted without the required documentation shall be returned to the Contractor for completion before the Architect commences review."

E.3 Caps on overhead and profit

Sample: "Combined overhead and profit on changes in the Work shall not exceed the following: on Work performed by the Contractor's own forces, fifteen percent (15%); on Work performed by Subcontractors of any tier, ten percent (10%) for each Subcontractor performing the Work plus five percent (5%) for the Contractor; on Work performed under a Construction Change Directive priced on a cost-plus basis, the same percentages shall apply. No overhead or profit shall be added to bond or insurance, and bond and insurance shall be calculated on the cost of the Work exclusive of overhead and profit."

E.4 Notice and contemporaneous documentation

Sample: "The Contractor shall give written notice to the Architect and the Owner within seven (7) days of recognition of any condition giving rise to a claim for additional cost or time, regardless of whether the Contractor intends to file a Claim under Article 15. The notice shall identify the condition, the date and location of its occurrence or discovery, and the Contractor's preliminary estimate of cost and time impact, if any. Failure to give timely notice shall constitute a waiver of any Claim arising from the condition."

E.5 Substitution procedure

Sample: "Any request by the Contractor or any Subcontractor to substitute a product, material, or method for one specified in the Contract Documents shall be submitted as a written Substitution Request not less than thirty (30) days prior to the date the substituted item is required to be incorporated in the Work. The Substitution Request shall include: complete product data for the proposed substitute and the specified item; a statement of the differences between the two; a statement of any required changes to other Work; a statement of cost differential, if any, with the credit accruing to the Owner; and a statement of any change in time required, if any. Approval of substitutions is at the sole discretion of the Architect and the Owner. Substitution Requests submitted in any other form, including as a Request for Information or as part of a shop drawing submittal, shall not be considered."

E.6 Concealed conditions in renovation

Sample: "Where the Work involves modification of existing construction, the Contractor acknowledges that the Drawings of existing conditions are based on the most reliable information available to the Architect and Owner at the time of bidding, but that variations between the documented conditions and the conditions actually encountered are inherent in renovation Work. The Owner shall bear the cost of any concealed condition that materially differs from the documented existing conditions and that could not reasonably have been discovered by a prudent Contractor performing the investigations required by the Contract. The Contractor shall promptly notify the Architect upon discovery of any such condition and shall not perform any Work to remedy the condition until directed in writing."

E.7 Coordination of submittals

Sample: "The Contractor's review of each submittal prior to submission to the Architect shall include verification that the submittal is coordinated with the Work of all trades, with the dimensions of the Project, with the means and methods of construction, and with the Contract Documents. The Contractor shall stamp each submittal to certify that this review has been performed. Submittals received by the Architect without the Contractor's coordination stamp shall be returned without review. The Architect's review of submittals is for general conformance with the design concept and does not relieve the Contractor of responsibility for compliance with the Contract Documents, for coordination, or for the means and methods of construction."

E.8 Neutral initial decision maker

Sample: "For purposes of Article 15 of A201, the Initial Decision Maker shall be [name of neutral third party] rather than the Architect. The Initial Decision Maker shall render initial decisions on Claims in accordance with §15.2 and shall not be a party to any Project agreement. The Owner and Contractor shall each pay one-half of the Initial Decision Maker's fees and expenses. The Architect shall provide to the Initial Decision Maker, upon request, such information as the Initial Decision Maker requires to render an initial decision."

Appendix F. Case vignettes

Eight anonymized scenarios illustrating common change-order patterns and the design-side practices that would have prevented or mitigated them. Names, locations, and project details have been changed; the underlying mechanics are drawn from common patterns reported in the professional liability and project management literature.

F.1 The 90% set that was 70%

A mid-size higher-education renovation was issued for bid on a schedule the design team had warned was tight. The CD set was issued as "100%" but with several detail packages noted as "to be issued by addendum." The low bidder bid the set as issued and carried explicit assumptions about the missing packages. Three of those assumptions were wrong. The resulting change orders, over the course of construction, totaled approximately 9% of the original contract value. **Prevention:** the CD review program should have refused to certify the set as ready for bid until the deferred packages were included; if the schedule could not accommodate, the bid should have been delayed. The cost of a four-week bid delay would have been a fraction of the cost of the change orders.

F.2 The mechanical room that was too small

A new mid-rise office building's mechanical room was sized at SD from a rule-of-thumb load calculation. By DD the mechanical engineer's actual load calculation indicated the equipment would not fit, but the architectural plan was not updated, and the conflict was carried through CD. The contractor discovered the conflict during equipment shop drawings and submitted a PCO to reconfigure the room, displace adjacent program, and add structural framing. **Prevention:** the DD coordination review should have run the architectural model against the mechanical equipment schedule with appropriate clearances; the disagreement would have been visible at DD, when changes were cheap, instead of in the field, when they were not.

F.3 The substitution that was approved by RFI

A specified curtain wall system was the basis of a careful envelope design with documented performance criteria. The contractor's curtain wall sub asked, via RFI, whether an alternative system from another manufacturer would be "acceptable." The architect's response, intended as conditional, was read as approval. The substituted system was installed; in service it failed to meet the water performance the design intended; the corrective work was extensive. **Prevention:** the substitution request should have been returned with direction to follow the substitution procedure in Division 01, which would have required complete product data, performance documentation, and a written substitution evaluation before any commitment.

F.4 The owner who kept changing their mind

A K–12 school district's elected board reviewed the project at each phase gate and, on more than one occasion, directed program changes that the architect implemented without a written change in scope. By DD the project was over budget; by CD it was substantially over budget; by bid the budget had grown by more than 20%. The architect's additional services were largely unrecovered because the changes had not been documented contemporaneously as additional services. **Prevention:** every board-directed

change should have been documented in writing with a cost and schedule impact statement and an additional services request, presented to the board at the next meeting. The architect's discomfort with confrontation cost the firm a significant fee recovery and the project a coherent program.

F.5 The differing site condition

A new building on a former industrial site encountered undocumented subsurface obstructions during excavation. The geotechnical report had noted the potential for such obstructions in a single paragraph but had not investigated specifically. The contract documents did not address the risk. The contractor filed a Type II differing site condition claim that was largely successful. **Prevention:** the geotechnical investigation should have included test pits or borings adequate to the historical risk of the site; the contract documents should have disclosed explicitly what was investigated and what was assumed; an allowance for site obstructions could have been carried in the bid.

F.6 The code interpretation that changed

A renovation of a historic building was designed under an interpretation of the existing-building code that the local AHJ had accepted in a pre-application meeting. Mid-construction, a new plan reviewer assigned to the project took a different position, requiring an alternate compliance pathway that materially increased scope. The pre-application discussion had been documented only in the architect's notes, not in a memorandum co-signed by the AHJ. **Prevention:** the pre-application discussion should have produced a written memorandum, distributed to the AHJ and acknowledged in writing, which would have been the controlling reference for the subsequent plan review.

F.7 The CCD that became a fight

A complex laboratory project encountered an unexpected condition that required immediate work. The owner directed a construction change directive for the work to proceed; the contractor was instructed to track time and materials. Six months later the contractor's submitted cost was twice the architect's estimate. The CCD's pricing terms had not been carefully specified at issue; the negotiation that followed consumed months and ultimately resolved at a number neither party found acceptable. **Prevention:** the CCD should have specified the pricing method (cost plus a defined fee, with cost components defined) before work began; daily time-and-material tickets should have been signed by the architect's representative each day; the contractor's submitted cost should have been compared against the signed tickets rather than reconstructed after the fact.

F.8 The submittal stamp that approved a deviation

A shop drawing for a structural connection was submitted with a deviation from the specified detail. The reviewing engineer stamped the submittal "reviewed" without noting the deviation, on the assumption that the deviation was trivial. It was not: the connection as built was incapable of carrying the design load, and was discovered only during commissioning. The corrective work was substantial. The engineer's defense — that the deviation was the contractor's responsibility — was weakened by the silent approval. **Prevention:** every submittal should be reviewed against the documents and any deviation explicitly noted on the stamp. The discipline of explicit notation is not bureaucratic burden; it is the documentation that protects the design professional.

Appendix G. Glossary

Terms are defined as used in this guide and in the AIA 2017 contract family. Definitions are descriptive, not contractual; the operative definition for any specific project is the one in the contract documents.

AHJ Authority Having Jurisdiction. The governmental entity responsible for enforcing the requirements of a code or standard, typically the local building department, fire marshal, or zoning authority.

ASI Architect's Supplemental Instructions. A written instruction from the architect, on AIA Form G710 or equivalent, clarifying the contract documents without changing cost or time.

Basis of design The narrative and tabular documentation of the products, systems, and performance criteria that form the design intent, typically incorporated by reference into the specifications.

Betterment A legal doctrine under which an owner's recovery for the cost of corrective work is reduced by the value of any benefit the corrective work provides that the owner would have paid for in any case.

BIM Building Information Modeling. The use of coordinated digital models as the design and coordination platform for a project.

CCD Construction Change Directive. A written order signed by owner and architect (not contractor) directing a change in the work in advance of agreement on price or time (A201 §7.3).

CD Construction Documents. The phase in which the drawings and specifications are completed to a level sufficient for bidding and construction.

CO Change Order. A bilateral written modification signed by owner, contractor, and architect adjusting the contract sum, time, or scope (A201 §7.2).

Concurrent delay Delay caused by two or more independent events occurring in the same time period, where each event would independently have delayed the work.

Constructability The property of a design that can be efficiently built with available labor, equipment, and sequencing logic in the project's market.

Contingency An owner-held reserve, typically expressed as a percentage of construction cost, intended to absorb unanticipated cost during construction.

CPM Critical Path Method. A scheduling technique that identifies the longest path of dependent activities through the project, controlling the project duration.

DBB Design-Bid-Build. The traditional project delivery model in which design is completed and competitively bid before construction begins.

DD Design Development. The phase between schematic design and construction documents in which the design is developed in detail and coordinated across disciplines.

Eichleay A formula derived from federal contracting case law for calculating extended home-office overhead on compensable delay.

E&O Errors and Omissions. Common term for professional liability insurance covering claims arising from the architect's professional services.

Fragnet A small network of activities representing a change or impact, inserted into a baseline CPM schedule to analyze the effect on the critical path.

IDM Initial Decision Maker. The party designated under A201 Article 15 to render initial decisions on claims; by default, the architect.

LOD Level of Development. A standardized framework (e.g., the BIMForum LOD Specification) for describing the geometric and informational completeness of model elements at defined milestones.

Measured mile An analytical technique for quantifying productivity loss by comparing productivity during an impacted period to productivity during a comparable unimpacted period on the same project.

PCO Proposed Change Order. A contractor's submitted request for a change to the contract, including proposed cost and time, before it is executed as a CO.

RFI Request for Information. A written request from the contractor to the architect for clarification of the contract documents.

SD Schematic Design. The earliest design phase in which the basic design approach is established and presented to the owner for approval.

TIA Time Impact Analysis. A forward-looking schedule analysis that inserts a fragnet representing a change or impact into an updated CPM schedule to determine the effect on substantial completion.

Appendix H. Annotated bibliography and further reading

This bibliography is selective rather than comprehensive, and is grouped by topic. Web addresses are included where the source is freely available; print sources are cited in standard form. Citations are current as of the date of writing; readers should confirm current editions and availability.

Contract documents and commentary

- American Institute of Architects. *AIA Document A201-2017, General Conditions of the Contract for Construction.* AIA, 2017. The primary general conditions document referenced throughout this guide.
- American Institute of Architects. *AIA Document B101-2017, Standard Form of Agreement Between Owner and Architect.* AIA, 2017. The owner-architect agreement form.
- AIA. *The Architect's Handbook of Professional Practice,* 15th ed. Wiley, 2014. The standard reference on architectural practice in the U.S. context.
- ConsensusDocs. *Standard Documents.* ConsensusDocs, current editions. An alternative family of construction contract documents, useful for comparison.
- Design-Build Institute of America (DBIA). *Design-Build Done Right Best Practices.* DBIA, current edition. Practice guidance for design-build delivery, with implications for change order risk allocation.

Specifications and coordination

- Construction Specifications Institute (CSI). *The Project Resource Manual (PRM): CSI Manual of Practice.* CSI, current edition. The standard reference on specification writing and project documentation in U.S. practice.
- CSI. *MasterFormat.* CSI, current edition. The standard classification system for construction information.
- CSI. *SectionFormat / PageFormat.* CSI, current edition. The standard format for individual specification sections.

BIM and clash detection

- BIMForum. *Level of Development (LOD) Specification.* BIMForum, current edition. The reference standard for model element completeness at defined project milestones.
- National Institute of Building Sciences (NIBS). *National BIM Standard-United States (NBIMS-US).* NIBS, current version. The U.S. national standard for BIM data exchange and process.
- Smith, D. K., and Tardif, M. *Building Information Modeling: A Strategic Implementation Guide.* Wiley, 2009. An introductory text on BIM in practice; useful for the chapter-level treatment of coordination.

Claims, change orders, and construction administration

- Civitello, A. M., Jr., and Locher, W. D. *Contractor's Guide to Change Orders,* 3rd ed. Prentice Hall, 2008. The contractor-side counterpart to this guide and the work whose perspective this volume is written against.
- Bramble, B. B., and Callahan, M. T. *Construction Delay Claims,* current edition. Wolters Kluwer. The standard treatise on schedule delay claims.
- Cushman, R. F., et al. *Construction Disputes: Representing the Contractor,* current edition. Wolters Kluwer. Legal treatise covering claims practice from the contractor's perspective; useful for architects who need to understand the litigation context.
- AGC of America. *Smart Brief* and member research on change orders and project performance, available through AGC publications and member resources, agc.org.

Professional liability and risk management

- Victor O. Schinnerer & Company / CNA. Annual Risk Management reports for design professionals. Published periodically; useful summaries of claim trends and severity drivers for AIA-insured firms. schinnerer.com.
- AXA XL (formerly XL Catlin). Design professional risk management publications and seminars. axaxl.com.
- Berkley Design Professional (DPIC). Risk management bulletins for design professionals. berkleydp.com.
- Travelers. *Risk Control for Architects and Engineers,* periodic publications. travelers.com.

Productivity and cost analysis

- Mechanical Contractors Association of America (MCAA). *Change Orders, Overtime, Productivity: The Effects of Change Orders on Productivity.* MCAA, current edition. The widely cited reference on productivity loss attributable to change orders, used in many measured-mile analyses.
- RSMeans. *Building Construction Cost Data,* annual. Gordian / RSMeans. Standard reference for unit pricing and productivity factors in change order evaluation.
- Construction Industry Institute (CII). Research publications on project performance, change management, and front-end planning. construction-institute.org.

Industry data and benchmarking

- FMI Corporation. Periodic industry reports on construction productivity, project performance, and risk. fmicorp.com.
- McGraw-Hill Construction / Dodge Data & Analytics. *SmartMarket Reports* on BIM, change management, project delivery. construction.com.
- U.S. Government Accountability Office (GAO). Project audit reports on federal construction programs, frequently illustrating root causes of cost growth on public projects. gao.gov.

Note on this volume

This guide draws on the general body of architectural practice literature, the AIA standard documents and their accompanying commentary, the CSI documentation standards, and the published research and risk management materials of the professional liability carriers serving the design industry. It cites no proprietary source verbatim. Where it differs from any contract document, the contract document governs.